BUSINESS

GUIDE TO PUBLIC-PRIVATE COLLABORATION ON CITY CLIMATE RESILIENCE PLANNING

CENTER FOR CLIMATE
AND ENERGY SOLUTIONS

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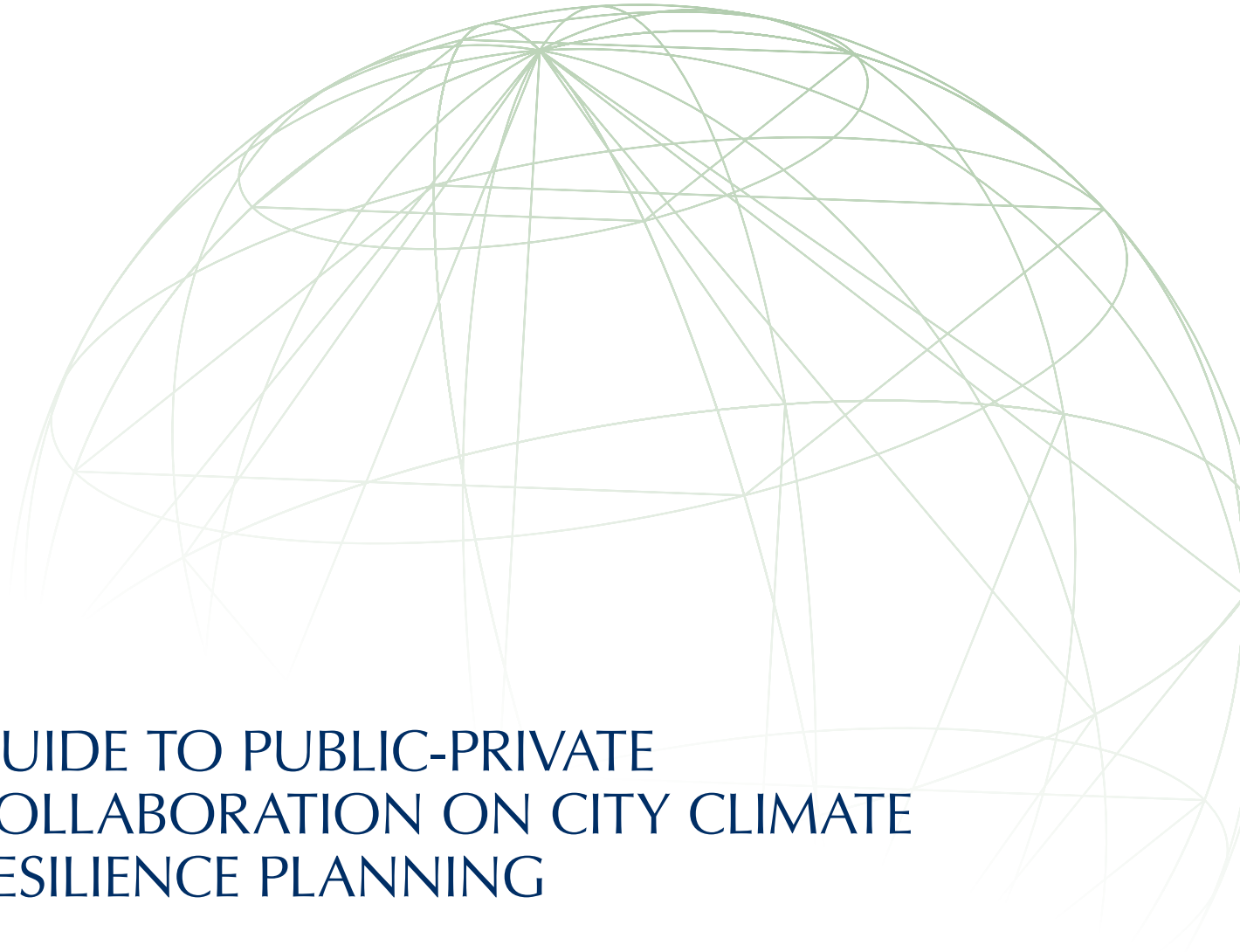
May 2017



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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. Our mission is to advance strong policy and action to reduce greenhouse gas emissions, promote clean energy, and strengthen resilience to climate impacts. Learn more at https://www.C2ES.org.

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FOREWORD

Bob Perciasepe, President, Center for Climate and Energy Solutions
Alexandra Liftman, Global Environmental Executive, Bank of America

Cities are on the front lines of fighting climate change, as they must deal with more frequent and intense storms, heat waves, droughts, and other climate change impacts. More of them are protecting their citizens and assets from these impacts by building climate resilience. We also know that a key goal of city climate resilience planning is to maintain or recover economic vitality.

Companies, too, are gaining more familiarity with assessing how climate change impacts their business and taking steps to reduce that risk. Recommendations from an industry-led task force of the Financial Stability Board released in December and to be finalized later this year provide additional guidance on how companies can disclose climate-related financial risks (and opportunities) to their investors and other stakeholders.

Despite common needs and challenges, no guidance exists for how the public and private sector can work together on these issues. Until now.

Our vision is to advance the field of city climate resilience planning to a more collaborative paradigm where local governments and businesses work together to solve the shared challenge of preparing for climate change. When city leaders and business leaders collaborate, it can lead to a virtuous circle through which initial resilience actions by cities lead to actions by businesses that lead to further action by cities. Since 2013, the Center for Climate and Energy Solutions (C2ES) and Bank of America have partnered to better understand how companies are preparing for climate change. This latest work reflects our findings that businesses need government to take action too.

This guide is an important first step that provides city leaders and planners concrete recommendations they can take to invite and promote public-private collaboration on city climate resilience planning in their communities. Cities that follow the steps in this guide can build a collaborative climate resilience planning process to ensure the city's climate resilience plan benefits from the insights of the private sector and works best for the community overall.

ACKNOWLEDGEMENTS

C2ES thanks Bank of America for its support of this work. As a fully independent organization, C2ES is solely responsible for its positions, programs, and publications. For further information, please visit https://www.c2es.org/about/c2es-funding-guiding-principles.

C2ES would also like to thank the many city and business officials who participated in our 2016 pilot workshops. Their commitment to the resilience of their communities was a continual inspiration. In particular, we would like to thank the individuals who partnered with us on behalf of their cities, and whose leadership is moving climate resilience planning forward in their communities: Leah Bamberger (Providence, Rhode Island), Dennis Murphey (Kansas City, Missouri), Jasmin Moore (Johnson County, Kansas), Tom Jacobs (Mid-America Regional Council), Kristin Riott (Bridging the Gap), Suzanne Torriente and Amy Knowles (Miami Beach, Florida), Mark Hartman and Lisa Jones (Phoenix, Arizona).

Our workshops also benefited from the expertise of individuals from IBM and AECOM who developed the Disaster Resilience Scorecard and helped facilitate our climate resilience workshops. Additionally, Peter Williams (IBM) and Jon Philipsborn (AECOM) provided helpful comments on a draft of this report.

EXECUTIVE SUMMARY

Climate change is causing increased temperatures, sea level rise, more intense extreme weather events, and other impacts across the United States. More cities are recognizing these risks and taking steps to increase their resilience to current and future impacts. At the same time, many businesses are also identifying and acting on climate risks. While guidance exists to help each of these sectors improve their climate resilience, there is no guidance on why and how they can work together to improve resilience planning. This report fills that gap.

Building on our previous research on resilience planning in large companies, C2ES worked with pilot cities across the country to understand how to best promote city-business collaboration. C2ES brought together local government and business officials in Kansas City, Mo.; Miami Beach, Fla.; Phoenix; and Providence, R.I., to assess each city's climate preparedness and prioritize resilience needs using the Disaster Resilience Scorecard, a free, public tool developed by IBM and AECOM. This report is informed primarily by the experiences of these cities, which are diverse in geography, size, climate threats, and economic make-up.

THE VALUE OF COLLABORATION

Climate resilience is enhanced when cities and businesses work together rather than alone because:

- Cities and businesses have common interests and needs in climate resilience planning. Both benefit when the community is strong, and suffer when climate change affects infrastructure, power and water supplies, and public health. Businesses need their communities to be climate resilient to maintain business continuity. Cities need their businesses to be climate resilient for the economic health of the community.
- Cities and businesses have complementary strengths to bring to climate resilience planning. Businesses own and operate much of the critical infrastructure across the country upon which cities rely. They often have different decision-making timelines, leading to different emphasis on long-term vs. short-term horizons. Businesses may have data analysis and emergency response resources that would be helpful to cities. Their different approaches and strengths make them good partners.
- Businesses are influential political constituencies in cities, and having their support for the city's climate resilience planning efforts can boost the overall political support for the process.

INSIGHTS AND ACTIONS TO PROMOTE COLLABORATION

This report recommends specific actions that city resilience planners can take to invite and promote business collaboration on city climate resilience planning. These actions build off specific insights into businesses and the way they approach collaboration with city leaders. These actions can be incorporated into every step of resilience planning and supplement any other resilience planning guide that a city may choose to use.

Table ES-1 outlines recommended actions, and Chapter III of this report provides more detail. Insights, and the recommendations for city resilience planners that flow from them, are:

Resilience planning is an extension of existing programs and partnerships. Cities don't need to reinvent the wheel when they begin resilience planning. They can take advantage of existing expertise in emergency management and sustainability offices. Likewise, cities and businesses already interact in numerous ways. These existing partnerships build a foundation for collaboration on city climate resilience planning.

Recommendations:

- Cities should include sustainability planners and emergency managers in climate resilience planning.

- Cities and businesses should use existing communication channels to collaborate on climate resilience.

Businesses respond to city leadership. Demonstrating that climate resilience is a high priority for the local government is an important motivator for businesses to get involved. While many businesses are concerned about the resilience of public infrastructure, community-wide climate resilience planning must be initiated by the government.
Recommendations:

- City leaders should engage in the process to demonstrate that resilience planning is a priority.
- To bring in business stakeholders, city officials should leverage relationships built across departments.
- City climate resilience planners should set up a process for continual collaboration to demonstrate that business involvement is valued.

Businesses respond to data. Cities can take steps to collect and communicate data to business stakeholders in ways that will promote collaboration. While most large companies recognize climate risks, a lack of data that can help them zero in on specific assets or threats can stymie resilience planning.
Recommendations:

- Cities should find partners, including in academia and state and federal agencies, to develop localized climate projections.
- Cities and businesses can work together to establish a uniform climate planning scenario so that climate resilience is better coordinated throughout the community.
- A city should explore and prioritize climate threats together with businesses, conduct a vulnerability assessment, and share the results directly with businesses.
- Communicating the impacts in a tangible way will help businesses engage on resilience planning.

'Business' is not a monolith. Each industry will have its own priorities for climate resilience planning, and small and large businesses and publicly traded and privately held companies will have different levels of participation in climate resilience planning. A local Chamber of Commerce can be a good resource for engaging small businesses.
Recommendations:

- Cities need to engage small and large businesses differently because of the different resources and risks that businesses of different sizes have. A local Chamber of Commerce can be a good resource for engaging small businesses.
- Cities should hold one-on-one meetings or small focus groups with individual sectors to ensure that diverse business views are represented.

Innovative financing can help promote collaboration. Some resilience improvements can be incorporated into existing city planning with little to no additional expenditure, but others will require new funding sources to implement. Businesses will be most interested in collaborating on climate resilience planning when they see that cities are committed to exploring innovative ways to fund the required investments.
Recommendations:

- For resilience improvements that require new funding sources, cities should commit to exploring the potential of public-private partnerships to deliver the desired solution.
- Cities should explore insurance incentives for resilience to encourage public and private action.

TABLE ES-1: Actions to Promote City-Business Collaboration on Climate Resilience Planning

RESILIENCE PLANNING IS AN EXTENSION OF EXISTING PROGRAMS AND PARTNERSHIPS	
	Include sustainability planners and emergency managers in resilience planning.
	Use existing channels of communication.
BUSINESSES RESPOND TO CITY LEADERSHIP	
	Conduct outreach from the office of the mayor or the office of the city manager.
	Develop and use personal relationships to reinforce the high-level outreach.
	Set up a process for continual business collaboration on climate resilience planning.
BUSINESSES RESPOND TO DATA	
	Find partners that are developing localized climate projections.
	Establish a uniform climate planning scenario for the community.
	Conduct a vulnerability assessment and share directly with businesses.
	Communicate climate change risks in a tangible way.
'BUSINESS' IS NOT A MONOLITH	
	Engage small businesses differently than large businesses.
	Hold one-on-one meetings or small focus groups with individual sectors.
INNOVATIVE FINANCING CAN HELP PROMOTE COLLABORATION	
	Develop public-private partnerships for resilience actions and investments.
	Explore local insurance incentives for resilience.

I. INTRODUCTION

Communities across the country are experiencing increased temperatures, sea level rise, and more intense extreme weather events, among other impacts of climate change.[1] More cities are becoming aware of these threats and are incorporating them into their planning processes. More than 1,000 U.S. mayors signed the Mayors' Climate Protection Agreement, which includes resilience in its latest update.[2] A 2014 survey of nearly 300 U.S. cities found that 40 percent were developing a climate adaptation plan.[3] This shows that climate resilience planning has become nearly as common in cities as setting greenhouse gas reduction targets (53 percent of cities in the same survey had set reduction targets).

Businesses are committing to resilience in addition to emissions reductions. In 2015, 81 companies signed The American Business Act on Climate Pledge and made voluntary commitments to reduce greenhouse gas emissions. Eight of these included resilience commitments.[4] Previous C2ES work found that more than 90 percent of large companies in the Standard & Poor's Global 100 Index identified climate change as a significant business risk and had already experienced impacts or expected to in the near term.[5] This increasing awareness has led to the development of guidance for protecting global supply chains from climate change impacts[6] and making business processes more climate-resilient.[7] Spurred by growing recognition of climate risks, a Financial Stability Board (FSB) industry-led task force is developing recommendations for climate-related financial disclosures by publicly-traded companies.[8] The task force recommendations will be voluntary, but they will encourage companies to be more consistent and transparent with their shareholders and other stakeholders about their long-term planning around climate-related risks and opportunities.

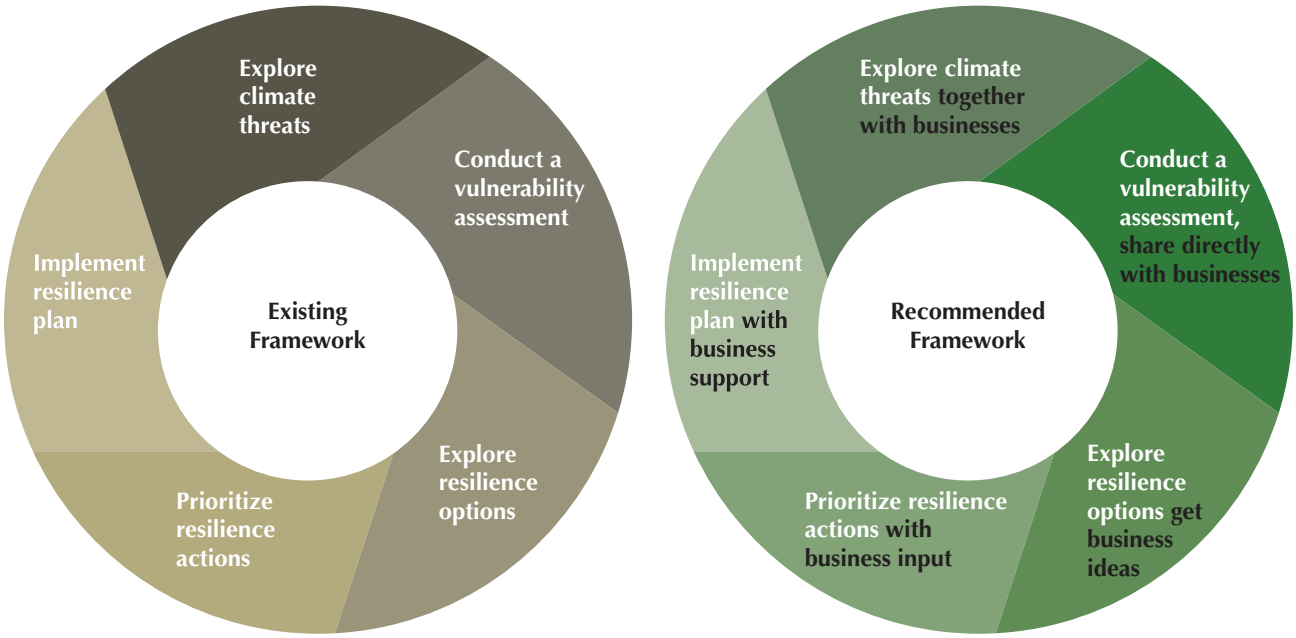
In general, climate resilience planning follows a multi-step iterative process. The U.S. Climate Resilience Toolkit includes a five-step process based on a review of different frameworks (see **Figure 1**).[9] Similar iterative processes are outlined in other guides on city resilience planning. The international association ICLEI—Local Governments for Sustainability has developed guidance, tools, and other resources for cities on resilience planning, including *Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments*.[10] Other guides focus on specific topics (e.g., coastal resilience[11]), sectors (e.g., transportation[12]), and regions (e.g., California[13]). Additionally, C2ES has developed a framework for climate resilience planning for businesses that follows a similar process.[14]

The first steps of climate resilience planning focus on using data to examine regional climate trends and projections, which are then used to assess the potential vulnerabilities and risks to areas of concern for the community (e.g., buildings, infrastructure, people, natural systems). In the next steps, cities explore possible solutions to the risks and determine which actions to prioritize. These actions can be included in a plan, which will be implemented, monitored, and modified over time. Planning for resilience often requires reviewing and updating as new information becomes available and as solutions are implemented and improved.

Existing resources all provide valuable information on the planning process and help local governments identify stakeholders to engage in resilience discussions. However, engagement with the business community is often lacking from the recommendations provided in these guides. This is a critical shortcoming.

Business activity is central to the economic health of a city, and climate change impacts pose serious risks to business activity. Every city hit by a severe storm, flooding, or wildfire understands the need for resilience and fast disaster recovery. Business interruptions affect residents' quality of life, disrupt the local economy, and reduce tax revenues. Moreover, businesses can be valuable partners in city resilience planning. Businesses own and operate much critical infrastructure across the country, and they have data sets and risk scenarios that can support city resilience planning. Large businesses see significant climate change vulnerabilities in public infrastructure,[15] so they are often eager to support city

FIGURE 1: Incorporating Business Collaboration into Climate Resilience Planning Frameworks



Source: Existing climate resilience planning framework, adapted from U.S. Climate Resilience Toolkit.

leadership because it can help to reduce their own risks.

While cities and businesses may recognize the value in working together on climate resilience, they may not know how to successfully do so. This report recommends specific actions that city resilience planners can take to invite and promote business collaboration on resilience planning within their community. As **Figure 1** shows, our recommendations can be incorporated into every step of resilience planning and supplement any other resilience planning guide that a city may use.

Our recommendations are based on years of research into climate resilience in the private sector, city sustainability, and climate policy. Over the last year, we also undertook a pilot process with four cities to explore best practices for engaging businesses on city climate resilience planning. In each city we held workshops with public and private sector representatives to examine the city's expected climate threats and discuss climate preparedness. From the diverse perspectives represented in our workshops, we have identified recommendations that can apply to any city. Details about our pilot process are provided in **Appendix A**.

The following sections of this report review common themes that emerged about the value cities and businesses saw in working together, and provide recommendations to city resilience planners for how they can invite and promote collaboration with the private sector.

II. WHY COLLABORATE? RECOGNIZING THE VALUE OF BUSINESSES AS STAKEHOLDERS IN CITY CLIMATE RESILIENCE PLANNING

The city government staff and business representatives who participated in our pilot workshops expressed three motivating factors for participation that can apply to any city.

CITIES AND BUSINESSES HAVE COMMON INTERESTS AND NEEDS

Cities and the businesses that operate in them both have a vested interest in ensuring that the community can thrive, even under changing climate conditions. Cities need to be resilient to protect their citizens. Businesses need cities to be resilient because climate impacts can damage public and private infrastructure, disrupting production and business continuity and increasing operational costs.[16] Businesses may also see competitive advantages to supporting city climate resilience (**Box 1**).

The link between climate change and the economy can be seen in the current impacts of extreme weather events. The National Oceanic and Atmospheric Administration's (NOAA) National Centers for Environmental Information tracks insured and uninsured losses from weather and climate events, and found that 15 events in 2016 caused more than $1 billion in losses each.[17] Extreme events are projected to increase in frequency and intensity over time,[18] likely leading to increases in losses as well without additional resilience measures.

For small businesses, a single extreme weather event can be especially damaging. In a study of small businesses affected by Hurricane Sandy in 2012, The Hartford found 52 percent lost sales or revenue.[19] Moreover, 25 percent of these businesses had to slow down or stop hiring due to the storm, demonstrating how negative impacts on businesses can affect the community overall.

Climate change also affects human health, which is a concern for both governments and businesses. Health impacts include increased heat mortality, extended allergy seasons, exacerbated air pollution, and an increase in the spread of vector-borne diseases like Lyme disease or West Nile virus.[20]

The Risky Business Project's 2014 report, *The Economic Risks of Climate Change in the United States*, warned that by the end of the century, productivity in sectors that rely on outdoor labor (i.e., construction, utilities, agriculture, mining) could decrease by 3 percent in warm regions like the Southeast.[21]

Economic impact estimates conducted early in the outbreak of the mosquito-borne Zika virus in 2015 and 2016 put the losses in Latin America and the Caribbean at $3.5 billion, or 0.06% of GDP in affected countries due to reduced labor productivity, increased preventative costs, and lost tourism revenue.[22] While uncertainty remains about the magnitude of the role of climate change in the Zika outbreak, and the ultimate economic toll of the virus globally, including in the United States, the example demonstrates the interest that businesses have in considering public health in climate resilience plans.

Just as cities and businesses jointly suffer the negative impacts of climate change, they may jointly benefit from the economic development opportunities that come from improving resilience. Upgrading or relocating infrastructure, implementing energy efficiency projects, building microgrids, and restoring natural ecosystems can improve resilience, create jobs, and require business solutions.

Cities and businesses also have common needs regarding resilience planning. A key need is data on climate projections and impacts. Resilience planners in the public and private sectors recognize the value to the community that comes from having common scenarios and projections used in planning. For example, if a business adds flood proofing to withstand a 500-year flood at a facility while a city designs a road to withstand a 100-year flood, then the business could still see disruptions (and the city would see tax revenue loss) in the event of a 500-year flood. Optimal investment decisions in both sectors can come when common scenarios are used.

BOX 1: Collaboration Makes Business Sense

Businesses can gain competitive advantages when they work collaboratively with cities. A 2012 report from the United Nations Global Compact examined how large corporations are partnering with communities to sustainably and resiliently manage water resources.[23] The report noted other benefits to the companies including strengthened reputation within the community. Collaboration on overall climate resilience is likely to result in similar benefits to businesses.

Engaging on climate resilience may also reveal climate-related business opportunities. In their recommendations, the FSB Task Force on Climate-related Financial Disclosures encouraged companies to describe how revenues may increase from the sale of renewable energy, electric vehicles, drought-resistant crops, water efficiency technologies, and climate- and weather-related insurance services.[24] Similarly, on a local level, businesses may see opportunities to install distributed renewable energy sources and retrofit buildings with storm-resistant materials as part of improving a city's climate resilience.

In addition to economic motivations, many large businesses have sustainability commitments, and this practice is expected to increase.[25] This trend is causing more businesses to consider the well-being of the community in which they operate, which can extend to climate resilience as well.

CITIES AND BUSINESSES HAVE COMPLEMENTARY STRENGTHS

City governments and their business communities make good partners because their resources complement each other. City planners often take a long-term view of city functions, with planning often including a 50-year horizon or more. Cities also may use their authority over regulated industries like water and electricity to advance and approve resilience planning.[26] Many businesses, on the other hand, traditionally plan for risk management by looking out five years or less.[27] Bank of England Governor Mark Carney has referred to this challenge as "the tragedy of the horizon."[28]

While local governments are responsible for long-term plans for their communities, they are often quite limited in financial and data resources, and they may not have a full understanding of how impacts to infrastructure may affect business operations, supply chains, and financial investments. Some federal and state datasets can be useful for local climate resilience planning, but the scope may be insufficient. Large businesses, though, often have entire departments devoted to assessing data that may impact their business models. Some businesses have in-house expertise on constructing and reviewing climate-related scenarios. This is particularly true in sectors with significant energy and water use (e.g., electricity, oil and gas, agriculture, and food and beverage companies).[29]

Businesses may also have personnel and equipment such as trucks or fuel that can be devoted to enhancing emergency response. Emergency response plays an important role in protecting a city from acute impacts of climate change like increased extreme precipitation events.

When cities and businesses collaborate, the community's overall climate preparedness can benefit from these complementary strengths (**Figure 2**). Having businesses at the table for climate resilience planning leads to a richer, more in-depth understanding of the community's needs and priorities. This is especially true when a broad segment of the business community is included.

Collaboration can facilitate knowledge sharing between emergency managers and long-term planners. Both local governments and large businesses have staff devoted to these issues, but they are frequently siloed. Resilience planning can initiate a dialogue between these groups, both within and between the public and private sectors. Cities can use their convening power to start this conversation.

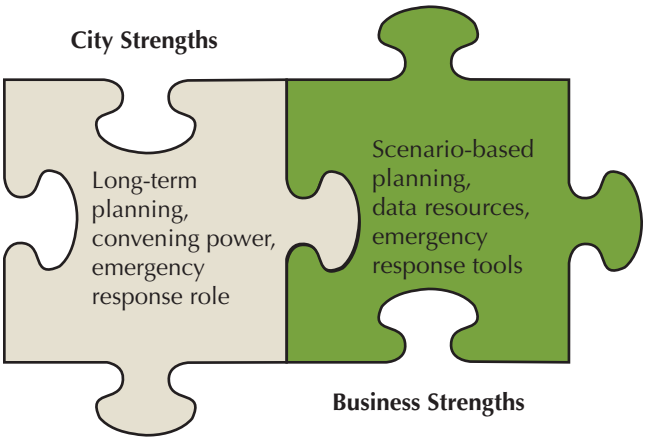
Collaboration can also create efficiencies in risk management and disaster planning. Currently, businesses concerned about threats to infrastructure outside their control may create independent business continuity or emergency preparedness plans to provide for alternative modes of transportation for employees or back-up power. With local government leadership, businesses could work together and eliminate redundant back-up plans for transportation and power.

BUSINESS COLLABORATION CAN BUILD AND HELP SUSTAIN POLITICAL MOMENTUM

Businesses can be an ally to local governments in communicating the need to better address the climate risks of today and the future; this is often an undervalued benefit. Even though the cities we worked with had overall positive relationships with businesses, they had not yet invited businesses to the resilience planning process, despite close coordination on emergency response. We encountered very few examples of businesses that did not want to be involved in city climate resilience planning, suggesting there is strong (albeit dormant) support for resilience planning in the private sector.

Expanding the stakeholders involved in resilience planning can increase political support and the willingness to devote public resources to the topic. Inviting businesses to the resilience planning process makes it more likely they will engage with, and ultimately, support city efforts. The World Business Council for Sustainable Development's Urban Infrastructure Initiative, working with 10 global cities and international businesses, found that involving businesses early when developing a city's sustainability plan led to more innovative and integrated solutions.[30] It also ensures that resilience planning benefits a broader cross-section of the community, since businesses will have unique needs in addition to the common needs they share with city governments (as identified above).

FIGURE 2: Cities and Businesses Have Complementary Strengths



Additionally, businesses have internal communications systems that can amplify a city's communication strategy on climate resilience. Businesses might share information with their employees about climate risks in the region, voluntary actions to enhance resilience, or how the company and city are working together on the issue.

III. HOW TO COLLABORATE? ACTIONS TO EFFECTIVELY INVITE AND PROMOTE COLLABORATION

The following five insights and subsequent recommendations for promoting public-private collaboration on city climate resilience planning (**Table 1**) are derived from the conversations with participants in our workshops and other research. These insights from practitioners on the ground add weight to the message that collaboration can result in stronger resilience planning than if the city goes it alone.

Climate resilience planning is an iterative process, and these recommended actions can be taken at any point in the process.

INSIGHT: RESILIENCE PLANNING IS AN EXTENSION OF EXISTING PROGRAMS AND PARTNERSHIPS

Cities and businesses alike often view climate resilience as an extension of their environmental and sustainability goals. In some cases, this can be helpful because there are some sustainability strategies, like increased energy efficiency, that also improve climate resilience. Sustainability managers may also look at longer-term planning horizons, developing action plans to be implemented over a 5- or 10-year (or longer) period. Addressing climate resilience will require both short- and long-term strategies. Some climate change impacts will pose more near-term risks (e.g., extreme events), while others will pose more gradual risks (e.g., sea level rise). Incorporating resilience into sustainability or environmental programs can help to address some types of climate impacts. When practitioners are familiar with a strategy, such as energy efficiency, they face low barriers to implementing these strategies to meet resilience goals as well. But this perspective can miss several critical components of resilience, such as hardening infrastructure and updating emergency response plans to new climate threats.

Some cities and businesses, however, include climate resilience as part of their "all hazards" approach to emergency management. This helps ensure that climate resilience is incorporated into broader planning processes. City emergency managers often have close working relationships with their private sector counterparts, particularly businesses that offer critical services and large employers in the community. This existing public-private sector collaboration can form a foundation for collaboration on resilience planning. However, the emergency management field often focuses on near-term impacts and acute events, and may be less equipped to prepare for slow-moving, chronic changes, such as sea level rise, increasing average temperatures, and changing prevalence of disease vectors.[31] Climate change is expected to create both acute and chronic impacts—existing climate threats will intensify while new threats emerge.[32]

Both cities and large businesses tend to be organized with separate departments to manage sustainability programs and emergency response. The following actions can facilitate interdisciplinary collaboration, and ensure that climate resilience planning benefits from the expertise in both fields.

Action: Include sustainability planners and emergency managers in resilience planning

There are many ways resilience planning can be organized by a city, including designating a single person in an existing department, creating a Resilience Officer, or establishing a joint task force within the local government. The choice will vary by city, and will reflect existing resources and priorities.

Regardless of organization, the planning process should be designed to include the participation of at least sustainability planners and emergency managers, since successful resilience planning requires both these skills and expertise. This is true for public and private sector participation. A company's emergency management department will have a different view than a company's sustainability department, so each should be included in climate resilience planning. Not all cities and businesses have sustainability offices, and in many cases these job functions are located in an environmental office. For simplicity, this report uses only the term

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	Conduct outreach from the office of the mayor or the office of the city manager.
	Develop and use personal relationships to reinforce the high-level outreach.
	Set up a process for continual business collaboration on climate resilience planning.
BUSINESSES RESPOND TO DATA	
	Find partners that are developing localized climate projections.
	Establish a uniform climate planning scenario for the community.
	Conduct a vulnerability assessment and share directly with businesses.
	Communicate climate change risks in a tangible way.
'BUSINESS' IS NOT A MONOLITH	
	Engage small businesses differently than large businesses.
	Hold one-on-one meetings or small focus groups with individual sectors.
INNOVATIVE FINANCING CAN HELP PROMOTE COLLABORATION	
	Develop public-private partnerships for resilience actions and investments.
	Explore local insurance incentives for resilience.

"sustainability," but cities should apply this action in whichever way best suits the city's organization. Land use planners within city government will also have relevant expertise.

Each organizational choice has various advantages and disadvantages to consider. These are outlined in **Table 2**.

A resilience working group could address many of the disadvantages noted above for any of the organization types as long as the group includes four types of participants—public sector sustainability planners, public sector emergency managers, private sector sustainability planners, and private sector emergency managers. Other important stakeholders, such as vulnerable communities, are key to successful climate resilience planning and may be included in the same working group. We encourage resilience planners to refer to other guides that offer specific recommendations for addressing the needs of these populations as they are not the focus of this report.

Additionally, a city could establish a resilience advisory group comprising private sector participants representing sustainability and emergency management departments within their organizations. This group could offer expert advice on the city's climate resilience planning without taking a formal role.

Action: Use existing channels of communication

Local governments have many channels of communication to the local business community, including personal relationships developed through the everyday activities of emergency management, economic development, city planning, and other departments. Cities may also have roundtables or working groups on specific topics that include public and private sector participants. There is no need to reinvent the wheel for climate resilience planning. Successful collaboration can and should leverage existing networks. As noted above, though, resilience planners should use communication channels in different departments covering different topics.

TABLE 2: Advantages and Disadvantages for Different Organizational Approaches for Organizing City Climate Resilience Planning

APPROACH	ADVANTAGES	DISADVANTAGES
Single Point of Contact in Existing Department	Builds upon existing expertise Low budgetary requirement	May introduce bias (i.e., short-term vs. long-term planning perspective) Can overburden staff, resulting in less ambitious plan
Resilience Officer	Can provide a cross-cutting perspective Demonstrates city priority to resilience planning Provides a clear point of contact on resilience to the business community	High budgetary requirements Challenges incorporating resilience planning into other departments' processes
Joint Task Force (convened by Mayor's Office, Emergency Management, Sustainability, or other)	Can provide a cross-cutting perspective Low budgetary requirement for any single department	Challenges in organizing a large group of city employees Consuming staff time on internal coordination could reduce staff time available for external engagement Lack of clarity to business community about department priorities May lose momentum as other priorities arise

INSIGHT: BUSINESSES RESPOND TO CITY LEADERSHIP

Our initial work with our pilot cities showed that strong city leadership was critical to engaging private sector participants on climate resilience planning. As in the public sector, private sector staff who work on environmental, resilience, or related issues face large demands on their time. While it is becoming more common for large businesses to have a chief sustainability officer (CSO) (or someone who fills this function under a different title),[33] this position may not have resilience built into the job description.[34] Small businesses are less likely to have an employee devoted to sustainability and resilience issues full time because of limited staff, resources, and expertise.[35]

City leadership can overcome the limitations on private sector staff time and resources and motivate businesses to participate. The following actions can promote stronger businesses engagement and enable better collaboration on climate resilience planning.

Action: Conduct outreach from the office of the mayor or the office of the city manager

City leaders can help cultivate a shared vision among the city's stakeholders. When elected leaders demonstrate that resilience planning is a priority for them, other community members are likely to follow. Long-term economic competitiveness is a key motivator for preparing for climate change impacts, and city leaders can be effective communicators of this message. The exact nature of outreach will depend on how a local government organizes its resilience planning. For example, if a city establishes a resilience working group with public and private sector representation, then invitations to participate in the working group could come from the mayor's office including the mayor's signature. The mayor could also provide opening remarks to the group's first meeting.

Action: Develop and use personal relationships to reinforce the high-level outreach

Local government interacts with the business community on an everyday basis on numerous topics, and personal relationships develop through these interactions. We observed that when businesses were invited to engage on climate resilience planning by an individual they already know and trust, they were more likely to participate. Direct connection, such as through a personal phone call, was a more effective way of engaging businesses than emails or outreach from an unknown entity. In some cases, a city department may not have an existing point of contact within a business. In this case, additional outreach will be needed (using existing networks as identified above), to develop a new relationship for climate resilience planning collaboration.

This action will of course require additional staff resources than an outreach strategy relying upon a listserv, a template document, or some other non-personalized method of outreach. It will also require greater collaboration within local government, as some personal relationships with the business community will reside in different departments (e.g., economic development, environment, emergency response, etc.). Devoting these resources to personal outreach is a way of demonstrating that resilience planning is a priority for local government, and thus reinforces any outreach from elected leaders. Businesses will also understand that the local government sees resilience planning as building on existing programs. This is the same way that businesses view climate resilience planning, according to our survey of very large businesses.[36] Having this common understanding established at the beginning of the process will lay the foundation for more effective collaboration.

Action: Set up a process for continual business collaboration on climate resilience planning

Businesses are more likely to collaborate on resilience planning if they know their input will be used throughout the process. A resilience working group or advisory group can provide this assurance, if the planning process clearly states how input from the group will be used in development of a resilience strategy or action plan. The group could play a defined advisory role, or it could even be tasked with developing a resilience plan itself, to be recommended to the local government for adoption. An example of this is the Detroit Climate Action Collaborative, a multi-stakeholder group undertaking resilience planning for the City of Detroit that has included businesses in the development process from the outset.[37] Similarly, the city of Boston engaged businesses in the development of its climate resilience plan, with the help of the Boston Green Ribbon Commission.[38] The Stamford 2030 District is a collaborative between public, private, and non-profit stakeholders working to achieve sustainability and

resilience goals, and is another example of how cities can promote continual business engagement.[39]

Local governments can also establish a series of listening sessions with the business community to gather feedback on the development of a resilience plan. These sessions should be a continual part of the planning process to promote business buy-in and successful collaboration. A later section of this report lays out the reasons why these listening sessions should be small, and focused on a single business or sector at a time.

Once personal connections are established on climate resilience planning, additional communication could be conducted by email or a focused social media platform to minimize the staff resources required to sustain collaboration.

INSIGHT: BUSINESSES RESPOND TO DATA

Businesses rely on data to make decisions. But they do not often have access to reliable data about climate change impacts. When we examined how the S&P Global 100 Index companies approach climate risks, we found that more than 90 percent acknowledged climate risks that would negatively affect their business, but only 39 percent had conducted vulnerability assessments to determine details about those risks.[40] Many companies reported lack of data as a key reason for not preparing for climate change impacts. While recent developments, as noted below, have addressed this gap, data access remains a key concern.

Businesses perceive a lack of data in part because they often need asset-specific climate projections, but climate models have historically generated data with a 100-kilometer resolution or less. In other words, businesses want data for impacts on a specific building, but models can only generate data for an area about the size of Connecticut. Recent advances are helping to bridge this gap. For example, climate models run on the supercomputer at the Argonne National Laboratory can use a technique called dynamic downscaling to generate climate projections with 12-kilometer resolution (a little smaller in area than the city of Washington, D.C.).[41] However, this resolution may still not be adequate for business planning, and the analysis takes several months to complete for the country as a whole.

An additional challenge facing business and city resilience planners is that climate risks are, by nature, scenario-based and probabilistic. Future emissions of greenhouse gases are projected based on trends in economic and population growth, policy choices, and other factors. Scientists can use computer models to assess these various uncertainties and estimate impacts at local levels, but this analysis results in very large data sets that require specialized skills to use. A 2014 collaborative effort between federal climate scientists and academic and professional communications experts found that a climate projection for the U.S. that included different climate scenarios required 17 terabytes of data.[42] For comparison, most current laptop computers have less than 1 terabyte of data storage.

Several efforts are underway to further develop climate modeling techniques and inform climate resilience planning. A few examples demonstrate how academic researchers are developing location-specific data to support cities. Arizona State University (ASU) houses the UREx Sustainability Research Network, which is undertaking a multiyear mission to develop city-specific climate scenarios for 10 cities in the United States and Latin America.[43] The research products and data visualization tools that come from this effort may be transferable to other cities as well. Colorado State University, in partnership with more than a dozen other universities, runs the Urban Water Innovation Network (UWIN), focused specifically on water issues.[44] UWIN has six U.S. cities participating in pilot research studies, and is also developing tools and models that can be used by other cities. The Resilience Dialogues, a project coordinated by the U.S. Global Change Research Program and the American Geophysical Union, connects local leaders with climate scientists to facilitate communication of climate change impacts.[45] This effort started in 2016 with five pilot U.S. communities, added 10 new communities (cities and tribes) in 2017, and aims to expand in the future.

Some cities already have access to common data. For example, the state of California supports an online tool called Cal-Adapt that provides climate projection data to communities throughout the state.[46]

While this research field continues to develop, local governments have additional options for identifying actionable climate data to share with their business communities and promote collaboration on climate resilience planning. The following actions can address the data needs of businesses and promote their participation in city climate resilience planning.

Action: Find partners that are developing localized climate projections

The networks mentioned above are examples of one pathway to developing localized climate projections, but there are many more. Local universities can be an excellent source of climate data and are often a credible voice in the community. Nearly every U.S. state has a state climatologist who can provide observations and projections relevant to the state.[47] Other state agencies and federal agencies also collect and communicate climate data. Large businesses may even have their own internal climate projections they would be willing to share in a collaboration with local government. When resources permit, private consultants also have capabilities to develop localized climate projections.

Action: Establish a uniform climate planning scenario for the community

City planners will need to establish a climate scenario to be used for resilience planning. This scenario will include specific risks to the community. The impacts may represent a "worst case" planning scenario (e.g., 8 feet of sea level rise by 2050), or a range of likely impacts (e.g., maximum July temperatures will be 1–5 degrees higher by 2050). Climate scenarios can also be risk-based (e.g., flood levels of 2 feet will become a 1-in-100-year event by 2050).

Businesses may be separately collecting data on climate impacts, but the resilience of the community overall will be best served when cities and businesses use the same climate projections and impacts data. This does not mean that planning parameters should be identical. For example, if a coastal city is expected to have 3 to 8 feet of sea level rise over the next century, a business may create its resilience plan assuming 3 feet of sea level rise, while the city may plan around 8 feet of sea level rise. But having a common scenario will help both city and business planners better understand the risks.

Action: Conduct a vulnerability assessment and share it directly with businesses

Climate resilience planning starts by understanding climate threats and vulnerabilities (**Figure 1**). Businesses can provide valuable insight into a city's climate vulnerabilities, especially those businesses that own and operate critical infrastructure, and they should be consulted in the initial stages of exploring climate threats. A vulnerability assessment can identify a community's specific risks and vulnerabilities to climate change impacts. Vulnerability assessments generally examine three components: exposure, sensitivity, and adaptive capacity.[48] While the methodology and scope of a climate vulnerability assessment can vary, completing an assessment can help identify critical vulnerabilities within the community. A city should solicit input from businesses in advance of completing a vulnerability assessment to understand the priority climate risks for which businesses need specific information.

The vulnerability assessment will use the climate scenario(s) to identify key vulnerabilities to the community. A city's vulnerability assessment may or may not examine vulnerabilities to private assets, so a business may still need to conduct its own assessment. However, businesses need to understand what a city's vulnerabilities are. For example, a business would have a vested interest in knowing if a road to their key production facility was expected to flood more often.

Public mapping tools like NOAA's Sea Level Rise Viewer can be used to visualize different sea level rise scenarios and identify areas that are exposed to potential flooding, like a road that would be inundated with 2 feet of sea level rise. The assessment could then identify vulnerabilities from inundation of that road, for example access to a hospital (or industrial zone) could be disrupted for a segment of the community.

Businesses are more likely to be engaged on climate resilience planning with a local jurisdiction when they have access to data about climate vulnerabilities in that area. For some businesses, the relevant employee(s) may need this data to demonstrate to their management why collaboration on climate resilience in that jurisdiction is in the company's interest.

Action: Communicate climate change risks in a tangible way

Only about a third of Americans believe they have personally experienced climate change impacts,[49] despite the scientific evidence that impacts are being experienced by the entire country today.[50] Communication strategies can overcome this perception by providing more actionable information. For example, businesses may not know how to respond to the broader concept of climate change, but they know how to respond to a 5-degree increase in the hottest day of the year by 2030.

The technical partners identified above can also be helpful in communicating climate change risks. They will have the technical expertise to generate the correct data (including uncertainty estimates) and often work with communications experts who can generate impactful communication materials.

INSIGHT: 'BUSINESS' IS NOT A MONOLITH

In our conversations with local governments, we found that the terms "private sector" or "business community" are used without specifying individual businesses. However, not all businesses are alike; large businesses have a very different perspective on climate resilience than small businesses, with different resources to offer. Publicly traded businesses may differ in their public stance on climate resilience than privately held businesses, in part because of the requirement that publicly traded companies disclose material risks. The health sector has more interactions with disadvantaged populations than other sectors, and can be a useful facilitator to those communities.

Each industry will differ in exposure to climate threats. For example, heavy industry with its long-lived capital assets may be more exposed to physical climate change threats than the service sector, which may be most vulnerable to worker health impacts.

Collaboration on city climate resilience planning can be improved when city leaders consider this heterogeneity. One business will rarely have the same view as another, so multiple sectors should be engaged. The following actions can help ensure that diverse business views are represented and increase the chances that overlapping concerns (and resources) can be identified.

Action: Engage small businesses differently than large businesses

Small businesses rarely have the resources to devote their own representative to a resilience planning process.[51] Collaboration will need to rely instead upon a person or organization (e.g., local Chamber of Commerce) that can reflect small business concerns and act as a liaison. Small businesses may be more nimble than large businesses in adapting to climate change impacts,[52] so presenting resilience planning as a business opportunity may help to engage them.

Small businesses generate about half the country's economic output,[53] but in some cities (e.g., those with a large tourism industry) the economic contributions of small businesses can be much higher. In these communities, it is especially key to develop a strategy for collaboration that respects the limited resources small businesses may have.

Large businesses, on the other hand, will typically have staff devoted to business continuity planning or related topics like sustainability and emergency management. They may also have a strong incentive to engage on climate resilience planning, especially if they have conducted internal analysis on their vulnerability to climate risks and have reported them to their stakeholders. City leaders can more effectively invite large business representatives to the resilience planning process when they understand these motivating factors.

Action: Hold one-on-one meetings or small focus groups with individual sectors

Because businesses will have diverse views, individual outreach is necessary to ensure that a single participant or sector does not dominate the process. A large town hall-style meeting is unlikely to promote collaboration, as this setting rarely allows for dissenting opinions to be expressed. Instead, we recommend small focus groups with one or two sectors represented, or individual meetings or interviews that allow business representatives to provide their input on resilience planning directly.

INSIGHT: INNOVATIVE FINANCING CAN HELP PROMOTE COLLABORATION

The cities we worked with to complete the Disaster Resilience Scorecard typically viewed their financial capacity for resilience as a weak area. This self-assessment was often based on a lack of a line item in the city's budget identified for climate resilience. The cities also typically reported a lack of incentive programs for private sector resilience investments and a lack of other financing mechanisms. This situation in common.

In some cases, climate resilience can be improved with little or no additional funding. This "resilience dividend" can accrue by simply considering climate change impacts in existing public works projects and master plans. For example, if natural gas infrastructure is being upgraded because of safety requirements, the new pipes could be made of material resistant to saltwater damage to improve resilience to sea level rise and storm surge. As another example, the recommended list of trees to be planted within the city could be updated to account

for changing climate zones. This would allow natural turnover in the urban forest to increase the city's resilience to increasing temperature over time.

In other cases, though, additional financing will be required. Raising taxes or other fees is an option for supporting resilience planning, but may be met with resistance by the business community. We found widespread interest from public and private sector participants in our pilot workshops in using financial incentives instead to simulate greater resilience. The National Flood Insurance Program's Community Rating System is one example of this approach. Under this federal program, property owners receive discounts on their flood insurance premiums when the community undertakes certain flood risk reduction activities.[54]

To explore other financing options, C2ES held a webinar featuring a few examples of innovative climate resilience financing options.[55] These case studies, described below, demonstrate the diversity of approaches being used across the country today.

After Hurricane Sandy, New Jersey received $200 million from a Community Development Block Grant for Disaster Recovery from the U.S. Department of Housing and Urban Development. Using these funds, New Jersey created an Energy Resilience Bank (ERB), which is the first of its kind in the nation. The ERB will provide grants and low-interest loans for distributed energy resources to promote resilience for critical facilities affected by the disaster, such as water and wastewater treatment facilities and hospitals and related healthcare facilities.

The Rockefeller Foundation provided funding for public-private partnerships to promote resilience in eight U.S. cities: El Paso, Texas; Hoboken, N.J.; Honolulu, Hawaii; Miami Beach, Fla.; Milwaukee; New Orleans; Norfolk, Va.; and San Francisco. Some of the innovative ideas involved combining public green spaces with underground parking garages and storm water management systems so that the revenue streams from parking fees and water rates could finance the infrastructure required.

The insurer Swiss Re produced and is marketing a new financial instrument known as a "resilience bond" to monetize the risk reduction benefits from investments in resilience infrastructure. The resilience bond is a risk transfer mechanism for the property and casualty insurance industry that was developed with the modeling company RMS as well as Goldman Sachs and the Rockefeller Foundation. The resilience bond is a hybrid between a traditional capital bond and a catastrophe bond. If cities sponsored a resilience bond, they would receive an upfront rebate for their investment in resilience infrastructure and, in the event of a triggering event causing unforeseen losses, they would receive a contingent payment.

The following actions can lead to innovative financing for climate resilience projects with high capital costs, and can demonstrate to businesses that the city is committed to exploring all financing options.

Action: Develop public-private partnerships for resilience actions and investments

Public-private partnerships (PPPs) vary in form and typically involve a long-term arrangement formalized through a contract.[56] Utilizing a PPP to design, construct, and maintain a resilience investment (e.g. replacing a flood-prone road with a new road at higher elevation) can be appealing to a city because it avoids the need to take on debt to fund a project. Supporters of PPPs note that formal partnerships provide additional benefits to taxpayers by lowering the total cost of the project over its lifetime (because private firms can typically acquire financing at lower rates than public entities) and by incentivizing the private sector partner to deliver the public service earlier than traditional public-funded projects. Not all PPPs have delivered these promised benefits, though. An independent analysis by the Congressional Budget Office in 2012 evaluated existing U.S. highway infrastructure PPPs and found that they did not increase the total level of funding for a project (except for when a jurisdiction had self-imposed budget or debt constraints) but did result in slightly faster and cheaper projects.[57] Because of the complexity in designing a PPP that guarantees taxpayer benefits, most states have some form of legislation in place to guide their development.[58]

Informal partnerships could also be developed to promote climate resilience planning and improvements. For example, public sector notification systems could be coordinated with a company's employee notification system so that messages about heat waves, heavy precipitation events, or other climate risks could be more effectively distributed throughout the community. Cities could promote private sector resilience champions – businesses that voluntarily take steps to promote climate resilience, for example by adding landscaping features

that reduce storm water runoff during rainstorms or that promote energy efficiency upgrades in employees' homes.

By communicating an intent to develop PPPs as part of the resilience planning process, a local government can entice greater participation and collaboration with businesses.

Action: Explore local insurance incentives for resilience

The insurance industry can be a strong influencer of economic and social behavior, including in building resilience.[59] One direct way insurers can incentivize resilience is by offering premium discounts to customers who make resilience upgrades and thereby reduce their climate risk.

Insurance companies are motivated to incentivize resilience in part by the findings of a 2005 study that showed that disaster mitigation projects overall have a 4:1 benefit to cost ratio.[60] Additionally, several states require insurers to disclose their financial risks due to climate change, though companies vary in the quality of their disclosure and the disclosure process continues to develop.[61]

City resilience planners can work together with state insurance commissions to identify the best locally relevant options. The insurance industry is regulated at the state level, and policies may be needed to incentivize state-specific resilience measures.

A 2012 study by researchers at Harvard Law School notes that coastal municipalities in particular can benefit from collaborating with the insurance industry.[62] The benefits include gaining specific data on coastal impacts, encouraging small local insurance providers to follow best practices in incentivizing resilience, educating property owners on risks and opportunities, and identifying policy barriers.

When state insurance policies allow for the industry to incentivize resilience, local resilience planners and business communities can benefit from coordinating with the insurance industry. When state policies do not allow this practice, then collaboration can help to identify this barrier and find ways to overcome it.

IV. CONCLUSION

Through our work with cities and businesses across the country, we have found that the public and private sectors have a strong willingness to work together on climate resilience planning, though they often do not know how to accomplish their shared goals. Our recommendations can be used by cities in every stage of climate resilience planning to invite and promote collaboration with businesses.

It is important to recognize the value in collaboration. Cities and businesses face climate threats together, and they both suffer when resilience actions are not implemented. They have different and complementary strengths, and collaborating on climate resilience planning can facilitate knowledge sharing that benefits other focus areas as well. Including businesses in the climate resilience planning process also expands the number of stakeholders involved and can increase the political support for the effort. Most employees are proud when their company engages in community problem solving and employees are citizens who place value on local government that is working for their well-being. Employee and citizen pride can help build the support for action.

Local governments and the business community already interact regularly in a collaborative way. In many cases, these recommended actions for climate resilience planning may simply be extensions of ongoing efforts or reflect actions that city resilience planners would take anyway. That perspective is helpful in lowering the barriers to city-business collaboration. While the term "climate resilience planning" may be new, the idea that public and private sector stakeholders both benefit when they work together is not. Climate change is presenting communities with new threats and exacerbating existing ones, but strong collaboration is likely to protect against these risks and build greater resilience.

APPENDIX: OUR APPROACH TO INVESTIGATING CITY-BUSINESS COLLABORATION ON CLIMATE RESILIENCE PLANNING

The findings of this report are based on insights from C2ES research and engagement with various stakeholders over the past several years. C2ES hosted workshops focused on city-business collaboration on climate resilience, including in-depth work in four pilot cities that brought city and business stakeholders together to start a conversation about resilience planning in the community. While these cities differ in size, dominant industries, political environments, and climate change threats (**see Box A-1**), their commonalities provided the basis for this report's recommendations.

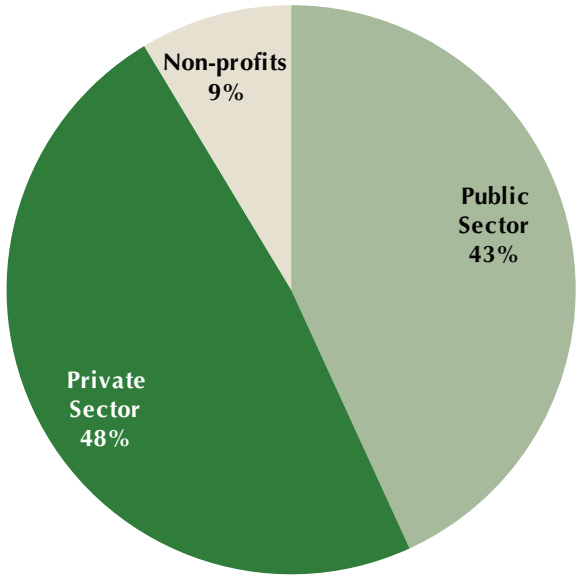
In each city, we used a similar process that included 1) working with NOAA's Regional Climate Centers (and often other experts like state climatologists and academic researchers) to identify expected local climate and extreme weather impacts; 2) coordinating with city officials to identify where in the process of climate resilience planning they were and which issues they wanted to examine; and 3) inviting local businesses and other stakeholders to a workshop to assess the city's climate vulnerabilities and resilience planning process. We developed this process in a previous collaboration with the city of Anchorage, Alaska.

As **Figure A-1** shows, we had nearly equal participation by public and private sector in our workshops. Public sector participants came from a variety of city government departments. Some workshops also had state government participation. Private sector participants represented the diversity of the local economy including finance, manufacturing, health care, energy, communications, and tourism sectors. Although not a focus of our outreach, our pilot city workshops also included non-profits like environmental and community advocacy groups. In total, 139 participants attended the workshops, exclusive of C2ES staff and facilitators.

THE DISASTER RESILIENCE SCORECARD

Each workshop used the Disaster Resilience Scorecard, a free, public tool developed by IBM and AECOM. The scorecard is designed around the "Ten Essentials" of disaster risk management, a holistic approach to considering disaster preparedness and resilience developed by the United Nations Office for Disaster Risk Reduction.[63] The scorecard does not assess a city's climate vulnerabilities specifically, but can be used to measure its resilience to natural disaster scenarios (those "most probable" and "most severe"). The scorecard measures the organization, capacity (financial, resource, and other), and plans to prepare for, respond to, and recover from impacts. The scorecard was designed to encourage engagement across city departments as well as with external stakeholders including public, private, and non-profit organizations. In our workshops, scientists presented local climate impact observations and projections, from which participants qualitatively

FIGURE A-1: Workshop Participants by Sector



BOX A-1: Pilot Cities

We worked with four cities, representing different geographic areas of the United States, to identify commonalities in city climate resilience planning.

Kansas City, Missouri
Kansas City is located at the confluence of the Missouri River and Kansas River and has a population of about 475,000. Kansas City's resilience planning is coordinated through its Office of Environmental Quality in partnership with the Mid-America Regional Council (MARC), the metropolitan planning organization for the region. Kansas City adopted a Climate Protection Plan in 2008 that sets mitigation goals, and climate resilience planning activities are beginning in the metropolitan area.[64] Key climate threats are increased heat/humidity and extreme precipitation and flooding. Kansas City serves as an economic hub for the Midwest region. Its diverse business sector includes Cerner Corporation, Hallmark Cards, and Sprint Corporation, which are headquartered there.

Miami Beach, Florida
Miami Beach is located on barrier islands off the coast of Miami and has a resident population of about 90,000. The chief resilience officer also serves as assistant city manager. The city, with Miami and Miami-Dade County, was selected as a member of 100 Resilient Cities.[65] Key climate threats are sea level rise, storm surge, flooding, and hurricanes. Business activity in Miami Beach is centered around the tourism and hospitality industry. Real estate is another key sector.

Phoenix
Phoenix is in central Arizona with a population of 1.5 million. In 2016, the city adopted long-term sustainability goals[66] and is incorporating climate resilience into multiple city departments, including Sustainability and Homeland Security & Emergency Management. Key climate threats are increasing temperatures and more variable precipitation patterns. As the nation's sixth largest city, Phoenix has a large and diverse economy. Many large companies are headquartered in Phoenix, including Avnet, Freeport-McMoRan, PetSmart, and Republic Services.

Providence, Rhode Island
Providence is a coastal city of about 180,000 people located at the head of the Narragansett Bay. Providence's resilience planning is coordinated through the city's Office of Sustainability. Providence is committed to the Compact of Mayors, and Mayor Jorge Elorza signed an executive order in 2016 setting long-term greenhouse gas reduction goals and requiring climate change impacts to be incorporated into city processes.[67] Key climate threats are stronger hurricanes, sea level rise, increased flooding events, and increased heat/humidity. Higher education is a large employer and is central to the city's economy. Premier institutes of higher education like Brown University, Johnson & Wales University, and Rhode Island School of Design are in the city.

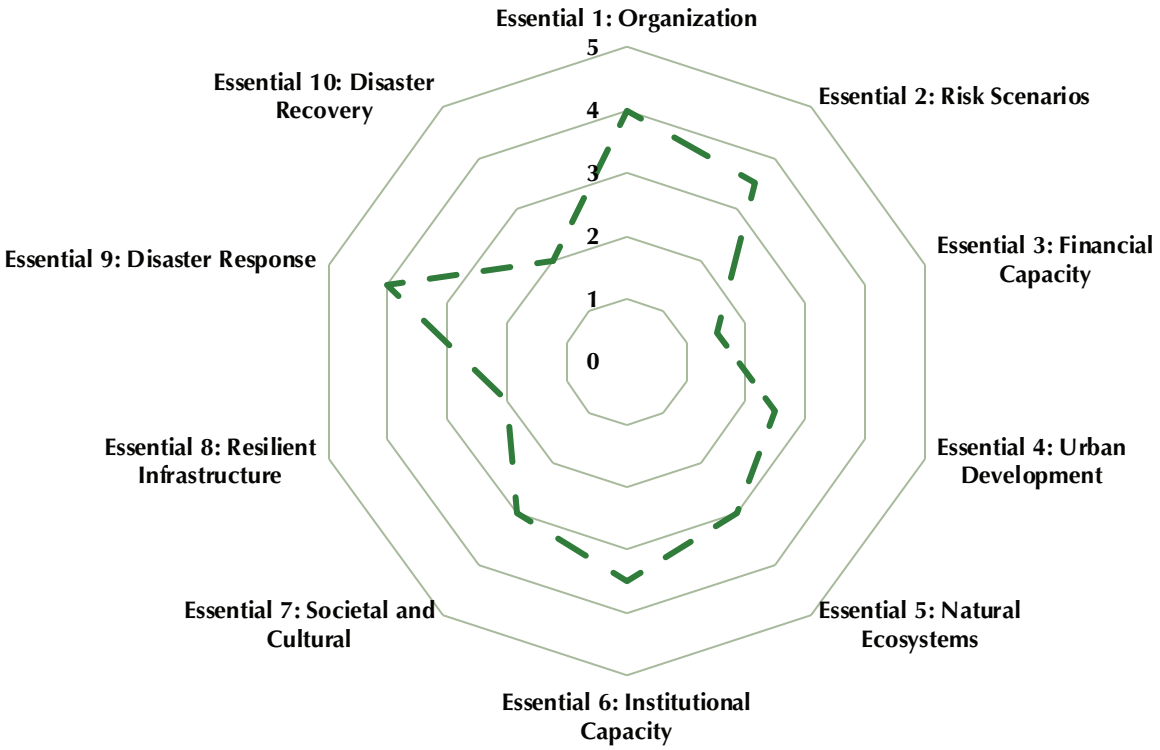
self-assessed climate vulnerabilities.

The scorecard is not designed for cities to compare their scores with other cities. Rather, it is a useful tool for a city to measure its disaster preparedness and resilience by creating a "baseline" score using the "Ten Essentials". As **Figure A-2** shows, a city might score high in one area and low in another. Through this process, a city can identify strengths and where greater dedication, partnership, and/or resources are needed. A city could re-evaluate its scores later to track progress.

By initiating a holistic discussion and building a common understanding across constituencies, the scorecard can help a city prioritize needs and actions for a climate resilience plan. The scorecard was developed with acute natural hazards in mind, but our workshops focused scorecard completion around the most probable climate threats, including chronic changes and "stresses" associated with climate change.

While each city faces different threats and planning circumstances, we noted some commonalities through the scorecard completions. By sharing these common challenges, strategies, and approaches, cities can be better informed and prepared as they begin climate resilience planning.

FIGURE A-2: Demonstrative Results of a Scorecard Assessment



This chart shows scores for each of the Ten Essentials for a hypothetical city. In our workshops, participants completed a self-assessment of the city's existing resilience planning on a scale of 0 (weak) to 5 (strong). The Scorecard is not designed to compare resilience between cities.

One common finding in our work and others is that cities are often "tactically strong, but strategically weak," especially regarding climate change impacts.[68] They are used to responding to extreme weather and natural disasters, but aren't considering that the frequency and intensity of these events will change over time.

Some of the actions recommended in this report can help overcome the tendency to focus on response planning rather than climate preparedness.

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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. Our mission is to advance strong policy and action to reduce greenhouse gas emissions, promote clean energy, and strengthen resilience to climate impacts. Learn more at https://www.C2ES.org.

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