STRONG, HEALTHY & JUST

Springfield's Climate Action & Resilience Plan

City of Springfield
Office of Community Development

The preparation of this plan was aided through Federal financial assistance from the Department of Housing & Urban Development under the provisions of Title I of the Housing & Community Development Act of 1974 as amended.

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Please note that this plan is a summary document of much more work. The supplemental materials that comprise the full plan are listed at the end of this document and available for download and review at:
http://www.pvpc.org/projects/springfield-climate-action-resilience-plan-carp

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DEFINITIONS

URBAN RESILIENCE

Urban Resilience is the capacity of individuals, communities, institutions, businesses, and systems to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience. Chronic stresses weaken the fabric of a city on a daily or cyclical basis and examples include: poverty, segregation and the long-term consequences and effects of institutionalized racism in the country and city, unemployment, and food insecurity. Acute shocks are sudden sharp events that threaten a city, and examples include: a tornado, a snow storm in October when the leaves were still on the trees, and Hurricanes.

Rockefeller Foundation: 100 Resilient Cities definition (modified for Springfield)

ENVIRONMENTAL/ CLIMATE JUSTICE

Environmental/Climate Justice is based on the principle that all people have a right to be protected from environmental hazards and to live in and enjoy a clean and healthful environment regardless of race, color, national origin, income, or English language proficiency. Environmental justice is the equal protection and meaningful involvement of all people and communities with respect to the development, implementation, and enforcement of energy, climate change, and environmental laws, regulations, and policies, and the equitable distribution of energy and environmental benefits and burdens.

Environmental Justice Policy of the Massachusetts, Executive Office of Energy and Environmental Affairs, 2017

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GOALS

REDUCE GREENHOUSE GAS (GHG) EMISSIONS

Enact programs, policies and local, state, federal legislation (regulations) to reduce GHG emissions generated by transportation, heating/cooling/electrifying buildings, processing waste, and water by 80% from 2015 baselines by 2050.

INCREASE COMMUNITY RESILIENCE

Increase community resilience through adaptation to and mitigation of climate change impacts with a focus on the city's vulnerable populations where they live and work maintaining an ongoing commitment to and emphasis on climate justice throughout all current and planned work.

OBJECTIVES

SUPPORT CITY COMMITMENT

Support City and stakeholder commitment to the identified and necessary actions to **reduce GHG emissions by 80% in 2050**, by:

- 'greening the grid'—accelerating the transition to clean, safe, sustainable energy generation and use (solar, hydro, geo-thermal, Combined Heat and Power (CHP), wind, micro-grid, distributed generation, not yet available technologies),
- making all existing buildings and vehicles and related physical infrastructure (micro-grid, roads with bikelanes, etc) as energy efficient as possible,
- modifying the regulatory environment to incentivize maximum energy efficiency
- facilitating stakeholder (residents, commercial sector, industrial sector, government) action.

MAKE SPRINGFIELD LESS VULNERABLE

Make Springfield less vulnerable to the consequences of climate change in our region, which are primarily more extreme heat, more severe flooding, and generally more severe and un-predictable weather, by:

- building upon active participation and input from residents and stakeholders from all sectors of the Springfield community, provide actionable strategies to reinforce and build resilient community networks that increase human resilience, including confidence in government with a focus on climate justice and enhancing equity
- increasing infrastructure resilience-working to transition/integrate natural systems for maximum efficiency and effectiveness.

EXECUTIVE SUMMARY

This plan lays out a path for the City of Springfield Massachusetts to reduce our overall greenhouse gas (GHG) emissions by 80% in 2050 and to enhance urban resilience, making Springfield stronger, healthier and more just. Springfield has 33 years to change the way we live and get around such that we generate just 1/5 of the GHG emissions we produced in 2015 and protect our vulnerable residents and infrastructure from increased threats.

We know that almost all (97%) of GHG emissions in Springfield come from heating, lighting and cooling buildings and from transportation. Two important ways to achieve our city's goal would be to drive 80% less and use 80% less energy to heat, light and cool buildings and run our appliances. Because GHG emissions come from burning fossil fuels, another way to achieve our 80% GHG emissions reductions goals would be to transition our energy from polluting fossil fuels to clean, safe, sustainable sources such as solar power, wind power, hydro power, and geo-thermal.

Springfield plans to maximize energy efficiency while at the same time facilitating and investing in clean, safe, sustainable energy.

In addition to being a Climate Action plan, this is also the city's new resilience plan. As a Climate Action plan, it provides strategies to survive and thrive amidst increasingly dangerous and unpredictable natural disasters: tornados, October snow storms, tropical storms, and hurricanes, are made worse by our over use of fossil fuels. As a resilience plan, it also lays out a path to make this city stronger—today and in the future—so that we can survive and thrive amidst the chronic stresses of poverty, racism and unemployment that make us weak and vulnerable.

This "Strong, Healthy, and Just" plan joins the City's new suite of recent plans guiding development:

- Analysis of Impediments to Fair Housing (2012) and annual Community Development Block Grant (CDBG) plans
- ReBuild (2012)
- Complete Streets-Ped/Bike (2014)
- Open Space and Recreation Plan update (2015)
- Hazard Mitigation Plan update (2016)
- Urban Forestry Plan (2017 pending update of 09 plan)

While this is Springfield's first climate action and resilience plan in name, it is certainly not the first time Springfield has acted in response to climate change or worked to be resilient. Springfield has been a leader in Massachusetts with respect to climate action (defined as acting to reduce GHG emissions) throughout the last 15 years, entering into an agreement with an Energy Services Company (ESCO) to systematically reduce municipal energy use well in advance of any other municipalities in the region and reducing municipal energy use significantly; receiving one of the first in the country Climate Showcase communities grants; and being certified in the first round of Green Communities. Similarly, Springfield has been a leader with respect to hazard mitigation, emergency preparedness, green infrastructure, and open space and natural resource protection. Many of the goals, objectives, actions, and strategies in the above-referenced plans are climate action and resilience related.

The first recommendation of this plan, therefore, is for the City to conduct an analysis of the progress that has been made on previous plans, and to continue to move forward on prioritized implementation of the climate action and resilience-related strategies (see Supporting Materials, Strategies and Action Matrix).

A second and related priority recommendation is for the City to invest additional staff and possibly programmatic and financial resources to publicize and otherwise communicate with residents about the exemplary climate action and resilience work underway (and planned) by the city—especially in neighborhoods with high concentrations of chronically stressed residents: Metro Center, Memorial Square, Brightwood, McKnight, Bay, Six Corners, Old Hill and Upper Hill. An impression emerged during the plan development process of missing and/or inaccurate information about the investments being made throughout the city, and especially in these target neighborhoods. It is important that the City publicize these existing action plans and support expansion of this work and implementation of additional strategies included in this plan to make the city safer and more resilient day by day, while also reducing GHG emissions.

The remaining top priority recommendations that reduce GHG emissions and enhance resilience are **detailed in the 'Taking Action' section of this report** (see page 41). Additional work quantifying interim goals and evaluation measures is targeted for completion by October 1, 2017, and updates will be communicated via: www.resilientspringfield.org.

ACTION CATEGORIES:

1. **Building Confidence in City Government**
2. **Changing the Way We Get Around**
3. **Efficiently Using Energy**
4. **Greening the Grid**
5. **Building/Creating Resilient Infrastructure**
6. **Managing the Urban Forest**
7. **Building Human Resilience**
8. **Reduce, Re-Use, Recycle**
9. **Resident Actions**
10. **Business/Anchor Institution Actions**

City staff and consultant team at the Community Resilience Building workshop, May 12 2017

OVERVIEW

The impacts of climate change and recognition of the need to find ways to live with extreme weather and the changing environment became strikingly apparent for Springfield during the period 2011 through 2013, when the city experienced five weather events, declared by the President to be national disasters. The most severe was an EF3 tornado which tore a ½ mile wide 6.2 mile long swath of destruction through the heart of downtown and the city's residential neighborhoods. Tornado damage to structures, including leaking roofs, was exacerbated by wind and rains of Tropical Storm Irene in 2011. Another freak storm, the October 2011 record early snowstorm, decimated the city's tree canopy which was vulnerable because trees were still fully-leafed out. Springfield's other disasters were a 2011 blizzard and 2013 Superstorm Nemo.

June 1, 2011 tornado

Springfield is located in Western Massachusetts and is the fourth largest city in New England, with a population of 153,060 in a metropolitan area of 692,942 residents. While the city is unique in experiencing so many natural disasters in such a short time, it is otherwise a prototypical northeast post-industrial city. Historically Springfield was a manufacturing leader, but it has experienced economic decline over the last half-century, led by loss of manufacturing jobs, exacerbated by white flight, and further impacted by foreclosures and abandonment. As Springfield lost economic ground, its economic distress has become geographically concentrated in the neighborhoods designated as the Urban Watershed Resilience Zone (see map). These neighborhoods abut (and include) the downtown area, are closest to the Connecticut River, have a 41% poverty rate, and are made up predominantly of people of color. The target neighborhoods are home to 11% of the region's total population and include 34% of all Latinos and 32% of all Blacks in the metropolitan area.

Springfield has a rich African-American cultural history and functions as a gateway city for migrant Puerto Ricans and immigrants and refugees from Vietnam, Eastern Europe, and Africa. It has built a strong array of community-based organizations and neighborhood associations to provide spaces for community development and services for residents in need. Yet widespread and deep poverty (32% overall poverty rate) negatively impacts the tax base, making it difficult for the City to contend with aged infrastructure and vulnerable residents. While the city is the employment and economic center for the region, most high-paid workers live outside Springfield, while city residents are likely to be in low-paying positions or unemployed. As a result of these demographics, the Commonwealth of Massachusetts designates Springfield as an Environmental Justice Community.

Poverty, unemployment, racism and segregation, and high rates of preventable health problems are chronic stressors that make Springfield and its residents extremely vulnerable in the face of disaster. Layered onto these chronic stressors, climate change science indicates that Springfield is likely to experience more extreme weather events, particularly storms with greater duration and volume of rainfall, as well as extreme heat. Increased rain combined with environmental degradation from past disasters makes low-lying distressed neighborhoods subject to localized flooding and overwhelms the city's combined sewer overflow (CSO) outlets, and extreme heat endangers the lives of elders, the sick and otherwise vulnerable residents. CSO overflow and stormwater runoff pollutes the Connecticut River, a National Blueway that flows through four states from the Canadian border to the Long Island Sound.

Past disasters have compromised the Van Horn and Watershops Pond dams along tributaries in the City; the failure of either would lead to catastrophic flooding of very low-income neighborhoods. Springfield's extensive loss of tree canopy increases stormwater impact, and contributes to increased urban heat island effect in the city and to decreased air quality throughout the region. Poor air quality exacerbates asthma, which Springfield residents suffer from at much higher than average rates. The ability of the city and the region to recover from extreme weather events is often complicated by loss of electric power, compromising the response of hospitals and other emergency services.

Springfield is committed to ensuring that all of its residents have an equitable ability to recover from and be resilient to future disasters. In order to bring about this equity, the City is focusing resources on promoting health, economic stability, and environmental security through environmental upgrades and catalytic multi-benefit projects in its poorest neighborhoods (see map of Urban Watershed Resilience Area). At the same time, the City is taking concrete steps to decrease its contribution to climate change through a decreased carbon footprint, and is making legislative and policy changes that will enhance the city's protection from the impacts of both its chronic stressors and likely future disasters.[1] This commitment to climate justice reinforces and is reinforced by the priority actions detailed in this plan as well as by the process through which this plan was developed.

June 1, 2011 tornado damage

1 Excerpted from the City of Springfield's application to the National Disaster Resilience Competition

The Pioneer Valley Planning Commission (PVPC) and our collaborators, Partners for a Healthier Community (PHC), Arise for Social Justice (Arise), the University of Massachusetts Landscape Architecture and Regional Planning (LARP), and the office of Civic Engagement and Service-Learning (CESL) are grateful for the opportunity to facilitate this planning process. As Paul Hawken eloquently stated in his recent work, *Drawdown*, the most comprehensive plan ever proposed to reverse global warming:

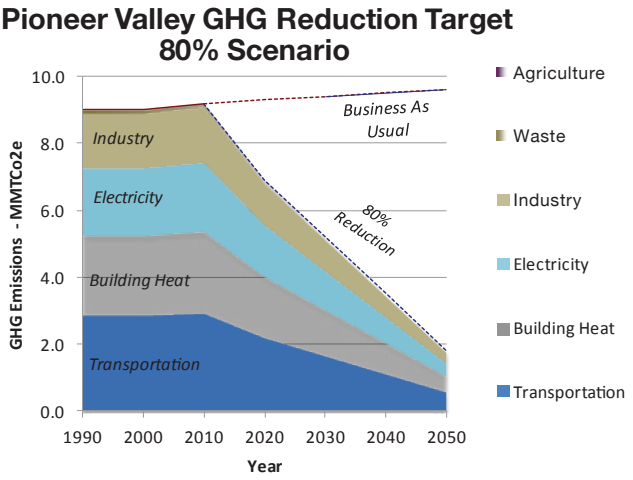
> *To be clear, our organization did not create or devise a plan. We do not have that capability or self-appointed mandate. In conducting our research, we found a plan, a blueprint that already exists in the world [in our case—in the City of Springfield] in the form of humanity's [Springfield's] collective wisdom, made manifest in applied, hands-on practices and technologies that are commonly available, economically viable, and scientifically valid [and in Springfield's case, being implemented and/or planned].*

As we have facilitated this planning process, we "found" this plan—in existing City plans, in the actions and strategies of City departments, in the business and not for profit community and in the lived experience, needs, desires, and choices of city residents.

We followed a transparent and logical process to identify and prioritize the myriad actions needed to accomplish climate action and resilience in Springfield. First, we created a Climate Action & Resilience Assessment Tool (CARAT—included in Supporting Materials) to inventory and compare the City of Springfield's existing climate and resilience related actions and strategies to best management practices gleaned from highly-regarded, successful climate action/resilience plans from similar cities around the country.

The results of the assessment process informed a Strategies and Actions Ranking Matrix (SARM included in Supporting Materials), into which we integrated the results of our resident and stakeholder outreach meetings. The resulting tool produced a list of prioritized strategies and actions, based on the City priorities and shared values of: social justice, equity (equal access to opportunity), climate action, local involvement in design and decision making, creating layers of protection by working at multiple scales, design in flexibility and adaptability, and leveraging building cycles.

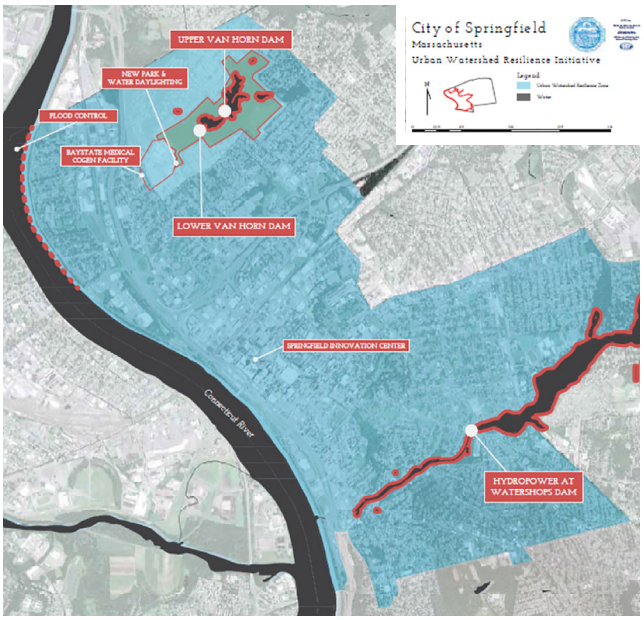
The SARM is included in the supplemental materials and available for immediate download here: http://www.pvpc.org/sites/default/files/doc-strong-healthy-just-springfield-climate-action-resilience-plan-2983.pdf



The actions summarized at the end of this plan are the top priority actions identified by this planning process. A broader range of action are included in the SARM and are necessary to achieve the very ambitious GHG emissions reduction goal of this plan,

80% reduction in GHG emission in 32 years. While there is much that city officials, residents, businesses, and institutions can and must do to act with respect to climate change, we are also dependent on our state and federal government partners to take action. As noted, the Commonwealth of Massachusetts has successfully placed itself as a leader with respect to climate action and clean energy by a course of deliberate and thoughtful legislative and other government actions, plans, rules and regulations implemented over the last 20 years. In addition to the direct actions recommended in this plan, we also encourage support for state and federal actions that will enable city officials, residents and businesses and institutions to achieve our goals.

This plan supports efforts in the MA legislature to use carbon pricing, whether through a cap-and-trade program, a carbon tax or carbon fee, to encourage communities, organizations, even individuals to use less carbon-intensive energy sources by raising the prices of fossil fuels to reflect their associated carbon pollution. As State Senator Mike Barrett says: ""This is really about a single idea: If you start posting a complete price for a product that is underpriced today, people will react to the complete price by using less. That's it—carbon pricing in a nutshell. Massachusetts can lead the nation in the fight against climate change by applying this one concept to fossil fuels." Massachusetts has already been pricing carbon for the electricity sector for more than five years through a cap-and-trade program called the **Regional Greenhouse Gas Initiative, or RGGI.** It involves a regional carbon cap and a market for its nine member states to sell and purchase carbon credits. But for Massachusetts, the power sector accounts for only 20 percent of the state's emissions; the remaining 80 percent comes from sources not covered under RGGI––such as heating fuels, construction, transportation and manufacturing. Carbon pricing proposals aim to fill that gap.



Urban Watershed Resilience Initiative

I was surprised that the two big sources of emissions were transportation and residential, were responsible for the really largest part of the emissions, and how hard it will be to make a difference because so many people contribute to these factors

Participant at Mason Square community meeting, 4/13/2017

part 1

UNDERSTANDING

OUR CHALLENGES

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The problems this plan seeks to solve are the production of greenhouse gas (GHG) emissions and the vulnerability of the city and its residents to both the chronic stresses that exacerbate vulnerability: poverty, systemic racism and resulting inequitable access to opportunity, unemployment/under-employment, disproportionately high rates of preventable disease, and the acute shocks of the effects of climate change- increasingly severe and unpredictable weather, flooding, and extreme heat. We completed our problem identification by inventorying GHG emissions and assessing vulnerabilities. The full GHG Emissions Inventory Report and Vulnerability Assessments are included in the Supporting Materials.

GHG EMISSIONS INVENTORY SUMMARY

The City of Springfield recognizes that GHG emissions from human activity are contributing to climate change, the consequences of which pose substantial risks to the future health, wellbeing, and prosperity of our community. In Springfield, as throughout the United States, these risks are disproportionately shouldered by those with the least resources to respond. Furthermore, Springfield has multiple opportunities to benefit by acting quickly to reduce community GHG emissions.

Greenhouse gas emissions can be quantified in two ways:

- Measurement-based methodologies refer to the direct measurement of greenhouse gas emissions (from a monitoring system) emitted from a flue of a power plant, wastewater treatment plant, landfill, or industrial facility.
- Calculation-based methodologies calculate emissions using activity data and emission factors. To calculate emissions accordingly, the basic equation below is used: Activity Data x Emission Factor = Emissions

All emissions sources in this inventory are quantified using calculation based methodologies. Activity data refer to the relevant measurement of energy use or other greenhouse gas-generating processes such as fuel consumption by fuel type, metered annual electricity consumption, and annual vehicle miles traveled. Please see our supporting documents for a detailed listing of the activity data used in composing this inventory. Known emission factors are used to convert energy usage or other activity data into associated quantities of emissions. Emissions factors are usually expressed in terms of emissions per unit of activity data (e.g. lbs CO2/kWh of electricity). For this inventory, calculations were made using the International Council for Local Environmental Initiatives' (ICLEI) ClearPath software.

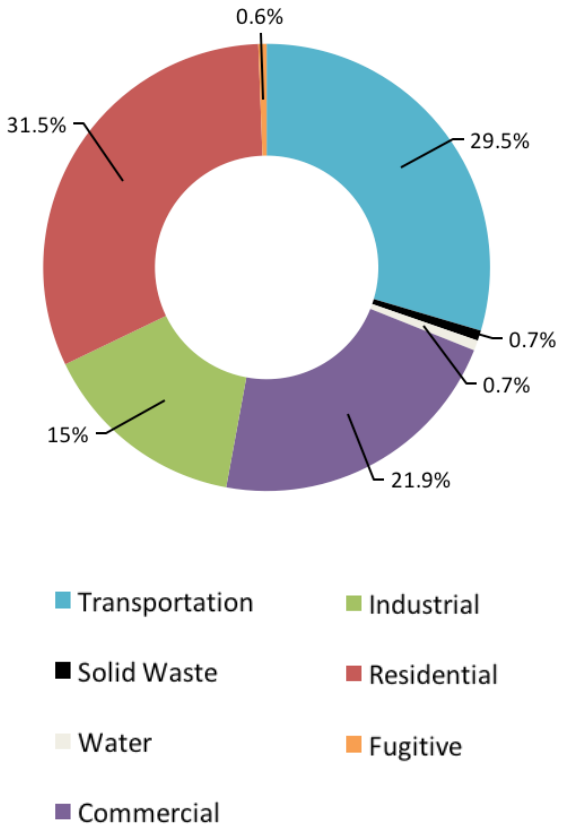
CHANGE/ACTION EXPLAINED

Naturally occurring gases dispersed in the atmosphere determine the Earth's climate by trapping solar radiation. This phenomenon is known as the greenhouse effect. Overwhelming evidence shows that human activities are increasing the concentration of greenhouse gases and changing the global climate. The most significant contributor is the burning of fossil fuels for transportation, electricity generation and other purposes, which introduces large amounts of carbon dioxide and other greenhouse gases into the atmosphere. Collectively, these gases intensify the natural greenhouse effect, causing global average surface and lower atmospheric temperatures to rise.

As these greenhouse gas emission concentrations increase and climate change progresses, Springfield will be impacted. In fact, we are already seeing some of these impacts. Springfield could be impacted by hotter summers and wetter winters. Springfield is also likely to see an increased number of strong storms that will impact the City annually. These storms will bring strong winds and heavy amounts of rain and/or snow, which could lead to severe wind and flooding damage. For a more in-depth analysis of how Springfield is expected to be impacted by climate change see the Vulnerability Assessment Summary (and full assessment in Supporting Materials).

Many communities in the United States have taken responsibility for addressing climate change at the local level. Reducing fossil fuel use in the community can have many benefits in addition to reducing greenhouse gas emissions. More efficient use of energy decreases utility and transportation costs for residents and businesses. Retrofitting homes and businesses to be more efficient creates local jobs. In addition, money not spent on energy is more likely to be spent at local businesses supporting the local economy. Reducing fossil fuel use improves air

quality, and increasing opportunities for walking and bicycling improves residents' health. These are just some of the co-benefits of addressing climate change at the local level.



Community-wide GHG emissions results by sector

KEY FINDINGS

There are a variety of emissions sources and activities included in the community-wide inventory. The largest contributor is energy use in buildings (residential, industrial, and commercial) which accounts for 68.5% of Springfield's overall emissions. The next largest contributor is transportation (vehicles, transit, trains) with 39.5% of the overall emissions. Actions to reduce emissions in both of these sectors are the focus of this climate action and resilience plan as they account for 97.9% of overall GHG emissions. Water/ wastewater processing, solid waste management and fugitive emissions are responsible for the remainder of emissions (2.1%) within the City of Springfield.

NEXT STEPS

The City has set an ambitious goal to reduce emissions by 80% by 2050. In order to hit this target, Springfield officials, residents, businesses and visitors will all need to play a role in the implementation of these climate action recommendations. In order to track emissions over time, ICLEI's[2] protocol recommends carrying out a thorough greenhouse gas emissions inventory every five years at a minimum.

Springfield's commitment to climate action is well supported by the Commonwealth of Massachusetts, which is recognized as a leader in the country with respect to climate action and clean energy. Massachusetts was one of the first states to adopt a renewable portfolio standard, committing the Commonwealth to an ever-increasing amount of renewable energy, and in 2008, with the passage of the Global Warming Solutions Act (GWSA), the state committed to 80% reductions in GHG emissions, which was consistent with guidance from the Intergovernmental Panel on Climate Change (IPCC) at the time.

2 We used the ICLEI-Local Governments for Sustainability GHG emissions inventory software, www.icleiusa.org

VULNERABILITY ASSESSMENT SUMMARY

The second phase of our problem identification was an update of a preliminary vulnerability assessment conducted by the City as part of the application to the National Disaster Resilience (NDR) competition. This Vulnerability Assessment update affirms and advances the City's approach to resilience in the targeted Resilient and Equitable Urban Watershed. The Vulnerability Assessment seeks to understand how different communities in Springfield would be impacted by climate change. Key to this was understanding how social factors contribute to vulnerability and looking at how the city's geography and infrastructure attributes contribute to or detract from resilience.

The spatial intersection of social and geographic vulnerability, along with the presence of vital infrastructure for the City's emergency management system, strongly supports Springfield's emphasis on the Watershed Resilience Zone for its Climate Action and Resilience Plan, and suggests the possible additional inclusion of Indian Orchard as an area of focus because of the social vulnerability of its residents.

Our Social Vulnerability Index maps (full set in Supporting Materials), including a number of demographic factors among them race and income, show a concentration of the highest-range vulnerability block groups within the Zone, in neighborhoods such as Memorial Square, Brightwood, Metro Center, and Old Hill. The Zone also contains a number of second highest-range vulnerability block groups in the South End, Six Corners, Bay, and Liberty Heights neighborhoods. The only neighborhood outside the Watershed Resilience Zone that indicated high vulnerability was Indian Orchard, in the northeast corner of Springfield. Maps showing the individual social variables that contribute to the total high vulnerability can be explored further in the Supporting Materials.

The lack of air conditioning during heat waves is a health risk. This data is not available in the Census, but we have some estimates based on region and income. In Massachusetts in 2009, almost 80% of households had an air conditioner, often a window unit, but those units only used 1% of total energy expended in the state.[3] A recent national dataset from the US Energy Information Administration indicates that only 36% of households with annual incomes under $40,000 (and only 15% under $20,000) use air-conditioning equipment of any kind.[4] As there are 30,846 households in Springfield that make less than $40,000 per year, it is possible that only 11,105 households have air-conditioning equipment.[5] This increases the vulnerability of lower-income households to rising heat levels.

The flood zones analyzed are based on current FEMA maps.[6] It is expected that in the future, flooding will increase in frequency but will be largely contained to the current flood zone. Flooding under climate change is expected to be more frequent and intense, so the designation of '100 year' and '500 year' should be understood as showing locations where fairly

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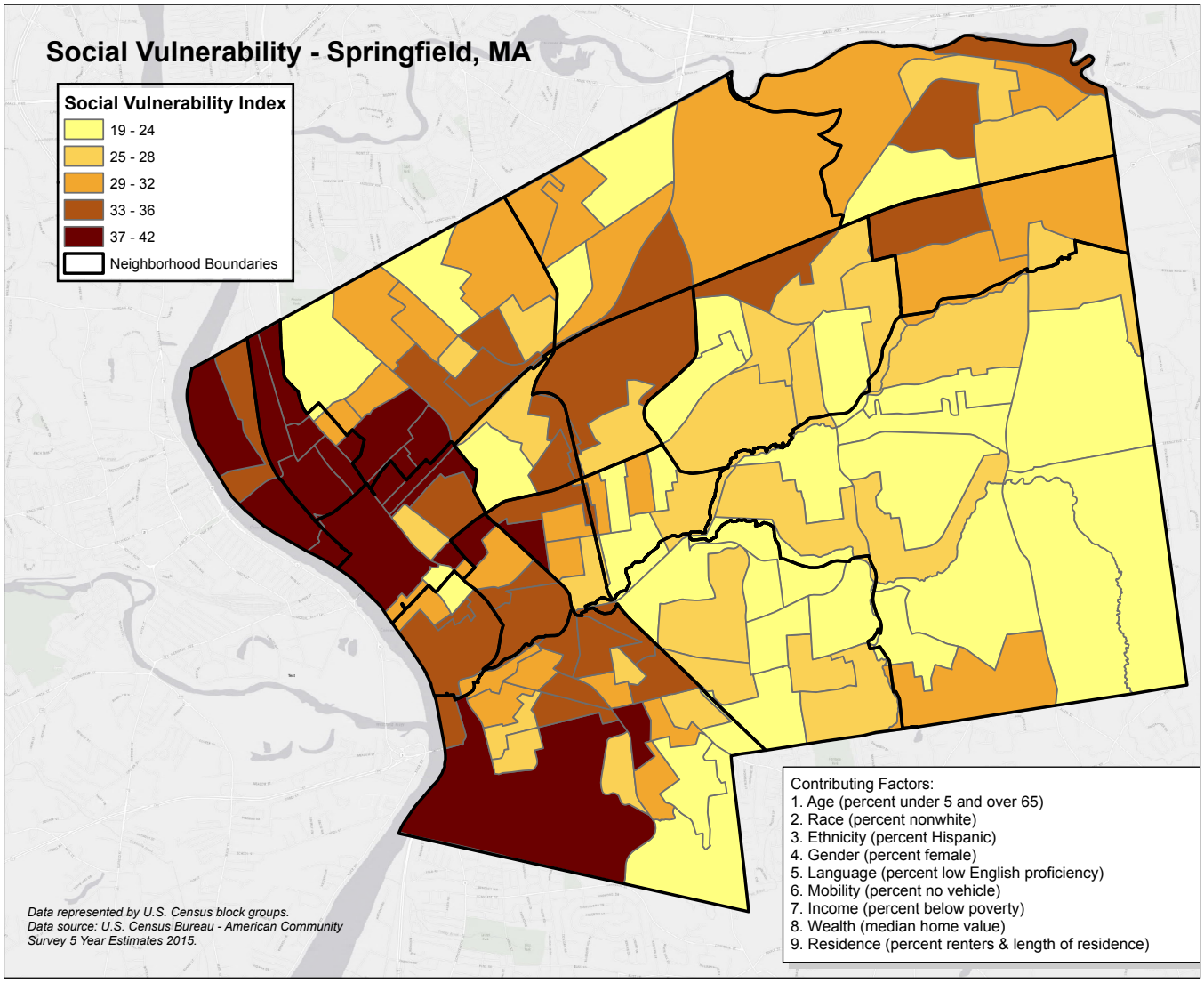
3 US Dept. of Energy, Energy Information Administration. 2013. Household Energy Use in Massachusetts. Retrieved April 28, 2017, from https://www.eia.gov/consumption/residential/reports/2009/state_briefs/pdf/ma.pdf

4 US Dept. of Energy, Energy Information Administration. 2017. 2015 Residential Energy Consumption Survey. Retrieved March 30, 2017, from https://www.eia.gov/consumption/residential/data/2015/#ac

5 United States Census Bureau. 2015. S1901: Income in the past 12 months. 2011 – 2015 American Community Survey. Retrieved March 25, 2017, from https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml

6 It is our understanding that FEMA is in the process of updating floodplain maps but the updates for Hampden County have not yet been released.



Social Vulnerability Map

frequent flooding and rarer (but still likely) flooding should be expected.

Impervious surfaces were also analyzed. These are paved areas like parking lots and streets as well as built structures. Asphalt and similar materials intensify the effect of sunshine, absorbing sunshine during the day and reflecting it back out overnight. This worsens high temperatures well into the evening on a calm summer night. Impervious areas also prevent infiltration of rainwater, leading to more flow of water across sites and potential flooding. Brightwood, South End, and to a lesser extent Memorial Square and Indian Orchard have the largest areas subject to flood risk. Properties along the city's rivers are also at risk of fairly frequent flooding under climate change. Areas containing Combined Sewer Overflow (CSO) outfalls may also experience backup flooding during heavy rain events.

Areas with low tree canopy are clearly visible on the Vulnerability Assessment maps included in Supporting Materials. Most cities have fewer trees in core commercial areas such as Metro Center. Of more concern are the residential areas such as the South End, Memorial Square, East Springfield and residential parts of Metro Center, which should be evaluated for potential tree planting on city property and/or help to residents planting trees near their houses for cooling and air quality.

By cross-referencing the Social Vulnerability Index with the Geographic Vulnerability Map and Tree Canopy map, it is apparent that the most socially vulnerable neighborhoods mentioned above (including Indian Orchard) are also the most geographically vulnerable. They have the highest exposure to flooding from both the Connecticut and Chicopee Rivers, and except for Indian Orchard, these neighborhoods also possess the lowest levels of tree canopy and the highest concentration of impervious surfaces. These neighborhoods are therefore both vulnerable to flooding through sheetflow (rainwater running over land) in severe storms and also have the least ability to mitigate intense urban heat. CSO events are also distributed exclusively along the waterfront areas of these neighborhoods, suggesting that high volumes of stormwater may be moving through them during intense rain events.

This area is also home to a high degree of critical infrastructure. Fire Station 10 is within the 500-year flood zone, and City Hall, Baystate Medical Center are both located immediately adjacent to that zone, meaning they may be more at-risk in the future as flooding becomes more frequent and more powerful. Additionally, Indian Orchard is home to MassPower, which is exposed to flood risk from the Chicopee River. Lastly, the Watershed Resilience Zone also hosts the Lower Van Horn Dam and the Watershops Pond Dam, both of which are noted to be in High Hazard condition. If these dams were to be breached during a flood event, impacts to the Zone could be severe.

Springfield's critical infrastructure for responding to a disaster, including fire stations, is distributed across the city. The Chicopee River puts many culverts into flood zones, reducing their utility in a big storm but also increasing their importance to stormwater management. Increasing permeability near these may be particularly helpful. Baystate Hospital's new Combined Heat and Power (CHP) plant (funded in part with NDR funds secured by the City) includes a 30-day back-up power supply, and is therefore an important asset during a disaster.

The Resilience Index map reveals a cluster of heating/cooling centers, emergency shelters, and hospitals/urgent care centers in the most vulnerable neighborhoods, all of which are located along PVTA routes. This indicates the City's already substantial presence of facilities essential to recovery from climate

hazards, which will provide a useful foundation for additional work during the implementation of this Strong, Healthy & Just (SHJ) plan. Food outlets are also critical due to their role in providing food and water before, during, and after disasters. Specific types of outlets represented in this analysis include both full service grocery stores and neighborhood bodegas/convenience stores—the latter may or may not provide healthy food options that contribute to greater resilience, but they may help residents meet their daily needs. Ensuring food outlets remain open during disasters is essential to making sure they truly contribute to local resilience.

RECOMMENDATIONS

The City has planned an integrated set of grey (traditional cement or other non-natural) and green (natural, such as trees and rain gardens) infrastructural solutions to mitigate climate risks in the Urban Watershed Resilience Zone. This approach includes efforts such as dam restoration and hardening alongside park enhancements for stormwater retention, and upgrades to flood control systems. Our assessment supports this multifunctional design, as it will provide significant co-benefits in addition to climate adaptation. These recommendations are steps that can be taken to support both climate justice and resilience.

Flooding is widely recognized as a significant and increasing risk under climate change. Heat waves are also an important public health concern, as they can directly result in illness and death among vulnerable populations. Addressing both of these will increase the resilience of the city and its residents. Generally, the City has correctly identified the most vulnerable neighborhoods for investment and provision of resilience services in the targeted Urban Resilience zone, although our maps also encourage consideration of Indian Orchard as a neighborhood of concern.

There is an array of green and grey infrastructural solutions, as well as non-structural approaches (zoning, building codes, etc) to address the primary challenges to resilience. Common green infrastructure solutions to flooding focus on allowing water into an area deemed "floodable" to allow natural infiltration and also the movement of rainwater across the ground (sheetflow). These kinds of approaches can include parks designed for water retention. When it is not wet, parks serve all their social functions and cool nearby homes. When significant rain occurs, the park is closed to use and simply allows water to infiltrate into the aquifer. This approach should also help with CSO problems, as it diverts water from sewer systems. Careful design is needed to get the right elevation and planting to ensure all these functions. Memorial Square, Brightwood, South End and Indian Orchard would appear to benefit from evaluation for this type of climate action/resilience intervention, due to proximity to flood zones and high concentrations of impervious surfaces.

Rain Garden

Across the broader community, water infiltration can be encouraged through landscape elements such as bioswales (ditches with the right plantings that hold rainwater and let it infiltrate) or rain gardens (somewhat larger than swales but the same idea), which can help halt sheetflow and allow rains to infiltrate back into the groundwater before they flood nearby neighborhoods. Some cities are using vacant lots or sidelots for this purpose, or small agricultural plots which also provide permeable surface.[7] Building bioswales/rain gardens can be a job training and employment program for residents in neighborhoods looking to build skills. Maintenance of this sort of dispersed infrastructure can be challenging for City departments with strapped budgets, however, and it is necessary to include resident training in maintenance of rain gardens.

Green infrastructure also offers many opportunities to reduce heat. Increasing the urban tree canopy by planting street trees can help provide a cooling effect to the buildings next to them, while reducing particulates in the air and sequestering carbon. This serves important justice roles when the trees are planted in denser, less wealthy neighborhoods that have fewer trees (South End, residential portions of Metro Center, Memorial Square, East Springfield). Green roofs (specially constructed rooftops designed to be covered in plants) reduce both ambient heat and the amount of energy needed to cool their specific building; these could be implemented specifically on public housing units to further achieve a justice focus. Where green roofs are not possible, flat rooftops can be repainted white to lower the heat they retain; this can be particularly helpful in the densest parts of town, where extensive tree canopy is not spatially feasible or suited to the urban scale (e.g. parts of Metro Center).

7 Cuyahoga Land Bank. Side Yard Program. (n.d.). Retrieved April 29, 2017, from http://www.cuyahogalandbank.org/sideYard.php

Common green infrastructural solutions to flooding and heat can be considered together, because they often create positive synergies that reinforce the effectiveness of each. For example, creating a waterfront park with a berm along the banks of a flood-prone river can reduce flood risk, while creating a multi-use running/bicycling trail atop the berm; and street trees with large pervious growing areas around them can reduce heat while also retaining stormwater during heavy rains. Additionally, community gardens can be considered a form of green infrastructure (especially those on vacant lots) as they reduce temperatures, infiltrate stormwater, build community cohesion, address local food insecurity, and get rid of impervious surface that worsens the urban heat island effect.

Grey infrastructure refers to more traditional forms of engineering that usually aim to prevent flooding from entering areas used by people. This can take the form of dams and levees, retractable floodgates, or other constructed barriers against rising waters. Green and grey infrastructure can be thoughtfully combined--for instance, levees with foundations and water-facing walls of concrete can be topped with soil and grass to create a waterfront trail for walking, jogging and biking, such as the Connecticut Riverwalk and Bikeway.

Non-structural solutions, zoning regulations and building codes as well as community services, and social capacity building programs, can and should play an accompanying role. For instance, a proactive approach to building and zoning codes can encourage more environmentally conscious siting of new buildings so that residents benefit from cross-breezes. Codes can also require or provide incentives for putting mechanical systems on the second floor in case of floods – this is sometimes called 'floodable design.' Opening and publicizing cooling centers (air-conditioned public spaces) and establishing longer

seasons for public pools can mitigate the effects of heat waves. "Pop-up pools," quickly constructed swimming facilities like the one built in Brooklyn Bridge Park[8] can expand pool capacities in existing parks without permanent commitments of land. Areas where there are more elderly without cars, such as Forest Park, may benefit from social capacity building, such as programs to be sure people know which neighbors to check on in case of flooding or a heat wave. To support seasonal employment, teams of residents can be trained and paid to visit the elderly across the city during heat episodes to make sure all is well. The City can provide helpful assistance to potential garden-starters by transferring City-owned property at low cost, or by purchasing privately-owned lots from willing owners.

Pricing and other subsidies have a role to play. Expanding enrollment in home-owners and renters insurance can be a key recovery mechanism for the city's economically disadvantaged vulnerable residents. However, paying for such insurance is a challenge for low-income families who may move often. There may be ways to develop cooperatives to increase the likelihood of renters being able to afford such insurance. An incentive program that lowers the cost of air-conditioning for lower-income or aged individuals can increase resilience to higher temperatures. One innovative idea is to connect energy audits with the provision of very low-cost air conditioners to low-income residents who complete whatever energy improvements are recommended for them. This would achieve the health benefits of air conditioning during extreme heat events, while minimizing the net energy used to do so. Incentives for tree planting on residential or small commercial lots may also be helpful.

8 Brooklyn Bridge Park. Pop-Up Pool. (n.d.). Retrieved April 10, 2017, from http://www.brooklynbridgepark.org/attractions/pop-up-pool

Neighborhood-level solar microgrids, owned and operated by residents, have also been proposed in cities like New York[9]. These energy systems can provide redundant power in the event of outages, and allow residents to produce their own energy (and potentially sell surplus power back to the utility's grid, or to each other [10]). The cost of solar panels can be subsidized by the City as a means of further reducing reliance on fossil fuel-based electricity, in addition to the expansion of local hydropower.

Solar Panels in Springfield

CONCLUSION

Adapting to climate change is well within the abilities of Springfield and its residents, especially when there is a shared understanding of which residents face highest risk, and an affirmative plan to address these increased vulnerabilities first. The results of this vulnerability assessment have been integrated into the SHJ planning process and will help direct resources and outreach to the neighborhoods that need it most.

9 WE ACT for Environmental Justice. Northern Manhattan Climate Action Plan. (n.d.). Retrieved March 5, 2017, from https://www.weact.org/campaigns/nmca/

10 Cardwell, D. 2017, March 13. Solar Experiment Lets Neighbors Trade Energy Among Themselves. Retrieved April 10, 2017, from https://www.nytimes.com/2017/03/13/business/energy-environment/brooklyn-solar-grid-energy-trading.html

I think it is really important at this point to put some plans in place for neighborhoods. Neighborhood plans need to go into place, especially for the communities that are underserved.

Participant at Central Library meeting, 4/29/2017

part 2

ENGAGING
OUR COMMUNITY

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The Goal of Public Outreach and Engagement is to understand the needs, lived experiences, and concerns of Springfield residents, as well as build community buy in and support for the Strong, Healthy & Just: City of Springfield Climate Action and Resilience Plan while soliciting residents and other key stakeholders input for the content of the plan.

ENGAGEMENT HISTORY

The call for the SHJ Climate Action and Resilience Plan originated with the community in 2013, when 24 local organizations came together to hold the first Climate Justice Conference in the City's history, focusing on the impact that climate change and greenhouse gas pollution had on neighborhoods in Springfield.

Over the next four years, city residents continued to advocate for such a plan, delivering post-cards to the Mayor's office, passing a resolution at the Springfield City Council, and holding rallies and community events to encourage the City to do more when it came to reducing pollution and building resilience.

In 2015, the City committed to assembling a Climate Action Plan Working Group, a partnership between City staff and community organizations to explore possible actions for the City to take with regard to climate issues, with a focus on environmental justice communities, those being the communities that are most impacted by climate change and are least responsible for its existence.

As a part of that working group, the City of Springfield committed to following the Principles of Environmental/Climate Justice, included in the supporting materials.

In 2016, the City of Springfield received funds as a part of the National Disaster Resilience Competition, including funds to support the development of a Climate Action and Resilience Plan, leading to the facilitation and creation of this document.

Climate Justice Conference in 2013

SUMMARY OF INPUT, BUY–IN AND SUPPORT

Given the City's strong and unwavering commitment to Climate Justice, broad outreach and engagement to collect input on this plan development process was critical. Engagement strategies emphasized outreach to vulnerable populations in Springfield, and also included key stakeholders from across the anchor institutions, businesses, not for profit advocacy organizations, City officials and staff, policy makers, and the community at large.

A total of 363 people participated in the engagement activities, with eight sectors of the community represented, including residents, City staff, economic development, higher education, health, transportation, real estate, utility, waste management, and community based organizations. In April 2017 we held three community meetings and nine stakeholder events.

Across all of these events common themes emerged. People are aware of and ready to discuss livability measures included under the heading of climate action and resilience such as making it easier and safer to walk, bike, and grow food. Many people are interested in expanded/improved public transportation, bike lanes and crosswalks, community gardens, and citywide composting. Interest in other climate action/resilience strategies grew over the course of community engagement as participants learned from the GHG emissions inventory, the vulnerability assessment and the research into best practices from across the country. Residents, landlords, and community advocates need more information and clearer access points to programs like Mass Save, Community Solar, and how to work together to plant more trees. Engaged residents repeatedly communicated the need for existing climate action and resilience initiatives to be easier to use and more accessible to more people, especially economically disadvantaged residents. A desire for improved access to information about resources available from the City, the State and other public and private sources was expressed many times as was a desire for transparency and leading by example from the City.

Residents expressed a need for intentional and culturally humble efforts initiated by the City and other institutions in power to build confidence that improvement plans for the city, both existing and those being developed, will be implemented with dedicated resources targeted at low income neighborhoods. Educational campaigns, positive messages from the City and media, and formal community engagement strategies by the City are opportunities to act upon this request.

Community Meeting in Springfield's North End Neighborhood

Stakeholders affirmed their engagement with the City on a number of post-tornado recovery efforts, and expressed a desire for heightened visibility and leadership from the City to elevate ongoing climate action and resilience activities and initiatives. As noted, there are many climate action/resilience initiatives underway in the City about which residents and key stakeholder would like to know more. These include but are not limited to: significant solar panel installations, like the one at the parking lot at Smith and Wesson; community and school gardens; Baystate Medical's new Combined Heat and Power (CHP) plant; large institutions adapting to the new ban on food waste in landfills implemented by the Commonwealth in 2016; construction job training targeted at low income residents, and a regional bike share program. There was strong support expressed from a variety of sources for a City staff position that focuses on climate action and resilience including oversight and facilitated implementation of this plan. Other recommendations included focusing new development on brownfields versus green space, convening key sectors to work together on projects, increasing the number of residents with flood and other disaster insurance, expanding education to small businesses about the Mass Save program, and improvements to public transportation both in service and in an accelerated transition to electric and hybrid vehicles. Concern for funding to support climate actions was voiced as well. A Resilience Officer for the City of Springfield, educational and planning opportunities for businesses and institutions, and policies that require climate planning and action were recommended to address these issues. (Complete summary of engagement, including residents' action commitments included in Supporting Materials)

The climate action and resilience content utilized for the community engagement strategies was taken directly from research and analysis concurrently happening throughout this SHJ planning process, including findings from best practice research, problem identification (GHG Emission Inventory and Vulnerability Assessment), and the risk analysis matrix. As the community engagement strategies rolled out, input collected was integrated into the planning of the next event. These strategies provided rich input to help narrow priorities, highlight current efforts, and inspire continued engagement with implementation efforts in the future. As a standard of practice for each of the strategies, we determined that each event should be convenient, comfortable, informative, fun, acknowledge and respect different expertise, designed for a variety of learning styles, and action oriented.

Community Meeting at Springfield Public Library

ENGAGEMENT PROCESS DESCRIPTION

The following engagement and outreach activities were implemented. Through facilitated discussions, each activity was agreed upon by consensus, approved by the City, collectively designed, implemented, and evaluated.

Outreach and Engagement efforts consisted of six key activities:

1. Informative and interactive Resident Engagement Community Meetings to educate and engage residents, especially low-income residents and communities of color. These were two hours in length.
2. Direct outreach via traditional and social media (Facebook)
3. Interviews with Key Sector Stakeholders[11] to find out what they were already doing, areas that they were interested in doing more, and barriers they might be experiencing
4. A Half Day Community Resilience Building Workshop (CRB-described in Overview section).
5. Citywide Survey developed among the partners with content advised by best practices, partner input, and vetted by PHC Research and Evaluation Team. It was administered online and in person.
6. City-sponsored "Sustainability Dashboard", www.resilientspringfield.org

11 Jay Minkarah-DevelopSpringfield, David Cruise-Regional Employment Board (REB), Dr. John Cook-President STCC, Liz Celluci-Columbia Gas

CLIMATE ACTION / ACCIÓN CLIMÁTICA

CONTENEDORES DE RECICLAJE

RECYCLING CONTAINER(S)

Processing waste uses energy, and using energy produces GHG emissions which cause global warming. So if we reduce the amount of waste we process, we reduce global warming. In Springfield recycling rate is only 15%

El procesar la basura utiliza energía, y energía produce emisiones de gases de efecto invernadero que causan el calentamiento global. Por lo tanto si reducimos la cantidad de residuos que procesamos, nos reducir el calentamiento global. En Springfield, tasa de reciclaje es sólo el 15%

CLIMATE ACTION / ACCIÓN CLIMÁTICA

YARDA Y CUBO DE COMPOSTAJE CASERO

YARD AND HOME COMPOSTING BIN

Approximately 30% of waste burned at Covanta is food waste that could be removed and composted

Aproximadamente el 30% de los residuos quemados en Covanta es residuos de alimentos que podrían ser quitados y compostado para hacer fertilización organica

RESILIENCE / CAPACIDAD DE RECUPERACIÓN

BICICLETA

BICYCLE

An energy efficient and extremely healthy means of transportation=climate action, and mobility can be very important after a disaster-gasoline might not be available. Made easier/safer by City led/ funded (with state and federal funded) bike-lanes

Un medio de transporte Energía eficiente y extremadamente saludable = acción climática, y movilidad puede ser muy importante después de un desastre – puede que la gasolina no este disponible. Hecho más fácil/más seguro iniciado y financiado por la ciudad (financiado con fondos estatales y federales) carriles bici

RESILIENCE / CAPACIDAD DE RECUPERACIÓN

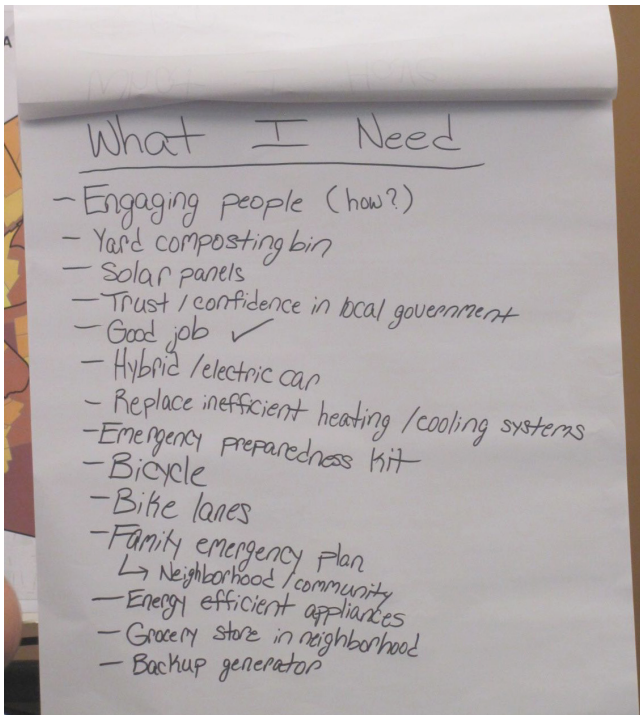
PARADA DE AUTOBÚS

BUS STOP

A bus stop close enough to use with service to get me where I need to go. Requires advocacy at federal level for more funding for transit

Una parada de autobús lo suficientemente cerca para utilizar con servicio para llevarme a donde tengo que ir. Requiere actividades de promoción a nivel federal para más fondos para el tránsito

Climate Action and Resilence Cards



Community Meetings

OUTREACH AND PROMOTION

Recruitment and promotion efforts were implemented through a multi-tiered approach by phone, email, website posts, social media, print media, and in person announcements at community meetings. A press release by the City with a general announcement of the SHJ work and opportunities to get involved was issued by the City and all SHJ collaborators promoted the launch and engagement events. Two community meetings in November 2016 were supported by a supplemental grant secured by Arise for Social Justice and the University of Massachusetts, Amherst, allowing for broader outreach to low-income communities and communities of color. The Community Meetings were promoted collectively and through one on one outreach. Each individual strategy had targeted promotion and recruitment efforts.

RESIDENT ENGAGEMENT COMMUNITY MEETINGS

In April, 2017, three two-hour resident engagement community meetings were held, two with a neighborhood focus and one with a citywide focus. A meeting facilitator guide was developed and given to each SHJ group work partner playing a role in the meetings. Food and childcare were provided at each meeting. The community meetings were designed in four parts, each part intentionally informative and interactive, with opportunities to provide input on City actions to include in the final SHJ and to share opportunities to take individual action.

The four parts included:

Discussion at Community Meeting in the North End Neighborhood

Resident Engagement Community Meetings

EDUCATION STATIONS

Green House Gas Emissions Inventory, Vulnerability Assessment, and the Timeline Gallery Walk that highlighted events in Springfield's history related to extreme weather, energy use in building and transportation, and climate justice activism.

PRIORITIZATION EXERCISE

Dotting exercise that included a list of possible actions that the city could take based on best practices and space was included for participants to add actions to the list that supported some of their own priorities and priorities the emerged after playing the What I Have/What I Still Need card game. Participants had 5 sticker dots to place on their priorities.

HAVE/NEED CARD GAME

Engaged participants to sort and discuss assets they "have" and assets they "still need" to be more resilient and actions to address climate change. This was a small group activity that involved discussion and prioritization. All participants left with their deck of cards and were encouraged to use them as a tool to have discussions about climate action and resilience with their family, friends, and other community members (cards and instructions included in Supporting Materials).

"ONE COMMITMENT AND ONE REQUEST"

The closing activity in which each participant was asked to make one personal commitment toward climate action and resilience and one request to the city.

STAKEHOLDER MEETINGS

A series of meetings with key sector stakeholders were scheduled over two weeks. There were nine meetings held, with a total 19 people participating, with representation from each of the 7 sectors.[12]

Rich information was collected from these meetings highlighting the private sector's high level of commitment to, interest in, and activity both reducing GHG emissions and making the city stronger. From Springfield Technical Community College's (STCC) provision of no cost bus passes to all students versus charging a fee for parking, DevelopSpringfield's commitment to rehab versus demolition, and the Regional Employment Board's partnership with the city to hire un/under-employed residents, the business/anchor institution community in the city is eagerly leading by example.

CITYWIDE SURVEY

A citywide survey was designed based on similar surveys conducted in other cities in the U.S. as part of their Climate Action and Resilience Planning process. It was then reviewed by the SHJ workgroup and PHC Research and Evaluation Team before being finalized. The survey asks questions about individual actions to address climate change and increase resilience, and asks questions about prioritizing potential actions the City can take to mitigate the effects of climate change and increase resilience to severe climate events. The survey was available in print form and online and over 200 surveys have been collected. There was at least one respondent from each Springfield neighborhood, and respondents from a variety of sociodemographic backgrounds were represented.

Respondents were asked to indicate their willingness to take individual action on a number of climate change action areas. Many Springfield residents that responded to the survey indicated that they were already taking steps to address climate change and increase resilience. The responses identified key opportunities for continued engagement on Climate Change Action throughout Springfield, as well as areas where the community needed more information to take action (see summary on next page). The most frequently cited barriers to taking Individual steps to address climate change were: lack of resources, lack of information, and health conditions/mobility issues. Other challenges mentioned included time, issues with public transportation, lack of bike infrastructure (lanes, bike racks, etc.) and related safety concerns, and renter issues (landlord won't allow, no space for compost/garden).

When asked about actions the city should take, respondents prioritized a wide range of activities from encouraging businesses to use less energy and to hire locally for climate action and resilience jobs, to improving the built environment with more tress, bike lanes and sidewalks. In addition to ranking the priority of specific city actions, respondents were asked to identify other actions that the City could take to make Springfield more resilient to acute climate events. Information and education was one of the most frequently cited actions, with responses ranging from more information about community resources and programs to education about climate change. Trash and waste also emerged as a theme, with suggestions including improvements to trash service (i.e. increased pick-ups) and imposing and enforcing fines for dumping and littering. Other themes included restoration of parks, green space, and trees; providing incentives to adopt energy efficient measures or go solar; home improvement; and transportation-related improvements.

12 Sectors: Business, Healthcare, Higher Education, Housing and Real Estate Development, Waste Management, Transportation, Utilities.

KEY HIGHLIGHTS FROM CITYWIDE SURVEY

OPPORTUNITIES TO ENGAGE THE COMMUNITY IN CLIMATE CHANGE ACTION:

The following are the top five areas that had the largest percentage of respondents who were willing to take action. These represent opportunities to engage the community in action.

- Work with landlord to Implement Mass Save Audit Recommendations (tenants' responses) **56%**
- Make emergency preparedness kit for family **52%**
- Start or participate in a volunteer "check in on elders" initiative in my neighborhood **49%**
- Take the $2,000 from Mass Save and implement audit recommendations (homeowners' responses) **44%**
- Learn about cooling/warming centers in my neighborhood and tell neighbors and friends **44%**

OPPORTUNITIES FOR EDUCATING RESIDENTS:

The following are the top 5 areas areas that had the largest percentage of respondents indicating that they did not know what the action was or that they needed more information to make a decision. These represent opportunities to educate the community.

- Install solar panels and/or participate in community shared solar **34%**
- Learn about cooling/warming centers in my neighborhood and tell neighbors and friends **32%**
- Start or participate in a volunteer "check in on elders" initiative in my neighborhood **29%**
- Get permission from my landlord to get Mass Save Energy Audit (from tenants) **23%**
- Make an emergency preparedness kit for my family **23%**

TOP 5 CITY ACTIONS

The following top city actions were identified based on respondents ranking the action as a high priority. These represent opportunities for the City to take action to mitigate the effects of climate change and increase resilience to acute climate events.

- Encourage businesses to reduce energy use **77%**
- Improve the health and number of shade trees **77%**
- Prioritize hiring Springfield residents who are unemployed or under-employed for climate action and resilience work **74%**
- Make it easier for renters to take advantage of free Mass Save energy efficiency building assessments and installations **71%**
- Add more bike lanes, sidewalks and visible crosswalk **69%**

When you sit here and just see all of this happening, you think, gosh, this is so much. I'm one little person. What can I possibly have impact on? But yet we all know, if you could get every person to make some step, you can make a bigger thing.

Participant at Forest Park community meeting, 11/29/2016

part 3

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Springfield's Strong, Healthy & Just Plan recognizes climate change as a threat multiplier: acute stresses caused by climate change, such as increased severe weather, have the ability to aggravate existing stresses within the City such as systemic racism, economic disparity, disproportionately high rates of preventable disease (asthma, cardiovascular, diabetes, hypertension, and obesity) and food insecurity. Therefore, we framed Springfield's climate action and strategies research with the understanding that climate solutions must not only protect the status quo, but provide a net increase in social equity throughout the city.

TAKING ACTION ON
OUR PRIORITIES

PROCESS OVERVIEW

To establish the initial goals, objectives, and actions for the Strong, Healthy, & Just: Springfield's Climate Action & Resilience Plan, we updated the strategies and recommendations identified in the 2015 City of Springfield Climate Action/Resilience Plan Framework and surveyed the document's source plans for any updates since its original publishing. Of every strategy researched, we sought to understand:

- *its climate mitigation and/or resilience goals*
- *how it affected disparate demographics across the city*
- *which demographics it helped the most*
- *which (if any) demographics it harmed.*

We also reviewed greenhouse gas (GHG) emissions inventories and climate action/resilience strategies from 11 cities identified as being either similar in population size and history to Springfield, or as having exemplary plans.[13]

We compared each climate action/resilience plan's objectives and recommended strategies to develop a baseline understanding of the best practices and actionable goals in use by the country's most successful municipalities. Concurrently to reviewing municipal climate action/resilience plans, we conducted a review of best practice reports related to policy and programs for climate adaptation (resilience). These reports, including The Kresge Summary Report (April 2017), ICLEI-Local Governments for Sustainability, the Georgetown Adaptation Clearinghouse, the EPA Climate Smart Growth workbook, and the Community Resilience Building Guide, detail policies that can be adapted to any city in the country and emphasize solutions based in systems theory

Strategies were selected to reduce GHG emissions and to facilitate resilience, specifically:

1) reduce exposure: remove people and property from paths of destruction,
2) reduce sensitivity: bad things will happen--so limit the damage: for example, change zoning to raise new construction above an anticipated flood level, change zoning to require light-colored "cool roofs" to lessen the urban heat island effect, plant shade trees to reduce urban heat island effect, and
3) enhance adaptive capacity: support the 'qualities' that help people cope: strong social ties, good health, economic well-being, and confidence in local government.

During the course of this extensive literature review, we learned that the most highly effective strategies and actions were those which followed the SMART Objective criteria (Specific, Measurable, Achievable, Responsible, and Time-bound). Across the country, those strategies and actions which identified specific and measurable objectives were those which were implemented by their communities most successfully. We additionally found that in order to be "achievable," strategies and actions must be cost effective (with co-benefits in GHG emissions reductions across multiple sectors and/or in community resilience), politically feasible, and applied with a social/climate justice lens.

We worked with our City advisory team, comprised of representatives of all key City departments, to assess the resulting list of 97 potential actions and strategies, using the Climate Action Resilience Assessment Tool and compiled the results into a master document, the Strategies and Action Ranking Matrix

The Strategies and Action Ranking Matrix ranks proposed strategies and actions by utility and the level of demand for and/or commitment demonstrated by the City, its residents and stakeholders.

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13 Worcester, MA; Chattanooga, TN; Knoxville, TN; Louisville, KY; Grand Rapids, MI; Eugene, OR; Boston, MA*; Dubuque, IA*; Minneapolis, MN*; Oberlin, OH*; and Portland, OR* *indicates Climate Champion*

The matrix scores 0 or 1 point when a proposed action:

- *appears in a relevant City plan*
- *is identified in the community and/or stakeholder outreach meetings as a desired course of action*
- *has documented GHG emission reduction and/or resilience co-benefits.*

The Strategies and Action Ranking Matrix revealed two types of existing "successes" within City policy. The first type of success includes the highest scoring strategies/actions -- those which the City is already implementing, which have been identified as priorities in the City's various major plans, and for which the community has expressed support. These include strategies such as adopting and implementing a Complete Streets Policy and prioritization plan, allowing urban agriculture in the zoning code, passing a Community Garden Ordinance, and prioritizing wetland and water resources protection.

The second type of success includes some relatively mid- or low-scoring strategies which may not have been identified in City plans or by the community as priorities, but which either the City or State is already implementing. The proposed "supporting improved access to utility data for building owners and managers seeking to improve energy and water performance" strategy is an example of a low-scoring success, as the City has access to Mass Energy Insight and property owners can access low- or no-cost Mass Save home/business energy assessments.

We considered this combination of 28 high- and mid-to-low-scoring strategies as "low-hanging fruit" for the City, and developed a single encompassing strategy to encourage the City to 'implement the City's recent core plans' (ReBuild 2012, Analysis of Impediments to Fair Housing and annual Community Development Block Grant (CDBG) plans, Complete Streets: Ped/Bike 2014, Open Space and Recreation Plan (OSRP) Update 2015, Hazard Mitigation update 2016, 2017 Urban Forestry Plan update on '09 plan) recommendations—especially those identified as Best Practices through this planning process. The remaining 69 strategies were identified as areas of opportunity for the City, and were prioritized for further refinement and adaptation to the conditions existing within Springfield.

Downtown Springfield

FURTHER REFINEMENT AND PRIORITIZATION– COMMUNITY RESILIENCE BUILDING WORKSHOP

To further refine the remaining 69 strategies, and to integrate the resident engagement, City staff engagement, stakeholder interviews, GHG emission inventory and vulnerability assessment results, we conducted a final Community Resilience Building Workshop on May 12, 2017 (CRB Workshop Guide included in Supporting Materials). With City leadership and targeted invitations to key industry and institutional stakeholders as well as to residents engaged in community meetings held throughout the month of April, the goal of the workshop was to gather laypeople and experts together in specific workgroups for half a day to focus on molding (revising, generating new as needed) the 69 remaining generic strategies to implementable and realistic, yet aspirational, strategies and specific actions for the City of Springfield.

The workgroup topics were selected based on the support for the possible strategies expressed at the various engagement events, interest and support from City staff, and availability of funding and other resources from the state and federal government. To facilitate the work groups, we identified two topic-specific "thought leaders" with direct, local expertise in the given field. Each group was presented with a draft problem statement and sample SMART objectives, which had been previously drafted in collaboration with the relevant thought leaders, using the proposed strategies/actions as a starting point. Each group was then asked to review and revise their problem statement to accurately reflect their perception of conditions in Springfield, and either revise the proposed SMART objectives or draft their own. Groups were advised to consider how their proposed objectives would be funded, whether they were politically feasible, and what intermediary steps or cultural shifts would need to accompany their final objectives. Following this format, each workgroup established and elucidated an understanding of the existing opportunities and barriers in Springfield surrounding their focus topic, and developed actionable strategies for progress within that framework. These results ultimately informed and prioritized the strategies and actions presented in this Plan. The full matrix of strategies is included in the supporting documents including proposed/affirmed lead implementer, possible funding source, evaluation metrics, and timeline. (Meeting handouts included in Supporting Materials)

The topic areas evolved into the first six categories of proposed actions in this plan:

1. **Building Confidence in City Government**

   Leading by Example & Engaging the Community to Build Community Confidence

2. **Transportation Demand Management**

   Changing the Way We Get Around

3. **Efficiently Using Energy**

   Tracking and optimizing energy use in our homes and businesses.

4. **Greening the Grid**

   Generating and using renewable energy in the city

5 **Creating Resilient Infrastructure**

Building smarter infrastructure systems with community co-benefits.

6 **Managing the Urban Forest**

Planning and maintaining Springfield's trees to reduce threats and increase benefits.

Based on feedback from city staff and other stakeholders, four additional categories of action were added:

7 **Building Human Resilience**
Ensuring equity and public health

8 **Reduce, Re-Use, Recycle:**
Toward Zero Waste

9 **Resident Actions**

10 **Business/Anchor Institution Actions**

The topic "Building Human Resilience" was explored at the May 12th workshop during the "Confidence in Government" work session, and we determined the topic necessitated its own category. The topic, 'Reduce, Re-use, Recycle—Toward Zero Waste' was not explored at the Community Resilience Building workshop both because the GHG emissions inventory yielded the result that under 1% of the city's GHG emissions come from waste processing, and also because our review of City actions combined with stakeholder interviews showed that the City is considering and/or implementing the proposed best practices. The actions are included in this plan because there is support from residents to have the City work toward zero waste, including but not limited to: supporting composting, expanded and easier recycling, and a ban on plastic bags. Similarly, this plan summary does not include actions related to urban agriculture, which is an area of strength in the City. The full action matrix does include food and urban-agriculture related actions.

In addition to the topic specific actions, we have also identified a list of priority actions for residents to take to increase their resilience and act on climate as well as a list of priority actions for businesses and corporations to facilitate collaborative implementation of this plan.

City Councilor Adam Gomez at 2013 Climate Rally

BUILDING CONFIDENCE IN CITY GOVERNMENT

Throughout the entire SHJ planning process, we encountered both a desire to see the City leading by example with respect to climate action and resilience combined with a fear that the City would not follow through. Confidence in the City would be significantly enhanced if the City were to accomplish some of the" low hanging fruit" strategies identified throughout this planning process AND if the City made a significant effort to let people know and celebrate successes. More respectful and intentional communication is needed and the City needs to design and commit resources to do community engagement. People engaged in this process reflected that the Rebuild Springfield process worked because of massive outreach efforts.

GOALS

1. **Lead by example to implement priority recommendations in this plan.**
2. **Ensure ongoing resident engagement in plan implementation and refinement over time.**
3. **Build confidence in city government.**

14. The Climate stabilization Wedges is an approach produced by Princeton University researchers[1] looking at Climate change mitigation scenarios. The project was funded by Ford Motor Company between 2000 and 2009 and has been receiving funding from BP since 2000.[2] The goal of the approach, Stephen Pacala and Robert H. Socolow, is to demonstrate that global warming is a problem which can be attacked using today's commercially available technologies to reduce CO 2 emissions. The objective is to stabilize CO2 concentrations under 500ppm for the next fifty years, using wedges from a variety of different strategies which fit into the stabilization triangle.

15. By calling for national and international binding emission reductions agreements, establishing stronger inventory standards and reporting, committing to a set of local actions to reduce greenhouse gas emissions, and growing the carbon offset market by removing barriers to municipal offset projects, the Mayors' National Climate Action Agenda is intended to make a statement that emission reduction projects – starting with existing cap and trade programs in the US - are not only viable, but essential initiatives that must be embraced and scaled across the country, www.climate-mayors.org

STRATEGIES

1 Review the status of the City's recent core plans' recommendations and action steps (especially those identified as best practices in SHJ). Recommit to their implementation with public timeframes. Proactively publicize City's ongoing Climate Action & Resilience work, especially work catalyzed by NDR in the Urban Watershed Resilience Zone of neighborhoods dominated by economically disadvantaged communities of color. Highlight the workforce development underway that is hiring un/under-employed Springfield residents to perform climate action resilience work supported by NDR and other funds.

2 Maintain resilientspringfield.org website as a transparent means of engaging and communicating with residents on implementation of the SHJ plan and of celebrating successes.

3 Formally involve the Springfield business community and anchor institutions in SHJ implementation. Consider creating a commission, modeled after Boston's Green Ribbon Commission, charged with ensuring their active engagement in SHJ implementation.

4 Work with the business and research community to create Implementation Wedges[14] /Interim Goals to clarify exactly what actions will contribute to which percentages of GHG emissions reductions required.

5 Continue to convene the City Committee created by the Mayor to secure NDR funds and utilize this committee to oversee the implementation of this plan. Establish a committee point person in each City department to take the lead on implementing those items from the plan that fall under the purview of their respective departments. Consider including members of the SHJ plan development working group, as well as community, business, and youth representatives in the City Committee. Consider allocating funds for stipends to allow vulnerable community members to serve on committee, including at least one stipended youth position.

6 Launch a SHJ mini-grant implementation project fund for small groups of residents to participate in plan implementation

7 Join the Mayors' National Climate Action Agenda[14] and consider joining comparable initiatives moving forward to ensure Springfield's active participation in cutting-edge Climate Action & Resilience communities of practice.

8 Work with the Pioneer Valley Planning Commission (PVPC), the Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA) and other federal, state, regional and local entities to identify/secure funding for a new City staff position, or to revise an existing position, charged with working with the SHJ implementation City Committee and City departments to implement SHJ.

9 Research a best practice model of a city that is committed to community engagement and has a plan and in collaboration with community leaders, both official and unofficial, to develop a strategic engagement plan for the city.

10 Work with utilities, the Commonwealth, local foundations and others as appropriate to create a program whereby home-owners/renters who have a Mass Save Home Energy Assessment (HEA) and implement maximum recommended home energy efficiency improvements, receive a no cost or low cost super energy efficient air conditioner. Work to improve access to home-owner's/renters property insurance.

11 Continue the work to break down silos within City government and build capacity in the City and in the community to implement the SHJ

CHANGING THE WAY WE GET AROUND

Thirty-one and a half percent of Springfield's GHG emissions come from transportation and 99% of these emissions are from personal vehicles. We need to both get people out of cars as well as transition our City's fleet to electric and hybrid vehicles that can be powered by our increasingly green grid. Actions and strategies to 'change the way we get around' are designed to: a) Shift modes-make it easier for people to use transit, car-pool, walk, and bike versus driving alone in a single vehicle; b) reduce Vehicle Miles Traveled (VMT)—make it easier for people to work from home, ride share, walk, bike, use transit; and c) transition to increasingly energy efficient vehicles (federal Corporate Automobile Fuel Efficiency (CAFÉ) standards) and clean fuels-electric, hybrid, other technologies as they become available.

The city supports and relies upon the PVTA for public transit and is committed to supporting efforts to expand funding for public transportation both in the city and that connects the city to its neighboring communities. Springfield is excited about the expanded North/South train service in the region and very supportive of planned East/West train service. The city is also committed to working with the western MA delegation to ensure the federal government's ongoing commitment to increasingly efficient CAFE standards which ensure an increasingly efficient fleet of vehicles on the nations' roads.

As noted previously, the actions included in this summary plan are NOT comprehensive. These actions represent the priorities articulated at the Community Resilience Building workshop. It is understood that to achieve the ambitious goal of 80% reductions in GHG emissions by 2050, Springfield, and the United States, will need to dramatically improve transit access and transition to zero emission vehicles (ZEV). Springfield is working with PVPC on the region's ZEV charging station plan.

GOALS

1. **Increase the number of residents who commute to work by means other than single-vehicle from 20.5% to 55% in 2030 with an increasing percentage by 2050.**

2. **Increase the number of on-road bike lanes from 2.5 miles in 2017 to 10 miles in 2020 with an ever-increasing number in 2050.**

3. **Increase the number of regular bus riders.**

4. **Increase the number of EVs/AFVs and necessary charging stations in the city.**

STRATEGIES

1 Implement Complete Streets Plan which details needed and desired pedestrian and bicyclist improvements—crosswalks, sidewalks, bike lanes, bike paths etc. over time as roads receive capital improvements and funding becomes available.

2 Implement Bike Share with a focus on ensuring accessibility and use by the city's low income residents.

3 Work with the Business Improvement District (BID) and the Chamber of Commerce to create a staff position of Transportation Demand Management (TDM) coordinator to assist businesses with getting their workers to reduce commuting in single occupancy vehicles.

4 Encourage employers to provide employees with emergency ride home programs, vanpool match programs, telecommute options, and flextime options to encourage alternative methods of commuting, such as carpooling, public transit, or work from home.

5 Encourage colleges to participate in the PVTA pass program.

6 Revisit the City's parking requirements (last updated in 2012) to identify techniques to realize the City's 'park once and walk' approach in the downtown.

7 Encourage MGM's planned work to bring back electric trolley service in downtown from Union Station to Springfield Technical Community College, the casino, the Basketball Hall of Fame, and Riverfront Park.

8 Address PVTA rider concerns of uncomfortable seats, late arrivals, lack of shelters, snow clearing at shelters, grocery bag limit, and limited night service.

EFFICIENTLY USING ENERGY

The vast majority of GHG emissions are coming from heating, cooling and electrifying buildings. In addition to 'greening the grid', we must do everything we can to make our buildings energy efficient so that we are not wasting precious money and resources. To assess the achievement of the goals articulated below, we will need more data, specifically: the baseline of home energy assessments in Springfield per year and the completion rate sorted by income as well as the baseline of implementation of recommended improvements. The SHJ work group stresses the importance of ensuring collaboration and linkage of existing (and future) initiatives, including but not limited to: Springfield Partners for Community Action (SPCA), Healthy Homes, Grinspoon, Eversource, and Columbia Gas, and acknowledges that most people are aware of Mass Save and the availability of robust energy efficiency incentives in MA, but that awareness does not by itself, translate into action.

GOALS

1. **Increase rate of energy efficiency audits by 20% by 2020 (and increasingly each decade to achieve 80% reductions by 2050).**

2. **Increase number of housing units that complete recommended work to 100% by 2025.**

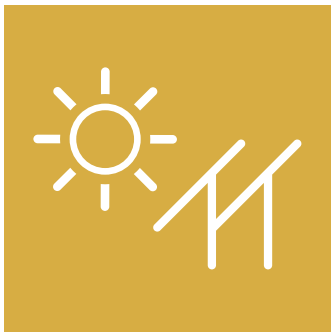
STRATEGIES

1 Form intentional partnerships among and between 5 groups: landlords, housing court, receivers, businesses, and the SHA, and support neighborhoods in marketing Mass Save.

2 Implement national best practices for energy efficiency in homeowner and rental properties. Evaluate expanding the planned Springfield 'Healthy Homes' initiative. Encourage homeowners and rental property owners to fully participate in all eligible Mass Save programs. Potential incentives include decreasing property taxes for participants or providing a low or no cost air conditioner to those households which implement all recommendations.

3 Create an energy performance tracking and annual reporting system for commercial and multi-family properties.

GREENING THE GRID / RENEWABLES



It is vitally important that actions to develop clean, safe, sustainable sources of energy occur concurrently with the above-described energy efficiency work. During the Community Resilience Building workshop, work groups advanced several Springfield-specific recommendations for solar and for a micro-grid downtown, but the SHJ includes a comparable interest in and commitment to researching and integrating all viable renewable energy opportunities in the city.

SOLAR

Community engagement surfaced a sincere interest in and frustration at securing solar power in Springfield. The community does not have adequate access to strategies or resources that will make solar power affordable and plentiful. Currently the economic benefits of solar are not flowing to low-to-moderate income home-owners and hardly ever to renters. 60% of Springfield residents rent their homes. There is an education gap as to the benefits and financing options available with respect to owning solar PV versus leasing and a concomitant lack of access to tax equity investors (tax credit appetite-issue with all federal tax credits). There is also a lack of access to regional and local staff support for local retention of economic solar benefits and there are also some local regulatory barriers. Strategies identified should strengthen the tenant-landlord relationship; create community cohesion/strength; keep money local; prioritize technologies that have low life cycle costs and low negative environmental impacts, and promote equity and equitable access to opportunity, including financial opportunity.

GOALS

1. **Increase solar generation to make up 10% of Springfield's community energy consumption by 2022 and 50% solar by 2050.**
2. **Ensure 50% of all low-income accounts have a 50% or greater discount from community shared solar projects by 2022.**
3. **Improve air quality.**
4. **Utilize solar to maintain a micro-grid that will keep critical facilities operational during power outages.**

STRATEGIES

1. Identify a solar expert point person in the City to field questions and provide technical assistance and guidance to residents and other property owners.
2. Pass a resolution stating support for solar goals and strategies.
3. Launch an educational campaign sponsored by an impartial group to explain solar options and financing.
4. Create incentives to encourage residential and commercial adoption of solar installations.
5. Host a community solar development program and support the development of a local socially equitable tax equity fund to achieve the goals for community solar.
6. Support community shared solar projects with 50% low-to-moderate income buy-in per project.
7. Research the feasibility of adopting an ordinance requiring all new and major renovations to include solar or be able to accommodate solar.
8. Send experts and City staff/residents to participate in statewide discussions on behalf of resident and local business needs with respect to solar and other renewable energy sources.
9. Host a group purchasing program for solar, such as Solarize Mass.
10. Facilitate a working group of 'solar champions' with neighborhood council/civic association involvement to promote solar to residents.

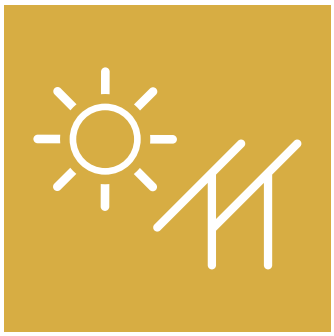
OTHER RENEWABLE-RELATED STRATEGIES:

1. Research geo-thermal using Community Music school as a case study and publicize to city
2. Research viability of launching a residential geo-thermal initiative

MICRO-GRID

Like so many of the actions and strategies identified throughout this planning process and reinforced by the work groups, success with a micro-grid will require leadership from the City. There is a well-established process in place right now in Massachusetts, and funding is available both from the MA Clean Energy Center and from the Massachusetts Department of Energy Resources (DOER), but still a successful initiative requires 'cheer-leading' by the City.

GREENING THE GRID / MICRO-GRID



GOAL

1	**Implement a successful micro-grid project in Springfield by 2020.**

STRATEGIES

1 Create a Springfield micro-grid working group to advance this initiative. Members should agree to implement the following detailed action plan:

- Meet with Eversource and ISO New England to understand grid connection and other issues.
- Research how other cities are implementing micro-grids, and conduct site visits and conference calls to exchange ideas. Possible site visits include the Codman Square CDC project in Dorchester and the fuel-cell micro-grid in Woodbridge CT.
- Research funding opportunities from Massachusetts Clean Energy Center, Department of Energy Resources, and other sources. Apply for feasibility study grants.
- Investigate battery storage for micro-grid and emergency back-up power, especially for nursing homes and grocery stores in vulnerable neighborhoods.
- Engage UMASS researchers as appropriate.
- Engage the largest property owners and energy users, such as MassMutual, Baystate Hospital, MGM, Picknelly, Mass Visitors & Convention Bureau, and the Greater Springfield Chamber.
- Focus on Downtown/Metro Center and integrate EV car charging stations
- Conduct research to understand the level of retro-fitting necessary in existing buildings in order to connect to micro-grid.
- Assess the feasibility of a regulatory option of requiring new developments to be 'micro-grid ready'.

2 Oversee feasibility study.

3 Launch project by 2019 for completion in 2020.

BUILDING RESILIENT INFRASTRUCTURE

GOALS

1. **Reduce vulnerability/enhance resilience of Springfield residents**

2. **Reduce vulnerability/enhance resilience of existing and planned infrastructure.**

As noted in the overview section, economically disadvantaged residents and deindustrialization has left the City with a low tax base, leading to deferred maintenance and weakening infrastructure. For example, the City is still using stormwater standards from 1950. The DPW believes Green Infrastructure (GI), making use of natural systems for environmental benefits (in addition to traditional infrastructure) is a good idea, as long as implementation decisions are made on a site-specific basis. From the City's experience, success with GI is 2/3 public relations and 1/3 public perception. Standards may need to be different between public/private and in new site development vs. redevelopment, and should include off-site mitigation options because integrating GI into planned development is a challenge.

The City owns its drainage system with 380 stormwater outfalls. The Springfield Water and Sewer Commission (SWSC) owns water & sewer (CSO) systems (~1/3). The best areas for GI are out of the CSO areas and projects are more difficult to implement in the denser downtown region. The City's goal is to have stormwater as CLEAN as possible and water quality needs to be addressed. A challenge is establishing who is responsible for maintenance. More thought is needed for GI and CSO reduction in vulnerable communities, as the most vulnerable areas of the city are already separated and do not offer much space for GI. The best place for GI in vulnerable areas is on private property, but experience in the City has shown that convincing economically challenged residents to host green infrastructure on their property is challenging. The City favors moving incrementally because a staged approach allows learning to take place. Implementation is most likely to happen in the private sector first. There are still considerable basic needs to successfully design and implement a comprehensive GI plan for the City, including collecting and tracking data on soils in Springfield, where appropriate for infiltration, and where there is contamination, etc...

A central challenge is how to develop a systems approach to Green Infrastructure. There are two approaches: a relatively "easy" regulatory approach, and the "ordinance approach".

STRATEGIES

1 Develop a Springfield-specific Green Infrastructure (GI) policy and design manual, which should include:

- Standards by location & city-wide
- Set of criteria to assist developers and the City in determining what type of infrastructure system is appropriate for a given location and project type. This set of criteria should set GI as the standard, requiring developers to prove they have completed a thorough site analysis and alternatives assessment regarding infrastructure systems design.
- Neighborhood-specific content, designed to educate Springfield's 17 neighborhood groups at the concept-level.

2 Highlight projects already in the city to help build the case and educate neighborhood residents and developers alike. Monitor public and private installations.

3 Set up "pop up green infrastructure" demonstrations along public roadways, in public plazas and parks, in public and commercial parking lots, and in other highly trafficked and/or highly impervious sites.

MANAGING THE URBAN FOREST

Because of the extensive damage to the tree canopy in the 2011 tornado, in addition to Springfield's long-standing commitment to urban forestry, managing trees merits its own category of actions. There are a number of concerns related to resilience and tree canopy in Springfield. Trees can enhance resilience, but they are also a 'threat multiplier'. Trees may pose safety issues in a weather-related disaster. If a tree planted too closely to underground or overhead utility lines is uprooted or falls, it may destroy that infrastructure, posing possible health and economic threats. Trees in poor health can also lose limbs and potentially damage property or directly harm residents. Further, poorly placed vegetation can block sight lines along roadways, increasing the likelihood of motor vehicle accidents.

Possible strategies to reduce these concerns include choosing the "right tree for the right place," which will ensure environmental safety and increase specimen health. Continued attention to proper tree care and maintenance will also reduce the risk of tree-related hazards.

At the time of this plan development, the forestry department has no funding to plant new trees within Springfield. They are funded to maintain and care for existing trees and remove those that pose safety concerns. In order to reach a 100% stocking rate within the City, they would need to replace trees at a 2:1 ratio. Currently, the city is losing about 700 trees per year. Unfortunately, HUD doesn't consider trees to be part of the resilience strategy defined in the NDRC grant, so Springfield's forestry proposal was unfunded when the City was awarded the grant. Springfield can take advantage of the Gateway City legislation, which allows for private tree plantings within the city. Related funding also covers education and outreach. Possible strategies to reduce this concern include identifying and securing sustainable funding sources for planting trees within the city.

GOAL

1 **Achieve Springfield's climate justice goals via enhancing the quality of the City's urban forest through proper species selection and planning, increased tree canopy cover, adequate care and maintenance, and public education on the value of trees in an urban setting.**

STRATEGIES

1 Identify and secure sustainable funding sources for annual tree planting.

2 Identify and secure sustainable funding sources for tree care and maintenance of public trees.

3 Focus planting efforts in neighborhoods with the greatest risk of urban heat island (UHI) effect and the lowest rate of tree canopy cover.

4 By 2022, plant 5,600 trees on public property and by 2060 achieve 100% stocking levels and have planted an additional 55,000 trees on public property.

5 By 2022, plant 300 trees per neighborhood on private property for a total of 5,400 trees across Springfield's 18 neighborhoods.

6 Secure funding and develop an incentive program for planting trees on private properties.

7 Implement a city-wide green infrastructure policy, as identified in Strategy 1 of the *Building Resilient Infrastructure* goal.

ADDITIONAL STRATEGIES:

1 Enhance opportunities of forestry-related job and skills trainings for Springfield's youth and residents and collaborations with area academic institutions

2 Increase public education efforts pertaining the value and importance of trees, shrubs, and fruit producing vegetation regarding:

- Food access and security
- Mental and community health co-benefits
- Urban ecosystem services

BUILDING HUMAN RESILIENCE

The topic of resilience covers all aspects of human life, as we recognize that poverty, resulting low rates of home ownership, systemic racism, inequitable access to opportunity, disproportionately high rates of preventable disease and other facts of life for many Springfield residents make them increasingly vulnerable to severe weather disasters. Other initiatives underway in the City are working to increase human resilience, and this plan supports and affirms the importance of those plans' and projects' successful implementation. Two aspects of human resilience emerged after the many disasters of 2011: the importance of air conditioning and the need for property insurance for home-owners, renters and business owners. Our research indicates that no one existing plan highlights these needs, so they are included here.

GOALS

1. **All property owners and renters in Springfield will have homeowners, renters or business-owners insurance.**

2. **All residences will include air conditioning. Just as they are required to include heating in the winter, landlords will be required to provide cooling in the summer.**

STRATEGIES

1 Establish a program, spearheaded by utilities, to provide super energy efficient air conditioners to homeowners and renters who do not have access, contingent upon completion of Mass Save HEA and full implementation of recommended energy efficiency home improvements to maximum $2,000 incentive.

2 City, SHJ Implementation team, businesses, and anchor Institutions create a program to provide low or no cost (as needed) property insurance coverage to all vulnerable homeowners and renters.

3 Assess the feasibility of adopting a building requirement for air conditioning in all new developments and as part of any major rehabilitation work over a certain size (excluding single family homes).

REDUCE, REUSE, RECYCLE– TOWARD ZERO WASTE

Most of the waste management strategies included in the strategy matrix focus on people's behavior, enhancing waste reduction, and reuse and recycling. This is because the city's waste processing system does not generate a significant amount of GHG emissions (less than 1%) as waste management innovations are underway. The City adopted single stream recycling and composts yard waste and the Commonwealth has aggressive bans on materials going into landfills, such as food waste and demolition debris. Finally, the city is served by a waste to energy processing plant. Ongoing assessment and a commitment to optimization of the collection and transportation process could reduce GHG emissions from trucks.

GOAL

1	**Work toward zero waste.**

STRATEGIES

1 Explore alternative waste solutions to the current trash fee model, especially those included in the Massachusetts Department of Environmental Protection's 2013 Solid Waste Master Plan Pathway to Zero Waste, to reduce the amount of waste being sent for incineration.

2 Use regulatory means as appropriate to promote, require, or incentivize alternatives to traditional building demolition, such as rehabilitation, adaptive reuse, relocation and deconstruction.

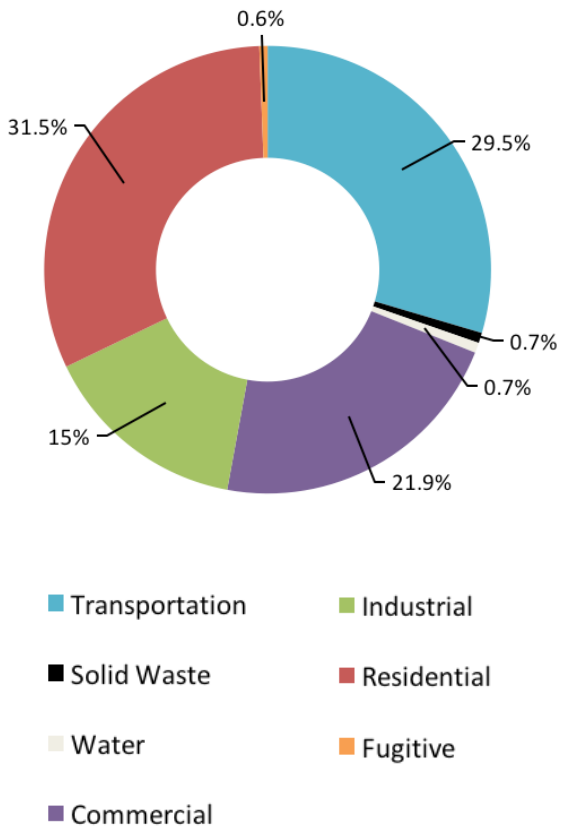
3 Implement educational campaigns to:
A) 'Buy Smart' (plan before purchasing, buy local, give gifts of experience, purchase durable goods)
B) Re-use
C) Borrow, share, and rent items
D) Fix and maintain items

4 Adopt a plastic bag ban and polystyrene ban.

5 Implement educational campaigns to reduce the volume of food waste generated in homes by promoting proper food storage, meal planning, and composting.

6 Implement educational campaigns to avoid electronic waste, encourage the recycling of electronic products, and the purchasing of environmentally-friendly electronics.

Residents are responsible for an estimated 56% of GHG emissions in Springfield, 29% in transportation and 27.1% in building-heating, cooling, electricity. Residents' actions, however, can go only so far without significant, sustained, targeted investment from the City, starting with implementation of existing previously mentioned City plans (2012-Present). Research suggests that determined, immediate action by property owners in all sectors (residential, commercial, industrial, government) could achieve 20% reduction in energy use relatively easily.[15]



Community-wide GHG emissions results by sector

RESIDENT ACTIONS

GOALS FOR RESIDENTS

1. **Achieve 100% Mass Save participation from home energy assessment (HEA) to full implementation of all recommended improvements**
2. **100% home/renters insurance coverage**
3. **100% access to Air Conditioning**
4. **Switch increasingly large percentage (80% by 2050) of energy used from polluting fossil fuels to clean, safe, sustainable energy sources: solar, hydro, geo-thermal, CHP, wind, other-- regardless of income and ownership v. rental status and vehicles from gas to hybrid, electric.**
5. **Shift increasingly large number/ percentage of trips from single vehicle to transit (bus, bus rapid transit, train, trolley) and bike (bike share, pedicab), walking, ride-sharing, car-pooling, tele-commuting, home businesses, other means as they become available.**

15 www.pnas.org/content/106/44/18452

STRATEGIES

1 Demand the City and key collaborators: utilities, state government, anchor institutions, local foundations, allocate necessary resources, and/or secure additional funding as needed, to aggressively implement this plan on all fronts. Subsidize vulnerable residents' participation as needed, with the utmost urgency, regardless of who is serving on the City Council or as Mayor. Residents should advocate for:

- Regulatory changes necessary to incentivize maximization of energy efficiency, always-construction/de-construction, rehab vs. demo, water conservation, etc.
- Utilities and other collaborators to develop programs to provide no cost home-owners/renters insurance if property owners get a Mass Save HEA and implement all recommendations up to $2,000 maximum incentives.
- Utilities and other collaborators to develop programs to provide super energy efficient air conditioners to all property owners/renters that receive Mass Save HEA and implement to $2,000 maximum incentives.
- Implementation of the Complete Streets plan.

2 Advocate with City Council, the Mayor, State Representatives and Senators for MA commitment to funding climate action and resilience sustainably, with a 40-year commitment.

3 Home-owners and renters should commit to requesting Mass Save HEA and following through with up to the maximum of $2,000 worth of incentives, thereby taking advantage of the Utility/Mass Save/Collaborator initiative identified in Strategy 1.

4 Home-owners and renters should commit to energy aggregation to clean, safe, sustainable energy through City aggregation.

5 Home-owners and renters should commit to purchasing community solar or other clean, safe and sustainable energy source to achieve 10% renewable by 2025, 30% by 2030, 50% by 2040, and 80% by 2050.

6 Commit to signing up with the City 311 resident/City communication system and also with the reverse 911 emergency information text messaging system to stay aware regarding impending weather or disaster related news.

7 Residents should commit to familiarizing themselves with the City's emergency shelter system, locations, accessibility, and hours of operation.

8 Commit to not drive alone, and instead make use of mass transit (bus, bus rapid transit, train, or trolley), carpool, or engage in active transportation (walking or biking). Simultaneously, residents should commit to driving or carpooling in efficient vehicles (electric or hybrid) one day a week for 2 years, and then increase to 2-3 days a week over 5-8 years, then increase to 3-4 days a week by 2030.

9 Residents should commit to advocate for grocery store in Mason Square.

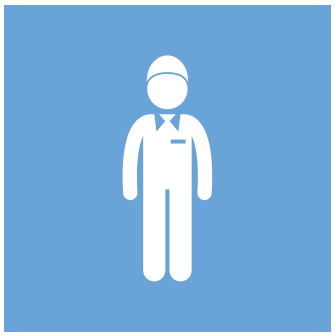
10 Residents should commit to hosting green infrastructure on their property, in the form of rain barrels, gray water systems, rain gardens, and other water-smart systems.

11 Resident should commit to planting and maintaining more trees on their property as directed by the City Urban Forestry plan.

12 Residents should commit to living sustainably in their everyday lives. Residents can make habits of adopting such behaviors as: turning off lights when leaving rooms; keeping their thermostats as low or high as comfortable to maximize energy efficiency; not idling their cars more than necessary during travel and not at all in parking lots, driveways, or while waiting; recycling, re-using, and reducing waste; and avoiding motorized transportation whenever possible.

BUSINESS/ANCHOR INSTITUTION ACTIONS

The Commercial/Industrial sectors are responsible for an estimated 39% of GHG emissions in Springfield, in building-heating, cooling, and electricity. In many cases, Springfield's anchor institutions, businesses, and Industry are leading the way with respect to both climate action and resilience. We applaud their leadership and seek a long-term commitment to collaborate with the City and continue to lead the way with respect to resilience and climate action.



GOALS

1	**Continue to lead by example.**
2	**Collaborate with City and other stakeholders in SHJ plan implementation.**

STRATEGIES

1 Serve at the request of the Mayor on a SHJ Anchor Institution/Business Commission (modeled after Boston's Green Ribbon Commission) to ensure ongoing engagement and leadership of Anchor Institutions and Businesses and Industry in SHJ implementation.

2 Collaborate with PVPC plan development team to complete wedge scenario development and quantification of all proposed measures to ensure evaluation and refinement as necessary to achieve maximum efficiency and effectiveness.

3 Commit to systems thinking approach to collaboration on implementation of SHJ plan.

4 Commit to implementing all policies, regulations and practices to facilitate maximum energy efficient behavior of employees, workers, neighbors.

5 Commit to implementing all policies, regulations and practices to maximize energy efficient processes in all business practices, starting with Mass Save Building/process energy assessment and full implementation to maximum extent of incentives available.

6 Work with Utilities, Commonwealth, local foundations and others as appropriate to create program whereby home-owners/renters who have a Mass Save HEA and implement maximum recommended home energy efficiency improvements to $2,000 receive a no cost maximum energy efficient Air Conditioner and home-owner's/renters property insurance (subsidized/free as necessary).

7 Work with local banks to offer full range of zero interest loans funded by Mass Save.

8 Contribute funds to City to support implementation.

9 Commit to hiring preferences for locally qualified residents.

10 Commit to re-investing locally.

11 Commit to focus on climate justice.

12 Collaborate with chamber, utilities, and the City on back-up power planning and implementation and ensure continuity of operations plan and back-up power as needed for critical functions.

13 Assist employees with emergency planning.

14 Switch increasingly large percentage (80% by 2050) of energy used from polluting fossil fuels to clean, safe, sustainable energy sources: solar, hydro, geo-thermal, CHP, wind, other-- regardless of income and ownership v. rental status and vehicles from gas to hybrid, electric.

15 Shift increasingly large number/percentage of trips from single vehicle to transit (bus, bus rapid transit, train, trolley) and bike (bike share, pedicab), walking, ride-sharing, car-pooling, tele-commuting, home businesses, other means as they become available.

SUPPORTING MATERIALS

Please note that this plan is a summary document of much more work. The supplemental materials that comprise the full plan are available for download and review at:

http://www.pvpc.org/projects/springfield-climate-action-resilience-plan-carp

Materials included:

- **Action Selection Process**
- **Climate Action & Resilience Assessment Tool (CARAT)**
- **Strategies and Action Ranking Matrix**
- **GHG Emissions Inventory**
- **Vulnerability Assessment**
- **Community Resilience Building Workshop Agenda and Supporting Materials**
- **Engagement Report**
- **What I Have/What I Need—Resilience and Climate Action 'card game'**
- **Timeline of Springfield's energy use, climate-related events, and resilience**
- **Annotated bibliography/webliography**
- **Principles of Environmental Justice**
- **Springfield Suite of Recent Plans weblinks and summaries**

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