MAYOR KATJANA BALLANTYNE

CLIMATE FORWARD

City of Somerville
Community Climate Action Plan

UPDATED APRIL 2024

SustainaVille
@sustainaville.ma

ONE CALL to CITY HALL 311 SOMERVILLE, MA

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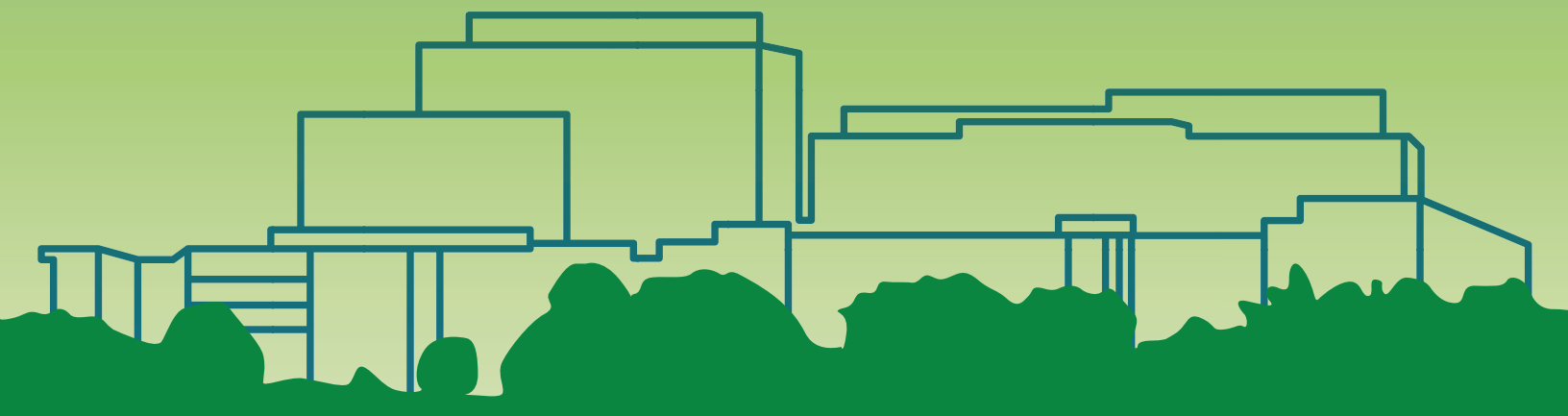

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Office of Sustainability and Environment

Christine Blais, Director

Emily Sullivan, Climate Change Program Manager

Naomi Gross, Community Engagement Specialist

Elyse Belarge, Sustainability Planner

Erik Larson, Energy Manager

Julia Damiano, Environmental Policy Manager

Kathryn Cole, Financial Analyst

Garrett Anderson, Residential Decarbonization Program Manager

Erin Noël, Former Community Engagement Specialist

Vlad Khan, Former Financial Analyst

Vithal Deshpande, Former Environment Program Manager

Collaborating Departments

Arts Council

Capital Projects

Communications Department

Council on Aging

Department of Racial and Social Justice

Department of Public Works

Engineering Department

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Law Department

Mayor's Office

Office of Food Access and Healthy Communities

Office of Intergovernmental Affairs

Office of Strategic Planning and Community Development (OSPCD)

OSPCD–Economic Development Division

OSPCD–Housing Division

OSPCD–Housing Stability Division

OSPCD–Mobility Division

OSPCD–Planning, Preservation, and Zoning Division

OSPCD–Public Space and Urban Forestry Division

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Traffic and Parking Department

Commission on Energy Use and Climate Change

Larry Yu, Chair

Ramón Bueno, Vice Chair

Eri Furusawa

Eliza Johnston

Courtney Koslow

Alexis Washburn

Julie Wood

Consulting Team

Arup

John Bolduc

Kim Lundgren Associates, Inc.

LETTER FROM THE MAYOR

Dear Somerville Community,

Climate change is one of the greatest challenges of our lifetimes. While this issue is global, its impacts are local. Our community is already facing longer, hotter summers and more frequent storm events. However, what makes Somerville stand out among our neighbors is how we unite when challenges arise. Our shared values of creativity, innovation, and inclusivity help us persevere.

Since 2018, our City has followed a strategic guide for how we will work together to respond to this critical challenge. We call this guide Climate Forward, Somerville's community climate action plan. Together, we will transform Somerville into a community that embodies SustainaVille principles – a city that works together to take bold steps to slow climate change while ensuring we are a diverse and vibrant community where all people thrive. We have made progress since 2018, including increasing available renewable energy through the Somerville Community Choice Electricity program, extending the MBTA Green Line and Community Path, and investing more in our urban tree canopy.

Over the past year and a half, we used the latest science to update the foundational documents of Climate Forward. We conducted Somerville's first-ever Consumption-Based Emissions Inventory, looking at our impact both within and beyond our borders. In addition, new data used to inform the Climate Change Vulnerability Assessment revealed that by 2070, some areas of our city may see flooding up to 10 feet. This is three times higher than previously projected. Using more recent and comprehensive data, we were able to better understand how climate change is already impacting us, how it will impact us over time, and how we can prepare to better manage impacts.

This is a community-driven plan, informed by residents, local stakeholders, and dedicated municipal staff. More than 700 community members and groups contributed their ideas, priorities, concerns, and hopes to craft this climate action plan for Somerville. Your dreams and commitment to the future laid the foundation for our work together. This level of input was integral to creating a plan that directly responds to community needs and reflects residents' voices.

Through the plan that follows, we have developed a shared vision for a carbon net-negative future. With bold, strategic, inclusive action, and investing in our kids and innovation, Somerville will take on this global issue while keeping local interests the priority.

We will be successful by delivering justice, equity, and compassion every day to strengthen our resilient, diverse, and thriving community. I am eager to work together to make SustainaVille a reality.

Sincerely,

Katjana Ballantyne

Mayor Katjana Ballantyne

Introduction: Moving Climate Forward

Somerville is a dynamic, ever-evolving city. However, one constant is that when challenges arise, the city comes together as one community to find solutions. Now, climate change is putting that collaborative spirit and resilience to the test. Somerville is proud to meet that challenge with an actionable, ambitious, and progressive plan: Climate Forward.

Climate Forward is Somerville's plan to creating a strong, healthy community in the face of climate change while simultaneously reducing climate pollution, also referred to as greenhouse gas (GHG) emissions, and our dependence on fossil fuels. In 2018, the original iteration of Climate Forward set out ambitious goals and strategies to:

Reduce Somerville's contribution to climate change (mitigation).

Prepare Somerville for the unavoidable impacts of climate change (adaptation).

Fairly distribute the opportunities created by climate action and work to alleviate the unequal burdens of climate change (equity).

This updated version of Climate Forward builds upon those aspirations and Somerville's successes over the past five years. Drawing upon community feedback and the latest climate data, this plan lays out new priorities and strategies that will be implemented through 2035 across different sectors, including energy, buildings, natural resources, mobility, waste, and community health.

The Climate Forward Plan update also holds Somerville to a higher standard in terms of reducing GHG emissions, the primary pollution causing climate change. Not only is Somerville committed to reaching net zero emissions by 2050, in alignment with the Commonwealth's Decarbonization Roadmap, but Mayor Ballantyne's administration aspires to reach carbon net-negative in the future as well. Achieving these goals and building resilience to climate impacts will not be easy, but many of the solutions we need are ready and available.

Vision for a Climate-Ready Future

Climate Forward takes an innovative and equitable approach to ensuring the Somerville community can thrive now and in the future. Four vision statements represent the intentions of the planning process and priorities for implementation.

Equitable

Somerville will transform practices to address structural and institutional inequities, allowing resources and the benefits and opportunities created by climate action to be justly distributed to all.

Carbon Net-Negative

Somerville will strive to reach net-negative GHG emissions by removing more emissions than the community emits, prioritizing the direct emission sources within Somerville.

Resilient

Somerville will adapt in order to prepare for the impacts of climate change, and in the process enhance local community power and capacity.

Thriving

Somerville will take bold, strategic, inclusive action, and invest in kids and innovation to take on global issues while keeping local interest the priority.

Centering Equity During Implementation

To achieve this vision, Somerville will:

Equitably consider the needs of the community to ensure these goals are met for highest-need stakeholders within the community.

Ensure meaningful involvement in decision making, implementation, and leadership by low-income communities of color.

Co-create the policies and programs identified in this plan, prioritizing working with frontline communities who experience the ongoing burden of environmental injustices.

During the planning process, Somerville conducted a Feasibility and Equity Assessment for each action in the Climate Forward Plan to determine:

- Co-benefits of implementing the action (e.g., public health benefits, quality of life benefits, etc.).
- Existing vulnerabilities that the action can help to address.
- How the action benefits community members who are underserved and/or disproportionately impacted by climate change.

Implementing the Plan

In addition to implementing all of its existing plans and strategies that support climate action, the City will implement the 77 actions in Climate Forward between now and 2035 in response to the urgency of the climate crisis. Several tools and programs will be leveraged to support implementation.

TRACKING PROGRESS

Somerville will track and share progress toward achieving Climate Forward goals on the City's website. Somerville's SustainaVille webpage will be a centralized place to learn about City programs, track progress towards goals and targets, and identify actions community members can take.

CONTINUED COMMUNITY ENGAGEMENT

In 2019, the Office of Sustainability and Environment launched the Climate Forward Ambassador Program with the goal of educating residents about climate change and increasing the community's capacity to engage in climate action. Somerville will continue the program as the City works to implement Climate Forward. The City also seeks to support other climate-related opportunities, such as expanding the Climate Justice Cohort of the Mayor's Summer Jobs Program.

Connected Efforts

In addition to the actions included in this plan, the City has also committed to taking action through other many other related initiatives. These efforts create an interconnected network of projects to make Somerville healthier, safer, and more sustainable.

Capital Investment Plan

Provides a 5-year roadmap for the City's expenditure on major investments for critical infra-structure such as buildings, streetscapes, parks, property, and equipment.

Vision Zero Action Plan

2020
Identifies long term strategies for
eliminating deaths and serious injuries from the transportation system.

Building Master Plan

2021
Analyzes the potential relocation of City and School Administration offices to improve the constituent experience, increase service efficiency, and reduce operating costs.

Zero Waste Plan

2023
Identifies waste reduction and diversion goals and connects these goals to GHG emission reduction targets.

Public EV Charging in Somerville Report

2020
Identifies potential actions to increase access to electric vehicle (EV) infrastructure in the city.

Citywide Drainage and Water Quality Master Plan

2022
Recommends a collection of infrastructure projects that will reduce flooding, improve water quality, and mitigate combined sewer overflows.

Urban Forest Management Plan

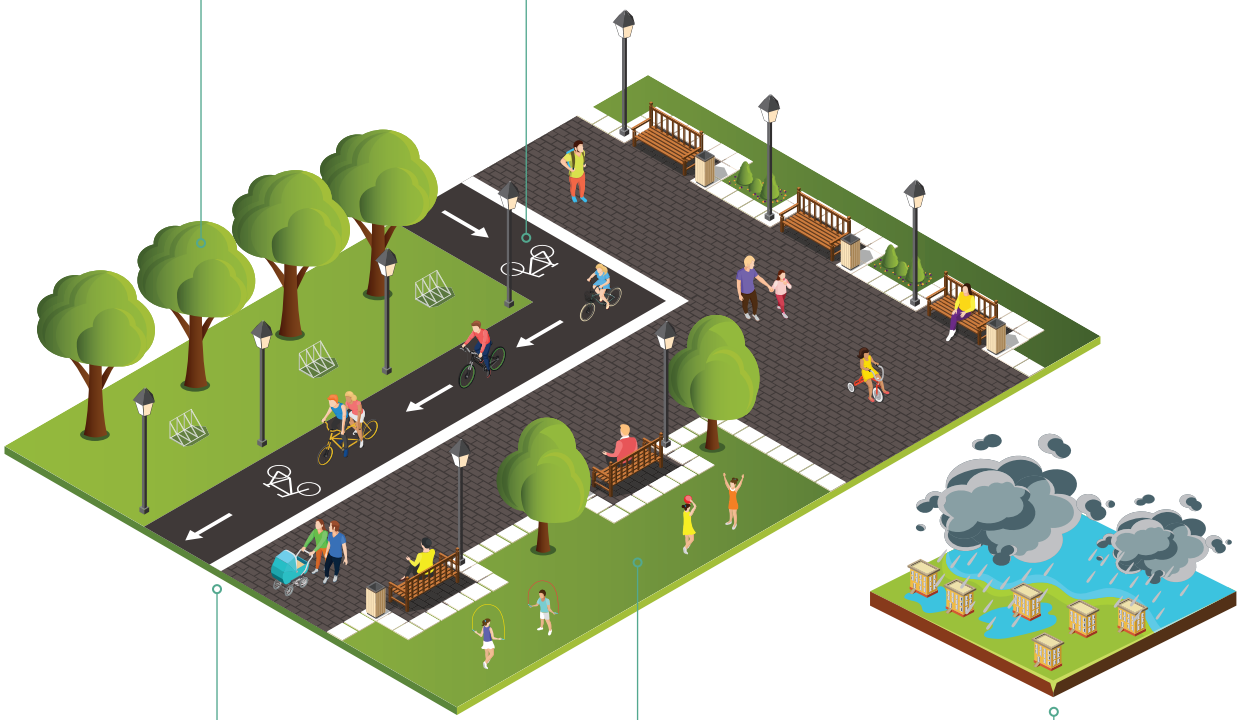
2021
Guiding document for the expansion, preservation, and maintenance of Somerville's urban canopy.

Bicycle Network Plan

2023

Maps out steps to expand and upgrade the current network of bicycle facilities to create safe and connected routes.

Additional plans and studies related to the Climate Forward Plan include Somerville's ADA Transition Plan, Citywide Parking and Curb Policy Study, the Lower Mystic Regional Climate Assessment, and the forthcoming Pollinator Action Plan.



SomerVision 2040

2021
Comprehensive plan to ensure Somerville continues to be an exceptional place to live, work, play, raise a family, and grow older.

Open Space and Recreation Plan

2024
Will guide the next seven years of City work on parks, sports fields, open space, conservation land, and recreational programming.

Hazard Mitigation Plan

2022
Guides efforts to respond and adapt to natural hazards, worsened by the impacts of climate change. The Federal Emergency Management Agency said the Plan could be referenced as a best practice for Region 1.

History of Climate Action in Somerville

Climate Forward builds upon Somerville's longstanding legacy and commitment to advancing sustainability and climate resilience. Over the last decade, Somerville has sought to become a climate leader through advancing innovative policies and programs, sparking action and collaboration in other communities, and leading by example.

2011

Somerville earns designation as a Massachusetts Green Community.

2014

"SustainaVille" brand is created to house Somerville's climate-related programs and initiatives.

Somerville commits to achieving net zero emissions by 2050.

2015

Somerville launches Energy Efficiency Now (SEEN) Program to increase resident and landlord adoption of energy efficiency measures

Somerville joins the Compact of Mayors.

2016

Somerville completes an initial Greenhouse Gas (GHG) Inventory, its first rigorous analysis of emissions sources.

Somerville leads the adoption of a 14-city metro-Boston net zero region commitment in 2016

2017

Somerville conducts an initial Climate Change Vulnerability Assessment (CCVA) to identify climate hazards and risks.

The Board of Alderman passes a resolution to affirm the goals of the Paris Climate Agreement.

Somerville is awarded SolSmart Gold by the U.S. Department of Energy, becoming the first municipality in Massachusetts to receive that designation.

2018

Somerville becomes a Massachusetts Municipal Vulnerability Preparedness (MVP) Program designated community.

Somerville completes an update to its GHG Inventory.

Somerville releases first Climate Forward Plan.

ClimateForward

To update Climate Forward, the City engaged with staff and community members, conducted assessments and inventories using the latest climate data available, and updated goals, strategies, and actions.

2019-2022

Somerville works to implement priority actions in the first Climate Forward.

SomervilleCityCouncil passes a Green New Deal resolution.

JAN 2023

Somerville launches planning process to update Climate Forward.

Somerville completes its first Consumption-Based Emissions Inventory to estimate the GHG emissions associated with the goods and services used by Somerville residents.

AUG 2023

Somerville updates its CCVA using the most up-to-date climate data.

Somerville conducts aPathwaysAssessment to identify the specific methodsandindicators necessary to achieve deep reductions in GHG emissions.

OCT 2023–JAN 2024

Somerville conducts community engagement through events, focus groups, and a community survey.

Somerville hosts a workshop with City staff to identify barriers and opportunities to achieving climate progress.

APR 2024

Somerville releases updated Climate Forward Plan.

ClimateForward

Climate Change in Somerville

When we burn fossil fuels to power buildings and vehicles, climate pollution is released. When these gases become trapped in the atmosphere, the planet warms and our climate changes. Since the first iteration of Climate Forward was released in 2018, Somerville has experienced the escalating consequences of climate change, including extreme heat, coastal flooding, and stormwater flooding. All of these climate hazards put community members at risk and place stress on infrastructure and natural resources.

As climate hazards are only expected to become more intense and more frequent in the coming years, Somerville is prioritizing preparation and resiliency to ensure that the Somerville community is safe and well-resourced.

Coastal Flooding

Coastal storms are expected to bring storm surge, heavy rainfall, and high winds to Somerville, resulting in extensive damage to the Boston Harbor region. Coastal storm events are expected to escalate in frequency by nearly 50% by the end of the century (2090).[1]

Stormwater Flooding

Stormwater flooding is expected to increase in its frequency and intensity. Precipitation projections show that the amount of rain resulting from 10- and 25-year storms is projected to increase by nearly 40% between present day and 2070.[2]

Heat

Somerville has significant heat exposure, with 82% of the city defined as a "hot spot," meaning the area has a Land Surface Temperature (LST) index within the top 5% statewide. Prolonged exposure to extreme heat can have severe implications on public health, particularly for seniors, children, people experiencing homelessness, and individuals with chronic illnesses.[3]

Assessing Risks and Vulnerabilities

Somerville completed a comprehensive Climate Change Vulnerability Assessment (CCVA) in 2017 as a direct response to growing concerns identified by the community about climate change. The CCVA analyzed vulnerabilities associated with Somerville's key climate stressors: increased precipitation, sea level rise and storm surge, and higher temperatures. In 2023, Somerville updated the CCVA to incorporate current trends and projections. The updated CCVA illustrates that climate impacts are becoming more frequent and intense, and more neighborhoods and assets are vulnerable and at risk than previously identified.

Protecting People and Places

Climate change disproportionately affects marginalized and low-income communities in Somerville, increasing their exposure to the damages and health risks caused by climate hazards and limiting their capacity to recover, despite these communities contributing the least to climate pollution. Therefore, the CCVA analysis gives specific attention to the impacts of climate change on socially vulnerable populations, which can help Somerville prioritize resilience efforts and ensure that resources are equitably distributed.

Using the Social Vulnerability Index (SVI), the CCVA considers the social vulnerability of residents throughout Somerville using factors like socioeconomic status, household characteristics, demographic data, housing type, and transportation access. The SVI was integrated with a social infrastructure analysis to understand the impact that climate change can have on community resources that play a vital role in supporting the most vulnerable Somerville community members. Social infrastructure is defined as libraries, places of worship, and community organizations that encompass a diverse range of focuses from housing and access to healthcare to economic development.

These findings provided the foundation for actions in this plan that address strengthening community resilience and preparing for emergencies.

EXAMPLE: Social Infrastructure at Risk from Extreme Heat in Somerville[4]

Food Resources
>10 assets

Social Infrastructure
>10 assets

Places of Worship
6-10 assets

Critical Facilities
6-10 assets

Medical Facilities
3-5 assets

MBTA Assets
3-5 assets

Schools
3-5 assets

Public Housing
3-5 assets

Higher Education
1-2 assets

Shelters
1-2 assets

Building Community Resilience

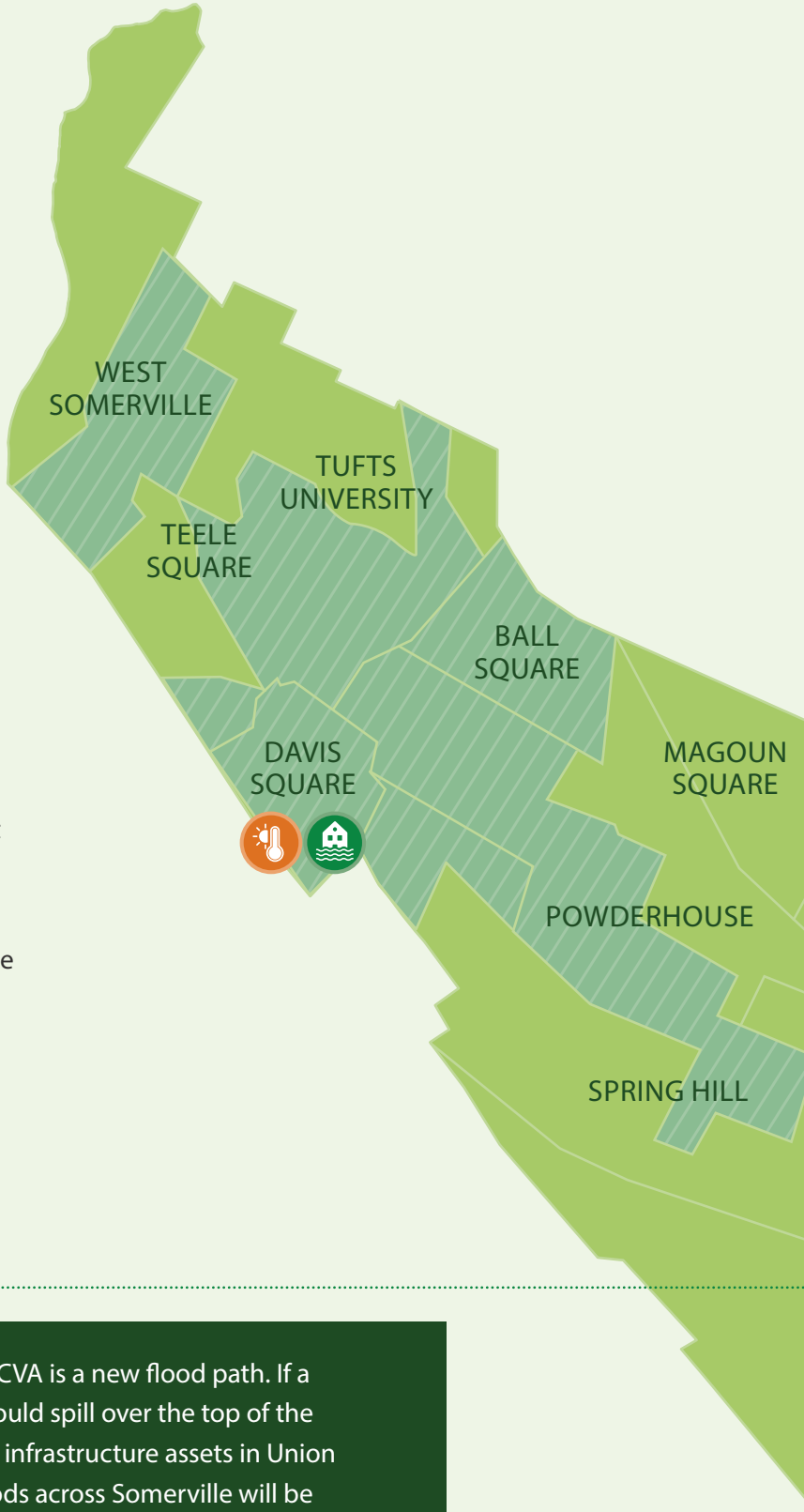
High Outdoor Heat Exposure[6]

Coastal Flooding Risk[7]

Stormwater Flooding Risk[8]

State designated environmental justice population meeting at least one criteria.[5]

Non-environmental justice populations.

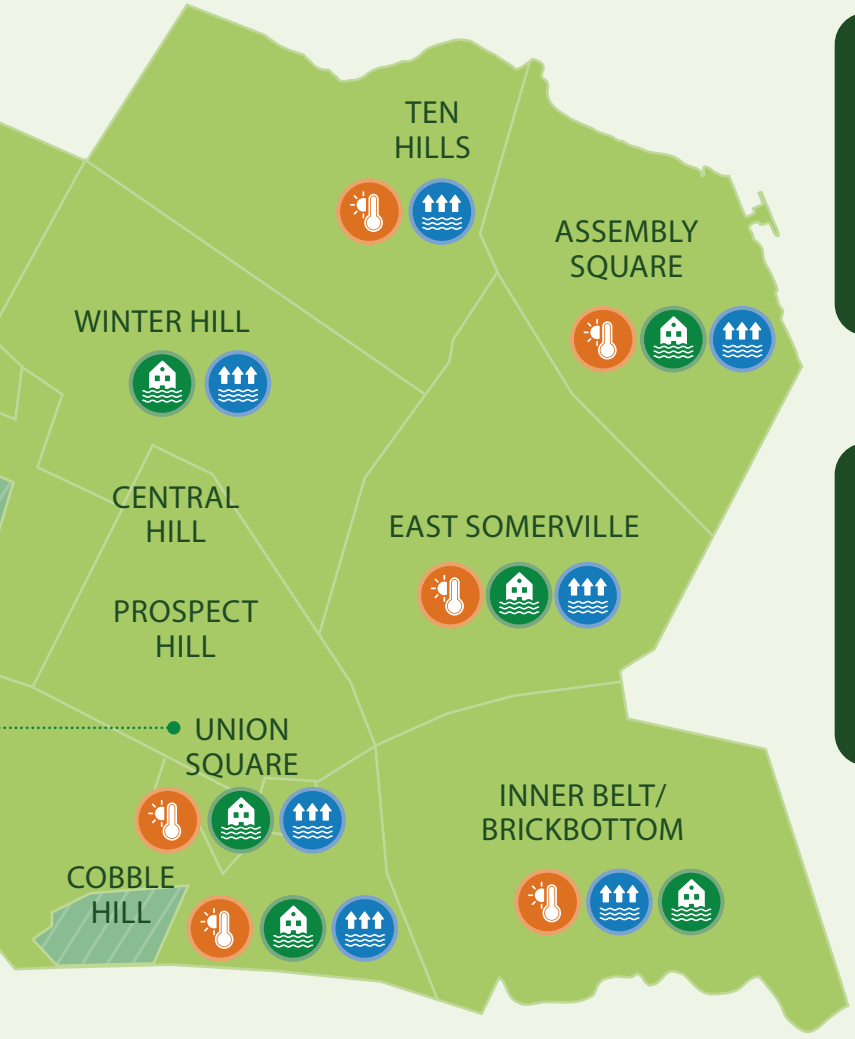


In the face of the climate crisis, Somerville must ensure that all community members are able to withstand and quickly recover from current and future climate stressors. At the same time, Somerville recognizes that systemic inequities exist across the city that have contributed to higher rates of pollution and health concerns in neighborhoods that are disproportionately low-income and non-white. These existing environmental justice issues must be acknowledged and addressed alongside the climate hazards that are also impacting these frontline communities "first and worst."

All Somerville residents deserve to live, work, and play in a community that is free from pollution and safe from the impacts of climate change.

The most critical new finding from the updated CCVA is a new flood path. If a 100-year storm event takes place in 2070, water could spill over the top of the Charles River Dam, exposing more than 10 critical infrastructure assets in Union Square. Access the CCVA to see how neighborhoods across Somerville will be impacted by coastal flooding, stormwater flooding, and extreme heat.

As Somerville continues to build community resilience and prioritize frontline communities, we honor and rely on the ongoing work of activists and community-based organizations. Supporting and partnering with these organizations will be crucial to implementing the resilience-related actions in this plan.



Resilience (noun)

The ability of individuals and organizations to anticipate, prepare for, and respond to hazardous events, local impacts, and day-to-day disturbances related to climate change.

Environmental Justice (noun)

The principal that all people have a right to be protected from environmental hazards and to live in and enjoy a clean and healthful environment.

Engaging the Community

Assessing the impacts that climate change could have on community members and neighborhoods through a CCVA is critical to understanding where and how Somerville can become more resilient. But technical analysis and data only tell part of the story. The rest of the story is best told by community members themselves, sharing their experiences with extreme weather, their need for affordable housing, and their vision for what Somerville can and should look like in the future.

The Climate Forward team sought to listen to and engage as many community members as possible. Over the course of 10 months, and with a goal of equitable engagement, the City sought input from key organizations that reflect the diversity of the community to understand their unique experiences, needs, and priorities. The City accomplished this through:

- Attending dozens of events and meetings
- Building meaningful community partnerships
- Conducting digital outreach
- Offering a Community Survey in seven languages

"I would like to see more education about climate preparedness."

"As a renter, I have no say in what energy type we use. Renters should have a mechanism to decide this."

"I think continuing to improve biking infrastructure and public transit to reduce car usage as much as possible should be the number one priority."

Community Survey

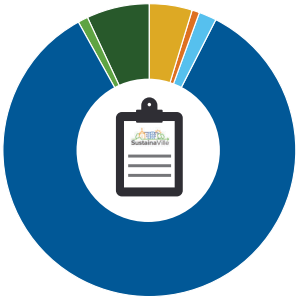
Between August and December 2023, Somerville administered a Climate Forward Community Survey. Nearly 600 community members responded and shared their barriers and opportunities for taking action on climate change, as well as what the City should prioritize.

Community Survey Demographics Snapshot

What is Your Age?

- Under 18 / 1%
- 18-24 / 5%
- 25-34 / 35%
- 35-44 / 23%
- 45-54 / 14%
- 55-64 / 9%
- 65-74 / 8%
- 75+ / 3%
- Prefer not to self-identify / 2%

Which Race/Ethnicity do You Identify with?



- American Indian/ Alaska Native / -%
- Asian/Pacific Islander / 5%
- Black/African American / 1%
- Hispanic or Latino/a / 2%
- White or Caucasian / 84%
- Other/Multiple Ethnicities / 1%
- Prefer not to self-identify / 7%

Actual Somerville Demographic Distribution, U.S. Census Bureau (2022)

- American Indian/ Alaska Native / 0.3%
- Asian/Pacific Islander / 10.5%
- Black/African American / 4.1%
- Hispanic or Latino/a / 10.9%
- White or Caucasian / 68.7%
- Other/Multiple Ethnicities / 8.3%

Demographic information was only collected through the Community Survey. Age was provided by 93% of respondents and race/ethnicity was provided by 84% of respondents.
Age Respondents=550.
Race/Ethnicity Respondents=499.

The City worked to implement best practices to make the Community Survey as accessible as possible for all community members. The Climate Forward team worked with community groups and the Somerville Office of Immigrant Affairs to distribute the survey widely. However, there is more work to be done in the future to reach a more diverse and representative sample of the community.

80

community members

attended a public launch of the Climate Forward update in October 2023, with remarks by Mayor Ballantyne.

20

community meetings

attended in Spring and Fall 2023 to introduce the planning process and distribute the Community Survey.

593

community responses

on the Climate Forward Community Survey.

70

local students

engaged through the Mayor's Summer Job Climate Justice Cohort, Somerville High School, and Tufts Undergraduate Program.

ClimateForward

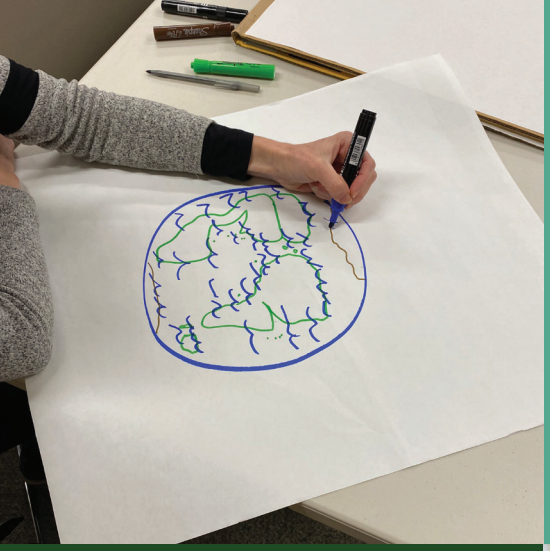
The Climate Forward Plan would not have been as robust and detailed without community expertise. During the planning process, the Office of Sustainability and Environment conducted focus groups and 1-on-1 conversations with the following community organizations, service providers, and institutions:

Tufts University

Groundwork Somerville GreenBikes Youth Team

Somerville High School New Wave/ Full Circle Class

Somerville High School Environmental Community Support Club



32

informational interviews

held with community-based organizations, community organizers, and small business owners.

30

community members

participated in general focus groups.

15

community events

to engage residents, including the farmers market, ArtBeat, Fluff Festival, SomerStreets, Somerville Park(ing) Day, Civic Day, and Climate Palooza.

3

public meetings

hosted at all three library branches during Fall 2023 to collect feedback from community members.

Stakeholders (continued)

Council on Aging

Community Action Agency of Somerville

MassLandlords.net

Immigrant Service Providers Network

Cambridge Health Alliance

Mothers Out Front

Sunrise Boston

Commission on Energy Use and Climate Change

Climate Coalition of Somerville

350 Mass Cambridge and Somerville Node

Somerville Stands Together

Somerville Alliance for Safe Streets

St. Benedict Parish

Union Square Main Streets

East Somerville Main Streets

Eversource

Greenhouse Gas Inventories

Somerville's Contribution to Climate Change

GHG emissions are produced when fossil fuels such as gas and oil are burned to power buildings, cars, and industrial processes. The City of Somerville is committed to measuring and reducing both local emissions sources and household consumption. There are two different approaches to inventorying GHG emissions—geographic and consumption-based—both of which Somerville has assessed to identify the most impactful strategies for reducing emissions.

Sources of Emissions within Somerville

A traditional geographic GHG inventory focuses solely on the emissions generated within Somerville's boundaries, giving a localized view of our direct emissions sources. Most of Somerville's emissions come from the energy used to power buildings (63%) and transportation (34%).

Somerville's 2018 Community GHG Emissions by Sector[9]

Buildings

63%

387,114 $MTCO_2e$

Transportation

34%

209,312 $MTCO_2e$

Solid Waste

3%

20,564 $MTCO_2e$

Wastewater

<1%

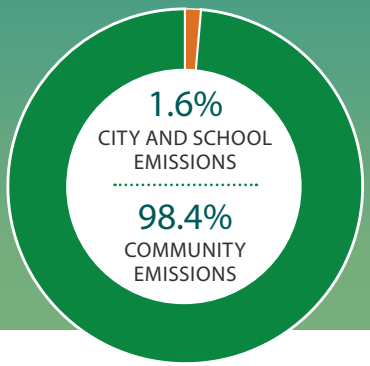
2,727 $MTCO_2e$

Total: 619,717 $MTCO_2e$

$MTCO_2e$

GHG emissions are measured in terms of metric tons of carbon dioxide equivalent ($MTCO_2e$). CO_2e or carbon dioxide equivalent is a metric used to bundle and compare different types of GHG emissions (e.g., methane, nitrous oxide) by converting them to an equivalent amount of carbon dioxide, the most common GHG.

In 2018, city and school operations generated 9,981 $MTCO_2e$, which is 1.6% of the footprint of the entire community.[11] See how the city and schools are taking action to reduce emissions from their operations.



How Does Household Consumption Impact Emissions?

A consumption-based GHG inventory considers not only the emissions produced within Somerville's boundaries but also the emissions associated with the goods and services consumed in Somerville—including those imported or exported. It provides a broader perspective by looking at the complete lifecycle emissions of the products and services used by community members, offering insights into the overall impact of individual consumption choices.

In 2023, Somerville completed its first consumption-based inventory, which found that the average Somerville household produces 33 $MTCO_2e$ every year, most of which comes from food (25%), transportation (24%), and services (21%).[5]

Somerville's 2019 Household Consumption GHG Emissions by Category[10]

Beyond Somerville's Borders

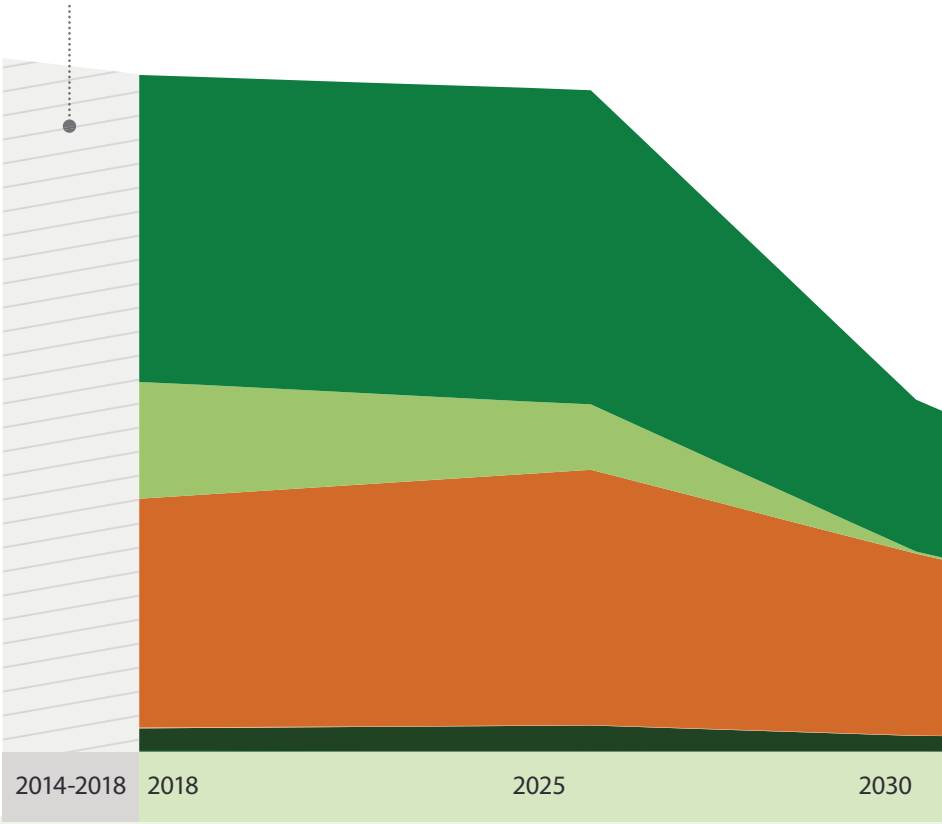
From the perspective of both inventory methods, there are a wide range of actions that the City, homeowners, and businesses can take today to rapidly decrease GHG emissions across Somerville. Locally, these solutions include transitioning to renewable energy, electrifying buildings and vehicles, using energy more efficiently, and decreasing waste. In addition to reducing local emissions, Somerville can work to eliminate emissions from beyond the City's borders. With thoughtful planning and policies, Somerville can help to shift consumers, producers, and entire industries towards lower carbon solutions for everyone.

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.

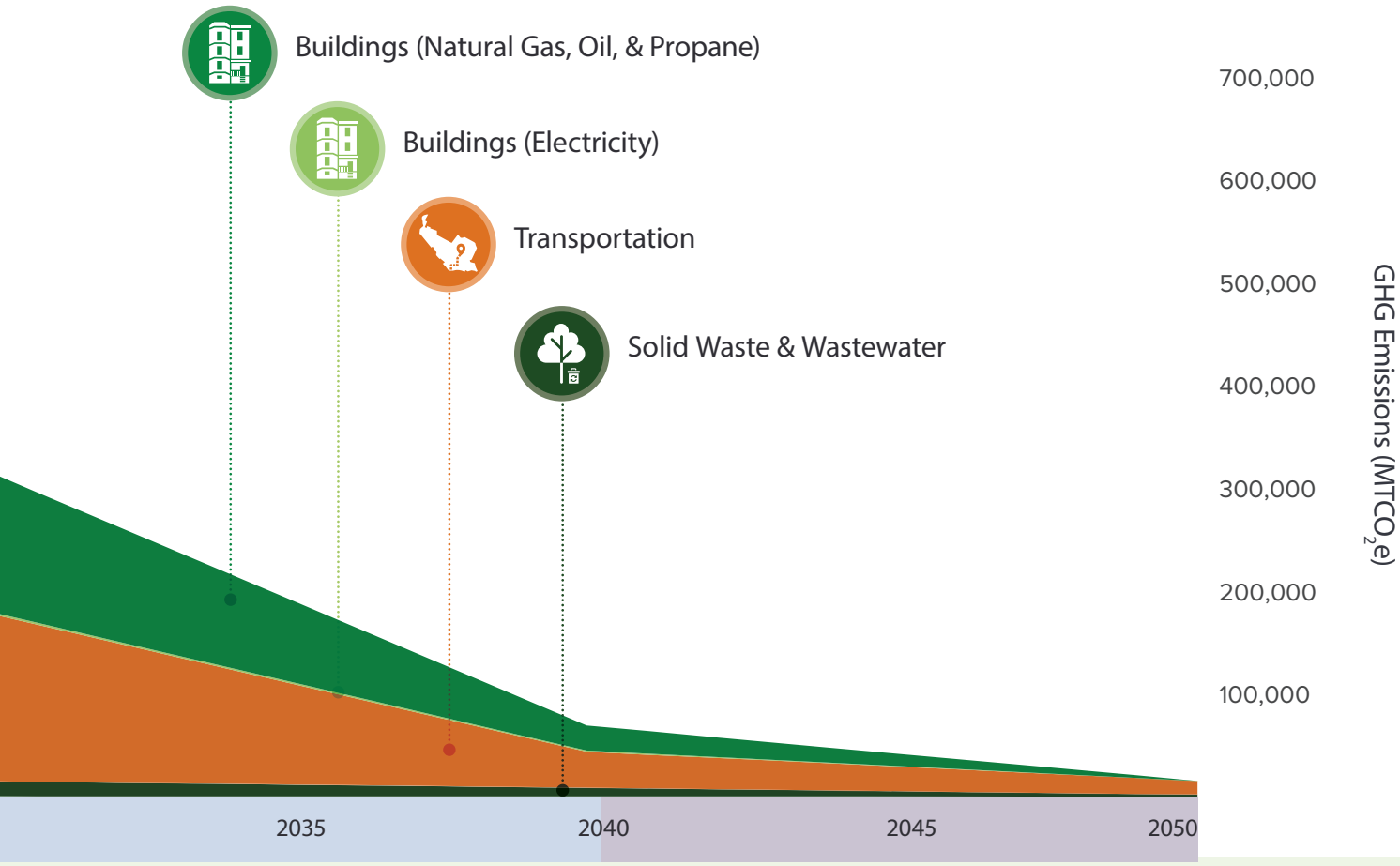
By 2030, Somerville will aim to...

- 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 $MTCO_2e$

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 $MTCO_2e$

Achieving Carbon Net-Negative

Global climate models show that even if we rapidly reduce GHG emissions in the short term, achieving the international goal to limit global warming to +1.5° C will require additional removal of CO_2 from the atmosphere in the long term.[14] The City of Somerville recognizes this reality and, to remain a climate leader, Somerville will think beyond its borders. Therefore, Somerville is committing to going beyond net zero emissions by 2050 to achieve carbon net-negative emissions by 2050.

Carbon net-negative means that Somerville will remove more GHG emissions than the community emits into the atmosphere.

Striving for carbon net-negative does not mean that Somerville will simply offset any emissions that are not eliminated. It means that Somerville will build restorative systems that help to remove GHG emissions sustainably and reliably. The City can achieve some of that vision by maximizing natural systems (e.g., trees) within Somerville that can absorb carbon dioxide, but there are limits to what can be achieved with those solutions, especially given the community's urban setting. Other innovations will need to come from our two largest sources of emissions: buildings and transportation.

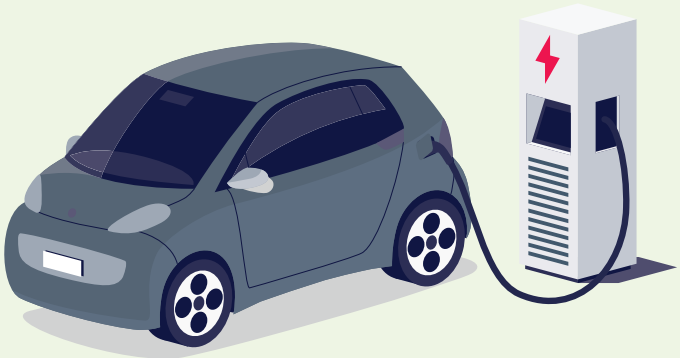
Examples of Carbon Net-Negative Solutions

Right-Sized Mobility

As electric vehicle adoption becomes more widespread, there is increased recognition of the challenges associated with sourcing enough materials for batteries and other components and ensuring safe and fair labor practices. It is important to recognize that bigger vehicles and bigger batteries require more raw materials. One way Somerville can tread lightly for its transportation needs is to ensure a place for small urban electric vehicles (UEVs), which are more compact and have limited top speeds.

In addition, it is likely that variations on e-bikes will continue to fill gaps in range and comfort needs. Choosing smaller modes of transportation will help reduce the demand for charging and take up significantly less room for parking. Strategies to help "right size" the mix of vehicles operating in Somerville could include adjusting vehicle parking permit fees based on weight, managing curb space, and creating awareness of a growing range of climate friendly mobility options.

If as many as 10% of the EVs on the road in 2030 were UEVs, we could avoid over 14,000 $MTCO_2e$ in production emissions while reducing the demand for scarce minerals.



Reducing Embodied Carbon in Buildings

All of the proposed buildings identified in Somerville by Design will usher in more than 21 million square feet of new development. At 6.1 million square feet per year, the full embodied carbon impact of those buildings could be in the range of 300,000–500,000 $MTCO_2e$ per year spread throughout the economy, which is approaching the size of Somerville's annual carbon footprint. Fortunately, there are many ways that improved building design and construction could work to reduce this impact.

The use of low-carbon cement, for example, is rapidly gaining uptake as the technology matures and is incorporated into federal building policies. If adopted widely, approximately 20,000 of those annual embodied GHG emissions could be avoided. Other products such as mass-timber—reinforced wood that is a strong, low carbon alternative to concrete and steel—could reduce the carbon impact of new construction by 50% if it was used across the board. The greatest reductions of all can happen if existing structures are repurposed and expanded. And, while Somerville is looking to reduce the embodied carbon in buildings today, soon it may be feasible for the City and local developers to construct buildings that capture more carbon than they emit.[15]

Manufacturing of Materials

Onsite Construction

Energy Consumption

Embodied carbon emissions are locked in as soon as the building is completed. These emissions include the creation of building materials such as concrete, steel, and glass.

Operational carbon emissions are produced when a building uses energy for lighting, heating, cooling, and other infrastructure.

Looking to the Future

Somerville's options to achieve carbon net-negative will continue to evolve, but one thing will remain constant: Everything that humans do has a climate impact. The consumption-based inventory illustrates the emissions that result from nearly every choice that individuals, businesses, and the City makes, regardless of where those emissions occur. From dietary changes to purchasing smaller vehicles, adopting a mindset of resource efficiency can multiply Somerville's impact across the planet many times over. Climate Forward's long-terms goals will take decades to accomplish, and the solutions are not yet set in stone.

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.

This section outlines the progress that has already been made since the first iteration of Climate Forward, followed by goals, strategies, and actions for the future that will be acted upon between now and 2035.

BY THE NUMBERS

Key baseline data and trends to demonstrate where Somerville currently stands and progress to date.

LEADING BY EXAMPLE

Innovative accomplishments and initiatives currently underway in Somerville.

ACCOMPLISHMENTS TO DATE

Actions from the first iteration of Climate Forward that have been successfully implemented.

GOALS, STRATEGIES, AND ACTIONS

Each focus area chapter contains a summary table of goals, strategies, and actions, along with co-benefits and alignment with other City plans. Key metrics, baseline data, and 2030, 2040, and 2050 targets have also been identified to help track and demonstrate progress towards each goal. "Recommended Metrics" have also been identified for data that the City does not currently collect and track, but plans to start tracking in the future.

GOAL TM-1	Goal
STRATEGY TM-1.1	Strategy
ACTION TM-1.1.A	Action

Performance Metric	Baseline Data	Historic Data	2030 Target	2040 Target	2050 Target

Buildings & Energy

Energy powers the world. But where and how that energy is generated will make or break Somerville's efforts to reduce the impacts of climate change. For example, buildings account for the largest portion of energy used in Somerville. Lights, appliances, and HVAC systems all consume energy, and right now, most of that energy is created by the burning of fossil fuels. Phasing out fossil fuels and phasing in renewable sources of energy, in addition to constructing and upgrading buildings to be zero carbon and more efficient, will be essential to meeting Somerville's climate goals.

Vision

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

BY THE NUMBERS

In Somerville, 63% of GHG emissions come from buildings, the largest source of emissions. Within the buildings sector, 49% of emissions come from residential buildings, 41% from commercial buildings, and 10% from fugitive (leaked) natural gas emissions.

Building GHG Emissions by Sub-Sector[17]

Residential / 49%

Commercial / 41%

Fugitive (Leaked) Natural Gas / 10%

Natural gas is the dominant fuel Somerville uses to heat, cool, and power its buildings. To rapidly reduce emissions, Somerville will aim to power more and more buildings with clean electricity instead of natural gas.

Building GHG Emissions by Fuel Source[18]

Electricity / 28%

Natural Gas / 57%

Fuel Oil / 15%

LEADING BY EXAMPLE

Approximately 75% of the Somerville community's electric accounts are enrolled in Community Choice Electricity (CCE) Local Green option. The CCE program provides regional electricity supply options and more renewable energy to Somerville residents and businesses. Since 2017, Somerville CCE's default product has saved participants nearly $22 million compared to Eversource Basic Service while also containing more renewable energy.[16] Future savings cannot be guaranteed because future Basic Service rates are unknown.

ACCOMPLISHMENTS TO DATE

Since the first iteration of Climate Forward was released in 2018, Somerville has taken the following actions related to Buildings & Energy.

- ✓ Updated zoning to require buildings over 25,000 sq. ft. to be LEED Gold certifiable and all projects over 50,000 sq. ft. to be LEED Platinum certifiable.
- ✓ Updated zoning to require net-zero buildings in certain development areas.
- ✓ Submitted a home rule petition to be one of 10 communities in Massachusetts to prohibit fossil-fueled systems in most new construction and major renovation projects.
- ✓ Established the Somerville Green Score, a standard to encourage developers to incorporate features that enhance sustainability and resilience, such as shading and green space.
- ✓ Proposed an ordinance that would establish a rental registration system and require owners of rental properties to provide information to tenants.
- ✓ Increased the supply of renewable energy for the Community Choice Electricity program's Local Green default option with 20% additional zero carbon, regionally-produced renewable energy.

Goals, Strategies, and Actions

The Climate Forward planning process identified goals, strategies, and actions for each focus area. The actions are Somerville's specific next steps that will be acted upon between now and 2035 to build upon previous achievements, increase community resilience, and aggressively decrease greenhouse gas emissions.

The tables below note where there is alignment between the strategies in Climate Forward and the strategies in other City plans that are currently being implemented. Co-benefits have been identified for each strategy to show community benefits that can be achieved through the implementation of the actions. Finally, key metrics and targets have been identified for the City to track and evaluate over time in order to demonstrate progress on each goal.

Co-Benefits

- B Biodiversity
- C Conservation
- ER Economic Resilience
- EJ Environmental Justice
- E Equity
- G GHG Emissions Reduction
- I Infrastructural Resilience
- L Leading by Example
- P Public Health
- Q Quality of Life
- R Regional Collaboration
- S Social Resilience

		ALIGNMENT
GOAL BE-1	Somerville's buildings and homes are constructed and retrofitted to be healthy, safe, resilient, net-zero, and affordable, to the greatest extent.	
STRATEGY BE-1.1	Require new construction and major renovations to minimize climate pollution and climate risk. CO-BENEFITS: G ER I P E Q	Somervision 2040
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.	
ACTION BE-1.1.B	Require submission of an assessment report on embodied carbon in plan development review.	
STRATEGY BE-1.2	Improve environmental health, indoor air quality, and energy performance in Somerville's rental properties. CO-BENEFITS: ER EJ E G I P Q S	Somervision 2040, Hazard Mitigation Plan
ACTION BE-1.2.A	Implement a rental registry program with requirements for owners of rental properties to disclose energy information to the City and prospective tenants.	
ACTION BE-1.2.B	Establish energy efficiency standards for residential rental properties and an inspection program with targeted outreach and training to property owners.	
ACTION BE-1.2.C	Develop strategies to deliver support to rental properties to support sustainability and resiliency upgrades while maintaining affordability and discouraging displacement.	
STRATEGY BE-1.3	Pursue deep energy efficiency and electrification through retrofits of existing buildings. CO-BENEFITS: ER E G I P Q	Somervision 2040
ACTION BE-1.3.A	Expand the Road to Net Zero program and HeatSmart CoolSmart campaigns to prioritize and match community members with all available incentives.	
ACTION BE-1.3.B	Establish emissions-based building performance standards for large buildings (20,000 sf+) in coordination with neighboring communities and statewide disclosure programs.	

ACTION BE-1.3.C	Establish emissions-based building performance standards for buildings <20,000 sf in coordination with neighboring communities and statewide disclosure programs.	Somervision 2040
ACTION BE-1.3.D	Launch an energy coaching program to match residents and businesses with existing programs and incentives for electrification, efficiency, and renewable energy.	

METRIC	Baseline Data	Historic Data	2030 Target	2040 Target	2050 Target
Number of net zero buildings constructed	Metric		Increase		
Share of homes electrified	3% (2022)[19]	N/A	55%	90%	100%
Share of commercial buildings electrified	3% (2022)[20]	N/A	50%	90%	100%
Residential annual energy usage per capita (MMBtu/person)	30 (2020)[21, 22]	39 (2018)[23, 24]	28	24	20
Commercial annual energy use per sq. ft. (MMBtu/sq. ft.)	0.0870 (2020)[25, 26]	0.0941 (2018)[27, 28]	Decrease		
Average share of income spent on energy costs (energy burden)	8% (2022)[29]	N/A	Decrease		

ALIGNMENT

GOAL BE-2	Clean energy supplies 100% of community energy through local and regional generation.	
STRATEGY BE-2.1	Expand access to local and regional renewable energy sources. CO-BENEFITS: G ER I P Q	SomerVision 2040
ACTION BE-2.1.A	Increase renewables mix of Community Choice Electricity Somerville Local Green option to 100% by 2030.	
ACTION BE-2.1.B	Leverage funding opportunities to re-establish solarize campaigns to offer bulk purchasing for property owners.	

METRIC	Baseline Data	Historic Data	2030 Target	2040 Target	2050 Target
Total electricity produced by solar energy (MWh)	9,671 (2021)[30]	7,100 (2018)[31]	20,000	60,000	80,000
Share of residential electric accounts participating in Community Choice Electricity 100% Local Green option (100% renewable energy)	5% (2022)[32]	N/A	80%	90%	100%

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		ALIGNMENT
GOAL BE-3	The energy grid is more resilient to shocks and stressors through the use of local backup power and increased efficiency.	
STRATEGY BE-3.1	Ensure Somerville's energy grid system is resilient to climate impacts. CO-BENEFITS: G I L P Q R ER S	Lower Mystic Vulnerability Assessment, Hazard Mitigation Plan
ACTION BE-3.1.A	Conduct a feasibility study for district energy solutions, such as large, shared transformers, microgrids and networked geothermal systems, and advocate to the State to allow utilities to expand their networked geothermal services.	
ACTION BE-3.1.B	Advocate to the State to require each utility company to complete a climate risk assessment and continue to work with utilities locally to address potential risks to the grid from climate change impacts.	
ACTION BE-3.1.C	Advocate to the State to expand and improve Mass Save offerings, processes, and programming for property owners and renters, including improving language access.	
ACTION BE-3.1.D	Pilot support programs that would enable residential buildings to install technologies to support electrical resiliency and alleviate high demand periods.	

METRIC	Baseline Data	Historic Data	2030 Target	2040 Target	2050 Target
Backup power capacity by facility type (MWh)	Metric		Increase		
Average power outage duration (hours)	3.54 (2021)[33]	3.69 (2019)[34]	Decrease		

Community Voices

Perspectives from residents, business owners, and community members

> Increase access to solar power by providing incentives to landlords and homeowners.

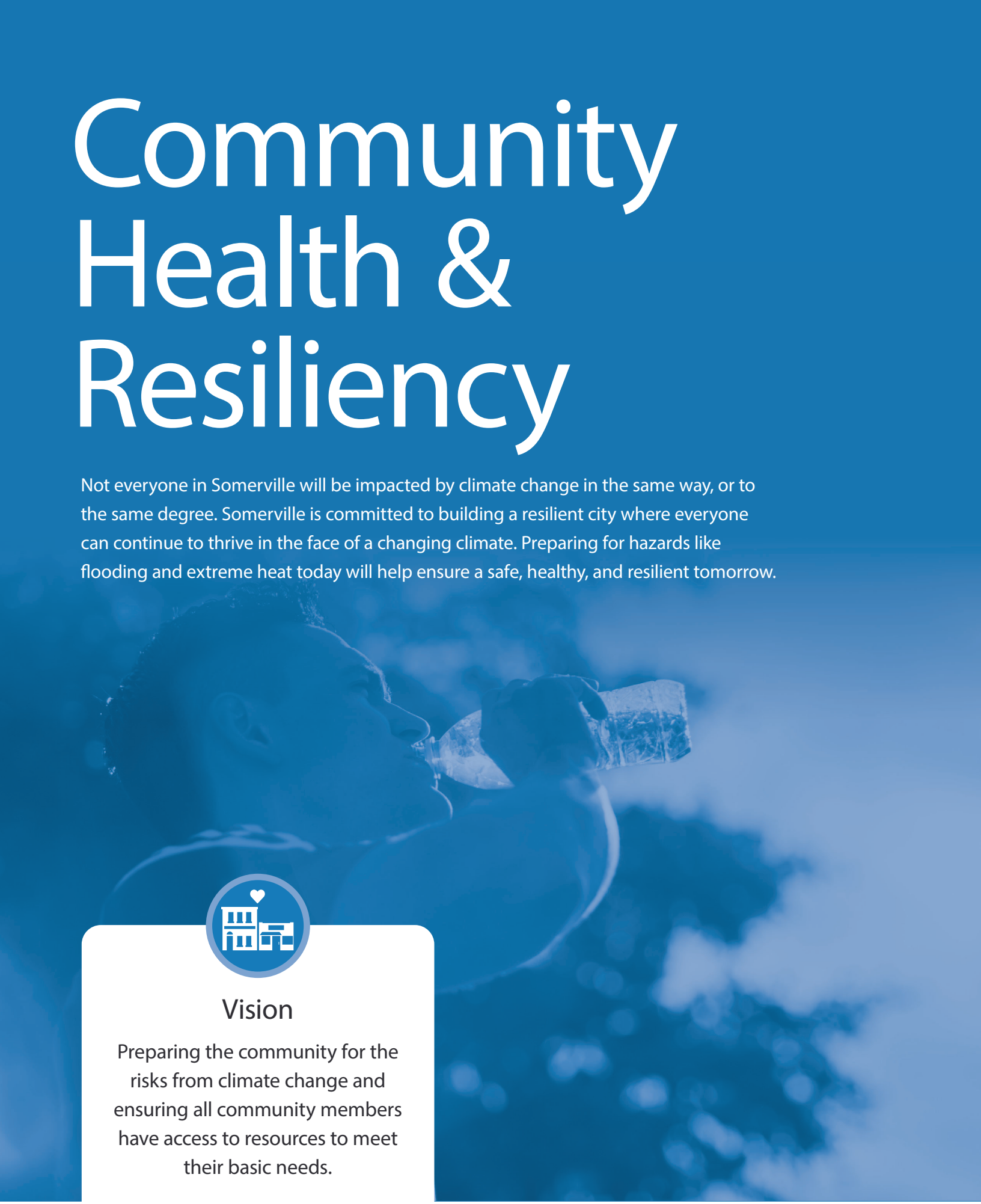
> Somerville needs to work regionally to prevent increases in rent and displacement due to green gentrification.

> As a renter, I don't have control over my unit…my landlord won't change the heating system just because I ask. It's too expensive to buy a house in Somerville.

> As a landlord, I have an enormously difficult time getting Mass Save benefits to my rental units, including free insulation.

Community Health & Resiliency

Not everyone in Somerville will be impacted by climate change in the same way, or to the same degree. Somerville is committed to building a resilient city where everyone can continue to thrive in the face of a changing climate. Preparing for hazards like flooding and extreme heat today will help ensure a safe, healthy, and resilient tomorrow.



Vision

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

BY THE NUMBERS

50%

of Somerville's critical facilities and infrastructure are projected to be exposed to one or more climate hazards through 2070.[35]

1,709

homes in Somerville are at moderate risk of flooding over the next 30 years.[36]

35

days above 90°F are expected annually in Somerville by 2050, a 67% increase from the 21 days above 90°F in 2023.[37]

15 to 36

inches of sea level rise projected by 2070 due to Mystic River and Charles River flooding, with near-term projections at 4 to 8 inches by 2030.[38]

LEADING BY EXAMPLE

Climate models project that Somerville will experience a hotter and wetter future. Keep Cool Somerville is an initiative to improve community resilience to extreme heat, and recently awarded grants to help community members to pay their utility bills, purchase A/C units, and stay cool outside with cooling kits. Another municipal program, Flood Ready Somerville, equips residents with the knowledge and tools they need to manage flood events.

In addition, the City operates an emergency alert network which has over 70,000 subscribers and offers alerts in five languages. The system allows the City to quickly notify citizens of extreme weather or other emergencies. Alert networks like Somerville's are vital to ensuring residents are prepared and ready for dangerous climate hazards like major hurricanes, blizzards, or flash floods.

ACCOMPLISHMENTS TO DATE

Since the first iteration of Climate Forward was released in 2018, Somerville has taken the following actions related to Community Health & Resiliency.

- ✓ Published cooling informational resources in seven languages.
- ✓ Launched Keep Cool Somerville to identify best practices and provide grants for pilot projects to improve community resilience to extreme heat.
- ✓ Continued to operate the City's emergency alert network.
- ✓ Completed an update to the City's Climate Change Vulnerability Assessment to identify the top climate risks.
- ✓ Launched the Climate Ambassadors Program, leading four cohorts through training and education.

Goals, Strategies, and Actions

The Climate Forward planning process identified goals, strategies, and actions for each focus area. The actions are Somerville's specific next steps that will be acted upon between now and 2035 to build upon previous achievements, increase community resilience, and aggressively decrease greenhouse gas emissions.

The tables below note where there is alignment between the strategies in Climate Forward and the strategies in other City plans that are currently being implemented. Co-benefits have been identified for each strategy to show community benefits that can be achieved through the implementation of the actions. Finally, key metrics and targets have been identified for the City to track and evaluate over time in order to demonstrate progress on each goal.

Co-Benefits

- B Biodiversity
- C Conservation
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- EJ Environmental Justice
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- I Infrastructural Resilience
- L Leading by Example
- P Public Health
- Q Quality of Life
- R Regional Collaboration
- S Social Resilience

		ALIGNMENT
GOAL CR-1	Somerville's residents, businesses, and institutions are informed and prepared for the acute and prolonged risks from climate change and can effectively adapt to changing conditions.	
STRATEGY CR-1.1	Implement a multi-faceted strategy to increase access to cooling and other amenities during climate emergencies. CO-BENEFITS: ER EJ E P Q S	Hazard Mitigation Plan, SomerVision 2040, Keep Cool Somerville Strategy Toolkit
ACTION CR-1.1.A	Partner with local businesses and community-based organizations to launch a campaign to promote informal cooling centers throughout the city.	
ACTION CR-1.1.B	Implement the Keep Cool Somerville Strategies Toolkit.	
STRATEGY CR-1.2	Enhance social capital and social infrastructure throughout Somerville to strengthen community resilience. CO-BENEFITS: ER EJ E P Q S G	Hazard Mitigation Plan, SomerVision 2040
ACTION CR-1.2.A	Pilot a block party grant program to enhance local connections and social resilience at the neighborhood level.	
ACTION CR-1.2.B	Support and expand the number of community members involved in growing local food through the community garden network.	
ACTION CR-1.2.C	Establish and formalize a communication network between the City of Somerville and community-based organizations to identify resources needed to reduce impact of climate risks and enable information sharing.	
STRATEGY CR-1.3	Support a culture of climate action in Somerville. CO-BENEFITS: EJ E Q S	SomerVision 2040
ACTION CR-1.3.A	Collaborate with local partners to integrate climate justice education and literacy into existing educational programming, ensuring culturally-relevant resources are developed (example: Community Action Agency's Leadership Development Institute).	

METRIC	Baseline Data	Historic Data	2030 Target	2040 Target	2050 Target
Share of buildings with central A/C	36% (2023)[39]	N/A	45%	75%	100%

		ALIGNMENT
GOAL CR-2	Somerville's emergency response services and physical infrastructure are resilient to climate hazards.	
STRATEGY CR-2.1	Enhance public services and infrastructure to be resilient to the impacts of climate change. CO-BENEFITS: I L P Q R S	Hazard Mitigation Plan, SomerVision 2040, Citywide Drainage and Water Quality Master Plan, Lower Mystic Vulnerability Assessment, Climate Change Vulnerability Assessment
ACTION CR-2.1.A	Incorporate climate change considerations into the City's plans to improve its sewer and drainage system, particularly efforts to mitigate combined sewer overflows (CSOs) and ultimately separate stormwater and sewer systems and permanently close combined systems.	
ACTION CR-2.1.B	Implement the Hazard Mitigation Plan.	
ACTION CR-2.1.C	Advocate to State, Federal, and municipal partners to enable implementation of interventions identified through Resilient Mystic Collaborative (RMC), including supporting the RMC conceptual plan to raise the Amelia Earhart and Charles River Dams and install storm surge barriers at 8 locations (including Draw 7 Park).	
ACTION CR-2.1.D	Collaborate with regional partners to strategically advance community safety, stability, and preparedness in response to flooding along the waterfront and other vulnerable neighborhoods.	
STRATEGY CR-2.2	Ensure development of physical infrastructure needed to support community resiliency. CO-BENEFITS: ER E I P Q	Hazard Mitigation Plan, SomerVision 2040, Lower Mystic Vulnerability Assessment, Keep Cool Somerville Strategy Toolkit
ACTION CR-2.2.A	Partner with 1-2 social infrastructure institutions identified as vulnerable through the Climate Change Vulnerability Assessment Update to implement resilience upgrades.	
ACTION CR-2.2.B	Investigate community interest in a resilience hub pilot program at an existing community-serving facility.	
STRATEGY CR-2.3	Expand equitable access to emergency preparedness resources and education ensuring language justice principles and accessibility are prioritized. CO-BENEFITS: ER EJ E Q S I P	Hazard Mitigation Plan, SomerVision 2040, Lower Mystic Vulnerability Assessment, Climate Change Vulnerability Assessment
ACTION CR-2.3.A	Improve upon the ability of emergency communications to reach socially vulnerable populations in their first languages.	
ACTION CR-2.3.B	Work with local businesses and social infrastructure institutions identified in the Climate Change Vulnerability Assessment Update to provide technical assistance to develop business continuity plans and accrue resources for implementing them.	
ACTION CR-2.3.C	Partner with the Digital Bridge Initiative to launch an interactive online mapping platform to educate about climate risk at a property level and provide technical resources to the community for how to manage those risks.	

METRIC	Baseline Data	Historic Data	2030 Target	2040 Target	2050 Target
Share of at-risk properties with flood insurance	Metric		Increase		
Share of residents signed up for emergency alerts	93% (2022)[40]	63% (2016)[41]	95%	100%	100%

Co-Benefits

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		ALIGNMENT
GOAL CR-3	Somerville addresses the historic inequities that currently impact communities experiencing environmental and climate injustice.	
STRATEGY CR-3.1	Enhance social support systems to respond to intersecting impacts of climate hazards on marginalized communities. CO-BENEFITS: EJ E Q S I P	SomerVision 2040, Hazard Mitigation Plan, Keep Cool Somerville Strategy Toolkit
ACTION CR-3.1.A	Develop "know-your-rights" trainings and guides for employees and business owners about occupational heat exposure and other climate hazards in all relevant languages.	
STRATEGY CR-3.2	Identify and mitigate existing environmental hazards that are exacerbated through climate change and negatively impact community health. CO-BENEFITS: EJ E Q S I P L	SomerVision 2040
ACTION CR-3.2.A	Develop air pollution monitoring system to identify poor air quality hotspots.	
ACTION CR-3.2.B	Support community health organizations in developing programming to respond to childhood asthma and other climate health outcomes.	

METRIC	Baseline Data	Historic Data	2030 Target	2040 Target	2050 Target
Number of poor air quality hotspots	Metric		Decrease		

Community Voices

Perspectives from residents, business owners, and community members

> We need to bring climate change conversation and education to the everyday things affecting people's lives.

> Don't leave us behind, don't just think about the future…think about people living in Somerville now.

> I would like to see in general more education about climate preparedness.

> Climate change is the biggest issue in my entire life.

Natural Resources & Waste

Somerville relies on its limited natural resources to reduce local temperatures, absorb stormwater, filter pollutants, and support urban wildlife. As climate change turns up the heat, increases flooding, and threatens biodiversity, the City is looking to enhance natural resources and waste management practices to make Somerville a healthier, greener place to live.

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.

BY THE NUMBERS

100%

of Somerville residents live within a 10-minute walk to a park. The national average is 55%.[43]

↑12,000

public trees are maintained by the City of Somerville. Every year, Somerville plants hundreds of new trees around the City.[44]

28%

of household waste was diverted from the landfill in 2022.[45] Somerville's Zero Waste Plan aims to steadily increase the amount of waste diverted to recycling and composting.

LEADING BY EXAMPLE

The Public Space and Urban Forestry Division (PSUF) completed its Urban Forest Management Plan that provides a data-driven plan and set of goals to maintain Somerville's forest over the next 5-10 years.[42]

Plant 350 trees a year through the Urban Forestry Department.

Diversify the species of trees in the city canopy to maximize its resilience to pests and disease.

Require tree plantings in new developments and parking lots.

ACCOMPLISHMENTS TO DATE

Since the first iteration of Climate Forward was released in 2018, Somerville has taken the following actions related to Natural Resources & Waste.

- ✓ Completed citywide stormwater modeling and analysis.
- ✓ Published the Citywide Drainage and Water Quality Master Plan report, which identifies projects to mitigate flooding and improve water quality.
- ✓ Developing the region's first municipal Pollinator Action Plan.
- ✓ Completed a public tree inventory.
- ✓ Completed the Urban Forest Management Plan, which set the goal of obtaining 16% canopy cover.
- ✓ Conducted a Consumption-Based Emissions Inventory to estimate GHG emissions from household consumption.
- ✓ Published a Zero Waste Plan, and set a goal of reducing waste by at least 90% by 2050.

Goals, Strategies, and Actions

The Climate Forward planning process identified goals, strategies, and actions for each focus area. The actions are Somerville's specific next steps that will be acted upon between now and 2035 to build upon previous achievements, increase community resilience, and aggressively decrease greenhouse gas emissions.

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		ALIGNMENT
GOAL NRW-1	Somerville's natural systems are resilient and provide benefits to all.	
STRATEGY NRW-1.1	Construct stormwater infrastructure that incorporates nature-based solutions for enhanced resilience benefits. CO-BENEFITS: C ER EJ E I L P Q R S	Hazard Mitigation Plan, Citywide Drainage and Water Quality Master Plan, , Keep Cool Somerville Strategy Toolkit, Urban Forest Management Plan
ACTION NRW-1.1.A	Increase drainage capacity to mitigate stormwater-based flood impacts.	
ACTION NRW-1.1.B	Investigate a stormwater enterprise fund to improve stormwater management.	
ACTION NRW-1.1.C	Utilize green infrastructure to improve water quality and mitigate heat risk to senior living, supportive, and public housing facilities.	
ACTION NRW-1.1.D	Finalize and implement the Updated Combined Sewer Overflow (CSO) Control Plan in conjunction with Cambridge and the Massachusetts Water Resources Authority.	
ACTION NRW-1.1.E	Develop an urban surface transformation strategy for public property to modify pavement and hardscape in a way that reduces and manages urban heat island impacts.	
STRATEGY NRW-1.2	Increase citywide canopy cover to 16% from 14.6% and manage Somerville's tree canopy and landscapes to support humans and non-humans. CO-BENEFITS: B C EJ I P Q	Urban Forest Management Plan, Pollinator Action Plan, Open Space and Recreation Plan, Hazard Mitigation Plan, SomerVision 2040
ACTION NRW-1.2.A	Prioritize tree planting and preservation of existing canopy in heat vulnerable neighborhoods.	
ACTION NRW-1.2.B	Implement strategies of the Pollinator Action Plan, Open Space and Recreation Plan, and Urban Forest Management Plan to increase biodiversity and support healthy habitats.	

METRIC	Baseline Data	Historic Data	2030 Target	2040 Target	2050 Target
Share of tree planting sites utilized (tree potential)	92% (2023)[46]	N/A	95%	100%	100%
Share of community covered by impervious surface	Metric		Decrease		

		ALIGNMENT
GOAL NRW-2	Somerville practices smart resource use by minimizing consumption and maximizing efficient reuse of materials.	
STRATEGY NRW-2.1	Encourage sustainable consumption practices across Somerville. CO-BENEFITS: G L P Q S	Zero Waste Plan, SomerVision 2040
ACTION NRW-2.1.A	Require clear signage around plant-based options in restaurants and grocery stores.	
ACTION NRW-2.1.B	Develop purchasing policy requiring vendors to offer low-carbon alternatives.	
ACTION NRW-2.1.C	Pilot program to offer plant-based options at all meals served in Somerville Public Schools.	
ACTION NRW-2.1.D	Expand the City's Buy Recycled Policy to require low-carbon purchasing requirements for all products by City departments and Public Schools.	
STRATEGY NRW-2.2	Encourage sustainable reuse practices across Somerville. CO-BENEFITS: G L P Q S ER I	Zero Waste Plan, SomerVision 2040
ACTION NRW-2.2.A	Develop a City-sponsored food waste redirection program, considering services such as composting, organic waste disposal, food donation, and recovery.	
ACTION NRW-2.2.B	Research and develop a deconstruction ordinance.	
ACTION NRW-2.2.C	Implement policy recommendations from the Consumption-based Emissions Inventory (2023) and Zero Waste Plan (2023).	

METRIC	Baseline Data	Historic Data	2030 Target	2040 Target	2050 Target
Average household waste disposal rate (pounds/household/year)	1,264 (2022)[47]	1,606 (2020)[48]	803	482	161
Share of waste diverted from incineration/ landfill	28% (2022)[49]	29% (2020)[50]	50%	70%	90%

Community Voices

Perspectives from residents, business owners, and community members

> We need to invest in ecology for the sake of ecology.

> Our goal should not just be to minimize impacts of and to humans, but to create positive impacts.

Transportation & Mobility

Transportation accounts for 34% of Somerville's total GHG emissions.[51] By promoting low-carbon options such as walking, biking, taking public transportation, and carpooling, these emissions can be reduced. Fortunately, Somerville is already ahead of the game. The city's urban setting lends itself to a culture of sustainable transportation, where public transit, walkability, and safe biking are prioritized.

Vision

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

BY THE NUMBERS

Somerville is a public transit hotspot, and the City is dedicated to enhancing public transportation by improving the 15 existing bus routes and over 400 bus stops that run through the city. The city also has service in the form of the Assembly Square T station (opened in 2014) and through the Green Line Extension project (opened in 2022).

30

miles of bike infrastructure across the city, such as protected bike lanes and off-street paths.[53]

18%

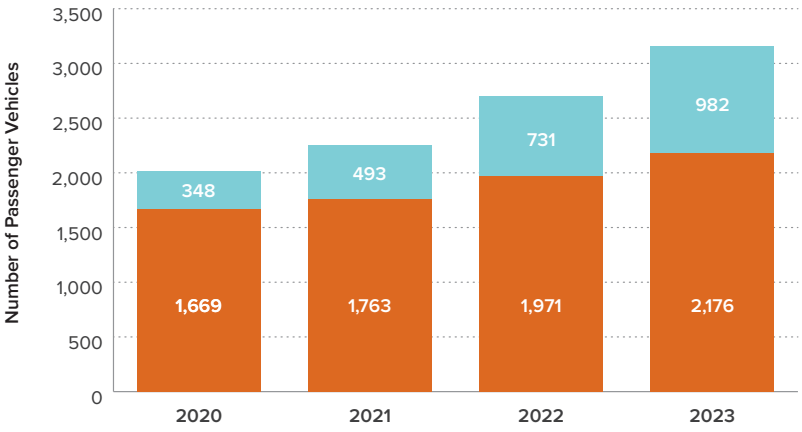
of Somerville commuters take public transit like the MBTA, more than double the rate of both Boston and the state.[54]

89

Somerville has an excellent Walk Score of 89 with highly walkable neighborhoods and accessible commercial areas.[55]

LEADING BY EXAMPLE

Somerville and private developers are working to make it easier to choose electric vehicles by installing charging stations with multiple plugs throughout the city. Currently, Somerville has 52 publicly available plugs per 1,000 electric vehicles (EVs), higher than the national average at 43/1,000 EVs.[52]



Annual Electric Vehicle Registration

Driving electric is a big part of our future and Somerville wants to make owning an EV accessible for everyone. The number of fully electric (zero-emission) vehicles registered in Somerville has increased by almost 200% since 2020.[56]

HYBRID ZERO-EMISSION

ACCOMPLISHMENTS TO DATE

Since the first iteration of Climate Forward was released in 2018, Somerville has taken the following actions related to Transportation & Mobility.

- ✓ Installed the City's first bi-directional priority bus lane on Broadway.
- ✓ Completed the Washington Street Rapid Response Bus Lane project in conjunction with MBTA.
- ✓ Completed the Citywide Parking & Curb Use Study to guide parking policies in alignment with city goals and community values.
- ✓ Supported the construction of the MBTA Green Line Extension and Community Path Extension, opened in 2023.
- ✓ Added 9.8 miles of on-street bike facilities and 8 BlueBikes stations.
- ✓ Conducted research on best practices for expanding EV public charging.
- ✓ Developed the Guide to Installing Electric Vehicle Charging Equipment for installing EV charging at home, including a special guidebook for renters.
- ✓ Created a Fleet Electrification Roadmap to inform purchasing of city and school vehicles.

Goals, Strategies, and Actions

The Climate Forward planning process identified goals, strategies, and actions for each focus area. The actions are Somerville's specific next steps that will be acted upon between now and 2035 to build upon previous achievements, increase community resilience, and aggressively decrease greenhouse gas emissions.

The tables below note where there is alignment between the strategies in Climate Forward and the strategies in other City plans that are currently being implemented. Co-benefits have been identified for each strategy to show community benefits that can be achieved through the implementation of the actions. Finally, key metrics and targets have been identified for the City to track and evaluate over time in order to demonstrate progress on each goal.

Co-Benefits

- B Biodiversity
- C Conservation
- ER Economic Resilience
- EJ Environmental Justice
- E Equity
- G GHG Emissions Reduction
- I Infrastructural Resilience
- L Leading by Example
- P Public Health
- Q Quality of Life
- R Regional Collaboration
- S Social Resilience

		ALIGNMENT
GOAL TM-1	Car trips (vehicle miles traveled) are reduced in Somerville by 25%.	
STRATEGY TM-1.1	Phase out subsidies for automobile use in favor of promoting alternative low-carbon mobility options. CO-BENEFITS: G L P Q R	SomerVision 2040, Bicycle Network Plan
ACTION TM-1.1.A	Implement tiered pricing for parking permit registration and/or excise tax rates.	
ACTION TM-1.1.B	Advocate for a regional congestion charging program.	

METRIC	Baseline Data	Historic Data	2030 Target	2040 Target	2050 Target
Annual vehicle miles traveled (VMT) by registered passenger vehicles	354,015,542 (2023)[57]	354,015,542 (2021)[58]	265,512,000	Decrease	

		ALIGNMENT
GOAL TM-2	Public transit ridership is increased by 25%.	
STRATEGY TM-2.1	Reconfigure streets and enhance infrastructure to improve MBTA service and incentivize use of public transit. CO-BENEFITS: G EJ E L P Q R	SomerVision 2040, Vision Zero Action Plan, Bicycle Network Plan
ACTION TM-2.1.A	Add bus lanes and in-lane bus stops citywide.	
ACTION TM-2.1.B	Partner with MBTA to install weather shelters and real-time arrival signs at bus stops through 'Climate Smart Bus Stop' initiative to reduce urban heat island effect and empower community members to make informed transit decisions, prioritizing the most vulnerable neighborhoods.	

STRATEGY TM-2.2	Support regional planning for new transit. CO-BENEFITS: G EJ E L P Q R	SomerVision 2040
ACTION TM-2.2.A	Advocate for MBTA extensions within Somerville and regionally.	
ACTION TM-2.2.B	Implement north-south microtransit solutions to connect Mystic Avenue to Union Square.	
STRATEGY TM-2.3	Increase affordability of public transit programs. CO-BENEFITS: G EJ E L P Q	SomerVision 2040
ACTION TM-2.3.A	Grow City transit pass programs for students, low-income residents, and municipal and school workforce.	

		ALIGNMENT
GOAL TM-3	Pedestrian and bicycle travel are increased by 100%.	
STRATEGY TM-3.1	Reduce accessibility barriers and climate impacts experienced by bicyclists and pedestrians. CO-BENEFITS: G EJ E I L P Q	Somerville ADA Transition Plan, Vision Zero Action Plan, SomerVision 2040
ACTION TM-3.1.A	Expand the Shared Streets program to convert public streets into limited-car and green public spaces.	
ACTION TM-3.1.B	Develop performance-based design standards for resilience interventions in the public right-of-way, including standards for shading along sidewalks.	
STRATEGY TM-3.2	Expand options for biking and micromobility throughout the Somerville community. CO-BENEFITS: G EJ E I L P Q	Somerville ADA Transition Plan, Vision Zero Action Plan, Bicycle Network Plan, SomerVision 2040
ACTION TM-3.2.A	Expand public bikeshare system in Somerville and across the region.	
ACTION TM-3.2.B	Create charging and storage infrastructure to support electric micromobility options, such as e-bikes and e-scooters.	

METRIC	Baseline Data	Historic Data	2030 Target	2040 Target	2050 Target
Share of commuters biking or walking	18% (2020)[59]	16% (2015)[60]	24%	33%	35%
Share of commuters using public transit	30% (2020)[61]	36% (2015)[62]	35%	47%	50%

Co-Benefits

- B Biodiversity
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- S Social Resilience

		ALIGNMENT
GOAL TM-4	50% of vehicles driven by residents in Somerville are decarbonized.	
STRATEGY TM-4.1	Expand access to EV charging infrastructure across Somerville. CO-BENEFITS: G P Q	Public EV Charging in Somerville Report, Parking and Curb Policy Study
ACTION TM-4.1.A	Identify priority locations for public EV charging stations and secure funding for installation.	
ACTION TM-4.1.B	Develop public/private partnerships to pilot programs to enhance publicly accessible electric vehicle infrastructure.	
STRATEGY TM-4.2	Accelerate EV adoption among Somerville's residents and businesses. CO-BENEFITS: G P Q	Public EV Charging in Somerville Report, Somerville ADA Transition Plan, Vision Zero Action Plan, Bicycle Network Plan, SomerVision 2040
ACTION TM-4.2.A	Launch a targeted EV education and outreach campaign to increase adoption and promote existing State and Federal incentives.	

METRIC	Baseline Data	Historic Data	2030 Target	2040 Target	2050 Target
Number of building permits for private EV charging stations	Metric		Increase		
Number of publicly available EV charging stations on private and public property (Level 2)	52 (2023)[63]	50 (2020)[64]	55	60	65
Number of publicly available EV charging stations on private and public property (DC fast charging)	11 (2023)[65]	3 (2020)[66]	13	15	20
Share of registered passenger vehicles that are electric or plug-in hybrid	2.5% (2023)[67]	1.3% (2021)[68]	40%	90%	100%

Community Voices

Perspectives from residents, business owners, and community members

> Increased heat waves prevents biking. I got an e-bike to overcome weather challenges.

> When BlueBikes were free that month in August 2022, that was really nice.

> Please improve public transit, including not eliminating existing bus routes that people rely on!

> Connect planting street trees to transportation. It's already often too hot to walk or bike on Somerville streets with the lack of mature street trees.

Leadership

The City is committed to leading on climate action and reducing GHG emissions from public schools, municipal buildings, and operations. But the City can only make so much progress on its own. It is up to everyone in the Somerville community to lead the way to a sustainable, resilient future. To meet the goals set forth in this plan, the City will continue working with residents, local organizations, businesses, other municipalities, and the state and federal governments to move the needle and make a difference.

Vision

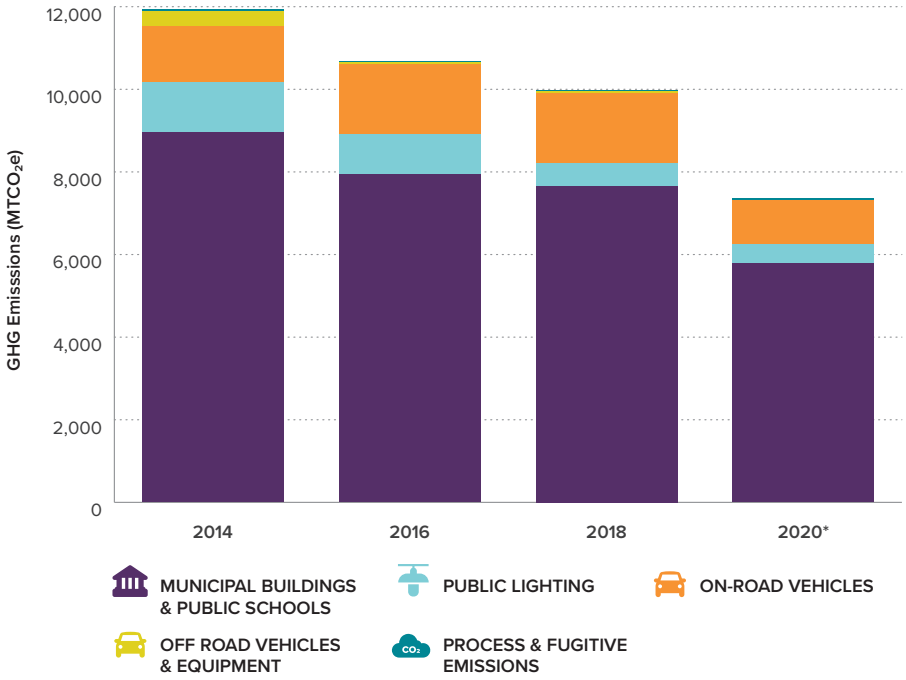
Proactively preparing for climate change and leading by example, while acting as a regional leader that sparks action in other communities.

BY THE NUMBERS

In 2017, the City launched the Somerville Community Choice Electricity Program, which provides electricity supply options and more renewable energy to residents and businesses. 80 small, local businesses are enrolled in 100% renewable energy through the Somerville Community Choice Electricity Program.[69]

The City isn't just talking the talk. Somerville is a designated Massachusetts Green Community and reduced municipal energy use by 14% between 2014–2018, demonstrating what success can look like for the entire community.[70]

City and School GHG Emissions by Sector



* While a complete municipal GHG emissions inventory exists for 2020, it should not be relied upon as an accurate marker of progress due to the variabilities caused by the COVID-19 pandemic.

LEADING BY EXAMPLE

The Municipal Vulnerability Preparedness grant program (MVP) supports cities and towns in Massachusetts to begin planning for climate change resiliency and implementing priority projects. Somerville has won several MVP grants to conduct a flood risk communication campaign, map its stormwater system, conduct green infrastructure studies and water quality analyses, and more.

For example, Somerville led an MVP Program grant funded project with Boston, Chelsea, Everett, Revere, Winthrop, and the Mystic River Watershed Association (MyRWA) focused on regional infrastructure resilience. The Lower Mystic Vulnerability Assessment identifies vulnerabilities in the lower Mystic River basin and prioritizes improvements based on their impact on the lives of vulnerable populations.

ACCOMPLISHMENTS TO DATE

Since the first iteration of Climate Forward was released in 2018, Somerville has taken the following actions related to Leadership.

- ✓ Adopted the State's Municipal Opt-In Specialized Stretch Energy Code to support municipal building decarbonization.
- ✓ Submitted comments and letters to State agencies and utilities to advocate for more equitable and sustainable building codes and requirements, policies, and programs.
- ✓ Worked with partners to engage utilities on addressing gas leaks.
- ✓ Helped found the Resilient Mystic Collaborative to bring together neighboring communities to work on local solutions to increase climate resilience.
- ✓ Worked with neighboring communities to complete the Lower Mystic Vulnerability Assessment to identify priority actions to address climate impacts to built and social infrastructure.

Goals, Strategies, and Actions

The Climate Forward planning process identified goals, strategies, and actions for each focus area. The actions are Somerville's specific next steps that will be acted upon between now and 2035 to build upon previous achievements, increase community resilience, and aggressively decrease greenhouse gas emissions.

The tables below note where there is alignment between the strategies in Climate Forward and the strategies in other City plans that are currently being implemented. Co-benefits have been identified for each strategy to show community benefits that can be achieved through the implementation of the actions. Finally, key metrics and targets have been identified for the City to track and evaluate over time in order to demonstrate progress on each goal.

Co-Benefits

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- S Social Resilience

		ALIGNMENT
GOAL LE-1	Somerville leads by example by integrating sustainability and resilience principles into city and school operations and decisions.	
STRATEGY LE-1.1	Reduce GHG emissions associated with city buildings, school buildings and purchases. CO-BENEFITS: L ER G I	SomerVision 2040, Capital Investment Plan, Building Master Plan, Vehicle Purchasing Policy
ACTION LE-1.1.A	Set citywide emissions and renewable energy standards for all existing and new city and school buildings.	
ACTION LE-1.1.B	Establish embodied carbon thresholds for concrete and steel used on city and school projects, in alignment with the federal Buy Clean Initiative.	
ACTION LE-1.1.C	Strengthen vehicle purchasing policy to require purchase of readily available electric vehicle options at time of replacement of city and school owned vehicles.	
STRATEGY LE-1.2	Ensure City projects reduce disparate impacts on vulnerable communities. CO-BENEFITS: L ER G I EJ E S	SomerVision 2040, Capital Investment Plan, Building Master Plan, Hazard Mitigation Plan, Citywide Drainage and Water Quality Master Plan
ACTION LE-1.2.A	Develop a citywide definition of equity.	
ACTION LE-1.2.B	Expand the use of the Feasibility & Equity Evaluation Framework or similar to ensure public projects and investments enhance resilience in socially vulnerable communities.	
ACTION LE-1.2.C	Strengthen the Capital Investment Plan to explicitly prioritize sustainability, energy conservation, whole building decarbonization, resilience, and support for environmental justice (EJ) neighborhoods.	
ACTION LE-1.2.D	Ensure the Building Master Plan incorporates identification of at-risk assets to flooding and extreme heat, as identified in the Climate Change Vulnerability Assessment.	
ACTION LE-1.2.E	Establish a procedure for asset management incorporating the Office of Sustainability and Environment in planning and decision making for municipal and school assets from the outset.	

METRIC	Baseline Data	Historic Data	2030 Target	2040 Target	2050 Target
City and School GHG Emissions ($MTCO_2e$)	9,981 (2018)[71]	11,928 (2014)[72]	4,990	998	0
Share of municipal and school emissions reduced	N/A	N/A	50%	90%	100%
Number of city and school net zero buildings constructed or renovated	Metric		Increase		
Annual city and school energy use intensity (kBtu/sq. ft.)	Metric		Decrease		
Share of city and school fleet that is electric or plug-in hybrid	2.4% (2022)[73]	2.3% (2019)[74]	40%	90%	100%
City and school owned renewable energy capacity (MW)	Metric		Increase		

		ALIGNMENT
GOAL LE-2	Somerville is a regional leader that sparks action through advocacy and collaboration.	
STRATEGY LE-2.1	Foster regional collaboration to enhance knowledge and resource sharing with neighboring communities. CO-BENEFITS: R L P Q S	SomerVision 2040, Lower Mystic Regional Climate Assessment, Hazard Mitigation Plan
ACTION LE-2.1.A	Collaborate with neighboring communities to improve regional coordination before, during, and after emergencies.	
STRATEGY LE-2.2	Advocate for State-level policies that increase enabling conditions for accelerated climate action. CO-BENEFITS: R L G I P Q S	SomerVision 2040, Lower Mystic Regional Climate Assessment
ACTION LE-2.2.A	Advocate for statewide building code updates that promote public health, energy conservation, pollution reduction, and resiliency.	
ACTION LE-2.2.B	Advocate to the legislature to grant municipalities more autonomy in regulating emissions in existing buildings.	
ACTION LE-2.2.C	Convene regional partners and coordinate with utilities and the State on transmission and distribution upgrades to ensure infrastructure, buildings, and vehicles are ready for the transition to renewable energy and electrification.	
ACTION LE-2.2.D	Advocate for more stringent regulation of utility gas leaks.	
ACTION LE-2.2.E	Advocate for at least $100 million per year in dedicated funding for the Municipal Vulnerability Preparedness grant program.	
STRATEGY LE-2.3	Ensure adequate green workforce training and job opportunities for community members to support a just transition to industries impacted or expanded by climate action. CO-BENEFITS: ER E Q R	SomerVision 2040
ACTION LE-2.3.A	Launch a workforce development initiative for community members to ensure skilled labor training opportunities are accessible and sufficiently available as demand for cleantech increases.	
ACTION LE-2.3.B	Expand the Community Benefit Agreement Ordinance to set employment standards for Somerville residents, people of color, women construction workers, unions, and apprenticeships.	

METRIC	Baseline Data	Historic Data	2030 Target	2040 Target	2050 Target
Number of advocacy-related efforts conducted by the City	Metric		Increase		

Art by Kari Percival

Commissioned by Mayor Ballantyne's Office of Sustainability and Environment for SustainaVille Week 2024

Implementation Blueprints

To help facilitate the implementation of the Climate Forward Plan, Implementation Blueprints were developed for 10 priority actions. These Blueprints are intended to serve as step-by-step guides for how these actions can be implemented efficiently and successfully.
Each Blueprint includes:

- A description of the action and which City department will serve as the Champion (i.e., implementation lead);
- Estimated timeframes and costs, which may change over time depending on available resources during implementation;
- Specific steps that will be undertaken to implement the action;
- Examples of technical and financial resources;
- Equity considerations, opportunities to overcome barriers, and an explanation of potential impact.

Blueprints

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.

Buildings and Energy

ACTION

Action BE 1.3.B

Establish emissions-based building performance standards for large buildings (20,000 sf+) in coordination with neighboring communities and statewide disclosure programs.

DESCRIPTION OF ACTION	Establish energy and emissions-based building performance standards using a phased approach that begins with energy use reporting for large buildings (20,000 sf+) in Somerville to inform development of performance targets. Provide clearly defined metrics and targets per building use type. Educate and engage building owners to facilitate compliance and access to resources and incentives.
CHAMPION	Office of Sustainability and Environment (OSE)
OVERALL TIMEFRAME	Long (3+ years)
ESTIMATED COST	Program Implementation: < $100,000, assuming ability to leverage state funds.

IMPLEMENTATION STEPS	ESTIMATED TIME TO IMPLEMENT STEP	INTERNAL COLLABORATORS
1. Coordinate planning with Department of Energy Resources' (DOER) implementation of statewide plans to leverage existing mechanisms and streamline processes for building owners.	1-3 months	Grants Development Department
2. Research funding opportunities and apply for grants to research and establish standards and reporting processes.	3-4 months	Information Technology SomerStat
3. Determine data management and software infrastructure needs to support management and analysis.		
4. Engage with external stakeholders to review draft policy and refine accordingly.	4-6 months	Office of Strategic Planning and Community Development (OSPCD) Inspectional Services Department (ISD)
5. Develop draft requirements, process, and reporting schedules for review by external stakeholders.	4-5 months	Communications and Community Engagement OSPCD ISD

IMPLEMENTATION STEPS	ESTIMATED TIME TO IMPLEMENT STEP	INTERNAL COLLABORATORS
6. Establish a building energy disclosure ordinance through the City Council to create data collection mechanisms and processes.	3 months	City Council ISD
7. Develop and deliver training materials and technical tools on building performance standards for building managers. Resources could include toolkits, training guides, compliance guides, workshop presentations, outreach and marketing materials.	6 months	ISD
8. Analyze benchmarking data to establish current performance levels and develop aggressive and achievable performance thresholds as appropriate for different building types.	6-12 months	ISD OSPCD SomerStat
9. Establish the building performance ordinance through City Council that includes a schedule for periodic review and updates to building size thresholds and performance levels to drive continuous improvement.	3 months	City Council ISD
10. Implement the building performance ordinance and provide training to impacted stakeholders.	6-12 months	ISD OSPCD
11. Analyze and publish annual reporting data to demonstrate progress towards community greenhouse gas (GHG) reduction targets and inform adjustments to the standard and related building energy initiatives.	Ongoing	ISD OSPCD

TOOLS & RESOURCES

FINANCIAL TOOLS

- Inflation Reduction Act (IRA) Funded Technical Assistance for the Adoption of Building Energy Codes
- Building Codes Implementation for Efficiency and Resilience Grant, U.S. Department of Energy (DOE)
- Buildings Funding Opportunities, U.S. Department of Energy (DOE)
- Massachusetts Clean Energy Center (MassCEC) Grant Programs
- MA Department of Public Utilities (DPU)

TECHNICAL RESOURCES

- SEED Platform, U.S. Department of Energy (DOE)
- Building Energy Reduction Ordinance (BERDO 2.0), City of Boston
- Building Energy Use Disclosure, Town of Lexington
- Building Energy Use Disclosure Ordinance, City of Cambridge

EQUITY CONSIDERATIONS

- Include the option of an alternative compliance mechanism (fee) and earmark funds for equity-targeted building energy programs.
- Assist nonprofits and small businesses in reporting capabilities and meeting performance standards and identifying support for retrofits and sharing resources.
- Leverage data to identify energy savings potential in communities with environmental justice zones, and extreme heat vulnerabilities.
- Provide accessible and engaging training for compliance, reporting, and incentive opportunities.
- Consider if developers and building owners will incur additional costs due to efficiency upgrades and if those will be passed onto renters and small business owners.
- Investigate the potential costs associated with the new regulations and implement measures to minimize and mitigate those costs to minimize risk of displacement.

OPPORTUNITIES TO OVERCOME POTENTIAL IMPLEMENTATION BARRIERS

- Publish open and accessible data to drive market transformation and value creation through high-performance buildings.
- Integrate benchmarking program into citywide climate and sustainability education campaigns including technical and financial information to facilitate access to resources.
- Create education and training for facility managers about utility data tracking principles and tools, as well as utility savings strategies and incentive opportunities.
- Align with other reporting timeframes including state and neighboring municipalities.

LEVEL OF IMPACT

Large Buildings in Somerville

While large buildings (20,000 sf+) only make up 21% of the total number of non-residential and multifamily buildings in Somerville, they account for 82% of the gross area. Establishing size thresholds for building performance standards can be used to target larger buildings that significantly impact energy consumption and GHG emissions.

There are currently 286 large buildings in Somerville that would need to comply with the proposed emissions-based performance standard. Most of these large buildings are either office space or multi-family housing comprising 12,490,679 square feet and 7,948,504 square feet respectively (Figure 1).

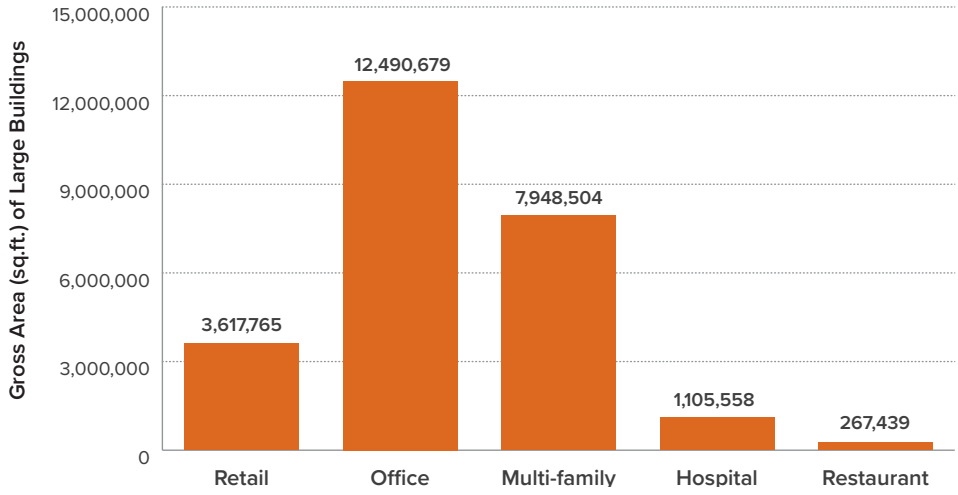


Figure 1. Gross Area of Large Buildings by Use Type[75]

LEVEL OF IMPACT

Additional Emissions-Based Building Performance Standards for Large Buildings

The following examples can be used as best practice and policy design references for establishing emissions-based building performance standards.

- New York, NY: The Climate Mobilization Act, passed in 2019, includes Local Law 97 that establishes emissions caps for large buildings over 25,000 square feet. Buildings exceeding these limits are required to reduce emissions or face penalties.
- San Francisco, CA: The City's Existing Commercial Buildings Energy Performance Ordinance requires owners of commercial buildings over 50,000 square feet to annually benchmark energy usage and undergo energy audits.
- Seattle, WA: The City's Energy Benchmarking Law requires non-residential and multifamily buildings over 20,000 square feet to annually benchmark and report energy usage. The City aims to use this data to develop strategies for improving energy efficiency and reducing emissions.

Buildings and Energy

ACTION

Action BE 1.3.D

Launch an energy coaching program to match residents and businesses with existing programs and incentives for electrification, efficiency, and renewable energy.

DESCRIPTION OF ACTION	Accelerate building electrification, energy efficiency, and renewable energy by expanding public awareness and education through an energy coaching program. Provide residents and businesses with relevant partnerships, and connections with technical and financial assistance for building decarbonization.
CHAMPION	Office of Sustainability and Environment (OSE)
OVERALL TIMEFRAME	Medium (1-3 years)
ESTIMATED COST	Program Implementation: < $100,000 for outreach.

IMPLEMENTATION STEPS	ESTIMATED TIME TO IMPLEMENT STEP	INTERNAL COLLABORATORS
1. Meet with staff from other municipalities who have led energy coaching programs to determine best practices, challenges and barriers, and opportunities for improvement.	2-3 months	Communications and Community Engagement Office of Strategic Planning and Community Development (OSPCD) Economic Development Office of Housing Stability Housing Division Inspectional Services Department (ISD)
2. Assess existing energy education, incentive programs, and community needs. Determine what enhancements can be made to support residents and businesses through rebates, incentives, and education.	3-4 months	
3. Identify appropriate training curricula from nonprofits, private companies, or universities that will equip coaches with skills to confidently make evidence-based recommendations.		
4. Recruit and train citizen volunteer coaches and/or City staff and develop content for different program delivery channels.	6 months	
5. Establish outreach priorities, incorporating existing needs and opportunities for high-impact, equitable distribution and diverse representation of residents and businesses.		

IMPLEMENTATION STEPS	ESTIMATED TIME TO IMPLEMENT STEP	INTERNAL COLLABORATORS
6. Establish methods and responsible staff members to track and report program touch points with residents and conversion rate to action.	3-4 months	Communications and Community Engagement Economic Development Office of Housing Stability Housing Division ISD
7. Develop and launch outreach to inform residents and businesses about the program and encourage participation.	2-3 months	
8. Prepare annual reports to ensure program capacity is revised and expanded as needed.	Ongoing	

TOOLS & RESOURCES

FINANCIAL TOOLS

- Buildings Funding Opportunities, U.S. Department of Energy (DOE)
- Energy Efficiency and Conservation Block Grant Program, DOE
- EmPower Massachusetts, Massachusetts Clean Energy Center (MassCEC)

TECHNICAL RESOURCES

- Massachusetts Clean Energy Center (MassCEC)
- MA Department of Energy Resources (DOER)
- HeatSmart Mass
- Eversource Energy Efficiency Programs
- Consumption-Based Inventory Technical Report

EQUITY CONSIDERATIONS

- Provide highly accessible program outreach and participation steps. Provide information through multiple languages, formats, and venues.
- Ensure that program participation reflects the diversity of residents and businesses and is equitably distributed throughout the city.
- Prioritize participation among low-income, energy-burdened, minority residents, seniors, and small and minority-owned businesses.
- Offer a range of incentive options and technical resources, tailored to different communities, industries, and property types. Provide additional incentives for income-eligible households.
- Offer a stipend or provide an hourly living wage to support willing coaches that can represent and best engage with underserved populations within Somerville.

OPPORTUNITIES TO OVERCOME POTENTIAL IMPLEMENTATION BARRIERS

- Continuously re-evaluate capacity to expand the program and achieve equitable geographic distribution of partnerships, projects, and outreach campaigns.
- Address environmental safety and health impacts that may exist in some homes, particularly those over 50 years old.
- Coordinate across departments to cross-promote rebates, incentives, and demonstration projects through existing communication channels and community events.
- Leverage existing community relationships to strengthen existing partnerships and recruit new residents and businesses.

LEVEL OF IMPACT

More than 60% of Somerville's greenhouse gas (GHG) emissions come from energy used in residential and commercial buildings. Fortunately, energy coaching programs can provide cost savings to community members and greater energy efficiency in the built environment while simultaneously decreasing emissions. These programs are designed to help individuals and businesses implement energy efficiency and electrification upgrades that drive substantial co-benefits, such as indoor air quality improvements and GHG emissions reductions, while lowering utility costs. Energy coaching program services may include:

- Technical Support & Financial Incentives: Information on energy-saving practices and energy-efficient technologies available in the community, as well as financial incentives, rebates, and grants for efficiency and electrification projects.
- Audits & Energy Assessments: Assistance in conducting energy assessments for homes or businesses, including evaluation of current energy usage, identification of areas for improvement, and recommendations for energy-efficient measures.
- Education & Outreach: Educational workshops, seminars, or outreach events to raise awareness about energy efficiency practices and related environmental and social benefits.
- Workforce Development: Assessment of workforce needs and related trainings for rating specialists, contractors, and relevant sectors to ensure best practice adoption.

Community Health and Resiliency

ACTION

Action CR 2.2.A

Partner with 1-2 social infrastructure institutions identified as vulnerable through the Climate Change Vulnerability Assessment Update to implement resilience upgrades.

DESCRIPTION OF ACTION	Ensure that identified social infrastructure institutions can withstand and ramp up operational ability during climate-related hazards including power outages, floods, and heat waves when services are needed most.
CHAMPION	Office of Sustainability and Environment (OSE)
OVERALL TIMEFRAME	Long (4+ years)
ESTIMATED COST	Program Implementation: < $100,000 to facilitate the process. Target grants for design assistance and construction costs.

IMPLEMENTATION STEPS	ESTIMATED TIME TO IMPLEMENT STEP	INTERNAL COLLABORATORS
1. Review results of recent assessments to determine eligibility criteria for community-based organizations (CBOs), including the Climate Change Vulnerability Assessment, Mystic River Watershed Regional Facilities Assessment, and other recent surveys.	4 months	Communications and Community Engagement Infrastructure and Asset Management (IAM) Capital Projects Health and Human Services
2. Solicit applications from CBO facilities for City assistance with resiliency upgrades and select 1-2 CBOs.	6-8 months	Health and Human Services IAM Grants Development
3. Reach out to property owners for permission to conduct site assessment.	3-6 months	Law Department CBOs
4. Identify and secure funding for site assessment, facility recommendations, and 25% cocept design.	3-12 months	Grants Development CBOs

IMPLEMENTATION STEPS	ESTIMATED TIME TO IMPLEMENT STEP	INTERNAL COLLABORATORS
5. Write and release a Request for Proposals for a consultant team to conduct site assessment, provide facility recommendations, and create a 25% concept design.	3-4 months	IAM Capital Projects Procurement and Contracting Services CBOs
6. Assess the facilities to identify exposure to hazards and determine specific upgrades that need to be taken. Complete recommendations and 25% concept design.	6-12 months	IAM CBOs
7. Identify and secure funding for 100% design and complete design.	12-18 months	Grants Development IAM Health and Human Services CBOs
8. Collaborate with property to review and approve 100% design.	3-6 months	Law Department CBOs
9. Identify and secure funding for construction.	12-24 months	Grants Development CBOs
10. Write and release RFP for construction.	3-4 months	Procurement and Contracting Services CBOs
11. Complete construction of all determined resiliency improvements.	12-18 months	CBOs
12. Share surveys with CBOs on a yearly basis to receive feedback from community members on the improvements.	Ongoing	CBOs
13. Support CBO's outreach efforts to ensure awareness of the resources and services available during an extreme event.	Ongoing	Public Works Communications and Community Engagement Health and Human Services

TOOLS & RESOURCES

FINANCIAL TOOLS

- Hazard Mitigation Assistance Grant, Federal Emergency Management Agency (FEMA)
- Community Development Block Grant, Department of Housing and Urban Development (HUD)
- Municipal Vulnerability Preparedness (MVP) Program
- Building Resilient Infrastructure and Communities (BRIC) Grant Program, Federal Emergency Management Agency (FEMA)

TECHNICAL RESOURCES

- Somerville's Climate Change Vulnerability Assessment
- Climate Resilience Design Standards & Guidance, Resilience Massachusetts Action Team
- Coastal Flood Resilience Design Guidelines, Boston Planning & Development Agency
- Climate Resiliency Design Guidelines, NYC Mayor's Office of Climate and Environmental Justice

EQUITY CONSIDERATIONS

- Ensure the target facilities are accessible to the broader community.
- Prioritize social infrastructure institutions that are disproportionately impacted by extreme heat, flood risk, intense storms, and other climate hazards.

OPPORTUNITIES TO OVERCOME POTENTIAL IMPLEMENTATION BARRIERS

- Determine metrics for resilience benefits/outcomes associated with the projects.
- Ensure project selection is done through a balance of technical assessment and community input by ensuring survey results and CBO feedback is integrated into the process.
- Establish partnership agreement with CBOs to outline roles, responsibilities, and standards for design and construction at the beginning of the process.

LEVEL OF IMPACT

Social infrastructure institutions are defined in the Climate Change Vulnerability Assessment (CCVA) Update as libraries, places of worship, and nearly 40 community organizations encompassing a diverse range of focuses from homelessness to economic development, to access to healthcare.

These social infrastructure organizations and food resources are projected to be exposed to all hazard types, including coastal flooding as early as 2030. These organizations include the Elizabeth Peabody House, Partners for Youth with Disabilities, Somerville-Cambridge Elder Services, Trader Joe's, and Stop & Shop, among others. In Union Square, critical facilities, shelters, community organizations (e.g., Community Action Agency of Somerville, Culture House HQ, Communities for People Inc.), and public housing units will be exposed to coast flood risk resulting from the overtopping of the Charles River Dam.

Natural Resources and Waste

ACTION

Action NRW 1.1.E

Develop an urban surface transformation strategy for public property to modify pavement and hardscape in a way that reduces and manages urban heat island impacts.

DESCRIPTION OF ACTION	Establish a targeted approach to understand the diversity of public surfaces across the city and identify the highest priority intervention points. This includes crafting recommendations for surface qualities in different settings, determining prioritization strategies, and aligning internal policies to guide the transformation process.
CHAMPION	Infrastructure and Asset Management (IAM)
OVERALL TIMEFRAME	Long (3+ years)
ESTIMATED COST	Program Implementation: $100,000 - $500,000

IMPLEMENTATION STEPS	ESTIMATED TIME TO IMPLEMENT STEP	INTERNAL COLLABORATORS
1. Establish definitions, vision, and objectives for urban surface transformation.	2 months	Public Works Inspectional Services Department (ISD) Engineering Mobility Office of Sustainability and Environment (OSE) Planning, Preservation, and Zoning (PPZ) Public Space and Urban Forestry (PSUF) Fire Department Racial & Social Justice (ADA Coordinator)
2. Identify and train staff to oversee mapping and characterization of urban surfaces alongside assessments of urban heat island effects, stormwater management, and related challenges.	6 months	PPZ PSUF

IMPLEMENTATION STEPS	ESTIMATED TIME TO IMPLEMENT STEP	INTERNAL COLLABORATORS
3. Host public meetings, workshops, and/or surveys to continuously involve the community in decision-making and understand their concerns and priorities.	Ongoing	SomerStat Communications and Community Engagement OSE Mobility PSUF Engineering
4. Draft the city-wide strategy, standards, and decision-making framework to enable prioritization among evolving projects.	6-12 months	OSE Mobility PSUF Engineering
5. Identify priority pilot project(s) from the strategy to implement, prioritizing neighborhoods vulnerable to climate impacts.	2 months	OSE Mobility PSUF Engineering
6. Identify and secure funding sources, which may include grants, private partnerships, or internal sources. Allocate resources for design, construction, and maintenance of surface transformations.	6-12 months	Finance Grants Development Department OSE
7. Establish a regulatory/incentive framework based on the strategy. Develop or update City ordinances, codes, and regulations to support and enforce the implementation of the strategy, including maintenance requirements.	4 months	ISD OSE PPZ
8. Implement public education campaigns to inform community members about the benefits of the strategy and encourage individual practices that align with the strategy.	Ongoing	Peer communities (e.g., Cambridge) Metropolitan Area Planning Council (MAPC) Communications and Community Engagement OSE Mobility PSUF
9. Continuously monitor the progress and effectiveness of the strategy using local data on temperature, heat island effects, and stormwater runoff. Adjust the strategy, as needed, based on the results and feedback from the community.	Ongoing	OSE SomerStat

TOOLS & RESOURCES

FINANCIAL TOOLS

- Municipal Vulnerability Preparedness (MVP) Action Grant
- MAPC Technical Assistance Program

TECHNICAL RESOURCES

- Keep Cool Somerville
- Smart Surfaces Coalition
- Smart Surfaces Guide, Carnegie Mellon University Center for Building Performance and Diagnostics
- Cool Roofs Rating Council
- Somerville Urban Forest Management Plan
- Extreme Heat Resources, MAPC
- Delivering Urban Resilience, Capital E

EQUITY CONSIDERATIONS

- Engage diverse communities from the outset, gathering input and feedback, and prioritize underserved neighborhoods.
- Allocate resources based on data-driven assessments of disparities in temperature, heat islands, and demographics.
- Target areas with the highest temperatures, densely populated neighborhoods, and the most vulnerable populations to address disparities.
- Prioritize projects that benefit those most impacted by extreme heat, such as the elderly, children, outdoor workers, and residents in highly paved, green space-limited areas.
- Find a balance between creating open spaces and addressing other priority needs, such as affordable housing, to minimize displacement.
- Promote education, outreach, and cultural sensitivity to ensure all residents benefit from and contribute to the strategy's success.

OPPORTUNITIES TO OVERCOME POTENTIAL IMPLEMENTATION BARRIERS

- Make actions visible with physical markers, publish project lists via online maps, and regularly publish data on areas retrofitted and estimated impacts to maintain awareness of Somerville's leadership.
- Develop retrofitting guidelines and comprehensive design standards, including performance-based standards for construction materials, prioritizing environmentally friendly materials. Include clear criteria for the transformation of existing surfaces, collaborating with developers and property owners to achieve scale in retrofitting efforts.
- Continuously monitor materials suppliers for examples of conforming products and ensure project developers are aware.
- Set performance-based objectives, such as a percentage increase in shade cover, a target average albedo level, or a specific reduction in air temperature to allow flexibility in selecting strategies to achieve objectives.
- Incorporate maintenance considerations from the beginning of the project and establish maintenance plans alongside the initial design, ensuring that resources and strategies are in place to sustain the improvements over time.
- Invest in cost-effective maintenance equipment and practices.
- Explore public-private partnerships and grant opportunities to help fund and manage maintenance tasks effectively. Facilitate green job creation for management and maintenance tasks associated with the program.

LEVEL OF IMPACT

Identifying priority locations to manage urban heat island effects and improve stormwater quality will require a characterization of urban surfaces alongside a comprehensive assessment of urban heat island effects and stormwater challenges. Somerville has completed much of this analysis at a high-level through the development of the Climate Change Vulnerability Assessment (CCVA) Update, which assessed both urban heat and stormwater flooding, and through the Urban Forest Management Plan and Citywide Drainage and Water Quality Master Plan.

According to the CCVA, 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. 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, Brickbottom, Twin City Plaza, Union Square, East Somerville, and Assembly Square. For example, the concentration of paved transportation infrastructure, comprising I-93, the Green Line Extension, and MBTA Commuter Rail tracks makes residents living, working, and commuting nearby particularly vulnerable to heat exposure.

Natural Resources and Waste

ACTION

Action NRW 2.1.B

Develop purchasing policy requiring vendors to offer low carbon alternatives.

DESCRIPTION OF ACTION	Establish a comprehensive purchasing policy to facilitate the procurement of low-carbon foods by both Public Schools and City departments. The policy should consider not only the food itself but factors like packaging, transportation, and food waste, considering the entire product life cycle.
CHAMPION	Office of Sustainability and Environment (OSE)
OVERALL TIMEFRAME	Medium (1-3 years)
ESTIMATED COST	Program Development: < $100,000

IMPLEMENTATION STEPS	ESTIMATED TIME TO IMPLEMENT STEP	INTERNAL COLLABORATORS
1. Conduct a full assessment of the current food procurement practices in public schools and City departments, and best practices from other communities.	4 months	School Department School Committee Somerville Public Schools Food and Nutrition Services Office of Food Access and Healthy Communities (OFAHC) Procurement and Contracting Services (PCS)
2. Establish clear definition of low carbon meals.	3 months	School Department School Committee Somerville Public Schools Food and Nutrition Services OFAHC

IMPLEMENTATION STEPS	ESTIMATED TIME TO IMPLEMENT STEP	INTERNAL COLLABORATORS
3. Set clear, measurable goals for transitioning to low-carbon foods, considering factors like nutrition, sustainability, and cost-effectiveness. Determine percentage requirements of food/purchasing to meet goals.	4 months	School Department School Committee Somerville Public Schools Food and Nutrition Services OFAHC Students Parents Teachers and Staff
4. Conduct market research to identify vendors and suppliers who can assist the City in meeting the identified goals. Assess supply chain impacts related to transportation, packaging, and production of various vendors and supplies.	4 months	School Department Somerville Public Schools Food and Nutrition Services PCS Vendors Suppliers
5. Draft a detailed purchasing policy that outlines the requirements for low-carbon foods. Include guidelines for food sourcing, nutritional standards, utensils, budget considerations, and vendor contract provisions.	6 months	School Department School Committee Somerville Public Schools Food and Nutrition Services OFAHC
6. Present policy to School Committee for consideration and adoption. Present municipal department food and beverage procurement ordinance to the Mayor, then City Council for adoption.	6 months	School Department School Committee City Council Intergovernmental Affairs
7. Establish a system for monitoring food procurement practices and compliance with the policy.		School Department Somerville Public Schools Food and Nutrition Services SomerStat PCS
8. Launch an educational campaign to inform the public, students, and city employees about the benefits of the new food policy.	3 months	School Department Office of Communications and Community Engagement OFAHC
9. Rollout policy to schools and City departments. Train food service staff, procurement officers, and relevant staff on the new policy's requirements and procedures.	Ongoing	School Department Somerville Public Schools Food and Nutrition Service

IMPLEMENTATION STEPS	ESTIMATED TIME TO IMPLEMENT STEP	INTERNAL COLLABORATORS
10. Evaluate the policy and its impact on food programming.	Ongoing	School Department Somerville Public Schools Food and Nutrition Service PCS

TOOLS & RESOURCES

FINANCIAL TOOLS

- Farm to School Grants, U.S. Department of Agriculture (USDA)
- Healthy Food Financing Initiative, USDA

TECHNICAL RESOURCES

- Example Policies, Center for Good Food Purchasing
- Climate Friendly Purchasing Toolkit, The West Coast Climate & Materials Management Forum
- Somerville Community Food System Assessment
- The Meat of the Matter: A Municipal Guide to Climate-Friendly Food Purchasing, Responsible Purchasing Network
- Consumption-Based Emissions Inventory Technical Report

EQUITY CONSIDERATIONS

- Offer a diverse range of culturally and religiously appropriate food options and provide clear labeling of ingredients and preparation methods to accommodate cultural and religious preferences.
- Include a variety of plant-based protein sources and promote the benefits of plant-based diets for both health and the environment.
- Offer choices for individuals with allergies, intolerances, or specific health requirements.
- Create a platform for ongoing dialogue and feedback to ensure the policy remains inclusive and responsive to changing community needs.
- Develop educational programs and campaigns to inform the public about the health and environmental benefits of the policy.
- Ensure that City departments and schools provide information on the nutritional content and sourcing of their food, fostering transparency and building trust within the community.

OPPORTUNITIES TO OVERCOME POTENTIAL IMPLEMENTATION BARRIERS

- Encourage local food producers to adopt sustainable practices and work with suppliers to expand their offerings.
- Provide training and support to procurement officers to help them understand and implement the policy effectively.
- Develop contingency plans with alternative sourcing options to maintain a consistent supply of healthy, low-carbon foods.
- Explore partnerships, grants, and subsidies to support the adoption of sustainable food practices without overburdening budgets.
- Implement a monitoring and reporting system and establish clear penalties for non-compliance to motivate adherence.
- Establish emergency food stockpiles that align with the policy's principles and collaborate with relief organizations to ensure food availability during crises.
- Consider rolling out the policy in phases, starting with pilot programs if feasible.

LEVEL OF IMPACT

Somerville conducted a Consumption-Based Emissions Inventory (CBEI) in 2022 to estimate the GHG emissions associated with the goods and services used by all residents within Somerville. Unlike other types of consumption, everyone needs to eat every day, which makes food the single largest category of consumption-based emissions in Somerville and creates big opportunities for reductions through dietary choices. Food comprises roughly 25% of the overall consumption-based emissions inventory with animal products such as meat, dairy, and eggs as the highest emissions source from products.

Somerville's CBEI recommends that the School District switch to local, plant-based foods for school lunches. As supported by the results of the CBEI, avoiding animal products will avoid significant GHGs. Fruits and vegetables, however, have the highest share of transportation-related emissions, illustrating that a shift to sourcing food from local suppliers is one of the best options for reducing emissions from those staples.

Transportation and Mobility

ACTION

Action TM 3.1.A

Expand the Shared Streets program to convert public streets into limited-car and green public spaces.

DESCRIPTION OF ACTION	Identify neighborhoods for temporary pedestrian-only or limited-car zones and the subsequent expansion of the Shared Streets program. These initiatives aim to create safer, more accessible, and inclusive urban spaces that contribute to a higher quality of life for residents while fostering a sense of community and reduced environmental impact.
CHAMPION	Mobility
OVERALL TIMEFRAME	Long (3+ years)
ESTIMATED COST	Capital Costs: > $4 million per mile[76] Program Implementation: $100,000 - $150,000 per event[77]

IMPLEMENTATION STEPS	ESTIMATED TIME TO IMPLEMENT STEP	INTERNAL COLLABORATORS
1. Conduct a thorough assessment of neighborhoods to identify potential areas for pedestrian-only and limited-car zones. Criteria for selection may include high foot traffic, safety benefits, pedestrian route connectivity, and community interest.	3-5 months	Engineering Planning, Preservation, & Zoning Traffic and Parking Department Office of Sustainability and Environment (OSE)
2. Assess the technical and logistical feasibility of creating pedestrian-only and limited-car zones in the selected neighborhoods. This includes evaluating traffic patterns, access for emergency services, parking, and transportation alternatives.	6-8 months	Economic Development Engineering ADA Coordinator Health and Human Services Traffic and Parking Department OSE
3. Work with traffic engineers and safety experts to conduct a safety assessment to ensure that the proposed pedestrian zones are safe for both pedestrians and other road users.	6-8 months	Engineering ADA Coordinator Traffic and Parking Department OSE

IMPLEMENTATION STEPS	ESTIMATED TIME TO IMPLEMENT STEP	INTERNAL COLLABORATORS
4. Engage with the local community to gather input and address concerns. Hold public meetings, surveys, and workshops to ensure the project aligns with community needs and desires.	6 months	Communications & Community Engagement Health and Human Services OSE Engineering
5. Develop a detailed plan, including the specific boundaries of the pedestrian zone, transportation alternatives (public transit, bike lanes), and temporary infrastructure (e.g., barricades, signage).	12 months	Infrastructure & Asset Management (IAM) Office of Strategic Planning and Community Development (OSPCD) Engineering OSE Racial and Social Justice (ADA Coordinator)
6. Implement traffic management strategies to divert vehicles away from the pedestrian zone, including rerouting, road closures, and signage.	6 months	Engineering Traffic and Parking Department
7. Establish a system to monitor the effects of the pedestrian-only and limited-car zone pilot, including business impacts, traffic flow, air quality, safety, and community well-being.	2 months	Engineering Traffic and Parking Department OSE Communications 7 Community Engagement
8. Share the results of the pilot program with the public to ensure transparency and maintain community engagement.	2 months	Communications & Community Engagement Engineering OSE SomerStat
9. Incorporate lessons learned into strategies for expanding to other areas and/or longer periods.	Ongoing	Engineering OSE SomerStat

TOOLS & RESOURCES

FINANCIAL TOOLS

- Transportation Alternatives Program, Federal Highway Administration (FHA)
- Congestion Mitigation and Air Quality Improvement Program, FHA
- Community Development Block Grants, U.S. Department of Housing and Urban Development

TECHNICAL RESOURCES

- National Association of City Transportation Officials (NACTO)
- National Complete Streets Coalition, Smart Growth America
- Walk Friendly Communities
- The Open Streets Project
- Case Study: Pavement to Parks, San Francisco

EQUITY CONSIDERATIONS

- Ensure that the pedestrian zone benefits all segments of the community, considering factors like accessibility, inclusivity, and the needs of vulnerable populations.
- Conduct extensive community outreach and education campaigns to actively involve community members in the decision-making process and gather input.
- Prioritize accessibility and consider the needs of individuals with disabilities to ensure that everyone can enjoy the pedestrian zones. Include curb cuts, ramps, and other accessible features. Consult with disability advocacy groups to ensure that the zone is inclusive.
- Allocate resources, services, and amenities based on the needs of underserved neighborhoods to ensure a fair distribution of benefits.
- Continuously monitor the impact of the pedestrian and limited-car zones and be prepared to address any emerging equity issues, such as disparities in access or benefits.

OPPORTUNITIES TO OVERCOME POTENTIAL IMPLEMENTATION BARRIERS

- Engage in extensive dialogue with local businesses in affected areas and offer potential solutions to concerns such as increased foot traffic, pop-up markets, and special promotions during the pedestrian-only or limited-car periods.
- Implement alternative transportation options, such as improved public transit, cycling infrastructure, and park-and-ride facilities, to minimize the impact on commuters. Communicate the benefits of reduced traffic congestion and improved air quality.
- Seek funding from various sources, such as grants, partnerships with local businesses, or community fundraising initiatives. Consider cost-sharing with businesses that stand to benefit from the project.
- Plan for changes in waste generation and needs for public safety and other services that occur with changing use of large areas.
- Consider location of current EV stations and feasible sites for future stations to ensure coordinated support of multiple mobility enhancements.

LEVEL OF IMPACT

Examples of pedestrian-only and limited-car zones from cities across the globe are plentiful and the documented benefits are numerous: reduced air pollution, increased foot traffic for businesses, pedestrian safety, and more. Some studies attempt to quantify the community benefits associated with limiting areas to pedestrians and cyclists, which can be leveraged to demonstrate the potential benefits of implementing pedestrian-only and car-limited zones in Somerville.

- An assessment[78] of the impacts of car-free days and events on human health found that ambient concentrations of nitrogen oxide (NO) and black carbon, pollutants associated with road transport, are reduced up to 95% and 80%, respectively, during car-free periods. Reductions of carbon monoxide (CO), carbon dioxide (CO_2), and nitrogen dioxide (NO2) were smaller, reaching 60% in some cases.
- An analysis put forth by Yelp[79] looked at restaurants in five different areas that blocked vehicle access in 2020: Boston's Little Italy, San Francisco's Mission District, Chicago Central Loop's West Fulton Market, downtown Boise's 8th Street, and Burbank's San Fernando Boulevard. The data showed a boost in the share of consumer activity in these locations compared to the rest of the city.
- A national study[80] evaluated the economic impacts of cycling and pedestrian street improvements along 14 corridors in six U.S. cities and found positive effects on both sales and employment for adjoining businesses, with particular benefits to restaurants.

Leadership

ACTION

Action LE 1.1.B

Establish embodied carbon thresholds for concrete and steel used on city and school projects, in alignment with the federal Buy Clean Initiative.

DESCRIPTION OF ACTION	Establish embodied carbon thresholds for concrete and steel used on City development and renovation projects, with the aim of achieving a near-term 10-20% reduction in embodied carbon compared to the National Ready Mixed Concrete Association (NRMCA) Eastern Region baseline and progressive ongoing improvement. Provide education and outreach materials to support sustainable design, procurement, and construction processes.
CHAMPION	Infrastructure and Asset Management (IAM), Capital Projects Division, and Engineering
OVERALL TIMEFRAME	Medium (1-3 years)
ESTIMATED COST	Program Implementation Cost: < $100,000

IMPLEMENTATION STEPS	ESTIMATED TIME TO IMPLEMENT STEP	INTERNAL COLLABORATORS
1. Review similar initiatives under development in other communities and levels of government for material specifications, data collection and compliance processes used to demonstrate reductions in embodied carbon.	3-4 months	Office of Sustainability and Environment (OSE) Procurement and Contracting Services (PCS) Information Technology SomerStat
2. Review and monitor updates to the federal government implementation of the Buy Clean provisions of the Inflation Reduction Act to ensure standards are in line with definitions and terminology used in federal policies.		
3. Review documentation of recent municipal projects of all types and identify mechanisms in the development process for demonstrating compliance and recording quantities of materials used.	5-6 months	Infrastructure and Asset Management (IAM) OSE PCS
4. Hold and facilitate a series of workshops and discussions with developers, suppliers, and other key stakeholders in the building industry to understand barriers and opportunities to address embodied carbon.	5-6 months	Communications and Community Engagement OSE Office of Strategic Planning and Community Development (OSPCD) PCS

IMPLEMENTATION STEPS	ESTIMATED TIME TO IMPLEMENT STEP	INTERNAL COLLABORATORS
5. Develop draft policy to establish embodied carbon thresholds and language to be used in bid specifications Review with stakeholders and refine as needed.	3-4 months	OSE Procurement and Contracting Services
6. Finalize policy and present it to Mayor for review and approval.	3 months	Public Works OSE PCS
7. Develop and deliver training materials and educational content to contractors for incorporating low-carbon materials into construction projects which correspond to requirements in bid specifications.	6 months	Communications and Community Engagement OSE PCS Economic Development Public Works
8. Document quantities of low-carbon materials used and total avoided carbon resulting from the policy annually.	Ongoing	OSE PCS
9. Report the documented metrics annually and use them to evaluate the effectiveness of the policy and inform future policy changes.	Ongoing	OSE

TOOLS & RESOURCES

FINANCIAL TOOLS

- Buildings Funding Opportunities, U.S. Department of Energy (DOE)
- Somerville Department of Infrastructure and Asset Management (IAM) general budget and capital budget for projects

TECHNICAL RESOURCES

- Federal Buy Clean Initiative, Office of the Federal Chief Sustainability Officer
- Massachusetts Clean Energy Center (MassCEC)
- Building Science Advisor, U.S. Department of Energy (DOE)
- Priority Green Expedited Program, City of Seattle
- Embodied Carbon Policy Case Studies, Carbon Leadership Forum
- Embodied Carbon in Construction Calculator, Building Transparency

EQUITY CONSIDERATIONS

- Engage with a diversity of suppliers and development contractors–including minority- and women-owned businesses–to understand challenges and barriers, strengthen relationships within the building industry, and ensure equitable procurement.
- Engage with construction and building materials suppliers to facilitate awareness about the demand for and availability of lower embodied carbon materials.
- Ensure fair trade practices of procured materials.

OPPORTUNITIES TO OVERCOME POTENTIAL IMPLEMENTATION BARRIERS

- Align requirements and specifications with federal procurement guidelines to ensure widespread availability of products.
- Facilitate ongoing engagement with building developers and construction materials suppliers to understand challenges and barriers.
- Develop and distribute clear, concise educational materials to build awareness among building developers and construction material suppliers. Include targeted outreach to address the needs and challenges specific to these stakeholder groups.
- Lead by example and provide updates to the community through the City's website, newsletter, public forums, and relevant collaborators.

LEVEL OF IMPACT

Embodied Carbon Overview

As noted by the Carbon Leadership Forum (CLF), most of a building's embodied carbon is released upfront in the product stage, so there is little to no chance to decrease embodied carbon with updates in efficiency after the construction phase. As such, there is an urgent need to address embodied carbon now to meet short- and long-term climate targets. Fortunately, embodied carbon policies are spreading rapidly; there have been 150 embodied carbon policies proposed in the U.S. Currently, the Carbon Leadership Forum recognizes 16 proposed and/or passed policies in Massachusetts that consider embodied carbon, with 12 policies at the municipal level.

- Amherst's Climate Action Adaptation and Resilience Plan
- Andover Climate Action Plan
- Boston Deconstruction Pilot Program
- Boston Mass Timber Accelerator
- Brookline Embodied Carbon Resolution
- City of Cambridge Net Zero Action Plan (2021 Addendum)
- Lexington Climate Action Plan
- Newton Sustainable Design Ordinance - Chapter 30: Zoning Ordinance
- Zoning Ordinance of the City of Boston
- Zoning Ordinance of the City of Cambridge

LEVEL OF IMPACT

Example Policies for Embodied Carbon

- U.S. General Services Administration (GSA): IRA Section 60503 provides the GSA with $2.15 billion for acquisition and installation of construction materials and products with substantially lower levels of embodied GHG emissions as compared to estimated industry averages. The GSA has issued performance standards that must be met for projects at federal facilities.
- Brookline, MA: The Brookline Resolution (2021) mandates the incorporation of low-carbon concrete products in Town projects and promotes the adoption by developers for all new construction projects. Low-carbon products, as specified in this proposal, refer to materials that generate a minimum of 10% less carbon dioxide (CO_2) emissions during their production and utilization compared to the average mixture typically employed for a specific application.
- Los Angeles, CA: LA's Green New Deal (2019) adopted the Buy Clean California requirements for steel, insulation, and glass and requires the Bureau of Engineering (BOE) to study the use of building materials that sequester carbon. The Buy Clean California Act (BCCA) requires facility-specific Environmental Product Declarations (EPDs) to be submitted for eligible materials in state-funded construction. Eligible materials must be below the maximum Global Warming Potential (GWP) limits set by the Department of General Services (DGS).
- Portland, OR: Portland has enhanced embodied carbon adoption by establishing a Low-Carbon Concrete Purchasing Policy. This initiative established a product-specific Environmental Product Declaration (EPD) requirement for concrete mixes used on City projects, conducted pilot tests of lower-embodied carbon concrete mixes, and defined Global Warming Potential (GWP) Thresholds for concrete mixes.

Leadership

ACTION

Action LE 1.2.C

Strengthen the Capital Investment Plan to explicitly prioritize sustainability, energy conservation, whole building decarbonization, resilience, and support for environmental justice (EJ) neighborhoods.

DESCRIPTION OF ACTION	Prioritize city and school projects that reduce climate pollution and improve resilience by integrating sustainability criteria into the Capital Investment Plan and Building Master Plan.
CHAMPION	Infrastructure and Asset Management (IAM)
OVERALL TIMEFRAME	Medium (1-3 years)
ESTIMATED COST	Minimal additional cost. Work within existing processes.

IMPLEMENTATION STEPS	ESTIMATED TIME TO IMPLEMENT STEP	COLLABORATORS
1. Identify staff from the Office of Sustainability and Environment (OSE) and Racial and Social Justice (RSJ) to provide input on Capital Investment Plan recommendations.	1-2 months	Finance Department Mayor's Office School Department
2. Conduct an evaluation of Capital Investment Plan to identify opportunities to include sustainability and resiliency.	5-6 months	OSE Public Works Finance Department Mayor's Office School Department
3. Conduct research and assessment of municipal assets that are vulnerable to flooding and extreme heat.	5-6 months	OSE Public Works Finance Department Mayor's Office
4. Coordinate internally to share findings and propose inclusion of identified assets.	2-3 months	OSE Public Works Finance Department Mayor's Office School Department

TOOLS & RESOURCES

FINANCIAL TOOLS

- Green Bond Principles (Example in Portland, OR)
- Revolving Loan Funds
- NOAA Funding and Financing Coastal Resilience Projects
- Green Communities Grants
- Energy Efficiency and Conservation Block Grant
- Community Preservation Act

TECHNICAL RESOURCES

- Integrating Resilience into Local Capital Improvement Programs, University of Maryland Environmental Finance Center
- Somerville's Climate Change Vulnerability Assessment

EQUITY CONSIDERATIONS

- Ensure sustainability and resiliency review does not deter projects for underserved populations, but rather prioritizes projects that will aid vulnerable communities.
- Prioritize projects that reduce heat vulnerability or flood risk and encourage projects that reduce economic disparities.
- Create and maintain structures that forward community goals.

OPPORTUNITIES TO OVERCOME POTENTIAL IMPLEMENTATION BARRIERS

- Utilize the scoring framework and structured decision making to improve objectivity and transparency.
- Ensure there are mechanisms for re-evaluating scoring at regular intervals.
- Publish open data detailing the energy performance, climate risk, and other metrics that would illustrate the need for timely action on projects.

LEVEL OF IMPACT

Best Practices in Capital Investment Planning

The following examples can be used as a template for how to integrate sustainability and resiliency considerations into the Capital Investment Plan process.

- San Francisco, CA: San Francisco has enhanced its CIP by incorporating a Climate Action Framework which includes strategies for reducing greenhouse gas emissions, enhancing resilience, and promoting environmental justice. The City actively aligns its CIP with the Climate Action Framework, incorporating criteria related to energy efficiency, resilience, and environmental justice into the evaluation and prioritization of projects. The City also involves the Department of the Environment in the CIP process to assess projects for their contribution to climate resilience, energy efficiency, and social equity.
- Seattle, WA: Seattle has incorporated sustainability and environmental justice considerations into its CIP by establishing a Sustainable Buildings and Sites Policy. The City actively involves the Office of Sustainability and the Department of Planning and Community Development in the CIP committee to evaluate projects based on their environmental impact and support for communities disproportionately affected by environmental challenges.

Considerations for the Building Master Plan

The results of the Climate Change Vulnerability Assessment (CCVA) Update identified neighborhoods and asset types vulnerable to climate hazards such as extreme heat, coastal and stormwater flooding. This data can be used to determine vulnerable buildings and building improvements to be incorporated into the Building Master Plan. The CCVA found that Assembly Square, Union Square, East Somerville, and Davis Square have the most assets exposed to one or more hazards, and social infrastructure, food resources, medical facilities, and MBTA assets are the most exposed asset classes in Somerville.

Leadership

ACTION

Action LE 2.2.C

Convene regional partners and coordinate with utilities and the State on transmission and distribution upgrades to ensure infrastructure, buildings, and vehicles are ready for the transition to renewable energy and electrification.

DESCRIPTION OF ACTION	Increase capacity to plan and implement distribution network upgrades to enable sector-wide electrification. Utilize private, local, and regional collaborations and state and federal advocacy to push for legislation, services, resources, and programs. Upgrades could include renewable energy connectivity, battery storage, undergrounding, non-wire alternative infrastructure, and advanced metering infrastructure.
CHAMPION	Office of Sustainability and Environment (OSE) , Planning Preservation & Zoning, and Engineering
OVERALL TIMEFRAME	Ongoing
ESTIMATED COST	Matching funds as applicable.

IMPLEMENTATION STEPS	ESTIMATED TIME TO IMPLEMENT STEP	COLLABORATORS
1. Identify and establish relationships with relevant stakeholders and regional partners (e.g., large energy users and must-run facilities).	1-2 years	City Departments Infrastructure and Asset Management (IAM) Office of Strategic Planning and Community Development (OSPCD) External Partners Eversource and National Grid Massachusetts Clean Energy Center MA Executive Office of Energy and Environmental Affairs MA Federal Funds and Infrastructure Office MA Office of Climate Innovation and Resilience Metropolitan Area Planning Council City of Boston City of Cambridge Metro Mayors Climate Task Force Developers
2. Discuss regional collaboration with primary partners and develop agreement on objectives and advocacy strategies.		

IMPLEMENTATION STEPS	ESTIMATED TIME TO IMPLEMENT STEP	COLLABORATORS
3. Develop regional advocacy strategies to encourage funding opportunities and policy adoptions that support distribution network upgrades.	1-2 years	IAM OSPCD Public Works
4. Review and catalog barriers to timely infrastructure upgrades, including City and State permitting processes.		Eversource IAM
5. Assess existing and planned potential for electrification initiatives and distribution upgrades to determine timelines and areas of high priority for distribution upgrades. Incorporate scenarios for building efficiency, distributed storage, and low-energy transportation targets.		Communications and Community Engagement
6. Hold and facilitate a series of public workshops to communicate barriers and opportunities to address distribution network upgrades and energy transition efforts.	1-2 years	Eversource National Grid
7. Conduct community education and engagement campaign to explain distribution system needs and build community support for changes.		Grants Development Department
8. Develop coordinated plan for distribution system upgrades based on best practice research, stakeholder engagement, and community energy demand.	6-12 months	Communications and Community Engagement
9. Implement upgrades and advocacy strategies per the finalized coordinated plan.	Ongoing	Public Works IAM OSPCD Eversource National Grid
10. Monitor the impact of implemented upgrades and continue to assess the need and demands for additional network upgrades.	Ongoing	IAM Public Works Eversource National Grid

TOOLS & RESOURCES

FINANCIAL TOOLS

- Grid Resilience and Innovation Partnerships (GRIP) Program, U.S. Department of Energy (DOE)
- Building Resilient Infrastructure & Communities (BRIC) grants, Federal Emergency Management Agency (FEMA)

TECHNICAL RESOURCES

- Grid Modernization Plan, MA Department of Public Utilities (DPU)
- GridWise Alliance
- Smart Electric Power Alliance
- Smart Grid Consumer Collaborative (SGCC)

EQUITY CONSIDERATIONS

- Align utility work and upgrades with ADA regulations.
- Prioritize deployment of advocacy efforts, infrastructure investments, and grid updates for early adopters, marginalized, and environmental justice communities.
- Ensure opportunities for workforce development within targeted communities are included in project and regulation design processes.
- Pair upgrades with programs dedicated to more affordable and accessible energy efficiency upgrades and electric HVAC and appliance installations.
- Identify and provide information about the cost of electrification and efficiency programs to low-income and marginalized community members and relevant stakeholders.
- Investigate the potential costs associated with distribution network upgrades and develop measures to minimize and mitigate those costs to minimize risk of displacement.

OPPORTUNITIES TO OVERCOME POTENTIAL IMPLEMENTATION BARRIERS

- Co-develop amenities like public charging infrastructure to help ensure that the infrastructure can meet rising energy demand.
- Connect with Mobility and Engineering to ensure adequate traffic flow and alternate routes in and around areas under construction. Coordinate upgrades and project timelines with other street and sidewalk closures.
- Investigate zoning incentives to incentivize electrification and installation of shared transformers.
- Investigate innovative cost share, financing, and payback structures.
- Collaborate with partners at all levels of government.

LEVEL OF IMPACT

Distribution Network Upgrade Overview

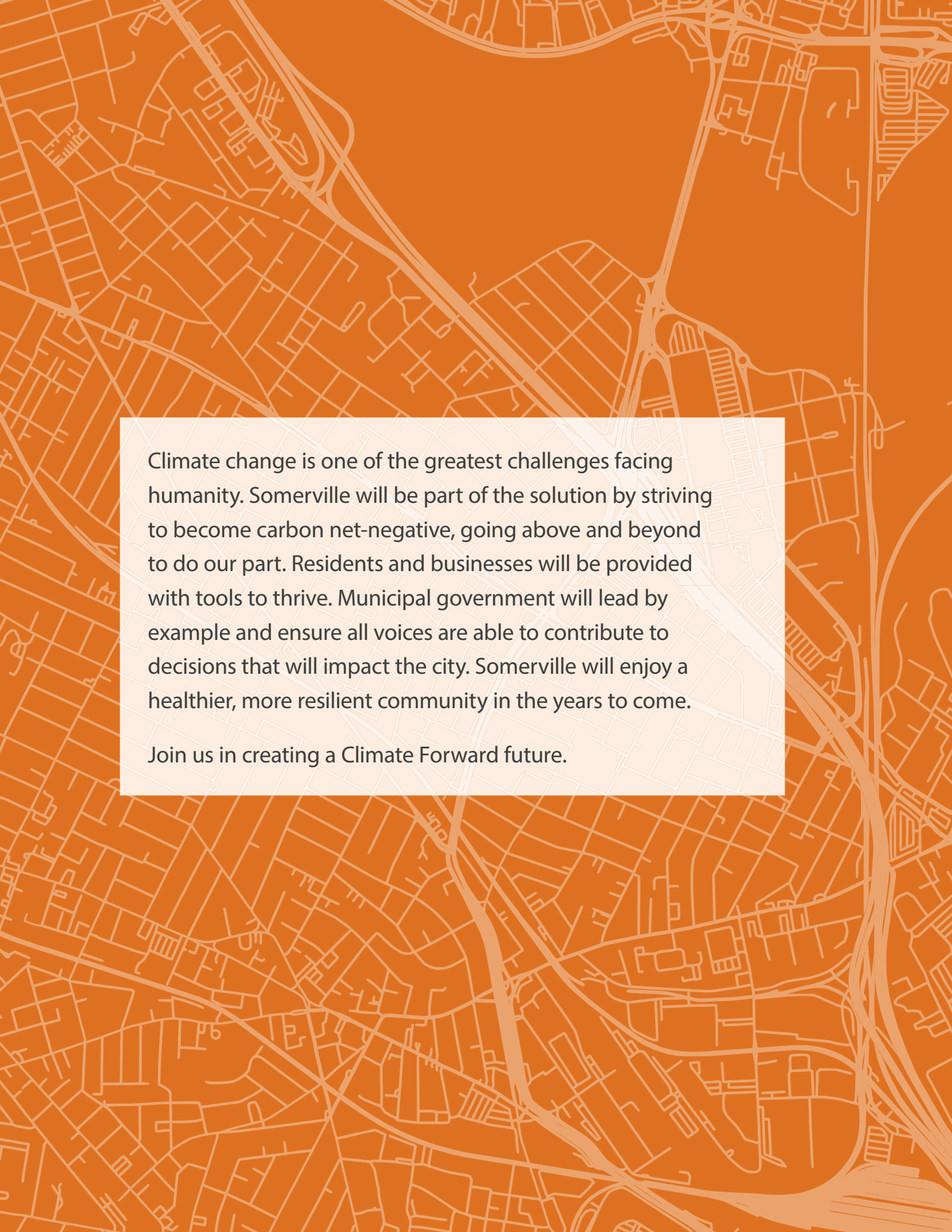
Distribution network upgrades address various challenges and capitalize on opportunities in the evolving energy landscape. Here are some key reasons why distribution network upgrades are crucial:

- Reliability & Resilience: Technologies, such as smart grids and automation, enable quicker detection, isolation, and restoration of faults, minimizing outage durations.
- Growing Energy Demand: Capacity enhancements and grid modernization help ensure that the infrastructure can meet the rising energy demands of communities.
- Energy Efficiency: Advanced metering and smart grids enable better monitoring and consumption control, increasing efficiency and reducing distribution system waste.
- Integration of Renewable Energy: Distribution network upgrades facilitate the seamless integration of renewable energy, promoting a more sustainable energy mix.
- Environmental Justice and Equity: Research shows that fossil-fueled appliances can worsen indoor air quality, leading to asthma, respiratory infections, and heart disease. Frontline communities are disproportionately impacted, as they face worse indoor air quality due to these outdated appliances. Large, shared transformers may create a pathway to create all-electric homes and businesses, creating healthier spaces, as well as a more affordable means to obtaining additional electric capacity once upgrades at a time that is most cost-efficient for system replacement.

Distribution Network Upgrade Initiatives

The following examples can be used as best practice references for implementing distribution network upgrades and coordinating regional initiatives.

- California Public Utilities Commission (CPUC): The CPUC High Distributed Energy Resource Future Grid Proceeding has developed several resources to guide best practice around performing community engagement for needs assessments, identifying gaps in operational needs, and performing outreach to ensure meaningful engagement in the process of planning for changes to the grid.
- San Diego Community Power: As a community choice energy provider, SDCP developed a Community Power Plan to better plan its own programs as well as work with the capacity of the physical utility grid.



Climate change is one of the greatest challenges facing humanity. Somerville will be part of the solution by striving to become carbon net-negative, going above and beyond to do our part. Residents and businesses will be provided with tools to thrive. Municipal government will lead by example and ensure all voices are able to contribute to decisions that will impact the city. Somerville will enjoy a healthier, more resilient community in the years to come.

Join us in creating a Climate Forward future.

Glossary

Action	The specific activity that will be undertaken to execute a strategy.
Carbon Net-Negative	Removing more greenhouse gas (GHG) emissions than a community emits.
Climate Change	Long-term shifts in temperatures and weather patterns that go beyond natural climate variability observed over comparable time periods. Greenhouse gas (GHG) emissions generated by human activity are the leading cause of the earth's rapidly changing climate today.
Deconstruction	Carefully taking apart portions of a building and removing its contents with the primary goal of reuse.
Diversion Rate	Measures the portion of waste not sent to landfill or incineration. Tracking diversion rates helps measure the effectiveness of reuse, recycling, and composting programs.
Embodied Carbon	Greenhouse gas emissions released during the lifecycle of building materials, including extraction, manufacturing, transport, construction, and disposal.
Environmental Justice	The principal that all people have a right to be protected from environmental hazards and to live in and enjoy a clean and healthful environment.
Frontline Communities	Communities that experience the most immediate and worst impacts of climate change and are most often communities of color and low-income.
Goal	The desired outcome presented as a broad vision statement.
Green Infrastructure	Systems or measures that leverage plants, soil systems, and landscaping to absorb, store, and remove pollutants from stormwater, reducing flows to sewer systems and bodies of water.
Greenhouse Gas (GHG) Emissions	Gases that trap heat in the atmosphere, including carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Carbon dioxide is the primary greenhouse gas emitted through human activities, such as the combustion of fossil fuels for energy and transportation.
Hazard	A natural or human-induced physical event or trend that may cause loss of life, injury, or other health impacts, as well as damage to property, infrastructure, livelihoods, services, ecosystems, and environmental resources.
kW (Kilowatt)	A unit of measurement used for electricity. One kilowatt is equal to one thousand watts, which would power a 50-watt LED TV for 20 hours.
MMBtu (Million British Thermal Unit)	A common measure for different energy sources (electricity, natural gas, oil, etc.) that helps compare total energy use.
Land Surface Temperature (LST)	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.
Lifecycle Emissions	All emissions calculated through a lifecycle assessment, which accounts for all emissions associated to the good or service, regardless of which industrial or economic activities or sectors produce these emissions (e.g., energy, mining, manufacturing, or waste sectors).

$MTCO_2e$ (Metric Tons Of Carbon Dioxide Equivalent)	A unit that is used to bundle and compare different types of greenhouse gas emissions (e.g., methane and nitrous oxide) by converting them to an equivalent amount of carbon dioxide, the most common greenhouse gas.
MW (Megawatt)	A unit used to measure energy capacity, or the total amount of energy a system can produce at perfect conditions. One megawatt is equivalent to one million watts, or the energy produced by about 10 automobile engines.
Net Zero	Reducing greenhouse gas emissions to as close to zero as possible.
MWh (Megawatt Hour):	A unit equal to 1,000 kilowatts of electricity generated per hour and is used to measure electric output.
Operational Carbon	Greenhouse gas emissions emitted during the operational or in-use phase of a building, including heating, lighting, ventilation, etc.
Renewable Energy	Energy produced from renewable sources, such as the sun, wind, waves, and geothermal heat.
Resilience	The ability of individuals and organizations to anticipate, prepare for, and respond to hazardous events, local impacts, and day-to-day disturbances related to climate change.
Socially Vulnerable Populations	Social groups that are more susceptible to the adverse impacts of natural hazards, including disproportionate death, injury, loss, or disruption of livelihood.
Stormwater	Water runoff from rain events that flows over land or impervious surfaces and does not reabsorb back into the ground.
Social Vulnerability Index (SVI)	An index that uses U.S. Census data to determine social vulnerability of every county and tract, based on 16 social factors, including poverty, lack of vehicle access, crowded housing, etc. It is used by local officials to identify communities that may need support in preparing for hazards, or recovering from disaster.
Strategy	The general approach used to accomplish a goal.
Stressor	A day-to-day challenge that takes a toll on community members, such as living in poverty, the need for a living wage, and access to transportation.
Sustainability	The balance of resource efficiency, social well-being, and environmental stewardship while equitably meeting the needs of a growing community and thriving economy.
Urban Heat Island Effect	Occurs when a city experiences much warmer temperatures than nearby rural areas due to the presence of surfaces such as pavement and buildings that absorb heat.
10-year Storm	A rainfall of certain duration that occurs, on average, once every ten years is called a 10-year storm and has a 10% probability of occurring in a given year.
25-year Storm	A rainfall of certain duration that occurs, on average, once every 25 years is called a 25-year storm and has a 4% probability of occurring in a given year.
100-year Storm	A rainfall of certain duration that occurs, on average, once every 100 years is called a 100-year storm and has a 1% probability of occurring in a given year.

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