**DRAFT – 2/6/2023**

# TOWN OF HINGHAM

# CLIMATE ACTION PLAN


Hingham
Climate Action
Planning Committee

**DRAFT 2/6/2023**

DATE

Hingham Town Hall
210 Central Street
Hingham, MA 02043

RE: Hingham Climate Action Plan – Final Draft

Dear Residents, Businesses, and Leadership of the Town of Hingham:

On behalf of the Hingham Climate Action Planning Committee ("CAPC") and all of the participants that contributed through the public processes to arrive at this point, it is our great honor to present the attached Final Draft of the Town of Hingham Climate Action Plan ("Plan"). The Plan provides a path forward for achieving net zero carbon emissions by 2040. We considered numeous factors, including social equity and environmental justice. The recommendations and tasks delineated in this Plan have been developed specifically for Hingham by the community of Hingham residents, businesses, and leaders in Hingham, in consideration of Hingham's specific goals to achieve net zero and its current sources of carbon emissions.

In April 2021 the Town of Hingham voted to create the CAPC, charging it with evaluating a wide range of carbon emission reduction strategies and proposing measures to achieve a zero sum of carbon emissions by the year 2040 or another target date deemed feasible. The CAPC, with the assistance of Energyzt Advisors, LLC, an energy consulting firm whose engagement with Hingham was generously funded by the Hingham Municipal Lighting Plant, spent over a year fulfilling this mission, with countless hours contributed by public participants who attended public town hall meetings, participated in regular committee meetings, provided comments on surveys, advised community organizations on how to respond, and otherwise provided support and insight into the process.

The issuance of this Plan is particularly timely. In October 2021, a bomb cyclone nor'easter tore through Hingham with 90+ mile-per-hour gusts causing devastation that made national news. On January 29, 2022, another bomb cyclone dropped nearly two feet of snow in Hingham in a snow that broke records throughout Eastern Massachusetts and capped a 15 year period as producing the most snow in the Commonwealth's recorded history. That summer a level three "critical drought" declaration was made for Hingham and the entire Southeast Region in Massachusetts as the Town baked in unyielding heat for much of the summer with little to no precipitation. And in December 2022, yet another bomb cyclone brought devastating weather across 1,000 miles of the

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U.S.; though Hingham was spared the worst of the storm, our town endured 65 mile-per-hour gusts and localized flooding.

Hingham experiences severe weather. As a coastal, New England town, it will always experience severe weather and its adverse impacts. What is troubling is not isolated severity but frequency of that growing severity, which is increasing across all seasons, and is projected to continue to do so in the decades to come as the planet continues to warm under the greenhouse effect from carbon emissions. Frequent weather events and ongoing changes to the climate endangers lives and strains residential, business, and municipal coffers as each event demands increased time, money, and risk tied to preparation and recovery. State and federal programs are offering money to towns to mitigate such costs, especially for towns that show efforts to address the underlying problem.

Given the localized impacts of this global problem, Hingham, like everywhere else, must decide how it can: (1) reduce carbon emissions and mitigate its climate impact; and (2) adapt to the "new normal" of weather severity. This Climate Action Plan is Hingham's answer to the first challenge. The Town has separately undertaken vulnerability preparedness planning to adapt to climate change, and we encourage you to review Hingham's efforts, which can be found at https://hingham-ma.gov/306/Climate-Change.

The daunting scope of the level of behavioral change, transition away from fossil fuels, and overall carbon reduction required to be achieved can breed cynicism and despair, which often leads to paralysis and inaction. However, the only way to tackle a problem of this scale is through diligent, thoughtful, and concerted action at both the macro (state, national, and global) and micro (regional and municipal) levels. Citizen determination and desire, illustrated through community organizations, winning ballot initiatives, and Town Meeting warrant articles that overwhelmingly pass requires Hingham to act.

This Plan requires integration throughout all facets of the Hingham community. Together we can realize the solution to the problem to which we collective contribute.

Sincerely,

Brad Moyer, Chair
And the Climate Action Planning Committee Members:

| | | |
|---|---|---|
| Alyson Anderson | Carlos A.F. Da Silva | Henry (Bob) Hidell |
| Thomas Morahan | Elliott Place | Beth Porter |
| Kathy Reardon | Gary Tondorf-Dick | Nancy Wiley |
| | Maria Zade | |

Hingham Climate Action Planning Committee

# ACKNOWLEDGEMENTS

This Climate Action Plan could not have been created without the efforts of, and generous support from, the groups and individuals listed below. The Climate Action Planning Committee, and indeed all of Hingham, are fortunate to have so many willing to give their time and energy to the betterment of Hingham. Specifically, there are many Hingham citizens who participated in various engagement sessions, responded to surveys, volunteered their time in public outreach, and attended open meetings organized around development of this plan. The list below is representative, but not comprehensive:

## Select Board of Hingham
William Ramsey (Chair)
Joe Fisher
Liz Klein

## Advisory Committee
Brenda Black and Joe Griffin, who regularly attended meetings and reported back to their Advisory Committee colleagues

## Community Organizations
All citizen-run organizations, such as:
- Cleaner Greener Hingham
- Hingham Drives Electric
- Hingham Net Zero
- South Shore 350

## Climate Action Planning Committee
Brad E. Moyer, Chair, Energy Action Committee
Maria Zade, Cleaner Greener Hingham
Alyson Anderson, School Committee
Thomas Morahan, Hingham Municipal Lighting Plant
Gary Tondorf-Dick, Planning Board
Henry (Bob) Hidell, Conservation Commission

## Funding provided by:
HMLP

## Town Administration
Tom Mayo, Town Administrator
Art Roberts, Assistant Administrator
Michelle Monsegur, Assistant Administrator

## Town Staff
Virginia LeClair, Sustainability Coordinator

## Hingham Municipal Lighting Plant
Brianna Bennett, Sustainability Coordinator

## Town Committees and Representatives
All entities who provided input, including:
- Conservation Commission
- Energy Action Committee
- Planning Board
- School Committee

Nancy Wiley, Development & Industrial Commission
Kathy Reardon, Select Board Appointee
Elliott Place, Select Board Appointee
Beth Porter, Moderator Appointee
Carlos A.F. Da Silva, Moderator Appointee

## Consultant:
Tanya Bodell
John Malloy, Jr.
ENERGYZT

Hingham Climate Action Planning Committee

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# ACRONYMS

| Acronym | Definition |
|---|---|
| CAPC | Climate Action Planning Committee |
| CO2, CO2e | Carbon dioxide and Carbon Dioxide equivalents usually measured in tons |
| DER | Distributed energy resource; may include solar, batteries or other power generation resources located behind the retail meter |
| DOE | U.S. Department of Energy, a federal agency |
| DOER | Massachusetts Department of Energy Resources, a state agency responsible for energy oversight |
| DR | Demand Response, referring the ability of energy usage to decrease, defer or diminish demand in response to incentives |
| EE | Energy Efficiency, the focus on reducing wasteful energy usage through lower energy intensity technology and behaviors (e.g., switching to LED lightbulbs or Energy Star appliances) |
| ENE | Energy New England, the wholesale aggregator that supplies electricity to HMLP |

| Acronym | Definition |
|---|---|
| MassSave | An Investor-Owned Utility program in Massachusetts focused on education, outreach, and subsidies to utility customers to adopt energy saving investments such as insulation, window/door replacement, and switch to heat pumps. |
| MBTA | Massachusetts Bay Transportation Authority, a state agency responsible for public transportation |
| MW | Megawatt, a unit of electrical capacity associated with maximum generation or demand |
| MWh | Megawatt-hour<br>Equal to 1,000 kWh, a unit of electrical energy |
| NEPPA | Northeast Public Power Association, a non-profit organization of public power providers such as HMLP |
| Net Metering | Program in which the utility purchases excess solar power from residential and business buildings |
| Net Zero | A condition in which total carbon emissions attributed to an entity or organization are equal to zero when total carbon emitted is less than or equal to acquired emissions credits |
| PAYT/SMART | Pay-As-You-Throw / Save Money and Reduce Trash, programs that incentivize waste reduction |

| Acronym | Definition |
|---|---|
| EPA | U.S. Environmental Protection Agency, a federal agency |
| FCM | Forward Capacity Market, the competitive market that ISO—NE uses to purchase demand response and generation capacity for New England |
| HEIRP | Hingham Electrical Infrastructure Reliability Project, a transmission upgrade being implemented by HMLP |
| GHG | Greenhouse Gas, a general term to describe carbon emissions |
| HMLP | Hingham Municipal Lighting Plant, the electric utility servicing Hingham |
| ISO-NE | Independent System Operator of New England, the entity that operates the regional wholesale electricity market |
| kWh | Kilowatt-hour<br>Equal to 1,000 Watt-hours, a unit of electrical energy |
| LEED | Leadership in Energy and Environmental Design that sets standards for the design, construction, and maintenance of sustainable buildings and infrastructure |

| Acronym | Definition |
|---|---|
| PMOs | Personal Mobility Options, alternative means for individuals to travel individually or in small groups using autonomous driving vehicles, share rides, mobility pods, or other means |
| REC | Renewable Energy Credit, a separately-traded property right that allows the holder to claim renewable characteristics associated with its electricity |
| RETF | Renewable Energy Trust Fund, a funding mechanism established in Massachusetts in 1997, revised in 2008 in the Green Communities Act. |
| RGGI | Regional Greenhouse Gas Initiative, the voluntary greenhouse gas credit trading program that caps carbon emissions at the generation level across 11 plus states |
| SMART 2.0 | Solar MAssachusetts Renewable Target program that currently supports solar in Massachusetts with incentive credits |
| TOD | Transit-Oriented District, areas that co-locate residential and business units near public transportation depots |
| Ton | 2,000 pounds, also called “short ton,” used to measure carbon emissions |
| Tonne | A metric measure of weight equal to 1.10231 short tons used to measure carbon emissions |

Hingham Climate Action Planning Committee

| Acronym | Definition |
|---|---|
| MassCEC | Massachusetts Clean Energy Council, a non-profit primarily funded by state budget |
| MassDEP | Massachusetts Department of Environmental Protection, a state agency |

| Acronym | Definition |
|---|---|
| V2G | Vehicle-to-Grid, the concept that electric vehicles can offer services to electric distribution and wholesale electricity markets such as demand response and ancillary services |
| WRI | World Resources Institute |

Hingham Climate Action Planning Committee

# EXECUTIVE SUMMARY

A successful plan for community-wide action must come from a successful stakeholder process. For more than a year, the Climate Action Planning Committee engaged in such a process, bringing together the opinions of multiple participants through surveys, meetings, live outreach, and written publications. Throughout the process, considerations of social equity and environmental justice were discussed and incorporated. The process itself and recommendations focus on 1) transparency and inclusion, 2) education and outreach, and historic preservation. This Climate Action Plan ("Plan") is the result of that process – a documentation of the consensus built through conversation and discussion.

**Section 1** offers an introduction to what prompted development of a Plan, followed by an overview of the plan in Section 2. **Section 2** begins with a call to action -- what you can do to help implement the Plan (Figure ES-1). This type of matrix is repeated in the body of the Plan for each of the core components.

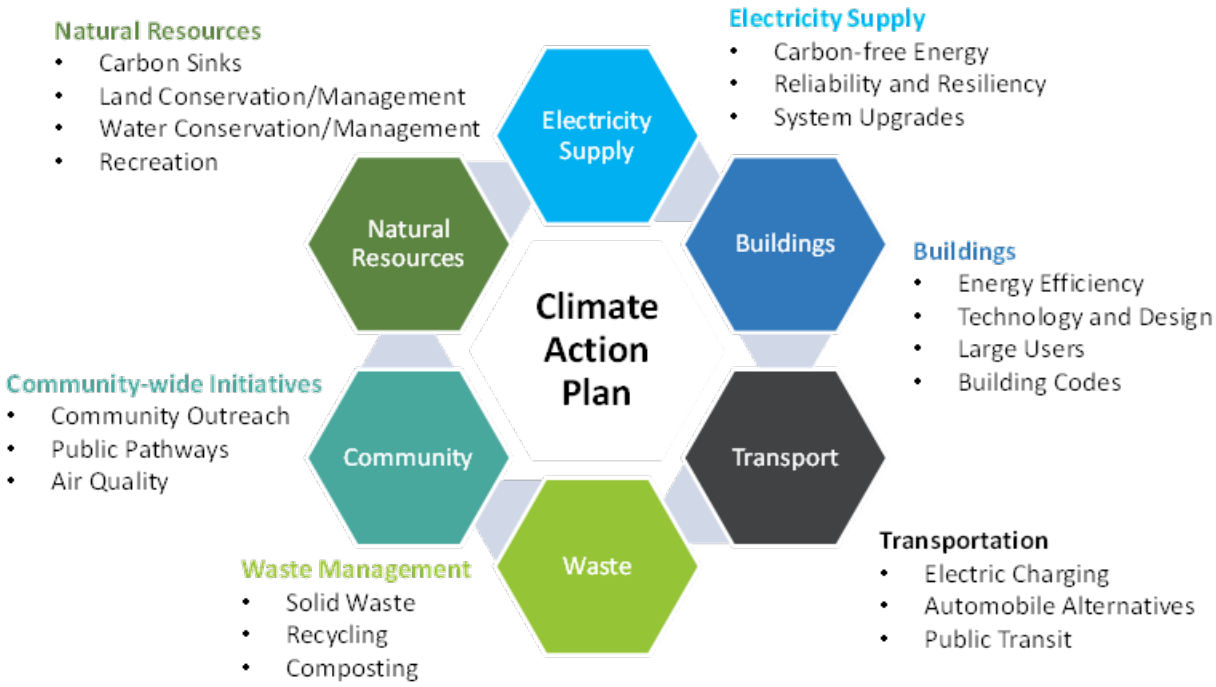
## Figure ES-1: What You Can Do to Help Implement the Plan

| | |
|---|---|
|  Residents | • Read the plan and become familiar with what you can do as a resident of Hingham<br>• Follow the progress on achieving the goals and tasks in this Plan and hold responsible parties responsible for implementation<br>• Be aware of warrant articles tied to this Plan and inform voters on how to proceed |
|  Businesses | • Read the plan and become familiar with what you can do as a business in Hingham<br>• Join other businesses in realizing economies of scale to implement recommendations<br>• Ensure implementation of this Plan provides a business-friendly environment |
|  Government | • Take the lead on education and implementation of this Plan<br>• Ensure responsible parties are specified and held accountable<br>• Establish appropriate funding processes to implement recommendations<br>• Track and monitor progress, with regular updates to the town |
|  Schools | • Publicize the Plan to students, parents and teachers so they are educated<br>• Encourage student groups and activities that enable and implement relevant tasks<br>• Find ways for the schools to modify operations to be consistent with the plan<br>• Provide a curriculum to inform students on sustainability and how to measure and reduce their environmental impact |
|  Innovators | • Understand opportunities in Hingham and elsewhere related to decarbonization<br>• Identify the technologies, business models and missing links to implementation<br>• Develop solutions to provide efficient and cost-effective means of achieving decarbonization |

**Sections 3 through 8** provide additional insight into how to address each of the core sources of

Hingham's carbon emissions. Those six component parts also provide a framework consistent with the categories that already have been and are being addressed by other Massachusetts municipalities in their climate action plans (see Figure ES-2).

## Figure ES-2: Core Components of Hingham's Climate Action Plan




Each section delves into the current state of Hingham's core sources of carbon emissions and provides an overview of the recommended actions to reduce those emissions. Those recommended actions are detailed further in Appendix A, which provides a series of tables that present specific tasks, relative cost, timeframe, metrics, and responsibility. Those tables may be used going forward to provide an annual update and dashboard against which Hingham's decarbonization progress can be tracked.

The Plan also identifies the parties that will play leadership roles going forward to guide the collective in implementing the plan. **Section 9** presents recommendations on the role that key stakeholders play in implementation, including:

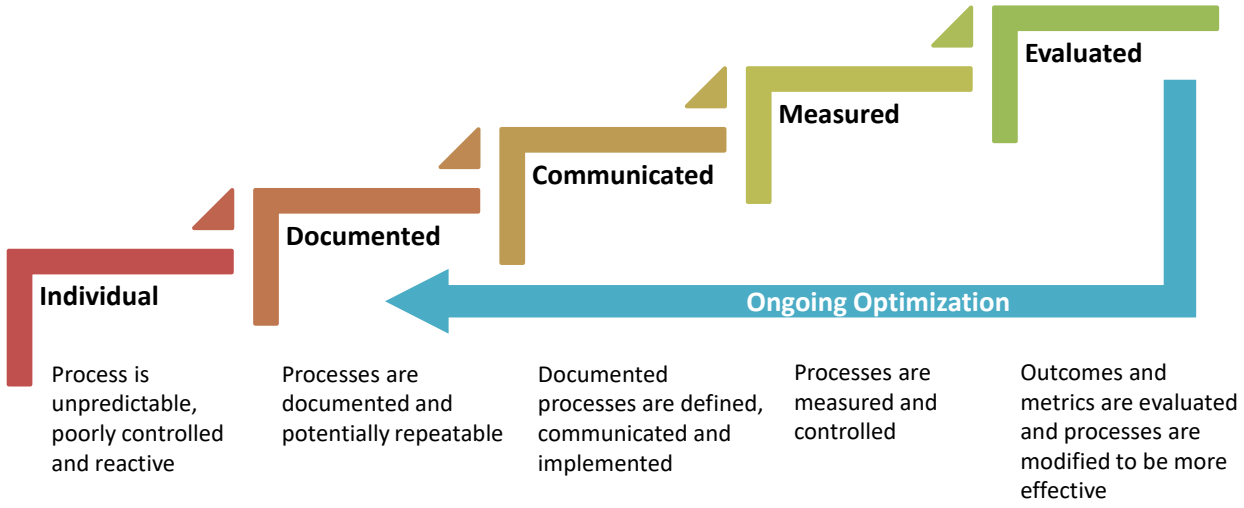
- Town leadership
- Hingham Municipal Lighting Plant
- Town Committees
- Businesses and Large Consumers of Energy
- Residents

- Public Interest Groups
- Hingham School District
- Government

With so many parties playing a role in implementation, the section on roles and responsibilities ends with a discussion on collaboration and coordination.

**Section 10** describes how to optimize the implementation process. Achieving net zero is a matter of establishing a process and constantly improving on that process based on tracking key variables and metrics within the broader context of local, industry and policy trends. Process optimization requires a continuous feedback loop of communication, assessment, and revision (Figure ES-3).

## Figure ES-3: Optimized Implementation of the Climate Action Plan




As complete as the Plan may be, and as optimized as implementation may become, the process will not be complete until decarbonization is realized and permanently in place, currently anticipated to occur no sooner than 2040.

The document itself therefore becomes a part of the process – a guide that will be revised and updated as conditions change and new solutions become technically, financially, socially, and politically, and feasible. As the Conclusion notes in **Section 11**, this Plan simply provides the start of a program for moving down the path towards decarbonization based on information and conditions known today. Over time, as conditions change, new technologies appear, policy requirements adapt, an updated revision will provide an update on what has been achieved and what still is required. With the Plan in place, it is now time to begin.

Hingham Climate Action Planning Committee

# 1. INTRODUCTION

A climate action plan is more than a simple report or document, it is a process. And that process begins with outreach and discussions to bring residents and town leaders to consensus on what the right path forward should be. This document provides the recommendations and insights garnered through a year-long process of the Climate Action Planning Committee to develop a Climate Action Plan for the Town of Hingham.

At the start, it is important to note that HMLP has played and will continue to play a critical role in developing, updating, and implementing the Plan, including funding for the Consultant who guided the Plan. However, it is the collective will of Hingham residents and businesses that established Hingham's goal to establish a Climate Action Plan to reach Net Zero. It is these individuals and organizations, together with Hingham's leaders, who will need to bring this plan to fruition.

Hingham already has established two goals that are critical to this Plan:

1) **Clean Energy Goals:** In 2017, the Hingham Municipal Lighting Plant ("HMLP") Board voted to add 100% carbon-free energy to HMLP's mission.

2) **Net Zero Goal:** Town Meeting approval in 2021 to develop a Climate Action Plan with the aim of achieving net zero carbon emissions by 2040.[1]

HMLP

HMLP funded the development of the Climate Action Plan with $80,000 from its green fund. As the sole electricity provider to Hingham, HMLP plays a critical role in decarbonizing the community and already is promoting electrification through its **Electrify Hingham** program, which includes information and rebates for:

1) Weatherization
2) Heat Pumps
3) Electric Vehicles
4) Solar & Batteries
5) Appliances
6) LED Lighting

[1] Article 14 approved at Hingham Town Meeting on May 4, 2021 specifically allows for establishment of a Climate Action Planning Committee to establish a Climate Action Plan ("CAP"). In the Comment section, establishment of the Climate Action Planning Committee affirms "the development of a CAP for the Town, including the goal of "net zero" carbon emissions by the targeted date." In the Recommended section, the Climate Action Planning Committee is charged with "establishing a Climate Action Plan, which will evaluate a wide range of carbon emission reduction strategies and propose measures within the Town of Hingham to achieve a zero sum of carbon emissions produced and taken out of the atmosphere ("net zero") by the year 2040 or another target deemed feasible." The Warrant is provided here: https://www.hingham-ma.gov/912/2021-Town-Meeting-Results; a record of the approval is provided here: https://www.hingham-ma.gov/912/2021-Town-Meeting-Results

There are multiple ways to achieve Hingham's net zero goals by 2040. Each path includes its own set of costs, benefits, and investment decisions. Members of the Climate Action Planning Committee, HMLP, the Town of Hingham, and the public engaged in numerous discussions regarding what path would be feasible for the community to pursue.

As with plotting any path, there are many ways to get to the same end-point. This plan charts a course built on consensus that focuses on feasibility, minimizes risks while maximizing returns, identifies alternatives, and maps out the milestones and landmarks to achieve Hingham's net zero goals.

The next section provides an overview of the Climate Action Plan. Each section thereafter describes the high-level categories of actions required to address carbon emitted by each source introduced in the overview, with a summary of what members of the Hingham Community can do and specific action items included in the appendices. The final section provides a recommendation for the path ahead and how to optimize the process for achieving Hingham's Net Zero goals.

HINGHAM NET ZERO

Hingham Net Zero was founded by residents of Hingham for education and advocacy to:

1. Raise awareness of the need for climate action.
2. Support the Town's efforts to reduce emissions.
3. Work to reduce carbon emissions across the town as quickly as possible.

It is important to note that Sections 2 through 8 each begin with a matrix that explains what YOU can do. You may be a resident or business in Hingham, part of government leadership or involved with the schools. Perhaps you are an innovator or someone involved in one of Hingham's many public interest groups. If you are focused on action, that first table suggests how you may move forward and help to implement the Plan's carbon reduction recommendations.

The appendices provide additional detail. Appendix A includes the specific action items, including general cost estimates and timeframes for implementation. Appendix B provides a town-wide carbon emissions inventory and illustration of a path towards decarbonization. Appendix C provides a summary of the survey results, and Appendix D lists the public meetings and public engagement opportunities that this Committee sponsored over the course of the engagement. Appendix E provides examples of potential funding resources that are available in 2023 for Hingham to pursue, recognizing that grant programs and funding sources are constantly changing and will need to be pursued both opportunistically and strategically.

Hingham Climate Action Planning Committee

# 2. OVERVIEW OF THE PLAN

## What you can do to help:

| | |
|---|---|
|  Residents | • Read the Plan and become familiar with what you can do as a resident of Hingham<br>• Follow the progress on achieving the goals and tasks in the Plan and hold assigned parties responsible for implementation<br>• Be aware of warrant articles tied to the Plan and inform voters on how to proceed |
|  Businesses | • Read the plan and become familiar with what you can do as a business in Hingham<br>• Join other businesses in realizing economies of scale to implement recommendations<br>• Ensure implementation of this Plan provides a business-friendly environment |
|  Government | • Take the lead on education and implementation of the Plan<br>• Ensure responsible parties are specified and held accountable<br>• Establish appropriate funding processes to implement recommendations<br>• Track and monitor progress, with regular updates to the Town |
|  Schools | • Publicize the Plan to students, parents and teachers so they are educated<br>• Encourage student groups and activities that enable and implement relevant tasks<br>• Find ways for the schools to modify operations to be consistent with the Plan<br>• Provide a curriculum to inform students on sustainability and how to measure and reduce their environmental impact |
|  Innovators | • Understand opportunities in Hingham and elsewhere related to decarbonization<br>• Identify the technologies, business models and missing links to implementation<br>• Develop solutions to provide efficient and cost-effective means of achieving decarbonization |

There are a number of frameworks for understanding how carbon emissions are generated and how to reduce them. The GHG Protocols were established by the World Resources Institute (WRI) in the early 2000s.[2] The GHG Protocols categorize carbon emissions into the following categories:

**Scope 1:** Direct greenhouse gas emissions generated within the boundaries of a community through combustion of fossil fuels or processing of carbon-intensive inputs that result in the release of carbon into the atmosphere.

**Scope 2:** Indirect greenhouse gas emissions occurring as a consequence of the procurement of electricity, heat, cooling, and steam for use within the community boundary, where combustion of fossil fuels and release of

[2] WRI, Global Protocol for Community-Scale Greenhouse Gas Inventories: An Accounting and Reporting Standard for Cities, Version 1.1,

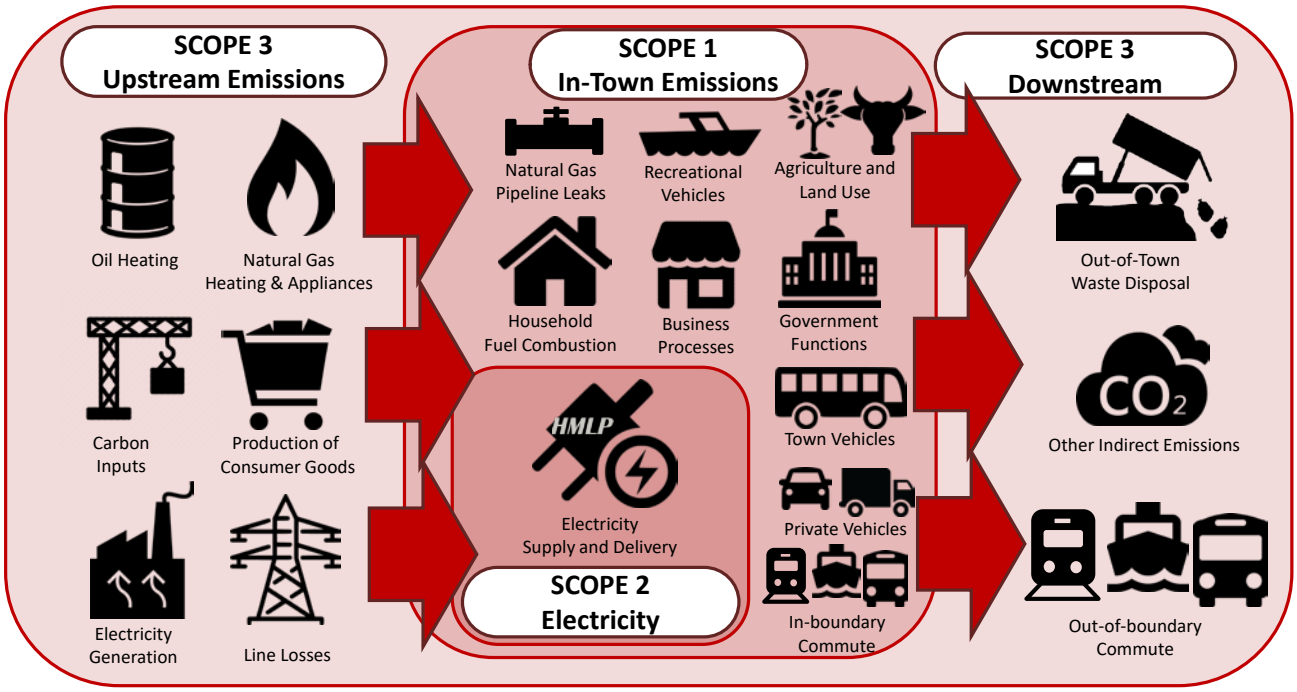
carbon emissions is performed by others outside of the community.

**Scope 3:** Indirect greenhouse gas emissions generated by others outside of the city boundary as a result of activities that occur within the city boundary.

**Scope 4:** Offsets or carbon-reducing activities outside of the emissions-generating activities.[3]

**Figure 1** illustrates each category and source of emissions that can be addressed by a community to reduce emissions based on the WRI GHG Protocols.

## Figure 1: Illustration of Community-Scale GHG Inventory Categories[4]




The WRI GHG Protocols for municipalities divide emissions into three categories:

[3] Scope 4 emissions were not a part of the original GHG protocol emissions categories, but are gaining traction as a means of offsetting any remaining carbon emissions that cannot be reduced or eliminated through direct intervention or alternatives.

[4] Developed to be Hingham-specific with the benefit of the World Resources Institute GHG Protocol for Cities, https://ghgprotocol.org/greenhouse-gas-protocol-accounting-reporting-standard-cities as documented in: Global Protocol for Community-Scale Greenhouse Gas Inventories, An Accounting and Reporting Standard for Cities, Version 1.1., p. 11, https://ghgprotocol.org/sites/default/files/standards/GPC_Full_MASTER_RW_v7.pdf

- **Scope 1:** Includes fuel combustion within the boundary due to heating, cooling and appliance usage, along with transportation. Land-use and incoming waste also contribute to a community's emissions.

- **Scope 2:** Grid-supplied energy delivered into the Town represents Scope 2 emissions, although carbon emissions from electricity generation within the town would be considered Scope 1 emissions.

- **Scope 3**: Includes emissions generated upstream from deliveries into Hingham such as public modes of transportation, as well as down-stream emissions from transportation sources that leave Hingham, waste that leaves Hingham, and leaks or losses due to energy transportation outside of the Town's boundary.

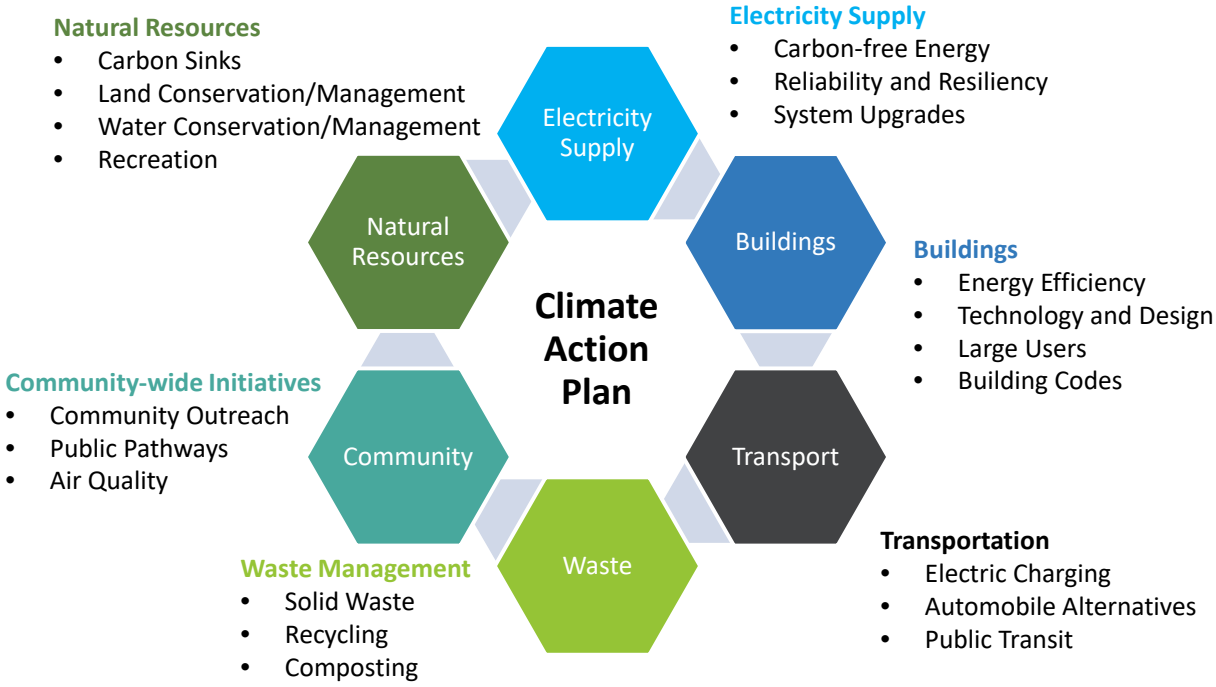
These sources of carbon emissions, which include what is brought into the Town and what is taken out of the Town (i.e., Scope 3 emissions), need to be acknowledged. This Plan targets a reduction in carbon emissions where the Hingham community can control whether or not carbon is emitted or absorbed. For purposes of this Plan, the goal of achieving "Net Zero" is to reduce carbon emissions that are in the control of the community to as close to zero as possible, including credits and offsets that counter the emissions that cannot be completely reduced.

A review of twenty-five other Massachusetts municipal climate action plans confirmed the key categories for targeting emissions presented in the WRI document, albeit organized into different groupings. The Climate Action Planning Committee chose to focus on the following six categories (**Figure 2**):

1) Energy
2) Buildings
3) Transportation
4) Waste Management
5) Community
6) Natural Resources

Hingham Climate Action Planning Committee

## Figure 2: Components of the Climate Action Plan




This Plan addresses each of these component parts in more detail, delving into key areas of implementation. The following sections provide a high-level summary of the decarbonization challenge specific to Hingham and a summary of the recommendations. For those interested in understanding who can do what to achieve the recommendations in the plan, each section includes a high-level summary of specific actions that can be taken by Hingham's residents, businesses, governing bodies, schools, and innovators. Appendix A provides specific action items to implement each of the component parts of the Plan.

# 3. ELECTRICITY SUPPLY

## What you can do to help:

| | |
|---|---|
|  Residents | • Understand the energy sources supplying your residence<br>• Support HMLP's move towards 100% clean energy<br>• Identify and invest in renewable resources directly when feasible and economic<br>• Explore ways to become more resilient in the face of extreme weather conditions |
|  Businesses | • Identify and pursue economic investments in carbon-free energy resources directly for commercial buildings<br>• Identify and implement reliability and resiliency measures when economic<br>• Perform your own carbon inventory, understand your carbon risks and develop your own sustainability plans for achieving net zero carbon emissions |
|  Government | • Support HMLP's efforts to achieve 100% clean energy<br>• Educate town residents and businesses on ways to achieve net zero<br>• Coordinate decarbonization efforts with State and Federal entities<br>• Establish personnel and processes responsible for obtaining grant funding |
|  Schools | • Identify ways to implement carbon-free resources as direct electricity supply<br>• Explore economic investments in resiliency (e.g., batteries and backup storage)<br>• Create a curriculum around the economics of alternative clean energy resources<br>• Aim to achieve net zero energy consumption by the schools |
|  Innovators | • Identify existing shortfalls in clean energy options<br>• Develop and commercialize energy storage technologies<br>• Implement innovative business models to make clean energy attainable for all |

HMLP provides electrical service to residents, businesses and other electricity end-users in the Town of Hingham. As indicated in the mission statement, "HMLP works diligently to provide the residents of Hingham with low cost, safe, reliable electric service on demand at a competitive price."[5]

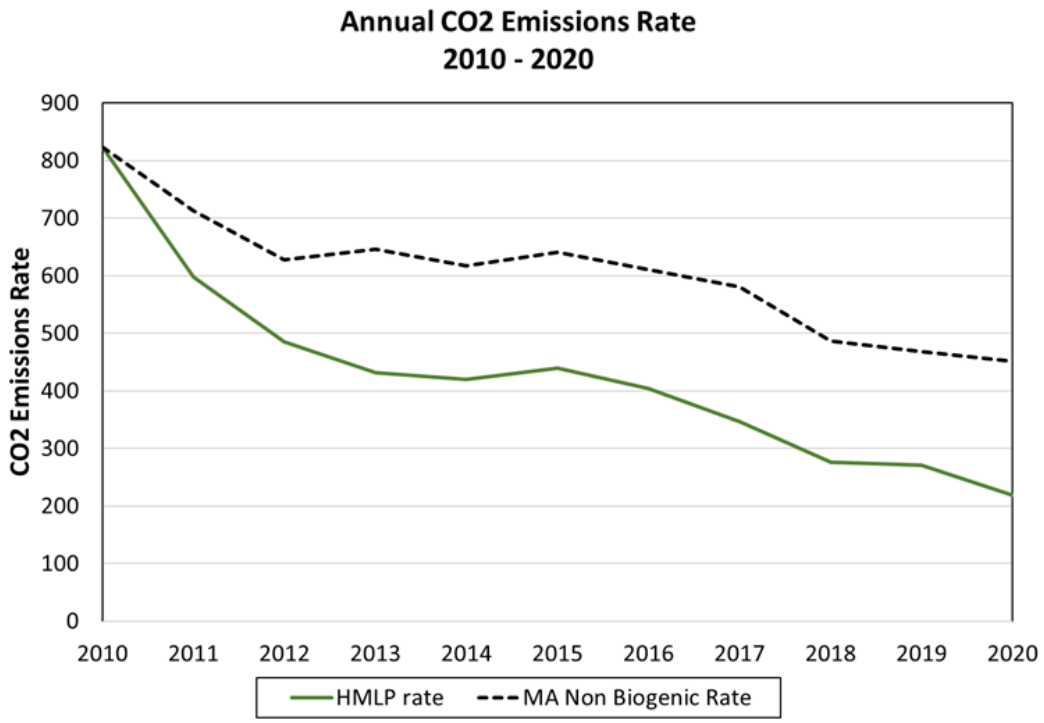
HMLP already is pursuing decarbonization and sustainability initiatives that fit into its mission, including the pursuit of 100% carbon-free energy for its ratepayers. HMLP has launched an Electrify Hingham Initiative to promote electrification and identify decarbonization opportunities, including local, state, and federal incentives. The list of activities that HMLP engages in to achieve carbon reductions at an affordable cost for Hingham ratepayers is extensive and dynamic – responding to available funds and market conditions. Although different aspects of HMLP's

[5] HMLP Website, https://www.hmlp.com/about-hingham-municipal-lighting-plant/

programs are addressed in this section, additional electrification opportunities are described in their relevant sections (e.g., buildings, transportation, and natural resources).

As a result of HMLP's efforts, Hingham's annual carbon dioxide ("CO2") emissions rate for electricity has declined by a faster rate than the state's emissions rate (**Figure 3**).

## Figure 3: HMLP Carbon Emissions versus Massachusetts[6]




This success to date, along with ongoing efforts to decarbonize HMLP's power supply and prepare for a net zero distribution system is a critical component of the Hingham Climate Action Plan. Not only is HMLP funding this study, the municipal utility is a critical component of implementation of the recommendations in the Climate Action Plan. Regardless of whether the proposed path is electrification, carbon-free energy procurement, purchasing carbon emissions credits, and/or operating virtual power plants created by residential batteries, the relationship with and input from HMLP is critical to the success of the Plan.

**Figure 4** summarizes the recommendations associated with electricity supply, with a focus on decarbonization of power sources while maintaining reliability and resiliency. Energy efficiency is the start of any program to decarbonize; reducing demand realizes greater efficiencies and reduces

[6] Hingham Municipal Lighting Plant, data for 2020 is an estimate.

the cost of switching from fossil fuels to carbon-free energy. The next section on Buildings addresses energy efficiency for all energy sources, followed by a section on Transportation that discusses conversion to more efficient electric vehicles. In contrast, this section focuses on decarbonizing Hingham's electrical power supply in order to provide a carbon-free source of energy for buildings and transportation as they become more efficient.

## Figure 4: Electricity Supply Decarbonization Recommendation Categories

| | |
|---|---|
| **Carbon-Free Energy** | • HMLP acquire all energy supply from carbon-free sources<br>• Continue carbon-free energy in town and net metering programs<br>• Use federal and state incentives to reduce direct costs<br>• Promote electrification |
| **Reliability** | • Quantify and mitigate risks associated with electrification<br>• Explore demand response and virtual power plant programs<br>• Pursue opportunities for system automation and optimization |
| **Resiliency** | • Explore community-solar and Hingham-based supply<br>• Create backup microgrid systems for Town buildings to support functions<br>• Offer protection to most vulnerable who rely on powered devices |
| **System Upgrades** | • Upgrade distribution system to allow for electrification load<br>• Invest in system automation to control decentralized energy resources<br>• Purchase carbon credits as needed to cover shortfalls |

The following sections describe these efforts in more detail, including the current status and recommendations regarding:

1) **Carbon-Free Energy:** Increase carbon-free energy and electrification for Hingham with decentralized, distributed energy resources ("DER"), carbon-free energy power procurement, and initiatives such as Electrify Hingham.

2) **Reliability & Resiliency:** Fortify system reliability and resiliency by strategically investing in demand response programs, DER, and community resources.

3) **System Upgrades:** Upgrade the physical transmission and distribution system to enable electrification of load and invest in tools to manage the system.

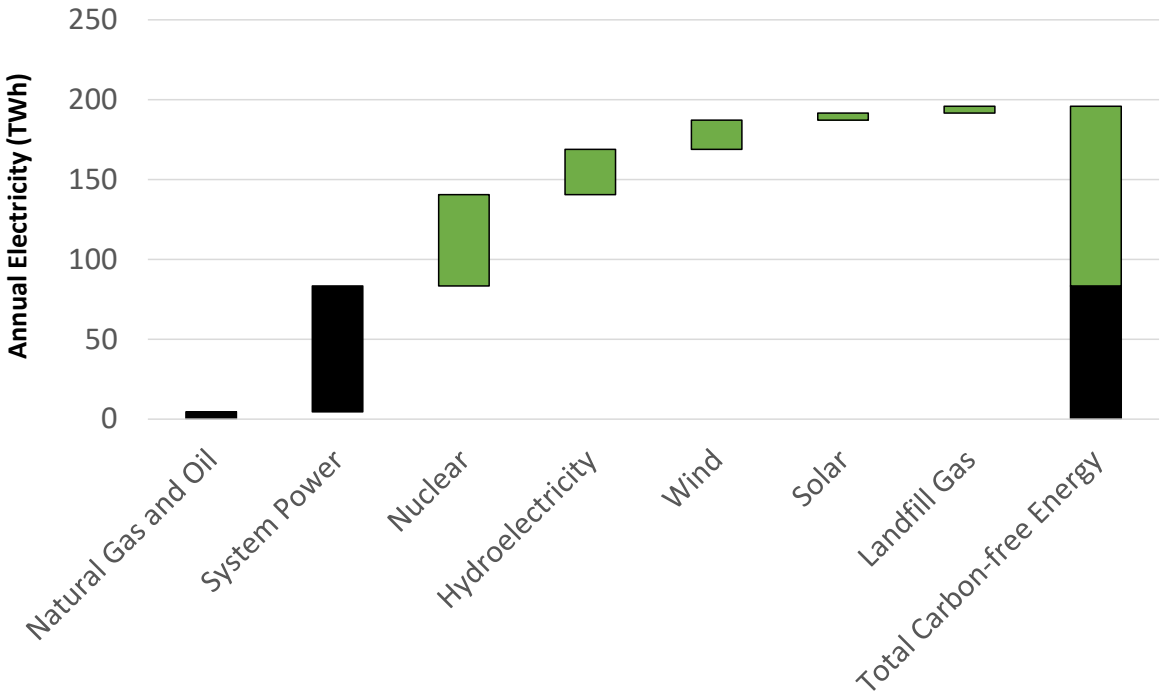
The next three sections provide a more detailed overview. Detailed action items (Appendix A) include new actions and continuation of existing efforts already underway to increase reliance on clean energy resources, improve reliability and resiliency, and ensure that the system is ready to meet Hingham's needs into the future.

## 3.1. CARBON-FREE ENERGY

The cornerstone of the Plan is HMLP's efforts to decarbonize its power supply and enable end-users to decarbonize theirs. When electricity is carbon-free, the electrification of buildings and transportation can occur without adverse impacts to the environment.

Fortunately, HMLP already has committed to seeking carbon-free energy for its power supply and the process of moving to net zero is underway. In 2021, 57 percent of Hingham's power supply was considered carbon-free (**Figure 5**).

### Figure 5: HMLP Electricity Supply Portfolio 2021[7]




Two aspects of HMLP's current services are worth note:

[7] Energyzt analysis of HLMP data.

1) **Power Procurements:** HMLP provides distribution services to Hingham and does not own its own generation resources. HMLP procures the electricity that Hingham uses through Energy New England ("ENE"). HMLP is a part owner of ENE and works with them to secure competitive power contracts when available. HMLP is not responsible for shutting down or converting existing plants to clean energy resources, and instead has the flexibility to consider alternative purchase arrangements.

2) **Carbon-free Energy Extends beyond Renewable Resources:** HMLP currently achieves its decarbonization goals through power purchases from clean energy resources such as nuclear power, hydroelectric plants, wind, and solar energy. Given the goal of decarbonization, the emphasis should continue to be procurement of zero-carbon energy.

HMLP also purchases power from customers with generation assets through its net metering program. In Hingham, this is most common from rooftop solar energy arrays. Net metering is when a resident or business produces more electricity than it uses and HMLP buys that excess energy from the customer.

The value of the energy sent back into the system, based on the market price for energy supply, is credited to a customer on their electric bill. A key action item is to continue this program so that electricity users in Hingham have the opportunity to purchase and install solar energy arrays on their property and sell any excess back to HMLP.

## NEGAWATTS = ENERGY SAVED

The first step in any carbon reduction initiative is to reduce the wasteful use of energy. A "negawatt" is a reduction in energy versus "megawatts" (a standard measure of energy production and consumption). Studies have shown that energy efficiency and demand response are the most cost-effective approaches for decarbonization given the current waste in the system. Every reduction in electricity watts, natural gas British thermal units, gallon of gasoline, or barrel of oil reduces associated carbon emissions and makes it less costly to convert to carbon-free sources. A dollar saved is a dollar earned, and energy you save can also earn money.

## VIRTUAL POWER PLANTS

The technology already exists for HMLP to consider aggregating such resources to decrease demand on HMLP's system and be paid to provide an offset to load through ISO-NE capacity markets. As Hingham electricity consumers become "prosumers" and produce their own power with solar arrays, acquire electric vehicles with two-way charging/discharge, and install their own energy storage systems, these dispersed Distribution Energy Resources ("DERs") may be combined into a virtual power plant.

Another program sponsored by HMLP is the "Electrify Hingham" program which offers ratepayers education and incentives to promote electric alternatives to traditional functions supplied by fossil fuels. Part of this program includes educating citizens on how to convert to electric alternatives. In addition to continuing this program, a new recommendation creates a broader education program for citizens to understand how they can reach net zero carbon emissions, of which electrification is a subset.

As HMLP's power supply portfolio decarbonizes, there should be a push towards electrification as part of achieving the Town's net zero goals. Educating citizens on the electrical alternatives also reduces inefficiencies in the market tied to lack of or asymmetrical information.

During 2020, HMLP established a fund for green initiatives, to invest in capital additions tied to green power investments.[8] As a result, the generation mix serving Hingham can be expected to become even cleaner.

## 3.2. RELIABILITY AND RESILIENCY

Reliability minimizes disruptions to delivery while resiliency minimizes the time required to resolve disruptions. Maintaining each of these at levels that ensure adequate power supply to Hingham electricity users is a key part of the transition to net zero carbon emissions.

Reliability is knowing that the lights will turn on when you flip the switch. An unreliable system is one that experiences frequent outages during which power supply is compromised or cannot be delivered. As electrical load increases, a system can become stressed, potentially resulting in declining reliability. This section describes the high-level recommendations to ensure decarbonization does not reduce the reliability of HMLP's system.

[8] Hingham Municipal Lighting Plant, Financial Report 2020, https://www.hmlp.com/wp-content/uploads/simple-file-list/FinancialReport2020.pdf

HMLP is primarily a distribution utility that is responsible for delivering electricity from the high voltage system overseen by ISO-NE through the low voltage system operated by HMLP to HMLP's customers located in Hingham. As a municipal light plant territory, everyone within the borders of Hingham must purchase electricity from HMLP.

HMLP's responsibility for delivering electricity ends at the Town's borders. However, nearly all of its energy comes from outside of its borders through power purchase agreements. Reliability requires ensuring that sufficient supply is procured and adequate delivery equipment is installed to bring that electricity to power consumers in Hingham.

The combination of reliance on a subset of wholesale electricity market resources, net metering purchases, and electrification of the system could combine to have an adverse impact on reliability. Therefore, the Plan recommends that attention be paid to reliability.

To this end, recommendations explicitly request that HMLP monitor, quantify, and mitigate any distribution system risks associated with electrification, consider using active demand response programs and virtual power plant programs (see sidebar) to reduce peak demand on the system, as well as pursuing additional opportunities for equipment and software that can automate and manage the system.

### REGIONAL GREENHOUSE GAS INITIATIVE

Massachusetts is one of 11 states that participate in RGGI (pronounced "Reggie") – an intergovernmental organization established to create a market-based carbon credit trading program. By purchasing and retiring carbon credits, HMLP can offset its own carbon emissions and incentivize greater carbon mitigation efforts.

Resiliency reflects how quickly a system recovers from a reliability event. A more rapid recovery reflects greater resiliency than a longer-term outage event. Resiliency can also be created through emergency preparation, backup power supply, and self-contained power systems that can operate off the grid (e.g., microgrids). While HMLP undertakes decarbonization and focuses on reliability, it also is important to proactively invest in resiliency to minimize the impact when the system is unable to deliver power supply.

HMLP has its own emergency preparedness efforts as well as arrangements with the Northeast Public Power Association ("NEPPA") mutual aid calls with other neighboring municipal light companies. Recommendations do not focus on these normal operational preparation and procedures. Instead, resiliency focuses on ways that clean energy investments can produce resiliency as well as decarbonization.

Recommendations for resiliency include having HMLP explore cost-effective ways to facilitate community solar and other Hingham-based carbon-free power supply. The Plan recognizes that Hingham has citizens that may be more vulnerable to extended outages, including those who rely on electricity-powered medical devices. By capitalizing on advancing technology, government incentives, and clean energy resources that HMLP and others within Hingham may locate within the borders of the Town, decarbonization efforts can be used to improve resiliency as well as the environment.

## 3.3. SYSTEM UPGRADES

The distribution system servicing the Town of Hingham was created during a carbon-based energy world. As a result, conversion to clean energy resources and electrification may impose new stresses on the distribution system that did not exist before.

HMLP already is engaged in a project to upgrade the transmission system delivering power over a high voltage line into Hingham. The Hingham Electrical Infrastructure Reliability Project ("HEIRP") is the construction and operation of a new transmission line and substation in Hingham to address critical reliability needs and support the Town's climate change initiatives.

This Climate Action Plan recognizes that the HMLP system will need investment to adapt to the new realities of an electrified system that includes greater integration of distributed energy resources. To this end, recommended actions focus on:

1) **Upgrades:** Encouraging HMLP to monitor and upgrade its transmission and distribution systems to allow for the targeted electrification of load, greater total energy consumption, and potentially higher winter peaks associated with installation of heat pumps.

2) **System Automation:** Cost-effective investment in system automation to control decentralized energy resources and optimize system operations to carry greater load with fewer losses.

HMLP already does and will continue to play a critical role in helping the Town of Hingham to achieve its net zero goals. The specific action items have been developed in conjunction with HMLP ensure continued reliance on HMLP to implement the clean energy goals of the Climate Action Plan.

Hingham Climate Action Planning Committee

# 4. BUILDINGS

## What you can do to help:

| | |
|---|---|
|  Residents | • Reduce consumption through energy-saving measures and automation<br>• Enroll in energy efficiency and demand response programs offered by HMLP<br>• Convert from oil to more efficient, lower carbon-emitting options<br>• Utilize MassSave programs offered by National Grid and the equivalent from HMLP<br>• Understand economics of converting from oil and natural gas systems to electric heat pumps and convert when feasible |
|  Businesses | • Reduce consumption through energy saving measures and automation<br>• Enroll in energy efficiency and demand response programs offered by HMLP<br>• Invest in more energy efficient, lower carbon-emitting HVAC options<br>• Utilize PACE program funding to invest in efficiency and clean energy |
|  Government | • Continue to engage in the MassCEC Green Communities Program and other state/federal efforts to promote funding for energy efficiency investments<br>• Invest Green Communities and other state monies into energy efficiency improvements to government buildings<br>• Where possible, convert to electric heat pumps and LEED building upgrades<br>• Educate students on engineering concepts underlying energy efficiency and LEED<br>• Encourage compliance with building codes that stretch beyond current efficiency/insulation requirements<br>• Analyze embodied energy footprint of existing buildings slated for demolition; new buildings will require a redundant embodied energy to construct<br>• Create and authorize a Hingham Buildings and Site Management Commission to develop conservation and preservation measures to steward Hingham building resources and address deferred maintenance pattern resulting in capital projects<br>• Update Hingham Zoning and Subdivision Control Bylaws with a lot coverage bylaw to protect the balance of open space and carbon sink, protection of trees, reduction in heat islands, reduced pavement and building footprint, conservation and expansion |
|  Schools | • Identify ways to implement energy efficiency and HVAC regulation and communicate with the town's grant writer to pursue funding<br>• Install automation (e.g., temperature control, lights, motion sensors) in buildings<br>• Explore replacement of existing fossil-fuel heating with heat pumps, use LED lighting, and invest in other cost-effective energy efficiency opportunities<br>• Aim to minimize essential and operational energy usage at the school buildings |
|  Innovators | • Identify existing shortfalls in HVAC systems that do not rely on fossil fuels<br>• Develop more efficient heat pumps that can operate in the most extreme weather<br>• Create business models that finance energy efficiency investments for residents and businesses |

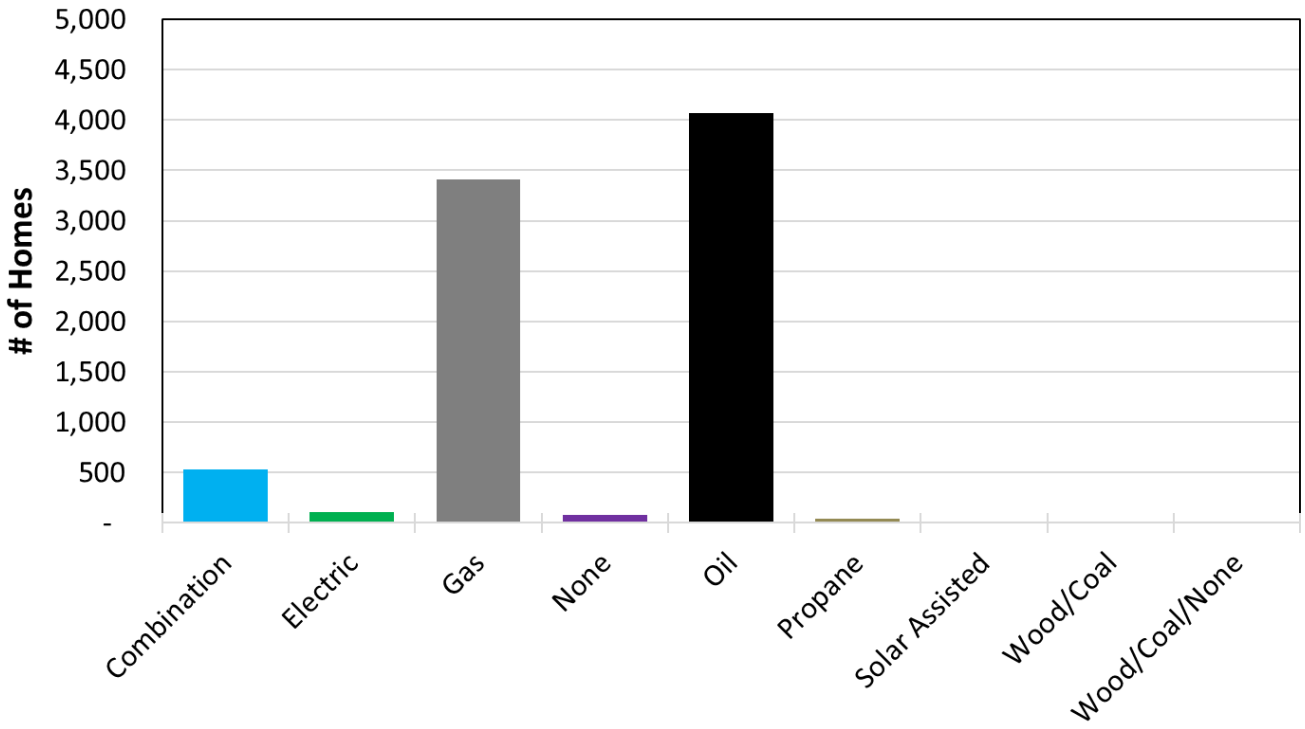
Buildings are one of the largest contributors to carbon emissions in Hingham. Nearly half of the homes in Hingham rely on oil for its heating fuel and 40 percent rely on natural gas. Only 108

homes rely on electricity (**Figure 6**). These figures illustrate how much potential carbon savings can occur if Hingham citizens can switch from carbon-intensive oil fuel to HMLP's low to no-carbon electricity. Depending on market conditions, the switch could be the more economic choice.

The technology behind air to air and air to water heat pump systems requires more development in order to facilitate systems that are affordable, serviceable, warrantable and capable of operation in home and businesses. Development of technologies to provide roof top solar assist systems to enable change to carbon free systems. In the interim, oil and gas fired home heating systems can be maintained as efficiently as possible and can assist the transition to electric heat pump systems as a backup system and replaced when no longer needed.

The bifurcation of Hingham into oil versus natural gas heating tends to be geographical. Only half of the Town has access to National Grid's natural gas distribution system. The rest generally rely on oil heat. Hingham buildings that rely on oil have a disproportionate impact on Hingham's carbon emissions. Moving to an electric heat source could create significant carbon reductions.

## Figure 6: Home Heating Fuels[9]




Before any discussion of technology conversions can occur, efforts should be made to r

[9] Hingham Data, analysis is based off data for 8,232 homes in Hingham

energy usage and create opportunities for flexible demand. Energy efficiency is nearly always the first step in any decarbonization program. Reducing energy usage – creating "negawatts" – should occur before purchase of a specific type of "megawatts." Not only do negawatts tend to be the most cost-effective approach to reducing carbon emissions, they make any investment in decarbonizing megawatts more effective.

To this end, the recommendations related to carbon emitted from buildings includes energy efficiency, promotion of more efficient appliances and heating equipment, specific programs targeting Hingham's largest users, and considering of adopting the Commonwealth's stretch codes for incorporation into Hingham's building codes (**Figure 7**).

**Figure 7: Building Decarbonization Recommendation Categories**

| | |
|---|---|
| **Energy Efficiency** | • Increase awareness and opportunities to reduce energy consumption<br>• Lead/join regional effort to compile list of contractors<br>• Promote programs such as Electrify Hingham, PACE financing and Mass Save |
| **Technology and Design** | • Promote/accommodate efficient heat pumps<br>• Educate Hingham residents on efficient alternatives with Electrify Hingham<br>• Institute new incentive opportunities for technological advancement |
| **Large Users** | • Establish commercial team to work with largest users to improve efficiency<br>• Encourage installation of automation and distributed energy resources<br>• Develop demand-side management program |
| **Building Code** | • Adopt the Massachusetts Opt-in specialized stretch code<br>• Identify/address opportunities for historical homes/districts<br>• Consider future limitations on new fossil fuel hookups |

Converting buildings from fossil fuel energy to decarbonized sources is perhaps the most significant lift in the Plan. Technology to do so cost-effectively may not be fully commercialized, although it continues to improve. Initially, education and incentives will be key to success, followed by a more comprehensive effort to publicize, market, and implement conversions of long-lived heating equipment and building systems over time. Each of the areas described above receives an overview below, with more detailed action items provided in Attachment A.

## 4.1. ENERGY EFFICIENCY

The first step in decarbonization is reducing energy usage. Reducing energy use serves two purposes:

1) Reduce reliance of fossil fuels; and

2) Make electrification more affordable.

Using existing technologies and incentives to reduce demand for energy is the first step in any decarbonization program.

HMLP already engages in energy efficiency programs that help customers to reduce their energy usage and demand. Around fifteen years ago, Hingham retained a consultant to identify ways the Town could reduce its municipal government electricity consumption. The Town also has been engaged in various energy efficiency investments through the Massachusetts Green Communities program, investing in more efficient operating equipment with funding from the Massachusetts Green Communities (see sidebar).

HMLP promotes energy efficiency to its electricity customers. National Grid offers MassSave incentives energy efficiency to Hingham's natural gas users. HMLP has direct access to Hingham's citizens that rely on heating oil, through their electricity usage. It is important to ensure that HMLP can offer their electricity customers that use heating oil information about energy efficiency opportunities as well as more efficient electrical alternatives.

Over the past decade, the impact of energy efficiency efforts has been a success. While Hingham's population has increased by 10

GREEN COMMUNITIES
Massachusetts
DEPARTMENT OF ENERGY RESOURCES

Hingham has received the following grants for energy efficiency as part of the Green Communities Program:

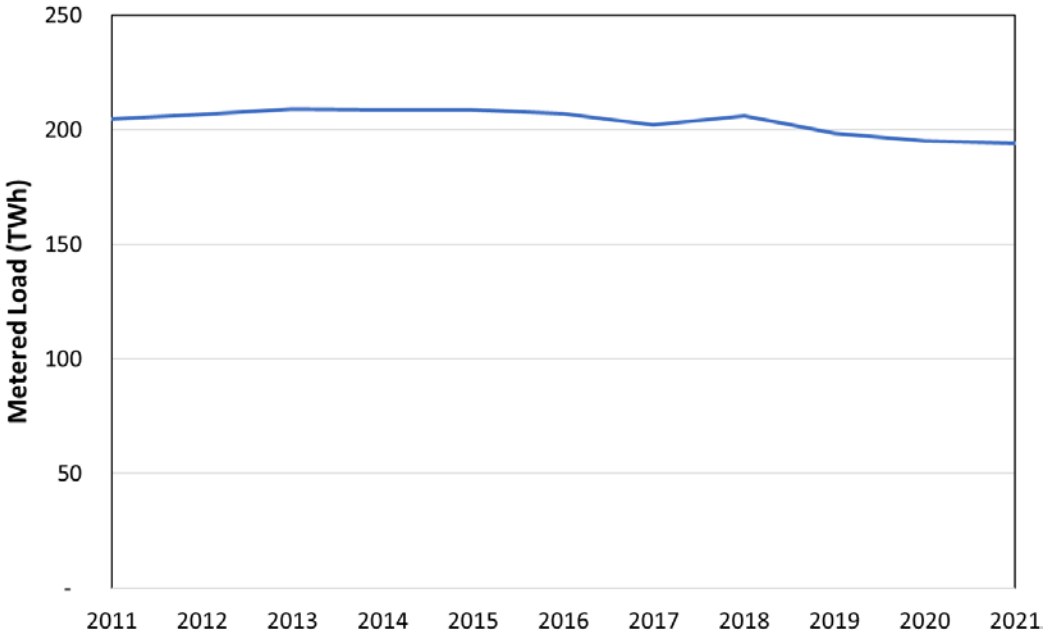
- **Efficient Pumps and Ventilation:** In 2018, the Town received $142,232 to fund energy conservation measures tied to improving demand control ventilation, variable frequency drives and lighting in the Broad Cove Sewer Pumping Station, South Elementary School and High School.

- **LED Lighting:** In 2022, Hingham received a grant of $185,475 to fund energy conservation measures including installation of LED lighting and administrative assistance in municipal facilities including the High School and Town Hall.

Massachusetts is considering a new version of the program tentatively called "Climate Leaders" that would further reward climate vanguards such as the Town of Hingham.

percent[10] and housing units have increased by 2.25 percent,[11] total energy usage has declined slightly from just over 200 TWh per year to below 200 TWh per year (**Figure 8**).

## Figure 8: Hingham Historical Metered Electricity Load (2011 – 2021)[12]




There continues to be room for improvement. Residents and businesses can realize energy cost savings through investments in energy efficiency and smarter energy use. Energy efficiency investments include insulation, air-sealing, less energy-intensive appliances, and LED lighting. Regulation of heating and cooling systems also may create savings.

This Plan recommends continuation and expansion of HMLP's existing programs, legislative support for maintenance and expansion of existing energy efficiency programs, and consumer education on energy efficient alternatives and decarbonization opportunities.

## 4.2. TECHNOLOGY AND DESIGN

Heating and appliances tend to be the largest energy users within the building envelope. Once energy efficiency and demand response programs have been implemented, additional efficiencies

[10] See U.S. Census data for Hingham in 2010 and 2020, https://www.census.gov/quickfacts/fact/table/hinghamtownplymouthcountymassachusetts,MA/HSD410220
[11] Hingham Housing Data Profile, http://www.housing.ma/hingham/profile
[12] Energyzt analysis of HMLP data; data was not available for 2014.

and decarbonization may be obtained through conversion of fossil fuel heating sources to cleaner alternatives.

Until the past few years, electric heat pumps simply were not feasible as a stand-alone solution for New England winters. The technology was notoriously inept at frigid temperatures which is a common occurrence in New England, requiring a fossil fuel alternative for backup during sub-zero conditions. Falling natural gas prices due to shale reserves and significant improvements in natural gas boilers outpaced efficiency improvements in heat pumps since 2008.

As New England experiences increasing reliance on significantly higher oil and natural gas prices due to global market conditions, however, improvements in electric heat pump technology can create a competitive advantage.

Electric heat pump technology has improved and continues to improve. Heat pumps may now prove to be a cost-effective and technologically feasible alternative to fossil fuel boilers and less heating systems that rely on those boilers to heat water or forced air. In addition, certain models are specifically configured to operate during freezing winter conditions. Converting an existing fossil-fuel heating system, however, is an expensive proposition unless the system is at end-of-life and ready for an upgrade.

It is important that the new installation matches the building's environmental control needs. Electric air to air, air to water, and solar assist heat pump technology, sizing and design, engineering and installation should be based on:

- Determining the heating load and sizing the pump(s).
- Designing and engineering the interface of the heat pump to the existing or new air distribution system or the existing or new hydronic heating system.
- For domestic hot water heating, a solar assist heat pump system and hot water storage tank can be utilized. The air to water heat pump design load should be set for the domestic hot water load demand and secondarily for the hydronic heating system load demand.
- The electrical load and distribution system will need to be sized to include lighting, appliances, cook tops, power, heat pumps, solar panel PV generation and connection to the HMLP grid, electrical vehicle charging, and interface with an inverter for the photovoltaic panel installation.

Appliances also have come a long-way with Energy Star ratings setting the market and built-in computer chips allowing for interactive communications and remote signals to provide demand response. As a long-lived capital investment, appliances can be converted from fossil fuel to lower carbon-emitting resources over time and as technology allows.

Recommendations include capitalizing on these technological advances by educating HMLP

customers on energy efficient alternatives including electric heat pumps. Creation of demand response programs that can capitalize on remote controls and new software management tools also can reduce carbon emissions through more efficient operations of HMLP's distribution system.

## 4.3. LARGE USERS

Large energy users are some of the most cost-effective targets for decarbonization. Many of those entities, which include industrial and commercial companies, golf courses, managed communities, and municipal government may want to decarbonize and most certainly want to save money. Federal and state programs target these types of large customers with incentives and rebates to encourage decarbonization investments. Helping these community members to reach net zero can address a large portion of Hingham's total carbon emissions with limited transaction costs.

Hingham is primarily residential, but there are a limited number of areas focused on business, industry and industrial parks concentrated in the lower south-west portion of the Town's borders. In addition, there are a number of thriving industrial parks, office parks, business districts and commercial businesses, including the downtown area, waterfront, and Derby Street shops. In total, Hingham hosts around 3,100 businesses that employ 14,174 people.[13] Those businesses are primarily commercial businesses.

Hingham is actively promoting expansion of the Town's commercial and industrial resources. The Development and Industrial Commission was established in the early 1960's and revitalized in 1997 under MGL Chapter 40, Section 8A for the promotion and development of the industrial resources of the municipality. Its charter states that the commission,

> . . . shall conduct research into industrial conditions, investigate and assist in the establishment of educational or commercial projects, including projects involving private enterprise, for the purpose of expanding or strengthening the local economy, and shall seek to co-ordinate the activities of unofficial bodies organized for said purposes.[14]

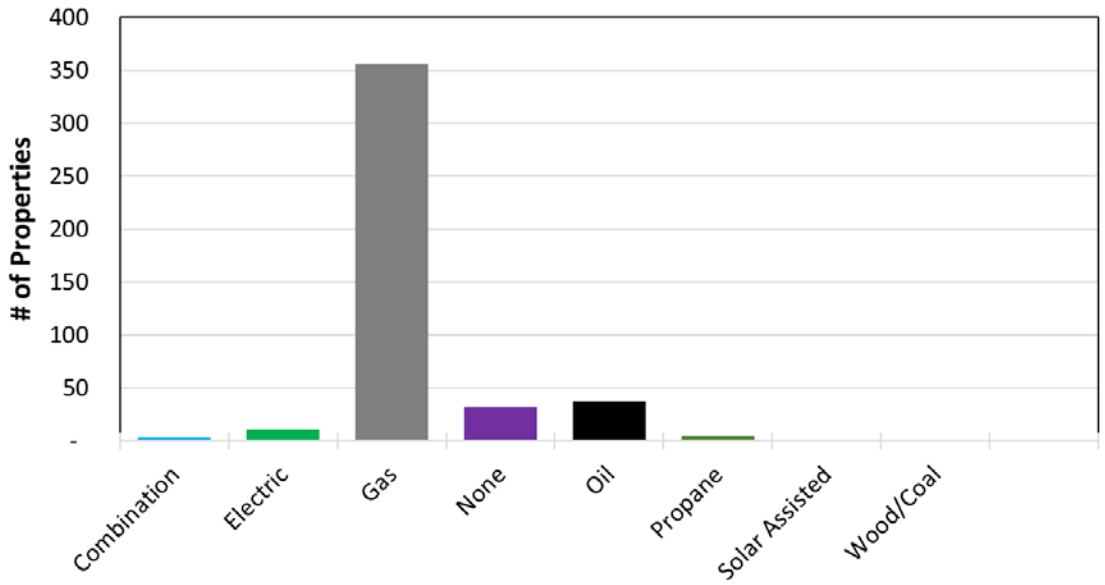
Expanding the commercial and industrial base could serve to increase carbon emissions. On the other hand, these large users are relatively small in number compared to residential energy users. However, the larger users are concentrated, have bigger building envelopes, and require more electricity for purposes of inputs to production and climate control. For example, the 632 non-residential customers represent only 13 percent of National Grid's customers in Hingham but consume around 43 percent of total natural gas consumption.[15] Most of the large commercial and

[13] US Chamber of Commerce, https://www.chamberofcommerce.com/united-states/massachusetts/hingham/
[14] Hingham Website, https://www.hingham-ma.gov/496/Development-Industrial-Commission
[15] Aggregated natural gas usage data provided by National Grid.

industrial properties are connected to National Grid's natural gas system (**Figure 9**).

There is an opportunity to incorporate efficiency and carbon-free planning by owners of the large commercial and industrial user buildings when they renovate the tenant occupied spaces upon tenant turnover. Development of carbon-free heating, ventilation and air conditioning energy systems should focus on the primary system infrastructure updates and the tenant operated distribution systems. Most of these systems are operated on natural gas for fuel and air ducting systems for distribution. The envelopes of the existing buildings could employ white solar reflecting roof membranes to reduce heat island effect; solar panel installation ready roof systems; MA Stretch Code compliant insulation, air and vapor membrane; and ventilation balance system updates.

## Figure 9: Hingham Heating Fuel for Commercial and Industrial Customers (2021)[16]




The geographically-concentrated set of large users that represent a significant portion of total natural gas create an ideal target for decarbonization, even with the predominant use of natural gas as the heating source. The Town should consider augmenting and expanding its interactions with large users to create a commercial/industrial team that explicitly targets this group to discuss incentives for implementation of:

[16] Energyzt analysis of HMLP data.

- Hingham's decarbonization goals
- Energy efficiency education and incentives
- PACE financing for upfront investments
- Demand response programs offered by HMLP
- Energy generation assets, such as solar for roofs and carports
- Backup generation and energy storage
- Installation and maintenance of electric vehicle charging stations

Some of these large energy users are national companies that may have their own net zero goals, offering synergies through public-private partnerships and ongoing collaboration.

## 4.4. BUILDING CODES

As part of the Green Communities program, Hingham was required to adopt a state-issued stretch code as aspects of its building code. At the time, the stretch code may not have been such a stretch as industry standards had caught up to the requirements. Hingham will be required to meet the Commonwealth's minimum code requirements.

At the end of 2022, the Commonwealth also approved a new specialized net zero opt-in stretch code. The Plan's action items recommend that the Town examine potential adoption of the specialized stretch code, identify and address opportunities for historical homes and historical districts, and examine potential Town-wide limitations on new fossil fuel hookups.

Addressing and publicizing how historical homes can partake in decarbonization efforts is particularly important for Hingham. Nearly one-quarter of the housing units in Hingham were built before 1939[17] and Hingham Main Street is lined with beautifully historic homes (see sidebar). Although building codes can and should be designed to target new construction, older homes could benefit from

### THE MOST BEAUTIFUL MAIN STREET IN AMERICA

In January 1942, First Lady Eleanor Roosevelt visited Hingham to complete a photo documentary co-authored with Hingham resident Frances Cooke Macgregor titled, "This is America."

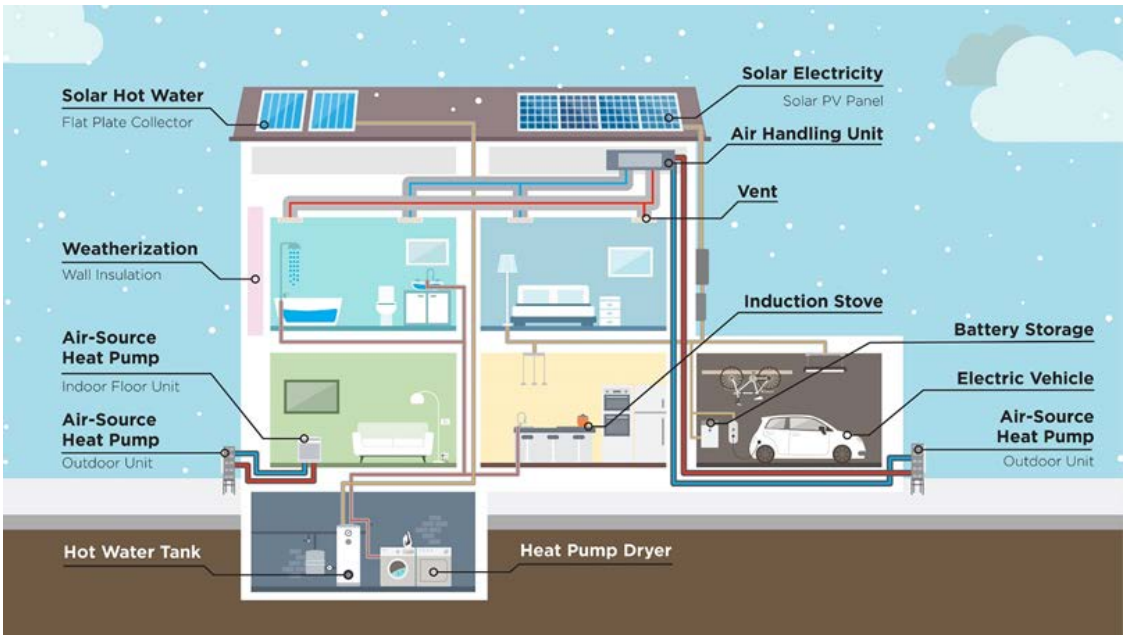
The First Lady reputedly enjoyed the mix of architecture and described Hingham Main Street as the most beautiful Main Street in America.

[17] Housing Hingham MA, http://www.housing.ma/hingham/profile

education and incentives to achieve cost savings moving forward.

Even without a new building code, there are a number of ways that historical buildings can become cleaner, greener, and smarter. There are also valid public sources providing information on how to do this. For example, improving the energy efficiency of the existing historical building envelope can be achieved with insulation, air and vapor barriers, reducing porosity of the envelope, and generally tightening up the airflow into and out of the building consistent with the original architecture. At a minimum, Hingham should aim to educate the public by referencing publicly-available sources on how to reduce heat loss. **Figure 10** illustrates components of a low-carbon residence, including distributed energy resources (DERs) such as rooftop solar and batteries.

## Figure 10: Example of a Clean Energy Home[18]




In Massachusetts, commercial and industrial users are eligible for investment dollars through the approved PACE program and HMLP rebates. Residential customers are not eligible at this time for PACE, but alternative residential financing opportunities are being discussed at the state level. Along with education, recommendations support Hingham advocating for and pursuing a residential PACE program or other financing option.

[18] MassCEC, p. 3, https://goclean.masscec.com/downloads/MassCEC-Introduction-to-the-clean-energy-home-guide.pdf

Hingham Climate Action Planning Committee

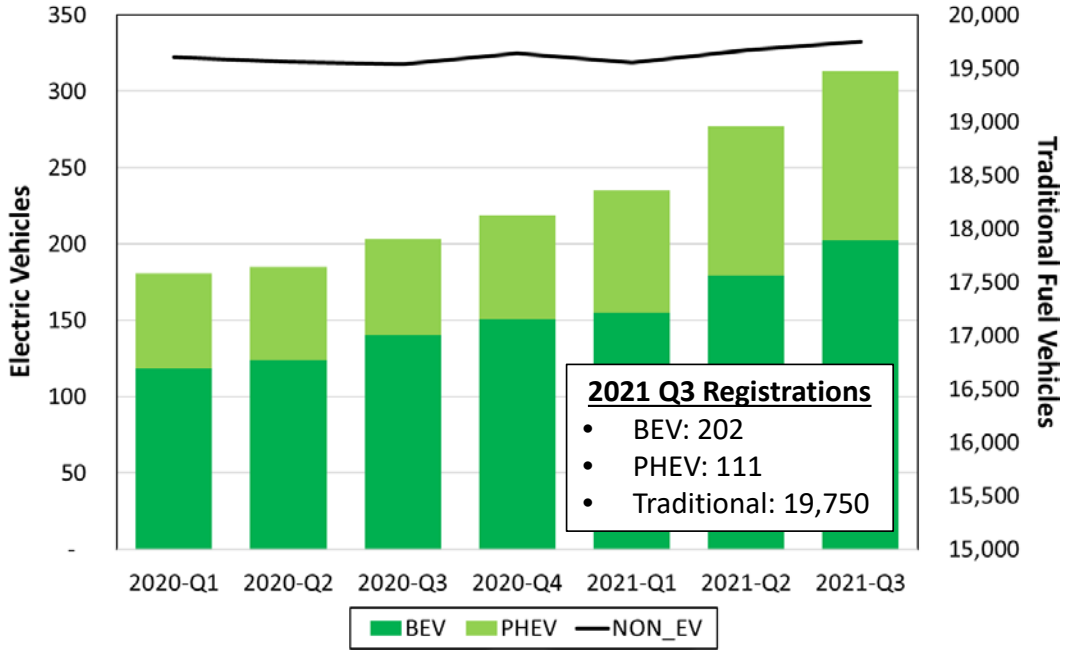
# 5. TRANSPORTATION

## What you can do to help:

| | |
|---|---|
|  Residents | • Provide educational resources. Explore the economics and feasibility of converting to electric and clean energy vehicles, and convert when economic and feasible, and if you are an EV owner, share their calculations and experience with neighbors and friends<br>• Explore the use of hybrid vehicles in the interim.<br>• Support installation of charging stations and carbon-free energy fueling stations in Hingham<br>• Make use of MBTA and other public transportation instead of driving whenever feasible<br>• Minimize automobile trips by bicycling, walking, combining errands, ride-sharing, or ordering online. Turn-off fossil-fueled vehicles while waiting rather than idling |
|  Businesses | • Consider converting vehicle fleets to alternative fuel, hybrid and electric<br>• Install EV charging stations in business, Commuter Rail, Commuter Board, MBTA bus stop (at old rail station), multi-unit housing, and shopping parking areas<br>• Explore possible business sponsorship of electric trolley system<br>• Allow employees to telecommute when feasible |
|  Government | • Convert vehicle fleet to alternative fuel and electric<br>• Procure funding for EV charging stations and install at parking for town buildings and town sports fields; charge an appropriate market price to collect fees for maintenance and replacement costs<br>• Explore public transit and personal mobility options, including the procurement of an electric bus trolley to make a loop connecting destinations throughout the entirety of Hingham<br>• Monitor grant programs for fleet conversion, installation of EV charging stations, and other opportunities.<br>• Monitor incentive programs for emissions, idle reduction, etc. |
|  Schools | • Monitor the economics and obtain funding for electric school buses<br>• Install EV charging stations in school parking lots for students, parents and teachers, as well as for electric school buses used to transport students from other schools<br>• Educate students on how to assess the economics of EVs and PHEVs instead of fossil-fuel powered automobiles and public transportation<br>• Encourage bicycling and walking to school when and where safe |
|  Innovators | • Continue to improve the economics of EV charging stations and business models so that they are commercially feasible without subsidies<br>• Expand the manufacturing of electric school buses to move down the cost curve to become on par with the cost of diesel buses<br>• Innovate around personal mobility technologies, including autonomous vehicles |

As with the rest of the country, registered automobiles (light duty vehicles) in the Town of Hingham are almost entirely internal combustion engines. However, Hingham drivers are increasingly purchasing plug-in hybrid electric vehicles ("PHEVs") and battery electric vehicles ("BEVs"). Out of roughly 20,000 registered light-duty vehicles, a bit more than 300 are identified as electric.[19] Year-over-year growth was 50% between the third quarter of 2020 and third quarter of 2021 (**Figure 11**).

## Figure 11: Hingham Electric Vehicle Light Duty Vehicles as of 2021[20]




As market offerings continue to proliferate over the next ten years, the Committee anticipates that electric vehicle purchases will increase exponentially. The largest automakers in the world are rolling out a plethora of new electric models, and start-ups are raising billions of dollars in public equity markets to offer niche solutions for trucks, vans, and commercial vehicles. The Environmental Protection Agency is granting $5 billion to subsidize electric school buses under the

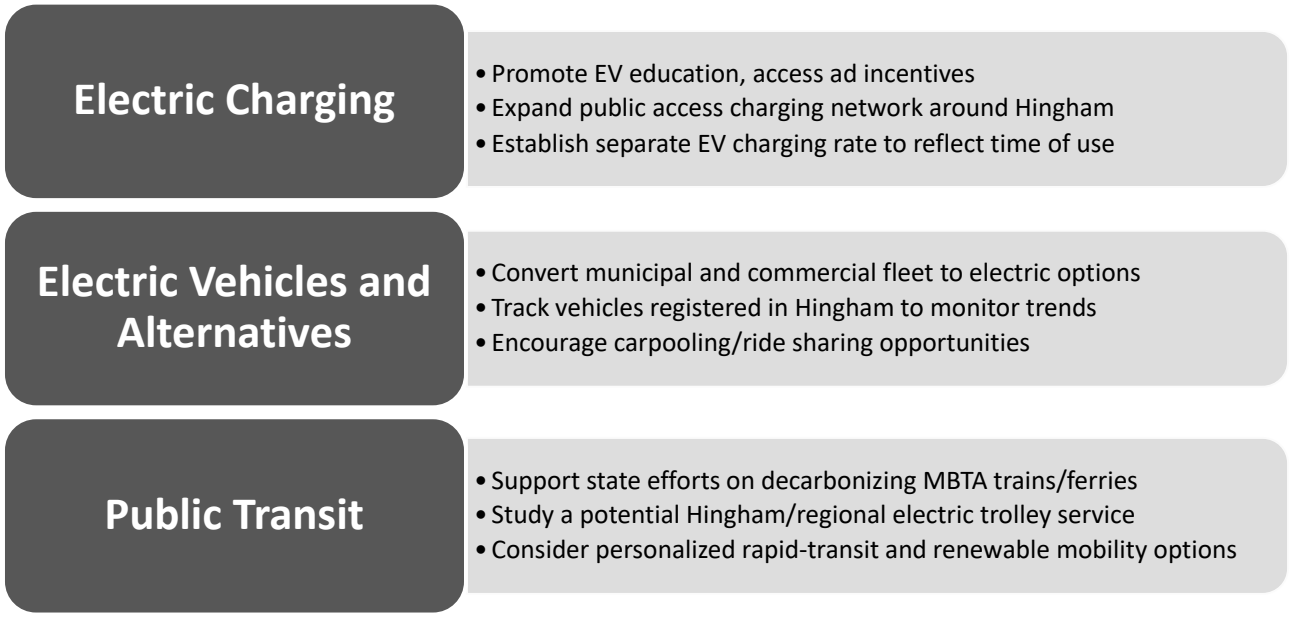
[19] There currently is no easy way to establish the number of electric vehicles based in Hingham and data is representational versus definitive. This will become more difficult as mainstream mass-market brands start to roll out their electric vehicle offerings. Going forward, the Commonwealth and Town could require registrants to specify on their registrations whether the vehicle is a BEV, PHEV or alternative fuel vehicle to allow for better tracking and monitoring.

[20] Energyzt analysis of vehicle registration data sourced from National Grid via IHS-Polk.

Infrastructure Investment and Jobs Act. Federal legislation just passed as the Inflation Reduction Act provides billions of dollars to effectuate a transition to alternative transportation fuels, including continuation of tax incentives for electric vehicles and establishment of widespread charging stations.

By 2035, the Commonwealth of Massachusetts requires 100 percent of new vehicles sold in Massachusetts to be electric.[21] Although internal combustion engines will continue to be purchased and operated in Hingham, they are set to phase out over time in keeping with Hingham's net zero goals. This Plan recognizes these broader trends and organizes its recommendations and actions around these areas (**Figure 12**).

### Figure 12: Transportation Decarbonization Recommendations Overview




As already mentioned, a decarbonized and well-maintained electrical system is crucial to enabling the electrification of transportation in Hingham. A brief overview is provided in the following sections, with detailed action items in Appendix A.

## 5.1. ELECTRIC CHARGING

In many cases, conversion to electric vehicles already makes economic sense. Educating consumers

[21] Joseph Choi, "Massachusetts to require 100 percent of car sales to be electric by 2035," The Hill, January 5, 2021, https://thehill.com/policy/energy-environment/532684-massachusetts-to-require-100-percent-of-car-sales-to-be/

will be important to ensure Hingham's citizens can make informed decisions. To this end, the Town should capitalize on educational efforts already underway through Electrify Hingham and Hingham Drives Electric (see sidebar) to enable electrification.

The Town of Hingham also can enable electrification of the community's fleet by pursuing the following activities:

- **Provide Information and Links to Valid Information Providers:** Provide information and links to valid information providers, such as Hingham Drives Electric (see sidebar), so that Hingham citizens can make informed investment decisions in their next automobile lease or purchase. Such information includes location of charging stations, process for installing charging stations at homes and businesses, and estimated savings for electric vehicles versus internal combustion engines. Utility rates factor into EV economics, and towns with municipal light plants such as Hingham tend to have lower rates, making electricity-based vehicles more attractive.

- **Educate:** Consumers of electric vehicles should understand the geopolitical implications of the mining of natural resources to make electric batteries for electric vehicles, and the resulting embodied carbon footprint in producing EVs (as well as any other vehicles). The manufacturers can and should be developing technologies that do no harm to the environment and do no harm to postcolonial emerging Third World nations in Africa.


Hingham Drives Electric is a program funded by HMLP to educate and encourage residents to explore electric vehicles. It is run by a team of EV specialists from ENE. The site provides multiple tools and resources that residents can use to compare the total cost of electric vehicles to their gasoline alternatives.

http://hinghamdriveselectric.org/

- **Interim Solutions**: Consumers of alternative fuel vehicles should pursue hybrid and plug-in hybrid vehicles**,** as well as conversion of internal combustion engine vehicles to hybrid, plug-in hybrid, and electric vehicles.

- **Install Charging Stations:** As the Town's fleet electrifies, ensure adequate charging installations by encouraging private providers to locate in the Town, as-of-right siting in commercial and multi-unit housing parking areas, and equity and charging access considerations tied to potential requirements for multi-unit housing units (e.g., apartment and condominium complexes), public housing, new developments, service stations,

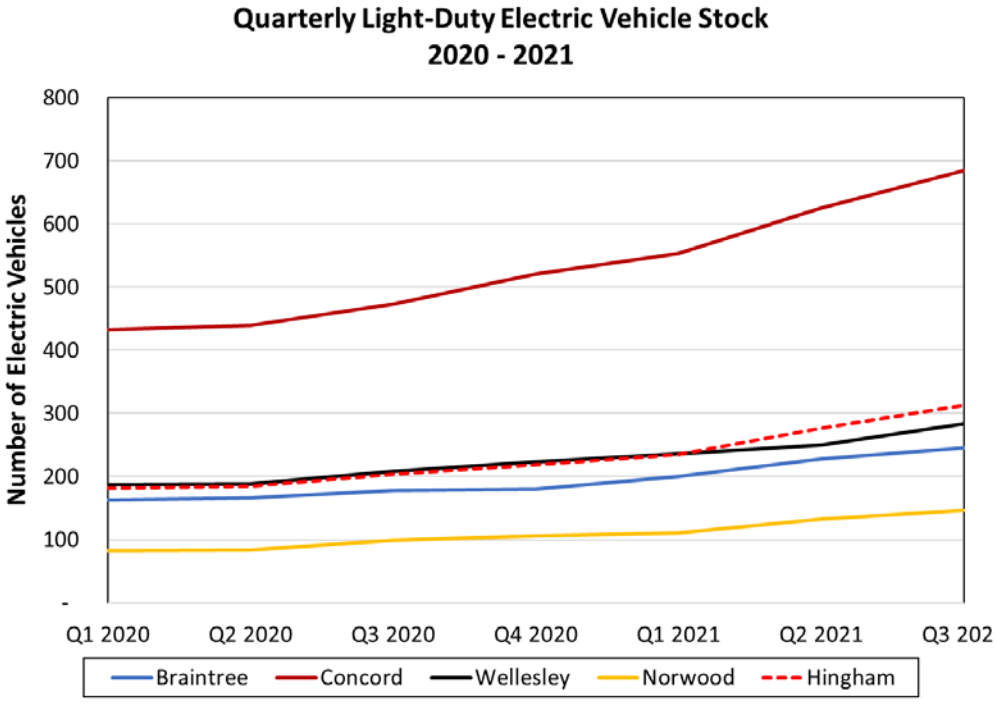
dealerships, and large commercial spaces. Increasing the ability to charge in Hingham drives economic dollars to Hingham's stores and commercial areas.

- **Establish Variable EV Rates for Electricity:** Encourage HMLP to establish variable electric vehicle rates for all charging stations in Hingham (including home installations) that sends a time-of-use signal through to the electric vehicle charging programs. Such signals equitably incentivize electric vehicle owners to charge in response to time-of-use pricing during off-peak hours when electricity is readily available, reducing stress on the system.

- **Promote Residential Carbon-free DERs (e.g., solar and batteries) for Charging Vehicles**: DERs are useful not only for HVAC electrical needs (powering heat pumps) but also to directly charge personal EVs (several systems are already on the market). This could also reduce high-peak demand on town electricity and possibly provide Distributed Energy Resources (DERs) to feed electricity back into the town system when not being used at home.

- **Incentivize:** Provide information on electric vehicle incentives from federal, state and local programs. Adopting average vehicle miles traveled in Massachusetts and applicable electricity rates, the website should include a calculation that compares the economics of electric vehicles in Hingham to a traditional vehicle over the lifecycle of the car.

## Figure 13: Comparison of Hingham EV Growth Rates to Similar Towns[22]




The goal should be to produce a noticeable increase in electric vehicle uptake versus other towns – an uptick that only recently started to happen (**Figure 13**).

## 5.2. ELECTRIC VEHICLES AND ALTERNATIVES

Technology is changing quickly and the Federal government has created incentives for alternative fuels. Such incentives are unlikely to make a significant difference over the next decade as electric vehicles are the focus of automobile manufacturers and state policy. That said, there are a number of automobile alternatives that Hingham should consider and, if it makes sense, promote:

- **Convert Municipal Fleet:** With respect to decarbonizing transportation, it is important that the municipal government lead by example. Local, state, and federal funding is available to

[22] Energyzt analysis of vehicle registration data sourced from National Grid via IHS-Polk.

both install charging stations and subsidize the purchase of municipal fleet electric vehicles, interim hybrid, and plug-in hybrids. As of 2023, the Inflation Reduction Act allows for non-profits such as the Town of Hingham to receive "tax credits" in the form of direct payments. Hingham should capitalize on the incentives available to convert its municipal fleets to electric vehicles if it is economic to do so. Even without special incentives, electric vehicles are becoming increasingly competitive against internal combustion engines that have higher maintenance costs and rely on volatile oil prices.

- **Prepare to Convert to Electric School Buses:** Although the initial round of EPA electric school bus conversion money was not likely to be awarded to Hingham, other funding options are available. In addition, $5 billion in subsidies over the next five years will create the electric school bus manufacturing capabilities and drive costs down the commercialization cost curve. State Net Zero policies also could result in funded or unfunded mandates within the next decade. Hingham should monitor broader trends on cost, production, and subsidies, and be prepared to convert its school bus fleet to go electric. Although initial EPA funding may not target Towns such as Hingham, there may be funding for innovative demonstration projects that would allow Hingham to receive funding while obtaining data and information on how electric buses may work within its school system.

- **Encourage Carpooling/Ride Sharing:** Carpooling and ride-sharing is a long-standing means of removing vehicles from the roads. The Town should be aware of how carpooling is incentivized in other areas, ride sharing is enabled, and highlight ways for residents of

## V2G = VEHICLE-TO-GRID

V2G is a set of incentives and systems that allow electric vehicles to interact with their interconnected power systems. Although the technology already exists to provide V2G services, market-based incentives and signals have not yet been fully developed.

As electric vehicles become a greater portion of the fleet, HMLP can play a role by establishing a set of electric rates and programs specific to electric vehicles. For example:

- **Time-of-use Pricing:** The state of New York requires its utilities to send a price signal that reflects the hourly price on the power system in order to create incentives for electric vehicles to charge outside of peak hours when low-cost electricity is more readily-available.

- **Demand Response:** National Grid has a program that pays EV owners $50 to enroll plus $20 annually that sends a signal to pause charging during peak demand events on hot summer days. and automatically resume charging afterwards.

Hingham to share rides to reduce emissions.

- **Track Vehicle Adoption and Public Reporting:** In order to monitor the success of its efforts and the need for infrastructure installation and upgrades, the Town of Hingham should begin a formal effort to explicitly track which registered vehicles are alternative fuel vehicles. Similarly, HMLP should monitor and track which homes have home charging stations and whether those chargers are Level-1, Level-2 or advanced fast-charge equipment. This information should be put into an easy-to-read chart or charts that highlight progress that the entire community is making with respect to automobile decisions and total carbon emissions saved.

## 5.3. PUBLIC TRANSIT

Hingham is home to multiple modes of public transportation that can move citizens and visitors around the state and therefore connect to the rest of the country and the world. Current modes of public transportation include:

- **MBTA Commuter Rail:** The diesel-fueled, double-decker purple commuter trains run from Boston South Station through the south shore and Hingham to the Greenbush Station in Scituate. Stops include West Hingham Station and Nantasket Junction.

- **MBTA Commuter Boat:** The MBTA operates a ferry that relies on maritime fuel oil out of the Hingham Shipyard that delivers passengers to Logan Airport, Hull, and Boston (Rowes Wharf and Long Wharf).

- **MBTA Buses:** The MBTA also operates Line 220 that connects the Hingham depot along Route 3A to downtown Quincy via a diesel-fueled fleet of buses, and the 714 bus line from Hingham to Hull and back.

The MBTA public transportation system therefore, at present, contributes Scope 3 emissions to Hingham's inventory. To eliminate the MBTA's carbon contributions to Hingham, the Town and citizens should work with the MBTA to encourage and support decarbonization to electric or alternative fuels.

Even in the absence of conversion to a decarbonized fuel source, however, greater adoption of public transportation options versus personalized vehicle commuting still decreases Hingham's carbon emissions.
In addition, Hingham should explore local public transit opportunities to connect the residents of the Town to the MBTA Public Transit Systems. Explore the procurement of an electric bus trolley to make a loop connecting destinations in South Hingham, Linden Ponds, Derby Shoppes, Queen Anne's Corner, Rockland Park and Ride Plymouth and Brockton Bus Line to Boston and Cape Cod, Hingham Center,

Town Hall, Downtown Hingham, West Hingham Commuter Rail, North Hingham, Nantasket Station Commuter rail, Shipyard, Commuter Boat, Beal Street, Summer Street, North Street, Thaxter Apartments, Library.

- Electric trolley service
- Senior transportation alternatives
- Internal Town transportation system
- Personal rapid-transit mobility options

Such services could reduce the need for residents to get into their cars to run neighborhood errands, increase mobility options for those who do not drive, and connect otherwise disparate parts of the community. Public transportation removes automobiles from roads, reducing total carbon emissions through scale transportation. However, the MBTA's reliance on diesel-fueled vehicles contributes to carbon emissions. For these reasons, the Plan both recommends promoting public transportation and supporting decarbonization of that transportation resource.

To this end, Hingham should support Commonwealth efforts to convert its public transportation solutions to decarbonized alternatives. Such conversions not only reduce Hingham's Scope 3 carbon emissions, they also would save Hingham's air and environment from particulate matter and diesel exhaust fumes.

Any analysis should include potential offsetting revenues that could be obtained through a vehicle to grid program that could offer capacity into ISO-NE wholesale electricity markets as demand response units.

Hingham Climate Action Planning Committee

# 6. WASTE

## What you can do to help:

| | |
|---|---|
|  Residents | • Where possible limit consumption and invest in high quality items that will last<br>• Support the reuse economy by choosing used items as much as possible<br>• Ensure that recycles are properly cleaned and sorted<br>• Use reusable bags for shopping, water bottles instead of single-use plastic, and organic/metal straws<br>• Compost organic materials and use the end-product of composting in yards<br>• Respond to incentives in a Hingham PAYT/SMART program to reduce waste |
|  Businesses | • Identify ways to reduce waste in production and service processes<br>• Support bans on single-use plastic regardless of implementation in Hingham<br>• Respond to incentives in a Hingham PAYT/SMART program to reduce waste<br>• Redistribute edible, excess food and compost food waste<br>• Increase accessibility to water bottle refill stations or provide other alternatives to single use plastic water bottles |
|  Government | • Implement PAYT/SMART program<br>• Implement community-wide composting programs<br>• Consider warrant article for commercial ban against single-use plastic<br>• Expand accessibility to recycling, composting, and water bottle refill stations |
|  Schools | • Find ways to reduce waste inside and out of the classroom<br>• Ensure that all schools are actively and properly recycling<br>• Increase accessibility to cafeteria and classroom recycling, composting, and water bottle refill stations<br>• Encourage engagement and participation in town efforts to research and implement carbon reduction programs<br>• Educate students on where our waste goes and why it creates carbon emissions<br>• Install dishwashers in school cafeterias in order to reduce single use items |
|  Innovators | • Create low-cost, biodegradable alternatives to single use plastic<br>• Invent and distribute cost-effective local waste-to-energy conversion technologies<br>• Develop materials and products that can be recycled and use recycled materials as an input to production |

The Town of Hingham no longer operates its own landfill. Instead, waste is processed at the Transfer Station and sent to a location outside of the border of the Town, generating Scope 3 emissions for which action can be taken, and therefore is addressed in this Plan.

Waste generates a significant amount of carbon and methane emissions. According to the EPA, municipal solid waste (MSW) landfills are the 3rd largest source of human-related methane emissions in the U.S.. Landfill gas, a byproduct of the decomposition of organic materials in

landfills, is composed of 50% methane and 50% CO2; methane is 28 to 35 times more effective than CO2 at trapping heat in the atmosphere.[23]

In Massachusetts, an estimated 40% of the waste stream could be removed from landfills and incinerators through recycling and composting.[24] Massachusetts is moving forward with reducing parts of the waste stream by banning textiles and mattresses as of November 2022. Furthermore, also of November 2022, any business generating over one-half ton of food waste is required to have it composted.

Hingham provides recycling services at the Transfer Station. In addition to mattress recycling, the Hingham Transfer Station also accepts other bulk items during designated days, including automotive batteries, computers and home electronics, large and small appliances, furniture, and hazardous materials such as paint, oil and propane tanks.[25] It is important for these efforts to be continued and an increase of education and marketing to ensure Hingham citizens use these recycling services.

Composting is another function that Hingham has begun to support on the residential level. Expanding composting to be a centrally-organized activity would contribute to removing organic material from the waste stream. Reduce waste and Hingham reduces carbon in the atmosphere.

**Figure 14** summarizes the focus of reducing carbon emissions by reducing waste. Broad recommendations emphasize efforts to minimize solid waste, increased recycling, and expand composting support (Each of these categories is discussed in more detail below and in the action items delineated in Appendix A.

[23] EPA, https://www.epa.gov/lmop/basic-information-about-landfill-gas
[24] Ryan Proulx, et. al, "Need to Enforce: Waste Bans in Massachusetts," September 2022, https://publicinterestnetwork.org/wp-content/uploads/2022/09/The-Need-To-Enforce_-Waste-Ban-Regulations-in-Massachusetts-9.7.22-2.pdf
[25] MassDEP, Recycle Smart, Hingham Transfer Station, https://recyclesmartma.org/location/hingham-transfer-station/

Hingham Climate Action Planning Committee

## Figure 14: Waste Minimization Recommendations Overview

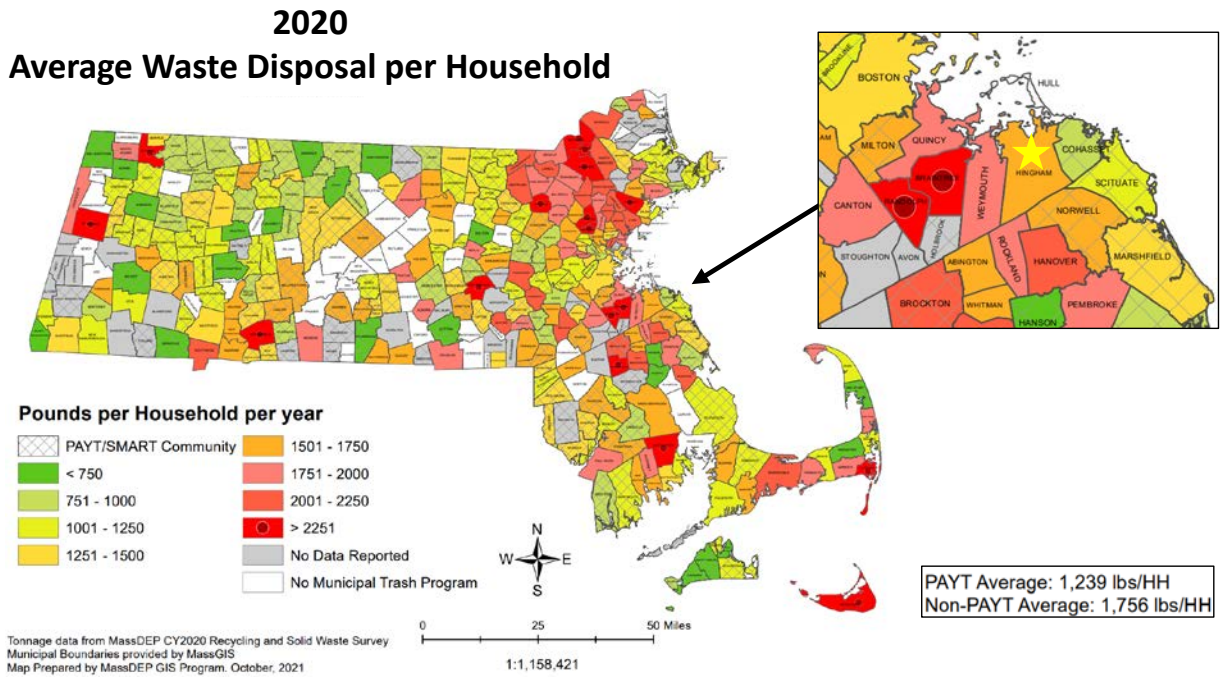

## 6.1. SOLID WASTE

Compared to other towns in Massachusetts, Hingham falls into the middle of the range with respect to average waste disposal per household. Hingham disposes of an average of 1,501 to 1,750 pounds per household per year.

Throughout Massachusetts, various towns and communities have adopted Pay-as-you-Throw (PAYT) programs that impose a higher cost for disposing of waste. An analysis of such programs indicates that those towns with PAYT reduce waste. Towns with such programs have been shown to produce less waste per household versus towns that do not have PAYT programs. In 2020, the average trash generated in PAYT municipalities was 29% less or 517 pounds per household (**Figure 15**).

Hingham Climate Action Planning Committee

## Figure 15: Hingham's Average Waste Disposal per Household vs. Other Towns




The benefits to waste reduction are why both federal and state agencies recommend implementation of this type of program.[26] The EPA notes that PAYT programs achieve three objectives: [27]

1. **Environmental Sustainability:** By reducing waste and increasing recycling, fewer natural resources need to be extracted and landfill greenhouse gas emissions are reduced.

2. **Economic Sustainability:** Reducing waste that has to be incinerated or buried in landfills reduces costs to the towns that are struggling with soaring municipal solid waste management expenses.

3. **Equity:** The variable rate program is inherently fair by charging consumers based on the trash they produce. When the cost of managing solid waste is a flat rate, those who recycle and minimize their waste subsidize their neighbor's wasteful actions.

---

[26] Massachusetts Department of Environmental Protection, "Pay-As-You-Throw (PAYT)/Save-Money-And-Reduce-Trash (SMART)," https://www.mass.gov/lists/pay-as-you-throw-paytsave-money-and-reduce-trash-smart
[27] EPA, https://archive.epa.gov/wastes/conserve/tools/payt/web/html/index.html

Currently, 155 MA municipalities (44%) have adopted a PAYT/SMART program. Neighboring towns on the South Shore have implemented similar programs.[28]

Hingham does not have a pay-as-you-throw (PAYT) program. Recommendations therefore include adopting a PAYT program for the Town of Hingham transfer station and regulating private haulers to be consistent with public rules, engaging in efforts to eliminate single-use plastic, and diverting bulk waste to recycling centers that are better able to reuse major components of large disposal items.

## 6.2. RECYCLING

Recycling is a means of reducing the amount of waste that lands in landfills. EPA estimates indicate that avoided emissions from recycling versus landfilled materials are 2.89 metric tons of CO2 equivalent per short ton.

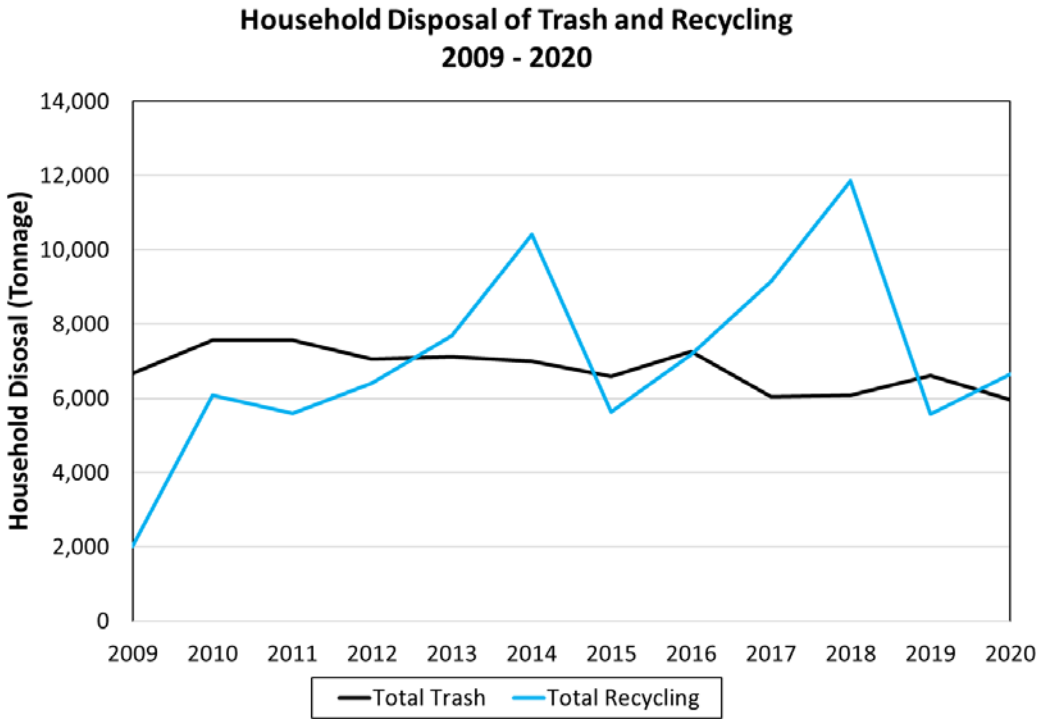
Hingham is a member of the South Shore Recycling Cooperative and enables residents to contribute waste products that can be recycled at various collection sites. Private companies that service Hingham residents may or may not adhere to recycling requirements. It would be appropriate to align and enforce private company offerings to public sector options so as to support every resident and business in Hingham in their efforts to reduce waste.

With proper verification and authorization from the Hingham Department of Public Works that requires proof of residency, residents may also deposit hazardous waste at 10-12 South Shore Recycling Cooperative sites throughout the south shore.

As a result of these existing efforts, Hingham has experienced an upward trend in recycling that is substantially greater than the downward trend in waste disposal (**Figure 16**).

[28] Cohasset, Scituate, Marshfield, and Norwell all have PAYT programs either at curbside, at drop-off, or both, https://www.mass.gov/lists/recycling-solid-waste-data-for-massachusetts-cities-towns

## Figure 16: Hingham Household Disposal of Trash and Recycling (2009 – 2020)




Recommendations serve to continue and expand existing efforts to reduce waste and increase recycling. These recommendations include extending transfer station hours, providing dedicated personnel to recycling, adding differentiated recycling bins in public spaces and public buildings, and increasing water filling stations in public places.

## 6.3. COMPOSTING

Composting is a fan-favorite for parts of Hingham and those who compost are passionate about the benefits. Almost anyone can compost. Small apartment units can use a kitchen-sized composting unit whereas larger residences may have a large rotating container or pile in the yard. That said, town-wide collection and processing through a centralized function enables every citizen to compost, which can reduce waste and unnecessary stress on the transfer station functions. Such services also could be useful for restaurants and commercial establishments that generate large amounts of reusable waste that remains out of landfills and may even reduce carbon emissions if the composted materials promote new greenery.

Composting begins at home, as well as in the schools. Although anyone can compost with commercially-available options as small as a bin that sits in the kitchen, there may be economies of scale for a larger, centralized solution to composting. Specifically, municipal programs may include curb-side collection and centralized digesters with redistribution. If a community-wide program is not feasible, a subscription-based service where members receive the organic material for use in their yards could be a starting point. To this end, Cleaner Greener Hingham has been a key promoter of composting (see side bar).


Cleaner Greener Hingham is a town-chartered committee of citizen volunteers who study waste within the Town, with an eye to finding environmentally sustainable solutions. In 2021, the Town of Hingham in partnership with Cleaner Greener Hingham announced a new Home Composting Program and offered free composting bins. Cleaner Greener Hingham's website offers video tutorials on composting.

To this end, recommendations include expanding existing efforts to establish town-wide composting for businesses and residents, exploring the potential decarbonization benefits associated with curb-side composting collection and education, anaerobic digesters, and waste-to-energy power supply alternatives.

Hingham Climate Action Planning Committee

# 7. COMMUNITY

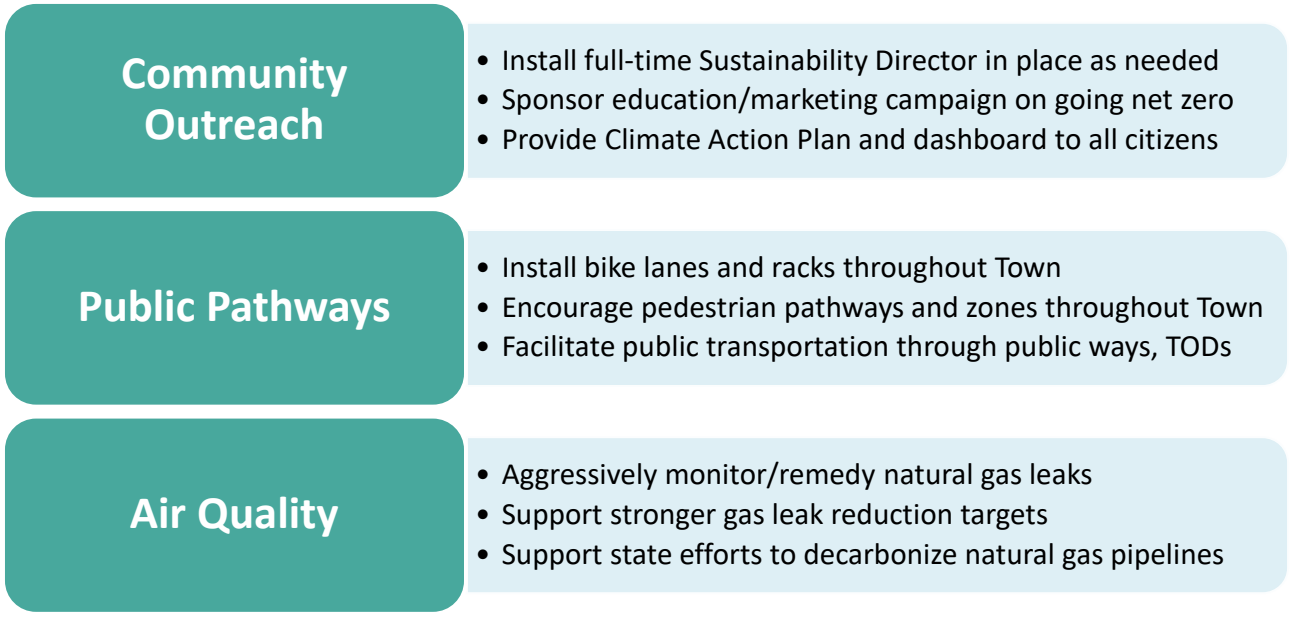
## What you can do to help:

| | |
|---|---|
|  Residents | • Educate yourself, family and friends on the Plan and updates using regular dashboards developed and issued by the Town<br>• Participate on Town committees that are supporting implementation of the plan and/or join interest grounds that encourage steps towards net zero carbon emissions<br>• Support and use bike lanes, pedestrian walkways, public transit and other ways to keep cars off the roads<br>• Demand action from the local utility to minimize natural gas leaks |
|  Businesses | • Stay up-to-date on decarbonization technologies, options and progress<br>• Work with utilities to find low-impact energy alternatives to minimize reliance on natural gas<br>• Develop and promote TODs and other mixed-use areas that maximize foot traffic |
|  Government | • Fund and hire a full-time sustainability official (e.g., a Sustainability Director) on an ongoing basis to oversee Plan implementation and other strategic initiatives<br>• Fund a full-time grant writer to pursue funding opportunities for energy decarbonization, energy efficiency, and initiatives in this Climate Action Plan, as well as other potential grants for the Town<br>• Install bike racks at town buildings and build bike paths/pedestrian walkways to facilitate community flow around town<br>• Collect data and create a regularly-updated carbon inventory and dashboard to monitor and publicize progress on carbon emissions reduction |
|  Schools | • Promote bike paths and pedestrian pathways to and from the schools from town centers and heavily residential areas so that students can transport themselves to and from school<br>• Install bike racks at school buildings and facilities<br>• Publicize progress on Climate Action Plan and carbon emissions through school programs and student/parent outreach<br>• Educate about the importance of choosing public transportation and carpooling |
|  Innovators | • Develop meaningful ways to convey information on carbon reduction initiatives<br>• Facilitate carbon inventories and tracking tools<br>• Develop clean energy alternatives to natural gas that can either bypass or use existing natural gas pipeline infrastructure |

Hingham is a community where people live, work and play. Increasing connectivity and connection across the town is an important part of fostering that sense of community. The community itself can reduce carbon emissions by bringing the Town's citizens together (**Figure 17**).

Hingham Climate Action Planning Committee

## Figure 17: Community Recommendations Overview




Each of these are described in more detail below, with detailed action items listed in Appendix A.

### 7.1. COMMUNITY OUTREACH

Community outreach is required to bring the entire community together. Implementation requires participation by nearly everyone in town. To support education, coordination, and collaboration among everyone who should be involved to achieve Hingham's Net Zero goals, this Plan recommends installing a full-time Sustainability Director, sponsoring education and marketing campaigns on how to reach net zero, and establishing a Plan dashboard that can be distributed on a regular basis to all citizens, showing steps to take and benchmarks reached.

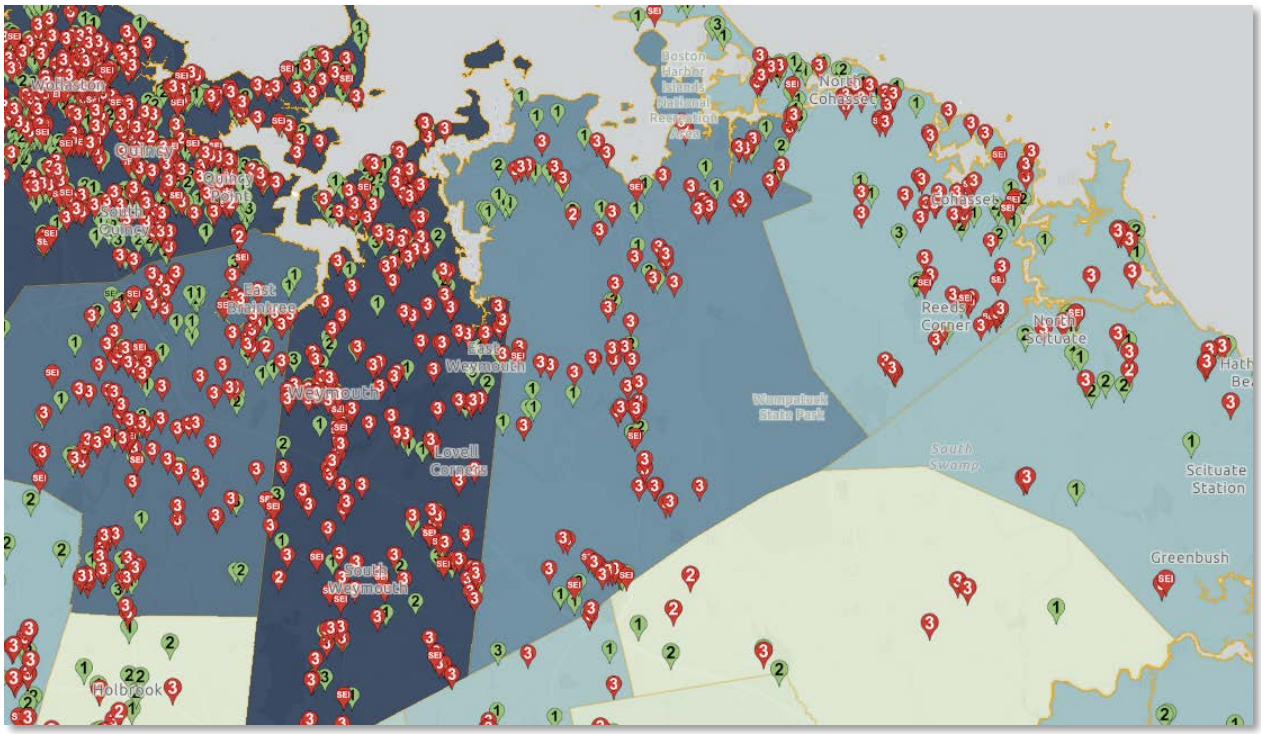
### 7.2. PUBLIC PATHWAYS

Public pathways are both a means of connecting the community and reducing carbon emissions. By making it easier for Hingham citizens and businesses to move away from automobiles, a broader swath of the Town can be active both physically, biking and walking, while also achieving Net Zero. To this end, the Plan recommends facilitating bike and pedestrian pathways throughout Town, installing bike racks at public locations throughout Town, and facilitating public transportation with public ways and transit-oriented districts ("TODs").

## 7.3. AIR QUALITY

Hingham experiences methane releases as a result of natural gas leaks. At the end of every year, Massachusetts gas distribution utilities are required to file annual service quality reports to the Department of Public Utilities (DPU). Since at least 2015, the number of gas leaks in Hingham has been flagged as an issue.[29]

### Figure 18: Map of Natural Gas Leaks (2021)[30]




Natural gas leaks are graded by the utilities as follows:

- **Grade 1** leaks are hazardous and must be repaired immediately.
- **Grade 2** leaks are non-hazardous, but could become hazardous in the near future and must be repaired within 1 year.
- **Grade 3** leaks are non-hazardous and are expected to remain non-hazardous. Grade 3 leaks are required to be repaired or eliminated within 8 years.

Natural gas leaks emit methane into the atmosphere. Although repairing gas leaks is the responsibility of Natural Grid who distributes natural gas supply to Hingham users, stopping gas leaks must be part of a Climate Action Plan to reduce emissions. As such, recommendations include aggressively monitoring/remedying natural gas leaks, supporting stronger gas leak reduction targets, and supporting state efforts to decarbonize natural gas pipelines. In addition, any Hingham review of adding or replacing an existing natural gas line should include a review of the status to repair the existing natural gas lines within the town that are leaking.

[29] Patch.com, "Map Reveals 199 Natural Gas Leaks in Hingham,"August 24, 2015, https://patch.com/massachusetts/hingham/map-reveals-199-natural-gas-leaks-hingham-0
[30] Heet.org, https://heet.org/gas-leaks/gas-leak-maps/

Hingham Climate Action Planning Committee

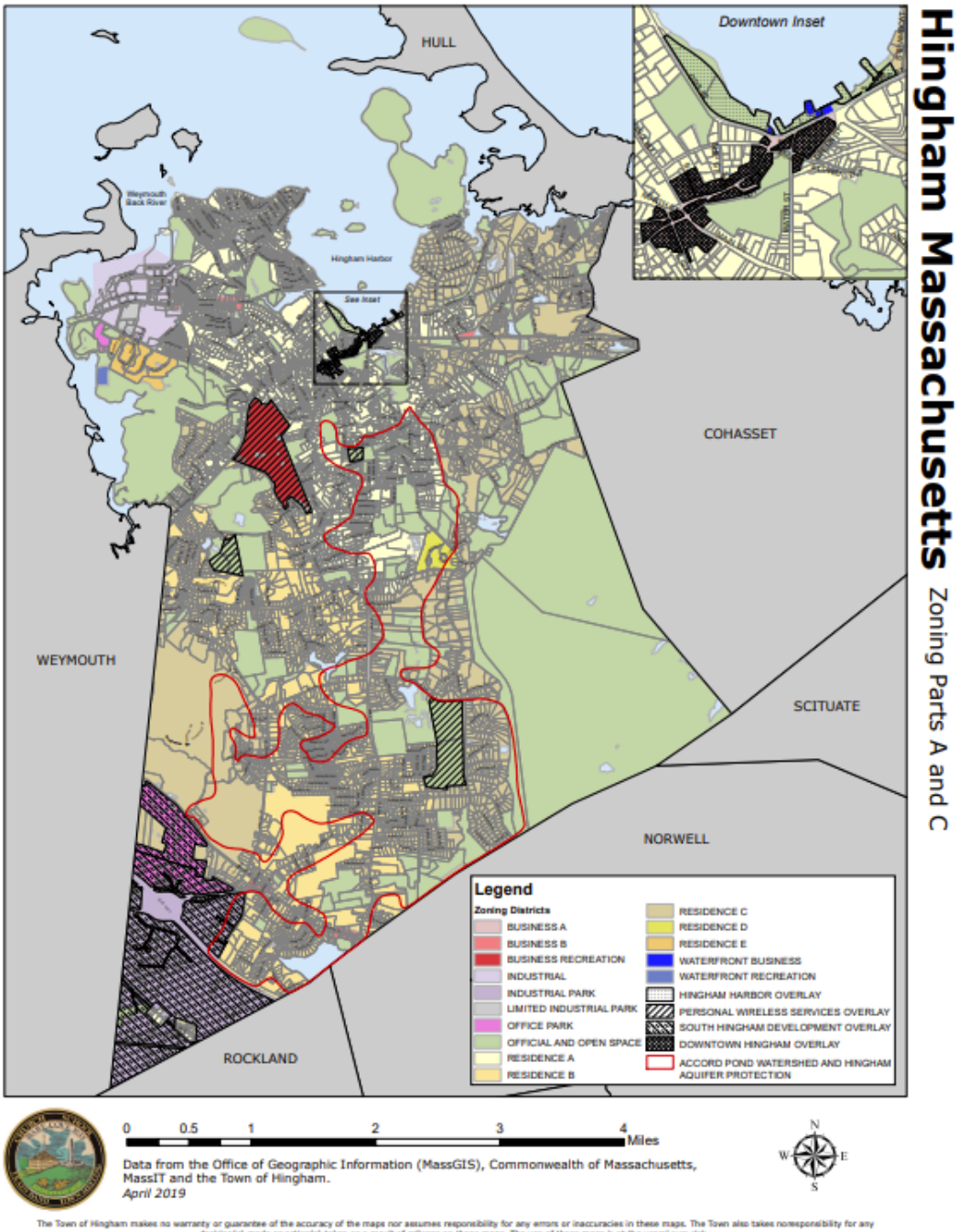
# 8. NATURAL RESOURCES

## What you can do to help:

| | |
|---|---|
|  Residents | • Reduce water consumption through smarter water use and technology<br>• Convert landscaping to native plants that thrive naturally without watering with low or no fertilizer<br>• Replace yard maintenance equipment using hydrocarbon energy with electric<br>• Engage in and fund conservation activities that enhance natural resources<br>• Convert boat engines to electric where economically and technically feasible |
|  Businesses | • Reduce water consumption by employing technology and resource management practices<br>• Convert business land scape to native plants and minimize use of fertilizers and water<br>• Develop land and operate industrial/commercial spaces to minimize emissions<br>• Convert landscaping tools to electric |
|  Government | • Educate citizens on water conservation, native plants to promote local carbon sink preservation and enhancement<br>• Reduce water consumption through water management practices and technology<br>• Convert landscaping for municipal facilities to native plants and minimize fertilizer<br>• Strengthen zoning and planning codes to protect naturally occurring carbon sinks, including updating Conservation Commission ordinances to protect natural resources beyond strict wetland restrictions to include ban on fertilizers and nitrogen runoff and pollution<br>• Where appropriate and adequate, expand on-site waste-disposal to facilitate groundwater recharge |
|  Schools | • Reduce water consumption through smarter water use<br>• Convert landscaping around school buildings to native plants<br>• Favor organic produce for the cafeteria to minimize need for fertilizer<br>• Educate students about water ecosystems, conservation, carbon sinks, and water conservation |
|  Innovators | • Develop more efficient organic or low fertilizer use agricultural practices<br>• Identify technology that minimizes water usage in manufacturing processes and waste disposal<br>• Develop negative and net zero materials for a more cost-effective pricing |

The Town of Hingham has a long history which is coveted and protected with six historic districts that help the Town to maintain its unique character. Similarly, Hingham boasts significant natural resources, including protected green space, coastline, watersheds, and waterways. These natural resources create carbon sinks that absorb carbon and allow for environmental exchanges that better the environment to the benefit of residents, businesses, and visitors.

## Figure 19: Hingham Zoning Parts A and C[31]




[31] Town of Hingham, Zoning Map, https://www.hingham-ma.gov/351/Zoning-Board-of-Appeals, https://www.hingham-ma.gov/DocumentCenter/View/2123/Hingham-Zoning-Map-Parts-A-and-C-PDF?bidId=

**Figure 19** provides the Hingham Zoning Map that illustrates the significant amount of official and open spaces throughout the community (in light green). Residential areas (yellows and tans) are the second largest set of zones, making the average total density across the Town equal to 910 persons per square mile.

The Town of Hingham covers an area of 25 square miles, of which 22.6 square miles is land and almost 10 percent is water. Hingham is proud of its location on the water, including 21 miles of shoreline and construction of a new harbor park further expands the public use of Hingham Harbor. The acquisition of the South Shore Country Club by the municipality provides additional recreation opportunities for residents while preserving the suburban character of this historic seaside community. Recreational areas include Bare Cove Park which has biking and walking trails around its 500 acres along Back River, World's End which is a 250 acre peninsula overlooking Hingham Harbor with beautiful views of Boston, and Wompatuck State park which includes 3,000 acres of woodland are and the largest public campground in the metropolitan Boston area.

In contrast to a sustainability plan focused on long-term conservation, this section focuses solely on ways that Hingham can capitalize on natural resources to promote decarbonization. In recognition of the role that Hingham's green spaces and ocean exchanges play, this Plan includes recommendations regarding development, maintenance, and protection of natural resources that contribute to carbon absorption (**Figure 20**).

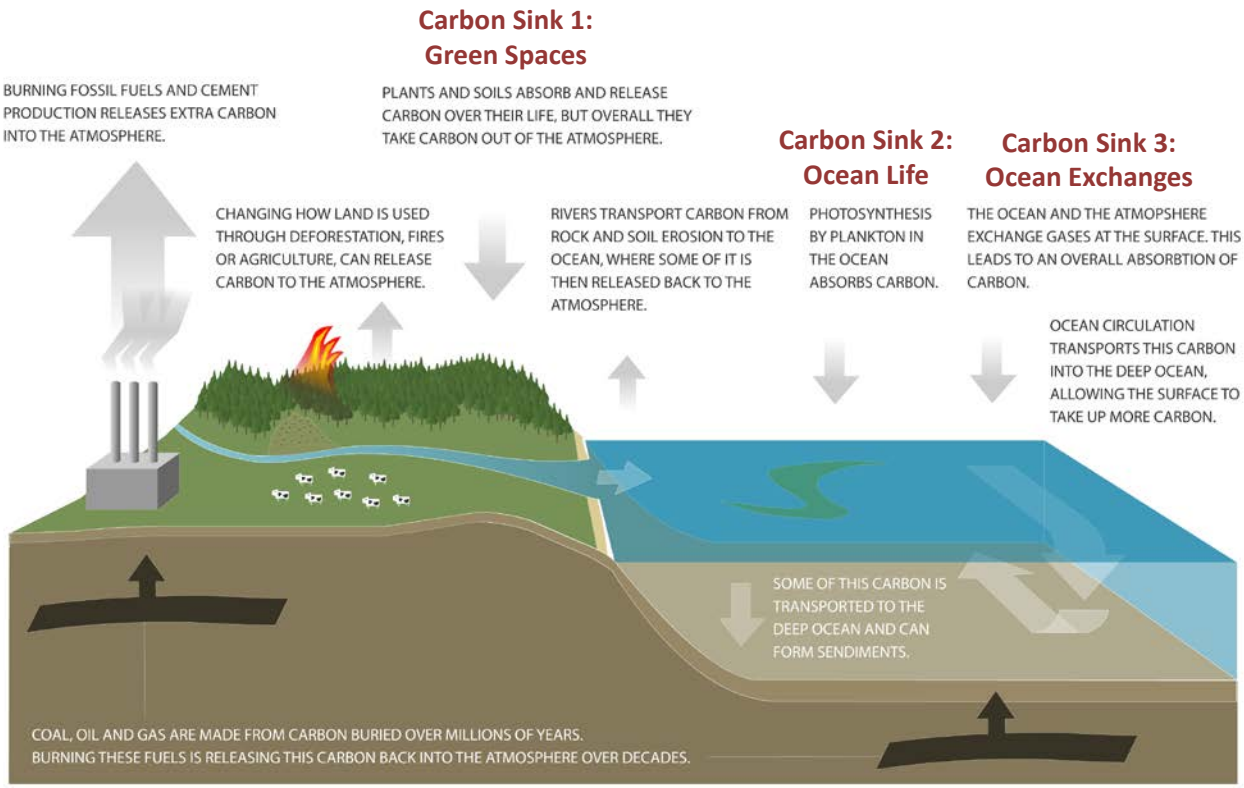
## Figure 20: Conservation and Creation

| | |
|---|---|
| **Carbon Sink Development** | • Educate residents and businesses to enhance/create carbon sinks<br>• Encourage land development in a way to decrease carbon output and increase carbon absorption<br>• Protect and restore wetlands with updated bylaws and regs |
| **Land Conservation / Management** | • Engage in tree maintenance and planting program<br>• Preserve/Conserve open space, land, forests and grasslands<br>• Expand protected green spaces that serve as carbon sinks<br>• Promote zero carbon emissions landscaping tools |
| **Water Conservation / Management** | • Reduce nitrogen fertilizers used on Town properties<br>• Protect carbon sinks through water use reduction<br>• Promote water conservation and generate usage targets |
| **Recreation** | • Reduce carbon emissions in recreational areas (land and sea)<br>• Enable electric motor alternatives at recreational areas<br>• Promote carbon-negative materials |

## 8.1. CARBON SINK DEVELOPMENT

Hingham has a number of naturally-occurring carbon sinks. These areas which include woodlands, waterways, marshlands, and harbors allow for carbon to be absorbed from the atmosphere and processed through nature's naturally-occurring functions (**Figure 21**).

### Figure 21: Illustration of Carbon Sinks[32]




Carbon sinks can operate on an expansive level (e.g., Amazon forest) as well as on a micro-level (e.g., natural landscaping in a front yard). Although Hingham has a wealth of large carbon sinks that require protection, residents and businesses can create their own carbon sinks through sustainable landscaping practices.

Recommendations include educating citizens about how to protect, enhance and create carbon sinks that include native plants and minimizes water usage. When developing Hingham land and waterways, consider how to do it in a way that decreases carbon output and increases carbon

[32] https://niwa.co.nz/atmosphere/faq/what-is-a-carbon-sink

absorption. The Town also can promote zero carbon emissions landscaping tools such as electrified mowers and leaf blowers that take advantage of HMLP's carbon-free electricity supply and reduce gasoline exhaust.

## 8.2. LAND CONSERVATION / MANAGEMENT

Hingham includes 6.25 square miles (i.e., 4,000 acres) of open space that is protected and overseen by various entities:[33]

- **The Hingham Conservation Commission** is responsible for the protection and management of the Town's conservation land – around 1,000 acres. This commission also manages the administration of the Massachusetts Wetlands Protect Act and related town bylaws.

- **Hingham Land Conservation Trust** acquires, maintains and preserves exceptional landscapes in Hingham and advocates for local land protection efforts. In addition to a number of smaller conservation parcels, they own three major properties: Jacobs Meadow, Eel River Woods and Whortleberry Hollow.

- **Trustees of Reservations** manages World's End (251 acres), Weir River Farm (75 acres), and the Whitney & Thayer Woods (824 acres co-managed with Cohasset).

- **The Commonwealth** is the largest protector of land in Hingham, overseeing the conservation and use of Wompatuck State Park (3,500 acres primarily in Hingham), Stodder's Neck (39 acres), and five Hingham Harbor islands including Langlee, Ragged, Sarah, Button and Bumpkin (44 acres).

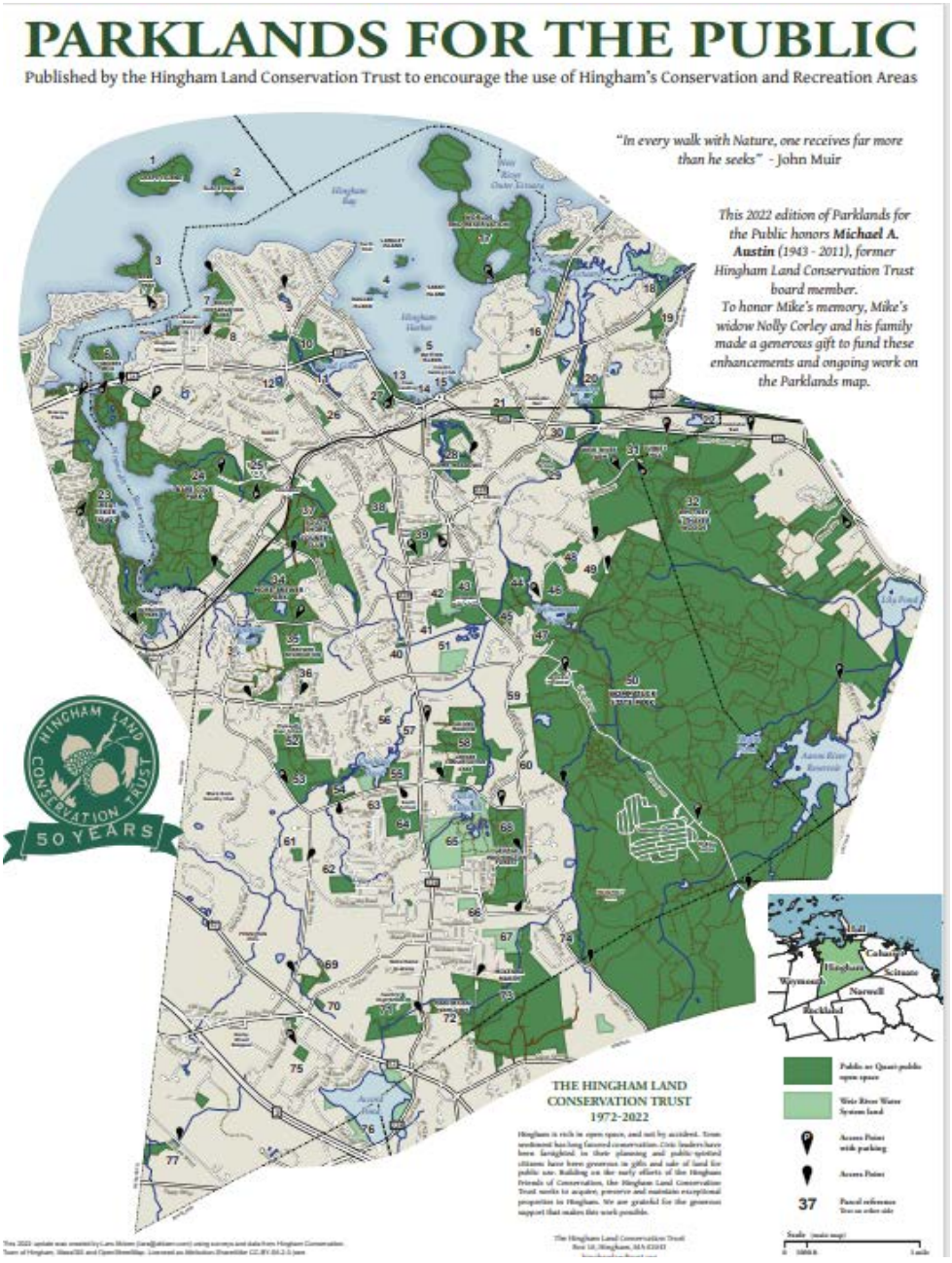
TREE CITY USA.

In 2020, the National Arbor Day Foundation named Hingham "Tree City USA" for the 32nd year, in recognition of the Town's commitment to tree care and planting. In that year, the Town's Tree and Park Division maintained:

- More than 1,000 acres of open space
- Over 10,000 public shade trees
- 45 tree plantings
- 193 tree removals
- 1,657 trees pruned

[33] Town of Hingham Website, https://www.hingham-ma.gov/307/Conservation-Property

## Figure 22: Conservation Lands in Hingham[34]




With slightly more than one-quarter of the land in Hingham currently protected through

[34]Hingham Land Trust, "Parklands for the Public," 2022, https://hinghamlandtrust.org/wp-content/uploads/2022/05/Parklands-Map-2022.pdf

conservation and public management, recommendations focus on preserving and conserving existing open spaces, land, forests and grasslands; expanding protected green spaces that serve as carbon sinks; and engaging in tree maintenance and planting programs.

## 8.3. WATER CONSERVATION / MANAGEMENT

Water conservation contributes to achieving Hingham's net zero goals in two ways:

1) **Decreasing Water Treatment Emissions:** Reducing water usage decreases the energy required to treat and deliver that water for end-use.

2) **Protecting Carbon Sinks:** Conserving Hingham's waterways and ensuring healthy ecosystems preserves some of Hingham's largest natural carbon collection absorption assets.

Hingham's potable water supply, which is managed by the Weir River Water System, takes advantage of the community's natural water resources located within the town's boundaries to store, treat, and deliver water to end-users. That said, water treatment, pumps, and delivery consume a significant amount of electricity, and therefore contribute to carbon emissions.

Although the primary source of energy – electricity – will be decarbonized as part of achieving HMLP's decarbonization goals, conservation reduces energy demand and increases system efficiency. Reduced demand for water saves users across the entire system money by deferring capital investment required to expand the system's capacity and associated rate increases. Therefore, recommendations include tasking the Water Commission and Citizen's Advisory Board with identifying and pursuing water conservation and reduction measures to implement through the Weir River Water System.

WEIR RIVER WATER SYSTEM

The Weir River Water System provides water treatment, supply, and delivery services to water users in the town of Hingham. Operations of the water system is outsourced under contract by Veolia, who is overseen by the Hingham Water Commission and the Weir River Water System Citizens Advisory Board. Just as the Hingham Municipal Lighting Plant takes the lead on electricity conservation and decarbonization, entities overseeing the Weir River Water System can lead water conservation efforts.

Hingham's location on the ocean also includes a number of rivers and estuaries such that 15.58 percent of the community is water. The estuaries within Hingham are particularly important as they transition between fresh water rivers and their entry into the ocean. Called the "breeding grounds" for the oceans, many sea species use estuaries to reproduce and some animals remain their entire lives within those brackish waters.

Protecting these delicate ecosystems along with the shallow waters of Hingham Harbor requires reducing run-off, manage stormwater flows, and restoring wetlands. This is an area where the Town can lead by example while enabling individual choices that meet a minimum level of care. For example, the Town of Hingham could reduce the use of nitrogen fertilizers on Town properties, update bylaws and regulations to protect Hingham's wetlands, and manage stormwater flows. Relying on native landscaping also reduces carbon emissions by minimizing the need for fossil-fueled yard equipment.

A focus on educating, implementing and supporting native plants and naturally-occurring drought-tolerate landscaping would support both of these initiatives. At a minimum, the Plan recommends that the Town of Hingham adopt native and drought-tolerate landscaping for all municipal grounds and landscaping to lead by example. The Weir River Water System also should take the lead on distributing educational and promotions that support conversion to native landscaping choices as a means of reducing water consumption and water bills. Correspondingly, rates should reflect essential and non-essential water use charges, with the later being significantly higher, with targeted usage by customer included on invoicing to reflect lot size and housing occupancy.[35]

By focusing on water conservation and the actions that decrease water usage, Hingham can restore natural habitats, conserve fresh water, ensure the health of the town's streams and rivers, control invasive species, and reduce water bills while helping to achieve the community's net zero carbon emissions goals.

## 8.4. RECREATION

In addition to protecting conservation lands and waters as carbon sinks, it is also important to protect recreation activities in these and other areas. Recreation is a lifestyle for Hingham residents who make use of the state and local parks, conservation lands, waterways, and harbors.

Recommendations aim to reduce carbon emissions in recreational areas, enable electric motor alternatives at recreational areas, and promote carbon-negative materials.

[35] This already is being done in dry ecosystems such as California and billing systems are able to customize targets and usage for each customer.

# 9. IMPLEMENTATION

This Plan should be considered a living document. It is a program for moving down the path towards decarbonization based on information and conditions known today. Over time, however, conditions will change, new technologies will appear, and policy requirements must be able to adapt. This section presents recommendations on how implementation of the Plan could proceed, focusing on the role that each stakeholder in Hingham could play.

## 9.1. LEADERSHIP

Ultimately, how to proceed and who will be responsible lies with Town leadership. To this end, the Select Board has the ultimate responsibility for ensuring implementation of the Plan. It is expected that the Select Board would work closely with the Town Manager and staff to ensure adequate resources are procured, appropriate staff and contractors are retained, relevant committees are empowered, and action items are executed.

## 9.2. HINGHAM MUNICIPAL LIGHTING PLANT

HMLP is the cornerstone of Hingham's Net Zero plans. HMLP should identify how it may achieve its net zero objectives with the new provisions concerning direct payments for clean energy projects and be required to provide at least quarterly updates to the teams responsible for implementing the plan. HMLP also may be in the best position to provide education and offer programs to Hingham residents that promote electrification and installation of on-site carbon-free electricity resources and energy storage capability. The full extent of HMLP's role will be defined during implementation of the Plan.

## 9.3. TOWN COMMITTEES

There are a number of Town Committees that may have responsibility over aspects of this Climate Action Plan. The composition of the Climate Action Planning Committee illustrates the multi-disciplined nature of the issue and what is required to implement this plan. With the issuance of the final Climate Action Plan, the charter of the Climate Action Planning Committee will end. However, a similar type of committee is required for implementation. Action items include reconstituting or establishing a Climate Action Plan Implementation Committee who would work with the Town, other Committees, HMLP, and public interest groups to coordinate execution of action items and provide regular updates to the Select Board and Town.

## 9.4. BUSINESSES

Businesses and large consumers of energy are an important part of the decarbonization plan. Hingham is encouraging industry and commercial to locate in town and the net zero plan should be a reason to do so. Part of the Plan includes educating large users about the options available to them, specifically:

- Becoming informed about ways to reduce carbon emissions
- Choosing to set net zero goals
- Reducing waste through low-impact packaging choices
- Increasing recycling and composting
- Investing in energy efficient options
- Participating in HMLP demand response and net metering programs
- Choosing electric input options instead of fossil-fuel inputs
- Converting to electric heat pumps instead of less efficient fossil fuel heating/cooling
- Converting business fleets to electric vehicles
- Encourage and host carbon-free electricity resources and electric storage backup generation options

There are sustainable, cost-effective ways to become more efficient.

## 9.5. RESIDENTS

This Plan acknowledges the supporting role that residents of the Town play in bringing net zero decarbonization goals to reality. Daily household decisions tied to composting, waste reduction, heating sources, and carbon-free energy investment all contribute to achieving the actions identified in this Plan. To this end, residents play a critical role through:

- Becoming informed about ways to reduce carbon emissions
- Avoid single-use plastic
- Reducing waste through low-impact packaging choices, recycling and composting
- Minimizing plastic packaging, containers, and bags
- Choosing cost-effective home electrification options over fossil fuel resources
  - Electric vehicles
  - Electric yard mowers, blowers, and trimmers
  - Electric snow blowers
- Choosing electric appliances instead of natural gas (e.g., dryers, ovens, stoves)
- Converting to electric heat pumps instead of less efficient fossil fuel heating/cooling
- Purchasing an electric or alternative fuel vehicle instead of internal combustion engines
- Considering carbon-free/renewable resource and electric storage backup generation

options
- Proposing and signing citizen petitions in support of action items in this Plan

## 9.6. INTEREST GROUPS

As highlighted throughout this Plan, Hingham benefits from a multitude of non-profit and volunteer interest groups that are specific to the Town as well as regional. Each group tends to have their own focus, which can be directly focused on reaching Net Zero (e.g., Hingham Net Zero), very specific (e.g., Hingham Drives Electric) or much broader (e.g., Sustainable South Shore/South Shore 350). Representatives from these groups are members of the Climate Action Planning Committee, attended meetings, and invited representatives from the Committee to present on the Plan's progress.

This Plan anticipates that these groups will continue to be involved and play a crucial role in implementation of this Plan. Specifically, they could be a critical part of the implementation of this Plan through:

- Citizen education
- Leadership support
- Highlighting success stories
- Organizing implementation efforts
- Providing social pressure in their areas of focus
- Proposing citizen petitions in support of action items in this Plan

It is the hope that this Plan can help to serve as a guide and focus community group efforts so that we are all moving in the same direction with purposefully-set goals and action items.

## 9.7. HINGHAM SCHOOL DISTRICT

Hingham Schools not only provide a means of hosting in-town solar, energy storage, and charging stations, they also can educate the next generation on how to live a sustainable life. Key areas where the schools can participate in helping Hingham go net zero include:

- Include environmental and energy economics classes as electives
- Host inspirational speakers focused on protecting the environment
- Support the High School club Green Team efforts
- Install water bottle fillers
- Avoid single-use plastic
- Build new schools according to stretch code requirements, including LEED certification
- Install solar energy arrays on rooftops that can host them

- Identify areas where carports may be installed to offset school electrical load
- Consider microgrid equipment and technology for backup power
- Explore conversion to electric school buses as they become more cost-effective

## 9.8. GOVERNMENT

Both the federal government and the Commonwealth of Massachusetts offers a number of subsidies, grants, and other funding opportunities. In addition to credits that are directly paid through the Inflation Reduction Act, funding has been made available for distribution to the Commonwealth through the Infrastructure and Jobs Investment Act. Combined, there are trillions of dollars of funding available to towns such as Hingham that are innovative and willing to move forward with clean energy resources and alternative fuels. Under the Inflation Reduction Act, tax credits are now directly available to non-taxing paying entities. Pursuing these funding opportunities and grants requires someone being responsible for grant identification and writing, as well as operational execution to receive the funding. Appendix E includes a list of potential grant and funding opportunities currently available, and this appendix should be updated on a regular basis to reflect the dynamic nature of decarbonization initiatives and clean energy funding.

## 9.9. COORDINATION AND COLLABORATION

With all of these individuals and groups playing a role, it is important to have coordination and collaboration. This alone could be a full-time job, and a position that municipalities as well as businesses focused on their own sustainability efforts have created for this purpose.

Hingham has developed a role for specifically this purpose:

- **Coordinate Implementation of the Climate Action Plan:** Reach across leadership, Town Committees, and multiple public interest groups to coordinate and direct efforts to execute the tasks identified in this Plan.

- **Prioritize Action Items:** Prioritize action items to focus on cost-effective, quick-hit, easy-to-implement action items to obtain quick wins and immediate carbon reductions.

- **Secure Grant Money:** Identify potential entities and funding available to offset the costs of implementing action items in this Plan.

- **Find Cost Offsets and Self-fund Opportunities:** Find grants and other means of offsetting the cost of a full-time sustainability official at a senior level within the Town.

Ideally, this position will be able to “pay for itself” as well as realize cost savings for residents, businesses, and the Town through the community’s decarbonization efforts.

Hingham Climate Action Planning Committee

# 10. TRACKING AND METRICS

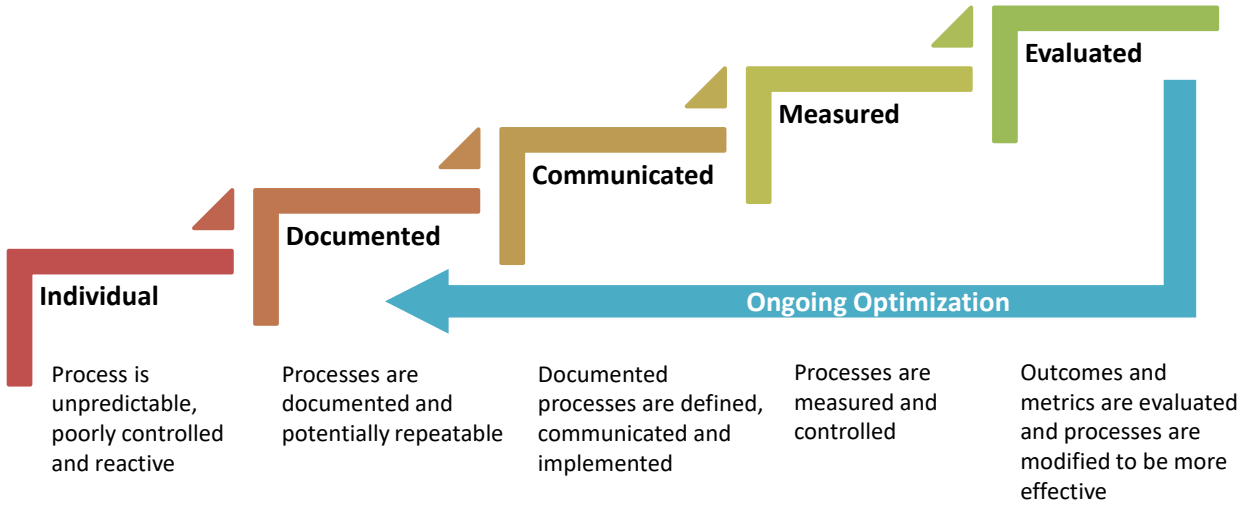
Achieving net zero is a matter of establishing a process and constantly improving on that process based on tracking key variables and metrics within the broader context of local, industry and policy trends. Process optimization requires a continuous feedback loop.

The first step is moving away from individual heroics towards documentation. To date, Hingham's net zero and decarbonization efforts have been carried by public interest groups and Town Committees. Their efforts have been laudable, but those groups, such as Hingham Net Zero, advocated for a documented Climate Action Plan.

Documentation is the second level of process improvement, followed by communication. This Climate Action Plan establishes the documentation of recommendations following nearly a year of ongoing discussions and communications. Going forward, communication will continue to be critical to implementation, including educating and informing town staff, residents, and businesses regarding actions that can and are being taken to reduce Hingham's carbon emissions.

The fourth step in process improvement requires tracking and measuring progress. This information then needs to be assessed and the Plan modified, documented, and communicated to continue the positive process optimization feedback loop (**Figure 23**). Individuals continue to play a role, but within the optimization cycle.

## Figure 23: Optimized Implementation of the Climate Action Plan




Optimizing the process for Hingham to achieve net zero by 2040 is no different. To this end, the greenhouse gas inventory established through this process must be updated on a regular basis –

ideally every year. New solutions and grant funding should be tracked, monitored, and acted upon when economic and feasible to do so. The Climate Action Plan should be updated on a regular basis as well, removing action items that have been achieved and either modifying or adding in new tasks to continue to achieve decarbonization.

# 11. CONCLUSION

A Climate Action Plan is more than a document – it is a process. The past year has been a wealth of discussion, collaboration, and realization that Hingham can start taking clear steps now to achieve its net zero goals by 2040. This Plan provides the initial steps on how to proceed. The benefit of our collective research and discussion is presented as support for the detailed recommendations listed in Appendix A. This document simply records the outcome and sets a path forward to achieve the goal of net zero by 2040.

With this Plan in place, it is now time to start the journey.

Hingham
Climate Action
Planning Committee

# APPENDIX A
# Action Items

Hingham Climate Action Planning Committee

# ELECTRICITY SUPPLY

| Implementation Steps | Timeframe | Metrics | Responsible Party |
|---|---|---|---|
| **3.1 CARBON-FREE ENERGY** | | | |
| 3.1.1 Support efforts to acquire all energy from carbon-free sources, including education about specific actions that can be taken to reach net zero. | Ongoing | Carbon content of power supply | Town<br>Residents<br>Businesses |
| 3.1.2 Follow state guidelines and meet state mandates for its power supply. | Ongoing | Percentage of carbon-free energy | HMLP |
| 3.1.3 Maintain goal to achieve a fully decarbonized power supply. | Ongoing | Carbon content of power supply | HMLP |
| 3.1.4 Continue to allow net metering for HMLP customers who choose to install DERs on their property. | Ongoing | Number of net metering program participants | HMLP |
| 3.1.5 Review HMLP's existing net metering program structure for potential economic and social value. | Near-term | Timeliness of review and suggestions | HMLP |
| 3.1.6 Continue HMLP's solar committee to identify renewable energy projects within the town and whether they are economically, socially, and environmentally viable. | Ongoing | Number of potential projects examined and viability | Town<br>HMLP |
| 3.1.7 Develop community solar projects that are economically, socially, and environmentally viable. | Long-term | Number of viable projects implemented | Town<br>HMLP |
| 3.1.8 Explore covered parking with solar arrays in open lots owned by Town | Medium-term | MW of solar carports | HMLP |
| 3.1.9 Review relationship between DER installation and property taxes so as to not create incentives for self-supply | Near-term | Timeliness of review | Town |
| 3.1.10 Encourage covered parking (solar arrays) in open lots owned by third parties | Medium-term | MW of solar carports | Third-parties<br>HMLP |
| 3.1.11 Monitor tax credit programs supporting carbon-free resources and determine whether they are viable for Hingham. | Ongoing | Regular updates to Select Board | HMLP |
| 3.1.10 Educate ratepayers about their clean energy supply options, new federal incentives, and explain how to implement carbon-free resources on their property. | Near-term | Number of notices; number of DER installations | Town<br>Residents<br>Businesses<br>HLMP |
| 3.1.11 Educate consumers on electrification opportunities and why they contribute to decarbonization given HMLP's power supply. | Near-term | Number of conversions to electric | HMLP |

| Implementation Steps | Timeframe | Metrics | Responsible Party |
|---|---|---|---|
| 3.1.12 Educate ratepayers about their clean energy supply options, new federal incentives, and explain how to implement distributed energy resources and backup generation/batteries on their property. | Near-term | Number of notices; number of DER installations | HMLP |
| 3.1.13 Acquire renewable energy credits and RGGI credits to realize incremental levels of clean energy to achieve goal without jeopardizing system. | Ongoing | Number of REC / RGGI credits acquired and rationale | HMLP |
| **3.2 RELIABILITY AND RESILIENCY** | | | |
| 3.2.1 Track electrification (e.g., home heating, EVs, DER) for Hingham buildings and report at Town Meeting at least annually | Near-term and ongoing | Number of and accuracy of annual reports | Town<br>HMLP |
| 3.2.2 Quantify risks associated with electrification. | Ongoing | Annual risk assessments | HMLP |
| 3.2.3 Consider Time-of-use (TOU) rates for electric vehicles and DERs to incentivize charging/output during optimal hours. | Near-term | Timeliness of TOU tariff review | HMLP |
| 3.2.4 Implement demand response program to include some combination of peak shaving/reliability technologies. | Near-term | Timeliness of DR program | HMLP |
| 3.2.5 To scale-up demand response program, explore incentives for batteries, hot water heaters, automatic thermostats, EV charging, and other DERs. | Medium-term | Number of resources enrolled in DR program | HMLP |
| 3.2.6 Monitor distribution system's available capacity for distributed energy resources (e.g., solar and batteries). | Ongoing | Total kW installed and circuit capacity remaining | HMLP |
| 3.2.7 Move forward on distributed energy resource projects that are economically beneficial to HMLP and its ratepayers. | Ongoing | Number of and kW installed from DER projects HMLP implemented | HMLP |
| 3.2.8 Move forward on DER projects that are economically beneficial to the Town and improve reliability and resiliency. | Medium-term | kW installed from municipal DER projects | Town<br>HMLP |
| 3.2.9 Identify potential DERs and resiliency opportunities on other buildings located in town | Medium-term | kW installed | Town<br>HMLP |
| 3.2.10 If economically viable, support the town in implementing resiliency opportunities on municipal buildings. | Medium-term | Number of reliable/resilient buildings | HMLP<br>Town |
| 3.2.11 Offer residents a registrar to self-identify reliance on power-dependent medical devices and other life-impacting needs for electricity. | Near-term | Activated registry | HMLP |

| Implementation Steps | Timeframe | Metrics | Responsible Party |
|---|---|---|---|
| 3.2.12 Provide vulnerable residents with information on backup power supply options. | Medium-term | Number and quality of outreach | HMLP |
| **3.3. SYSTEM UPGRADES** | | | |
| 3.3.1 Implement software and operational infrastructure to capitalize upon increase in DERs to create virtual power plants. | Long-term | Number of DERs managed by HMLP and hours used | HMLP |
| 3.3.2 Review underground wiring opportunities, including cost, dangers, and safety impact. | Near-term | Number of opportunities reviewed | HMLP |
| 3.3.3 Pursue underground distribution line opportunities when economically viable, safe, and determined to improve reliability associated with decarbonization efforts. | Medium to long-term | Miles converted to underground | HMLP |
| 3.3.4 Upgrade the distribution system to allow for DERs and electrification. | Long-term and ongoing | Number of reliability events | HMLP |
| 3.3.5 When existing metering technology is ready to be replaced, transition Hingham to updated metering infrastructure (e.g., Advanced Metering Infrastructure and TOU Meters). | Longer-term and ongoing | Number of AMI meters | HMLP |
| 3.3.6 Support the Hingham Electrical Infrastructure Reliability Project (“HEIRP”) at future Town Meeting and in general. | Near-term | Town approvals and siting | Residents Town |
| 3.3.7 Complete the HEIRP including the construction and operation of new transmission line and substation. | Near-term | Project Operation Date | HMLP |

# BUILDINGS

| Implementation Steps | Timeframe | Metrics | Responsible Party |
|---|---|---|---|
| **4.1 ENERGY EFFICIENCY** | | | |
| 4.1.1 Raise awareness on how Hingham residents and businesses can reduce their existing load through:<br>- MassSave energy assessments (natural gas)<br>- Energy New England (oil)<br>- HMLP programs (electricity)<br>Such awareness should include (1) rebates available for upgrades to air and water heat pumps, windows, doors, insulation, and air and vapor barrier systems, and (2) a schedule timeline for appliances and solar heating upgrades to help residents prepare for procurement and installation Awareness should equally address adaptation (lifestyle changes). | Near-term | Number of requested assessments | HMLP |
| 4.1.2 Create a teaching model to help residents and businesses conserve energy consumption, plan, design, budget and implement carbon-free energy resources. Such a model should educate citizens on ways to be more efficient, including:<br>- Weatherization<br>- Insulation subsidies/loans<br>- Programmable thermostats<br>- Air and vapor barriers<br>- LED lightbulbs<br>- Appliance replacements | Near-term | Number and extent of outreach | HMLP |
| 4.1.3 Lead/join local/regional efforts to compile information on contractors proficient in:<br>- Energy conservation<br>- Heat pump installation and operations<br>- Solar energy systems<br>- Electric backup power (e.g., batteries)<br>Effort should also identify home audit, design, architectural, engineering and contractor-based consulting services qualified to assess potential envelope, applicable heating/cooling systems, tree siting for maximum passive solar benefit, vehicles, etc., like the Mass Save Audit | Near-term | Participation of contractors | Town / Sustainability Official |
| 4.1.4 Collect and post information resources on a town-sponsored website (e.g., HMLP, Abode, Energy Sage, MassCEC, Inform HOAs). | Medium-term | Number of clicks | Town / Sustainability Official |

| Implementation Steps | Timeframe | Metrics | Responsible Party |
|---|---|---|---|
| 4.1.5 Create model home case studies and a building pilot demonstration, evaluation and teaching pilot program in a traditional, historic and contemporary home (both written and video recorded, akin to "This Old House" programming). | Medium-term | Timing and size of pilot project | TBD |
| 4.1.6 Identify potential equity issues associated with town-funded support (e.g., should larger homes receive the benefits of incentives or should there be a sliding scale by home size/income). | Medium-term | Timing and level of discussion | TBD |
| 4.1.7 Advocate for PACE program financing programs for Residential Customers. | Long-term | Number of discussions with legislators | Town<br>HMLP<br>Committees |
| **4.2 TECHNOLOGY AND DESIGN** | | | |
| 4.2.1 Promote high efficiency heat pumps to displace oil and natural gas-fired boiler systems. | Ongoing | Number of conversions to heat pumps | HMLP |
| 4.2.2 Educate customers on technology and product development for heat pumps to be integrated into water circulation heating and domestic hot water. | Ongoing | TBD | Private Contractors |
| 4.2.3 Promote Clean Energy Homes<br>- Energy Star Electric Appliances<br>- Electric / Induction Stoves. | Ongoing | Education effort | HMLP |
| 4.2.4 Collaborate with permit/ building inspector on how to promote more efficient HVAC options during renovations:<br>- Flyer in building permit<br>- Contractor outreach program<br>- Require contractor to provide alternatives with bids | Near-term and ongoing | Timeliness of program and number of flyers sent | Committees<br><br>Town Inspector |
| 4.2.5 Promote the decentralized solar generation capacity of homes and buildings to contribute to the electric grid and reduce dependency on a centralized grid and HMLP distribution overhead infrastructure, including new buildings in Town being made solar ready | Ongoing | | |
| 4.2.6 Develop detailed implementation plans for the Climate Action Plan and Hingham Master Plan to enable Zoning Bylaw and Building Code updates to reflect the Climate Action Plan and Master Plan goals and objectives. Include LEED and Building Wellness Code updates | Medium-term | | |
| 4.2.7 Monitor National Grid natural gas decarbonization roadmap and implementation progress. | Ongoing | Number of updates | TBD |
| **4.3 LARGE USERS** | | | |

| Implementation Steps | Timeframe | Metrics | Responsible Party |
|---|---|---|---|
| 4.3.1 Establish commercial team to work with large customers to educate on programs and program benefits, including automation and distributed energy resources. Include condominium, multi-family, commercial property owners and managers and require all heating and air conditioning contractors to provide carbon-free energy systems specifications in all bids to replace or make major repairs or changes to heating and air conditioning systems and other gas, propane, or oil fueled systems and appliances | Medium-term | Number of consultations | HMLP |
| 4.3.2 Support implementation of PACE program financing programs. | Industrial/Commercial: Near-term and ongoing | Number of PACE loans | Town HMLP |
| 4.3.3 Create and sign up large customers to participate in an aggregated demand response program. | Near-term development with medium-term implementation | Total MW offered into the FCM | HMLP |
| 4.3.4 Create clean peak program similar to investor-owned utilities to compensate for demand response from large energy storage units. | Medium-term | Total MW of energy storage used in demand response | HMLP |
| 4.3.5 Educate and promote net metering program for large users who implement solar energy arrays on their buildings. | Ongoing | Total MW purchased under Net Metering | HMLP |
| **4.4 BUILDING CODE** | | | |
| 4.4.1 Research and review Massachusetts stretch codes to determine whether they can be implemented in Hingham:<br>- Updated Green Communities requirements<br>- Massachusetts stretch codes | Near-term | Decision on whether or not to implement | TBD |
| 4.4.2 Explore adoption of the new MA Net Zero Opt-in Specialized Code and if it is feasible, go through the process for Hingham to review and approve adoption. | Near-term | Implementation | TBD |
| 4.4.3 Provide list of R-values and link to stretch code requirements to permit requests. | Near-term | Number of requested permits receiving | TBD |
| 4.4.4 Educate/promote Passive House/LEED-certified buildings for new construction. | Medium-term | TBD | TBD |
| 4.4.5 Require commercial and multi-unit building owners to notify potential renters of insulation R-values in rentable space. | Medium-term | TBD | TBD |

| Implementation Steps | Timeframe | Metrics | Responsible Party |
|---|---|---|---|
| 4.4.6 Explore community interest in limiting new fossil-fuel hookups. | TBD | TBD | TBD |
| 4.4.7 Require multi-unit buildings to provide:<br>- Electric vehicle charging<br>- Minimum number of charging stations<br>- Submetering | TBD | TBD | TBD |
| 4.4.8 Expedite approvals for heat pumps, insulation, solar, backup-power and batteries. | TBD | TBD | TBD |

Hingham Climate Action Planning Committee

# TRANSPORTATION

| Implementation Steps | Timeframe | Metrics | Responsible Party |
|---|---|---|---|
| **5.1 ELECTRIC CHARGING** | | | |
| 5.1.1 Promote Hinghamdriveselectric.org for residents and businesses to obtain information on electric vehicles. | Near-term | EV growth in Hingham versus state-wide | Town |
| 5.1.2 Increase EV charging stations in business, municipal, and public parking lots; charge appropriately to recover costs. | Near-term | Number of charging stations | HMLP |
| 5.1.3 Install EV charging stations in school parking lots for teachers, parents and students. | Near-term | Number of charging stations | HMLP |
| 5.1.4 Encourage EV charging stations and hookups in multi-unit housing and shopping lots. | Medium-term | Number of charging stations | HMLP |
| 5.1.5 Establish separate EV charging rate to reflect time of use to incentives charging during most efficient times. | Near-term | Implementation of EV Rate | HMLP |
| **5.2 ELECTRIC VEHICLES AND ALTERNATIVES** | | | |
| 5.2.1 Convert municipal fleet to electric and other non-fossil-fuel vehicles where economically and technologically feasible. | Medium-term | Percentage of fleet to EV conversions | Town and departments |
| 5.2.2 Do a demonstration project with at least one electric school bus to gather information. | Medium-term | Timing of bus demonstration | Schools |
| 5.2.3 Convert school buses to electric and other non-fossil fuels if it is economically feasible and install associated charging infrastructure. | Medium- to Long-term | Number of buses converted | Schools |
| 5.2.4 Provide tax incentives for higher MPG vehicles by charging higher excise taxes for less efficient vehicles. | Medium-term | TBD | Town Assessor's Office |
| 5.2.5 Encourage carpooling/ride sharing with incentives, bicycling, and walking. | TBD | TBD | TBD |
| 5.2.6 Educate on electric boating engine options and provide fast-charge electric charging options at docks. | Longer-term | TBD | HMLP |
| 5.2.7 Track electric vehicles (car and boats) registered in Hingham to understand trends and adoption rates. | Near-term | Number of registered electric vehicles | Town Assessor's Office |
| **5.3 PUBLIC TRANSIT** | | | |
| 5.3.1 Encourage use of public transit options. | Near-term | Growth in public transit use | MBTA |
| 5.3.2 Support state efforts on electrification / decarbonization of MBTA:<br>- Buses<br>- Trains<br>- Ferries. | Medium-term | Conversion of MBTA to alternatives | TBD |

| Implementation Steps | Timeframe | Metrics | Responsible Party |
|---|---|---|---|
| 5.3.3 Study a potential Hingham-based electric trolley/bus service that meets identified public needs to connect key Town destinations and the MBTA System, in order to promote economic growth and equitable accessibility. | Medium-term with Longer-term implementation | Timeliness of study | TBD |
| 5.3.4. Research/Understand carbon-free personal mobility options (e.g., solar, ride-sharing, elderly transportation options) and develop a plan for meeting identified needs for segments of the community. | Medium-term | Timeliness of study | TBD |

Hingham Climate Action Planning Committee

# WASTE

| Implementation Steps | Timeframe | Metrics | Responsible Party |
|---|---|---|---|
| **6.1 SOLID WASTE** | | | |
| 6.1.1 Adopt PAYT/SMART Program to create incentives to reduce waste:<br>- Residents<br>- Businesses<br>- Private Haulers | Medium-term | Reduction in Waste | DPW |
| 6.1.2 Require all private haulers to provide recycling to Hingham customers. | Near-term | Rule and Percentage of Compliance Private Haulers | DPW / Board of Health |
| 6.1.3 Reduce/limit/ban single-use plastic and non-refillable containers, such as by passing bylaws restricting drinks sold in single use plastic containers and modifying relevant health codes to allow customers to bring their own reusable containers for certain food item. | Near-term | Elimination of single-use plastic | CGH / DPW / Board of Health |
| 6.1.4 If economically feasible, eliminate plastic from school cafeteria plates and cutlery – convert to compostable wood/paper products | Near-term | Amount of plastic saved | Schools |
| 6.1.5 Institute fee for bulk waste. | Near-term | Reduction in bulk waste | DPW |
| 6.1.6 Divert textiles, mattresses (2022 mattress waste ban), hazardous waste from landfill to recycling alternatives. | Near-term | Tonnage of diverted bulk waste | DPW |
| 6.1.7 Establish polystyrene foam ordinance to ban as food packaging in the largest retailers. | Medium-term | Passage of ordinance at Town Meeting | TBD |
| 6.1.8 Increase offerings at lending libraries to reduce need for residents to purchase and publicize these offerings weekly. | Medium-term | | Hingham Public Library |
| 6.1.9 Explore waste to energy options for distributed energy resources. | Long-term | TBD | Businesses, HMLP |
| **6.2 RECYCLING** | | | |
| 6.2.1 Extend transfer station hours for drop-off and recycling. | Medium-term | Increase in recycling hours and tonnage | DPW |
| 6.2.2 Increase education for homeowners, schools and businesses regarding recycling options and fund staff to empty these bins frequently. | Near-term | TBD | CGH / DPW / Schools |
| 6.2.3 Add more recycling bins at fields, parks, schools, municipal buildings, and other public spaces. | Near-term | Increased recycling rates | DPW |

| Implementation Steps | Timeframe | Metrics | Responsible Party |
|---|---|---|---|
| 6.2.4 Increase water filling stations in town buildings. | Medium-term | Less water bottles in recycling | Hingham Water |
| 6.2.5 Increase textile recycling. | Near-term | Fewer textiles in waste stream | DPW, Schools, Businesses and other locations |
| 6.2.6 Promote Hingham Exchange program. | Medium-term | TBD | TBD |
| **6.3 COMPOSTING** | | | |
| 6.3.1 Establish community-wide composting program for municipal buildings:<br>- Clearly define what is compostable-<br>- Establish composting bins in schools and municipal buildings<br>- Create program for collection and distribution of post-processed compost | TBD | Reduced tipping fees / Reduced waste tonnage | Sustainability Coordinator / DPW director |
| 6.3.2 Educate businesses and residents on:<br>- Benefits of composting<br>- Clearly define what is compostable<br>- Explore curb-side composting collection options<br>- Create drop-off for compostable materials | TBD | TBD | TBD |
| 6.3.3 Explore potential siting and operations of an anerobic digester. | Long-term | | Town / DPW |
| 6.3.4 Find ways to reduce food waste and redistribute excess food in accordance with food laws. | Medium-term | Amount of food waste | Businesses |

Hingham Climate Action Planning Committee

# COMMUNITY

| Implementation Steps | Timeframe | Metrics | Responsible Party |
|---|---|---|---|
| **7.1 COMMUNITY OUTREACH** | | | |
| 7.1.1 Establish a full-time Sustainability Director to coordinate implementation of the Plan recommendations and obtain grants/funding to do so. | Near-term | Approved Budget and Timing of Hire | Town |
| 7.1.2 Reconstitute the Climate Action Planning Committee into an ongoing Climate Action Commission to monitor, track, provide updates, and advise on the Plan implementation and progress. | Near-term | Approval of Warrant Article | Select Board and Town Meeting |
| 7.1.3 Sponsor an education and marketing program to inform residents and businesses of incentives to install energy efficiency and adopt carbon-free energy solutions. | Medium-term | Marketing Plan | Town |
| 7.1.4 Promote net zero carbon emission opportunities for the Town, residents, and businesses. | Long-term | Realization of Net Zero Goals | |
| 7.1.5 Make copies of the Plan and associated dashboards readily available in digital and hardcopy | Near-term | Number of copies/ clicks | Town |
| 7.1.6 Favor Town vendors who have their own Net Zero and/or sustainability plan | Medium-term | RFPs with extra points | Town |
| 7.1.7 Regularly update the carbon inventory and track progress through an easy-to-absorb dashboards | Medium-term | Number of reports | Sustainability Director |
| 7.1.8 Continue ongoing communications with community groups to seek equitable outcomes on all Plan recommendations | Near-term | | Town |
| **7.2 PUBLIC PATHWAYS** | | | |
| 7.2.1 Develop a plan to connect schools, parks, the harbor, and commercial centers with bike paths, sidewalks, and possibly an electric trolley. | Near-term | Timeliness of plan | TBD |
| 7.2.2 Facilitate community movements throughout town via clean resources with installation of:<br>- Bike paths<br>- Bike racks<br>- Pedestrian walkways | Medium to long-term | Number of new pathways | TBD |
| 7.2.3 Connect areas of natural resources to/from public transit and public centers. | Medium-term | Number of new pathways | TBD |
| 7.2.4 Explore Transit Oriented Districts (TODs) as a solution to facilitate proximity to public transportation centers to minimize vehicle traffic. | Medium-term | TBD | TBD |
| **7.3 AIR QUALITY** | | | |
| 7.3.1 Monitor National Grid natural gas leak data for improvements/degradation | Ongoing | TBD | TBD |

| Implementation Steps | Timeframe | Metrics | Responsible Party |
|---|---|---|---|
| 7.3.2 Require aggressive program to:<br>- Encourage local utility to stop natural gas pipeline leaks<br>- Adopt gas leak reduction targets (e.g., AGA voluntary guidelines) | Ongoing | TBD | TBD |
| 7.3.3 Support state efforts to decarbonize the natural gas system | Ongoing | TBD | TBD |
| 7.3.4 Identify areas where Hingham energy consumers can benefit from incentives to move off natural gas and oil. | Medium-term | TBD | TBD |
| 7.3.5 Promote electrification of heating supply to decrease reliance on natural gas and oil. | Long-term | TBD | TBD |

Hingham Climate Action Planning Committee

# NATURAL RESOURCES

| Implementation Steps | Timeframe | Metrics | Responsible Party |
|---|---|---|---|
| **8.1 CARBON SINK DEVELOPMENT** | | | |
| 8.1.1 Educate residents, businesses and the Town Administration about carbon sinks. | Near-term | Number of meetings, local & State publications | Conservation Commissions, Land Trusts, Watershed Organizations |
| 8.1.2 Encourage land development that decreases carbon output and increases carbon absorption. | Near to Mid-term | Zoning By-law | Conservation Commission, Planning Board |
| 8.1.3 Provide education on the benefits of landscaping with native plants and sustainable choices. | Near-term | Workshops, local & State publications | Garden Clubs, Land Trusts, Watershed Orgs |
| 8.1.4 Protect wetlands with upgraded bylaws to match state and federal regulations. | Near to mid-term | Acres of additional wetlands protected | Conservation Commission |
| **8.2 LAND CONSERVATION / MANAGEMENT** | | | |
| 8.2.1 Engage in tree maintenance and planting program, including:<br>- Two for one tree planting policy<br>- Zoning bylaw for tree removal | Near-term | Number of trees saved or planted, Zoning By-Law | Tree Preservation Study Committee, Tree and Park (DPW), Planning Board |
| 8.2.2 Preserve/Conserve open space, land, forests and grasslands in Hingham. | Near to Mid-term | # Additional acres of conservation land or conservation protection easements | Open Space Acquisition Committee, Community Preservation Committee, private land trusts |
| 8.2.3 Expand protected green spaces that serve as naturally occurring carbon sinks. | TBD | # acres of additional protected carbon sink areas, including coastal. By-law amendments. | Open Space Acquisition Comm., Community Preservation Comm. Private Land Trusts,<br><br>Conservation Comm. |

| Implementation Steps | Timeframe | Metrics | Responsible Party |
|---|---|---|---|
| 8.2.4 Promote zero carbon emissions landscaping equipment for both the Town and residential users | Near to Mid-term | Workshops with suppliers, local & State publications | Hingham DPW (town use), Climate Change orgs Hingham Net Zero, Sustainable South Shore, |
| **8.3 WATER CONSERVATION/ MANAGEMENT** | | | |
| 8.3.1 Replace non-native plants with native plant landscaping at Town-owned properties to reduce water and fossil fuel use. | Near to Mid-term | # Town areas where non-natives are replaced | Hingham DPW (Tree & Park) Hingham Beautification Committee Con. Comm approval of species |
| 8.3.2 Reduce/eliminate use of nitrogen fertilizers on Town properties to improve water quality in ponds and rivers. | Near term | Report from DPW (Tree & Park) re nitrogen use. Less eutrophication in ponds and rivers. | Hingham DPW (Tree & Park). Approval from Con Comm? |
| 8.3.3 Educate water users on water conservation practices and benefits. | Near Term | Meetings, Workshops, Publications, | Weir River Water Commission & WRWS Citizens Advisory Board. Climate Action orgs, Land Trusts, Local Media |
| 8.3.4 Generate user-specific targets for water usage and report with water department bills, both residential and business. | Near Term | Impact of water usage targets in gallons saved | WRW Commission & Citizens Advisory Board. |
| 8.3.5 Create tiered pricing for water usage to differential between essential and non-essential usage and disincentivize the latter. | Near Term | Impact in gallons saved | WRW Commission & Citizens Advisory Board. |
| 8.3.6 Where appropriate and adequate, encourage on-site septic disposal | Mid-term | Number of septic adoptions | Town Conservation Commission Board of Health |

| Implementation Steps | Timeframe | Metrics | Responsible Party |
|---|---|---|---|
| **8.4 RECREATION** | | | |
| 8.4.1 Find ways to reduce carbon emissions in recreational areas (land and sea) by promoting electric alternatives. | Medium- to Long-Term | Number of electric vehicles including boat engines and bikes. | On water: Harbormaster & Harbor Development Committee. On land: Recreation Commission |
| 8.4.2 Enable electric motor alternatives at recreational areas with fast-charge stations. | Medium-term | Number of charging stations | HMLP & Harbor Development and Recreation Commissions. |
| 8.4.3 Promote use of carbon-negative materials and recycled inputs at recreational areas (e.g., picnic tables, chairs, playgrounds). | TBD | Number of areas with carbon-negative and/or recycled equipment | Recreation Commission |

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# APPENDIX B
# Carbon Emissions Inventory

TO BE COMPLETED, AND INSIGHTS INCORPORATED INTO TEXT OF PLAN

Hingham
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# APPENDIX C
# Summary of Community Survey Results

Hingham Climate Action Planning Committee

# SUMMARY OF COMMUNITY SURVEY RESULTS

During the months of April through September 2022, the Hingham Climate Action Planning Committee posted and publicized an online survey targeting the entire community of Hingham. The survey was advertised on the Town webpage, at public events, and during public meetings. The survey program was set to only allow for one response per IP Address so as to limit duplication of respondents. This appendix summarizes the results of the survey.

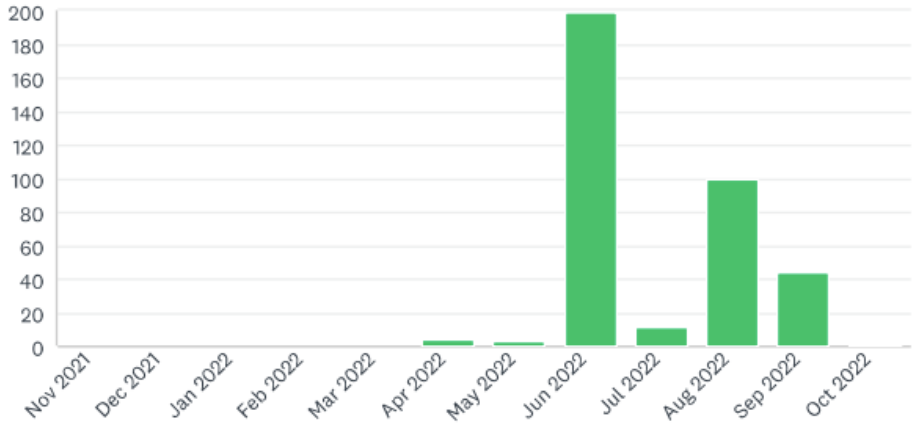
## C.1. Survey Response

| TOTAL RESPONSES | COMPLETION RATE | TYPICAL TIME SPENT |
|---|---|---|
| 362 | 100% | 4m:53s |

### Trends

**Responses (by month)**

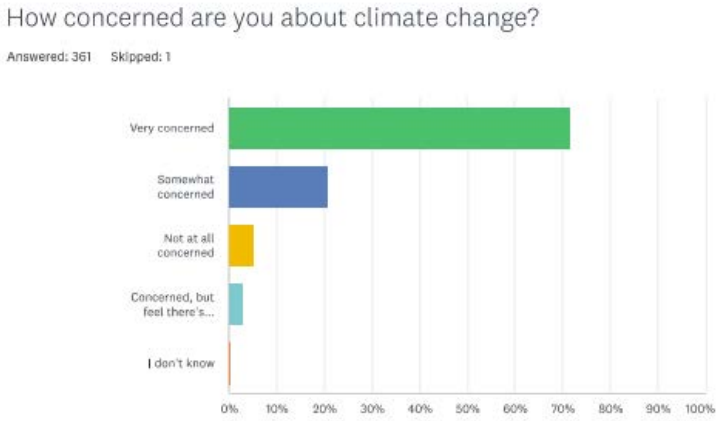
First: 4/24/2022 Zoom: Nov 2021 to Oct 2022



Hingham Climate Action Planning Committee

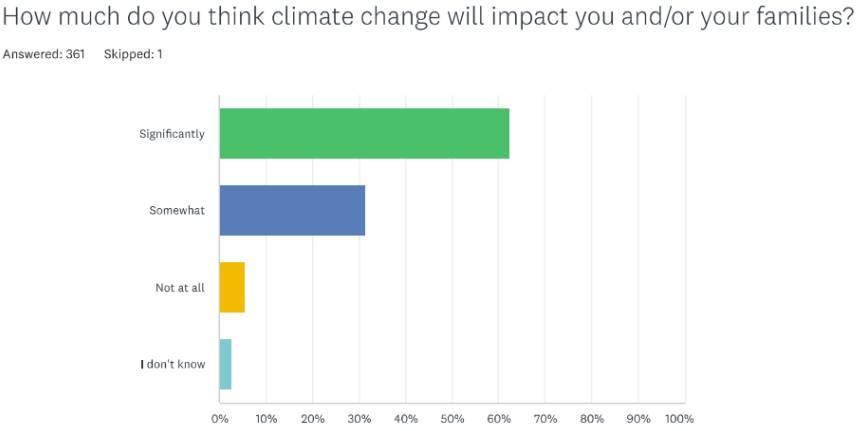
## C.2. Survey Questions and Results

### Question 1




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Very concerned | 71.47% | 258 |
| Somewhat concerned | 20.78% | 75 |
| Not at all concerned | 5.26% | 19 |
| Concerned, but feel there's nothing I can do | 2.77% | 10 |
| I don't know | 0.28% | 1 |
| **Total Respondents: 361** | | |

### Question 2




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Significantly | 62.33% | 225 |
| Somewhat | 31.30% | 113 |
| Not at all | 5.26% | 19 |
| I don't know | 2.49% | 9 |
| **Total Respondents: 361** | | |

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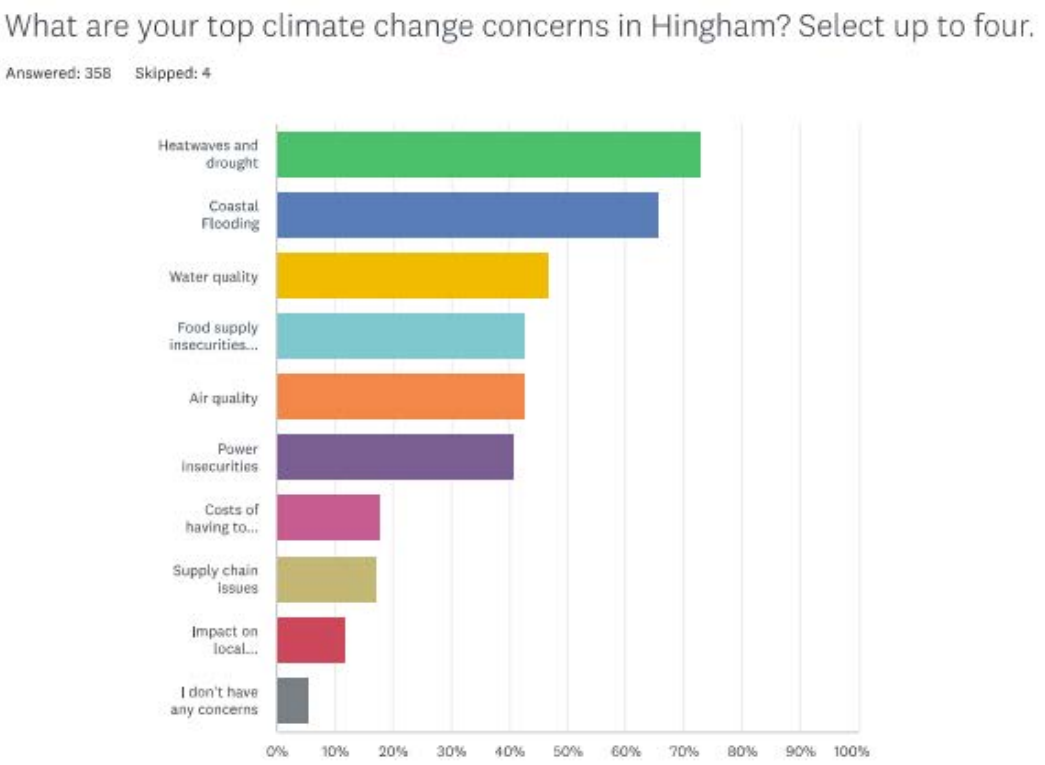
**Question 3**



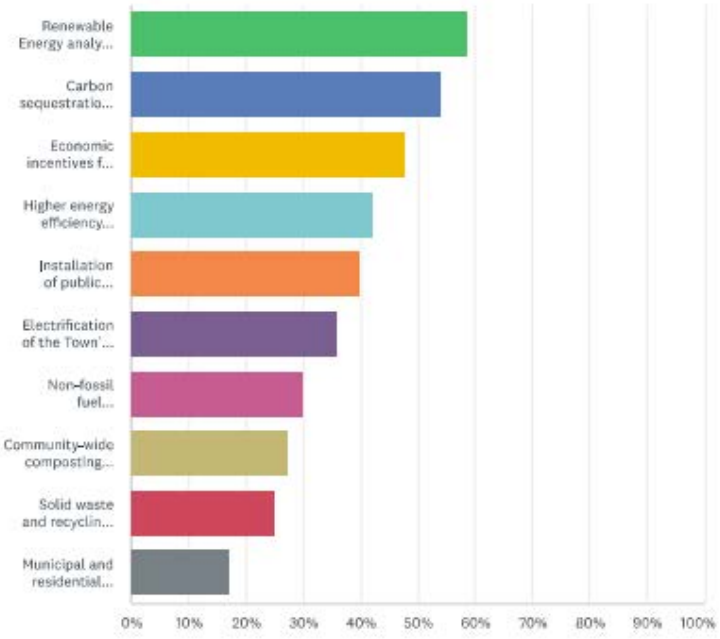

| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Heatwaves and drought | 72.91% | 261 |
| Coastal Flooding | 65.36% | 234 |
| Water quality | 46.65% | 167 |
| Food supply insecurities and rising costs | 42.74% | 153 |
| Air quality | 42.74% | 153 |
| Power insecurities | 40.78% | 146 |
| Costs of having to modify my home | 17.60% | 63 |
| Supply chain issues | 17.04% | 61 |
| Impact on local businesses | 11.73% | 42 |
| I don't have any concerns | 5.31% | 19 |

**Total Respondents: 358**

**Question 4**

The Hingham Climate Action Plan will include strategies to reduce greenhouse gas emissions in order to reach net zero carbon emissions in Hingham. Please choose the top four areas you would like to see covered in the plan.

Answered: 358 Skipped: 4




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Renewable Energy analysis and assessment | 58.66% | 210 |
| Carbon sequestration (conservation of green spaces, planting and preservation of trees) | 53.91% | 193 |
| Economic incentives for residents to modify homes | 47.77% | 171 |
| Higher energy efficiency building standards | 42.18% | 151 |
| Installation of public electric vehicle charging stations | 39.94% | 143 |
| Electrification of the Town's vehicle fleet | 35.75% | 128 |
| Non-fossil fuel transportation options (e.g. bike lanes) | 29.89% | 107 |
| Community-wide composting program | 27.37% | 98 |
| Solid waste and recycling education | 24.86% | 89 |
| Municipal and residential battery storage | 17.04% | 61 |

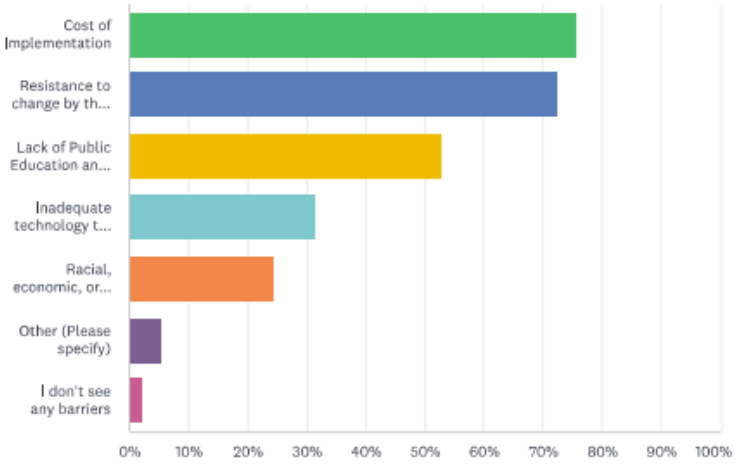
**Total Respondents: 358**

Hingham Climate Action Planning Committee

**Question 5**

## What are the barriers to addressing climate change in Hingham? Select all that apply.

Answered: 361 Skipped: 1



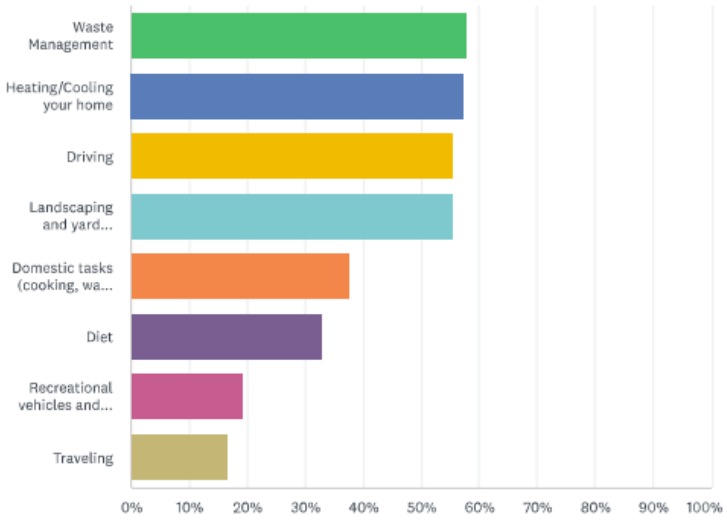

| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Cost of Implementation | 75.62% | 273 |
| Resistance to change by the public/private/corporate/industrial sector | 72.30% | 261 |
| Lack of Public Education and Information | 52.63% | 190 |
| Inadequate technology to address climate change | 31.30% | 113 |
| Racial, economic, or other inequalities | 24.38% | 88 |
| Other (Please specify) | 5.26% | 19 |
| I don't see any barriers | 2.22% | 8 |

**Total Respondents: 361**

**Question 6**

Which part of your carbon footprint (amount of carbon you personally emit) are you most willing to change? Select up to four.

Answered: 344 Skipped: 18




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Waste Management | 57.85% | 199 |
| Heating/Cooling your home | 57.27% | 197 |
| Driving | 55.52% | 191 |
| Landscaping and yard maintenance | 55.52% | 191 |
| Domestic tasks (cooking, water heating, drying clothes, etc) | 37.50% | 129 |
| Diet | 32.85% | 113 |
| Recreational vehicles and boats | 19.19% | 66 |
| Traveling | 16.57% | 57 |

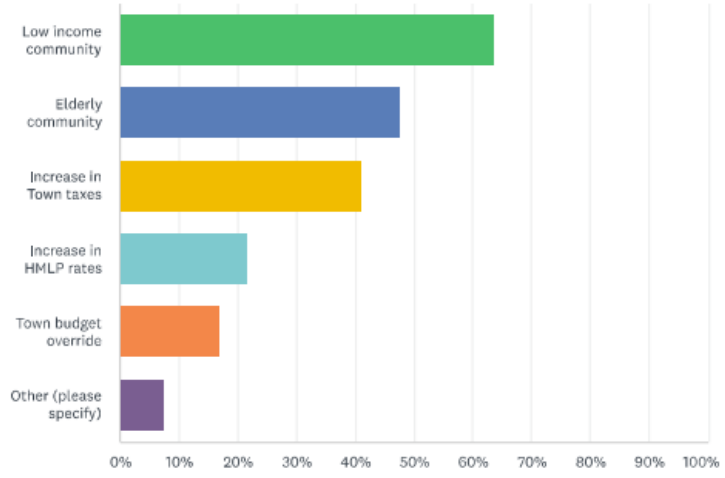
**Total Respondents: 344**

Hingham Climate Action Planning Committee

**Question 7**

What equity issues should we be mindful of when creating the plan? Select up to two.

Answered: 361 Skipped: 1



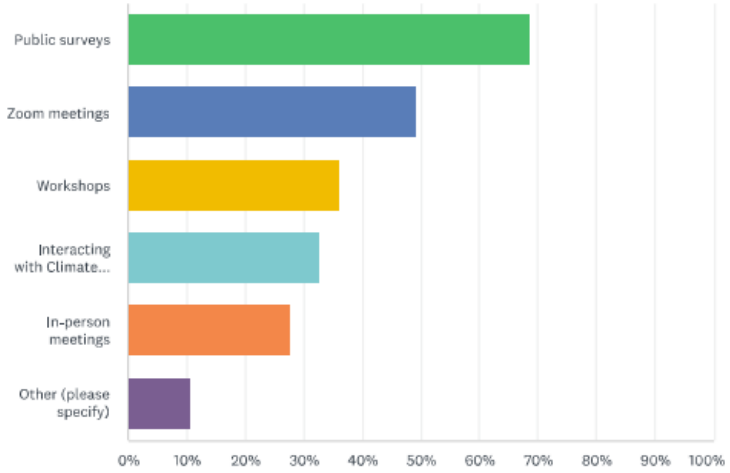

| ANSWER CHOICES | | RESPONSES | |
|---|---|---|---|
| Low income community | | 63.43% | 229 |
| Elderly community | | 47.65% | 172 |
| Increase in Town taxes | | 41.00% | 148 |
| Increase in HMLP rates | | 21.61% | 78 |
| Town budget override | | 16.90% | 61 |
| Other (please specify) | Responses | 7.48% | 27 |

**Total Respondents: 361**

**Question 8**

How would you like to be involved in climate action planning in Hingham? Select all that apply.

Answered: 361 Skipped: 1




| ANSWER CHOICES | | RESPONSES | |
|---|---|---|---|
| Public surveys | | 68.70% | 248 |
| Zoom meetings | | 49.03% | 177 |
| Workshops | | 35.73% | 129 |
| Interacting with Climate Action Planning Committee (CAPC) at events | | 32.41% | 117 |
| In-person meetings | | 27.70% | 100 |
| Other (please specify) | Responses | 10.53% | 38 |

**Total Respondents: 361**

Hingham Climate Action Planning Committee

**Question 9**

Do you have any other comments or suggestions?

Specific answers are available through the Town of Hingham.

**Question 10**

If you would like to receive updates on the plan and information about future events, please include your contact information below. For privacy purposes this information will not be shared or sold to third parties.

Answered: 178 Skipped: 184

| ANSWER CHOICES | | RESPONSES | |
|---|---|---|---|
| Name | Responses | 95.51% | 170 |
| Company | Responses | 0.00% | 0 |
| Address | Responses | 92.13% | 164 |
| Address 2 | Responses | 0.00% | 0 |
| City/Town | Responses | 94.38% | 168 |
| State/Province | Responses | 94.94% | 169 |
| ZIP/Postal Code | Responses | 93.82% | 167 |
| Country | Responses | 82.58% | 147 |
| Email Address | Responses | 92.70% | 165 |
| Phone Number | Responses | 65.73% | 117 |

**Survey End**

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# APPENDIX D
# List of Public Meetings and Community Engagement

Hingham
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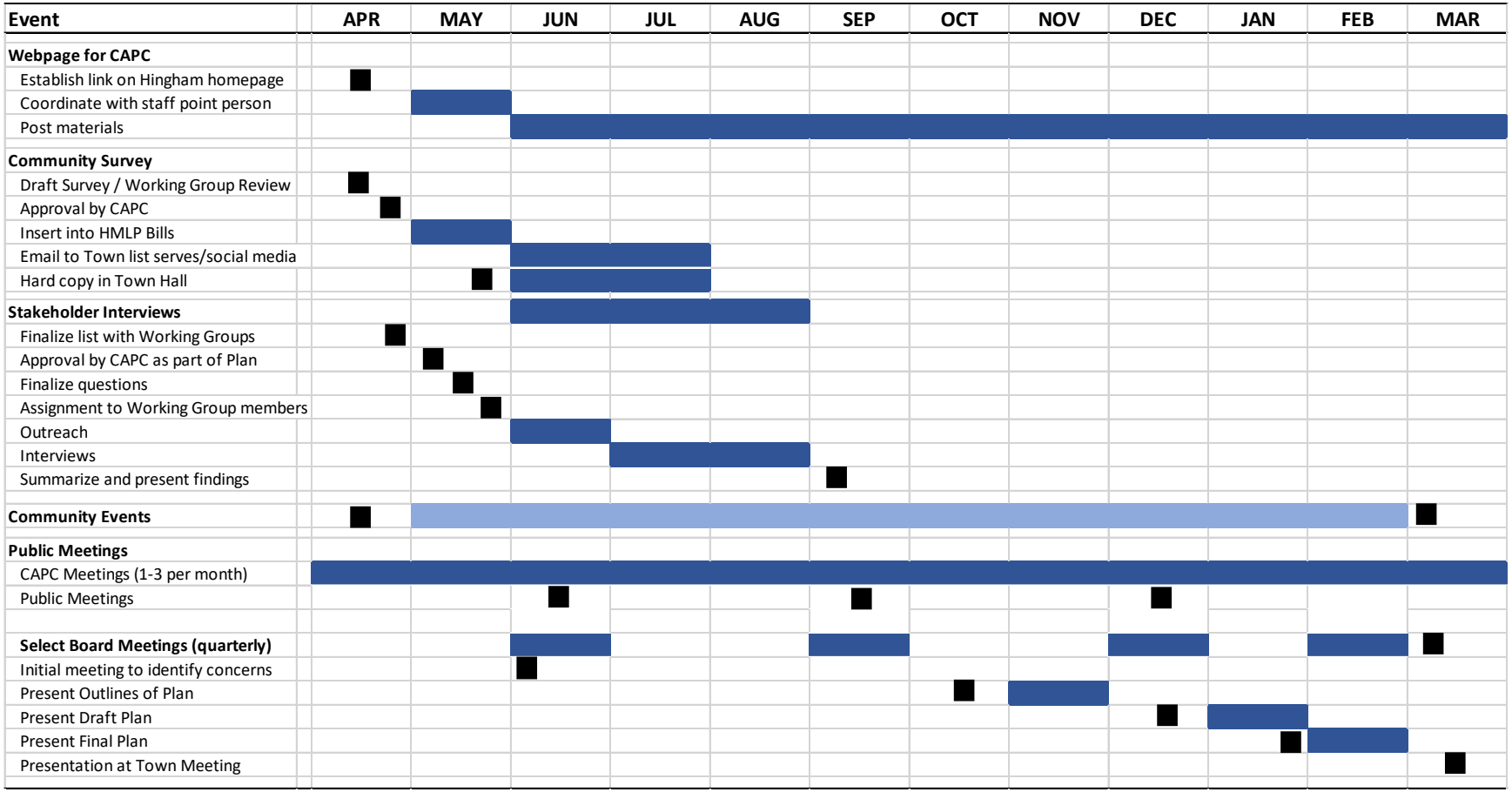
# D.1. Schedule of Public Outreach



Hingham Climate Action Planning Committee

# D.2. List of Public Meetings and Outreach

**CAPC MEETINGS**

**2023**

- January 11, 2023
- January 26, 2023
- Add
- Add
- Add

**2022**

- January 26, 2022
- February 9, 2022
- March 2, 2022
- March 8, 2022
- March 24, 2022
- April 6, 2022
- April 27 .2022
- May 25, 2022
- June 1, 2022
- June 29, 2022
- July 13, 2022
- August 3, 2022
- August 17, 2022
- August 31, 2022
- September 14, 2022
- September 20, 2022
- September 28, 2022
- October 12, 2022
- October 26, 2022
- November 10, 2022
- December 1, 2022
- December 7, 2022
- December 14, 2022

**2021**

- December 22, 2021
- December 1, 2021
- November 18, 2021
- November 3, 2021
- October 27, 2021
- October 13, 2021
- September 22, 2021

**PUBLIC ENGAGEMENT MEETINGS**

- December 7, 2022
- September 20, 2022
- June 15, 2022

Hingham Climate Action Planning Committee

**PRESENTATIONS TO SELECT BOARD**

- October 18, 2022
- June 28, 2022

**PRESENTATIONS TO SUSTAINABLE SOUTH SHORE**

- November 28, 2022
- May 31, 2022

**PUBLIC EVENTS**

- List here

**PUBLIC ARTICLES**

- John Borger, *The Anchor*, "Meet Hingham's Climate Action Planning Committee," September 9, 2022, https://www.hinghamanchor.com/meet-hinghams-climate-action-planning-committee/

- Carol Britton Meyer, *The Anchor*, "Citizen Involvement Key to Climate Action Plan's Success," October 19, 2022, https://www.hinghamanchor.com/citizen-involvement-key-to-climate-action-plans-success/

- Other

**VIDEO**

https://youtu.be/fQ-PChBF6IU

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# APPENDIX E
# Examples of Grants and Funding Opportunities

Hingham Climate Action Planning Committee

# Examples of Grants and Funding Opportunities

Grants and funding opportunities are constantly changing and this appendix should serve as an example of potential funding available for 2022 and 2023 as a basis for researching future grant opportunities going forward.

| Category | Program | Agency | Deadline | Program Goals |
|---|---|---|---|---|
| **Natural Resources** | DOER Green Communities | DOER | Mid-late Jan Competitive grant PON posted on Commbuys, due April 8 | Helps municipalities reduce energy use and costs by implementing clean energy projects in municipal buildings, facilities and schools |
| | MVP Program - Planning Grant Action Grant | | Planning Grant – Jan 6, 2023 Action Grant - Spring 2023 | Supports communities as they build resilience to climate change |
| **Transportation** | MPO Community Connections Program | MPO | 12/23/22 | Provides first and last mile solutions for community transportation, bike supportive infrastructure, bike share stations, vehicles, bike parking, shelters and lanes |
| | Complete Streets Program | MassDOT | Policy - Rolling Prioritization Plan – April 1 Construction Application – May 1 | Provides safe accessible options for all travel modes – walking, biking, transit, and vehicles. |
| | MassEVIP Fleets Incentives | MassDEP | First-come, first-served basis until funding spent | Helps eligible public entities acquire electric vehicles for their fleets |

| Category | Program | Agency | Deadline | Program Goals |
|---|---|---|---|---|
| **Transportation (Continued)** | MAPC Technical Assistance Program | MAPC | rolling | |
| | Shared Streets and Spaces Program | MassDOT | March 1, 2023 | Provides funding to municipalities to quickly implement improvements to plazas, sidewalks, curbs, streets, bus stops, parking areas and other public spaces to promote public health, safe mobility and strengthened commerce. |
| **Recycling** | SMRP - Small Initiative Program | MassDEP | June 2023 | Support local recycling, composting, organics, reuse, source reduction policy development and enforcement |
| | SMRP -Recycling Dividends Program | MassDEP | June 2023 | Payments to municipalities that have implemented specific programs and policies to reuse, recycle and reduce waste |
| **Buildings** | MAPC Technical Assistance Program | MAPC | rolling | |
| **Electricity** | MAPC Technical Assistance Program | MAPC | rolling | |