



RESILIENT PITTSBURGH

PIONEERED BY THE
ROCKEFELLER FOUNDATION

100 RESILIENT CITIES





“In Pittsburgh’s 200th year, we applaud the city’s hard fought urban resurgence and the strong leadership shown from Mayor Bill Peduto and Chief Resilience Officer Grant Ervin. Together with the community they are beginning to approach and tackle some of Pittsburgh’s very real and complex risks. Cities like Pittsburgh can no longer afford to plan and fund stand-alone projects; they will need to plan cooperatively across silos, think in an integrated manner, and consider long-term solutions with multiple benefits. 100 Resilient Cities remains an excited and willing partner with Pittsburgh as they forge a more resilient future.”

– Michael Berkowitz,
President, 100 Resilient Cities

Urban resilience is the capacity of individuals, communities, institutions, and businesses within a city to survive, adapt and grow no matter what kinds of chronic stresses and acute shocks they experience.

A young boy in orange shorts is running through a public fountain. The fountain consists of several tall, vertical metal frames, each with a central jet of water spraying downwards. The boy is in the foreground, running towards the right, with water splashing around him. In the background, other people are visible, and a modern building with a glass facade is partially obscured by the fountain's structure.

Regional fragmentation

Economic and racial inequity

Aging infrastructure

Mobility and transportation challenges

Environmental degradation

Lack of affordable housing

Food insecurity

Extreme weather events

Infrastructure failure

Hazardous materials incident

Landslide and subsidence

Economic collapse

Disease outbreak and pest infestation

INTRODUCTION

The City of Pittsburgh celebrates its 200th anniversary in 2016 thanks to a history of resilience that has demonstrated the grit and ingenuity of Pittsburghers to recover and rebuild after fires, floods, and financial failure. Today Pittsburgh faces fewer threats than many other cities thanks to our location, geography, and natural resources. However, the Steel City must still overcome certain challenges from its industrial legacy, and will face new pressures with climate change, urbanization and globalization. Pittsburgh will be a resilient city when our entire community shares in the same opportunity and prosperity, and all residents are equally well cared for and well prepared to face potential risks.

Urban resilience is the capacity of individuals, communities, institutions and businesses within a city to survive, adapt and grow no matter what kinds of chronic stresses and acute shocks they experience. Acute shocks are sudden disasters that threaten cities and chronic stresses are slow-burning issues that reduce the success of the city on a daily basis. Based on the research and community input gathered to date, Pittsburgh must prepare for the following shocks and actively mitigate the following stresses.

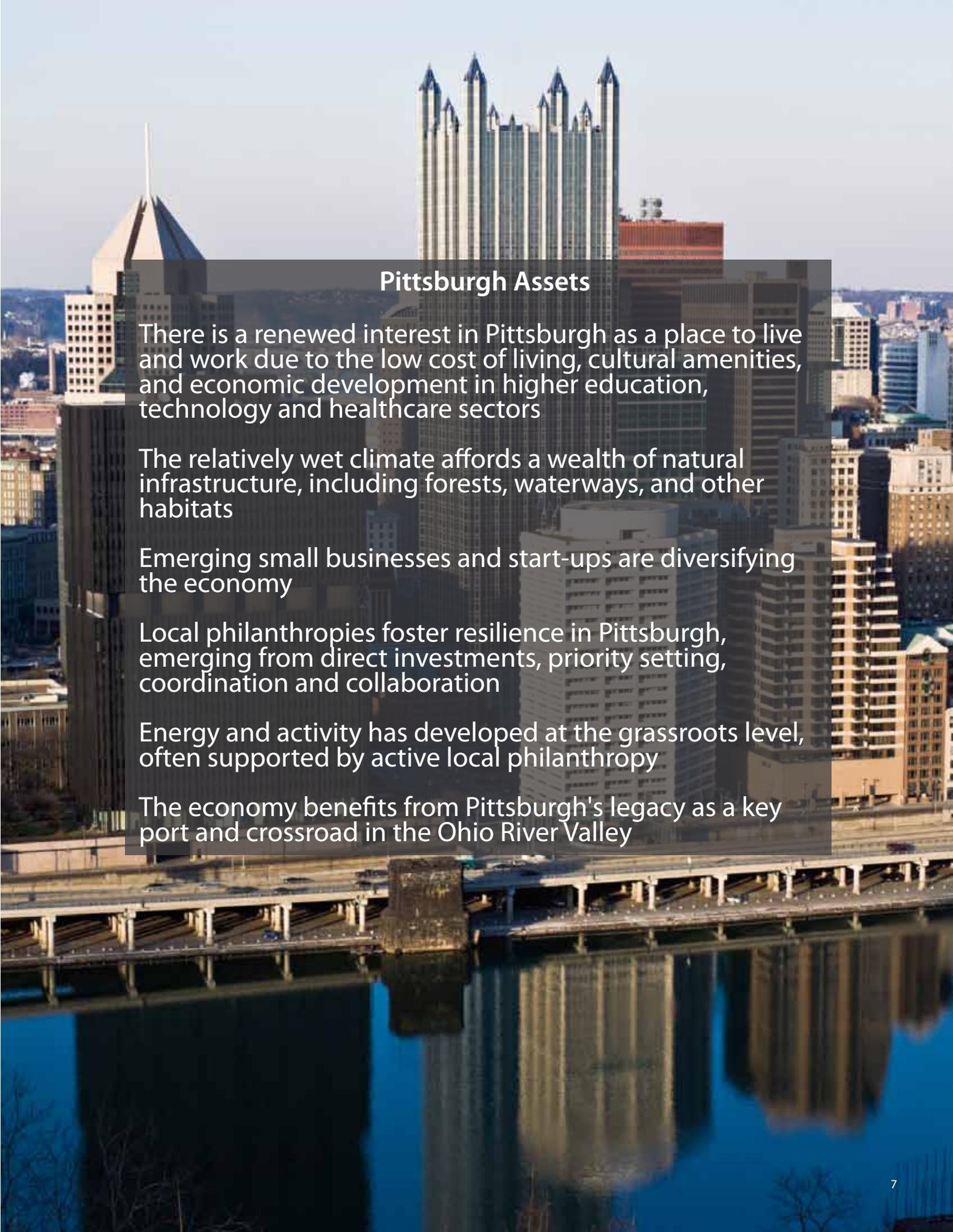
Figure 1 Pittsburgh Shocks and Stresses

Shocks:

- Extreme weather events
 - Rainfall and flooding
 - Winter storms
 - Extreme heat and cold
- Infrastructure failure
 - Transportation
 - Water
 - Energy
 - Ecology
- Hazardous materials incidents
- Landslide and subsidence
- Economic collapse
- Disease outbreak and pest infestation

Stresses:

- Regional fragmentation
- Economic and racial inequality
 - Employment
 - Health
 - Education
 - Crime
- Aging infrastructure
- Mobility and transportation challenges
- Environmental degradation
 - Air quality
 - Water quality
 - Soil health
- Food insecurity
- Lack of affordable housing

A photograph of the Pittsburgh skyline, featuring the prominent PPG Place tower with its distinctive pointed top. The city is reflected in the water of the Allegheny River in the foreground. A semi-transparent dark box is overlaid on the image, containing text.

Pittsburgh Assets

There is a renewed interest in Pittsburgh as a place to live and work due to the low cost of living, cultural amenities, and economic development in higher education, technology and healthcare sectors

The relatively wet climate affords a wealth of natural infrastructure, including forests, waterways, and other habitats

Emerging small businesses and start-ups are diversifying the economy

Local philanthropies foster resilience in Pittsburgh, emerging from direct investments, priority setting, coordination and collaboration

Energy and activity has developed at the grassroots level, often supported by active local philanthropy

The economy benefits from Pittsburgh's legacy as a key port and crossroad in the Ohio River Valley

A RESILIENCE STRATEGY FOR PITTSBURGH

100 Resilient Cities - Pioneered by The Rockefeller Foundation (100RC), is dedicated to helping cities around the world become more resilient to 21st century physical, social, and economic challenges, in the face of globalization, urbanization and climate change. In December 2014, Pittsburgh was selected in the second cohort of these 100 cities working to reduce the risks that threaten our communities and overcome the challenges that make our residents vulnerable.

100RC provides assistance to cities in four main pathways:

1. Financial and logistical guidance to establish an innovative new position in city government: the Chief Resilience Officer (CRO);
2. Expert support for development of a robust resilience strategy;
3. Access to the services of Platform Partners from the private, public and NGO sectors who can help develop and implement resilience strategies; and
4. Membership in a global network of 100 cities who can learn from and help each other.

On June 5, 2015, Mayor William Peduto appointed Grant Ervin as Chief Resilience Officer (CRO) to lead Pittsburgh's resilience efforts. As Pittsburgh's strategy partner, the RAND Corporation has been integral to developing this assessment and will continue to support the City in crafting a resilience strategy that strengthens our communities, infrastructure and economic systems. Organizations in 100RC's catalog of platform partners are eager to support resilience building in Pittsburgh, and will be connected to local partners to build capacity. Pittsburgh has already formed strong mutually beneficial relationships with cities around the world who face similar challenges.

The Pittsburgh Resilience Strategy will do three things:

1. **Catalyze resilience in the city and region** by establishing a shared set of goals, identifying areas for collaboration, and implementing cooperative resilience-building actions;
2. **Activate and concentrate funding and resources** by advocating for local needs and priorities, integrating complementary projects, and creating beneficial partnerships;
3. **Establish a resilience practice** by incorporating the resilience lens into decision-making and by sharing knowledge both locally and throughout the 100RC network.

Figure 2 Resilience Strategy Process



phase 01

FALL 2015/WINTER 2016

Objective:
Evaluate state of resilience and city capacity, and generate broad support and engagement in focus areas

Process:
Data collection
Stakeholder engagement

Outcome:
Preliminary Resilience Assessment (PRA)



phase 02

SPRING/SUMMER 2016

Objective:
Deep, rapid expert analysis, and generation of solutions through a resilience lens. Practical action, and multiple benefit decisions made

Process:
Focused analysis
Generate solutions
Prioritization

Outcome:
Pittsburgh Resilience Strategy

IMPLEMENTATION

This Preliminary Resilience Assessment (PRA) contains the knowledge gathered from over six months of research and stakeholder and community engagement by the Resilient Pittsburgh team: Chief Resilience Officer Grant Ervin’s team in the Department of Innovation & Performance and strategy partner the RAND Corporation, with guidance from 100 Resilient Cities. The PRA looks at the likelihood and severity of potential shocks and stresses; documents the existing activities in the City that improve resilience; and summarizes how City stakeholders view what is working well and where improvements are needed. All of this information led to the Discovery Areas. These Areas will guide the development of the upcoming Pittsburgh Resilience Strategy.

The Resilience Strategy will ultimately help the city prepare for, adapt to, and quickly rebound from shocks and stresses. Pittsburgh has already overcome a massive economic shock in recent decades, but like many cities, confronts “slow burning” issues that can potentially lead to catastrophic outcomes. Conversations in Pittsburgh emphasize the need to address a range of chronic stresses, from combined sewer overflows to poor air quality to racial inequity and lack of access to transit. The challenges that the City faces today will evolve in the face of climate change, demographic change and population growth.

A community-defined vision of Pittsburgh’s future will guide the resilience strategy and implementation. In Phase I Pittsburghers envisioned the following:

Pittsburgh will be an inclusive city of innovation. All residents will have their basic needs met. Pittsburgh’s ninety unique neighborhoods will retain their culture while also building social cohesion with all communities across the city. Proactive development of built infrastructure and thoughtful restoration of natural infrastructure will improve urban life and environmental health. Economic diversification and entrepreneurship will provide opportunities for all residents to prosper. Successful actions and best practices pioneered in Pittsburgh will be shared to help the entire region become more resilient.

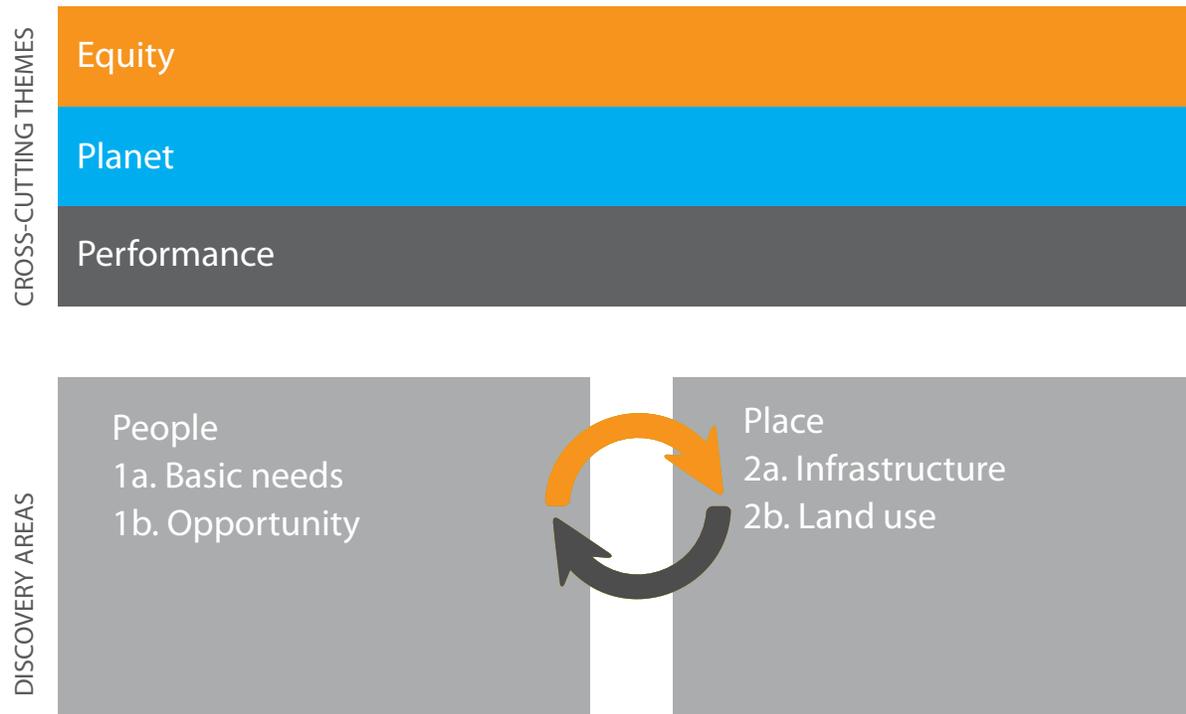
In order to achieve this vision, stakeholders and community members identified the following strengths, weaknesses and areas for improvement.

Figure 3 Key Strengths, Areas of Improvement and Weaknesses



The Discovery Areas and diagnostic questions will guide the development of the resilience strategy in Phase II.

Figure 4 Resilient Pittsburgh Discovery Areas and Cross-Cutting Themes



Discovery Areas:

1. People
 - 1a. Basic needs

How do we ensure that the basic needs of city residents are met, both in times of calm and catastrophe?
 - 1b. Opportunity

How do we ensure that all city residents have access to economic opportunity and prosperity?
2. Place
 - 2a. Infrastructure

How do we protect, maintain, and improve the city's critical natural and physical infrastructure systems?
 - 2b. Land use

How do we optimize land use to better support affordable housing, economic growth, community development, and stormwater management?

There are three cross-cutting themes that will guide the actions taken in each of the four Discovery Areas in Phase II:

- Equity: How can we ensure each resilience action accounts for equity issues, ensuring fair access for all city residents to economic, educational, and environmental opportunities and amenities?
- Planet: How can we use resilience to protect our local environment and be responsible, proactive global citizens?
- Performance: How can we integrate activities, improve collaboration, and evaluate progress?

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PITTSBURGH CITY CONTEXT

Pittsburgh is a mid-sized American city with a population of just over **300,000**.³ Pittsburgh is the principal city of Allegheny County, Pennsylvania, which is home to over **1.2 million** residents.⁴ The broader ten-county metropolitan region includes **2.57 million** residents, the 22nd largest metropolitan area in the United States.^{4,5}



GEOGRAPHY

Pittsburgh's geography is defined by its hills, waterways, and bridges. The city is famously located at the confluence of the Allegheny and Monongahela Rivers (and their tributaries), which converge in the heart of the city to form the Ohio River. Over **2,000** miles of streams and **90** miles of rivers flow through Allegheny County in total.⁶ Transportation routes generally follow the paths of rivers and streams, but the city is also home to some of the steepest roads in the country in order to connect different communities. These features contribute to a unique and beautiful cityscape, but can also serve to divide the city into unique or isolated geographic "pockets."

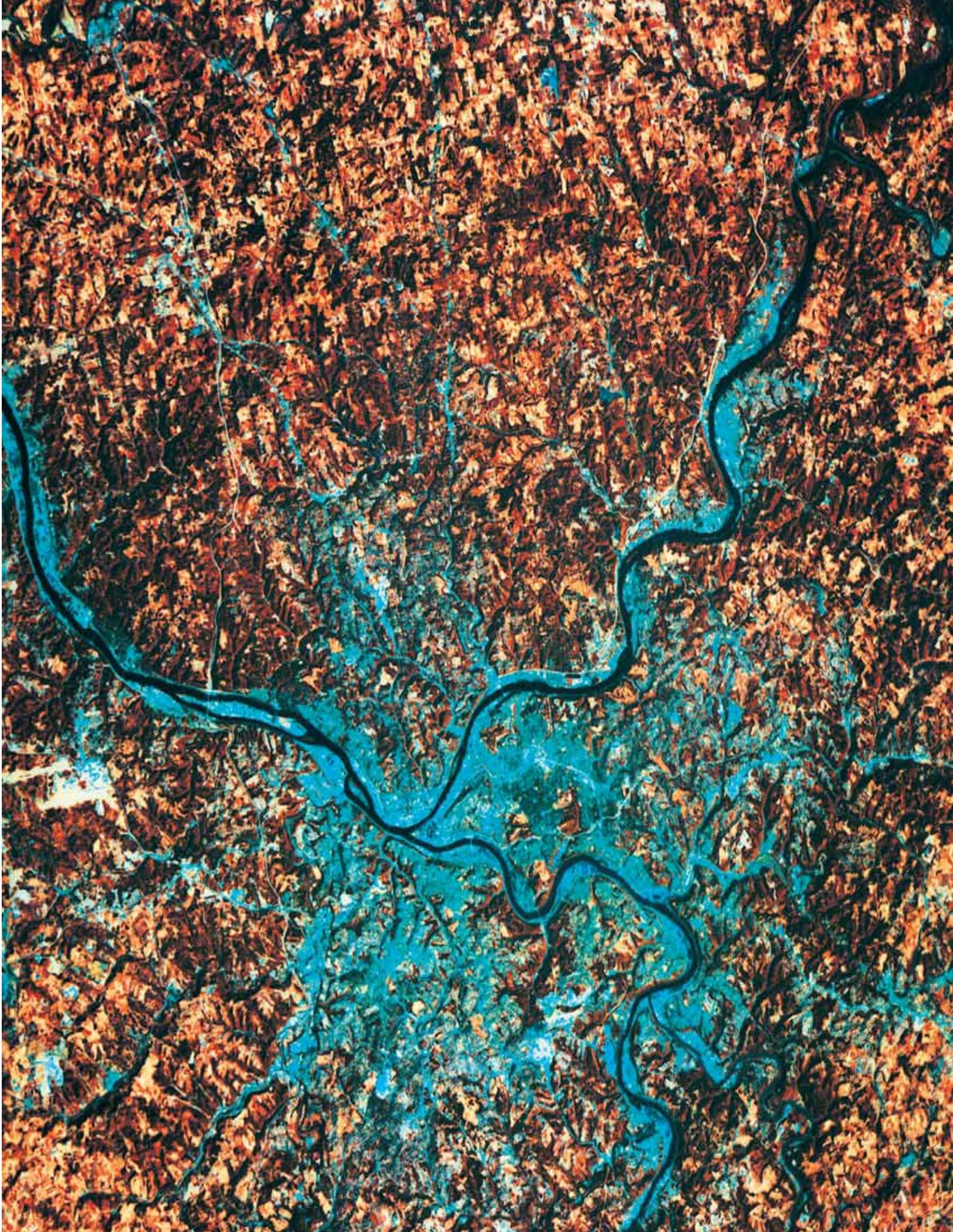
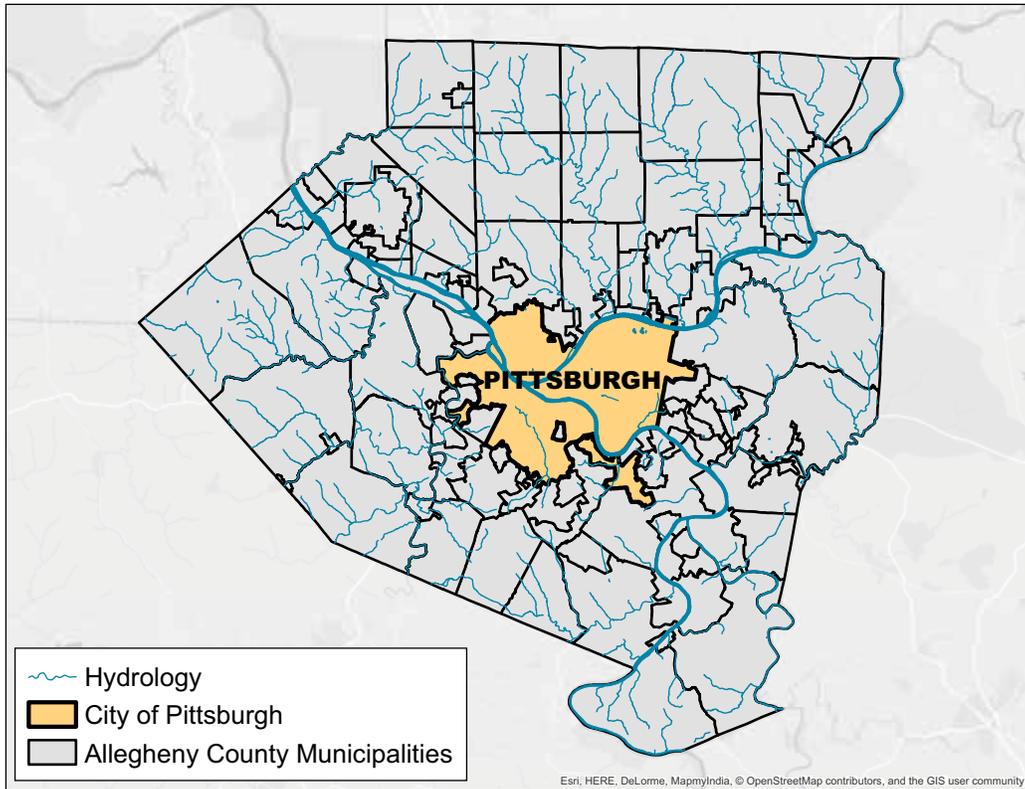
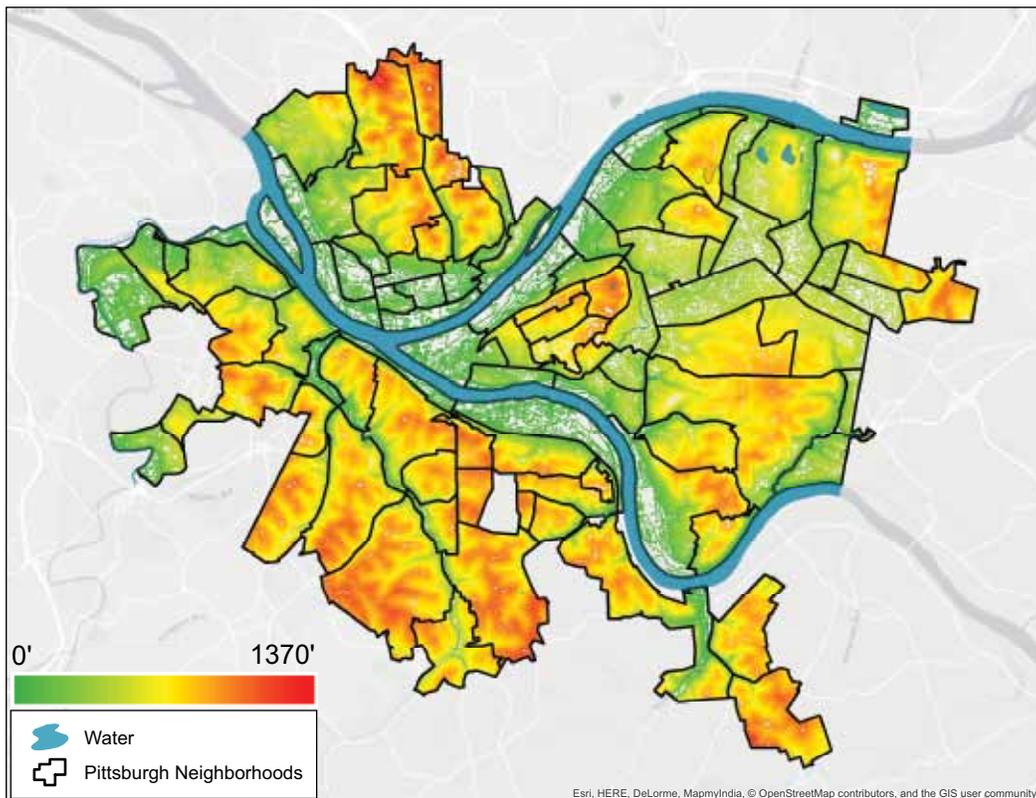


Figure 5 Map of Allegheny County Municipalities & Hydrology



Source: City of Pittsburgh, 2016

Figure 6 Map of Pittsburgh Neighborhoods & Topography



Source: City of Pittsburgh, 2016

GOVERNANCE AND LEADERSHIP

Innovation and a data-driven approach aim to improve quality of life. William Peduto became the Mayor of the City of Pittsburgh in January 2014 after running on a platform of neighborhood redevelopment and jobs, government reform and innovation, education and technology, and a clean and safe city. Mayor Peduto has committed to:

- Science-based and data-driven decision making;
- Planning efforts and investments in different sectors intended to improve city wellbeing; and
- Efforts to actively draw upon the best examples of urban redevelopment from other cities around the world.

Fragmentation challenges local governance. The 1974 Home Rule Charter (and similar legislation passed by surrounding municipalities) gives Pittsburgh and other cities in the region authority to perform any actions not expressly prohibited by Pennsylvania state law.⁸ The City of Pittsburgh alone includes 90 neighborhoods, Allegheny County has 130 municipalities, and the ten county metropolitan region includes over 900 government units in total. Governance of the many neighborhoods in the region is managed at the municipal level, but the sheer number of municipalities and scales of jurisdiction gives the region the unfortunate distinction of the greatest number of government units per capita in the United States.⁹ Each municipality has independent responsibility for managing infrastructure and administering many local services. The fragmented regional governance structure makes it far more difficult for the City to plan and collaborate with the diverse and plentiful local political entities.

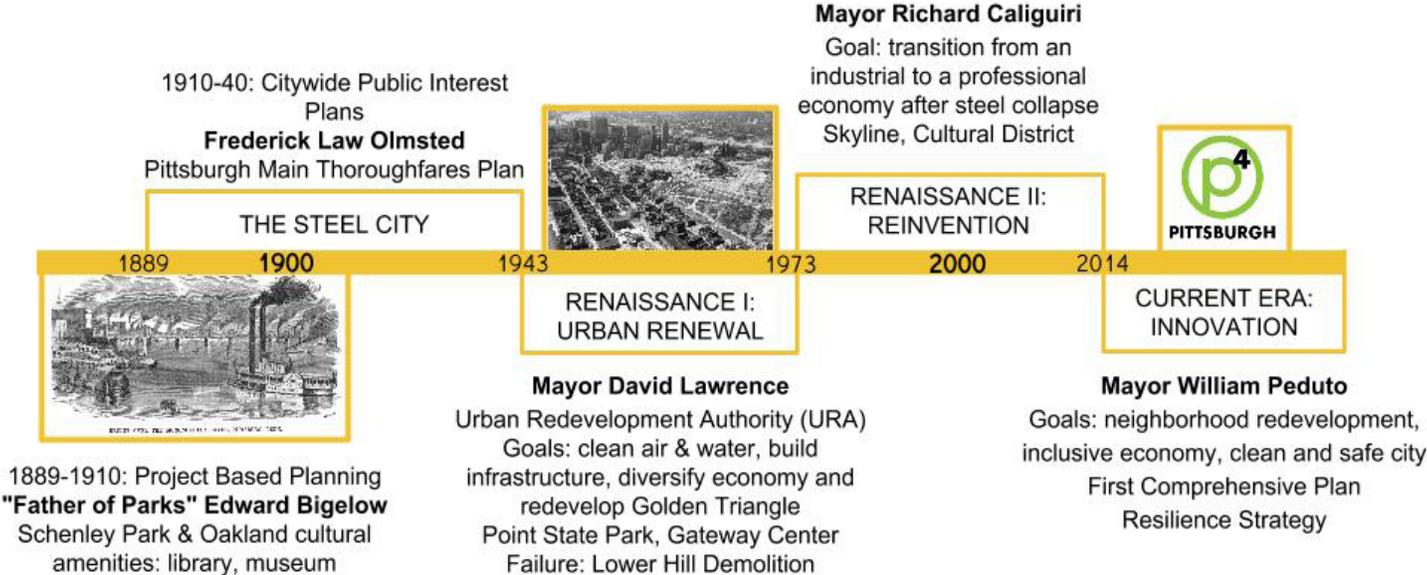


PITTSBURGH'S PLANNING HISTORY

Pittsburgh's modern planning history is comprised of four distinct eras:

- The Steel City
- Renaissance I: Urban Renewal
- Renaissance II: Reinvention
- Current Era: Innovation

Figure 7 Pittsburgh's Planning History



A defining element of Pittsburgh's current planning era is p4, an initiative by the Heinz Endowments and the City of Pittsburgh to set a new course for urban development that is "innovative, inclusive and sustainable."¹⁰ p4, comprised of People, Planet, Place, and Performance, will be a unifying framework for development and redevelopment in the city. The framework is a tool to prioritize public and private sector investments; set measurable standards for community participation and benefit; implement environmentally sustainable development; and encourage connectivity, accessibility and art.

As noted in the description of p4, sustainability via inclusive innovation is at the core of civic conversations about Pittsburgh's future. This is a key objective of the resilience strategy. The resilience strategy will unite and expand upon complementary initiatives throughout the city. This will be a strategy that not only positions the city for a positive growth trajectory, but one that will help the city react to inevitable disturbances.

Figure 8 Current City Plans



Additional plans in development include the Hazard Mitigation Plan, the City's first Comprehensive Plan, p4, the Greenways Plan and the EcoInnovation District Plan among others

BOOM, BUST, AND REBOUND

The city's narrative is one of ups and downs in population size, industry, and economic development. Pittsburgh will celebrate its 200th anniversary in 2016. The city's population and industrial power rose in the late 19th and early 20th century as the Industrial Era emerged. Steel became the city's great economic engine – at the height of the steel boom, Pittsburgh was producing 25 million tons of steel every year, which was 60 percent of total national production.¹¹ The steel and industrial boom led to investments in the city's physical infrastructure as well as its educational and cultural institutions, led by industrialists and financiers such as Andrew Carnegie, Andrew Mellon, and Henry Clay Frick.

The city continued to grow through the early decades of the 20th century, and the population peaked mid-century at 677,000 residents. Heavy industry, mining, and steel production provided jobs, prominence, and money to the region, but also took its toll on city residents and the natural environment, leading to severe air and water pollution, acid mine drainage, and polluted soils. This postwar peak was followed by major changes in the international economy, with a rapid growth in steel production in other countries competing with Pittsburgh steel that undercut prices and eventually led to the collapse of the domestic steel industry in Pittsburgh.

The collapse of the steel industry and the shift in US population from the “Rust Belt” to “Sun Belt” cities in the western US led to a substantial population decline in recent decades.¹² The population of the city and metropolitan area continued to decline after the economic collapse of the 1980s into the new millennium, and only recently stabilized at less than half of its peak population. The city retained both the vibrant cultural heritage and the architecture and infrastructure built during its Industrial Era peak despite this decline.

There is renewed interest in Pittsburgh as a place to live and work due to the low cost of living, cultural amenities, and economic development in higher education, technology and healthcare sectors. Because of the cultural capital and infrastructure built in the early 20th century, Pittsburgh can offer residents opportunities most often present in much larger cities, but with a cost of living that is 2.7% below the national average. Public and private sector organizations have also invested substantially in cleaning up the city's industrial legacy and creating new economic and residential opportunities. For example, there are many organizations that have helped turn the city's riverfronts from post-industrial brownfields into recreational sites, green space, and residential and commercial development opportunities.

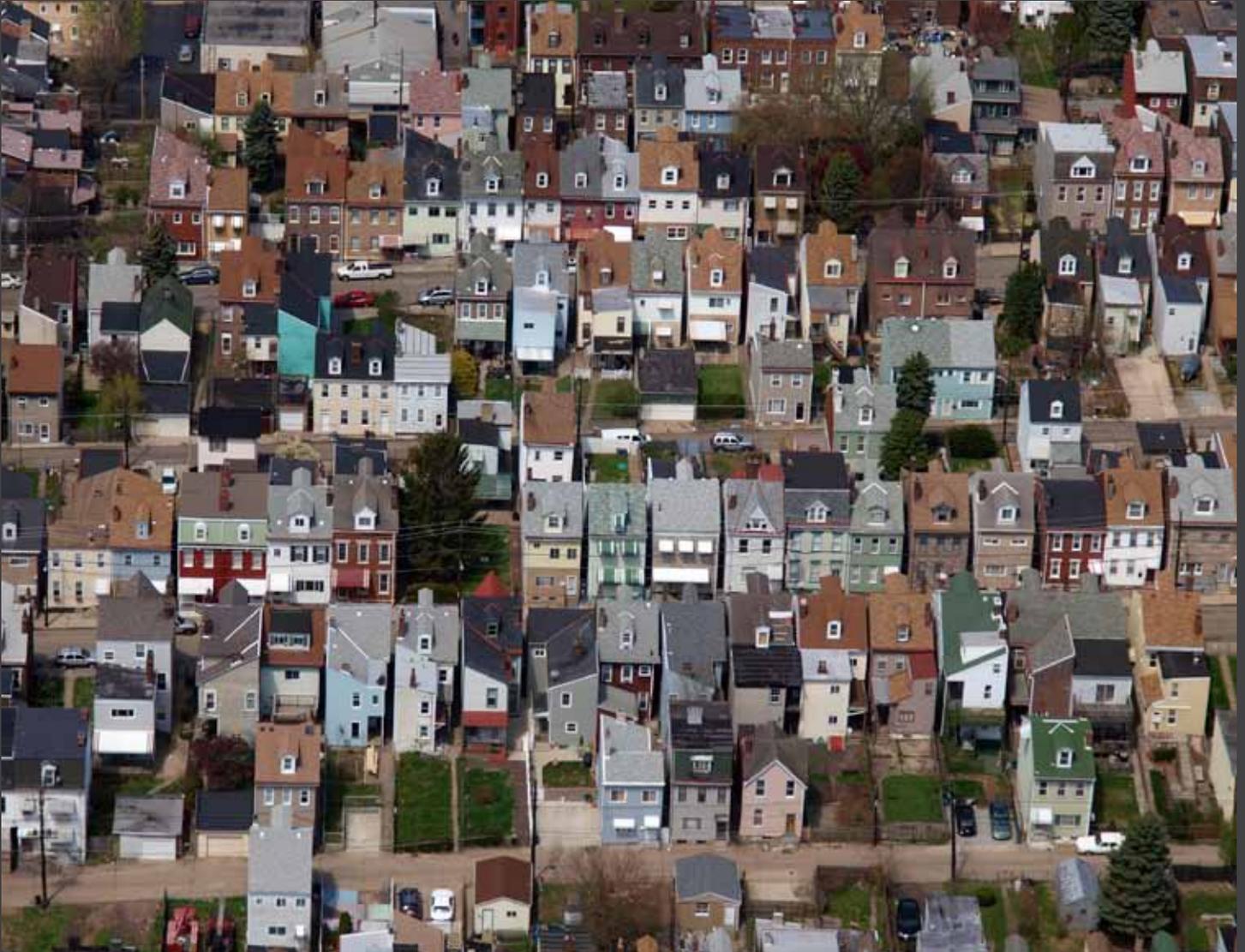
Although Pittsburgh's recent “renaissance” is still unfolding, these collective efforts have transformed the city's narrative from one of loss and decline to a story of resilience and opportunity. The resilience strategy will provide the opportunity to build on these emerging strengths while also addressing existing or emerging gaps and challenges.

LIVING IN PITTSBURGH

The industrial decline of the late 1970s and early 1980s led to downturns in Pittsburgh's economy and population levels, with consequences such as:

- **Surplus capacity of everything from housing stock to water supply.** Pittsburgh's water infrastructure and housing supply were constructed and expanded over its history to support a population of over 670,000 at its 1950 peak, while its current population hovers below half of that.^{3,14}
- **Total population has remained flat, but the population has changed.** The population that stayed in Pittsburgh has maintained crucial human capital in the education system, infrastructure service, and utility management. However as this population ages and transitions, workforce replacement in a variety of industries will require training a new generation.
- **In order to grow, Pittsburgh will have to attract new people from outside the region.** While Pittsburgh experienced a seven percent growth in its population between the ages of 20 to 34 years old since 2008, it currently has some of the lowest all-ages domestic and international immigration rates of any US city, with 3.9 percent and 3.6 percent coming from different US counties and other countries in 2014, respectively.¹⁵⁻¹⁷

Fortunately, Pittsburgh's urban capacity aligns well with the needs of a more globalized world. The data shows that the city has been able to make some progress in stabilizing and diversifying its population. According to the US Census Bureau, the city population declined from approximately 334,000 to 305,000 from 2000 to 2010 (about 9 percent), but from 2010 to 2014 the net loss fell to zero.^{3,18} Population losses are smaller than expected considering Pittsburgh's aging population and relatively low immigration rates.^{19,20} Additionally, the Mayor is undertaking initiatives such as the "Welcoming Pittsburgh" plan to grow the city population by at least 20,000 residents in the next 10 years and make Pittsburgh a more livable city for all, especially international immigrants new to the area.²¹



Pittsburgh's neighborhoods are economically and racially segregated. Pittsburgh's population is approximately 66 percent white and 25 percent black, with Asian Americans, Hispanic Americans, and other ethnicities making up less than 10 percent of the population. The city has faced persistent challenges with neighborhoods segregated by race, ethnicity, and class, with Pittsburgh ranking 22nd worst in the country and 7th among peer cities for residential segregation.^{22,23}

Although the city is often ranked highly in overall livability due to its low cost of living and wide range of economic, cultural, and recreational opportunities, these opportunities are not universally shared. Many Pittsburgh residents, including about 30 percent of the city's African-American population,²⁴ live in communities that have not fully experienced the city's economic recovery and face economic and racial inequity. For example, the median household income between 2007 and 2011 for white, non-Hispanic Pittsburgh residents was \$37,161. Median income for black residents, by contrast, was only \$21,790, below the poverty line for a family of four.²⁵ Populations of color in Pittsburgh also experience disparities in key health risks and outcomes, including environmental hazards (greater exposure to air toxins), higher smoking rates, more hospitalization due to asthma, and higher infant mortality rates.²⁶

The city and region's population has also skewed older in recent decades. The proportion of elderly residents (age 65 and older) in Allegheny County was 16.7 percent in 2010, compared with 13 percent for the nation as a whole. This proportion is projected to grow to 21 percent by 2040, mirroring national demographic trends.²⁷ An aging population poses challenges in terms of city and regional services, workforce maintenance and growth, and provision of healthcare and public health services. It also could leave the city more vulnerable to future shocks such as heat waves if residents and emergency officials are not adequately prepared. As a result, this demographic trend is an important one to address in the resilience strategy.

However, Pittsburgh is fairly well-positioned to accommodate increased demand for more acute and sophisticated health care services. There are 19 hospitals in the city- almost half of them owned by one of the city's main health care organizations, UPMC- and 15 ambulatory surgical centers.²⁸ Ninety percent of Pittsburghers have healthcare coverage, putting it above most of its peer cities.^{29,30} However, the city still struggles with chronic health issues: the Allegheny County Health Department's Plan for a Healthier Allegheny, for instance, prioritized five critical areas to improve the health of the county: Access; Chronic Disease Health Risk Behaviors; Mental Health and Substance Use Disorders; Environment; and Maternal and Child Health.²⁶

Pittsburgh provides high quality post-secondary educational opportunities, but primary and secondary education yields mixed outcomes. The City of Pittsburgh, home to eight colleges and universities, including the University of Pittsburgh and Carnegie Mellon University, is known for both the quantity and quality of its institutions of higher education. The city's primary and secondary education system, however, faces challenges with fragmentation, a reputation for poor performance, and low public school capture rates.³¹ Allegheny County alone contains 42 different school districts,³² each of which operate independently, in addition to an assemblage of charter and independent schools. While the City does not have direct jurisdiction over the school system, the resilience strategy will explore how education and schools can build resilience by creating pathways to opportunity and strengthening neighborhood cohesion.

ECONOMY AND WORKFORCE

A new Pittsburgh economy has emerged in the last two decades after the city suffered its industrial collapse. In 2003, the city was identified as a financially distressed municipality under Pennsylvania's Act 47.³³ This began a process of restructuring for the City's public finances (taxation and public spending) alongside the dramatic changes in the private sector economy. While Pittsburgh's poverty rate still hovers around 23 percent, the city is working to establish an inclusive new economy.^{29,34} Pittsburgh's new economy builds directly on its many educational institutions, rich cultural legacy, and history of philanthropic investment within the community.

Pittsburgh's economy is now reliant on the health care, education, and technology sectors. In fact, 21 percent of the city's working population is employed in the education or health sector.³⁵ An emerging technology and robotics sector in the city builds on research conducted at Carnegie Mellon University, the University of Pittsburgh, and other local research institutions. Other key industries across the region include finance and energy, especially because of recent technological innovations that allow for natural gas fracking in the Marcellus and Utica Shale formations. The decline in manufacturing jobs, once a key sector in the city, has since stabilized, though the number of manufacturing jobs in the city is less than 90% of what it was in 2005.³⁶

Pittsburghers are not employed proportionately in the city's key industries. Non-white workers make up an average of only 10 percent of the workforce in the city's top industries, and African American males in particular make up only 5.4 percent of the total workforce in the city.^{37,38} As the city's workforce ages, a variety of initiatives are working to ensure people of color have access to the education and opportunities that will create a more diverse and equitable workforce. Also, employment opportunities in information technology, health care, and the energy industry are creating economic stability that is attracting a younger and multicultural workforce to the area.¹⁹

The city also benefits economically from its original legacy as a key port and crossroad in the Ohio River Valley. Almost 120 million tons of cargo pass through the Port of Pittsburgh on the rivers every year,³⁹ while over 1 billion tons of cargo are transshipped via road or rail through the metropolitan area.⁴⁰ In total, the Pittsburgh metropolitan region produces 135.7 billion in terms of GDP.⁴¹ Community-focused non-profits employ a large number of Pittsburghers, with nearly 9 percent of residents employed in the non-profit sector.⁴² Finally, Pittsburgh's cultural amenities and economic resurgence have led to an increase in tourism in the city. Tourism currently brings in about \$5.6 billion to the region, and provides 40,000 residents with jobs.⁴³

Pittsburgh is also diversifying its economy by growing small businesses and start-ups. While health, education and technology sectors have shown rapid growth, they can also be volatile. There is some concern that the economy may be too reliant on these sectors. Further, these sectors are influenced by a range of external impacts from federal policies. The city also has the capacity to support emerging or new economic models. In 2014, for instance, \$333 million in venture capital funding went into 39 new companies, a 168 percent increase in dollars invested from 2013, and over 400 companies have been started out of projects at local universities in the past 15 years.⁴⁴ The city also has an active “maker movement,” which fuses its manufacturing past with modern innovation and experimentation.

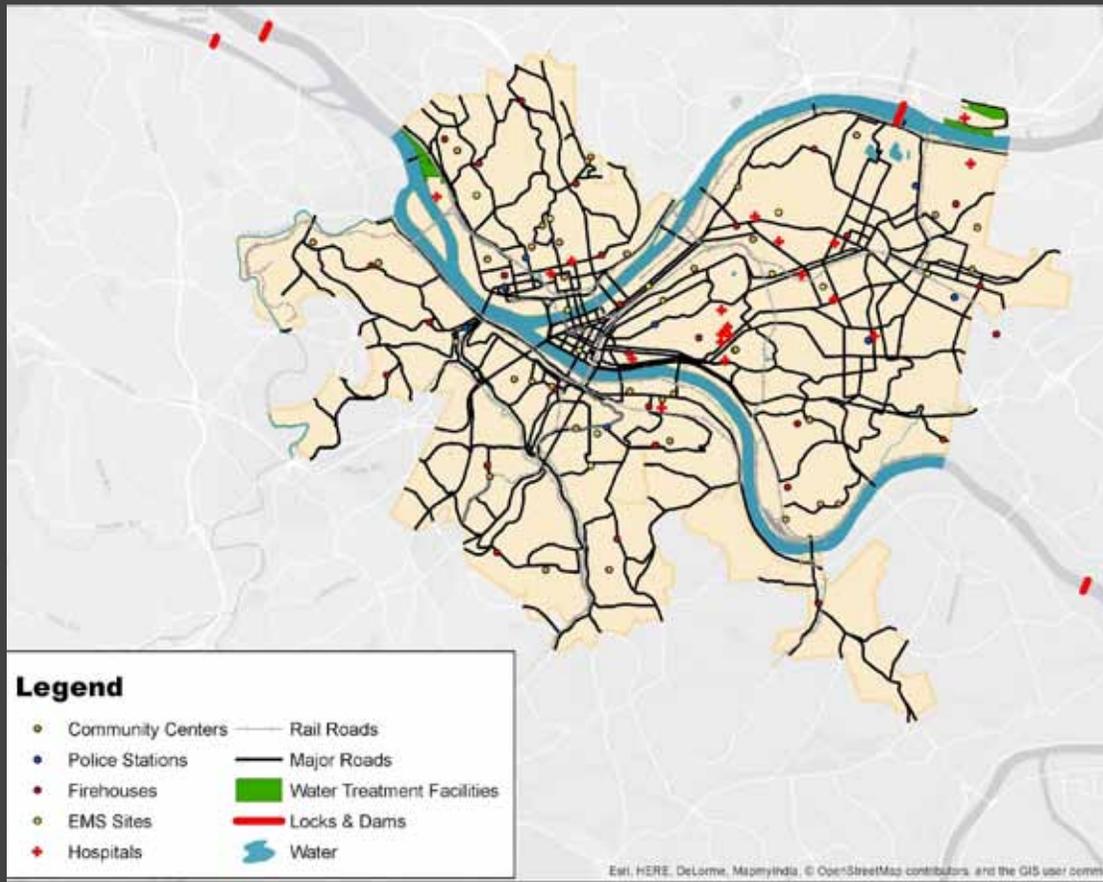
While the city has observed growth in startups and new small business formation, incubators for emerging business ideas, and accelerator programs to help support early stage entrepreneurs, Pittsburgh still lags behind peer cities in the number of new businesses per capita. However, the city does have a large number of small businesses over 5 years old.⁴⁵ The staying power of these “Main Street” businesses improves the city’s economic resilience. **The challenge moving forward will be to grow new and emerging industries and inclusive employment opportunities, building on strengths while diversifying to prevent a future economic collapse.**

PHYSICAL AND NATURAL INFRASTRUCTURE

Investments during Pittsburgh’s industrial peak created a large base of physical infrastructure, but much of it is now in disrepair and requires substantial re-investment. A large quantity of roadways and bridges, rail lines, waterways, locks and dams, building stock and housing are overbuilt across the city. Much of this infrastructure was built 50-100 years ago, sized for a much larger population, and is currently in need of substantial repair or replacement. In total, the American Society of Civil Engineers estimates that the state of Pennsylvania requires at least \$80 billion in total reinvestment, a sum split primarily between Pittsburgh and Philadelphia.⁴⁶

- **Water and sewer system:** Allegheny County’s sanitary sewer system, which services the city and 82 neighboring communities, is aging, poorly maintained, and inadequately sized to capture and treat stormwater during the region’s frequent wet weather events. As a result, combined sewer overflows into the rivers are a regular occurrence—over 9 billion gallons of combined stormwater and wastewater overflows in a typical year—along with sewage backups, which often result in road and business closures. Pittsburgh Water and Sewer Authority’s (PWSA) drinking water system is similarly strained, and loses at least one quarter of water treated at its single treatment plant to pipe leaks or bursts.⁴⁷
- **Transportation system:** The city’s road and river transportation modes are also strained by age, capacity, and limited financial investment. Because of the city’s hills, valleys and waterways, any failure to a key road, tunnel or bridge could immobilize residents, potentially isolating thousands of individuals until access is restored. Pittsburgh’s drinking water intake, river navigation and shipping system depend on an aging lock and dam system that is in need of repair and well past its planned service life.¹ A failure in that system could cause a public health crisis and cripple economic activity.
- **Housing stock:** Much of the housing stock was built in the early to mid-20th century and is still in place. However, abandoned or vacant properties are a regular feature in many neighborhoods. In addition to needing either demolition or substantial repairs to be habitable once again, these vacant properties blight struggling neighborhoods and further strain city services that rely on property tax income.
- **Energy grid:** Pittsburgh relies on a large-scale, interconnected electricity distribution system⁴⁸ which is fueled by a variety of sources, including coal, natural gas, and nuclear energy, with a small proportion fueled by renewables.⁴⁹ About 12% of Pittsburghers heat their homes with electricity, with the majority of households (76.7%) relying on piped gas for their heat source.⁵⁰ New developments in the district energy space aim to create a more resilient distributed energy grid less prone to capacity loss.⁵¹
- **Telecommunication networks:** Networks including cellular and internet services, are unevenly distributed throughout the city. Public wireless networks exist downtown and in specific neighborhoods via the PittMesh initiative, but many citizens still lack internet access.^{34,52} Many areas of the city also have poor cellular coverage, exacerbating the digital divide that disadvantages certain residents.⁵³

Figure 9 Map of Pittsburgh's Critical Infrastructure

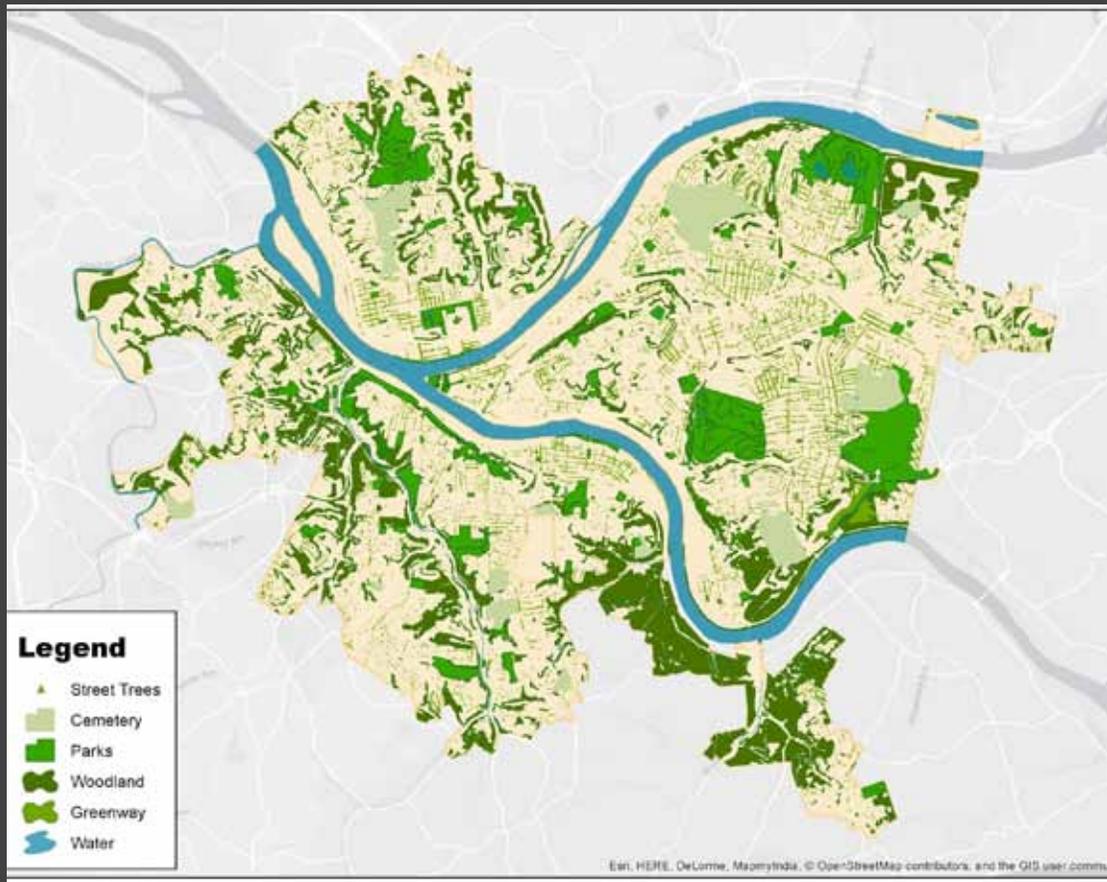


Source: City of Pittsburgh, 2016

Western Pennsylvania also includes a wealth of natural infrastructure, including forests, waterways, and other habitats, that are sustained by Pittsburgh's relatively wet climate. The City and Allegheny County manage over 15,000 acres of parks or urban forest, providing a green landscape and recreational opportunities for residents and visitors (Figure 5).^{54,55} Active conservation by city and county park organizations has expanded and improved these amenities in recent years. Almost 40,000 trees, amounting to 41% tree cover, were inventoried in the city and found to provide over \$2.24 million in ecobenefits each year.⁵⁶⁻⁵⁸ Estimates indicate Pittsburgh's urban forest redirects 15 million gallons of stormwater and removes 27,936 pounds of air pollutants each year.⁵⁶ The city also has policies, organizations, and natural assets to support urban agriculture and local food systems, including a number of community gardens and strategic uses of vacant land.⁵⁹ The resilience strategy will expand the reach and impact of these assets.

However, the region's tree canopy is susceptible to pests and other risk factors. An alarming 67% of the City's tree canopy is at risk of destruction by the Asian Longhorned Beetle. The Emerald Ash Borer was first located in Pittsburgh in 2007, and attacks all Ash trees, which make up nine percent of the city's tree canopy. Other threats include fungus, disease and invasive plant species. A decrease in tree canopy would not only reduce air and water quality and stormwater benefits, but destabilize hillsides as well.⁵⁶

Figure 10 Map of Pittsburgh's Natural Infrastructure



Source: City of Pittsburgh, 2016

Despite plentiful natural infrastructure, air and water quality issues still present chronic public health and economic challenges in the city. The US Environmental Protection Agency has categorized the region as an air quality nonattainment area. Though air quality has improved over time, Pittsburgh still ranks among the dirtiest monitored urban areas for air pollution and respiratory illness in the US.⁶⁰ Factors such as carbon intensive regional energy production, industry, transportation, and land use patterns directly impact the region's indoor and outdoor air quality. In addition, aging and outdated water management infrastructure, coupled with unsustainable land use patterns, have strained the region's water resources and turned one of the city's greatest assets into an environmental and public health hazard. In its Plan for a Healthier Allegheny, for instance, the Allegheny Health Department has prioritized improving air and water quality among other key public health objectives.²⁶

DEVELOPING THE PRELIMINARY RESILIENCE ASSESSMENT

The Preliminary Resilience Assessment (PRA) is a detailed snapshot of the current state of resilience in the city, providing a foundation based on data as well as resident and stakeholder perceptions to support strategy development. To develop this assessment, the Resilient Pittsburgh Team collected data via desktop research and an extensive stakeholder engagement process. Research and one-on-one conversations yielded data from the City of Pittsburgh and other data providers, including the Western Pennsylvania Regional Data Resource Center (WPRDC), Allegheny County Department of Human Services, the Allegheny County Health Department, and others. These data sources contributed information on Pittsburgh's assets, risks (shocks and stresses), and ongoing actions summarized in this PRA.

Stakeholder engagement activities included an agenda-setting workshop, one in-depth workshop with city leaders, six sector-based focus groups, and two Deliberative Democracy forums with community members. These activities contributed information on key assets, prioritization of shocks and stresses, perceptions of the City of Pittsburgh's strengths and weaknesses, and ongoing resilience building actions. To date, the resilience process has engaged almost 800 people.

Figure 11 Methods of Data Collection and Stakeholder Engagement in Phase I

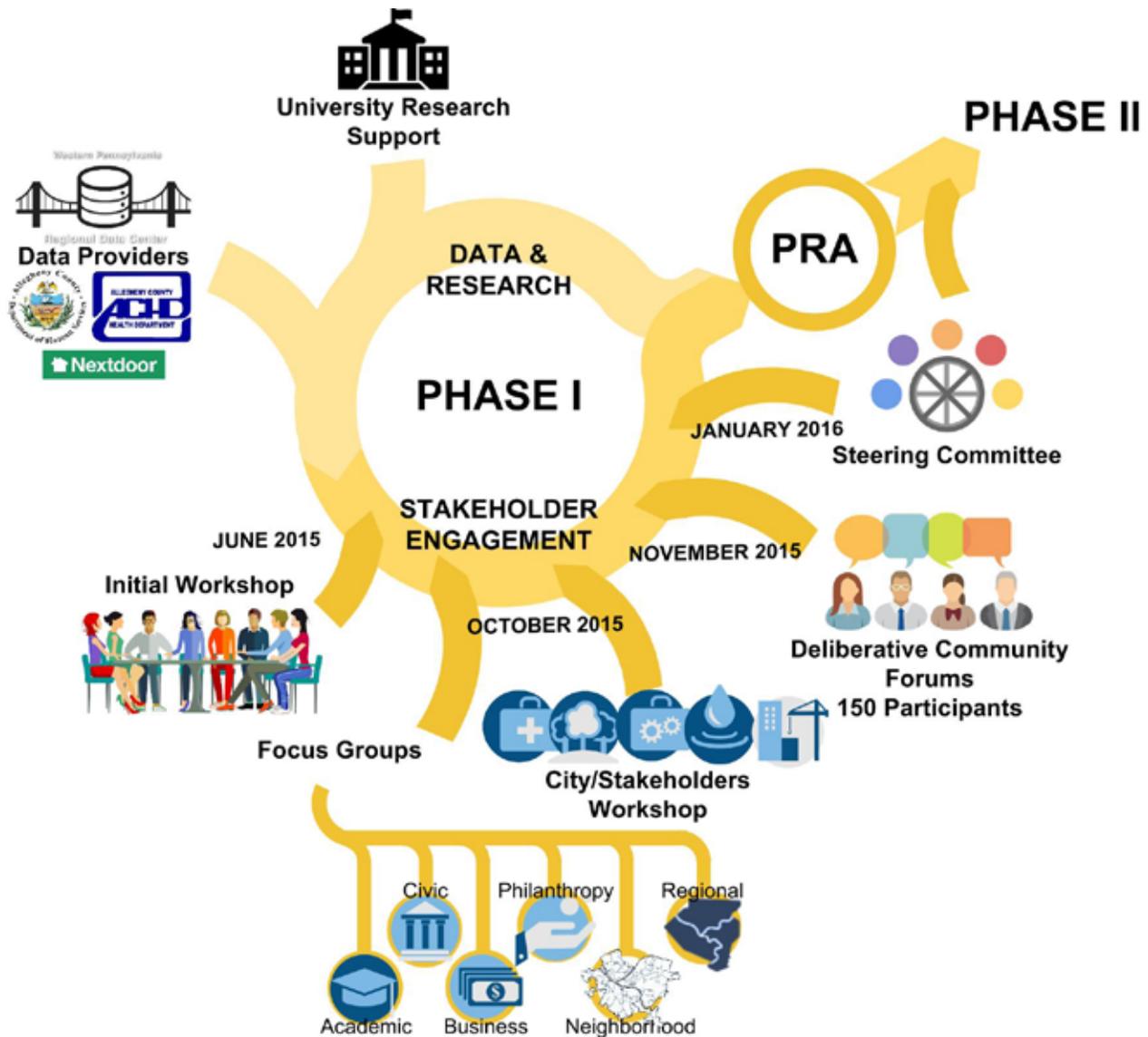


Figure 12 Photographs from June 5, 2015 Agenda Setting workshop (top) and November 19, 2015 East Liberty Deliberative Democracy forum (bottom)

Photo credit: Maren Cook



Photo credit: Maren Cook



Photo credit: Michael Mages



Figure 13 Participants in Phase I by Sector

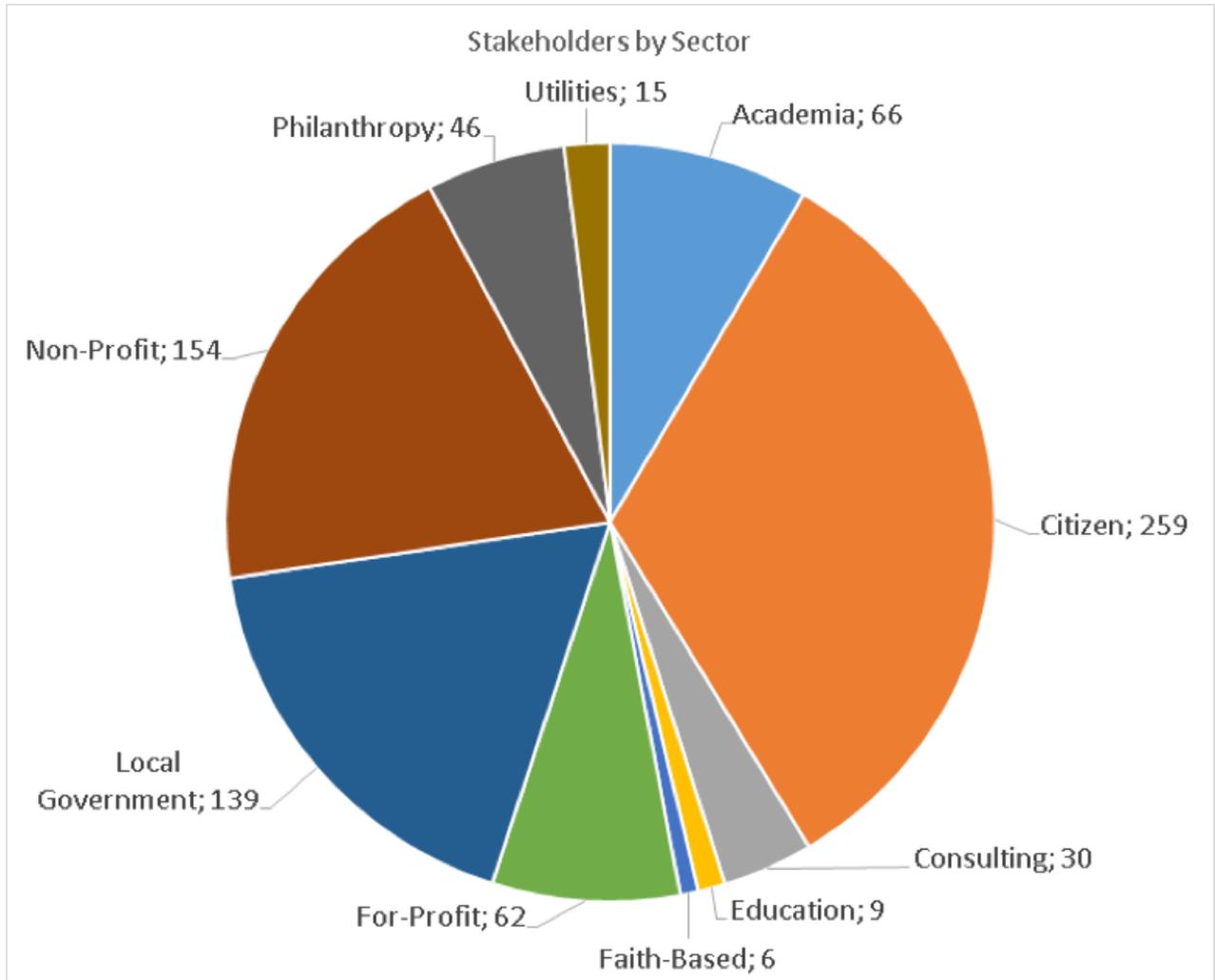
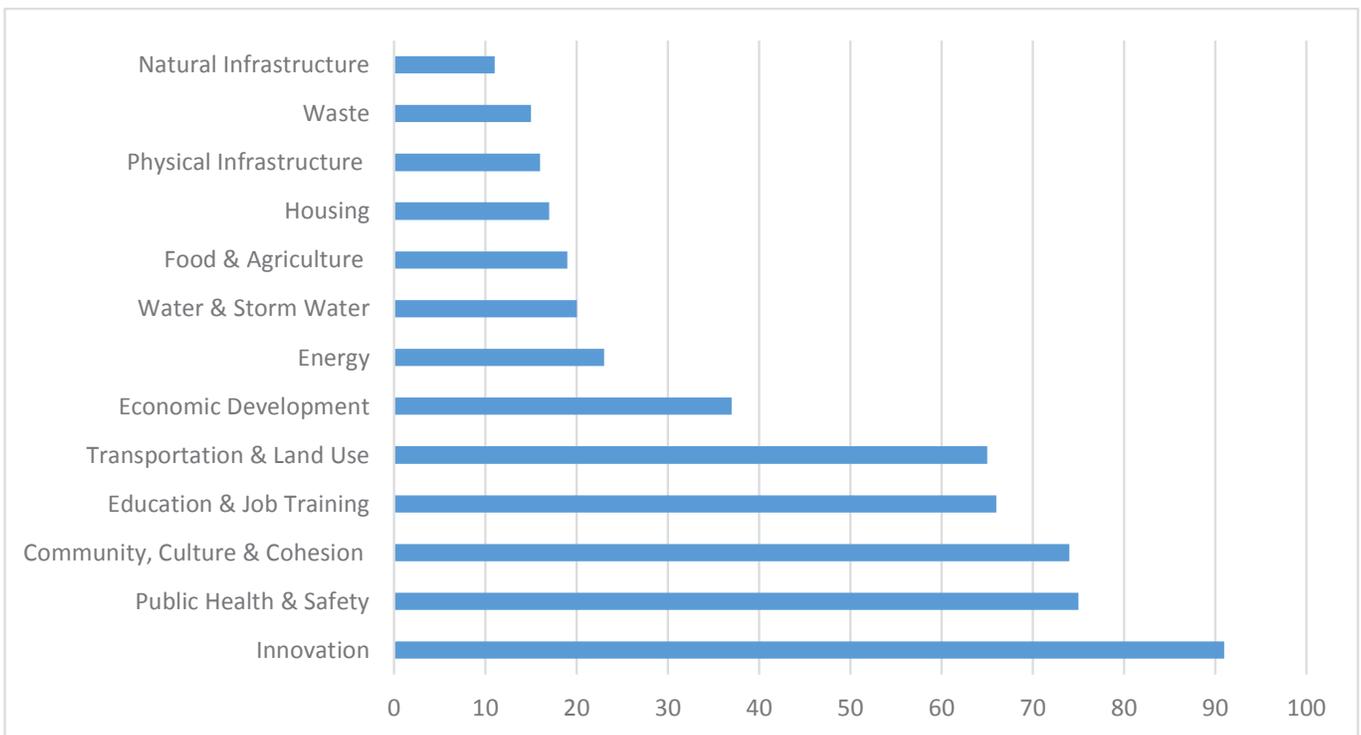


Figure 14 Participants in Phase I by Interest Area



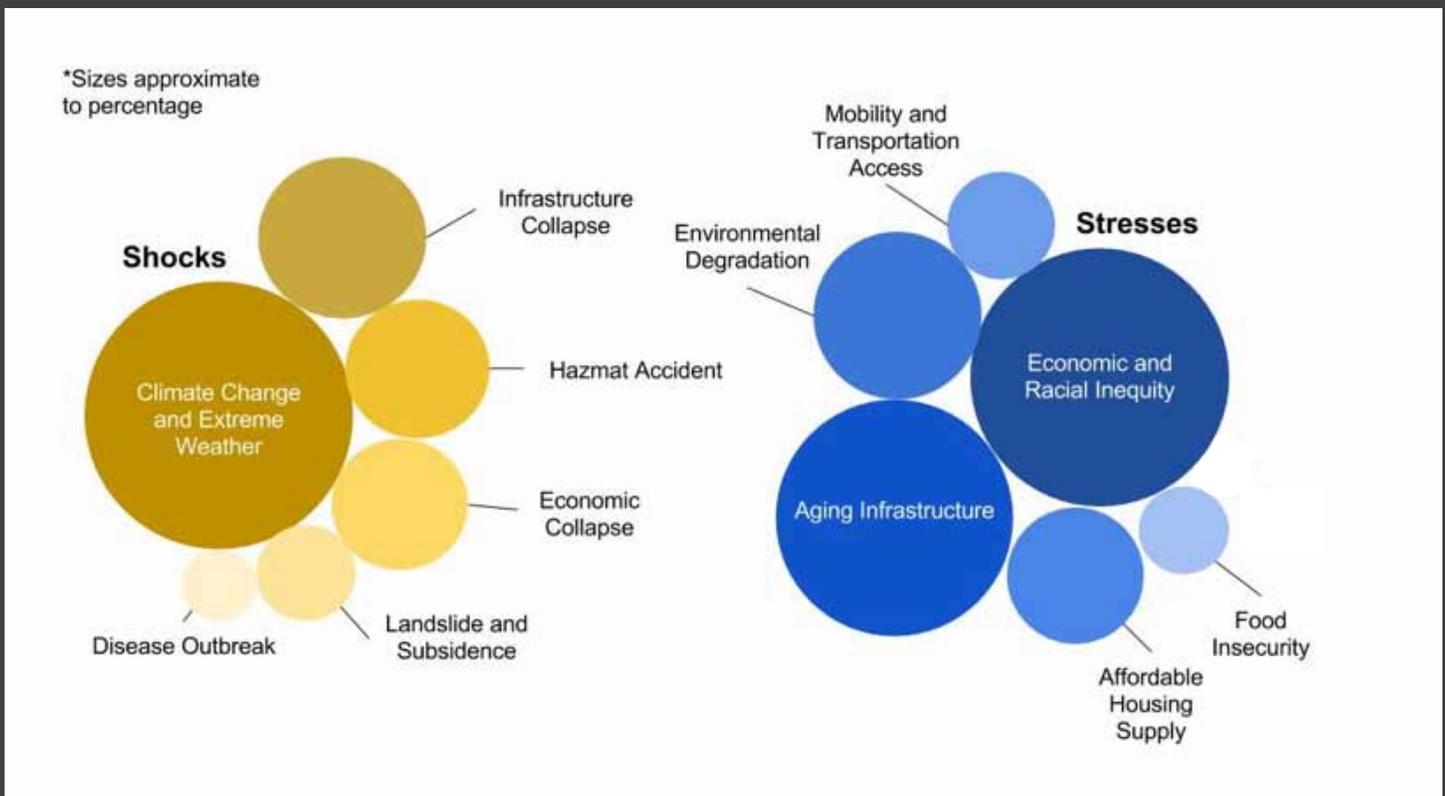
PITTSBURGH'S RISK PROFILE: KEY SHOCKS AND STRESSES

In its 100 Resilient Cities application, the City of Pittsburgh identified infrastructure failures, flooding, hazardous materials incidents, and heat waves as the sudden shocks that most threaten city resilience, in order of likelihood and severity. In terms of chronic stresses, the city's top identified priorities were environmental degradation (via air and water pollution), aging infrastructure, a declining or aging population, and shifting macroeconomic trends over time.

Stakeholder conversations and review of city data during Phase I of the resilience strategy process generally supported the priorities the city identified. The Resilient Pittsburgh team considered quantitative data on Pittsburgh's risks, stakeholder input on priorities, and opportunities to implement actions with co-benefits across shocks and stresses in order to determine the list of priority shocks and stresses discussed in this section.

Natural groupings emerged from the priority stresses identified in Phase I. In conversations with stakeholders and community members, the Resilient Pittsburgh team noted that issues of equity and access, including economic and racial inequity and food access and supply, were predominant concerns. Other frequently mentioned stresses relate to Pittsburgh's physical and natural infrastructure, including aging infrastructure and air, water and soil quality issues. Stresses related to mobility and transportation and affordable housing bridge these two domains. This suggests that Pittsburgh's risk profile has a central node of equitable access to reliable and robust infrastructure. The interconnection of the city's shocks and stresses creates opportunities for co-benefits, where a single action can both alleviate a stress and reduce the risk of a shock. For example, street trees clean air, absorb stormwater and prevent flooding, and also reduce urban heat, which improves the health of residents and reduces summer cooling bills.

Figure 15 Priority Shocks and Stresses



NOTE: Bubble size reflects the number of times stakeholders and community members referenced a specific shock or stress.

In addition to the priority shocks and stresses identified by the city, a few stakeholders highlighted other risks facing the city to be considered or addressed in concert with the city's priority risks. These risks included lack of affordable housing, food access issues and food insecurity, chronic disease, mental health and substance abuse, lack of ethnic diversity, and invasive species, like the Emerald Ash Borer and the Asian Longhorned Beetle, that threaten natural infrastructure. Some city-identified risks were hardly mentioned by stakeholders if at all, including a large influx of migrants or refugees or the possibility of a cyberattack.

Acute Shocks

Acute Shocks are sudden, large-scale disasters that disrupt city services and threaten residents. Pittsburgh's stable inland location, plentiful precipitation and hilly landscape place it at less risk from catastrophic natural disasters like coastal flooding or hurricanes, earthquakes, droughts or tornadoes, which threaten other cities in the 100RC network. However, Pittsburgh still faces risks from a number of acute shocks, including environmental shocks such as severe rainfall or winter storms, riverine or flash flooding, and heat waves; economic shocks such as industry collapse and bank failure; and social shocks such as food shortages and disease outbreak.

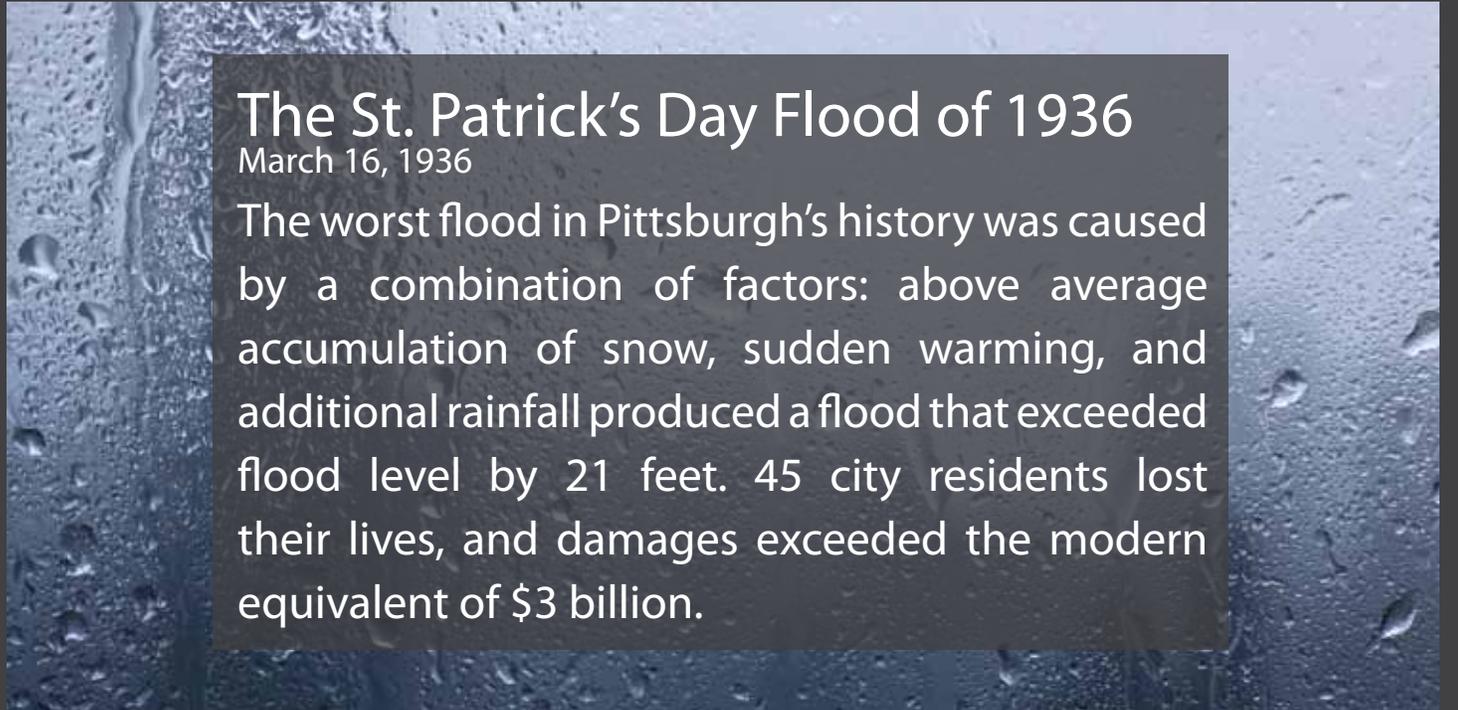
Looking forward, the resilience strategy must grapple with and address the following priority shocks, while also building capacity to deal with other disasters that may be less likely or severe.

Extreme Weather Events

Pittsburgh confronts a variety of challenges from extreme weather. Much of the city is adjacent to rivers and their floodplains, and local weather patterns can produce a range of extreme precipitation events. Such events have caused major disasters in the city's history, but climate change could make extreme weather events in Pittsburgh either more frequent, more intense, or both.⁶¹

Precipitation and Flooding

Pittsburgh's neighborhoods are at risk from flash floods and riverine flooding. This is due to prevalence of impervious surfaces, hills, issues with stormwater management capacity, and changes in precipitation patterns. Areas in the City of Pittsburgh experienced 11 significant flash flooding events between 2007 and 2013, including the 2011 Washington Boulevard floods that took the lives of 4 people.¹ River flooding is also a continued threat due to the location of the city at the convergence of three rivers. These risks have been managed since the U.S. Army Corps of Engineers began building flood control infrastructure along the major rivers following the 1936 flood,⁶³ but an upstream flood coupled with the failure of aging locks and dams could nevertheless lead to a major flood event in the heart of the city. As of 2001, Downtown Pittsburgh had experienced at least 4 "100-year" floods over the past century alone.⁶³

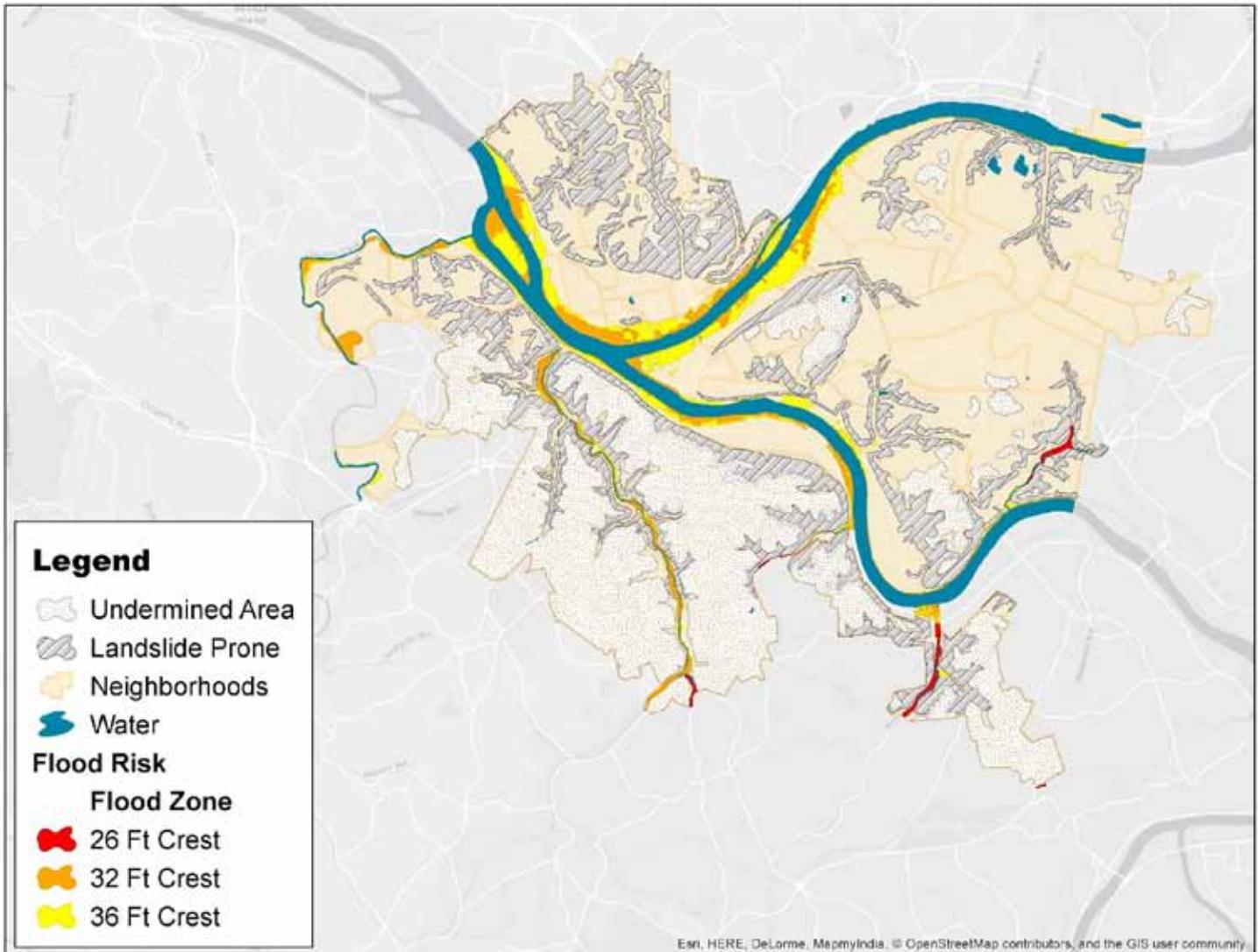


The St. Patrick's Day Flood of 1936

March 16, 1936

The worst flood in Pittsburgh's history was caused by a combination of factors: above average accumulation of snow, sudden warming, and additional rainfall produced a flood that exceeded flood level by 21 feet. 45 city residents lost their lives, and damages exceeded the modern equivalent of \$3 billion.

Figure 16 Map of Pittsburgh Landslide, Subsidence and Flood Risk



Source: City of Pittsburgh, 2016

Winter storms

Large winter storms are relatively common in Pennsylvania, and are expected to happen more frequently.

Major winter storms occur an average of 5 times per year in Pennsylvania, and since 2003 Pittsburgh has experienced three major snowstorms which led to emergency declarations.¹ In the coming decades, the Northeastern United States is projected to experience a greater number of major winter storms, with an average precipitation increase of 5 to 20 percent.⁶²

Extreme temperatures

Extreme hot and cold temperatures are expected to have a greater impact on the city in the future.

Long and extended cold spells are common during winters in Pittsburgh, with the longest stretch of sub-zero temperatures being 52 hours in January 1994, when temperatures reached -22° F.¹ On the flipside, the climate is warming and temperature fluctuations are increasing. Pittsburgh also experiences urban heat island effect, where cities with more thermal mass tend to be 1 to 3 degrees warmer than surrounding more rural areas.⁶⁵ Pittsburgh is expected to see 15 to 30 extreme heat days per year, an increase from the 9 to 13 experienced between 2000 and 2009.^{66,67} Pittsburgh's aging population and housing infrastructure, including outdated heating and cooling systems, place residents at increased risk of negative health effects stemming from extreme temperatures.⁶⁵

Infrastructure Failure

Due to the age and condition of much of the City of Pittsburgh's infrastructure (discussed in detail in the "Stresses" section of this report), and with the potential strain placed on infrastructure with extreme weather, the possibility of infrastructure failure is a growing concern. Because of the city's dynamic topography of hills, valleys, and waterways, for instance, any failure to a key road, tunnel, or bridge could immobilize residents, potentially isolating thousands of individuals until access is restored.

- **Energy grid failure:** The city relies on a large-scale, interconnected electricity distribution system.⁴⁸ Temporary power outages are common in the city, and are likely to increase as the energy grid is strained during extreme weather events.¹ During the polar vortex of 2014, a regional transmission operator lost 22 percent of its capacity; demand was close to exceeding supply.⁶⁸
- **Bridge failure:** Allegheny County maintains 557 bridges, nine of which are major river crossings; the City of Pittsburgh owns 186 bridges; and the two major railroad companies in the region also own and maintain bridges.⁶⁹⁻⁷¹ As of 2011, 30 percent of the bridges in Pittsburgh were considered structurally deficient.⁷²
- **Lock and dam failure:** Pittsburgh and the surrounding river system contain 23 locks and dams used to regulate water flow, transportation, and water supply to the city. Many of the locks and dams were constructed during the mid-20th century and have had few, if any repairs made since. In fact, only 5 of the 23 locks or dams have had any repairs made, most occurring before the 1990s.¹ A lock and dam failure could mean that the City loses the ability to draw and treat potable water, a key power plant could not receive fuel by barge, and hazardous materials could spill into the rivers.

Hazardous Materials Incidents

Hazardous materials are transported directly through the City of Pittsburgh by road, rail, and barge. Pittsburgh is a hub for a series of major transportation routes, including I-376, I-279, Route 28, Route 65, several rail lines, and the three rivers.¹ A derailment, spill, or explosion could directly affect a large segment of the population. Six train derailments occurred in Allegheny County between January and September 2015 alone (second most of any PA county).⁷³

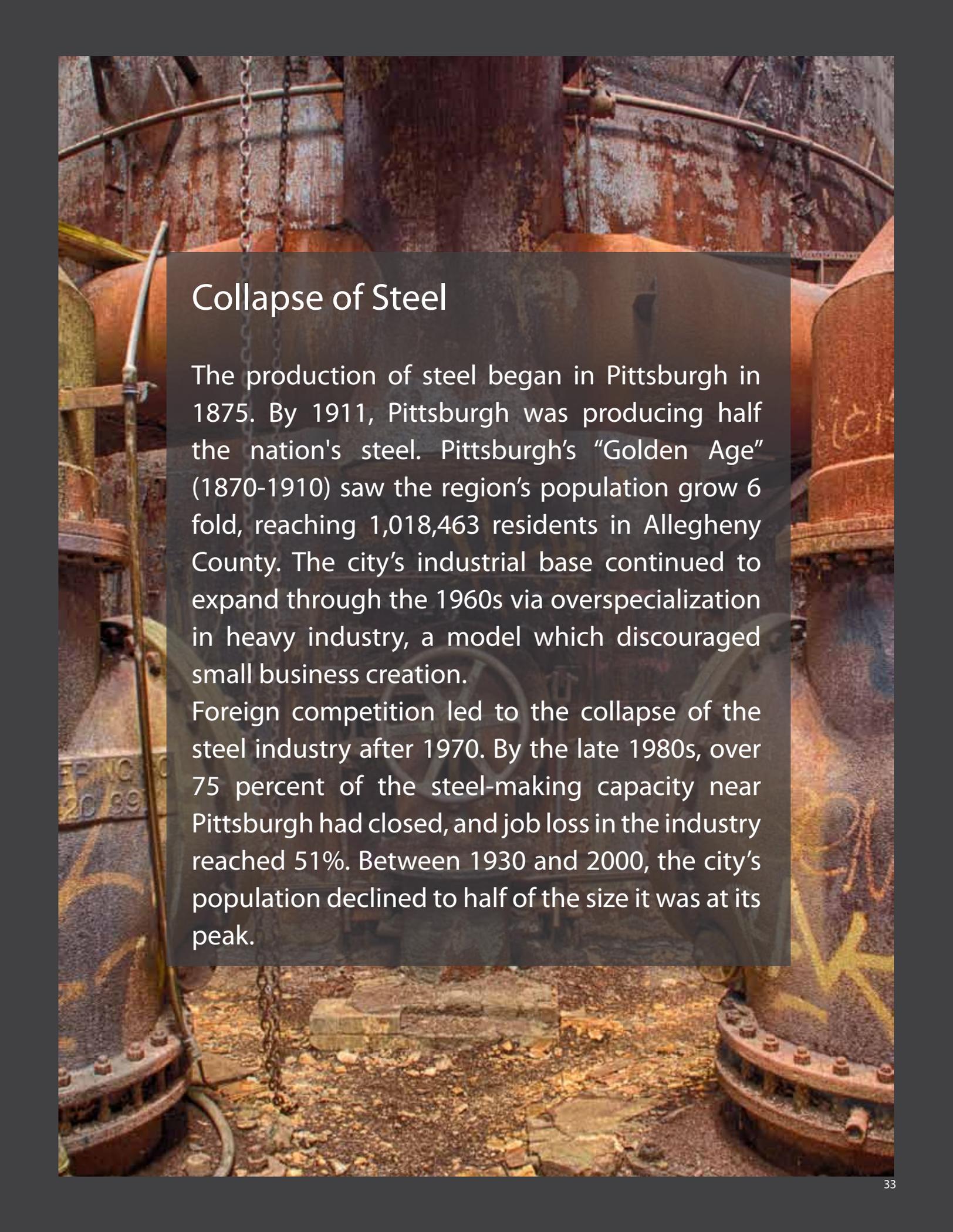
Extraction of natural gas from Marcellus and Utica Shale formations also poses safety risks to the region. Natural gas is one of several flammable and toxic materials that frequently travel through the city. There are 63 active natural gas drilling wells in Allegheny County and 1,146 wells in neighboring Washington County,⁷⁴ and an estimated 1.5 million people in Pennsylvania live in an area that could be affected by a train derailment resulting in a fire.⁷⁵

Landslides and Subsidence

Landslides and subsidence incidents regularly affect parts of the city, and may only get worse. The city and region have a long history of coal extraction and undermining, putting many areas at risk for subsidence and sink holes, in addition to the landslide risk of Pittsburgh's fragile hillsides. These risks are exacerbated by extreme weather risks such as extreme rainfall. In fact, 900 structures within the city limits are considered to be in areas "Very Hazardous to Landslides".¹ In recent years, landslides have occurred in the neighborhoods of Oakland, Greenfield and Perry North. Wet weather caused a landslide on Mount Washington in 2014 which covered 100 yards of rail lines, halting train traffic for 2 days.

Economic Collapse

While Pittsburgh's economy is increasingly reliant on the healthcare, education, and technology sectors, these sectors are also experiencing rapid changes. An analysis of healthcare utilization in the city in 2015 indicate that inpatient hospital admissions were down about 1 percent and surgical procedures were down about 6,500 cases in 2014. Though the shrinkage was relatively small, it resulted in local hospitals cutting full-time equivalent employees by 2.2 percent and shrinking salaries and benefits.⁷⁶ The Affordable Care Act is leading to significant changes in the healthcare industry nationwide, while issues with tuition prices and the arguably unsustainably high costs of education plague the higher education system. Locally, some conflicts between two of the city's largest health plans create even more tension. The volatility within two of the main drivers of Pittsburgh's economy create concern about the risk of a significant economic collapse, not unlike that of the steel industry in the mid-20th century. The significant proportion of Pittsburgh residents employed by non-profits would also be negatively impacted by changes in government contracts, public or private grant making, or charitable giving precipitated by, or independent of, other economic shifts. Overall, significant changes to the sectors Pittsburghers rely on would leave a much of the city's population in economic hardship.



Collapse of Steel

The production of steel began in Pittsburgh in 1875. By 1911, Pittsburgh was producing half the nation's steel. Pittsburgh's "Golden Age" (1870-1910) saw the region's population grow 6 fold, reaching 1,018,463 residents in Allegheny County. The city's industrial base continued to expand through the 1960s via overspecialization in heavy industry, a model which discouraged small business creation.

Foreign competition led to the collapse of the steel industry after 1970. By the late 1980s, over 75 percent of the steel-making capacity near Pittsburgh had closed, and job loss in the industry reached 51%. Between 1930 and 2000, the city's population declined to half of the size it was at its peak.

Chronic Stresses

Chronic Stresses are long-term, slow burning issues that overwhelm the capacity of city resources and erode resident well-being. This includes social stresses such as violence and a struggling education system; economic stresses such as poverty and unemployment; and physical and environmental stresses such as aging infrastructure and poor air and water quality. Pittsburgh's priority stresses exist at the intersection of equity, access, and physical and natural infrastructure, which are exacerbated by Pittsburgh's industrial legacy and issues of governance.

Regional fragmentation

The Pittsburgh region experiences fragmentation in governments and nonprofit organizations. As described previously, Pittsburgh is a city of 90 neighborhoods, in a county with 130 municipalities, in a metropolitan region comprised of 10 counties. While neighborhoods are not independently governed, neighborhood boundaries in Pittsburgh are often culturally and practically important. Many organizations and community groups operate at the neighborhood level. At the municipal level, each municipality has independent responsibility for managing infrastructure and administering many local services. A recent study ranked Pittsburgh second for regional fragmentation in the US, with more government units per capita than any other metropolitan area.^{9,77} There are also a great number of nonprofit and philanthropic organizations in the city who are challenged by a lack of coordination in the delivery of community services and neighborhood revitalization efforts. Pittsburgh began the process of drafting its first comprehensive plan in 2012, which will help coordinate projects and investments in the city, but the plan has yet to be completed. This fragmentation complicates planning efforts and requires that diverse stakeholders collaborate, something that continues to challenge the city.

Economic and Racial Inequity: Poverty, Health, Education, and Crime

High rates of violence, poverty, and blight, and an underserved education system continue to impact many of Pittsburgh's communities, particularly those of color. While Pittsburgh is gaining recognition for its quality of life and livability (Most Livable City, Best Place to Retire, etc.), not all of the city's neighborhoods are sharing in the same prosperity. As of 2010, Pittsburgh was considered the 17th most segregated city of the 50 US metropolitan regions with the largest populations of African American residents.⁷⁸ Many of Pittsburgh's heavily African-American neighborhoods experience especially high rates of housing vacancy and blight. For example, in 2011, Pittsburgh's Homewood neighborhood was nearly 44% vacant.⁷⁹ Unemployment rates also show racial patterns with African American men experiencing unemployment rate of 12.2% compared with 5.1% of white men.³⁷

Race-based achievement gaps plague Pittsburgh Public Schools and contribute to inequity as children grow up.

Only 37% of black PPS 3rd-8th graders were reading proficient in 2014, for instance, compared to 45% of black students of the same age statewide, 71% of white PPS students, and 77% of white students statewide.³¹

Populations of color in Pittsburgh also face significant health disparities in domains including exposure to air toxins, smoking rates, hospitalization due to asthma, and infant mortality rates.

²⁶ Additionally, many of Pittsburgh's predominantly African American neighborhoods, including Homewood, Lincoln-Lemington-Belmar, Beechview, and Garfield are considered food deserts and lack access to full-service grocery stores, farmers markets, or other sources of healthy food options.⁸⁰ Overall, around 14% of Pittsburgh residents struggle with food security, and African American residents are at higher risk than white residents.^{81,82}

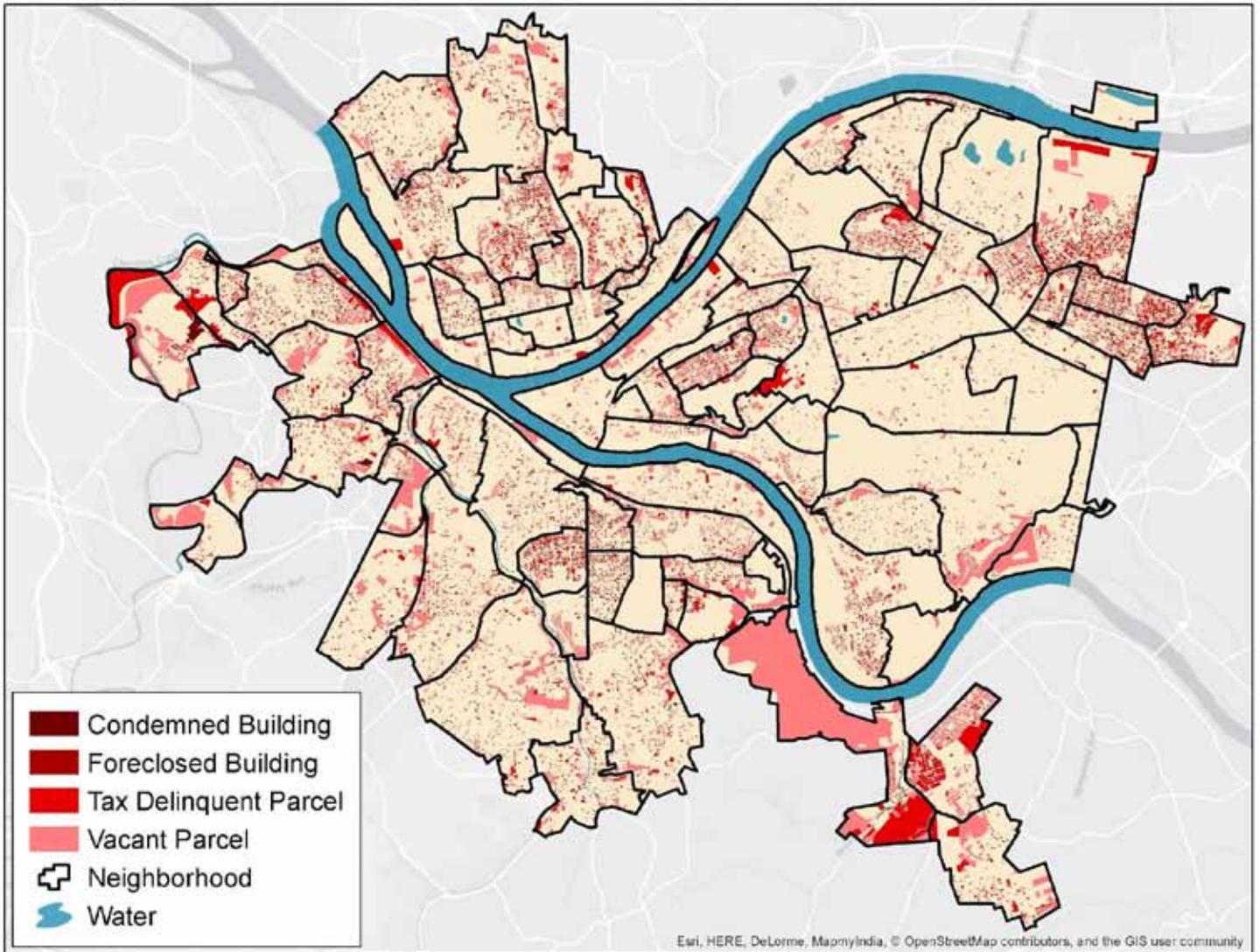
African American populations are also more likely to be involved with the criminal justice system, and to experience crime or violence.

According to the City of Pittsburgh Police Department, 56% of all arrests made during the 2014 calendar year were of African Americans.⁸³ A survey of Pittsburgh residents found that 5.5 percent of African American respondents reported being a victim of a crime, which is three times higher than the percent of respondents of other races reporting victimization.⁸⁴

Inequity in Pittsburgh degrades the city's resilience as a whole.

Persistent poverty and a lack of opportunity, as a result of a struggling education system and ongoing public safety concerns, disadvantage communities of color and certain neighborhoods. A lack of financial resources results in increased neighborhood blight, foreclosures and vacancies, food scarcity, and other issues. These stresses make neighborhoods more vulnerable in times of disaster. They also negatively impact resident quality of life and strain city resources on a day-to-day basis.

Figure 17 Map of Blight Indicators in Pittsburgh



Source: City of Pittsburgh, 2016

Lack of mobility and transportation access

Pittsburgh has a fairly robust transit system, allowing for personal vehicle, public, and active (bike and pedestrian) transportation, but access to transit networks is not equally distributed around the city. Research has found that many disadvantaged neighborhoods lack adequate transportation, making it more difficult to access jobs and resources available in other parts of the city.⁸⁷ Pittsburgh's transit system has the highest transit fares in the country, making it unaffordable for some low-income residents.⁸⁸ While protected bike lanes are being constructed in the city, residents remain concerned with safety issues around bike transit. Surveys of the working population in the city indicate that residents do not take advantage of public or bicycle transit options in large numbers, though some metrics show improvement. Between 2009 and 2013, less than one percent of adult workers biked to work, 9.4% used public transit, and 71.8% drove alone to work.⁸⁹ A recent survey of 20,700 commuters found that 48.9% of respondents drove alone to work or were dropped off, 30% took the bus or light rail (T), and 8.5% biked or walked.⁹⁰

Aging workforce

As Pittsburgh's population growth has remained stagnant following the industrial decline, its workforce has steadily aged. Though the city maintained its education, infrastructure, and utility management workforce, in 2010, 47% of Pittsburgh's workforce was over 45 (with about half of that population being over 55) and in 2014, 10 percent of the city's employed population was over 60.^{29,91} As this population ages and retires, workforce replacement in a variety of industries will require attracting and training a new generation of native Pittsburghers and domestic and foreign immigrants to the city.

Aging infrastructure

Much of Pittsburgh's infrastructure, including transportation networks, water and sewer management systems, and housing stock, was constructed during the population boom of the early-mid 20th century. The Golden Triangle and other downtown neighborhoods have benefitted from redevelopment over the past few decades, but repairs and upgrades were deferred in peripheral communities, and the capital burden currently strains city and county resources.

- **Transportation networks:** There are 5,147.4 square miles of roadway in the city,¹ many of which are overdue for repaving, are plagued with potholes, and are steep and may be treacherous in winter weather conditions.
- **Water and sewer management:** Pittsburgh's water and sewer management infrastructure—in particular, the combined sewer system that services the city—is aging, poorly maintained, and inadequately sized to capture and treat stormwater during the region's frequent wet weather events, which results in combined sewer overflows (CSOs) and sanitary sewer overflows (SSOs). Consequently, ALCOSAN (the Allegheny County Sewer Authority, which operates the only sewer treatment facility for Pittsburgh and 82 neighboring municipalities) is bound by an EPA consent decree to reduce CSOs by at least 85%.⁹² Pittsburgh obtains the vast majority of its drinking water from the Allegheny River, which is treated in a single water treatment plant, stored in an aging reservoir and water tank system, and distributed it through 1,200 miles of aging water lines. Fortunately, the city has experienced no drinking water quality violations for 30 years.⁹³ However, the lead pipes in old houses mean some residents have tested for 14.7 parts per billion of lead in their tap water, which is just under the federal intervention level of 15 parts per billion.
- **Housing stock:** Pittsburgh generally has high housing volume per capita. However, most houses in Pittsburgh are over 60 years old, with renter-occupied properties approaching a median age of 65 years. As an example, almost 17% of properties in the city experience leakage from the outside.⁵⁰ An additional 13 percent of properties in the city of Pittsburgh are vacant.⁷⁹ Ongoing repairs and maintenance strain homeowners, and blighted housing may put residents' health and safety at risk. In particular, lead-based paint in older homes presents poisoning risk for residents. A 2012 report found that 8 percent of Pittsburgh's children had elevated lead levels, likely primarily due to exposure to lead-based paint.⁹⁴

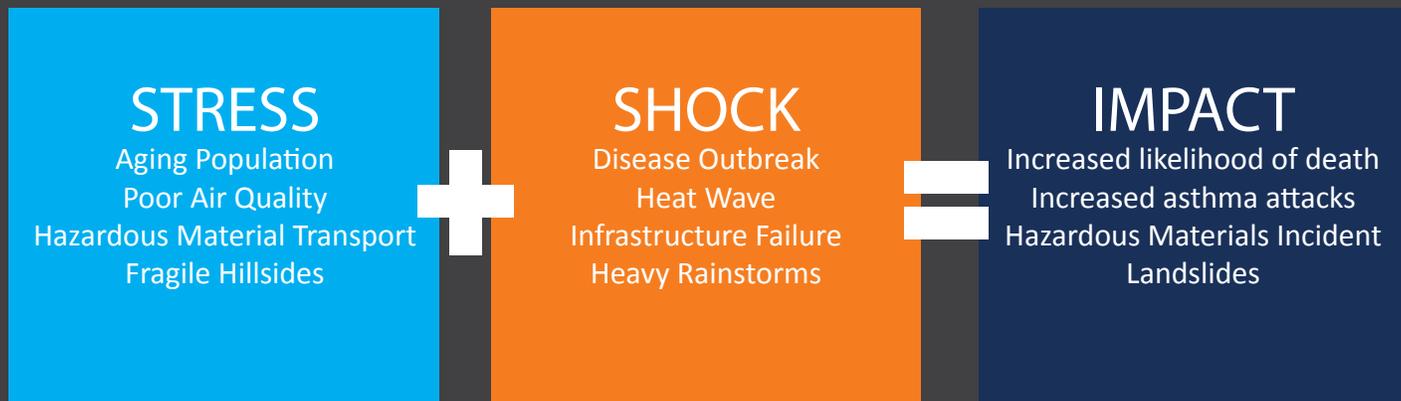
Environmental Degradation: Air, Water, and Soil

Pittsburgh's industrial past and aging infrastructure have led to air, water, and soil contamination. Pittsburgh still ranks among the top US cities for worst air quality, and in wet weather, the combined sewer system overflows and spills raw sewage into our rivers. Much of the current air, water, and soil degradation stems from Pittsburgh's industrial legacy, when the sky was dark with smoke at noon.¹¹ EPA has categorized the region as an air quality non-attainment area, and Pittsburgh's air quality is 9th worst in the country as of 2015.⁶⁰ As described previously, the storm and wastewater management infrastructure requires substantial upgrade in order to meet EPA water quality standards under the Clean Water Act. CSOs, primarily in the downtown area, discharge nine billion gallons of sewage into streams and rivers annually.⁹⁵ Finally, pollutants from steel and other manufacturing in the area, as well as from mining activities and vehicular emissions, have leached into the city's soil.⁹⁶

Interaction between shocks and stresses and planning for the unknown

The interrelationships between Pittsburgh's priority shocks and stresses may result in more negative impacts if a shock were to occur. For example, a lack of financial resources and blight in Pittsburgh's disadvantaged neighborhoods would leave residents unable to rebound after an extreme weather event that caused damage, such as a flood or heavy snowfall. Figure 4.4 demonstrates the relationship and subsequent impacts of certain key shocks and stresses.

Figure 18 Relationship Between Select Stresses, Shocks, and Their Impacts



While the Resilient Pittsburgh team and its partners have done extensive research and outreach to identify shocks and stresses for this Preliminary Resilience Assessment, as well as gauge the strengths and weaknesses that affect Pittsburgh's vulnerability, most major disasters are unprecedented and unexpected. The Resilient Pittsburgh team is acutely aware that there are potential future risks that we cannot predict. In the face of unknown adversity, Pittsburgh's best strategy is to protect and leverage its assets, reduce its weaknesses, and build the individual resilience and capacity of residents.



STAKEHOLDER PERCEPTIONS OF THE CITY'S RESILIENCE

From June through November 2015, the Resilient Pittsburgh team organized ten events that gathered data from over 360 stakeholders and residents. Guided discussions encouraged participants to discuss factors that have an impact on the city's resilience, including strengths, weaknesses, and areas for improvement. While there was some disagreement across stakeholders about specific strengths and weaknesses, a few themes emerged repeatedly throughout the process.

Figure 19 Key Strengths, Areas for Improvement and Weaknesses

+ KEY STRENGTHS

- City leadership, including its ability to convene partners, communicate and utilize data for decision-making;
- The presence of local academic institutions and philanthropies, and their collaboration with the City;
- The neighborhood level enthusiasm for resilience-related activity; and
- The emphasis placed on environmental and sustainability issues.

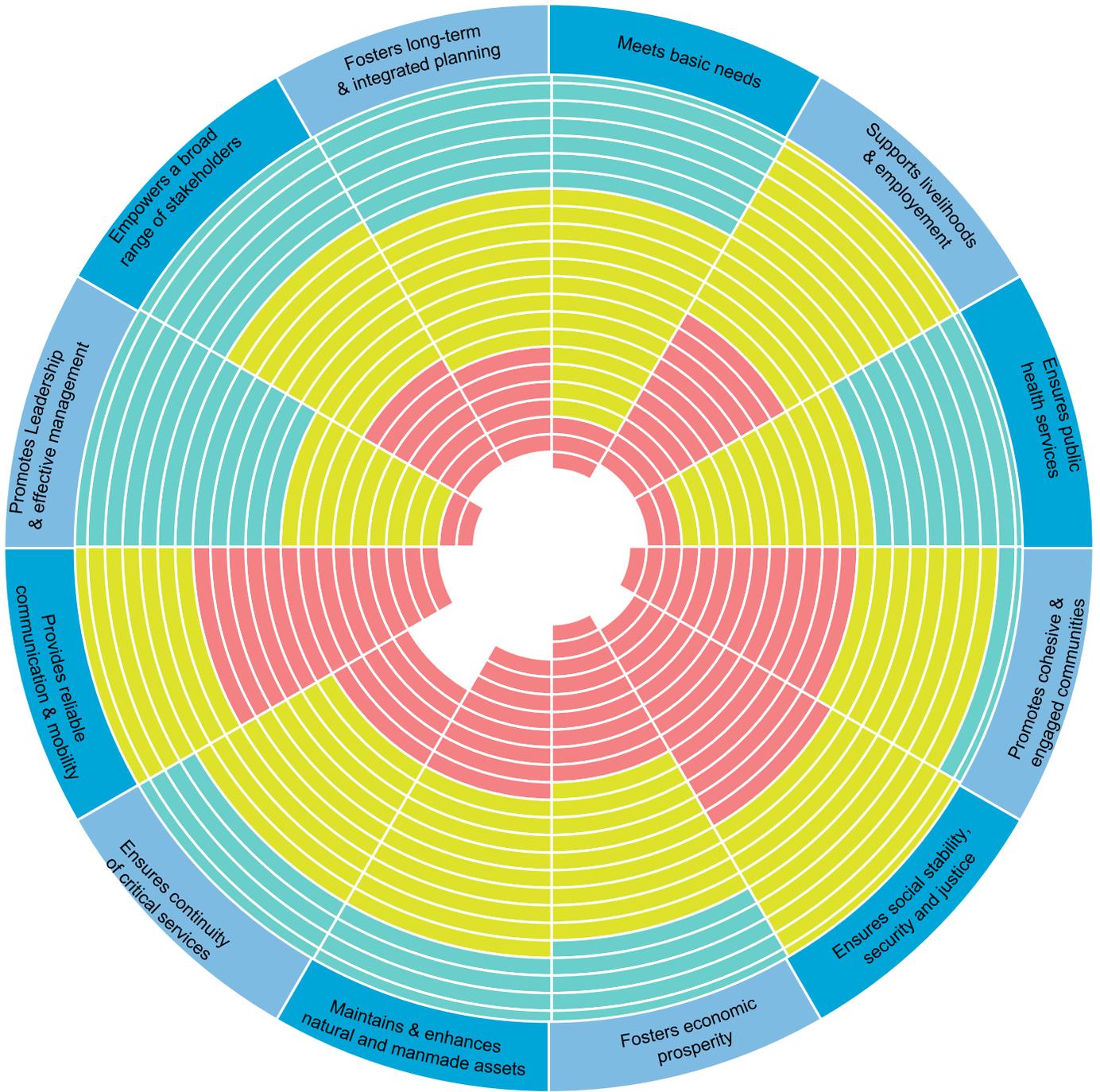
< KEY AREAS OF IMPROVEMENT

- Inclusive community engagement;
- Preserving and growing multi-modal transit options; and
- Addressing affordable housing and growing entrepreneurship

- KEY WEAKNESSES

- Coordinating between non-profit organizations and government entities;
- Addressing economic and racial inequity as the city grows;
- Managing workforce succession and workforce development; and
- Addressing aging infrastructure in an efficient and coordinated way

Figure 20 Stakeholders' Perceptions of Pittsburgh's Strengths and Weaknesses (N=340)



Agenda-setting workshop participants (N=161)

- Need to do better
- Doing well, but can improve
- Area of strength
- Unknown

WHAT IS PITTSBURGH DOING WELL?

Stakeholders expressed generally positive perceptions of city leadership and its role in convening diverse partners and engaging the public with clear communications. Participants felt that under the current administration, the City is doing better with long-term planning due to improved data-driven decision-making. The City's active and growing partnership with the academic community is seen as a key strength as researchers can assist in data collection and management for resilience planning.

Stakeholders also frequently acknowledged the important role for local philanthropies in fostering resilience in Pittsburgh, emerging from direct investments, priority setting, and coordination or collaboration. The City has a role in setting the philanthropic agenda and the cooperative relationship between the City and foundations is another key strength.

Another area of strength emerges from neighborhood level projects and interventions. Neighborhood groups, such as the Larimer Consensus Group, have formed to draw attention to and develop solutions for planning issues, service deficits, or investment gaps. These efforts demonstrate the local energy and activity that has developed at the grassroots level in Pittsburgh, often supported by active local philanthropy. However, stakeholders felt the responsibilities of neighborhood leadership versus the City should be clearer.

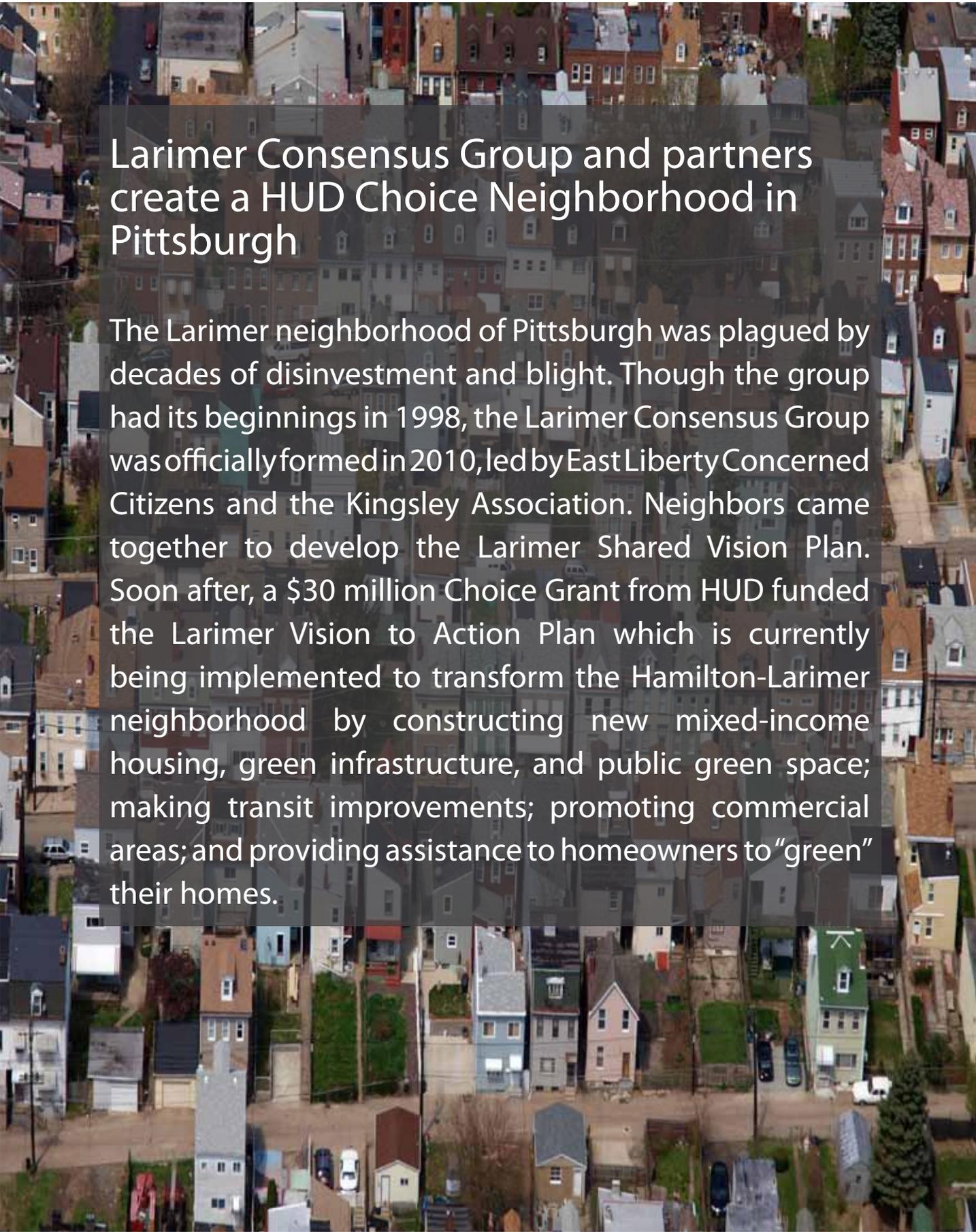
Participants identified environmental and sustainability topics as emerging strengths in the city, including climate adaptation, air quality improvements, and energy planning.

WHAT COULD STILL USE IMPROVEMENT?

Community engagement has fluctuated over time in Pittsburgh and was discussed as being in a period of "upswing". This change is evidenced by the number of neighborhood-scale actions occurring and participation in a neighborhood-based online social network (NextDoor). However, stakeholders expressed concern about the degree to which those engaged citizens truly represent the diversity of the city in terms of age, race, and socioeconomic status. In part, this is because community meetings and volunteer opportunities are more accessible to those who have time to be engaged. Participants also observed how the city's economic rebound has not been distributed evenly across diverse communities and significant divides still exist between populations of different races and economic standing. Stakeholders emphasized the need to be intentional about engaging traditionally marginalized groups and building trust in City planning processes.

Stakeholders identified multi-modal personal transportation as an area of growth for the city. Despite previous years of service cuts, high bus ridership shows that public transportation is a viable commuting option in the city. Recent surveys have also shown dramatic increases in bike ridership in the city, though there is room for improvement. Stakeholders also noted several key barriers to further progress on transportation. Access is not consistently or equitably distributed across all areas of the city, and systems are inefficient and in many cases disconnected from residential areas or job centers. These barriers are compounded by regional fragmentation. For example, trying to extend bike lanes throughout neighboring municipalities would require individual easements for each municipality.

Participants stated that they rely on the City to facilitate thoughtful land use planning, zoning, and coordination with academic communities to present potential solutions with multiple co-benefits in areas such as housing and entrepreneurship. Stakeholders noted that the city is experiencing a dramatic loss of available and affordable housing. Strategic land use planning should be leveraged to address affordable housing and foster new enterprises and entrepreneurship. Pittsburgh's traditional manufacturing jobs are declining, however there are new models of employment opportunities, such as shared workspaces. Participants also cautioned against redevelopment without thoughtful planning, which could result in increased inequity, and cited some emerging examples of gentrification in the city. To reduce blight and flood risk, stakeholders supported increased municipal acquisitions of vacant properties and vulnerable housing stock in floodways.



Larimer Consensus Group and partners create a HUD Choice Neighborhood in Pittsburgh

The Larimer neighborhood of Pittsburgh was plagued by decades of disinvestment and blight. Though the group had its beginnings in 1998, the Larimer Consensus Group was officially formed in 2010, led by East Liberty Concerned Citizens and the Kingsley Association. Neighbors came together to develop the Larimer Shared Vision Plan. Soon after, a \$30 million Choice Grant from HUD funded the Larimer Vision to Action Plan which is currently being implemented to transform the Hamilton-Larimer neighborhood by constructing new mixed-income housing, green infrastructure, and public green space; making transit improvements; promoting commercial areas; and providing assistance to homeowners to “green” their homes.

WHAT IS A CURRENT WEAKNESS?

Themes of development challenges and infrastructure issues, compounded by a lack of organizational and intergovernmental collaboration, were commonly discussed as areas of weakness for the city and metropolitan region. During virtually every focus group or workshop, stakeholders discussed the lack of multi-stakeholder alignment as a weakness, citing the number of organizations and ongoing parallel actions related to the same environmental, infrastructure, or health issues. They expressed a need for groups addressing the same issues to partner and coordinate, and for municipalities tackling similar challenges (e.g., stormwater management, transportation, education) to work together. Fragmentation in planning and management of public resources like public transportation, education, and sewer systems currently hinders progress and collaboration. As an illustration, Allegheny County alone contains 43 different school districts, each of which operate independently.

Much of the conversation related to inequity focused on a lack of employment and workforce development opportunities in the city, from the poor quality of public education available to some city residents, to the lack of job skill training and mentorship programs preparing residents for the new Pittsburgh economy. While Pittsburgh's unemployment rate remains relatively low, stakeholders describe underemployment as a challenge: many of Pittsburgh's disadvantaged populations remain across the digital divide, some without internet service in their neighborhoods, and many without the skills necessary to apply for and successfully fill available jobs. Coupled with an aging workforce, stakeholders saw this as an opportunity to intentionally address workforce succession while offering residents a chance to work higher paying jobs.

Additional areas of weakness cited frequently relate to Pittsburgh's aging and non-redundant infrastructure. Stakeholders cautioned about the shrinking availability of affordable housing near jobs and business districts in the city, and expressed concern that the public transportation infrastructure does not align well with live-work patterns in the region. Stakeholders highlighted the diaspora of working age Pittsburghers with families to the suburbs as a result of perceived challenges with the public education system and rising housing prices in "desirable" neighborhoods. Moreover, as many lower-income residents are priced out of the city center, they also may lack access to transportation to work or to meet critical needs. Finally, Pittsburgh's hills and rivers divide the city in challenging ways and result in a lack of redundancy in transportation networks—participants noted, for instance, that many neighborhoods have only one route in or out. For this reason, even infrastructure slated for improvement can cause major inconveniences and commuting challenges due to the lack of redundancy and multi-modality. The recently closed and demolished Greenfield Bridge is one example of these infrastructure improvements that highlights the city's lack of redundancy.

WHAT IS NOT BEING DISCUSSED?

An analysis of the factors discussed by stakeholders mapped to the City Resilience Framework revealed that there are a few aspects of city resilience that were not mentioned by many stakeholders, if at all, during the engagement process. Public safety was largely not discussed during stakeholder engagements, aside from the threat posed by violence in some disadvantaged neighborhoods. The Pittsburgh Police were generally seen as responsive to community needs, and their efforts to improve police-community relationships through increased community engagement and other community-oriented policing practices were recognized.

Emergency preparedness was mentioned a few times as a strength, with city leaders noting the good working relationships between regional emergency management and law enforcement agencies. Emergency preparedness and response was mostly absent in conversations during other forums, however. This may be because Pittsburgh has not experienced any recent acute shocks that necessitated a large coordinated response. However, it could also reflect a lack of awareness among community members and other stakeholders of the City's capacity and the resources available to residents.

Finally, while there was comparatively little discussion of potential inflows of new populations, including a large influx of refugees, this issue may be relevant. Migration of any new population will impact the city socially and economically, and the capacity of the city to integrate new residents while fulfilling basic needs should be assessed.



ONGOING ACTIONS RELATED TO RESILIENCE

While the city faces challenges and risks, Pittsburgh is experiencing an economic renaissance with an expanding technology sector, led by companies like Google, Apple, and Uber, a growing population of young adults, and an increasing focus on sustainable business and city planning. Consequently, the city has experienced a surge of enthusiasm and action around resilience-related topics.

A key activity during Phase I of the resilience strategy process was to develop an inventory of ongoing and emerging initiatives. Using a combination of desktop research and stakeholder engagement, the working team assembled an inventory of 187 ongoing actions related to resilience in the City of Pittsburgh. The level of activity and sheer number of ongoing actions suggests that new actions are being initiated regularly, so this list should be considered a working inventory snapshot.

The City Resilience Framework's 12 drivers are grouped into four quadrants: Health and Wellbeing, Economy and Society, Infrastructure and Environment, and Leadership and Strategy. An analysis of actions by CRF quadrant revealed that most activities (60%) are taking place in the Infrastructure and Environment domain of the City Resilience Framework. Projects in this domain include green infrastructure activities for stormwater management, advocacy for and construction of multi-modal transit infrastructure, and the formation of coalitions and networks working on energy efficiency and greenhouse gas emissions reduction. This finding confirms stakeholder perceptions that resilience-related activity in the city is largely focused on sustainability and the environment. These actions also reflect the increasing attention paid to physical infrastructure, including stormwater management and transportation systems, though stakeholders believe that more effort is needed.

Roadmap for Inclusive Innovation

“Inclusive Innovation provides equal access to products and services with new technologies, ideas, personnel and inventions to meet complex challenges and higher standards.” The Roadmap, released in September 2015, lays out a number of initiatives the City of Pittsburgh should undertake in the coming months and years to remain a hub of innovation for social groups, companies and people, including addressing the digital divide, empowering city-to-citizen engagement, providing open data, advancing the clean tech sector, and promoting the local business environment.

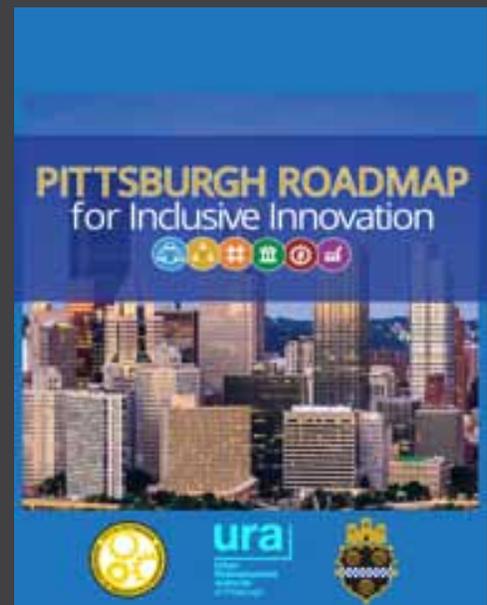
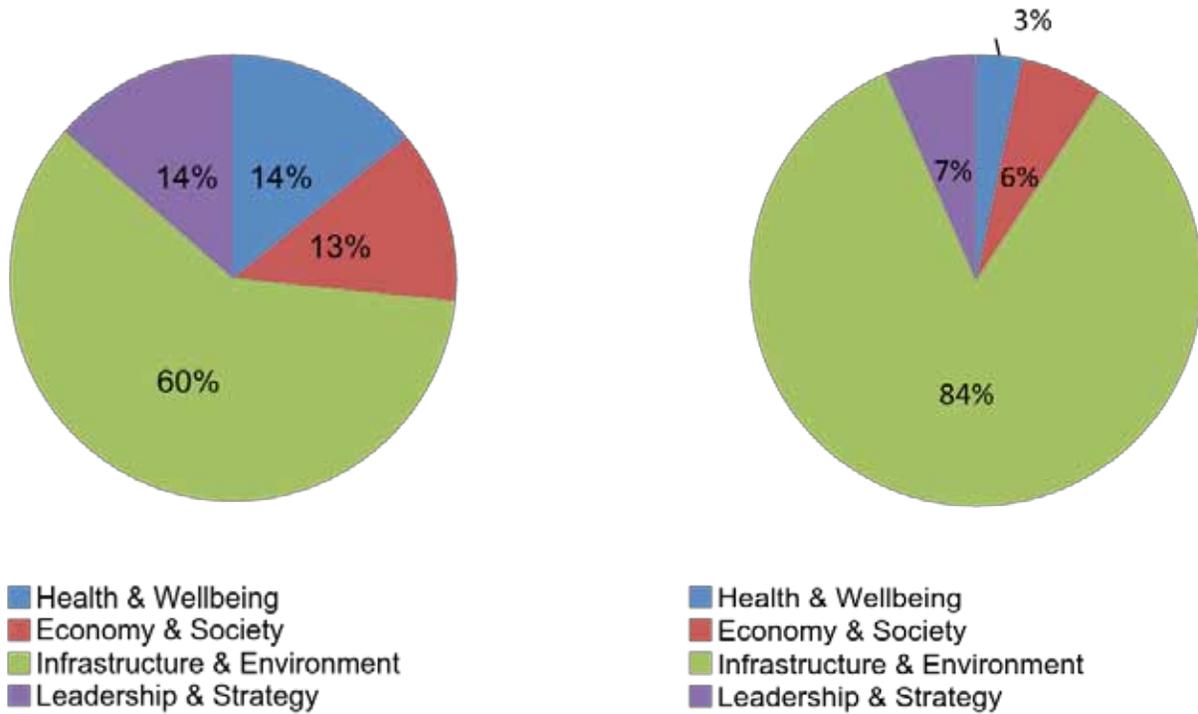


Figure 21 Breakdown of Resilience in the City Budget by Number of Projects (left) and Amount of Funding (right)



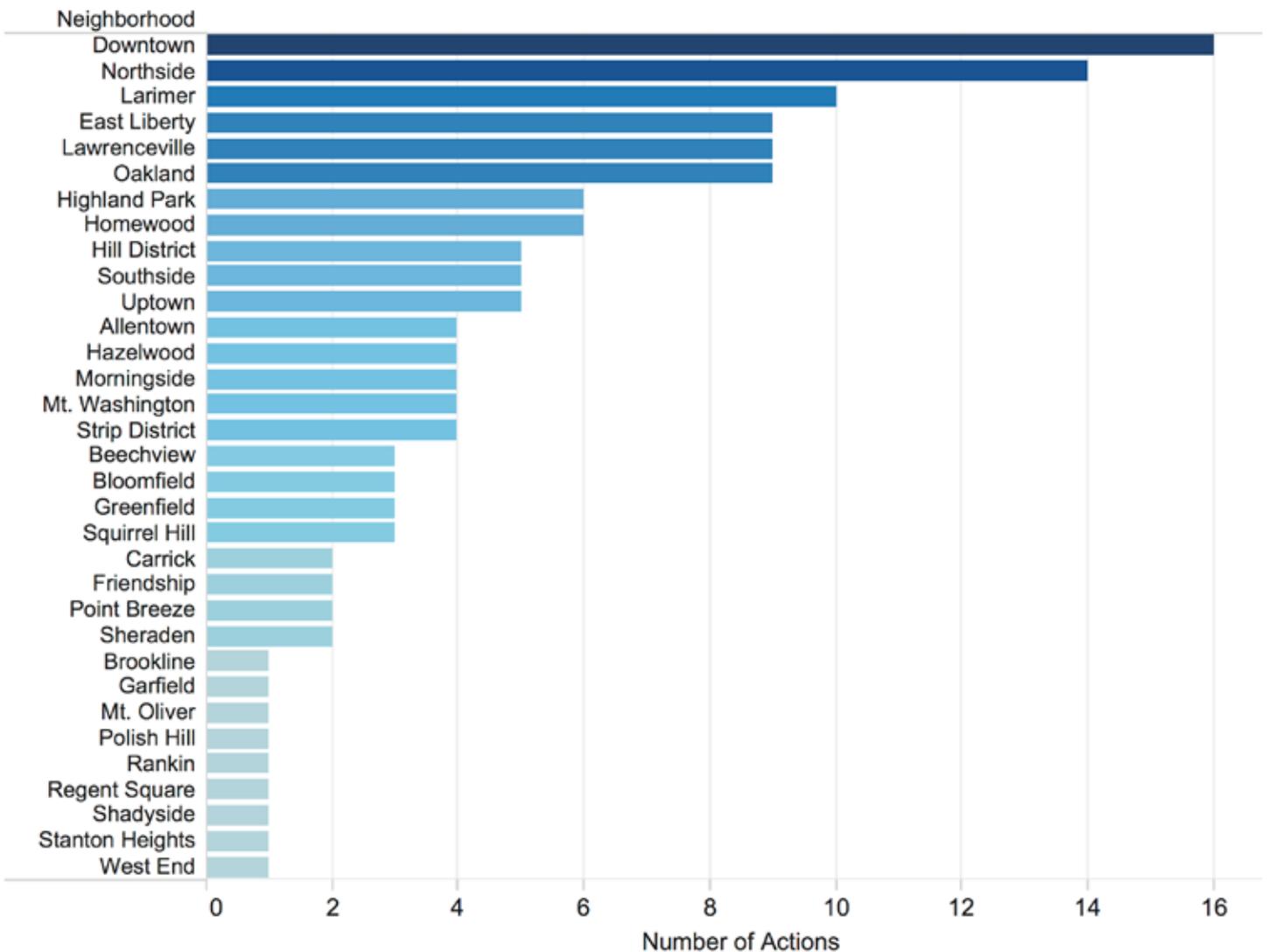
NOTE: 32.32% of the city's total capital and operating budget in 2016 (\$189,940,563 of the \$587,769,40) is dedicated to resilience-related activities.

Source: City of Pittsburgh, 2016

The city's 2016 capital and operating budget is similarly weighted towards the infrastructure and environment quadrant, with 60% of the City-led resilience projects and 84% of City dollars.⁹⁷ Health and Wellbeing is the least represented in the City's budget, receiving three percent of the resilience-related funding.

Actions that impact city resilience occur at various scales, from micro, to neighborhood, to city, to region, and beyond. While about half of the actions inventoried occur at the city level, a large proportion (20%) target specific neighborhoods in the city. These actions are not evenly distributed across Pittsburgh's 90 neighborhoods, which signals a need for deeper investigation and more inclusive planning in Phase II.

Figure 22 Resilience-related actions by neighborhood



Key activities focus on a few common themes that align with the prioritized risks and assets in the city, including sustainable economic development, connectivity and transportation, planning for climate change, using and sharing data citywide, workforce development, conservation and biodiversity, green infrastructure, housing, energy use, and food systems and access.

Finally, when reviewing the actions that are ongoing in the city, especially those lead by the City of Pittsburgh, the team discovered good alignment between existing actions and the Discovery Areas that will guide Phase II of the strategy process. Appendix A lists select actions by Discovery Area. This list is not comprehensive and will be supplemented with the in-depth research that will take place during Phase II for each Discovery Area.



Greening the Pittsburgh Wet Weather Plan

"Ensuring our largest public works project, our sewer infrastructure, invests in green first/sustainable technology and brings benefits to our communities." This plan, published in 2013, provides recommendations to guide planning and development of green infrastructure (GI) strategies. A key aspect of this plan resulted in 17 grants awarded in 2015 to local GI projects.

DISCOVERY AREAS FOR PHASE II

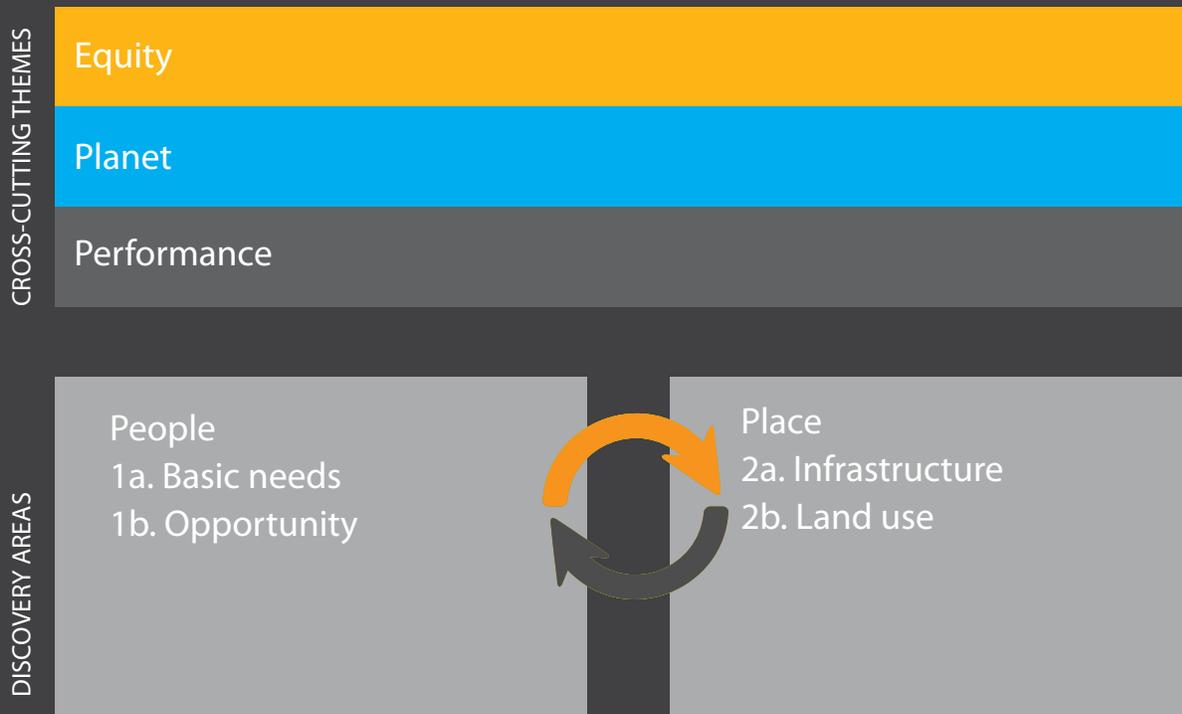
What is a Discovery Area?

100RC defines Discovery Areas as:

“key questions about the resilience of the city, identified through the PRA as targeted areas where the city needs to better understand risk, evaluate interdependencies, or gather new data or analysis in order to fully understand the potential for resilience-building initiatives in the city.”

Pittsburgh’s Discovery Areas emerged through an iterative process of assessing and prioritizing the city’s risks, ongoing actions that must be coordinated, and assets that must be leveraged and maintained for a Resilient Pittsburgh. The process also illuminated cross-cutting themes that can serve as an overlay to all of the Discovery Areas. Conversations with stakeholders also highlighted the importance of aligning these areas with the “p4” process, another strategic framework that will guide planning in the city. Each Discovery Area includes an overarching question and a sample of targeted diagnostic questions to guide research activities in Phase II.

Figure 23 Resilient Pittsburgh Discovery Areas



People

As Pittsburgh’s population and workforce ages, Pittsburgh is also positioning itself as a hub of “eds and meds” and technology. The new Pittsburgh economy relies on medium- to high-skill employees, which the city will need to attract, retain, and develop. This involves providing Pittsburgh’s residents with access to information, high quality primary and higher education, and workforce development opportunities. Higher wages and financial literacy will help disadvantaged residents break out of cycles of poverty.

A resilient city is made up of resilient people, capable of self-reliance in everyday life as well as times of disaster. The city struggles with meeting the basic needs of some residents, including access to healthy foods, clean air and water, and safe and cohesive neighborhoods. Residents also must have the skills, information, and support networks to cope in the face of sudden shocks.

These Discovery Areas seek to understand how to help the people of Pittsburgh not only survive, but thrive.

1a. Basic needs. How do we ensure that the basic needs of city residents are met, both in their daily lives and in a crisis?

This Discovery Area focuses on food security and access, pollution and chronic disease, public safety, and disaster preparedness.

Some questions that may be answered in Phase II may include:

- Who are the city’s most vulnerable populations in terms of basic needs (food, housing, work; consider geography, race, age, economics), and how can they be connected to services and guided on a pathway to self-reliance?
- What are the best ways for residents to be involved and invested in their neighborhood and/or the city’s resilience?
- Which neighborhood-level assets promote resilience, how are they distributed, and how can they be leveraged?

1b. Opportunity. How do we ensure that all city residents have access to education, economic opportunity, and prosperity?

This Discovery Area focuses on education, access to information, workforce development and job training, the city’s economic profile, and wages and financial literacy among city residents.

Some questions that may be answered in Phase II include:

- Which sectors will be most impacted by an aging workforce, and where are there future opportunities to create co-benefits

in addressing those needs?

- What are the “jobs of the future” and what skills are needed?
- What incentives are in place to attract or maintain certain industries in the city?
- What are the barriers preventing city residents from earning a living wage, and how can these barriers be addressed?
- What are some ways the city can promote financial literacy among city residents?
- How can the resilience strategy support ongoing efforts to close the digital divide?

Place

Pittsburgh is endowed with an abundance of both natural and physical infrastructure, from its three rivers to its green space, and from its water management system to its roads and bridges. These resources are well-established in the city, but are at risk due to deferred maintenance, climate change, and demographic and economic changes in the region. The city’s natural and physical infrastructure systems are inextricably related, as evidenced by ongoing interventions to address the city’s water, energy, and transit challenges that leverage both physical and natural assets.

New development in the city threatens the availability of affordable housing. Simultaneously, neighborhoods struggle with blight, vacant properties, and a lack of economic investment. Meanwhile, parts of the city are isolated by Pittsburgh’s topography and lack of transportation redundancy, while others are at risk of sewer overflows, flood damage, and/or landslide or subsidence as Pittsburgh’s existing infrastructure and use of land are not situated to adapt to future precipitation scenarios.

This pair of Discovery Areas seeks to understand how actions and plans at the region, city, and neighborhood level can enhance Pittsburgh’s infrastructure and optimize development to create a more resilient Pittsburgh.

2a. Infrastructure. How do we protect, maintain, and improve the city’s high priority physical and natural infrastructure systems?

This Discovery Area focuses on infrastructure systems, including water and sewer management, transportation, energy grid, information and communication technology, and ecosystems, including tree canopy, green space, soil, air, and water.

Some questions that may be answered in Phase II include:

- How can the city prioritize protecting and investing in physical infrastructure assets in order to improve access, redundancy and opportunity?
- Which of the city’s natural assets are currently at risk, or may be in the future?
- How can the city prioritize protecting and investing in natural assets?

2b. Land use. How can we optimize land use to better support a range of goals, including affordable housing, economic growth, community development, and stormwater management?

This Discovery Area focuses on zoning, optimizing new development, providing increased access to city amenities, and repurposing vacant land to enhance resilience.

Some questions that may be answered in Phase II include:

- How resilient are Pittsburgh’s current land use plans and regulations, and where are the opportunities to better support resilience through changes?
- How can the city help to grow natural assets and help residents benefit from these assets?
- How can the resilience lens be used as a screening tool for decisions related to new development and neighborhood-level

Cross-cutting themes

Equity: How can we ensure each resilience action accounts for equity issues, ensuring fair access for all city residents to economic, educational, and environmental opportunities and amenities?

- Involves developing a local definition and shared vision of equity for Pittsburgh
- Establishes concrete metrics for evaluating the equity impacts of resilience initiatives and investments

Planet: How can we use resilience to protect our local environment and be responsible, proactive global citizens?

- Builds upon existing enthusiasm for sustainability in the city
- Involves understanding Pittsburgh's sustainability goals to integrate efforts for resilience and environmental sustainability

Performance: How can we integrate activities, improve engagement, and evaluate progress?

- **Integration and collaboration:** Aligning ongoing activity by organizations and governments to reach common resilience goals
 - Involves a thorough assessment of actors, policies, and initiatives in each Discovery Area to understand ongoing actions, gaps, and opportunities to embed resilience in existing plans
 - Considers regional alignment around shared issues for resilience
- **Civic engagement and social cohesion:** Institutionalizing citizen engagement in civic decision-making and promoting connected communities
 - Involves investigating ways to obtain representative citizen engagement for resilience
 - Builds upon Pittsburgh's rich social fabric
- **Evaluation:** Measuring the impact of activities to increase resilience
 - Involves establishing goals and metrics around each Discovery Area
 - Establishes the resilience strategy as a shared prioritization and measurement framework for current and future planning efforts

NEXT STEPS IN THE RESILIENCE STRATEGY PROCESS

Phase I of the resilience strategy involved establishing a preliminary understanding of the challenges and opportunities for building resilience in the city of Pittsburgh. Discovery Areas will focus on four areas: basic needs, opportunity, land use, and infrastructure. As noted earlier, issues of equity, sustainability ("planet") and performance will be used as an overlay to assess potential actions in all of the Discovery Areas.

In Phase II, working groups will conduct in-depth research in each Discovery Area with the support of public and private institutions and lessons learned from other 100RC network cities. They will work to answer the diagnostic questions to further hone in on the initiatives and projects that will define the resilience strategy. The final strategy, timed for release in early July to coincide with the city's 200th anniversary of incorporation, will integrate ongoing activity, align future planning efforts and funding, and identify key initiatives to fill gaps in order to create a more resilient Pittsburgh.



REFERENCES

1. City of Pittsburgh Office of Emergency Management and Homeland Security. Hazard Vulnerability Assessment: City of Pittsburgh. 2013.
2. What Will Your Choice Neighborhoods Planning Grant Accomplish? . 2014. (Accessed January 14, 2016, at <http://portal.hud.gov/hudportal/documents/huddoc?id=LessonsfromPitt4132015.pdf>)
3. U.S. Census Bureau. State & County QuickFacts: Pittsburgh (city), Pennsylvania. 2013.
4. U.S. Census Bureau. State & County QuickFacts: Allegheny County, Pennsylvania. 2015.
5. Cycle 10 forecast of population, households, and employment by county, 2010-2040. 2015. (Accessed January 13, 2016, at <http://www.spcregion.org/pdf/datalib/SPC%20forecast%20county%20&%20region%20totals%202010-40.pdf>)
6. Inc. MBJ. Allegheny County Stormwater Management Plan Phase 1 Report," 20142014.
7. County Seats. 2013. at <http://www.spcregion.org/pdf/countyseats.pdf>.)
8. Home Rule Charter. 1974. (Accessed January 13, 2016, at <http://pittsburghpa.gov/cityclerk/homerule/>.)
9. Archibald R, Sleeper S. Government Consolidation and Economic Development in Allegheny County and the City of Pittsburgh, TR-569-CACECCG. Santa Monica, Calif. : RAND Corporation; 2008.
10. p4 Pittsburgh. 2015. (Accessed February 11, 2016, at <http://p4pittsburgh.org/>.)
11. Dietrich W. A very brief history of Pittsburgh. Pittsburgh Quarterly 2008.
12. Glaeser E. Revenge of the rust belt. The New York Times2009.
13. Cost of living index. 2016. (Accessed January 13, 2016, at <https://www.coli.org/>.)
14. Population of the 100 largest urban places: 1950. 1998. (Accessed December 23, 2015, at <https://www.census.gov/population/www/documentation/twps0027/tab18.txt>.)
15. International migration data. 2008. (Accessed January 13, 2016, at <https://www.census.gov/population/intmigration/data/>.)
16. Metro Area-to-Metro Area Migration Flows. 2013. (Accessed January 13, 2016, at <https://www.census.gov/hhes/migration/data/acs/metro-to-metro.html>.)
17. Getting Younger. Pittsburgh Today, 2013. (Accessed January 18, 2016, at <http://www.pittsburghtoday.org/Demographics-GettingYounger.html>.)
18. Pittsburgh, Pennsylvania Population: Census 2010 and 2000 interactive map, demographics, statistics, quick facts. 2012. (Accessed January 13, 2016, at <http://censusviewer.com/city/PA/Pittsburgh>.)
19. Belculfine L. Pittsburgh region's population changes little, census data show. Pittsburgh Post-Gazette2015.
20. Age and sex. 2011. (Accessed January 13, 2016, at <https://www.census.gov/population/age/>.)
21. The Welcoming Pittsburgh Plan: A Roadmap for Change. 2015. (Accessed January 13, 2016, at http://apps.pittsburghpa.gov/mayorpeduto/WelcomingPittsburgh_RoadMap_FullReport_FINAL2.pdf.)
22. Demographics/Race and Ethnicity. 2015. (Accessed January 13, 2016, at http://pittsburghtoday.org/view_Race_view3.html.)
23. The rise of residential segregation by income. 2012. (Accessed January 13, 2016, at <http://www.pewsocialtrends.org/files/2012/08/Rise-of-Residential-Income-Segregation-2012.2.pdf>.)
24. DeVita C, Farrell M. Poverty and Income Insecurity in the Pittsburgh Metropolitan Area: Urban Institute; 2014.
25. U.S. Census Bureau. American Community Survey, 2007-2011. Pittsburgh, Pennsylvania. 2011.
26. Allegheny County Health Department. Plan for a Healthier Allegheny. 2015.
27. The state of aging in allegheny county. Univerisity of Pittsburgh, 2014. (Accessed January 13, 2016, at <http://ucsur.pitt.edu/wp-content/uploads/2014/11/State-of-Aging-in-Allegheny-County.pdf>.)
28. Health Care Facilities. 2005. (Accessed January 13, 2016, at <http://sais.health.pa.gov/commonpoc/content/publiccommonpoc/CommonPOCSelect.asp?formSubmitted=normalformSearch>.)
29. Population 60 years and over in the United States. 2014. (Accessed January 14, 2016, at http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_14_5YR_S0102&prodType=table.)
30. Health Care Coverage. 2011. (Accessed January 18, 2016, at http://www.pittsburghtoday.org/view_HealthCareCoverage.html.)
31. Report to the community. 2015. (Accessed January 13, 2016, at <http://www.apluschschools.org/research-and-reports/report-to-the-community/>.)
32. Map of the Allegheny County School Districts. 2015. (Accessed January 13, 2016, at <http://www.aiu3.net/Level2.aspx?id=1412>.)
33. City of Pittsburgh, Allegheny County. Act 47: Municipalities Financial Recovery Act Amended Recovery Plan. In: Development CoPDoCaE, ed. Pittsburgh, PA2015.
34. Pittsburgh Roadmap for Inclusive Innovation. 2015. (Accessed January 13, 2016, at <http://pittsburghpa.gov/innovation-performance/innovationroadmap/index.html>.)
35. Economy at a Glance, Pittsburgh, PA. 2016. (Accessed January 12, 2016, at http://www.bls.gov/eag/eag.pa_pittsburgh_msa.htm.)
36. Statistics BoL. State and Area Employment, Hours, and Earnings: Pittsburgh, Manufacturing. 2016.
37. Simms M, McDaniel M, Fyffe S. An action plan for overcoming obstacles and unlocking opportunities for African American men in Pittsburgh2015.
38. Workforce Diversity Indicators Initiative. Behind the Times: The limited role of minorities in the Greater Pittsburgh workforce2015.
39. Lockages - River totals & port total. 2016. (Accessed January 13, 2016, at <http://www.port.pittsburgh.pa.us/modules/showdocument.aspx?documentid=685>.)
40. Infrastructure Policy Committee. Railways. In: University of Pittsburgh Institute of Politics, ed. Infrastructure Status and Needs

- in Southwestern Pennsylvania: A primer. Pittsburgh, PA: University of Pittsburgh; 2014:41.
41. Economic growth widespread across metropolitan areas in 2014. U.S. Department of Commerce, 2015. (Accessed January 14, 2016, at http://www.bea.gov/newsreleases/regional/gdp_metro/gdp_metro_newsrelease.htm.)
 42. Economy at a Glance, Pittsburgh, PA. U.S. Department of Labor, 2015. (Accessed January 14, 2016, at http://www.bls.gov/eag/eag.pa_pittsburgh_msa.htm.)
 43. Pittsburgh Tourism Set to Break Records in 2015. WESA, 2015. (Accessed February 10, 2016, at <http://wesa.fm/post/pittsburgh-tourism-set-break-records-2015>.)
 44. Todd D. Pittsburgh region's low startup ranking a bitter pill for local stakeholders. Pittsburgh Post-Gazette 2015.
 45. Pittsburgh ranks high for small business activity. Pittsburgh Post-Gazette, 2015. (Accessed February 10, 2016, at <http://www.post-gazette.com/business/pittsburgh-company-news/2015/12/10/Pittsburgh-ranks-high-for-small-business-activity/stories/201512100035>.)
 46. Report Card for Pennsylvania's Infrastructure: American Society of Civil Engineers; 2014.
 47. Anatomy of water main break. 2013. (Accessed January 14, 2016, at <http://wesa.fm/post/anatomy-water-main-break>.)
 48. Vulnerability of electric grid spurs upgrades and warnings. StateImpact, 2013. (Accessed January 14, 2016, at <https://stateimpact.npr.org/pennsylvania/2013/11/13/vulnerability-of-electric-grid-spurs-upgrades-and-warnings/>.)
 49. Pennsylvania State Profile and Energy Estimates. 2015. (Accessed January 14, 2016, at <http://www.eia.gov/state/?sid=PA>.)
 50. 2011 Housing Profile: Pittsburgh, PA. 2011. (Accessed January 14, 2016, at <https://www.census.gov/prod/2013pubs/ahs11-22.pdf>.)
 51. District Energy Pittsburgh. 2014. (Accessed January 14, 2016, at http://apps.pittsburghpa.gov/mayorpeduto/District_Energy_in_Pittsburgh_DOE_Power_Point_AL.pdf.)
 52. PittMesh.net. 2015. (Accessed January 14, 2016, at <http://www.pittmesh.net/>;))
 53. 2016. (Accessed January 14, 2016, at <http://opensignal.com/>.)
 54. Chapter 4: Parks, Open Space and Greenways Plan. 2008. (Accessed January 14, 2016, at <http://www.alleghenyplaces.com/docs/draftplan/chapter4e.pdf>.)
 55. Pittsburgh City Planning. Open Space PGH: Optimizing Pittsburgh's open space, park, and recreation system 2013.
 56. Pittsburgh i-Tree Ecosystem Analysis. 2015. (Accessed January 14, 2016, at <http://waterlandlife.org/assets/i-Tree%20Eco%20Pittsburgh%20FINAL.pdf>.)
 57. Mytreekeeper.com. 2015. (Accessed January 14, 2016, at <http://pittsburgh.mytreekeeper.com/>.)
 58. Nine Cities That Love Their Trees - and What They're Doing About It. 2014. (Accessed January 14, 2016, at <http://www.nationalgeographic.com/news-features/urban-tree-canopy/>.)
 59. Council PFP. Pittsburgh Food Policy Council Annual Report, 2014-2015 2015.
 60. State of the Air. 2015. (Accessed January 14, 2016, at http://www.stateoftheair.org/2015/assets/ALA_State_of_the_Air_2015.pdf.)
 61. Pennsylvania Climate Impacts Assessment Update. 2015. (Accessed January 14, 2016, at <http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-108470/2700-BK-DEP4494.pdf>.)
 62. Northeast. 2014. (Accessed January 14, 2016, at <http://nca2014.globalchange.gov/report/regions/northeast>.)
 63. Flooding in Western Pennsylvania. Pittsburgh Geological Society, 2001. (Accessed January 14, 2016, at <http://www.pittsburghgeologicalsociety.org/flood.pdf>.)
 64. Floodways with Neighborhoods Map. 2010. (Accessed January 14, 2016, at http://pittsburghpa.gov/publicsafety/ast/cwFloodways_26Ft_36FtZoom3x4---1.pdf.)
 65. Bradford K, Abrahams L, Hegglin M, Klima K. A Heat Vulnerability Index and Adaptation Solutions for Pittsburgh, Pennsylvania. Environmental science & technology 2015;49:11303-11.
 66. Horton R, Yobe G, Easterling W, et al. Chapter 16: Northeast Climate Change in the United States: Third National Climate Assessment. In: Melillo J, Richmond T, Yobe G, eds. US Global Change Research Program 2014:16-1-nn.
 67. Extreme Heat: More Intense Hot Days and Heat Waves. (Accessed January 14, 2016, at <http://www.nrdc.org/health/climate/heat.asp>.)
 68. Polar Vortex Review. 2014. (Accessed January 14, 2016, at <http://alleghenyconference.org/PDFs/Misc/January2014PolarVortexReview.pdf>.)
 69. Department of Emergency Management. Norfolk Southern Bakken Crude Rail Shipment Lines Draft Planning Revisions.
 70. Engineering UCAM. Allegheny County Road and Bridge Ownership Evaluation Report: URS Corporation and Mackin Engineering; 2008.
 71. Shanley SG. Allegheny County Department of Public Works 2015.
 72. The Fix We're In For: The State of Our Nation's Busiest Bridges. 2011. (Accessed January 14, 2016, at <http://t4america.org/docs/bridgereport/bridgereport-metros.pdf>.)
 73. Federal Railroad Administration Office of Safety Analysis. 3.08 Accident Map with Table. 2016.
 74. Shale Play: Natural Gas Drilling in Pennsylvania. 2011. (Accessed January 14, 2016, at <http://stateimpact.npr.org/pennsylvania/drilling/>.)
 75. 1.5 million at risk in PA for crude oil derailment. 2015. (Accessed January 14, 2016, at <http://publicsource.org/investigations/one-million-five-hundred-risk-pa-for-crude-oil-derailment#.VmGYwXarSUK>.)
 76. Report finds steep declines in region's healthcare industry. 2015. (Accessed January 14, 2016, at <http://www.bizjournals.com/pittsburgh/news/2015/10/22/report-finds-steep-declines-in-regions-healthcare.html>.)
 77. Hendrick R, Shi Y. Macro-Level Determinants of Local Government Interaction: How Metropolitan Regions in the United States Compare. Urban Affairs Review 2015;51:414-38.
 78. The Persistence of Segregation in the Metropolis: New Findings from the 2010 Census. 2011. (Accessed January 14, 2016, at Logan, John R., and Brian Stults. 2011. "The Persistence of Segregation in the Metropolis: New Findings from the 2010 Census."

Project US2010 brief. Washington, D.C.: US Bureau of the Census.)

79. Nobody Home: The Rise of Vacancy. 2011. (Accessed January 14, 2016, at http://www.pittsburghtoday.org/specialreports/nobodyhome_pghtoday_v5.pdf.)
80. McCart M. Food Deserts. Pittsburgh Post-Gazette 2014.
81. Allegheny County Hunger Profile. 2016. (Accessed February 3, 2016, at <https://www.pittsburghfoodbank.org/resources/about-hunger/allegheny/>.)
82. Bank GPCF. Hunger and Pittsburgh2014.
83. 2014 Statistical Report. 2014. (Accessed January 14, 2016, at http://apps.pittsburghpa.gov/pghbop/2014_Annual_Report_Final_draft.pdf.)
84. African Americans in Pittsburgh: The data in black and white. 2013. (Accessed January 14, 2016, at <http://www.pittsburghquarterly.com/index.php/Regional-Indicators/african-americans-in-pittsburgh-the-data-in-black-white.html>.)
85. 2016. (Accessed January 14, 2016, at http://www.pittsburghpa.gov/dcp/snap/published_data.htm.)
86. Racial Dot Map. 2013. (Accessed January 14, 2016, at <http://www.coopercenter.org/demographics/Racial-Dot-Map>.)
87. Promoting Neighborhood Diversity: Benefits, Barriers, and Strategies. 2009. (Accessed January 14, 2016, at www.urban.org/research/publication/promoting-neighborhood-diversity-benefits-barriers-and-strategies.)
88. Schmitz J. Transit fares on hold for 2 years. Pittsburgh Post-Gazette 2014.
89. Allegheny County. 2015. (Accessed January 14, 2016, at <https://profiles.ucsur.pitt.edu/profiles/county/42003/overview/>.)
90. Alliance GB. Make My Trip Count infographic2016.
91. Does Age Matter? Workforce aging and its implications for collaborative talent management in the Pittsburgh region. 2015. (Accessed January 14, 2016, at <http://www.trwib.org/admin/uploads/Workforce-Aging-Report-9-28-12.pdf>.)
92. United States District Court for the Western District of Pennsylvania. Allegheny County Sanitary Authority Consent Decree. 2007.
93. Quality Drinking Water. 2016. (Accessed February 10, 2016, at <http://www.pgh2o.com/quality-drinking-water>.)
94. Health PDo. 2014 Childhood Lead Surveillance Annual Report2014.
95. Companion Document to the Draft Wet Weather Plan. 2012. (Accessed January 14, 2016, at http://www.alcosan.org/Portals/0/Wet%20Weather%20Plan/Booklet_FINAL_7-19-12_singlepage.pdf.)
96. Amelia J. Reconstructing Pittsburgh's Pollution History with Dendrochemistry: an Analysis of Trace Metal Concentrations in a Schenley Park Red Oak Tree: University of Pittsburgh; 2010.
97. City Budget Archive. 2015. (Accessed January 14, 2016, at <http://pittsburghpa.gov/information/budget>.)



Appendix A. Select Resilience Building Actions in Pittsburgh

Overarching actions		
Action	Brief description	Lead organization(s)
p4 - Pittsburgh People, Planet, Place & Performance	Effort to forge a new model of urban growth and development that is innovative, inclusive and sustainable. This model is based around a central, unifying framework-p4: People, Planet, Place and Performance- and launched at an international summit organized by Sustainable Pittsburgh in April 2015.	Heinz Endowments, City of Pittsburgh, Urban Redevelopment Authority (URA), Sustainable Pittsburgh
10% Resilience Pledge	Mayor Peduto's pledge to commit the equivalent of 10% of the city budget per annum to support the city's resilience goals and activities.	City of Pittsburgh
People: Basic needs		
Action	Brief description	Lead organization(s)
Fresh Access Food Bucks Bonus	Provides an additional \$2 for every \$5 in SNAP benefits spent on fruits and vegetables at participating farmer's markets.	Just Harvest, Pittsburgh Citiparks
Healthy Together	Program aimed at enrolling children and teens in quality, free to low-cost healthcare programs, like Medicaid and CHIP.	City of Pittsburgh
Live Well Pittsburgh	Part of Live Well Allegheny, a comprehensive strategy on wellness that focuses on physical health, mental wellness, personal and community safety, prevention and preparedness. Includes partnerships with local organizations and for-profit companies, community events and awards, etc.	City of Pittsburgh, Allegheny County Health Department (ACHD), Allegheny County
Grub Up	Meal service program that provides healthy breakfasts, lunches and snacks during the summer and afterschool meals during the school year at no cost to all children up to 18 years old as well as mentally disabled individuals up to 21 years old.	City of Pittsburgh, Pittsburgh Citiparks
Allegheny County Community Health Assessment	A comprehensive document that examines factors affecting residents' health. It examines topics as wide-ranging as sexually transmitted disease (STD) rates, air quality data, mortality statistics, and the incidence of chronic disease, and also highlights major health disparities within Allegheny County	ACHD
Safer Together	Public safety outreach initiative aiming to build relationships, partnerships, and communication between the City's Public Safety Zone Councils, community-based organizations, and also within the neighborhoods they serve, with a focus on underserved populations.	City of Pittsburgh Dept. of Public Safety
National Initiative for Building Community Trust and Justice	\$4.75 million initiative that will seek to assess the police-community relationship in each of six pilot sites, including Pittsburgh, as well as develop a detailed site-specific plan that will enhance procedural justice, reduce bias and support reconciliation in communities where trust has been eroded.	U.S. Dept. of Justice
Mayor's Challenge to End Veteran's Homelessness	Local implementation of national Mayor's challenge to end veteran's homelessness in metropolitan areas. Pittsburgh achieved its goal of housing all homeless veterans by the end of 2015.	City of Pittsburgh (Mayor's Office and Housing Authority)
People: Opportunity		
Action	Brief description	Lead organization(s)
Pittsburgh Learn & Earn Summer Youth Employment Program	Provides six weeks of work experience to youth each summer. Program participants worked in a diverse range of occupational areas: in businesses and offices as well as in outdoor conservation work environments improving and reviving parks and public spaces.	City of Pittsburgh
My Brother's Keeper	Locally implemented national job and life skills development program for at-risk youth, focused on boys and young men of color.	City of Pittsburgh, Allegheny County
City of Learning	An effort to turn the entire city into a campus where young people can learn anytime and anywhere. The service connects young people to a network of learning opportunities throughout Pittsburgh, and get the recognition they deserve by earning digital badges for their achievements.	Cities of Learning, The Sprout Fund

Pittsburgh Roadmap for Inclusive Innovation	Lays out a number of initiatives the City of Pittsburgh should undertake in the coming months and years to remain a hub of innovation for social groups, companies and people. Includes action steps to address workforce development, citizen engagement, and promote the local business environment.	City of Pittsburgh Dept of Innovation and Performance
PowerUp Pittsburgh	A collaborative strategy that brings together government, business, universities and entrepreneurs to align our region's resources for the creation of jobs.	City of Pittsburgh
StudentConnections	A collaborative effort to ensure that all of Pittsburgh's kids can access all of Pittsburgh's opportunities. This effort will increase the collective impact of current programs, services, and larger initiatives by improving communication and coordination between and among the professionals engaged in this work and the families they support.	The Pittsburgh Promise, City of Pittsburgh, Allegheny County, Pittsburgh Public Schools

Place: Infrastructure

Action	Brief description	Lead organization(s)
Adaptive Traffic Signals	Traffic signal upgrades that use sensors to adapt to traffic flow to improve congestion and reduce fuel consumption in East Liberty.	City of Pittsburgh
Threat and Hazard Identification and Risk Assessment (THIRA)	Process for identifying potential manmade or natural threats and hazards to the city of Pittsburgh, describe the context, assess capacity to respond, and develop recommendations, including resource requirements.	City of Pittsburgh, Dept. of Emergency Management
Hazard Mitigation Plan Update	Will serve as a blueprint for reducing property damage from natural or manmade disasters, and will focus on saving lives from the effects of any future disaster.	Allegheny County Emergency Services
Greening the Pittsburgh Wet Weather Management Plan	Developed with the primary objective to develop a concise approach to reviewing, recommending and incorporating a plan for the implementation of green stormwater infrastructure technologies and policies to address stormwater runoff challenges facing the city.	PWSA
Better Bikeways Vision	Guiding document promoting interconnected, safe, attractive, and comfortable bikeways throughout the city in order to appeal to people of all ages, especially those who are interested in riding a bike but concerned for their safety.	BikePGH
Envision Downtown	Public-private partnership created by City of Pittsburgh and The Pittsburgh Downtown Partnership to craft a 21st century vision for the sustainable and efficient development of a Downtown for all	Pittsburgh Downtown Partnership, City of Pittsburgh, Allegheny County
Make My Trip Count, 2015 Commuter Survey	Survey of Pittsburgh region commuters to figure out how Pittsburghers regularly travel to work or school - and how that commute could be improved.	City of Pittsburgh, Mayor's Office
Downtown-Uptown-Oakland Bus Rapid Transit (BRT)	Proposed plan would provide fast, frequent transit service along major corridors using special buses to provide a smooth, comfortable travel experience and would focus on the corridor between Downtown and Oakland created by Fifth and Forbes Avenues. Further expansion east will also be studied so BRT could provide additional connections to Squirrel Hill, North Oakland, East Liberty, Bloomfield, Shadyside, Friendship and East Liberty.	City of Pittsburgh, Allegheny County, URA, Port Authority
Pittsburgh 2030 Districts	Collaborative of high performance buildings in Downtown and Oakland that aim to dramatically reduce energy and water consumption and transportation emissions, and improve indoor air quality while increasing competitiveness in the business environment and owners' returns on investment	Green Building Alliance
California-Kirkbride Healthy & High Performance Building Study	Effort to position California-Kirkbride as a model high performance neighborhood that reduces the cost of homeownership for its lower income families, capitalizing on its proximity to downtown and proposed District Energy sites.	Northside Coalition for Fair Housing, Green Building Alliance
ReEnergize PGH	A multi-organizational collaboration intended to maximize the impact of residential energy efficiency efforts throughout Allegheny County	Conservation Consultants, Inc.

SmartStreet Lights	Initiative to reduce streetlight energy use, improve visibility and public safety, reduce light pollution, and enable smart lot implementations	City of Pittsburgh
Northside Recycling Pilot	Study conducted on a single collection route in Pittsburgh's Northside with hundreds of residents in the summer of 2015 about recycling as well as answering questions and providing each resident with their own 32-gallon recycling container free of charge.	PA Resources Council (PRC)
Metro 21	Overarching initiative to research, design, develop, deploy, and evaluate solutions to the challenges affecting the economy and quality of life in metro areas. Projects have been completed in areas of: Citizen engagement, City operations, Water and sewer systems, Built infrastructure, Climate change and the environment, and Transportation	Carnegie Mellon University, City of Pittsburgh, Allegheny County

Place: Land use

Action	Brief description	Lead organization(s)
Pittsburgh Urban Forest Master Plan	Roadmap for the effective conservation and management of Pittsburgh's urban forest.	Tree Pittsburgh
City of Pittsburgh Comprehensive Plan	Large in scope, a long-range plan currently being revised which will direct city investments and resources towards management of the city's infrastructure and environment	City of Pittsburgh Dept. of City Planning
Affordable Housing Task Force	A group that has worked to produce affordable new housing units while preserving existing ones and to develop new programs for mixed-income urban development, aiming for a sustainable mix of housing options for households of varying income levels.	City of Pittsburgh
Urban Agriculture Zoning Code	Agriculture and Urban Agriculture are use classifications in the City of Pittsburgh Zoning Code that allow a range of small to large scale agricultural uses, from a chicken coop located in a backyard to a commercial farm.	City of Pittsburgh
Lower Hill Redevelopment	Redevelopment of the 28-acres currently occupied by surface parking lots and the former Civic Arena site in the Lower Hill District neighborhood.	Sports and Exhibition Authority, URA
Almono/Hazelwood	Redevelopment plan for the 178 acre LTV Steel Hazelwood site. Environmental sustainability, including alternate sources of energy, storm and waste water management and transportation innovation are key components of the plan.	URA, City of Pittsburgh
Uptown EcoInnovation District	Economic development strategy based in Uptown intended to attract and guide new investment; create unique places and experiences; expand the local economy; reduce the city's environmental footprint; and ensure equity and access to local opportunities.	City of Pittsburgh
Vacant Lot Toolkit	Comprehensive overview of the goals, policies, processes, procedures, and guidelines for transforming vacant, blighted properties into urban agriculture, community greening, and green infrastructure opportunities.	City of Pittsburgh
Choice Neighborhood Implementation Grant (Larimer)	Grant to the Larimer Consensus Group that has funded the construction of sustainable, mixed-income housing that helps advance the Larimer Vision Plan, the neighborhood's plan for a green sustainable future	HUD, Larimer Consensus Group
MainStreets Pittsburgh Program	Program that strives to ensure the health of the City's traditional neighborhood commercial districts by stimulating economic revitalization within the context of neighborhood preservation, good design, business recruitment and retention, and stakeholder engagement.	URA
Community Land Trust	Plan to create a community land trust which would make housing about 25% cheaper by only selling the house on the property, and not the land.	Allegheny Land Trust

Pittsburgh Land Bank Bill	Bill that established a locally-created, locally-controlled, state-enabled, single-purpose entity whose job it is to amass, inventory, manage and market blighted, abandoned and tax foreclosed properties that are sitting deteriorated and unused, bringing down property values and depressing the local market.	City of Pittsburgh
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Cross-cutting themes

Action	Brief description	Cross-cutting theme	Lead organization(s)
Climate Action Plan (PCAP 3.0)	Roadmap to analyze and implement strategies, policies and projects to reduce greenhouse gas emissions within city limits and mitigate Pittsburgh's contribution to global climate change	Planet	City of Pittsburgh
Pittsburgh Climate Initiative	Works collaboratively in the Pittsburgh region to reduce greenhouse gases through measurable actions. PCI also guides implementation and updates of the Pittsburgh Climate Action Plan, while coordinating resulting activities and tracking local emissions and reductions.	Planet	City of Pittsburgh
Green Workplace Challenge	The Pittsburgh Green Workplace Challenge (GWC) enables businesses, nonprofits, municipalities, and colleges/universities to participate in a friendly competition where they can receive due recognition for their sustainable actions and achievements.	Planet	Sustainable Pittsburgh
Western PA Regional Data Center	Supports key community initiatives by making public information easier to find and use. The Data Center provides a technological and legal infrastructure for data sharing to support a growing ecosystem of data providers and data users.	Performance	University of Pittsburgh's Center for Social and Urban Research
ServePGH	Pittsburgh's strategy for engaging residents in service. It is an office dedicated to addressing Pittsburgh's most pressing needs through impact volunteerism	Performance	City of Pittsburgh
Welcoming Pittsburgh	Roadmap laying out the Mayor's plan to improve the lives of all immigrants; create more informed, diverse, and welcoming experiences throughout our city; and ensure Pittsburgh is most livable for all.	Performance	City of Pittsburgh

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