City of Somerville
Planning Assistance Grant
Application

CITY OF SOMERVILLE, MASSACHUSETTS
KATJANA BALLANTYNE
MAYOR

June 25, 2024

Megan Dixon
Executive Office of Energy & Environmental Affairs
100 Cambridge Street, 9th Floor
Boston, MA 02114

Dear Ms. Dixon,

On behalf of the City of Somerville, I am very pleased to submit an application to EEA's Planning Assistance Grant Program to fund an Energy Transition Policy Economic Impact Study in Somerville. This project will be critical for better understanding how Somerville's energy transition will impact new construction and major renovations and how we can better incentivize building decarbonization.

Our diverse, densely populated community both experiences the public health impacts of fossil fuel emissions and is committed to reducing fossil fuel dependence. Two-thirds of Somerville's carbon emissions originate from buildings, but our residential and commercial buildings are mostly occupied by renters who have limited ability to influence decisions about a building's major systems. Poor air quality resulting from the combustion of fossil fuels, such as oil and gas, often disproportionately impacts Somerville's most vulnerable residents and contributes to childhood asthma and adult chronic obstructive pulmonary disease (COPD).

To address these challenges, Somerville has become a leader in climate action with a track record of innovative steps to support equity, increase resilience, and improve energy efficiency. Since 2011, the City has participated in DOER's Green Communities program. In 2024, we updated our Climate Forward Action Plan, which prioritizes action areas for working towards becoming carbon net-negative, preparing for climate change, and ensuring equity in the distribution of climate-related burdens and opportunities. Additionally, we were one of the first 4 municipalities in the Commonwealth to adopt and enact the Specialized Opt-In Building Energy Code in 2023. We are also awaiting response on our application, submitted in the Fall of 2023, to the State's Municipal Fossil Fuel Free Demonstration Pilot Project.

This economic impact analysis will allow us to build upon the work we've already done to reduce fossil fuel use, protect residents from the negative health impacts of fossil fuel emissions, and create cleaner, more resilient residential and commercial properties with necessary economic considerations and incentives. I appreciate your consideration of our application.

Sincerely,

Katjana Ballantyne

Katjana Ballantyne
Mayor

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Project Proposal: Narrative and Budget Summary

City of Somerville
FY25 Application to the
Planning Assistance Grant Program

1. **A task-by-task description of each major element of the proposed project including means of accomplishment, projected budget, a timeline indicating anticipated initiation and completion; any product to be delivered or outcome to be realized, and proposed measures of success**

A small, diverse city adjacent to Boston with 80,608 residents in a land area of 4.1 square miles, Somerville is the most densely populated city in New England. It has a significant need for continued growth to improve the city's commercial tax base and financial outlook, produce well-paying jobs with upwardly mobile career paths, and increase investment in affordable housing, schools, parks, and other local priorities. Somerville also has an aggressive timeline for the decarbonization of municipal assets, and we have committed to being carbon net negative as a city by 2050. The details of that commitment are described in our Somerville Climate Forward Plan (developed in 2018 and updated in 2024), which outlines action areas for working towards carbon neutrality, preparing for climate change, and ensuring equity in the distribution of climate-related burdens and opportunities. Guided by this plan, Somerville has become a leader in climate action with a track record of innovative steps to support equity, increase resilience, and improve energy efficiency.

Somerville is experiencing rapid development and redevelopment, including significant growth in transportation infrastructure, residential neighborhoods, retail areas, and industry. The building energy sector in Somerville accounts for approximately two thirds of total community-wide emissions. By incentivizing net-zero carbon emission building design, the City can avoid emissions lock-in from new construction and greatly reduce its carbon footprint.

Somerville's building stock is majority renter-occupied, meaning that building occupants often have limited ability to influence decisions about a building's major systems, such as energy source or use. While incentivizing building energy upgrades to reduce the City's carbon footprint is a vital step towards addressing climate change impacts in Somerville, implementing stringent energy standards can unintentionally impact rental prices, especially in rental units that are affordable without public subsidy to low-income households, i.e., so-called "naturally occurring affordable housing."

Additionally, Somerville recently applied to participate in the Commonwealth's Fossil Fuel Free program, which will enable the City to adopt and amend general or zoning ordinances or by-laws to require new building construction or major renovation projects to be fossil fuel-free. Should the City adopt this type of development regulation, developers could pass on the cost of energy efficiency projects to tenants, leading to significant and potentially unaffordable increases in rent for Somerville residents. To better understand the economic impact of energy efficiency regulations on renters, landlords, and other small business

owners and to identify ways to support equity in the distribution of the burdens and benefits of these regulations the City of Somerville requests a $50,000 FY25 Planning Assistance grant to conduct an Energy Transition Policy Economic Impact Study.

The study will 1) analyze the overall cost of requiring all types of development to be fossil fuel-free, 2) review and make recommendations towards revising zoning ordinance language, 3) recommend incentives for overdesigning/upgrading electrical capacity to facilitate electrification at a neighborhood level, and 4) recommend policy changes to mitigate adverse impacts on tenants and small businesses. It will focus on topics including, but not limited to:

1. How will a net-zero fossil fuel emissions policy for new construction and major renovations impact the cost of development projects?
2. How will these project costs affect tenants, especially those in Environmental Justice populations?
3. What steps can be taken to advance equity by mitigating adverse impacts on tenants and small businesses?
4. What type of upzoning or incentives would ensure the feasibility of fossil fuel free development for all types of development, including but not limited to residential, mixed-use, lab/R&D, etc.?
5. What type/magnitude of incentives will realistically encourage extra electrical capacity?

A final report will be produced containing results, policy recommendations, and guidance for next steps.

The following tasks will be accomplished to complete the study:

Action	Timeline	Request	Match	Goal	Deliverable
City releases Request for Proposals (RFP) seeking consultant to conduct study	Sept 2024	n/a	$0	Post RFP for response	RFP pdf
City reviews bids received and then chooses consultant	Oct 2024	n/a	$0	Select consultant	Consultant
City finalizes consultant contract	Nov 2024	n/a	$0	Fully execute consultant contract	Contract
Consultant holds regular check-in meetings with City staff to report on progress and identify any challenges	Dec 2024 – June 2025	$10,000	$5,000	Ensure timely and successful completion of study	Regular check-in meetings, invoices, quarterly reports to EEA, and final report to EEA
Consultant conducts interviews with developers	Dec 2024	$2,500	$2,500	Collect information to inform the study	Notes from interviews

Consultant carries out economic impact analysis	Jan-Apr 2025	$20,000	$10,000	Understand the economic impact of regulations on developers, property owners, renters, landlords, and business owners	Economic impact analysis, data analysis
Consultant reviews relevant city documents including but not limited to the Fossil Fuel Free Ordinance and develops recommendations for zoning incentives	Apr-May 2025	$7,500	$2,500	Incentivize all buildings to become net-zero	Recommendations, Word document
Consultant makes recommendations for extra electrical capacity incentives and where the incentives would be most appropriate (Somerville Zoning Ordinance, Fossil Fuel Free Ordinance, or elsewhere)	May-June 2025	$7,500	$2,500	Incentivize design for added electrical capacity	Recommendations, Word document
Consultant produces final report for review by City's project team	June 2025	$2,500	$2,500	Summarize results and recommendation, inform stakeholders	Word document

City staff will identify developers for the interviews and facilitate/coordinate interviews. The study will be completed by consultants procured through a qualifications-based process in accordance with procurement laws. To carry out the study, the consultants will establish a baseline of cost estimate data, collect cost and timeframe data for electrification of residential and commercial buildings, energy burden data, and other relevant data related to decarbonization, housing costs, and displacement.

In addition to staff from Somerville's Office of Housing Stability, Housing Division, Inspectional Services Department, Economic Development Division, and Engineering Division, the internal project team will be comprised of the following City of Somerville employees:

- Christine Blais, Director of Somerville's Office of Sustainability and Environment (OSE)
- Emily Sullivan, OSE Climate Change Program Manager
- Emily Hutchings, Senior Planner for Somerville's Planning, Preservation, and Zoning Division

- Garrett Anderson, OSE Residential Decarbonization Program Manager
- Elyse Belarge, OSE Sustainability and Resiliency Planner
- Josh Eckart-Lee, OSE Sustainability Planner
- Julia Damiano, OSE Environmental Policy Manager
- Luis Quizhpe, Equity Manager for Somerville's Office of Strategic Planning and Community Development
- Matt Zaino, Deputy Director of Inspectional Services
- Jennifer Price, Paralegal, Inspectional Services

The success of the project will depend on achieving the following measurable outcomes:

- Environmental Justice communities prioritized: The majority of Somerville residents live in areas of the city that qualify under at least one of the Commonwealth's Environmental Justice Criteria. Many of these same areas are experiencing rapid growth, increasing the number of residents who are vulnerable to climate hazards. This study aims to identify policy recommendations that offer appropriate consideration to Environmental Justice community members, a large portion of whom are renters.
- Increased coordination between City departments: The City of Somerville has pursued multiple efforts to promote climate action and reduce tenant displacement. Yet, we recognize that the housing and climate crises should be addressed in tandem with more explicit coordination. This project will allow us to consider how building decarbonization and housing stability policies can work together to ensure Somerville is a safe and healthy community for its residents.
- Economic impact analysis provides recommendations that support building decarbonization and housing affordability. Although the State conducted a pricing analysis and a residential cash flow analysis for the updated Stretch Code City staff have continued to hear concerns from community members and developers about the cost implications of building decarbonization. Since Somerville is committed to climate action *and* housing stability, the economic impact analysis will focus on data-driven policy recommendations that balance climate and housing needs.

2. Budget summary for the entire requested grant, including local match, and a breakdown of the requested grant funds by state fiscal year (FY25 and FY26)

The total cost of the Energy Transition Policy Economic Impact Study is expected to be $75,000. This includes $15,000 for regular check-in meetings between the consultant and the City's project team, $5,000 for interviews with developers, $30,000 to conduct the economic analysis, $10,000 to develop recommendations for zoning incentives, $10,000 to create recommendations for extra electrical capacity incentives, and $5,000 to produce the final report.

The City is requesting a $50,000 Planning Assistance grant and providing a 50% match in the amount of $25,000 from the FY25 general funds allocated to the Office of Sustainability and Environment in support of this work. All funds will be expended in FY25 according to the schedule above.

3. Explanation as to how proposed activities meet the evaluation criteria

The need for sustainability initiatives and housing affordability is highlighted throughout SomerVision 2040, the City's comprehensive plan. Somerville's community climate action plan, Climate Forward (updated in April 2024), identifies Buildings and Energy as one of five key focus areas to decrease pollution and increase climate resilience and preparedness. It calls for a just transition to renewable energy while prioritizing affordable, resilient, healthy, and high-performing buildings and homes. One of the Implementation Blueprints for this focus area lists conducting an economic analysis of policy changes as a critical step towards amending City ordinances and regulations. These amendments could include additional sustainability and resiliency requirements and incentives for new development and major renovations.

The study will inform development of regulations and incentives that encourage adoption of energy efficient practices in Somerville's building stock, focusing especially on transformational areas of rapid growth (e.g., Assembly Square, Inner Belt, Brickbottom, and Boynton Yards) in SomerVision 2040. These areas, which have special local regulations for development projects, are designated to show where the city and community envision enhancement of commercial spaces to facilitate creation of research and development facilities, support of housing production, and establishment of open spaces. The regulations could include the incorporation of zoning practices eligible for a simple majority vote Chapter 40A Section 5, such as permitting density increases and flexibility from dimensional requirements. Potential regulations that could be impacted by the outcome of the study include:

- Somerville Zoning Ordinance, various sections regulating zoning districts
- Somerville Zoning Ordinance Section 10.10 Sustainable Development
- Somerville Fossil Fuel Free Home Rule Petition #214201
- Somerville Fossil Fuel Free Ordinance #2023-22
- Somerville Code of Ordinances, Part II Chapter 7 Housing

While compliant with Section 3.A of the Zoning Act, Somerville continues to go beyond these requirements and evaluate the City's zoning to support sustainable development throughout the city. Our proposed study will provide important guidance in the context of current and anticipated growth.

This study comes at a critical time for the City of Somerville, as many of the areas experiencing rapid growth also qualify as Environmental Justice populations. Fifty-one of Somerville's 71 census blocks – or approximately 72% -- meet at least one threshold for the Commonwealth's Environmental Justice qualification, and 59,054 (73%) of the city's

residents live in the 51 census blocks. The majority of these residents qualify as Environmental Justice under the Minority criterion. Three census tract block groups in West Somerville, Winter Hill, and Central Hill qualify under both the Minority and Income criteria. Three separate census tract block groups in East Somerville and West Somerville qualify under the Minority and English Isolation criteria, and one block group in the Inner Belt/Brickbottom neighborhood satisfies all three criteria.

As Somerville continues to grow, more residents will be vulnerable to climate hazards. Two of the highest priority climate hazards identified in Somerville's 2023 Climate Change Vulnerability Assessment Update are increased heat and the urban heat island effect. Rising average temperatures combined with longer and more intense heat waves may increase electrical demand for cooling and could result in regional brown outs and higher instances of heat-related illness. New data from this assessment illustrates that nearly all of Somerville has moderate to high indoor and outdoor heat exposure risk. The areas of Somerville that experience higher than average land surface temperatures are predominantly Environmental Justice communities, many of which are experiencing increased growth and development pressure (e.g., East Somerville and Assembly Square, Ward Two and Inner Belt/Brickbottom, and Davis Square).

Recommendations from the study will support multiple types of building upgrades that will alleviate climate hazard risk for Somerville residents. These upgrades will improve the environmental health conditions of rental units by enhancing ventilation and bringing conditions up to modern housing and sanitary codes and facilitate decarbonization of appliances and vehicles to improve indoor and outdoor air quality. Additionally, by incentivizing or requiring increased electrical capacity in new development, the likelihood of electricity outages will be reduced, and the city's greenhouse gas emissions and urban heat island effect will decrease, especially for Environmental Justice populations.

The Energy Transition Policy Economic Impact Study will not only have a positive impact on Somerville's building stock but also improve its electronic micromobility. The City of Somerville does not currently require the incorporation of charging stations for micromobility into new development design. By increasing electric capacity in new development, there will be additional opportunity to incorporate design features that prioritize e-bikes or e-scooters.

To accomplish its electrification and decarbonization objectives, Somerville must understand the current and future economic impacts of energy-related regulations. The Energy Transition Policy Economic Impact Study will make it possible for us to do this and is therefore a critical step towards achieving our climate action goals.

Commitment to Match Letter

CITY OF SOMERVILLE, MASSACHUSETTS
OFFICE OF SUSTAINABILITY AND ENVIRONMENT
KATJANA BALLANTYNE
MAYOR

July 1, 2024

Megan Dixon
Executive Office of Energy & Environmental Affairs
100 Cambridge Street, 9th Floor
Boston, MA 02114

Dear Ms. Dixon,

I am writing to express the City of Somerville's commitment to provide a cash match for the Executive Office of Energy and Environmental Affairs Planning Assistance Grant Program. The City is applying for an award in the amount of $50,000. I am pleased to confirm our dedication to the completion of the Energy Transition Policy Economic Impact Study and our financial commitment to support its goals.

The Office of Sustainability and Environment commits to providing a 50% match, in the amount of $25,000, from the department's general fund budget for our Planning Assistance Grant Program application. The City has made significant progress towards embodying the Massachusetts Sustainable Development Principles by updating our Climate Action Plan and being one of the first municipalities in the Commonwealth to adopt and enact the Specialized Opt-In Building Energy Code in 2023. The City plans to further advance its innovative and equitable climate action work by using this funding to complete the Energy Transition Policy Economic Impact Study, enabling a comprehensive approach to Somerville's energy transition.

This study will provide invaluable insights and strategic direction for our ongoing efforts to foster sustainable development and combat climate change. The results will not only benefit our local community, but also serve as a model for other municipalities across the Commonwealth and beyond. Thank you for your consideration.

Sincerely,

Christine Blais
Director
Mayor's Office of Sustainability and Environment

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EMAIL: OSE@somervillema.gov

Relevant Plan Excerpts

Somerville Climate Forward

Key Focus Areas

Highlight added for emphasis

Action Plan

The *Climate Forward Plan* has five key focus areas. Each focus area represents an important aspect of the community that needs to be addressed to decrease climate pollution and increase climate resilience and preparedness.

BUILDINGS & ENERGY

Vision: Driving a just transition to renewable energy while prioritizing affordable, resilient, healthy, and high-performing buildings and homes.

COMMUNITY HEALTH & RESILIENCY

Vision: Preparing the community for the risks of climate change and ensuring all community members have access to resources to meet their basic needs.

NATURAL RESOURCES & WASTE

Vision: Practicing smart use of resources by protecting and enhancing trees and natural resources, decreasing consumption, and enhancing opportunities for recycling, recovery, and reuse of materials.

TRANSPORTATION & MOBILITY

Vision: Ensuring that affordable, safe, and zero-emission modes of transportation are accessible to all residents in Somerville.

LEADERSHIP

Vision: Proactively preparing for climate change and leading by example, while acting as a regional leader that sparks action in other communities.

Somerville Climate Forward Implementation Blueprint

Highlight added for emphasis

Buildings and Energy

ACTION

Action BE 1.1.A

Amend City ordinances and regulations to include additional sustainability and resiliency requirements and incentives for new development and major renovations.

DESCRIPTION OF ACTION	Ensure development is resilient to extreme heat and flooding by identifying and implementing new resilience requirements and incentives.
CHAMPION	Office of Sustainability and Environment (OSE)
OVERALL TIMEFRAME	Medium (1-3 years) per policy project
ESTIMATED COST	Program Implementation: $50,000 - $150,000 per policy project, depending on subject.

PRIORITY POLICY AREAS*
Somerville Zoning Ordinance and Building Code
Fossil Fuel Free **requirements and incentives**
Electrical capacity needs and local electrical transformation
Coastal and inland flooding
Extreme heat mitigation

*Policy projects may be pursued concurrently or sequentially, depending on capacity.

IMPLEMENTATION STEPS	ESTIMATED TIME TO IMPLEMENT STEP	COLLABORATORS
1. Review technical climate information, reports, and data.	6-12 months	Inspectional Services Department (ISD) Planning, Preservation, and Zoning (PPZ)
2. Review existing local, state, and federal regulations.		
3. Complete a policy evaluation based on the gap analysis to identify opportunities for sustainability and resiliency requirements and incentives, understand implications of potential policy changes, conduct an economic analysis of policy changes, and outline objectives of policies.		
4. Conduct a gap analysis of regulations related to policy project and best practices/examples of regulations in other municipalities.		
5. Conduct stakeholder engagement with impacted parties (i.e., developers and businesses) to gather input.	6-12 months	PPZ Engineering Community Organizations Businesses
6. Develop recommended updates to the City's policies based on assessment.	6-12 months	ISD PPZ Engineering Law Department
7. Conduct relevant approval processes for recommended updates. Amendments to ordinances will require approval by the City Council and policy updates will require Mayoral approval.	3-4 months	ISD PPZ Engineering Intergovernmental Affairs Mayor's Office Land Use Committee

TOOLS & RESOURCES

FINANCIAL TOOLS

- Massachusetts Vulnerability Preparedness Program (MVP)
- MassWorks Infrastructure Grant Program
- Massachusetts Clean Water State Revolving Fund

TECHNICAL RESOURCES

- Somerville's Climate Change Vulnerability Assessment
- Draft Massachusetts Climate Resilience Design Standards & Guidelines, Massachusetts Executive Office of Energy and Environmental Affairs (EEA) and Massachusetts Emergency Management Agency (MEMA)
- MBTA Flood Resilience Design Directive, MassDOT
- Climate Resilient Design Standards and Guidelines for Protection of Public Rights of Way, Boston Public Works Department
- Climate Ready DC Resilient Design Guidelines, D.C. Department of Energy & Environment

EQUITY CONSIDERATIONS

- Ensure that neighborhoods with high social vulnerability are prioritized for implementing sustainability/resilience measures.
- Investigate the potential costs associated with the new regulations and implement measures to minimize and mitigate those costs to minimize risks of displacement.
- Work in coordination with electric utility planning to ensure new housing has adequate infrastructure in place to meet requirements.
- Where appropriate consider special needs of small businesses through flexible compliance options.

OPPORTUNITIES TO OVERCOME POTENTIAL IMPLEMENTATION BARRIERS

- Determine approval processes for policy changes and ensure all parties are involved early and throughout the process.
- Evaluate staff capacity and training needs for regulation enforcement and program/policy implementation to ensure viability of new and updated regulations.
- Ensure updates are targeted at specific outcomes and do not add development burden without tangible community benefits.
- Provide a clear roadmap for the timing of when topics/policy areas will be under consideration.

LEVEL OF IMPACT

Somerville's Climate Change Vulnerability Assessment (CCVA) Update can be used to identify high-priority neighborhoods based on their social vulnerability and exposure to hazards. These areas should be the focus for implementing resilience upgrades.

For example, the CCVA identified social vulnerability index (SVI) over areas of high land surface temperature (LST). Neighborhoods with relatively higher SVIs often overlap with areas with greater heat exposure. For example, neighborhoods such as Brickbottom, Inner Belt, Twin City Plaza, Union Square, and Winter Hill have relatively higher social vulnerability compared to other neighborhoods in the city, while also being projected to experience higher heat exposure. These are priority neighborhoods to focus resilience upgrades, particularly measures to reduce heat exposure.

The CCVA also examined neighborhood exposure to hazards including coastal flooding and stormwater flooding. The neighborhoods that have the most assets exposed to one or more hazards include Assembly Square, Union Square, East Somerville, and Davis Square. Additionally, by 2070, both coastal and stormwater flooding are projected to impact the greatest number of assets in Assembly Square, Winter Hill, and Union Square. These neighborhoods should be identified as high priority areas for resilience measures based on their high level of vulnerability to these hazards, particularly coastal and stormwater flooding.

2023 Climate Change Vulnerability Assessment Update

Key Heat Risk Findings

Highlight added for emphasis

3. Heat Overview

According to the 2022 Massachusetts Climate Change Assessment, the Boston Harbor region is projected to see an increase of 3.6 degrees Fahrenheit in the summer mean temperature compared to the historical period of 1950-2013 by 2030. By 2070, it is anticipated that there could be an additional 39 days above 90 degrees Fahrenheit, resulting in prolonged periods of extreme heat. Prolonged heat exposure can have severe implications on public health including acute heat-related illnesses such as heatstroke. It can also exacerbate pre-existing health conditions, particularly for seniors, children, and individuals with chronic illnesses.

The 2017 CCVA found Assembly Square/East Somerville, Ward Two/Inner Belt, and Davis Square to have the highest outdoor heat exposure. The 2017 CCVA conducted an outdoor heat exposure analysis using surface temperature data from the Trust for Public Land, in addition to emissions data, percentage of open space, and estimated tree coverage to build out parameters for calculating urban heat island prevalence (see Figure 20).

Critically, this update utilized Land Surface Temperature (LST) index data to provide a spatial understanding of heat risk. LST is a satellite measure of the relative tendency of land areas to be hotter ranging from 0 to 1. This allows the city to locate which neighborhoods are experiencing more extreme urban heat island effects, and thus prioritize cooling interventions in those locations.

Notably, this new data illustrates that nearly all of Somerville has moderate to high LST indices shown in yellow, orange, and red (LST index over 0.4) shown below. The findings are largely consistent with the 2017 CCVA finding that Assembly Square, East Somerville, Davis Square, Inner Belt, and Union Square experience higher than average land surface temperatures.

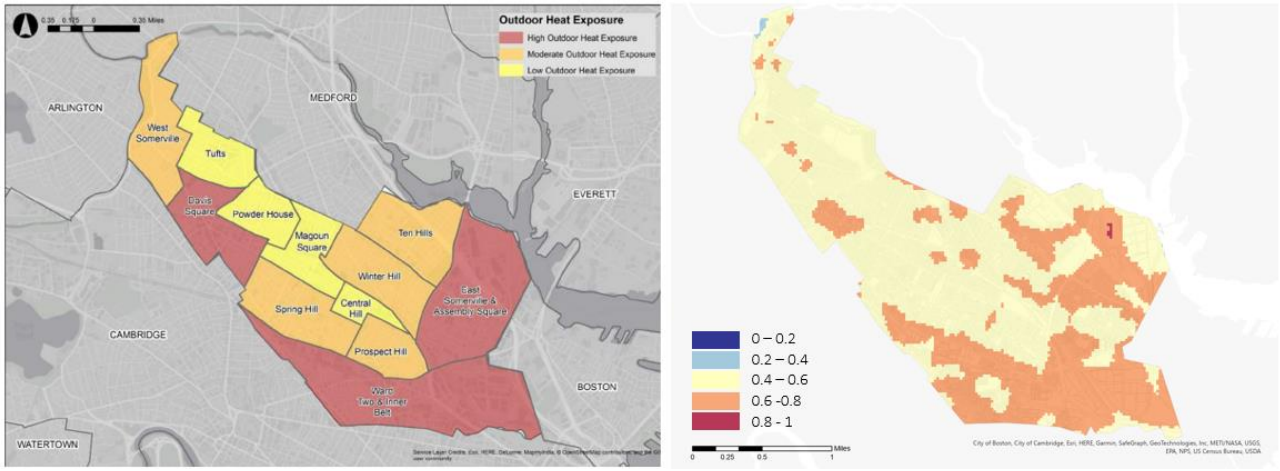


Figure 20. 2017 CCVA map of outdoor heat exposure by neighborhood compared to the 2023 CCVA update illustrating LST index.

3.1 Key Findings

Somerville has significant heat exposure, with 82% of the city defined as a hot spot. A hot spot indicates the area has an index within the top 5% statewide. Therefore, 82% of the city is within the 95th percentile for statewide Land Surface Temperature (LST) indices.

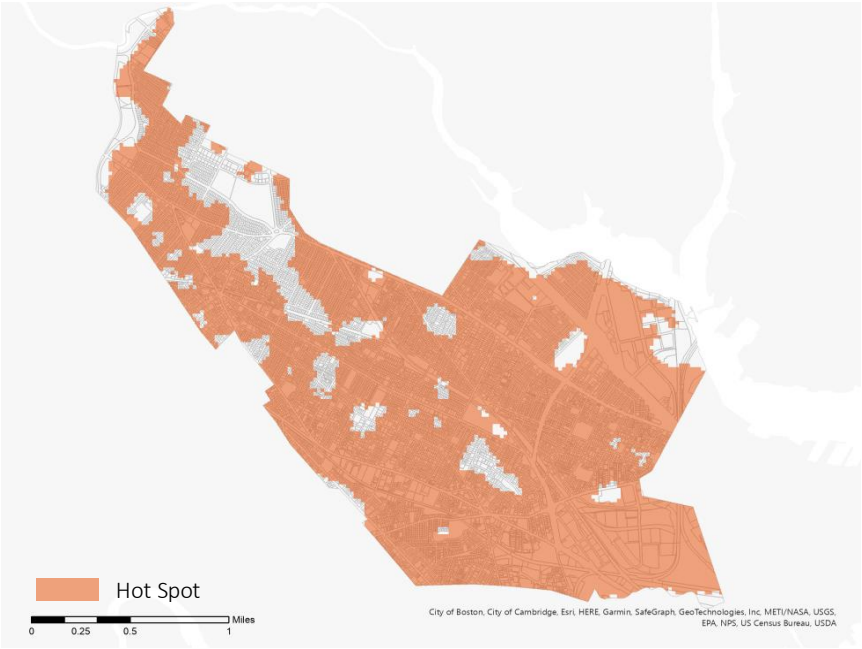


Figure 21. Identification of hot spots, or areas with an LST index within the 95th percentile of statewide LST indices.

Union Square, East Somerville, and Davis Square have the most assets exposed to high temperatures with social infrastructure, food resources, and places of worship being the most concentrated in areas of higher LST indices. An asset is deemed to be exposed if it is located in an area with a LST above 0.6.

Neighborhood	Extreme Heat (Present Day)
Davis Square	
East Somerville	
Union Square	
Assembly Square	
Spring Hill	
Ball Square	
Boynton Yards	
Hillside	
Inner Belt	
Magoun Square	
Teele Square	
Twin City	
Winter Hill	

Type	Extreme Heat (Present Day)
Social Infrastructure	
Food	
Place of Worship	
Critical Facility	
Medical Facilities	
Public Housing	
School	
MBTA Assets	
Shelter	
Higher Education	

1-2 assets 3-5 assets 6-10 assets > 10 assets

Figure 22. Infrastructure and Neighborhoods with the Most Assets Exposed to Extreme Heat (LST >0.6).

Impervious surfaces, like concrete and asphalt, contribute to the urban heat island effect by absorbing and storing more heat from the sun compared to natural surfaces like green spaces or tree cover. Neighborhoods and assets with higher LST indices are concentrated in areas with more impervious surface area and less green space, including Inner Belt, Brick Bottom, Twin City Plaza, Union Square, East Somerville, and Assembly Square (see Figure 19). For example, the concentration of paved transportation infrastructure, comprising I-93, the Green Line Extension, and MBTA Commuter Rail tracks, in Inner Belt makes residents living, working, and commuting nearby particularly vulnerable to heat exposure. Furthermore, a portion of Assembly Square maintains the highest LST within the city. It is the only neighborhood with an LST over 0.8 marked by dark red in the map shown below.

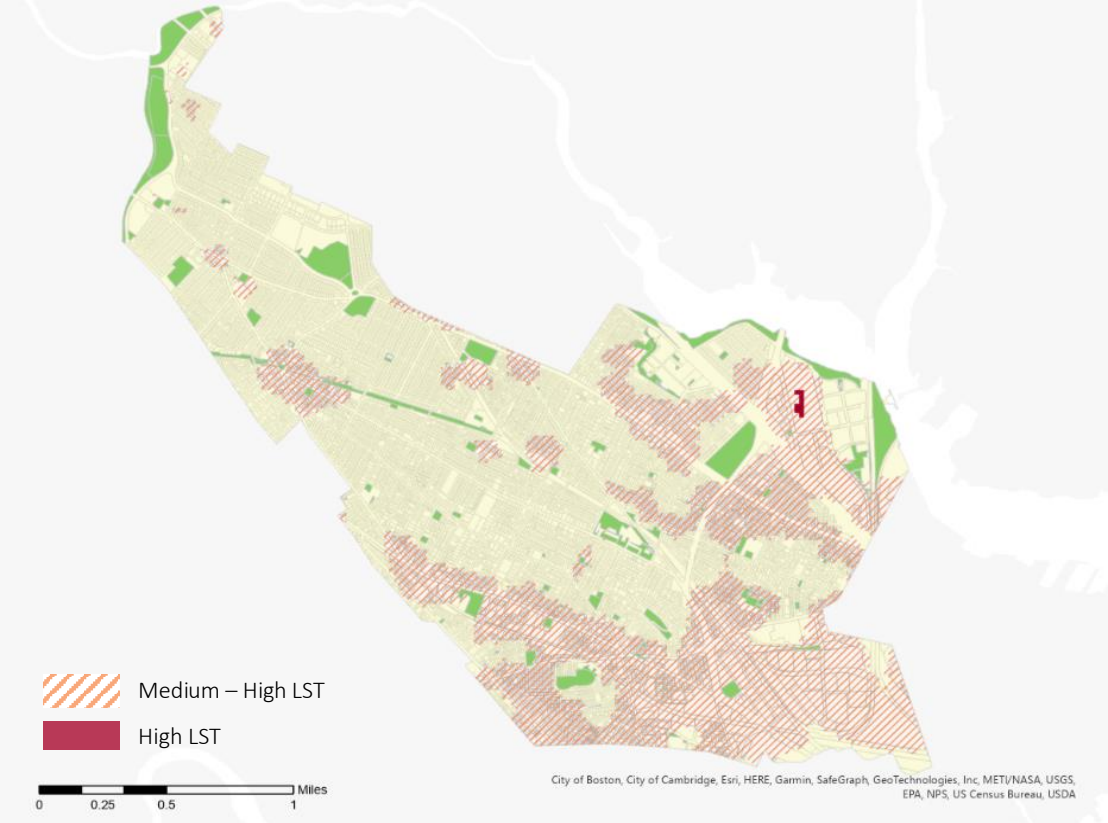


Figure 23. Open space compared to medium-high LST indices.

Within Somerville, neighborhoods with relatively higher SVIs often overlap with areas with greater heat exposure. For example, neighborhoods such as Brick Bottom, Inner Belt, Twin City Plaza, Union Square, and Winter Hill have relatively higher social vulnerability compared to other neighborhoods in the city, while also being projected to experience higher LST indices. Intensified heat disproportionally impacts socially vulnerable populations including those with existing medical conditions, seniors, and those dependent on public transportation. In particular, individuals with existing medical conditions are more prone to more severe health impacts of extreme heat, including heatstroke and worsening of existing cardiovascular and respiratory illnesses.

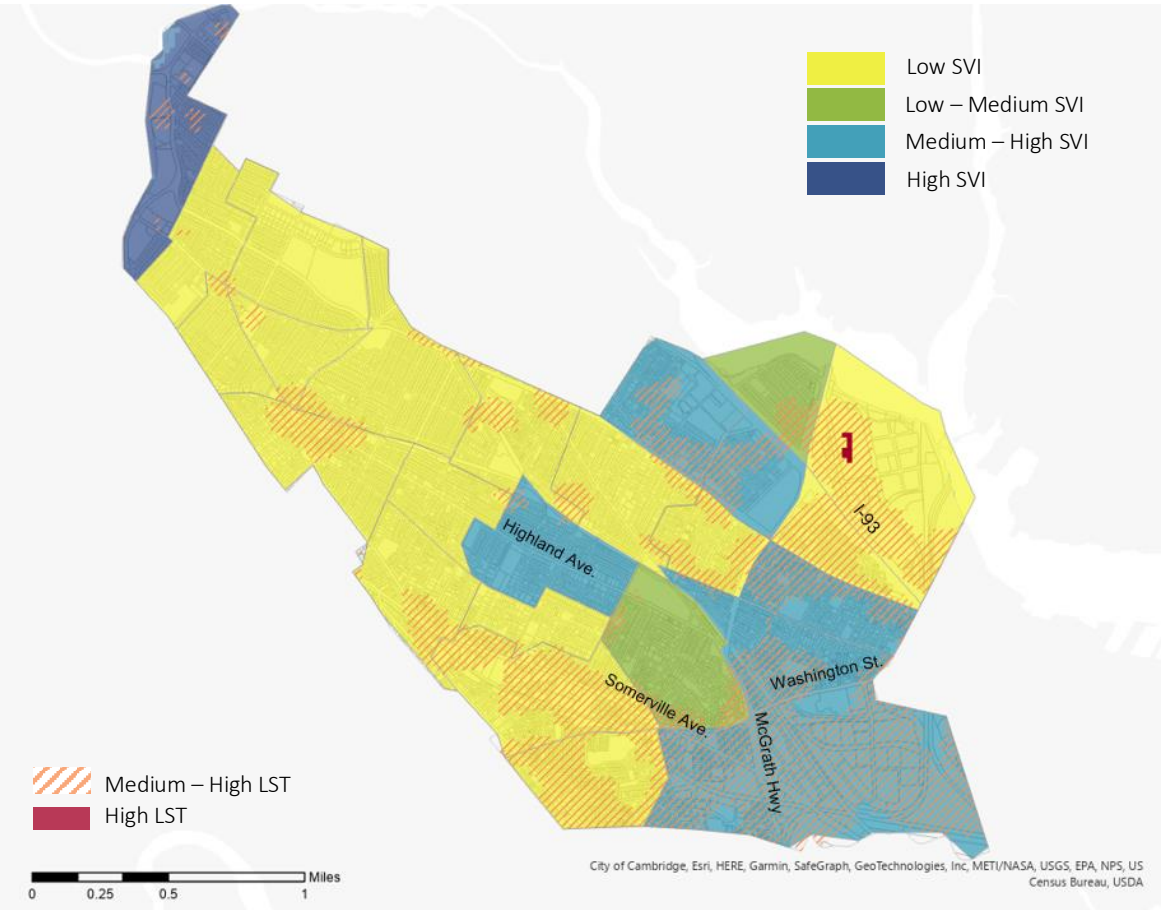


Figure 24. Social vulnerability analysis overlaid medium-high LST indices.

Somerville Climate Forward

Climate Pollution Reduction Targets

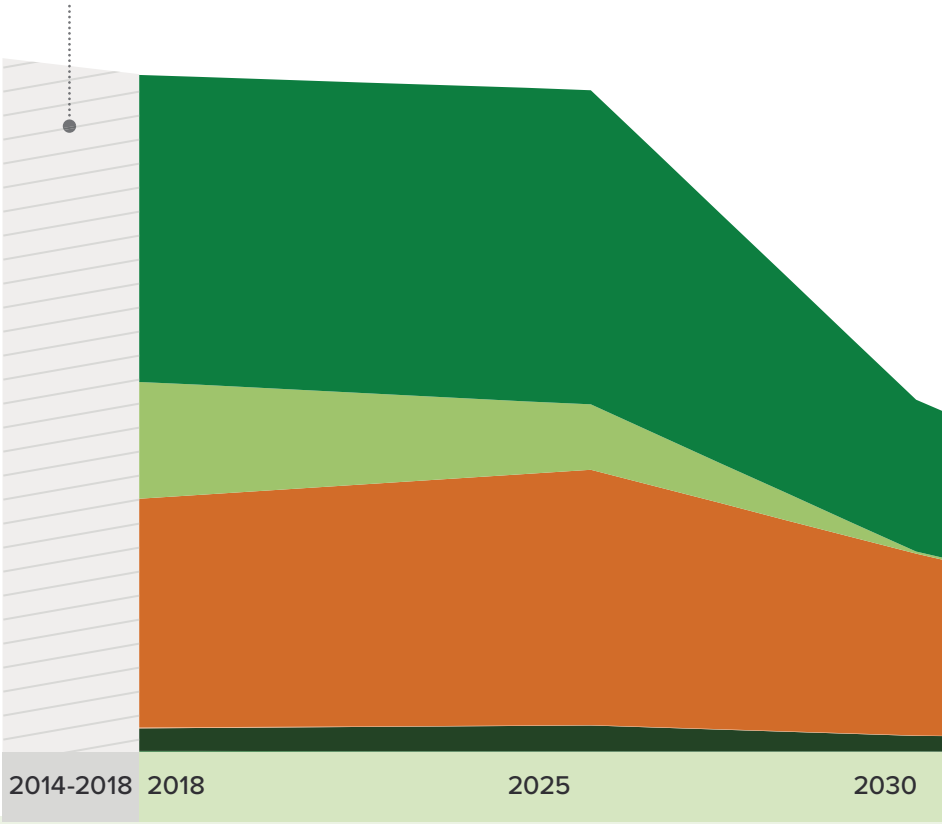
Highlight added for emphasis

Climate Pollution Reduction Targets

Pathways to Net Zero

The chart to the right represents emissions from the Somerville community, not including emissions from city and school operations. Achieving net zero emissions by 2050—as aligned with the Commonwealth's Decarbonization Roadmap—means reducing emissions to as close to zero as possible. In Somerville, achieving net zero will require decarbonizing all buildings, homes, and passenger vehicles; transitioning commercial vehicles to zero-emission models; fuel switching; eliminating all natural gas leaks; and diverting at least 90% of waste from incineration. In addition, the regional electrical grid must transition to 100% carbon-free sources of electricity (e.g., solar, wind, geothermal, etc.). Reducing community emissions at the pace illustrated by this Pathways Assessment[12] will involve a rapid overhaul of building systems and transportation infrastructure, and participation from all parts of the community.

Somerville reduced its community emissions from 651,426 $MTCO_2e$ in 2014 to 619,717 $MTCO_2e$ in 2018, the baseline year for this analysis.[13]



Through *Climate Forward*, Somerville is setting the course for achieving net-zero emissions by 2050 and meeting interim targets along the way. The above chart shows how emissions are projected to decrease over time. Eliminating the small amount of emissions that are currently projected to remain in 2050 will likely come from improvements and efficiencies in heavy-duty vehicles and large industry and equipment—sectors where emissions solutions are not yet available. In addition to setting climate pollution reduction targets for emissions sourced from the community, Somerville has set interim targets for municipal and school emissions, aiming for a 50% reduction in emissions by 2030 and 90% by 2040, with a goal of reaching 100% by 2050.

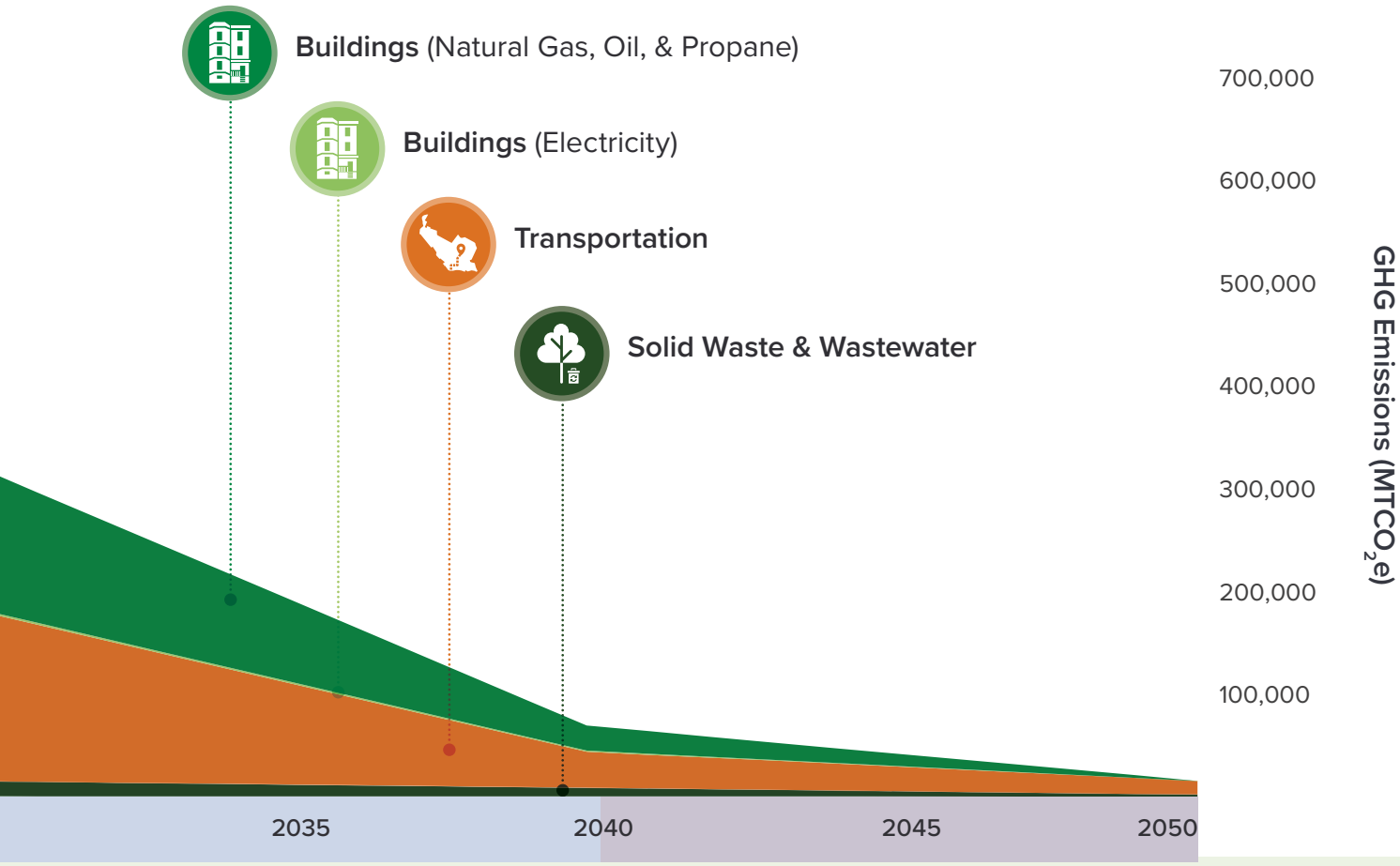
By 2030, Somerville will aim to...

- Electrify 55% of residential homes and 50% of commercial buildings
- Electrify 40% of passenger vehicles and 10% of commercial vehicles
- Source 100% of electricity from renewable energy in the Community Choice Electricity program
- Reduce natural gas leaks by 25%
- Divert 30% of both residential and commercial waste from incineration

TOTAL REDUCTION: **317,200 $MTCO_2e$**

As members of the Somerville Community, the city and schools have established the following GHG reduction targets.

2030	2040	2050
50%	90%	100%



By 2040, Somerville will aim to...

- Electrify 90% of residential homes and commercial buildings
- Electrify 90% of passenger vehicles and 80% of commercial vehicles
- Source 100% of electricity from renewable energy in the Community Choice Electricity program
- Reduce natural gas leaks by 50%
- Divert 60% of both residential and commercial waste from incineration

TOTAL REDUCTION: **520,800 MTCO2e**

By 2050, Somerville will aim to...

- Electrify 100% of residential homes and commercial buildings
- Electrify 100% of passenger vehicles and 90% of commercial vehicles
- Source 100% of electricity from renewable energy in the Community Choice Electricity program
- Reduce natural gas leaks by 100%
- Divert at least 90% of both residential and commercial waste from incineration

TOTAL REDUCTION: **586,700 MTCO2e**

SomerVision 2040

Climate & Sustainability

Highlight added for emphasis

Climate & Sustainability

STRENGTHS

In considering climate and sustainability in Somerville, the working group wants to build on the solid foundation in SomerVision 2030 and Somerville Climate Forward, our climate action plan. SomerVision 2030 established sustainability as one of our community's key values. The working group builds on this in SomerVision 2040 by making Climate and Sustainability a new topic chapter with a focus on:

- Strong environmental leadership
- Balanced transportation modes
- Engaging recreational and community spaces
- Improved community health and access to prevention and protective services
- Effective stewardship of our natural resources

In addition, Climate Forward extensively considered the changes that will reduce emissions in the following sectors:

- Buildings
- Transportation
- Environment (stormwater management, tree canopy expansion, consumption patterns)
- Community (education, civic, and community participation)
- Leadership to advocate for issues that can only be addressed at state or even federal levels

Many Somerville residents are already aware of climate change and other environmental issues and are eager to take action. This existing awareness will help to support individual efforts and mobilize needed behavior change at a larger scale.

The scope of the Climate & Sustainability topic chapter is: climate change mitigation, climate change adaptation, resiliency, energy efficiency, waste reduction, environmentalism, renewable energy, carbon neutrality, and pollution prevention and mitigation.

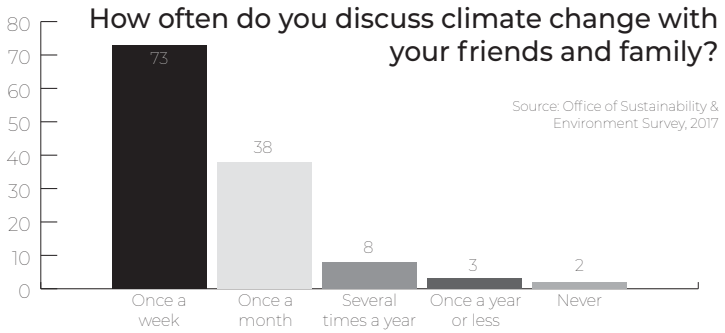
The SomerVision Number

80%

DECREASE IN CARBON EMISSIONS
from 2014 levels by 2040

Reducing carbon emissions is the most important strategy for mitigating climate change, and the 80% goal was first identified in the Climate Forward Plan. Related indicators include the percent of buildings' energy use from sustainable sources and the share of buildings with solar panels.

Beyond policy positions, the City has implemented several programs and physical designs to to enable the community to make sustainable lifestyle choices. The City developed the Somerville Waste Wizard to answer resident questions about how to safely dispose of waste and electronics. Textile recycling was recently launched. The City has invested in cycling facilities, including a bikeshare program to make biking a more attractive option. Priority bus lanes on Broadway makes bus service more reliable and attractive for riders even during heavy traffic. Investments to increase the city's tree canopy will help cool the city during the summer. Somerville is conducting parking reviews to evaluate the city's relationship with cars, especially in corridors with robust public transit. The Green Line Extension will soon offer further public transit opportunities. In 2016 the Solarize Somerville campaign led to the installation of over 100 solar arrays on Somerville



homes. If you're interested and haven't yet been engaged, check out Sustainaville, the City's home to the programs and initiatives to reduce our contribution to climate change and increase climate awareness.

CHALLENGES & OPPORTUNITIES

There are many challenges and opportunities related to climate change and sustainability because the problem is not simple to solve. Solutions are local and global and action needs to be taken in a wide variety of ways. We've identified the issues as: scale of influence, existing infrastructure, the environment and health equity, air quality, and engagement.

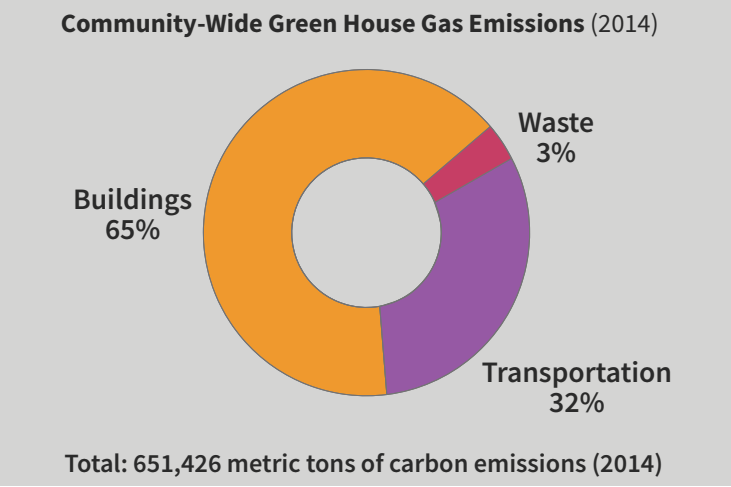
The biggest challenge facing Somerville are issues of scale. Much of what we know is environmentally harmful to Somerville is outside of municipal control. The air pollution from Interstate 93 is mostly from cars passing through and not beholden to any Somerville rules. Buildings in Somerville are the biggest consumers of fossil fuels, but Somerville has limited ability to impose new building codes because this is done at the State level. Similarly, transportation requirements like miles-per-gallon minimums are set by federal authorities. Many of the emissions contributing to climate change can only reform through policy change at different levels of government or from technological solutions.

Somerville Climate Forward is Somerville's first comprehensive climate change plan, grounded by a set of implementable actions. These tasks aim to reduce Somerville's contribution to climate change and work towards carbon neutrality, to prepare Somerville for the unavoidable impacts of climate change, and to fairly distribute the opportunities created by climate action and work to alleviate the unequal burdens of climate change.

Changes in Somerville will not be enough to stop climate change nor shelter Somerville residents from its impacts. Our actions may not produce any near-term, discernible benefits and makes it difficult to justify the costs of action on the municipal scale. This lack of control often manifests locally in resistance to changes that would make our community more sustainable. However, municipalities have an important role in effectively mitigating and preparing for climate change. It takes individual investment of cities to reduce their own GHG emissions and prepare for the impacts of climate change in order to move toward the collective impact necessitated by the current challenges and opportunities.

Climate change is driven by fossil fuel emissions and efforts to reduce emissions will require addressing well-established infrastructure. Buildings contribute 65% of Somerville's greenhouse gas emissions (GHG). Most are privately owned, so mitigating steps, if not mandated, will occur based on property owner interest and willingness to pay. Especially in circumstances where tenants are paying the energy bills, there is little incentive to improve. In addition, it will take drastic changes to wean the housing stock off fossil fuels.

Transportation contributes nearly all the remaining GHG from Somerville (32%) and is attributable almost entirely to single occupancy vehicles. Policy throughout the United States has privileged car ownership by directing tax money to build and maintain roads, zoning for an oversupply of parking, and creating below market-rate parking permit schemes. Residents purchased cars assuming these policies would continue, and fight for it to remain so. However, this perpetuates the problem. In order to impact the number of cars owned by Somerville residents the City should consider limiting the number of subsidies available - market rate parking policies, zoning to not create an oversupply of parking, and right-sizing roads for all modes. While electrifying cars can reduce carbon emissions, reducing cars and vehicle miles traveled (VMTs) overall will be difficult to do while so many subsidies remain in place. The City is constantly balancing the needs of all roadway users whether motorists, cyclist, or pedestrian.



The remaining three percent of carbon emissions come from waste, particularly from plastic waste. Plastic is an integral part of the US economy and very difficult to avoid. But, because plastic waste emerges from a myriad of sources yet contributes to less than three percent of Somerville's carbon emissions, even solving the problem would not provide a major contribution to making Somerville carbon neutral.

The effects of climate change will not be uniformly or equitably distributed. Those who are least likely to afford mitigation costs will also be the greatest impacted. Certain populations are more vulnerable to the impacts of climate change such as children, seniors, and people with preexisting health problems.The Wellbeing of Somerville Report provides several examples of how age and socio-economic status may put certain groups within Somerville at an increased risk:

- Young children have a limited ability to communicate when overheating or when left in dangerous situations and are less self-sufficient, more reliant on

adults for transportation and other needs, and less likely to cope emotionally during a disaster or climate event;

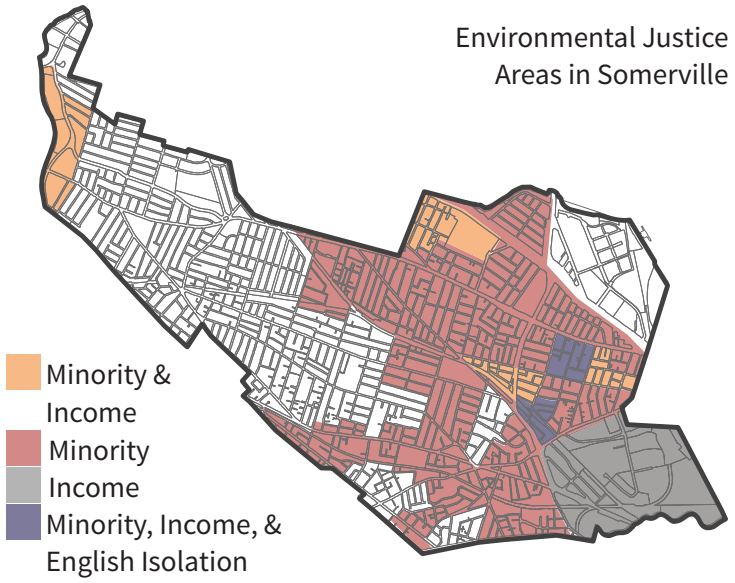
- New residents to Somerville may not be aware of emergency alerts and services available and may have difficulty with language access;
- Renters may have less capacity to make improvements to their homes and therefore could be more vulnerable to heat waves and flooding; and
- Seniors are more susceptible to extreme heat, the impacts from poor air quality, and insect-borne diseases and they may find it more difficult to access support services or evacuate during a climate event.

In addition, income and wealth influence the capacity to prepare for and recover from an extreme climate event. Thus, it is important to consider the role of policies, programs, and institutions which have historically distributed risks and opportunities unequally across the population.

The Wellbeing of Somerville Report highlights air quality as an environmental issue with serious health implications. Research shows that Somerville is a community disproportionately burdened with poor air quality, especially in the neighborhoods adjacent to Interstate 93 and Route 38. According to the National Climate Assessment, climate change will affect human health by increasing ground-level ozone and/or particulate matter air pollution. Recent studies have shown that ultrafine particles emitted from traffic are associated with respiratory infections, lung cancer, heart attacks, stroke and chronic obstructive pulmonary disease and are associated with elevated risk of asthma, heart conditions, and obesity.[1]

Ensuring a just and equitable transition to a clean energy economy and a clean energy future will not be easy. However, it's critical that any system the City deploys incorporates various language translations, easy access to information, and community events. Climate change will affect everyone in some way or another. To move forward, we must focus on the opportunities that are available to us.

Climate and Sustainability overlaps with several other chapters. Sustainability will need to be incorporated into all future plans that have any impact or expectation for future fossil emissions.



Environmental justice seeks to ensure the equitable distribution of environmental risks and benefits and fair and meaningful participation in environmental decision-making for all people, regardless of race, color, national origin, or income. In Massachusetts, an Environmental Justice Community is an area with a median household income that is equal to or less than 65% of the statewide median, or an area with over 25% of residents identifying as a race other than white, or an area with over 25% of households having no one over the age of 14 who speaks English very well, or some combination of the three.

1 Walker, Douglas I., et al. "Metabolomic assessment of exposure to near-highway ultrafine particles." Journal of exposure science & environmental epidemiology (2018): 1.

GOALS AND TAKEAWAYS

Leverage control. Above all, Somerville needs to understand what aspects of emissions we have control over, and what we can do within that realm to reset unconscious norms. For example, supporting permeable pavement or planting native plants or trees able to survive the anticipated heat. These must be deliberately considered and acted upon.

Target behavior change. Behavior change is needed to reduce greenhouse gas emissions. The community wants to make better choices, but the City should support efforts to make "better choices" more intuitive and straightforward.

Re-evaluate programs. Programs that were the right fit for the Somerville of 10, 20, 50 years ago, might not be the right fit for the Somerville of today. For example, the City currently utilizes zero-sort recycling (a SomerVision 2030 recommendation), which often has the unfortunate side-effect of decreasing the efficacy of recycling programs. We should continually monitor the results of programs to make sure they're still the best fit for our community and stated goals.

Focus on our largest GHG contributor. Buildings are the largest contributor to Somerville's emissions, and we need to continue to focus on them even though we have limited leverage. We need to support building retrofits, keeping in mind that improvements resulting in cost of living increases is an undesirable outcome.

EQUITY GOAL

Expand messaging. Climate change solutions will entail large changes for residents, local businesses, and how the City operates. How can we help the community understand and accept these changes prior to implementation?

Continue to educate and incentivize. Somerville can think creatively about how to incentivize positive behavior change (for example commuting by bike instead of by car or having a public forum to formalize commitments to fly less like Europe's No-Fly Pledges.

Integrate sustainability in other City objectives. Whether the city budget, neighborhood planning, or regulation, we need to integrate sustainability in all City processes, especially the way we live and move about.
Include food. Food systems are both heavily impacted and contributors to climate change and a community's resilience. In line with the Somerville Food Assessment findings, Somerville should aim to minimize the amount of food that is wasted and support local emergency food providers in creating a more cohesive network for receiving and distributing recoverable food.

Plan ahead. Someville will continue to see the impacts of climate change. We should investigate what actions Somerville can take to further reduce the immediate impacts of climate change that are likely by 2040. The City should put specific emphasis on serving low-income and high-vulnerability individuals with targeted climate change mitigation and emergency preparedness programs. For example, as tree cover mitigates the urban heat island effect, how can we expand tree cover to make more space available for tree plantings on public and private property? We need to consider adaptations for the future and what avenues exist to ease them – how do we learn to live with heat.

EQUITY GOAL

Prioritize Infrastructure. Our infrastructure plays a critical role in improving our sustainability and resiliency to future climate events. We should explore traditional and innovative ways of addressing our problems.

POTENTIAL TASKS

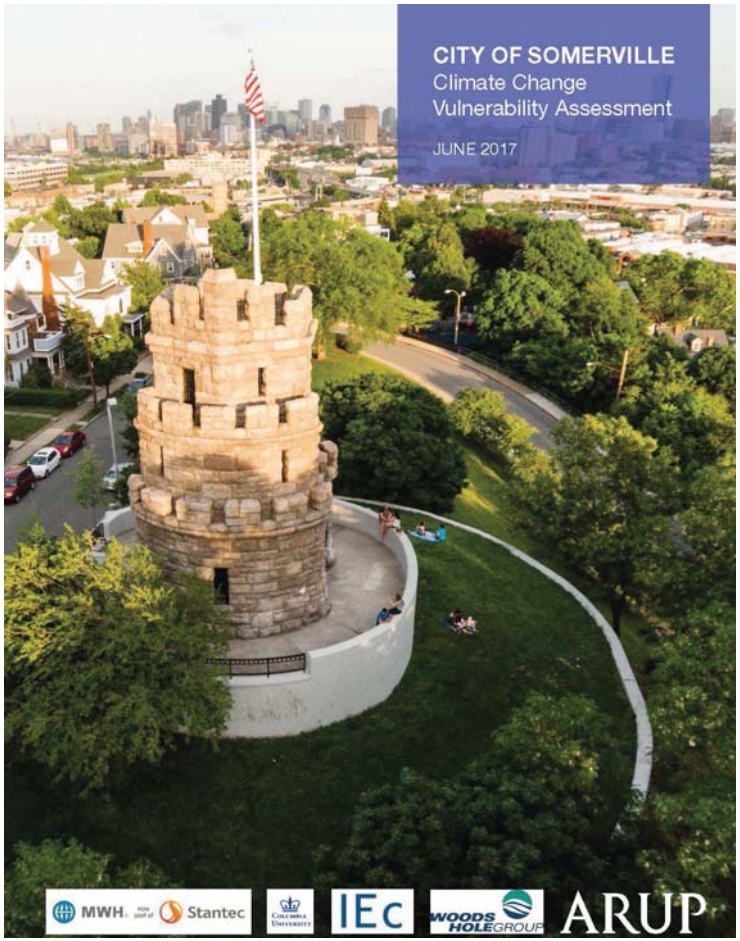
- Align sustainability values with existing city programs and policies.
- Continue to pursue policies that make Somerville less dependent on fossil fuel emissions.
- Develop a plan and guidelines for combating urban heat island impacts.
- Develop policy incentives to encourage sustainable behavior relating to consumer awareness – particularly for building energy consumption, but also for consumer good and transportation choices.

- Familiarize residents with various funds for supporting sustainable development, or consider generating a fund and encouraging residents to donate towards maintaining/planting vegetation locally as an offset for air travel.
- Incentivize landlords to make retrofits, which reduce fossil fuel emissions, improve indoor air quality, and increase resilience to flooding and heat extremes in older housing stock.
- Support and encourage green leasing efforts.
- Support implementation of the Stormwater Management Plan.
- Educate renters to ask for average utility costs prior to renting.
- Require education on residential energy efficiency measures and financial incentives as part of any City-sponsored first time homebuyer programs.
- Build on the zoning overhaul and increase or add new sustainability metrics.
- Publicize Somerville's sustainability-related values more prominently.
- Leverage social networks and citizen groups to share information and opportunities for reducing climate impacts, including food waste.
- Consider the use of public benchmark data for friendly competition between consumers: disaggregate and publicize data for neighborhoods to recognize good behavior and galvanize those who can improve.
- Ensure that materials on climate change are translated into multiple languages and are available to a wide diversity of groups, especially those most impacted by climate change.

- Adopt visible symbols of our commitments - explore opportunities to support renewable energy production.
- Engage the community in conversations around emergency response plans related to extreme weather events and disruptions to food supply due

to climate change impacts. These conversations should inform the development of community-driven emergency response plans and aim to increase personal resilience to climate change. They should be well-promoted to a variety of subpopulations.

- Publicize Somerville's successes to other communities to demonstrate that sustainable living is possible and encourage other communities to take steps to reap the same benefits.
- Educate Somerville residents and businesses on climate issues and available actions, to build a citywide culture of engagement and awareness.
- Utilize existing communication forums to enhance citizen awareness. For example add current air quality readings to the City website or within the Somerville newspapers.
- Leverage communications technologies and social media. For example provide text message notifications on days with poor air quality to encourage residents to abstain from driving, minimizing additional pollution and protecting their health. Many Somerville residents groups are highly active on social media, which can be used to personalize city announcements or initiatives.
- We should increase scientific literacy of City officials. Somerville already focuses on data-based problem solving. Enhance this by educating City staff and elected officials about new technologies, adaptation strategies, and other solutions.
- Get more community members engaged in climate issues by building a citywide culture of sustainability. For example match engaged residents with those who are less able to devote time to understanding and acting upon climate mitigation initiatives. This could include initiatives like planting vegetable gardens, grocery shopping to minimize plastic consumption, or providing forums for high school students to learn about the issues.
- Support public engagement. Somerville can identify, support, and disseminate grassroots efforts already



A vulnerability assessment explores what aspects of a system might be sensitive to certain threats. The City's Climate Change Vulnerability Assessment focused particularly on sea level rise and storm surge, precipitation, and temperature to analyze how the city would be directly affected by anticipated climate change. This enabled the City to identify the most at-risk populations, assets, and systems, which informed the Climate Forward planning process.

underway and leverage these to drive changes, particularly in the emissions-heavy building and transportation sectors.

- Expand data-driven action and establish protocols for data collection on local air quality on an ongoing and permanent basis.
- Transportation and land-use planning decisions can lower traffic related air pollution and resident exposure. Somerville should leverage the planning process to:
    - Put standards in place for new buildings to ensure that indoor air pollution (allergens and particulate pollution) is significantly reduced from outside
    - Pursue protective ordinances in areas within 500' of a high-traffic roadway
    - Mitigation measures for air pollution generation, such as EV stations
    - Emphasize road diet and walkability score; and
    - Emphasize transportation equity for transportation modes, but prioritize low emission mobility
- Create programs to help existing property owners and tenants within 500' of high capacity roadways.
- Support pedestrians, cyclists, and additional public transit. Between traffic gridlock and MBTA dysfunction, the timing is right to experiment with alternative methods like biking, Mystic River ferry service, dedicated bus lanes, street cars, paratransit, and micro-mobility (for example electric bikes and scooters).
- Leverage the Green Line Extension. This major change gives the city a window of opportunity to make other changes to reduce vehicle miles traveled and consequent emissions. These opportunities include restricting parking permits in transit-accessible areas, increasing the cost of city parking permits, and reducing street parking in favor of space for carbon neutral (or even negative) emissions, like bike lanes

or more trees.

- Take full advantage of existing natural resources. While many green spaces are used and appreciated, other resources like the Mystic River can be further developed as community spaces. New connectivity can help residents access and value the natural world.
- Revisit historic precedents. Somerville used to have many more people, yet much less vehicular traffic. Engage with our history to better understand what low-emission living looked like in Somerville and how we can readapt it today.
- Make thoughtful land use choices. Somerville neighborhoods are walkable, with good sidewalks and often many nearby services and destinations like stores and restaurants. Can neighborhoods further expand their self-sufficiency both to build social capital and minimize the need for vehicle trips? This initiative will be especially powerful if it includes job creation.
- Consider grant programs or financing options for any retrofitting projects residents apply to their homes and/or modes of transport.
- Evaluate waste streams including trash, recycling, and organic waste. Past solutions may not be 2040 solutions. New technologies may make for more efficient waste disposal.