

# Westborough Climate Action Plan

*Westborough, Massachusetts*

*Prepared by the Westborough Climate Action Plan Task Force*

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## Table of Contents

<b>EXECUTIVE SUMMARY .....</b>	<b>III</b>
<b>ACKNOWLEDGMENTS.....</b>	<b>IX</b>
<b>SECTION 1 - INTRODUCTION .....</b>	<b>1</b>
<b>Part 1 - The Foundation</b>	
<b>SECTION 2 - GREENHOUSE GAS INVENTORY .....</b>	<b>5</b>
<b>SECTION 3 - METHODOLOGY .....</b>	<b>17</b>
<b>Part 2- The Plan</b>	
<b>SECTION 4 - PRIMARY GOALS AND STRATEGIES.....</b>	<b>22</b>
GOAL - CLEAN-ENERGY SOURCED ELECTRICITY .....	22
<i>Strategy 1: Facilitate Participation in the SMART Program .....</i>	<i>22</i>
<i>Strategy 2: Steadily increase clean renewable power in the Westborough Power Choice program...23</i>	<i>23</i>
<i>Strategy 3: Renewable power generation facility for DPW water &amp; sewer facilities by 2030 .....</i>	<i>25</i>
<i>Strategy 4: Increase the Class 1 renewable sources in Westborough’s municipal electric supply .....</i>	<i>25</i>
<i>Strategy 5: Participate in new technology pilot programs .....</i>	<i>26</i>
GOAL: BUILDING ELECTRIFICATION .....	28
<i>Strategy 1. Adopt building codes and zoning bylaws to ensure heat and hot water systems are 100% carbon free. ....</i>	<i>30</i>
<i>Strategy 2: Promote State subsidy programs for building improvements and 2050-compliant heating systems .....</i>	<i>31</i>
<i>Strategy 3: Promote Ground Source Heat Pumps to C&amp;I oil and gas customers. ....</i>	<i>33</i>
<i>Strategy 4. Explore emerging technologies which reduce Building GHG emissions.....</i>	<i>34</i>
GOAL - TRANSPORTATION ELECTRIFICATION .....	36
<i>Strategy 1 – Outreach: proactively disseminate information about the benefits of EVs .....</i>	<i>37</i>
<i>Strategy 2 - Comprehensive plan for charging stations.....</i>	<i>39</i>
<i>Strategy 3 - Adopt methods for tracking GHG from residential vehicles .....</i>	<i>41</i>
<i>Strategy 4 - Partner with Central Mass Regional Planning Commission &amp; Neighboring Towns .....</i>	<i>42</i>
<i>Strategy 5 - Electrification of the Municipal Fleet .....</i>	<i>42</i>
<i>Strategy 6 - Task Force for Autonomous Vehicles .....</i>	<i>43</i>
GOAL: ENERGY EFFICIENCY .....	45
<i>Strategy 1: Implement Mass Save weatherization and energy efficiency projects.....</i>	<i>46</i>
<i>Strategy 2: Assist Westborough’s largest GHG-emitting C&amp;I businesses to participate in energy efficiency programs .....</i>	<i>48</i>
<i>Strategy 3: Lead by example on municipal building performance. ....</i>	<i>49</i>
<b>SECTION 5 - SECONDARY GOALS AND STRATEGIES .....</b>	<b>51</b>
GOAL: BUILDING ENERGY USE TRACKING.....	51
<i>Strategy 1: Implement processes to collect and report energy consumption data .....</i>	<i>51</i>
<i>Strategy 2: Annually publish Municipal Building Energy Disclosure reports.....</i>	<i>52</i>
<i>Strategy 3: Develop and promote voluntary C&amp;I Building Energy Disclosure reports.....</i>	<i>53</i>
<i>Strategy 4: Investigate residential energy use and efficiency reporting options.....</i>	<i>53</i>
GOAL: IMPROVE PUBLIC TRANSPORTATION OPTIONS .....	56
<i>Strategy 1: Promote and expand the Via bus service.....</i>	<i>56</i>
<i>Strategy 2: Advocate MBTA for expanded MBTA Commuter Rail Service.....</i>	<i>57</i>
<i>Strategy 3: Develop/Participate in Alternative Regional Transit Services.....</i>	<i>57</i>
GOAL: IMPROVE BIKE AND PEDESTRIAN INFRASTRUCTURE .....	59

*Strategy 1: Implement a process to prioritize bike and pedestrian infrastructure improvements..... 59*  
*Strategy 2: Use the "Corridor Study" Process..... 60*  
 GOAL: PROTECT AND EXPAND THE NATURAL ENVIRONMENT..... 62  
*Strategy 1: Identify funding mechanisms to protect and acquire additional open space..... 62*  
*Strategy 2: Educate and promote sustainable landscaping and tree canopy..... 64*  
 GOAL: REDUCE RESIDENTIAL AND MUNICIPAL WASTE BY 30% BY 2030 ..... 66  
*Strategy 1: Offer composting services at the Transfer Station..... 66*  
*Strategy 2: Increase single family household adoption of curbside composting..... 67*  
*Strategy 3: Implement town-sponsored curbside trash/recycle/composting in FY 2023..... 68*  
*Strategy 4: Implement composting at all Westborough public schools starting FY 2023..... 68*  
 GOAL: OFF ROAD EMISSIONS REDUCTION..... 70  
*Strategy 1: By 2025, develop a plan for reduction of Off Road Emissions. .... 70*

**Part 3 - Administration**

**SECTION 6 – COMMUNITY ENGAGEMENT..... 72**  
**SECTION 7- GOVERNANCE ..... 76**  
**SECTION 8 - CONCLUSION..... 81**  
**APPENDIX 1 – VOICES OF WESTBOROUGH ..... 83**  
**APPENDIX 2 – TOWN MEETING WARRANT ARTICLE..... 86**  
**APPENDIX 3 – CAP CHARTER, GOALS AND REPORTING STRUCTURE ..... 87**  
**APPENDIX 4 – TOWNS WITH SUSTAINABILITY COORDINATORS ..... 90**  
**APPENDIX 5 – TERMS, ACRONYMS AND DEFINITIONS..... 91**

## Executive Summary

### *Background*

When the Fall 2019 Special Town Meeting authorized the creation of a Task Force to develop a comprehensive Climate Action Plan (CAP), Westborough joined a growing number of communities in Massachusetts who have committed to dramatically and continuously reduce greenhouse gas (GHG) emissions and make the town a truly sustainable community.

The motivation to develop this plan is the global climate crisis,<sup>1</sup> which has accelerated over the last two decades and whose impacts are being felt even here in Westborough. The Town has seen more extended droughts during the warmer months, more heatwaves and an increasing frequency of intense rainstorms, which can lead to flash flooding.

***In its Fifth Assessment Report, the Intergovernmental Panel on Climate Change (IPCC), a group of 1,300 independent scientific experts from countries all over the world under the auspices of the United Nations, concluded there is a more than 95 percent probability that human activities over the past 50 years have warmed our planet. <sup>2</sup>***

By voting to develop a Climate Action Plan, the residents of Westborough overwhelmingly endorsed the idea that the entire community needs to take specific action to meet the goals defined in the Commonwealth's Global Warming Solutions Act (GWSA) of 2008, and the climate legislation that has followed. An effective local response to the global threat will require that all residents and businesses become more aware of how their individual decisions and activities impact GHG emissions.

With the publication of this document, the CAP Task Force has completed development of the first Climate Action Plan for Westborough. Its recommendations provide a roadmap which will dramatically and continuously reduce GHG emissions community wide for the next 30 years. The plan is aligned with State level goals and will leverage Commonwealth's programs for GHG reduction. The plan also defines a set of actions for the Town which will guide the community on a transition that addresses the climate change issues that specifically affect Westborough.

### *State Programs and Policies*

Westborough's Climate Action Plan was motivated by and is built on the foundation established by the Commonwealth. The GWSA made Massachusetts a leader in climate action in 2008 because its binding requirements which required the State to meet GHG emissions reductions goals for 2020 and 2050. The GWSA gives the governor and the executive agencies significant regulatory power to achieve these targets.

In response to recent scientific projections, in early 2020 Governor Baker modified the 2050 goal to Net Zero GHG Emissions, which is the goal Westborough has adopted in this plan. In December 2020, the Executive Office of Energy and Environmental Affairs (EEA) published the Decarbonization Roadmap to 2050 and issued the Interim Clean Energy and Climate Plan for 2030 (CECP 2030) which is based on the State Decarbonization Roadmap. CECP 2030 provides a broad array of policy recommendations and requirements for Massachusetts to achieve the interim 2030 emissions reduction goal on the pathway to Net Zero in 2050.

The CAP Task Force expects ongoing policy and program changes from the state and federal governments in 2021 and in the years ahead, which will provide new resources and new requirements that create opportunities and constraints on Westborough residents and business owners. This CAP is consciously built on the analytic and policy foundation of the Commonwealth so that Westborough is prepared for

climate change and can respond effectively with the assistance of the State and Federal government entities.

### *Methodology*

The CAP Task Force began by drafting a Charter document which detailed the scope, design, discovery, deliverables, and approval process. It was subsequently approved by the Town Manager and Board of Selectmen.

A guiding principle of Westborough's CAP is that all residents and businesses, as well as Town government, must make a commitment to take action to reduce GHG emissions to achieve the Commonwealth's current and future goals.

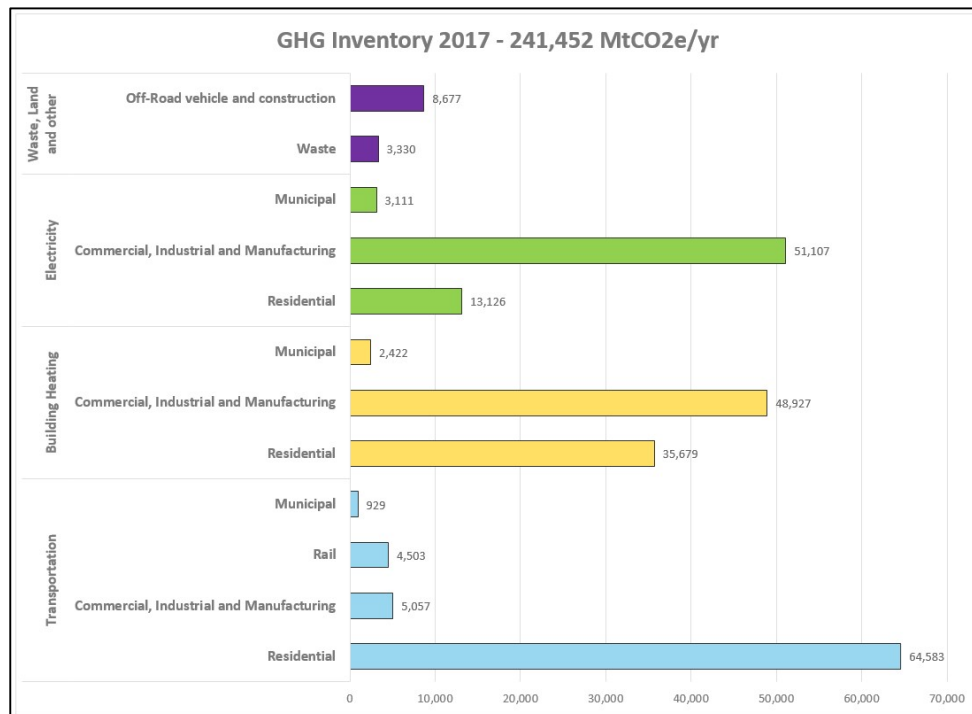
Over the last year, the CAP Task Force methodically pursued this objective. It had frequent reviews with the Board of Selectmen, Town boards and committees, and members of the public to gain feedback and insights which the Task Force used to develop the CAP.

### *Greenhouse Gas Inventory*

The Task Force completed a Greenhouse Gas Inventory which established baseline measures of Westborough's GHG emissions community wide using 2017 as a baseline for the town's emissions footprint. This inventory enabled the Task Force to prioritize the goals and strategies in the CAP based on the data which illustrates the sources and segments that generate the greatest emissions in Westborough. The tool and methodology were defined by a state agency and adopted by many municipalities statewide.

As shown in the chart below, the Inventory identified four areas as clear priorities for climate action:

1. Private passenger vehicles used by residents
2. Electricity generated outside Westborough
3. Building space heat and hot water for properties used by business or industry
4. Building space heat and hot water for residential properties



## Primary and Secondary Reduction Goals

The Westborough CAP focuses on 4 primary and 6 secondary goals, based on the GHG inventory. Each goal outlines a set of strategies that Westborough residents and businesses should implement to reduce GHGs. The strategies for each goal include: the target constituents, action details, parties responsible for execution, a timetable for achieving each goal, and an estimate of GHG emissions or a proxy metric to track impact. Importantly, the CAP goals and the strategies for achieving them are aligned with the milestones and action established in the Commonwealth CECP 2030 document.

### Primary goals

#### *Clean-Energy Sourced Electricity*

Westborough's electricity supply should comply with the Commonwealth's 2030 Clean Energy Standard and be generated almost entirely from renewable sources by 2050. Electricity generated by fossil fuels such as natural gas and purchased by Westborough businesses and residents accounts for approximately 28% of the community's greenhouse gas emissions. In order to reduce those emissions, Westborough must increase the percentage of electricity from clean sources.

#### **Strategies:**

1. Facilitate participation in the Solarize Massachusetts Renewable Target (SMART) Program
2. Increase proportion of clean renewable power in the Westborough Power Choice program.
3. Build a renewable power generation facility for water and sewer facilities by 2030.
4. Increase the Class 1 renewable sources in Westborough's municipal electric supply.

#### *Building Electrification*

By 2030, Westborough will eliminate systems that utilize fossil fuel sources for space heat and hot water in at least 20% of all buildings. To achieve this goal Westborough will enact policies and promote programs to electrify new and existing buildings to replace systems that currently operate on fossil fuels. For Westborough to achieve net zero emissions by 2050, the community will need to transition the way it heats buildings while making them significantly more energy efficient.

#### **Strategies:**

1. Adopt new energy building codes and enact zoning bylaws.
2. Promote state programs for building envelope improvements and heating systems.
3. Promote Ground Source Heat Pumps to Commercial & Industrial (C&I) oil and gas customers.
4. Explore emerging technologies.

#### *Transportation Electrification*

Over the next 15 years, residents will need to replace Light Duty Vehicles (passenger cars and trucks) which operate on Internal Combustion Engines (ICE) with Electric Vehicles (EVs). Because rebates and tax incentives have limitations in total dollar amount available, as well as offer timeframes, Westborough should take timely action to help residents learn about government programs which encourage EV purchase. The Town should take steps through policy and public/private development action to ensure EV charge stations are installed in sufficient quantity to support the 45% of residents who rent and do not have access to private charging equipment where they live.

**Strategies:**

1. Outreach; proactively disseminate information about the benefits of EVs.
2. Comprehensive plan for Charging Stations.
3. Adopt methods for tracking GHG Emissions from residential vehicles.
4. Partner with Central Mass Regional Planning Commission and neighboring towns.

*Energy Efficiency*

Implement energy efficiency measures to achieve a 10% reduction (2017 baseline) in the energy consumed in buildings by 2030. To implement efficiency measures that significantly reduce Westborough's energy consumption, the Town should focus on establishing relationships with Mass Save and other statewide programs. These programs help individual building owners improve their building envelopes and offer financial incentives to upgrade appliances and environment management equipment.

**Strategies:**

1. Implement Mass Save Municipal Partnership program.
2. Meet with businesses to learn about their energy and emissions and discuss State programs.
3. Lead by example on municipal building performance.

*Secondary goals**Building Energy Use Tracking*

Develop processes to track energy type and usage levels for space heat, cooling and hot water in all buildings. To reduce building emissions, obtain more granular data regarding energy type and consumption at the individual property level.

*Public Transportation*

Expand existing public transportation facilities and implement new programs to make public transit more attractive than individual vehicles for daily transportation needs. Build a priority list of projects for public transportation and implement 50% of them by 2030.

*Bike and Pedestrian*

Plan and build infrastructure that facilitates safe travel for bike-riders and pedestrians.

*Protection and Expansion of Natural Environment*

Protect and expand the natural environment to reduce greenhouse gases, improve water and air quality, encourage biodiversity and habitat growth, and enable improved community well-being.

*Waste Management*

Consistent with goals of the Massachusetts 2030 Solid Waste Master Plan, reduce residential and municipal waste by 30% by 2030.

*Off Road Equipment and Construction*

Off road emissions come from construction, landscaping, and other uses of fossil fuel in commercial, industrial and manufacturing processes. This goal will be deferred for 5 years until effective reduction strategies can be identified and implemented.

## Community Engagement

Reducing the causes of man-made climate change will require **everyone** to consider the impact that their daily decisions, both large and small, have on the climate and Westborough's environment and to **take action**. Individual choices taken collectively will determine the impact, good or bad, that Westborough has on the environment.

The barrier to making more climate-friendly decisions is often a lack of knowledge about the alternatives or a perception that a solution friendly to the environment will cost significantly more or deliver less value. Westborough need consistent, sustained community outreach on certain climate actions and opportunities to inform and persuade residents and businesses that clean energy options can deliver greater value at the same relative cost as a fossil fuel alternative.

Effective community engagement on climate actions cannot rest on a single approach. Westborough will likely need different strategies for business owners, renters, and homeowners. Engagement with some demographic groups will require tactics and communication channels that are effective for groups such as independently living senior homeowners on lower fixed incomes and residents who do not speak English. In addition, outreach tactics suitable to reach a large percentage of the target audience should be devised and validated overtime. Westborough's engagement plan must be enlightened and adapted for all of this diversity.

Actions planned:

- Climate Action Website;
- Case Studies;
- Webinars and/or in person workshops led by subject matter experts;
- Energy Fairs;
- Climate presentation programs and speakers to address civic groups; and
- Climate Action Ambassadors



## Governance

Implementing the CAP will require a significant commitment by the entire community to challenge status quo approaches as the community strive to achieve very dramatic changes to reduce GHG emissions. This plan will require changes by all stakeholders in the community, including residents, businesses and municipal government.

Changes to the CAP are inevitable and necessary to ensure the Town adjusts the path forward to account for Westborough's successes and failures, to take advantage of technical innovation, and to align local action with evolution of the state's strategy for GHG reduction. As such, the implementation of the CAP should be flexible and resilient.

The Town needs a variety of people from the Westborough community to support successful implementation of this plan, including ongoing leadership to coordinate efforts by a variety of stakeholders. At a management level, the various strategies described in the plan will require administrative leadership and oversight by Town staff. Based on the experience of other Massachusetts cities and towns, a Sustainability Coordinator on Town staff functioning as a CAP program manager can significantly improve the efficiency and effectiveness of strategy execution. Town leadership needs to determine the specific responsibilities of other town staff to support CAP implementation, including department heads, and town board and committees.

Sustainable Westborough can play a lead role to implement this plan in partnership with a Sustainability Coordinator. However, the Town will need to change its charter in order to support the scope of activities in this plan, as well as, re-organization of working groups, and expansion of its volunteer pool. Other community groups will be critical to spreading the information and the workload.

The essential work elements for plan governance are:

- strategic decisions on priorities,
- distribution of work elements,
- managing projects
- reporting project status
- annual updates to GHG emissions inventories to measure progress toward reduction.

### *References & Footnotes*

<sup>1</sup> NASA, Global Climate Change, Scientific Consensus <https://climate.nasa.gov/scientific-consensus/>

<sup>2</sup> IPCC, 5<sup>th</sup> Assessment Report (AR5)  
[https://www.ipcc.ch/site/assets/uploads/2018/02/AR5\\_SYR\\_FINAL\\_SPM.pdf](https://www.ipcc.ch/site/assets/uploads/2018/02/AR5_SYR_FINAL_SPM.pdf)

# Acknowledgments

## Section 1 - Introduction

Westborough Town Manager Kristi Williams established the Climate Action Plan Task Force in February 2020 in response to an Article in the Special Town meeting in October 2019 [See Warrant Article in Appendix A]. Based on research work and planning from February, 2020 through February, 2020, the Task Force developed this Climate Action Plan (CAP).

With the passage of the Global Warming Solutions Act (GWSA) in 2008, the Commonwealth of Massachusetts established mandatory requirements for economy-wide greenhouse gas (GHG) emission reduction goals for Massachusetts that were set by the Executive Office of Energy and Environmental Affairs (EOEEA) in consultation with other state agencies and the public.

The Climate Action Plan Task Force is guided by the principle that Westborough should do its fair share of meeting the state emissions reduction goals. This Climate Action Plan will define the initial steps on the transition to a low carbon community and will build the framework for managing and updating the plan in the years ahead.

The original 2008 greenhouse gas (GHG) emission reduction goal for Massachusetts was to achieve reductions of at least 80 percent below statewide 1990 GHG emission levels by 2050<sup>1</sup>; however, the state goals are continuing to evolve as the scientific evidence of climate change grows clearer and forecasts for the future climate changes require more dramatic action.

In January 2020 Governor Baker changed the 2050 goal to be NetZero Greenhouse Gas emissions statewide, in response to the latest science. The EOEEA, in response to this new goal and in fulfillment of their GWSA mandate issued a 2030 GHG Emissions goal and the Clean Energy and Climate Plan for 2030 (2030 CECP). Note that as of January 9, the latter is in draft status pending public comments through March 22. The CAP Task Force will use this draft 2030 CECP and the 2030 GHG Emissions target but will continue to update the Westborough CAP if/when state goals, plans and policies change.

Therefore, the key Westborough goals at this time are:

- By 2030, 45% GHG annual emissions reductions based on a 1990 baseline year
- By 2050, 85% GHG annual emissions reductions based on a 1990 baseline year
- Net Zero Emissions by 2050.

The Town will attempt to meet the Commonwealth's mandatory 2050 Net Zero Emissions goal set by the Baker Administration; however, the CAP Task Force considers these Westborough goals to be non-binding best efforts, not mandatory.

Because of uncertainty over the long-term, the Westborough CAP is focused on achieving the 2030 goal and on programs and policies that can be implemented in the next 3-5 years which put us on a path toward that success. The most important thing Westborough can do to achieve Net Zero in 2050 is to meet or exceed the 2030 goal.

Detailed analysis of technology, economics and market dynamics that are germane to the Westborough CAP is beyond the scope of the CAP Task Force; therefore, it relies on a team of experts from state agencies, universities, consulting firms and businesses assembled by the state to support the development of the Massachusetts 2050 Decarbonization Roadmap Report.<sup>2</sup>

The Roadmap Report (page 7) provides:

1. a comprehensive understanding of the necessary strategies and transitions in the near- and long-term to achieve Net Zero by 2050 using best-available science and research methodology.
2. an understanding of the tradeoffs across different pathways to reach the levels of deep decarbonization required by that limit.
3. a way to address many complex issues related to statewide deep decarbonization while focusing on one core question as a guide: How can the Commonwealth achieve Net Zero while maintaining a healthy, equitable, and thriving economy?
4. an integrated, cross-sector energy system analysis exploring eight distinct emissions reductions “pathways” to 2050, each capable of supporting the achievement of Net Zero emissions statewide in 2050.

The Westborough CAP is aligned with and leverages the key strategies and policies of the Commonwealth’s 2030 CECP which is based on the scientific and economic analysis in the 2050 Roadmap. The Westborough CAP Task Force endeavored to interpret and leverage the work of the state as reported in the 2030 CECP, 2050 Roadmap, and other reports and not to reproduce or second-guess this work.

This document has three parts:

1. **Part 1- Foundation** includes a discussion of the Methodology that the taskforce used to develop the goals and strategies and the baseline Westborough Greenhouse Gas Inventory.
2. **Part 2 - Plan** includes Primary and Secondary Goals which must be accomplished for Westborough to “do our fair share” of the state’s emission reduction goals.
3. **Part 3 - Administration** includes a discussion of the roles and responsibilities for Governance of the plan immediately and into the future and the plan’s approach for Community Engagement. Because the plan entails a community-wide change, Community Engagement is an essential component of the CAP.

Note that climate resilience, which was included in the Town Meeting Warrant Article, has not been included in the CAP because the town will address this issue through a separate Municipal Vulnerability Preparedness program<sup>3</sup>.

State goals (and the Town’s share of them), emerging technologies (both economics and capability) and broader economic conditions will continue to be dynamic and Westborough will need to be flexible and responsive to these changes. The activities of Town staff and volunteer committees are new and will require time to put in place. All residents and businesses are encouraged to get involved and to support the implementation and evolution of the CAP. The Town’s collective experience and knowledge will and must grow over time as the community learns together what programs and technologies are best suited for NetZero Westborough of 2050.

*Section References & Footnotes*

<sup>1</sup> GWGA Background: <https://www.mass.gov/service-details/global-warming-solutions-act-background>

<sup>2</sup> Massachusetts 2050 Decarbonization Roadmap Report: <https://www.mass.gov/doc/ma-2050-decarbonization-roadmap/download>

<sup>3</sup> Municipal Vulnerability Preparedness program:  
<https://www.town.westborough.ma.us/home/news/municipal-vulnerability-preparedness-draft-report-and-presentation-bos>

# Part 1 - Foundation

## Section 2 - Greenhouse Gas Inventory

### *What is a Greenhouse Gas Inventory?*

A Greenhouse Gas (GHG) Inventory quantifies the emissions released in a specific geographic area such as a town or state during a specific period, typically a calendar year. While there are different ways to measure a community's GHG emissions, the most common way is for a city or town to adopt a methodology based on international standards that enables consistent measurement of emissions from activities by residents, businesses, and municipal operations (public works and the school department, for example) which generate emissions. A GHG inventory then organizes the emissions from the various

community segments by source: Transportation, Building Heat, Electricity, and Waste & Transportation.

### *Why Develop a Greenhouse Gas Contribution Analysis for Westborough?*

To reduce GHG emissions at a rate sufficient to meet Net Zero in 2050, and interim targets in 2030 and 2040, residents and businesses will need to take significant action in the near term. However, GHG reductions will be slower at the start given the scope and scale of change necessary. A GHG inventory enables Westborough to establish a quantified baseline or starting point and the means to measure the impact of reduction strategies over time. By measuring GHG emissions across source and segment within Westborough borders, climate action priorities, goal setting, policies, and mitigation efforts can be grounded in accurate and timely data. The individual decisions by Westborough residents will collectively determine the trajectory of GHG emissions over time. Residents need to be persuaded that their personal actions are necessary and significant; reporting actual GHG emissions is critical to establish credibility with community stakeholders.

### *How is a Greenhouse Gas Inventory Used in Climate Action Planning?*

Greenhouse Gas inventories are essential to any climate action plan for several reasons. First, an inventory tool is necessary to quantify the sources and segments of GHG emissions in the community in order to understand the largest emissions sources (building, transportation, or waste) and to set informed goals and action plans to drive reduction overtime. Town leaders and community stakeholders need actual data attributable to the emitting segments (municipal, residential, commercial, or industrial) to decide on policies and programs that will reduce emissions and the metrics to verify they have the desired impact.

The citizens who control the property and vehicles that generate the emissions control the actions to reduce those emissions. Once a climate action plan is implemented the Town needs to follow a consistent methodology to benchmark GHG emissions year to year, so the impact of mitigation efforts can be evaluated. If the impact of climate action is not measured and reported in a consistent way, the effectiveness of various emissions reduction strategies cannot be quantified. Consequently, Town decisionmakers and stakeholders will have difficulty making course corrections and allocating resources to maximize GHG reductions over time.

#### **WHAT GREENHOUSE GASES ARE INCLUDED?**

*The primary greenhouse gases included in a typical community-scale inventory are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O). For accounting purposes, CH<sub>4</sub> and N<sub>2</sub>O are converted into total metric tons (MT) of CO<sub>2</sub> equivalent (CO<sub>2</sub>e). The conversion is based on their Global Warming Potential (GWP).*

*The Global Protocol also covers four other greenhouse gases: perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), sulfur hexafluoride (SF<sub>6</sub>) and nitrogen trifluoride (NF<sub>3</sub>). The Westborough inventory does not address these gases because they primarily result from industrial processes and product use, agriculture, forestry, and land use, which are not evaluated in this section.*

### *How did the Task Force Select the Greenhouse Gas Inventory tool for Westborough?*

The CAP Task Force had five criteria they considered in the selection of a GHG inventory tool:

- the underlying methodology should be based on accepted global standards, with validation from trusted and credible climate scientists;
- the tool should have a comprehensive scope to measure all GHG emissions activity within Westborough's geographic footprint;
- the tool should utilize data inputs from publicly available sources, so that the process of gathering local data is reasonable and repeatable;
- the tool should be easy to use, so that it is straightforward for various people to complete a periodic update; and
- the GHG Inventory Tool selected should be used by other Massachusetts communities of similar size and profile, so performance can be compared.

After reviewing several options, the CAP Task Force chose a GHG Inventory tool developed and released by the Metropolitan Area Planning Council (MAPC) in May 2020. MAPC is an organization serving 110 communities in Eastern Massachusetts with extensive experience assisting constituent cities and towns with Net Zero climate action planning.<sup>1</sup> While Westborough is not in MAPC's operating area, the MAPC GHG Inventory tool is available to any Massachusetts city or town.

The MAPC GHG Inventory tool is based on the 2014 Global Protocol for Community-Scale Greenhouse Gas Emission Inventories, an international standard that is identified as valid and credible.<sup>2</sup> The MAPC inventory provides direct links to Westborough source data collected by the Commonwealth from utilities and other commercial and governmental entities. The Guide and Toolkit greatly simplifies data collection and ensures that common data elements are used by the cities and towns participating in Massachusetts. Natick and Arlington partnered with MAPC to develop and pilot the Massachusetts version of the GHG Inventory Guide and Toolkit. Members of the CAP Task force gathered reference experience directly from the Sustainability Coordinators in Natick and Arlington, to help inform the GHG inventory selection decision.

### *How does the Greenhouse Gas Inventory Organize Emissions?*

The MAPC inventory tool organizes emissions sources into three domains to provide a basic structure suitable for measuring GHG emission in Massachusetts cities and towns. Table 1 shows a breakdown of the domains, segments and emissions sources in MAPC's inventory tool. This structure was developed by MAPC based on international standards to ensure the total GHG emissions reported is a complete reflection of the activity by each segment of the community (residents, businesses, and municipal operations) so that emissions are allocated to the various fuels consumed in those activities. By providing emissions data at a granular level, it becomes possible to use graphs to expose where mitigation or efficiency measures are needed and how community resources should be mobilized to move Westborough toward NetZero emissions in 2050.



Domain	Segment	Emissions Sources	Energy Types
<b>Stationary Energy</b>	Residential	Energy use in residential buildings as well as losses from distribution systems	Electricity Natural gas Heating fuel oil Petroleum Products  Various – may include natural gas, propane, diesel, and waste-to-energy
	Commercial, Industrial, and Manufacturing	Energy use in commercial, government and institutional buildings, manufacturing and industrial facilities, as well as losses from distribution systems.	
	Construction and Landscaping	Energy use from construction and landscaping equipment and activities.	
	Energy Industries	Combustion of fuel in various equipment, such as boilers and generators	
<b>Transportation</b>	On-road vehicles	All trips taken by passenger and commercial vehicles registered in the community. Portion of trips taken within the community boundary by on-road buses and trackless trolleys.	Gasoline Diesel CNG
	Railways	Portion of trips taken within the community boundary by public light and heavy rail.	Electricity
<b>Waste</b>	Solid Waste	Municipal solid waste disposed in/by landfills, incineration, composting, and anaerobic digestion	Landfill gas (methane)
	Wastewater	Process and fugitive emissions from treating wastewater	Not applicable

Table 1 – Domains, Segments and Emissions Sources in the MAPC’s Community Greenhouse Gas Inventory Tool <sup>2</sup>

### *What are Scopes in a Greenhouse Gas Inventory?*

The Global Protocol (GPC) is based on a scopes framework which simply allows a community to identify where GHG emissions activity is occurring that can be attributed to the city or town. Scope 1 emissions physically occur within the city or town’s geographic boundaries, Scope 2 emissions result from the consumption of grid supplied electricity, and Scope 3 are emissions that occur outside of the geographic boundary, but are driven by activities within the boundary (See Figure 1).

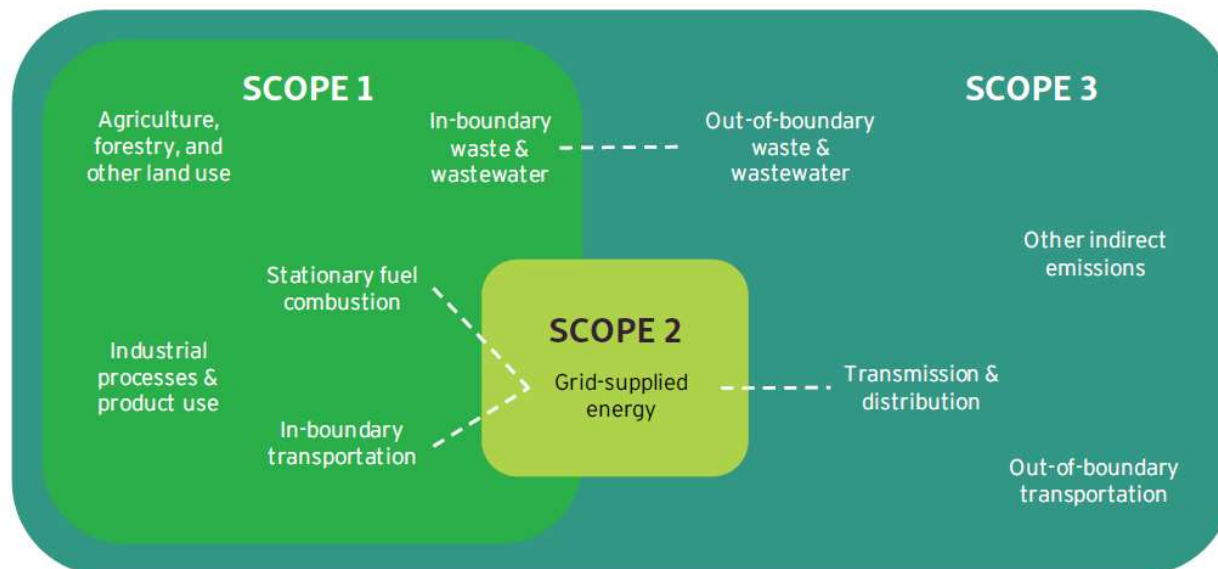


Figure 1 – Emissions Scopes Chart, adapted from the Global Protocol <sup>2</sup>

The baseline 2017 Westborough GHG inventory referenced in this document follows Scope 1 (Figure 1), which includes all emission within the town’s boundaries, plus Scope 2 which is the emissions from the generation of electricity outside Westborough consumed within the town. For transportation, the Task Force uses the *resident activity method* which includes all emissions from vehicles registered in Westborough regardless of where the vehicle is driven and excludes all vehicles registered outside Westborough which operate within Westborough’s borders.

### *What are the findings from the baseline 2017 Westborough GHG Inventory?*

The charts that follow present Westborough’s total 2017 GHG emissions data based on different perspectives. The selection of the Climate Action Plan’s four primary reduction goals in Section 5 and six secondary goals in Section 6 are based on the findings from the 2017 GHG Inventory. These charts and graphs should help the reader understand the objective data that underpins the goals and strategies in the scope of this Climate Action Plan. By measuring the source of emissions from different perspectives, climate stakeholders can assess the effectiveness of discreet reduction or mitigation strategies as they are implemented over time.

Table 2 reflects the total GHG emissions in 2017 from all Westborough energy consumption. The matrix illustrates the breakdown of GHG emissions by:

- **Sector**- the source of the emissions.
- **Market Segment**- the entity, individual or institution (residential, commercial & industrial or municipal) that controls the property responsible for the GHG generation (Note: In the remainder of the CAP document, this label may be referenced as “Segment”).
- **Emissions** – the total weight in metric tons of carbon emissions.
- **Percent Total** – reflecting the proportional share of GHG emissions in each Sector that is attributable to a specific Market.
- **Total**- the proportion of emissions by Sector, inclusive of all Markets.

Sector	Market Segment	Emissions (MT CO <sub>2</sub> e)	Percent Total All	Total (MT CO <sub>2</sub> e)
Transportation	Residential	64,583	26.7%	75,073
	Commercial, Industrial and Manufacturing	5,057	2.1%	
	Rail	4,503	1.9%	
	Municipal	929	0.4%	
Building Heating	Residential	35,679	14.8%	87,028
	Commercial, Industrial and Manufacturing	48,927	20.3%	
	Municipal	2,422	1.0%	
Electricity	Residential	13,126	5.4%	67,344
	Commercial, Industrial and Manufacturing	51,107	21.2%	
	Municipal	3,111	1.3%	
Waste, Land and other	Waste	3,330	1.4%	12,007
	Off-Road vehicle and construction	8,677	3.6%	
<b>Total All</b>				<b>241,452</b>

Table 2 - Westborough GHG Emissions Community Wide – 2017

Figure 2, the breakdown of **Westborough GHG emissions by Sector**, shows that the community has significant emissions sectors from fossil fuels used for space heat and hot water in Westborough's buildings (36%). Gasoline and diesel fuel from Westborough registered vehicles contributes 31%. And electricity generated from fossil fuels centrally and consumed in Westborough contributes 28%.

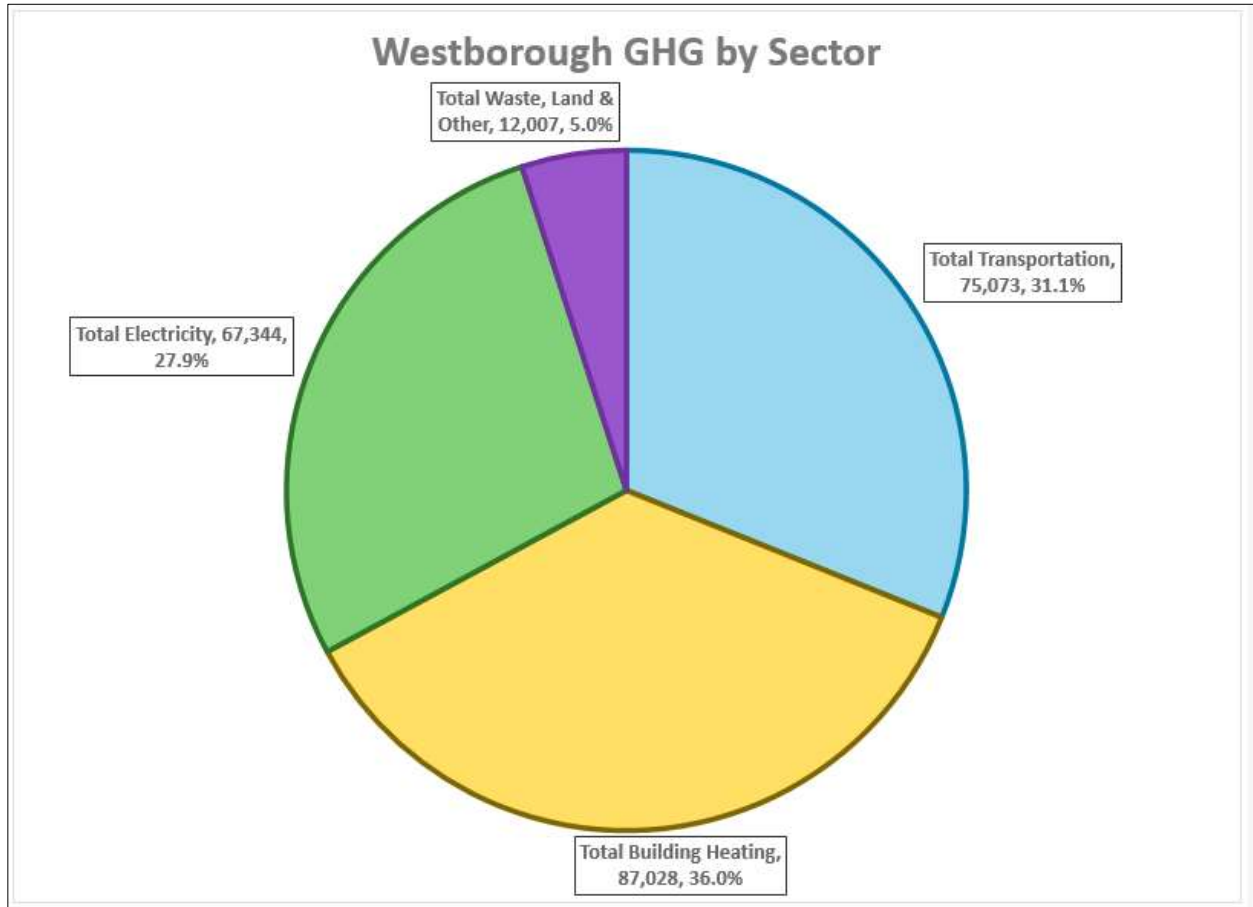


Figure 2 – Westborough GHG by Sector

Figure 3, **Westborough GHG by Market Segment**, illustrates that more than 90% of emissions are split between residents and businesses. Westborough's private property owners control the purchase decision for the vehicles they use and the buildings they own. As such, the Climate Action Plan goals and strategies will focus substantially on these market segments in Westborough.

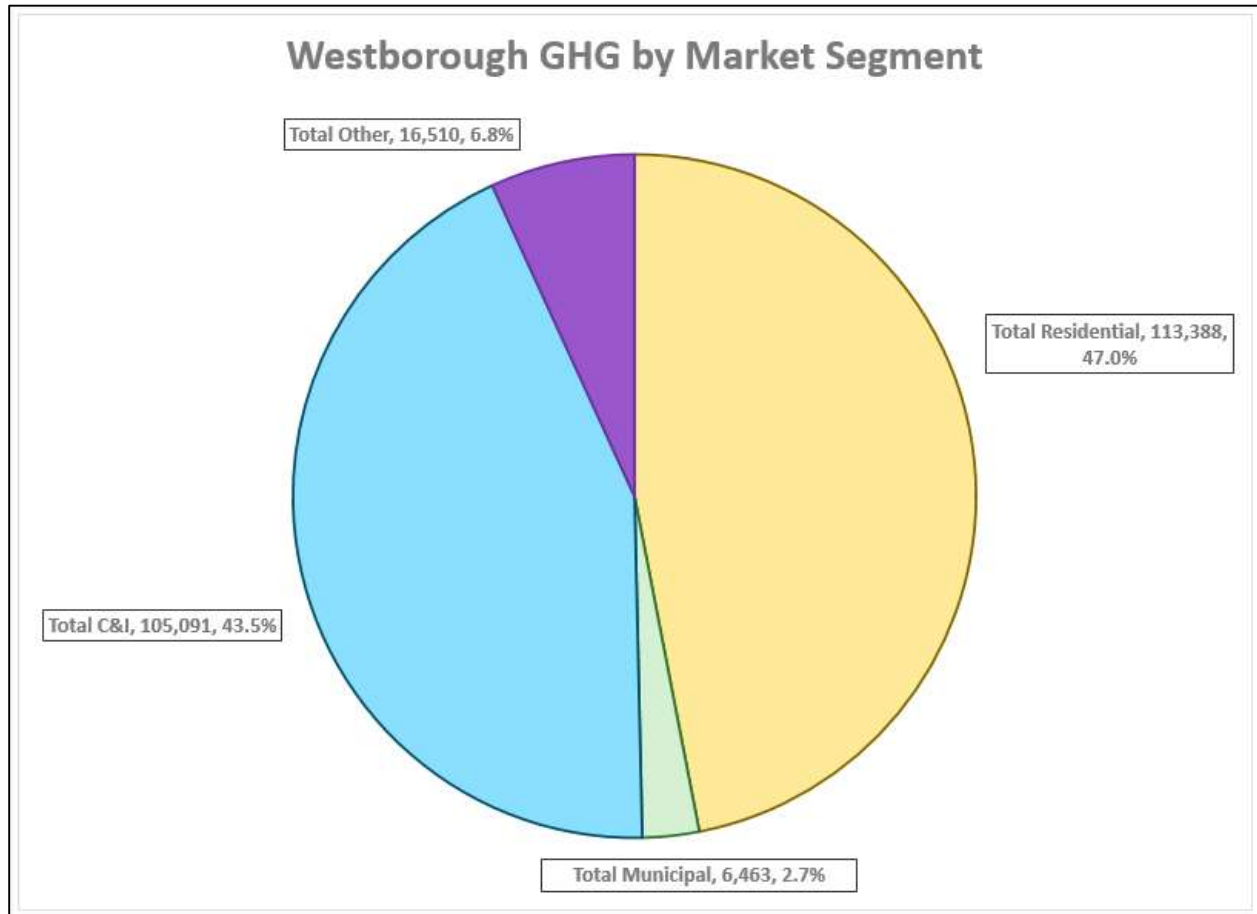


Figure 3 – Westborough GHG by Market Segment

Figure 4, **Emissions by Sector and Market Segment**, illustrates the proportional share of GHG emissions by segments of Westborough for each source. Notable are the four top contributor segments independent of source:

- 27% - Passenger cars and light duty trucks owned and operated by residents
- 21% - Electricity generated by fossil fuels outside Westborough and used in Commercial and Industrial (C&I) properties
- 20% - Fossil fuels consumed to provide space heat and hot water in C&I buildings
- 15% - Fossil fuels consumed to provide space heat and hot water in residential properties

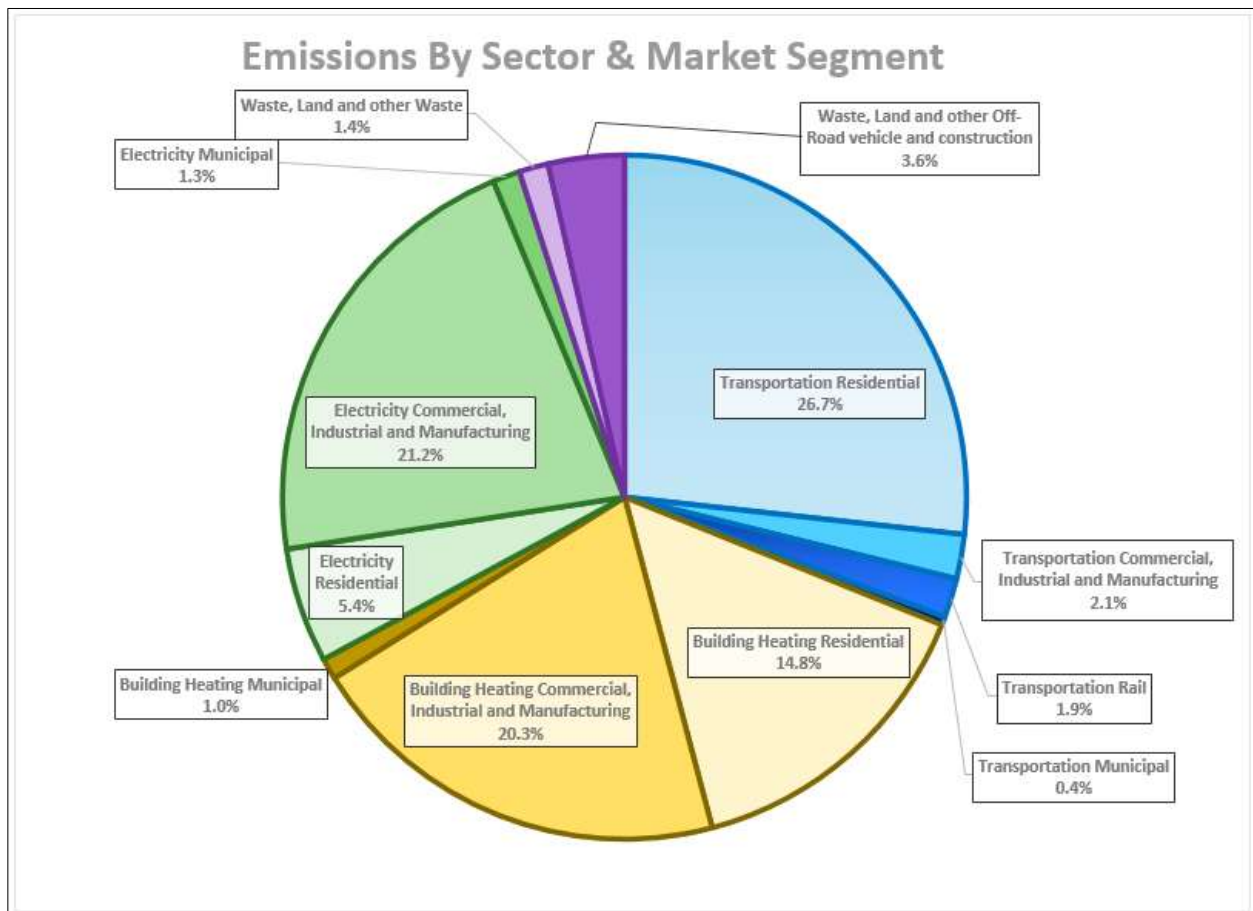


Figure 4 - Emissions by Sector and Market Segment (Residential, C&I, & Municipal)

When you examine the share of emissions by each sector within each emissions source in Figure 5, **Emissions Sectors Breakdown by Segment**, note the following:

1. Transportation - Westborough resident use of passenger cars and light duty trucks running on petrol fuels accounts for 86% of emissions of all segments.
2. Building Heating - Fossil fuels used for C&I space heat and hot water is 56% of the total, followed residential buildings at 41%. Municipal facilities consume only 3% of source GHG emissions in Building Heat.
3. Electricity - C&I customers account for more than three quarters of GHG emissions from grid-supplied electricity generated outside of Westborough.
4. Waste, Land, and Other - While a very small percentage of GHG emissions overall, 72% of emissions in the Land, Waste, and Other sector came from machines powered by internal combustion engines used in building construction and property management.

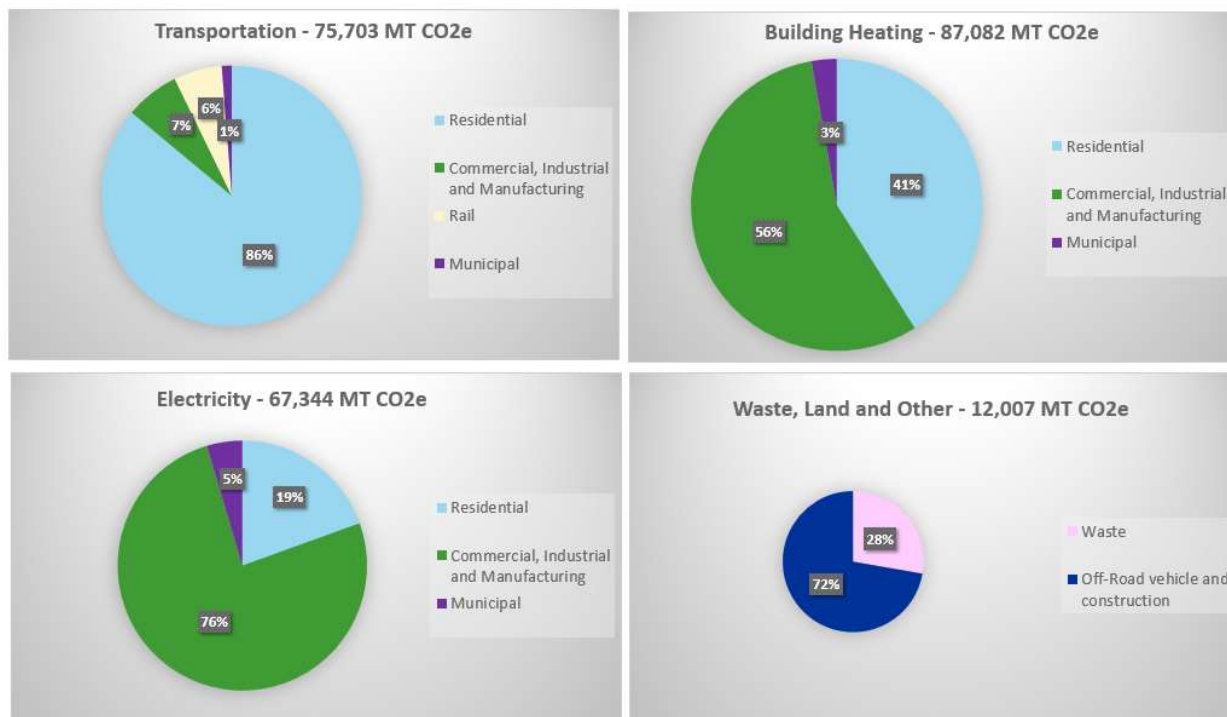


Figure 5 - Emissions Sectors Breakdown by Segment

Figure 6, **Market Segment Breakdown by Sector**, illustrate the percentage breakdown of emissions by source within each of Westborough’s three market segments. These graphs reinforce the importance of separate climate action strategies for emissions reduction in each segment based on major sources of emissions contribution. For residents, eliminating fossil fuels for personal vehicles as well as for space heat and hot water in homes is the priority. For Westborough businesses, the growing demand for electricity requires a focus on providing options to purchase cleaner electricity and equally to reduce or eliminate the use of fossil fuels for facility space heat and hot water. With an emissions profile similar to the C&I segment, Town municipal operations can pilot emissions reduction strategies and provide reference to businesses on approaches that work effectively.

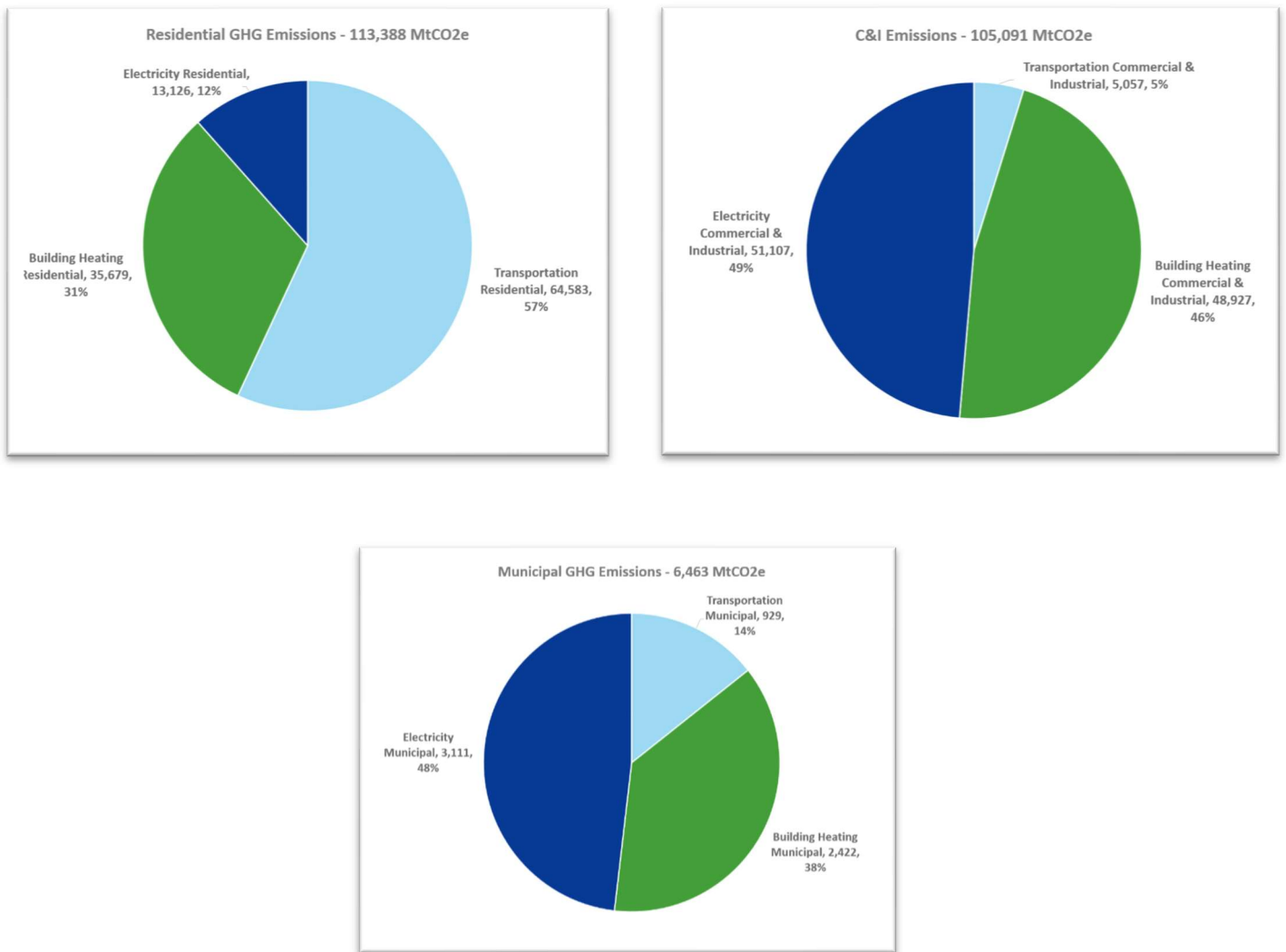


Figure 6 – Market Segment Breakdown by Emissions Sector



In summary, Figure 7, **Percent GHG Emissions by Source and Segment** chart illustrates the top GHG emissions in Westborough by segment and source. This Climate Action Plan document defines four primary goals to address these priority emissions.

1. Replace passenger and light duty trucks powered by internal combustion engines (ICE) with electric vehicles (EVs).
2. Convert fossil fuel systems for space heat and hot water to heat pump systems or other carbon free technologies in both residential and business properties.
3. Advocate for clean electricity with the Commonwealth and work with National Grid to provide Westborough residents and businesses expanded options to purchase electricity generated from carbon free sources.
4. Implement energy efficiency measures across all segments to reduce net energy consumption over time.

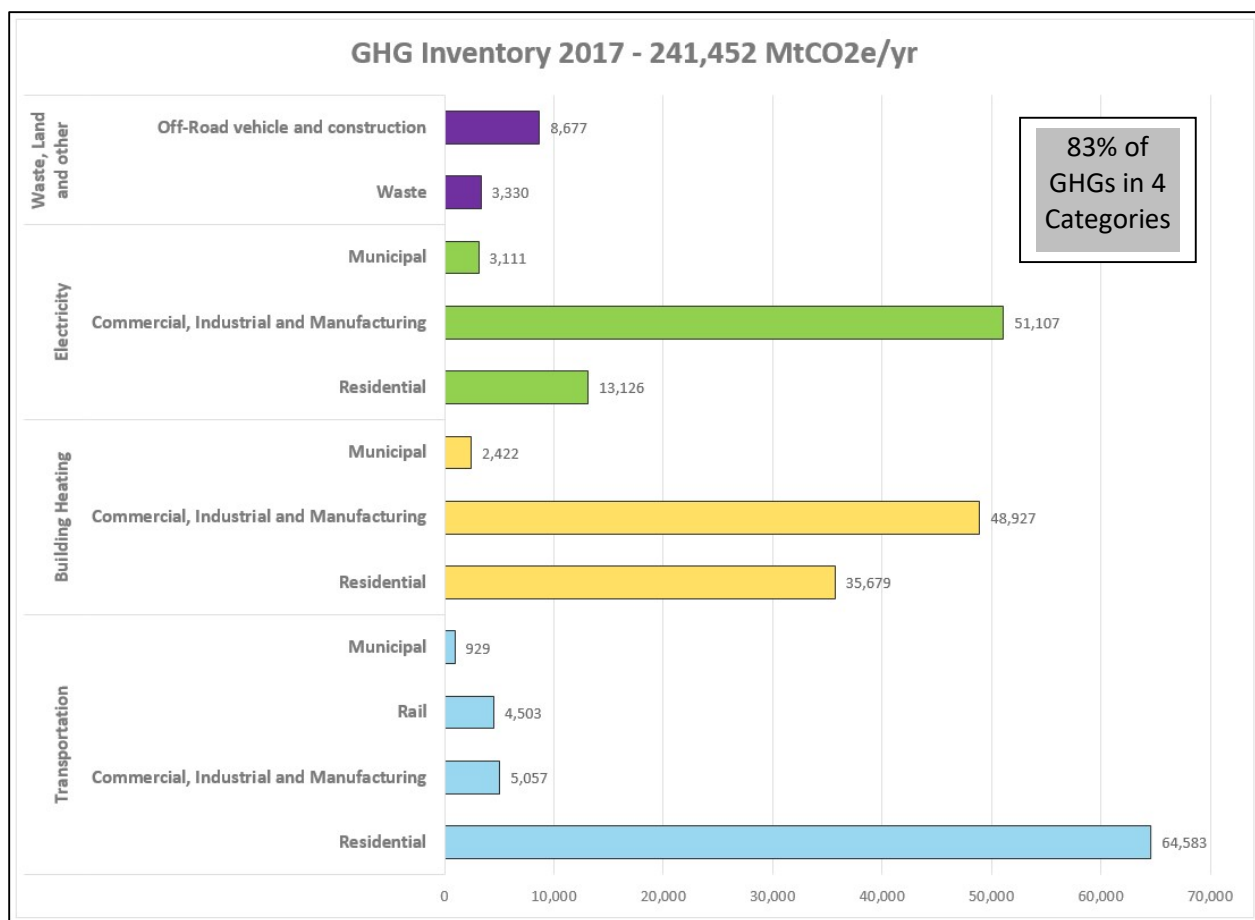


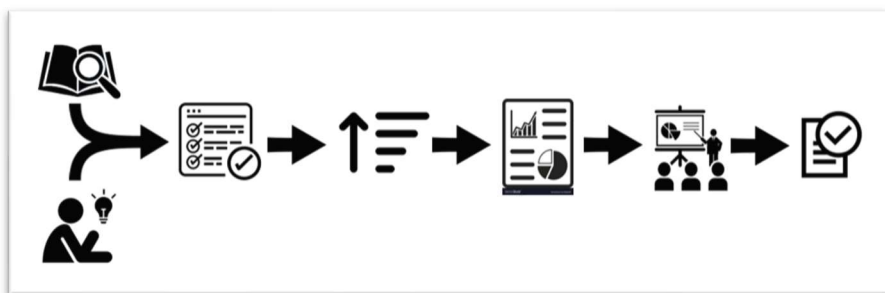
Figure 7 - GHG Emissions by Source and Segment

*Section References & Footnotes*

<sup>1</sup> <https://www.mapc.org/resource-library/community-ghg-inventory-resources/>

<sup>2</sup> Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC)  
<https://ghgprotocol.org/>

## Section 3 - Methodology



The Task Force was formed by the Westborough Town Manager, Kristi Williams, in response to a town meeting Warrant Article in October 2019 (see Appendix A).

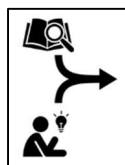
The first action of the task force was to review climate action plans, sustainability plans and clean energy plans from about 11 municipal and 3 regional plans. With this context the Task Force drafted the Task Force's Charter, Goals and Reporting Structure (CAP Charter - see Appendix B) and gained approval by the Board of Selectmen on April 6, 2020.

The CAP Charter defined the objective of the task force as development of a Climate Action Plan for Westborough which will dramatically and continuously reduce greenhouse gas emissions community wide for the next 30 years. The CAP's purpose is to define a set of actions for the town which will guide the entire community on a transition that addresses climate change related issues. The CAP which will be official upon approval of the Board of Selectmen will define the responsibility of the appropriate organizations to implement the plan. The implementation of actions involving Town government will occur through the existing Town budget and departmental and committee management processes.

The target completion date stated in the CAP Charter was delayed from March 1 to April 9, 2021 which allowed more time for committee review prior to requesting Board of Selectmen approval.

Based on the overarching goals specified in the CAP Charter as a baseline, the Task Force used a process that emphasized continuing evaluation and refinement of proposed strategies in order to create a final Climate Action Plan which, if implemented fully, should meet those goals over the next three decades. The refinement process included periodic presentations and requests for input from the public during the development of the plan.

### *Step 1: Discovery & Draft Inventory of Strategies*



Members of the task force reviewed existing plans from other towns in order to evaluate the goals other municipalities decided upon and the strategies they would use to implement them. The Task Force built an extensive list of potential strategies using common themes from other towns, currently available state programs, and ideas from brainstorming sessions within the task force. This review provided ideas that the Task Force could use as a basis to create goals and strategies for the Westborough plan. This process also allowed the Task Force to evaluate the tone, scope and writing style of plans to determine what it considered the best approach.

Based on the results of the evaluation of other plans and the detailed Greenhouse Gas Inventory described in Section 3, Westborough created four main subcommittees, called Working Groups, to create strategies for emissions reduction based on energy use sectors in Westborough.

The sectors Working Groups were:

- Electricity
- Building Heating & Cooling
- Transportation
- Waste, Land & Other

The task of each of these groups was to come up with detailed GHG reduction strategies that could be grouped into high level sector goals, such as “Electrify buildings that rely on oil & gas to heat or cool buildings”. The strategies were specific actions or techniques to achieve those goals.

### *Step 2: Applying Selection Criteria*



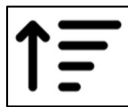
Once the Working Groups generated a list of strategies, the groups identified the economic market segment of the town which would need to implement the strategy (municipal, residential, commercial, or industrial) and gave each strategy a provisional and qualitative priority of High, Medium or Low.

The Working Groups defined and applied selection criteria to evaluate the effectiveness and impact on each strategy. In some cases, the criteria were subjective and the Working Groups had to collectively agree on the score.

The criteria were:

Criterion	1 Bad	2	3 Medium	4	5 Good
<b>Size of Benefit</b>	<ul style="list-style-type: none"> <li>● Cumulative effect of the likely outcome of the strategy is less than 0.1% of GHG emissions.</li> </ul>	0.3% of GHG emissions	1% of GHG emissions	3% of GHG emissions	<ul style="list-style-type: none"> <li>● Cumulative effect of the likely outcome of the strategy is 10% or more of GHG emissions.</li> </ul>
<b>Time to Benefit</b>	<ul style="list-style-type: none"> <li>● Majority of annual GHG emissions rate reduction will not be seen until over 15 years.</li> </ul>	... 10-15 years	... 5-10 years	... 2-5 years	<ul style="list-style-type: none"> <li>● Majority of annual GHG emissions rate reduction will be seen in less than 2 years.</li> </ul>
<b>Probability of Success</b>	<ul style="list-style-type: none"> <li>● Uncertainty in regard to technology, economics, funding, etc.</li> <li>● No examples of other towns who were successful with this program.</li> </ul>				<ul style="list-style-type: none"> <li>● Technology is proven.</li> <li>● Other towns have had success with this type of program.</li> <li>● Confidence in funding sources (or no funding needed).</li> </ul>
<b>Economics &amp; Cost Effectiveness</b>	<ul style="list-style-type: none"> <li>● Investments by Westborough residents and businesses are projected to have a long payback (over 10 years).</li> </ul>	... (7 - 10 years)	... (5 - 7 years).	... (3 - 5 years)	<ul style="list-style-type: none"> <li>● Investments by Westborough residents and businesses are projected to have a very good payback (less than 3 years).</li> </ul>
<b>Community Impact</b>	<ul style="list-style-type: none"> <li>● Expect high community opposition.</li> <li>● All funding from Westborough. residents and businesses.</li> <li>● Will disrupt norms.</li> <li>● Difficult to justify the need for change.</li> </ul>				<ul style="list-style-type: none"> <li>● Community will feel that change is necessary and fair.</li> <li>● Most Funding would come from others.</li> <li>● Costs allocated fairly and/or phased. Vulnerable populations buffered from costs.</li> <li>● Community ready for the change.</li> </ul>

### *Step 3: Goals and Strategies Prioritization*



At the end of Step 2, the Task Force had generated 17 sector goals and 75 strategies. Based on the results of the Greenhouse Gas Inventory analysis, which identified the primary sources of GHGs generated by Westborough, the task force evaluated the goals and strategies, consolidating them where there was obvious overlap. Furthermore, the Task Force grouped goals and strategies into Primary and Secondary.

**Primary goals** are those that were aligned with the largest sources of emissions identified in the Westborough GHG Inventory (see Section 2 of this plan) and had the greatest potential to reduce them. An example is electrification of personal vehicles.

**Secondary goals** are those that from an environmental perspective, were a collective good, but do not have as significant an impact on GHG reduction. An example of the latter is adding more bicycle and pedestrian infrastructure.

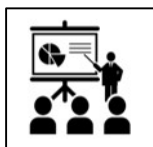
### *Step 4: Goal and Strategy Finalization*



Once the Task Force selected and prioritized goals and strategies, the next step was to write them up in detail for the report. Details for each strategy included, when needed, the following:

- Summary – brief description of the strategy
- Discussion – detailed writeup of the strategy including supporting information
- Costs – outline of the costs to implement the strategy
- Timing – when the strategy would start, how long the implementation might last
- Resources – identified funding sources.
- Responsible Parties – the organizations and/or town personnel who would be responsible for key activities in the strategy's implementation
- Next Steps – The initial activities needed to implement the strategy

### *Step 5: Reporting and Outreach*



During the development of the plan, the Task Force provided periodic updates to the Board of Selectmen and other Town Boards and provided opportunities for public input. In addition, all meetings of the Task Force were public. Due to COVID protocols for open meetings, all meetings were remote and were recorded and are available on request.

After the Task Force completed Step 4, members made presentations to various Town boards and committees during the Fall of 2020, held two public information sessions that were broadcasted and recorded by Westborough TV during December 2020, and made presentations to various community groups and businesses from November 2020 through the Spring of 2021.

The list of all Town Board and public outreach meetings were:

2020

- March 24 - Board of Selectmen - review of the Task Force charter and plan overview
- September 21 - Sustainable Westborough - CAP Goals
- September 22 - Board of Selectmen - Review of GHG Inventory, CAP Goals and Community Outreach Plan

- September 29 - Master Plan Leadership - GHG Inventory, CAP Goals and integration with Master Plan
- October 5 - Economic Development Committee - GHG Inventory and CAP Goals
- October 7 - School Committee - GHG Inventory and CAP Goals
- October 15 - Master Plan Sustainability and Climate Subcommittee - Climate Goals in Master Plan
- October 20 - Planning Board - GHG Inventory and CAP Goals
- October 21 - 495/MetroWest Partnership - GHG Inventory and CAP Goals
- November 10 - Conservation Commission - GHG Inventory and CAP Goals
- November 11 - Rotary Club - GHG Inventory and CAP Goals
- November 16 - WCLT Board of Directors - GHG Inventory and CAP Goals
- December 9 - Public Information Session - GHG Inventory and CAP Goals with Jillian Wilson-Martin Natick Sustainability Coordinator - Westborough TV recording
- December 10 - Public Information Session - repeat of above
- December 21 - Sustainable Westborough - CAP Governance Plan
- January 12 - Westborough Women's Club
- February 2 - Civic Club
- February 24 - Garden Club
- March 9 - Board of Selectmen - CAP Document presentation and request for approval
- March - Various town boards and committees
- April 9 - Board of Selectmen - CAP Document approval vote

### *Step 6 Approval*



A complete draft of the Climate Action Plan will be distributed to the Board of Selectmen and other town boards and committees on or about March 5 to request feedback and to offer to make a summary presentation at each committee's meeting. This complete draft of the CAP document will also be posted on the town website with a comments form available for all community members.

Boards and Committees to which the CAP Task Force will request a presentation are:

- Board of Selectmen
- School Committee
- Advisory Finance Committee
- Planning Board
- Conservation Commission
- Economic Development Committee
- Town Manager and staff

The CAP Task Force is planning to present to the Board of Selectmen at the next available meeting after March 5 to summarize the CAP, to initiate the public document review process and to schedule the meeting for approval of the final version 1 of the CAP by the Board of Selectmen, on or about April 9.

## Part 2 - Plan

## Section 4 - Primary Goals and Strategies

### Goal - Clean-Energy Sourced Electricity

**Westborough's electricity supply should comply with the state's Clean Energy Standard and be generated almost entirely from renewable sources by 2050.**

The Massachusetts draft Clean Energy and Climate Plan states that significant work is needed in order to meet the anticipated electricity demand with clean and renewable resources, which is essential for achieving economy-wide decarbonization by mid-century.



Widespread electrification of buildings and transportation services will cause electricity demand to more than double by 2050; therefore, GHG emissions due to electricity generation must decline dramatically even while total generation increases.<sup>1</sup>

Electricity generated by fossil fuels such as natural gas and purchased by Westborough businesses and residents accounts for approximately 28% of the community's greenhouse gas emissions. In order to reduce those emissions, the Town must increase the percentage of electricity from clean sources.

Massachusetts law currently requires that 40% of the electricity purchased from the regional electric grid for consumption in 2030 be from clean sources.<sup>2</sup> However, the draft Clean Energy and Climate Plan calls for the percentage to be raised to at least 60% to achieve the state's emissions reduction target,

and the Department of Environmental Protection is scheduled this year to consider promulgating regulations adopting the higher requirement. In addition, the Massachusetts 2050 Decarbonization Roadmap calls for the near complete adoption of renewable electricity by 2050.<sup>3</sup>

*Electricity consumed in Westborough currently has about 20% Clean Electricity and produces 67,344 MT CO<sub>2</sub>e/yr. With the draft CECP 2030 target of 60% clean electricity the emission would be reduced roughly by half to about 34,000 MT CO<sub>2</sub>e/yr.*

Converting to clean sources of electricity is a primary goal because of its potential to reduce Westborough's greenhouse gas emissions. This goal will ensure that Westborough does its part to help the Commonwealth achieve its objectives.

### Strategy 1: Facilitate Participation in the SMART Program

#### *Summary*

The Solarize Massachusetts Renewable Target (SMART) Program reduces greenhouse gas emissions by displacing fossil fuel electricity sources with renewable sources such as photovoltaic solar and complementary technologies.

#### *Discussion*

Solar resources represent a key component of a clean electricity supply. Massachusetts established the SMART program to encourage the continued use and development of solar photovoltaic sources of electricity by residential, commercial, industrial, and governmental electricity customers.



The program provides subsidies to qualifying units that use solar photovoltaic technology to generate electricity and which meet certain other eligibility requirements. Often these systems are paired with battery storage. Systems serving Westborough need not be located within the town. However, Westborough can encourage the development of solar units within the town by establishing a mechanism to encourage solar generation developers to target their placement on roofs, parking lots and other suitable locations. Similarly, the Town can compile a list of Town-owned sites that are good candidates for photovoltaic systems. The incentives in the SMART Program are especially attractive for systems serving low-income customers.<sup>4</sup>

Westborough will require a central resource to inform businesses and residents of the availability of the SMART Program and facilitate participation. Even when people become aware of the program, they may not know how to go about participating. The Town needs a local resource to facilitate participation by coordinating with the responsible state agencies, developers, and marketers of solar generation technologies, interested businesses and residents, and Town government.

*Westborough residents and businesses can encourage growth of solar in the state through participating in the SMART program. This can be done through local solar institutions or through purchasing power from remote solar farms.*

### *Cost and Funding*

The SMART Program provides subsidies for the installation of photovoltaic systems. The subsidies are funded by the distributed solar charge on all electric bills. Program participants pay the remaining cost of purchasing solar electricity or installing photovoltaic systems at negotiated prices. Consumers bear the commercial risks typical of other transactions with service suppliers and contractors.

### *Timing*

The SMART Program is operating now, but the state subsidies decrease over time. Westborough businesses and residents will therefore benefit by participating sooner rather than later.

### *Resources, Responsible Parties and Next Steps*

The Governance section (Section 8) of the CAP proposes that the Town designate a Sustainability Coordinator on Town staff. The Sustainability Coordinator would be responsible for:

- coordinating with the responsible state agencies, solar developers, and marketers;
- promoting the program within the community;
- informing businesses and residents on how to participate; and
- identifying opportunities for participation by Town departments.

The Sustainability Coordinator would serve as a central source of information but would not approve or endorse particular developers or marketers. In addition, volunteers under the banner of Sustainable Westborough could assist the Sustainability Coordinator by serving as a source of outreach to individual residents concerned about climate change or switching to renewable energy.

## **Strategy 2: Steadily increase clean renewable power in the Westborough Power Choice program**

### *Summary*

The carbon-free renewable content (clean sources of electricity) in the Westborough Power Choice default option is 38% in 2021, increasing 2% a year through the end of the current contract cycle in 2023.

The carbon-free renewable content should be proactively increased every contract cycle in support of the broader clean sources of electricity goal.

### *Discussion*

Westborough Power Choice is an electricity aggregation program that reduces greenhouse gas emissions by giving Westborough residents and businesses Town-vetted options for purchasing electricity from clean sources. Two of the three Westborough Power Choice plan options enable individual customers to opt for a greater proportion of electricity from clean sources in their supply than the minimum required by state law. For example, in 2021 the Westborough Clean Power Choice Standard Plan provides 38% and the Green Plan 100% electricity from clean sources.

By increasing the number of businesses and residents who participate in Westborough Power Choice and select the Standard or Green Plans, Westborough can more easily achieve the goal. The carbon-free renewable content of the Standard Plan in the current contract cycle ramps up at 2% a year through 2023. For the next contract cycle that will commence in November 2023 and each succeeding contract cycle, the Town should continue to ramp up the carbon-free renewable content of the Standard Plan. Additional renewable sources could include purchase of power from a community shared tariff generating unit under the SMART Program.

*Westborough Power Choice has been designed by the Town and vetted by experts to offer very competitive electricity with high renewable content, up to 100%. This program is an easy reliable way to increase the clean electricity community wide.*

### *Cost and Funding*

The Town conducts a competitive bid process to select the electricity supplier. The price is set by contract and purchasers pay the contract prices. There is no cost to the Town to participate other than the administrative time to negotiate and execute the contract every three years with the third-party consultant who administers the program for the Town. Through their choice of the Standard or Green Plans, individual customers pay for the electricity from clean sources in their monthly bill.

### *Timing*

The Town negotiated the current program options in 2020 and made it available to customers in November 2020. Residents and businesses may enroll in Westborough Power Choice, and have the flexibility to change their plan option at any time. The next solicitation for bids will occur in 2023.

### *Resources*

The Town Manager leads the bid solicitation and contract negotiation process with the support of a consultant and Sustainable Westborough.

### *Responsible Parties and Next Steps*

The Town Manager should consult with Sustainable Westborough in 2022 on the ramp up in carbon-free renewable content to be specified in the bid documents for the next contract cycle. The Sustainability Coordinator, should explore the possible purchase of electricity from a shared tariff generating unit under the SMART Program for all or a portion of that renewable content.

## Strategy 3: Renewable power generation facility for DPW water & sewer facilities by 2030

### *Summary*

The Department of Public Works (DPW) is investigating clean energy resiliency opportunities for the Town's water and wastewater infrastructure. The wastewater treatment plant already generates a portion of its power via a rooftop photovoltaic array. If the current investigation concludes that building a zero-carbon power source is feasible and the cost is reasonable, the DPW should build such a generation facility by 2030.

### *Discussion*

This project has the potential to reduce greenhouse gas emissions by substituting a zero-carbon power source for the purchased electricity used to deliver Westborough's water supply and treat Westborough's wastewater. If the DPW decides that the project is financially and technically feasible, the Town should explore sourcing electricity for other departments using zero-carbon power.

*Westborough Town government can promote increasing clean sources of electricity through the purchasing of our electric supply as well as through working with solar developers on building solar systems on town real estate.*

### *Cost and Funding*

The project would be funded through water and sewer bills or grants. The estimated cost will be determined by the study that is underway. The study will also determine the potential for long-term savings and the associated pay-back period.

### *Timing*

The study is expected to be completed in 2021. If the study shows that the project is feasible and the cost is reasonable, then the zero-carbon power source should be built by 2030.

### *Resources*

DPW staff would lead the project and contract with third parties for the required resources.

### *Responsible Parties and Next Steps*

DPW staff are responsible for assessing the study results and making a recommendation to Town officials on whether the project is feasible, and the estimated cost is reasonable.

## Strategy 4: Increase the Class 1 renewable sources in Westborough's municipal electric supply

### *Summary*

Electricity from clean sources in 2021 comprises only 18% of the electricity that the Town purchases for its own municipal use. The Town should purchase electricity from clean sources in an amount at least equivalent to current business and residential purchases through the Westborough Power Choice Standard Plan.

### *Discussion*

Although the Town purchases the majority of its electricity from solar farms, it does not purchase the associated renewable energy certificates which are the market-based products that support renewable electricity generation.<sup>5</sup> Electricity purchased from solar farms without the associated renewable energy certificates does not qualify as electricity from clean sources; thus, the Town purchases a significantly smaller percentage of electricity from clean sources for its own use than the 38% most residents purchase under the 2021 Westborough Power Choice Standard Plan. The Town should increase its support for carbon-free electricity so that it is at least equal in amount to the percentage in the Standard Plan.

### *Costs and Funding*

The cost will depend on the market price of electricity from clean sources at the time of purchase. Funding would need to come from the Town's budget.

### *Timing*

Analysis should begin in 2021 with purchases over not more than 3 years at the discretion of the Board of Selectmen.

### *Resources*

Town Staff would contract for the electricity purchase.

### *Responsible Parties and Next Steps*

The Town Manager would oversee the contracting process.

## Strategy 5: Participate in new technology pilot programs

### *Summary*

Westborough should seek out and participate in pilot programs for new technologies designed to reduce greenhouse gases associated with the generation of electricity.

### *Discussion*

Utilities, state agencies and private companies periodically conduct pilot programs for new technologies which have the potential to reduce greenhouse gas emissions. Participating in those programs could lead to lower emissions while providing businesses and residents the opportunity to learn about emerging technologies.

### *Costs and Funding*

The costs and sources of funding will be program specific.

### *Timing*

The process of researching and networking to identify pilot programs should begin as soon as possible.

### *Resources, Responsible Parties and Next Steps*

The Sustainability Coordinator would be responsible for leading the implementation of this strategy.

*Goal References & Footnotes*

- <sup>1</sup> <https://www.mass.gov/info-details/massachusetts-clean-energy-and-climate-plan-for-2030>.
- <sup>2</sup> <https://www.mass.gov/doc/310-cmr-775-clean-energy-standard-amendments-july-2020/download>.
- <sup>3</sup> <https://www.mass.gov/info-details/ma-decarbonization-roadmap>.
- <sup>4</sup> <https://www.mass.gov/doc/225-cmr-2000-final-071020-clean/download>.
- <sup>5</sup> <https://www.mass.gov/service-details/statutes-regulations-and-guidelines>

## Goal: Building Electrification

**By 2030, Westborough will eliminate systems that utilize fossil fuel sources (i.e., oil, natural gas, liquid propane) for space heat and hot water in at least 20% of all buildings.**

To achieve this goal, Westborough will enact policies and promote programs to electrify new and existing buildings with systems that currently use on fossil fuels.

Recent state legislation and policies proposed by the Massachusetts Executive Office of Energy & Environmental Affairs (EOEEA) will require all cities and towns to achieve a 2050 statewide limit of Net Zero greenhouse gas emissions, and to meet an interim target of 45% reduction below the 1990 level by 2030. In the Building sector, the Commonwealth established a target of 48% reduction in GHG emissions below the 2017 level by 2030. Westborough will also lower the annual GHG emissions in its building sector by 48% which is 41,513 MT CO<sub>2</sub>e, to a maximum of 45,515 MT CO<sub>2</sub>e by 2030. This Building Electrification goal includes strategies for achieving this target.

In 2019, the Commonwealth initiated a Decarbonization Roadmap study building on prior research to support the 2008 Global Warming and Solutions Act. The study's objective was to identify multiple technical and policy pathways by which the Commonwealth could equitably and cost effectively achieve Net Zero emissions in 2050. The 2050 Roadmap, published in 2020, concluded :

*“...the core elements common across pathways and most critical for consideration in the 2020s include a balanced clean energy portfolio anchored by significant offshore wind resources, more interstate transmission, **widespread electrification of transportation and building heat, and reducing costs by acting at the point of replacement for equipment, infrastructure, and systems that use fossil fuels.**<sup>1</sup>*

For Westborough to achieve net zero emissions by 2050, the community will need to transition the way the Town heats buildings while making them significantly more energy efficient. Doing so will result in healthier and more comfortable building spaces, greater resilience in the face of extreme weather, and reduced energy costs for owners and renters. However, to electrify buildings in a strategic and cost-effective manner is challenging, as it relies on private property owners to make a decision to convert to an air sourced heat pump or alternative carbon free system when their fossil fuel-based system fails or reaches the end of its service life.

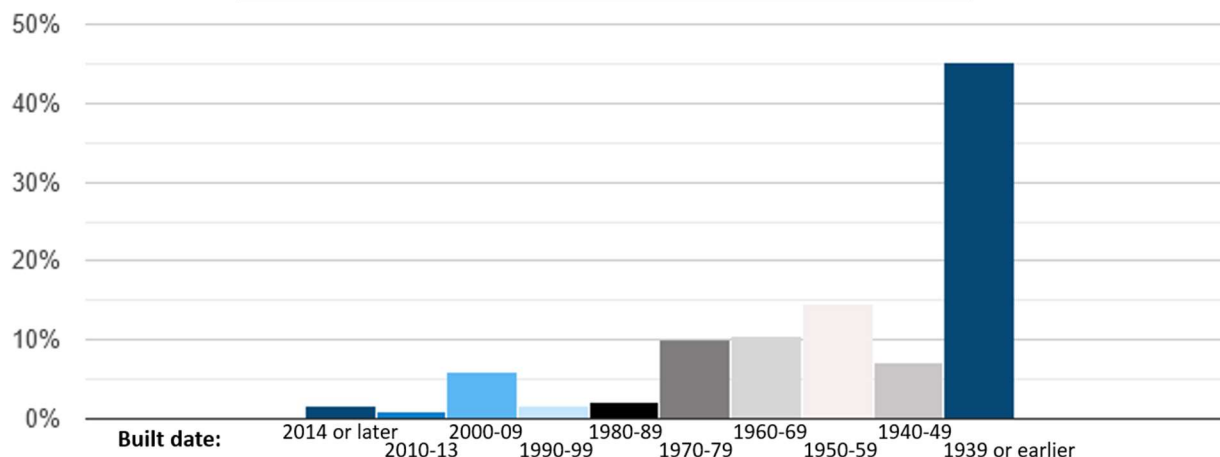
The relatively long life of HVAC equipment, often 20-30 years, means that equipment installed in the 2020s may still be in service by 2050. When a high efficiency fossil fuel space heat or hot water system is installed based on current energy codes, the property owner may still face significant costs in the future to convert to an electrified system if their system becomes non-compliant. For new construction, developers should be encouraged to build to Net Zero or Passive House standards which are not yet required by the State building and energy codes.

These factors underscore the urgency to ramp up sales of electrified or renewable heating alternatives to take advantage of as many of the transition points – the times during the 2020s when businesses and homeowners will be replacing heating systems – as possible. Section 7, Community Engagement has additional information about the implications of stock turnover points for various types of fossil fuel systems.

In the chart below, note that 45% of the housing stock in Westborough was built before 1940, with about 10% added each decade through 1980. Only 16% of Westborough's housing stock has been built since 1980. The older age of the town's structures presents both challenges and opportunities to help homeowners manage the transition to electrify their homes. To electrify 100% of space heat, hot water,

and any equipment consuming fossil fuels, every Westborough property owner will encounter unique feasibility and financial factors. The age, architectural diversity, and variety of uses reflected in Westborough’s building stock, combined with unpredictable external factors such as weather, fossil fuel markets, pace of innovation, will make it difficult to predict the transition cost for property owners over the next 10 years.

### Westborough, MA - House Built Date Distribution



The proportion of town wide GHG emissions from the residential, commercial, and industrial building stock is substantial. Westborough’s 2017 baseline Greenhouse Gas Emissions Inventory, detailed in Section 2, illustrates that 36% of Westborough’s GHG emissions town-wide are generated from building heat systems running on fossil fuels, primarily fuel gas or heating oil. Note that of the 4 sectors, Building Heat has the highest GHG emissions in Westborough.

Based on 2020 Property Tax Assessment data, Westborough has 7,855 residential units, 306 commercial and industrial buildings, and 19 municipal buildings contributing 56%, 41% and 3% of total GHG emissions respectively. While Westborough does not currently have data breaking down the fuel source for space heat and hot water for each building, the Town can make some general assumptions based on US Census data for Massachusetts which provides estimates of the type of fuel used for building space and water heating. The most recent Census data indicates that more than half of Massachusetts households use natural gas for home heating, about one in four rely on fuel oil, and about one in six households uses electric heat. In the Massachusetts commercial sector, 88% of commercial floorspace uses natural gas, fuel oil, or propane onsite.

Until the CAP Task Force can confirm the fuel source for space heat in Westborough buildings, the Climate Action Plan will utilize these statewide estimates to identify the number of target buildings the Town needs to electrify, and the likely number of stock-turnover points in any given year. The Climate Action Plan will track progress to achieve the 2030 goal by counting the number of actual conversions from fossil fuel to electricity each year.

Initially, the building electrification goal will emphasize outreach to privately owned residential, commercial, and industrial building owners to increase their awareness of the state targets and programs; the actions they should take in the near term to reduce emissions; and to prepare for energy switching. The goal strategies will include partnership with clean energy program providers who have proven methods to increase adoption of building energy efficiency measures. Every property owner needs easy, timely access to information about vetted HVAC and Plumbing contractors who service Westborough’s market and any financial incentives to electrify systems.

## Strategy 1. Adopt building codes and zoning bylaws to ensure heat and hot water systems are 100% carbon free.

### Summary

Progress toward the Net Zero goal will require a steady increase in the proportion of buildings that are 100% carbon free over the next 30 years. Westborough's building codes and zoning bylaws can be an effective and essential tool to eliminate reliance on fossil fuels for space heat and hot water by creating standards that will drive an orderly transition to electrification of nearly all buildings by 2050. The new Net Zero Stretch Energy Code is expected to be issued in 2021 by the State Board of Building Regulations and Standards. Westborough should consider adopting the code before 2028, the proposed date when it will become mandatory statewide. Westborough should also identify new zoning bylaws which reinforce future residential, commercial or industrial development be built to Net Zero standards.

### Discussion

To achieve both 45% emissions reduction in 2030 and Net Zero in 2050, Westborough should take legal measures to limit the number of buildings (new or existing) that employ fossil fuel space and hot water heating. Building code standards to support the emission reduction targets and Stretch Energy building codes are the appropriate regulatory mechanism to do so. From this point forward, any new construction that installs a fossil-fueled space heat or hot water system will likely be non-compliant with 2050 Net Zero standards, and will need to be retrofitted in the future at significant cost to the property owner. Otherwise, new homes constructed with fossil fuel heating systems, or replacement systems in existing homes, will continue contributing to Westborough's collective GHG emissions during their service life.

*Westborough should consider adopting the Net Zero construction standards as soon as Massachusetts issues the new Stretch Energy Building code.*

Action to revise the Stretch Energy Code (780 CMR Appendix 115.AA of the Massachusetts building code) was recently proposed by the Commonwealth in the CECP 2030 report. The update is designed to lay the regulatory foundation in the building code to achieve the new 2030 and 2050 emissions reduction targets. As a designated Green Community, Westborough will have the option to adopt the Stretch Energy Code Update when it is released as part of the Massachusetts 10<sup>th</sup> edition base code.

As stated in CECP 2030, "DOER [Department of Energy Resources] will present a new high-performance stretch energy code to the Board of Building Regulation and Standards [BBRS] in 2021 that allows for Green Communities to opt in starting in 2022 and will become mandatory and effective statewide no later than January 1, 2028."

When considering when to opt in, Westborough should consider both the urgency of climate change as well as the potential for disruption to the building industry. Coordinating adoption timing with neighboring towns can minimize this disruption to local builders. The Sustainable Westborough Building Committee and the town Building Department should reach out to impacted businesses and professionals through trade organizations, state agencies, and direct contact to find ways to smooth the transition to the statewide mandated Net Zero code implementation.

Zoning bylaws are another tool to accelerate local commitment to decarbonize the building sector. Zoning can reinforce climate standards, provide allowances to improve building envelopes, and ensure that carbon free space heat and hot water are installed. As Westborough monitors the Commonwealth's plans for its Stretch Energy Code, the Town should explore the options available and identify new zoning bylaws which will support Westborough's GHG emissions reduction goals.



### *Costs & Funding*

The Building Commissioner in consultation with the Board of Selectmen can adopt the new Stretch Energy code through standard administrative processes. [to be verified by Fred Lonardo]

Once adopted by Westborough, the individual property owner will bear any positive or negative financial impact of the new Stretch Energy Code over time. The incremental costs to weatherize the building shell and to electrify space heat and hot water will be reflected in new building construction costs or the rehab costs for a deep energy retrofit of an existing building. However, new studies illustrate that any increase in construction costs for materials, labor, and clean energy technology will be offset by energy cost savings over the average life of the building shell.<sup>2</sup>

### *Timing*

The State's implementation of the new Stretch Energy Code may allow municipalities some flexibility in adoption of a Net Zero code by creating a second optional Stretch Code. As proposed in the 2030 CECP, all municipalities could opt-in to the Stretch Energy Code in 2022 and all municipalities statewide must adopt this code by 2028. Note that Westborough is already committed to the Stretch Energy Code and revisions.

### *Resources, Responsible Parties, and Next Steps*

Once the BBRS releases a new Stretch Energy Code, the Westborough Building Department, through the Board of Selectmen and, if required, Town Meeting, should implement the new Stretch Energy Code. The Building Department should continue to monitor laws and regulations enacted at the State level which support building electrification.

The next steps by the Building Commissioner, Sustainability Coordinator, and Sustainable Westborough Building Heat Team are to:

- Monitor action by the DOER and BBRS to approve a new Stretch Energy Code and review any draft language proposed to the BBRS which refers specifically to Electrification;
- Consider when Westborough should opt in to the new code, and manage the local implementation of any regulatory changes that support early conversion to 2050-compliant technology for heat and hot water;
- Raise awareness within the community about the Stretch Energy Code prior to and after release. Tactics should be included in the Community Engagement plan for outreach to local HVAC contractors, consulting engineers, building designers, construction firms, and real estate developers serving Westborough's market.

## **Strategy 2: Promote State subsidy programs for building improvements and 2050-compliant heating systems**

### *Summary*

As state programs and policies are deployed to encourage property owners to switch energy sources and electrify buildings, Westborough should seek out partnerships with third party providers to participate in any initiatives that provide no-charge or subsidized professional services and/or equipment to residents and business owners.

## Discussion

The CECP 2030 plan outlines a clear intent by EOE, DOER, and MassCEC to transition from programs that offer financial incentives for high efficiency fossil fuel heating systems, to those that will increase electrification through direct subsidy to property owners who install air source and ground source heat pumps. The Mass Save program familiar to many property owners will change with recognition that the 2030 emissions reduction goal requires a substantial shift in program and policy focus to include GHG emissions reduction as a goal in addition to the current energy efficiency goal.

*Westborough should consider adopting the Energy efficiency measures that are cost effective and should always be the first step for building electrification. Renovation of existing homes built to existing standards or worse are a challenge and expensive to fix.*

Based on the CECP 2030, Mass Save will launch new programs to drive heat pump adoption:

*DOER will also work to ensure that Mass Save develops increased air source and ground source heat pump incentives and consumer education in 2022-2024 and expands access to energy efficiency and clean heating for low- and moderate-income renters and homeowners in Environmental Justice communities through targeted community-based incentives and outreach programs, and increased funding for pre-weatherization barriers.<sup>3</sup>*

In Westborough, the focus in 2021 should be on increasing no-cost energy assessments and subsidized weatherization of all homes and buildings housing small businesses. Current Mass Save programs provide substantial incentives to complete efficiency upgrades to building envelopes (see primary goal on Energy Efficiency for Building strategies). Income Qualified Programs are available for some homeowners to convert their fossil fuel space heat and hot water systems without any out-of-pocket cost.

## Costs & Funding

Building owners incur the costs and benefits of electrifying space heat and hot water. However, the Commonwealth has programs which provide direct and indirect financial incentives to offset the installation costs through rebate and subsidy. These programs may pay for all or a portion of the out-of-pocket costs incurred by the property owner. In addition, low/no interest financing programs provided by utilities allow building owners to pay for upgrades and electrification over the system lifecycle.

Mass Save provides a single point-of-contact for incentive programs to offset the cost incurred by homeowners. The state has income qualified programs for replacing failed heating systems and for installing heat pumps. Mass Save also provides no-cost building inspection services to help property owners identify system options and the associated installation costs, including any mitigation.

*Westborough should take advantage of all state and utility incentive programs that promote installation of Heat Pumps and high efficiency building envelopes.*

## Resources, Responsible Parties, and Next Steps

The Sustainability Coordinator will have the primary responsibility to monitor the various State agencies for new policies and programs which inform community stakeholders and provide financial incentives to property owners who elect to install carbon-free options. The Sustainability Coordinator will search for utility, State, and Federal programs which promote building electrification and can provide technical assistance to Westborough property owners.

The next steps by the Building Commissioner, Sustainability Coordinator, and Sustainable Westborough Building Heat Team are to:

- Monitor action by the DOER in 2021 to phase out incentives for fossil fuel heating systems and promote awareness among the professional and building trades community as well as the public.
- Monitor action by the DOER in 2021 that increases the financial incentives to install air and ground source heat pumps.
- Investigate opportunities from state agencies, utilities, and other sources to provide resources for building energy audits and other assistance for residential, commercial, and industrial building owners seeking information about the feasibility and cost to electrify space heat and hot water.
- Establish outreach strategies to single family residential, multi-family, small business, and large commercial/industrial property owners for the purpose of encouraging use of free program offerings which result in the identification of good prospects for electrification and financial resources to offset conversion costs to install heat pump systems.

### Strategy 3: Promote Ground Source Heat Pumps to C&I oil and gas customers.

#### *Summary*

Ground-source heat pumps (GSHPs) can provide cost-effective, energy-efficient space heating and cooling, hot water, and process heat by utilizing the nearly constant temperature underground to transfer heat between the ground and the commercial/industrial facility.

#### *Discussion*

Ground Source Heat Pumps (GSHPs) are typically the most efficient type of heat pump because the underground temperature is moderate year-round. Though they require electricity to operate, efficient GSHPs can provide the same amount of heating for substantially less annual cost than traditional fossil fuel or electric heating systems.

Benefits:

- Great option for new construction, but can also replace existing forced air or hydronic heating systems;
- High installation costs are offset by long-term energy cost savings compared with electric heat, oil, propane, or even natural gas heating plus highly efficient cooling; and
- Greatest greenhouse gas reductions of any heating and cooling technology

Westborough should promote awareness of this option to commercial/industrial property owners and coordinate the referral of interested commercial property owners to GSHP resources for site analysis.

Property owners will need to seek guidance from an independent expert to determine the feasibility and cost for new construction or retrofit to GSHP of an existing facility. The Town can provide lists of energy services companies who can provide this support.

*The Commercial and Industrial buildings in Westborough will require special solutions to eliminate fossil fuels so alternative technology options including ground source heat pumps should be explored.*

#### *Costs & Funding*

The property owner pays for the cost of purchasing and installing a GSHP at their facility and gain the financial benefit of lower utility bills; however, MassCEC's Clean Heating and Cooling programs offer

rebates to support the installation of renewable heating, hot water and cooling technologies at facilities across the Commonwealth.

In the CECP 2030 report, the EEA indicated an intent to enhance financial incentives for homeowners to switch to electric heat pump systems, and other carbon free heat and cooling technologies, and discontinue incentives and rebates for the purchase of higher efficiency fossil fuel systems.

The PACE (Property Assessed Clean Energy) program offered by Mass Development provides a creative financing mechanism to fund clean energy improvements in Commercial and Industrial buildings.

### *Resources, Responsible Parties, and Next Steps*

The Sustainability Coordinator should monitor developments in the statewide Heat Pump program as they are introduced, and advocate for the town to adopt appropriate programs when they are announced by MassCEC or Mass Save. The Sustainability Coordinator should work with Sustainable Westborough to coordinate and set up a resource center for GSHPs, including the State programs offering financial assistance for equipment or installation.

Sustainable Westborough should appoint a volunteer to organize a resource library for GSHPs, to include a list of GSHP vendors and installation contractors who are interested in working with Westborough business owners. Green Communities, Mass Save, and the MassCEC can provide lists of vendors, training, and documentation for an energy resource center.

Last, Sustainable Westborough should develop a detailed GSHP case study using Fales and Hastings to show the economic benefits.

## Strategy 4. Explore emerging technologies which reduce Building GHG emissions

### *Summary*

Westborough should develop a study group of interested citizens to research innovations in energy efficiency and carbon free heating and cooling building technologies. Technologies should include: green roof systems, hydrogen fuel cells, battery storage facilities, and renewable heat gas systems.

### *Discussion*

Innovation in building technologies that are viable at market scale will help to accelerate the reduction of GHG emissions from Westborough's building stock. In general, innovation should lead to a reduction in unit costs to switch from fossil fuels, and should expand the feasibility of retrofit in a larger proportion of buildings. Particular focus should be brought to solutions for structures that were built prior to 1980, given the age of Westborough's building stock. By increasing citizen awareness of viable options, Westborough will encourage property owners to improve energy efficiency, lower utility costs, and decrease GHG emissions.

### *Costs & Funding*

Initially, this effort would only require time and expertise from citizen volunteers to pursue.

### *Timing*

Initiate formal study and a mechanism to receive and publish information by 2024.

### *Resources, Responsible Parties, and Next Steps*

In the next 2 to 3 years, Sustainable Westborough should establish a study group for emerging clean energy technologies for buildings. The study group should include citizens with professional experience or subject matter knowledge in the clean energy technology domain. The initial team should decide the charter, group process, and communication. Westborough should consider participation in pilot implementation programs of new building technologies when they are available.

### *Goal References and Footnotes*

<sup>1</sup> MA Decarbonization Roadmap Study. URL: <https://www.mass.gov/doc/ma-decarbonization-roadmap-lower-resolution/download>

<sup>2</sup> [CASE STUDY REFERENCE]

<sup>3</sup> Interim Clean Energy and Climate Report for 2030. URL: <https://www.mass.gov/info-details/massachusetts-clean-energy-and-climate-plan-for-2030#interim-clean-energy-and-climate-report-for-2030>

## Goal - Transportation Electrification

### Consistent with MA State's Goals - Increase Electric Vehicles in Westborough to 20% of the Total Registered Vehicles by 2030

Transportation sector GHG emissions are due to fossil-fuel powered vehicles which burn gasoline or diesel. As discussed in the GHG Inventory (Section 3), the transportation sector accounts for roughly a third of the total GHG emissions in Westborough, roughly 75,000 MtCO<sub>2</sub>e per year, 86% of which are from personal light duty vehicles (LDVs) as shown in Figure 1.

The Commonwealth has established a transportation sector reduction target of 26% less GHG emissions by 2030, using 2017 as a baseline. Westborough will also lower the annual GHG emissions in its transportation sector by 26% or 19,568 MtCO<sub>2</sub>e, to a maximum of 55,505 MtCO<sub>2</sub>e by 2030. This section provides strategies for achieving the target emissions reduction.

*Residential vehicles are the largest producer of GHG emissions in Westborough. It accounts for 64,583 MT CO<sub>2</sub>e/yr. which is about 27% of the town's total emissions.*

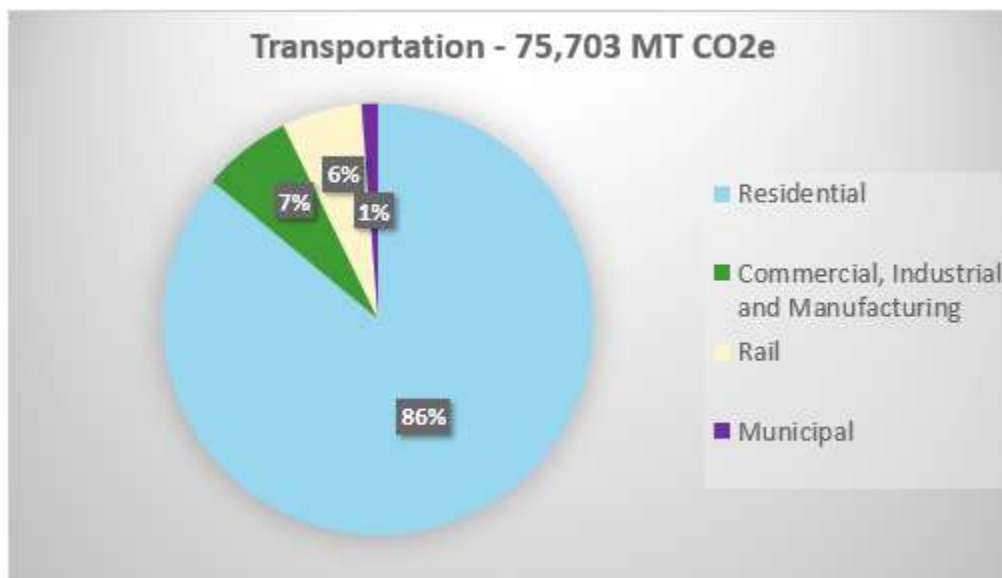


Figure 1 - Westborough Transport Sector CO<sub>2</sub> Emissions by Source

In the past few decades, Federal and Commonwealth policies have been the main drivers for reducing GHG emissions from the Transportation sector. In 2015, the Massachusetts established a Zero Emission Vehicle Commission whose aim was to support the adoption of **Zero Emission Vehicles (ZEVs)** in the Commonwealth.<sup>1</sup>

Within this document, the CAP Task Force will use the term **EVs** or **Electric Vehicles** for all ZEVs and will focus its strategies on fully battery electric vehicles (BEV). **ICE** or **Internal Combustion Engine** will refer to traditional fossil-fuel powered vehicles.

The State definition of ZEVs includes:

- **BEVs, PEVs or EVs**– Battery Electric Vehicles, Plugin Electric Vehicles or Electric Vehicles
- **PHEVs** – Plugin Hybrid Electric Vehicles
- **Hydrogen Fuel Cell Vehicles**
- Other future technologies that may produce a zero GHG emissions

The Commonwealth has established goals for adoption of EVs that are aggressive but well below the 2030 goals for other industrialized countries. Massachusetts goals are:

- 300,000 EVs by 2025
- 1,000,000 EVs by 2030
- Prohibition of sales of new ICEs after 2035

*To meet MA State goals, the number of EVs to climb steeply from the present 0.2% to 20% by 2030. In 2035, the state will no longer allow new ICE sales.*

In an attempt to meet the goals, the MOR-EV (Massachusetts Offers Rebates for Electric Vehicles) program started offering rebates and financial incentives for purchasing EVs. However,

the rate of EV adoption has been slow. From June 2014 to November 2020, the program issued rebates for only 17,500 EVs including all makes and models of passenger vehicles. For comparison, over 5,000,000 Light Duty Vehicles (LDVs) are currently registered in Massachusetts.

Given that over 80% of the vehicles purchased by consumers are used vehicles, the low rate of acquisition of new electric vehicles is likely to cascade into a low rate of EVs available in the used car market.

New vehicles sold today have an average lifecycle of 10-15 years;<sup>2</sup> therefore, in the next 30 years (2020-2050) the state's vehicle fleet will likely turn over only 2-3 times. A review of Westborough vehicle registration<sup>3</sup> shows similar trends including:

- Total Vehicles registered in Westborough = 16,358
- Proportion of vehicles age 15 years or less = 89%
- Average age = 8.3 years
- Median age = 6.0 years
- Approximate number of new cars registered each year = 1,300-1,500

A rapid adoption of EVs by the town residents is a critical goal. Because rebates and tax incentives have limitations in total amount available and in time, the Town should move urgently to educate residents about: EV features and benefits, to dispel the misconceptions of EV ownership experience, and to introduce the government programs which encourage EV adoption. More residents will choose to purchase an EV if the rationale is clear and there are financial incentives to do so.

*Newly purchased vehicles stay in use for about 10-15 years. Every new EV purchased by Westborough car buyers will reduce GHG emissions for more than a decade. In 2035, the state will no longer allow new ICE sales.*

## Strategy 1 – Outreach: proactively disseminate information about the benefits of EVs

### *Summary*

The pace of adoption of EVs by all Massachusetts communities will be a key factor in achieving the GHG emission targets set by the Commonwealth. In order to prepare the Westborough community for this change, the Town needs to immediately start an active information program about the availability and advantages of EVs over ICE vehicles. A high-visibility, sustained program will ensure that residents are prepared to make informed decisions when the time comes to replace their existing vehicles. Voluntary organizations such as Sustainable Westborough along with other local and regional organizations such as CMRPC (Central Massachusetts Regional Planning Commission) and the Committee on the Environment (COTE) of the Rotary Club can act as a trusted source of information with coordination by the Sustainability

Coordinator. These organizations may review and distribute online resources to residents to make them more informed EV buyers via web sites, social media and traditional media outlets. In addition, they can organize EV shows and similar events to enable potential buyers of EVs connect with current EV owners who are willing to share their experiences.

### *Discussion*

At present, a number of significant barriers exist which impede adoption of Electric Vehicles. Although EV owners nationwide have reported a high rate of satisfaction with their experiences with their vehicles, a large knowledge gap remains in the larger community.

An initial analysis of the reasons for slow EV adoption rate<sup>4</sup> revealed a few major barriers to the adoption of the EVs by the general consumer:

- I. Awareness
- II. Availability
- III. Charging Options

#### I. Awareness

Greater awareness of the advantages of the EVs over conventional fossil-fuel based ICEs including the convenience, affordability, technology, sustainability, and power performance is key to the wider adoption of EVs. Presently there are significant hurdles in overcoming this barrier. The total amount of advertising dollars spent on EVs is less than 3% of the amount spent on ICEs. The general perception is that EVs are expensive and that the technology is yet to be proven.

The cost of ownership of EVs is an important consideration. Studies have compared the EV and ICE cost of ownership in great detail.<sup>5</sup> For EVs, batteries are the major cost component. Although the battery prices are coming down rapidly this decrease is being offset by the gradual reduction in Federal and State EV financial incentives.

Overall, EVs have lower maintenance frequency and cost than equivalent ICEs. In addition, the cost of electricity per mile travelled is much lower compared to the cost of gasoline/diesel per mile. However, inflation due to the annual increase in utility rates has to be compared with the increasing price of fuel. Considering all these factors, EV ownership cost will be comparable or slightly less in the short and medium term (2025-2035), and is projected become clearly less expensive in the long-term (2050).

The main benefits of adopting EVs will be derived from the massive reduction in 'hidden costs' such as the damage to the environment and the economy in the long term. According to the "Massachusetts 2050 Decarbonization Roadmap"<sup>2</sup> the estimated state-wide savings in healthcare costs alone will be over \$295 Million. Improvements in productivity and job creation will be some of the additional benefits to the economy.

#### II. Availability

At present, roughly 50 different models of EVs are available worldwide with roughly half of them over \$50,000.<sup>6</sup> IHS Markitt predicted that by 2026, 133 EV models will be offered by 43 brands. Several auto manufacturers are planning to build EVs costing less than \$25,000 on the market within the next 3 years.<sup>7</sup> The increasingly competitive market will lead to improvements in technology and reduction in cost.

Consistent with the Commonwealth's recommendations in the CECP 2030, the Town should investigate the Drive Green program run by Green Energy Consumer Alliance to help residents purchase a new or used EV through education and group purchasing discounts. However, at present the major US EV manufacturer with the largest market share of EVs is not a part of this program.



### III. Charging Options

The charging infrastructure is another important component for the successful adoption of EVs by the community. With the expected ramp in EV purchases, municipalities and states need to ensure that there is sufficient infrastructure to support the influx of new vehicles and accompanying technologies. This document will discuss EV charging infrastructure in Strategy 2.

#### *Timing*

The publicity and educational campaign will require long-term planning. Volunteer organizations such as Sustainable Westborough will need to sustain a commitment to EV educational outreach to residents. Because residential vehicles are the largest source of GHG in Westborough, it is critical that Westborough moves quickly and aggressively with this strategy which when successful will eliminate GHG emissions for every new EV purchased for the subsequent 15 years.

#### *Resources, Responsible Parties and Next Steps*

Outreach may take many forms such as programs on local TV stations such as town-hall style meetings, organizing EV shows, etc. A dedicated resource such as a Sustainability Coordinator in collaboration with Sustainable Westborough will help gather and develop educational materials. The Sustainability Coordinator may also work with Sustainable Westborough to organize educational events in coordination with similar resources at the regional and state level. The Sustainability Coordinator will also gather and disseminate most information to enable town residents to take advantage of state and federal financial incentive programs in purchasing of EVs and installation of charging stations.

## Strategy 2 - Comprehensive plan for charging stations

### *Summary*

Westborough needs to develop a plan for EV charging stations including type, the quantity, and locations throughout the community with input from residents and National Grid. The Town should make every effort to streamline the permitting process within the law. The Building Department will need to provide permit assistance and guidance to applicants seeking to install charging stations.

*The vast majority of charging is at EV owners' residences. A plan to address the changing needs of renters at home as well as commuters at their employers can drive changes to local bylaws and building codes.*

Because roughly 80% of EV charging is expected to occur during evening hours,<sup>5</sup> Westborough needs to plan for universal access to charging stations which are convenient for all residents. Installing charging stations at homes with covered parking is straightforward. However, large Multi-Unit Dwellings may pose some difficulties. To support travelers passing Westborough on 90 and 495. Westborough should allow strategically located DC fast charging stations in locations with unrestricted public access near these highways or downtown, which may require changes in zoning bylaws.

### *Discussion*

EV charging infrastructure is currently cited as a major barrier to purchasing EVs. Car buyers are concerned that the range of an EV will be insufficient for their transportation needs, and they will be stranded without charge away from home. However, existing users' data indicates that 85% of vehicles miles traveled by LDVs are for trips less than 50 miles. Furthermore, as more EVs models are introduced with a full charge range in excess of 250 miles, this concern becomes much less of an issue. Above all, a good local vehicle charging infrastructure will be the best way to address this concern. Charging stations can

also be a service offering which provides new revenue opportunities for businesses along the Route 9 corridor, downtown and other strategic locations.

Facilities for charging their EVs may be categorized into the following segments, each with typical issues discussed below:

- I. Residential Units
- II. Multi-Unit Dwellings (Apartment/Condo Housings)
- III. Employers: Small-scale & Large Businesses
- IV. Public "Access-to-All" Charging Stations

#### I. Residential Units

Residential Units with covered parking are best suited for installation of charging stations. In general, Level 2 Charging stations (240V supply) are appropriate and the vehicles can be charged overnight or when not in use.

If these charging stations are connected to a communications network, the electric utility can vary the charging rates according to the time-of-day to avoid peak demand on the grid and set the price to consumers accordingly. This option is not available in Massachusetts at present, but should be considered in the future in order to adapt to the rising energy demand due to the wider adoption EVs. With control of EV charging times and rates, electricity suppliers will have unprecedented options and flexibility to shift the EV charging load to the time when the marginal cost of electricity is low.

#### II. Multi-Unit Dwellings (Apartment/Condo Housings)

Multi-Unit Dwellings (MUDs), particularly large MUDs such as the Fountainhead/Arrive residential Complex will present challenges for installation of charging stations at scale. MUDs will require a large number of charging units and supporting infrastructure, which will require substantial advance planning.

The Town will need to engage the building managers, community residents and utility service providers early in the planning process. The availability of networked charging stations of sufficient capacity to enable the renters to charge their vehicles in an affordable and convenient manner will be critical. The CAP Task Force recommends that the Town establish a special committee to study the issue of EV charging stations at rental properties and recommend implementation strategies and bylaws changes.

Other municipalities have already performed such studies. For example, the Building Owners & Managers Association in British Columbia developed open-source guidelines for the installation of charging units in MUDs and Mixed-Use Buildings.<sup>8</sup> Such information will be useful for building managers and owners who are considering installation of charging systems in MUDs. As discussed above, strategies to avoid demand peaks will also be advantageous in these locations.

#### II. Employers: Small- & Large Businesses

Charging stations at work locations are important for employees, especially for those who do not have access to such facilities at home or with a low full-charge range. Retail stores and other establishments are already offering EV charging as an enticement to attract customers. The Town should engage small businesses and large enterprises as it develops the Westborough EV charging station plan. The proposed committee, the Westborough Planning Department, and National Grid should coordinate with businesses on how to best locate charging stations at these facilities.

### III. Public “Access-to-All” Charging Stations

The availability of charging stations in public locations with ‘Access-to-All’ will be an important part of the charging station infrastructure in the town. The Town will need a comprehensive plan, including criteria for granting permits and reviewing Zoning bylaws, to account for this infrastructure.

#### *Timing*

A comprehensive plan for Charging Infrastructure in Westborough is a long-term effort but should begin immediately. As the Town develops the plan, the timing and resource requirements will begin to emerge and can be addressed on an ongoing basis.

The CAP Task Force recommends an early start on the implementation of this strategy, as charging station infrastructure will be a key enabler in the long-term achievement in GHG reductions.

#### *Resources, Responsible Parties and Next Steps*

A special committee task force charged with developing the plan will require support of the Sustainability Coordinator in partnership with state, regional and federal agencies and advice from consultants as needed.

## Strategy 3 - Adopt methods for tracking GHG from residential vehicles

### *Summary*

In order to evaluate the effectiveness of the policies and measures implemented in Westborough, the Town will need to obtain more accurate information regarding locally registered vehicle types and Vehicle Miles Travelled (VMT). The best way to obtain this information would be for Westborough to collaborate with other municipalities and/or advocating with Westborough’s statehouse legislative delegation.

### *Discussion*

Many regional agencies are developing tools for estimating GHG emissions (e.g., the MAPC tool). The Commonwealth may provide additional tools to municipalities in the future. The Sustainability Coordinator can conduct such surveys and use the data gathered to assess the effectiveness of Westborough’s GHG reduction approaches. Data includes:

- Type of vehicles registered in Westborough from the office of the Town Assessor.
- VMT data from the RMV (Registry of Motor Vehicles) obtained during annual inspection.

With these data the Town would be able to periodically estimate Transportation Sector GHG inventory and changes therein.

### *Timing*

Tracking vehicle GHG emissions is a long-term effort and will last throughout the period of planning. This strategy is recommended for implementation over the next 5 years.

### *Resources, Responsible Parties and Next Steps*

The Sustainability Coordinator can act as a liaison with MAPC and other regional organizations. The Town can engage other professionals and resources for the initial setup of the process. The Multi-town Climate Collaborative that Westborough is part of can be the focal point for advocacy to the state to secure local access to anonymous inspection data for vehicles listed on a municipality’s vehicle excise tax rolls.

## Strategy 4 - Partner with Central Mass Regional Planning Commission & Neighboring Towns

### *Summary*

The scope of Transportation planning by nature is larger than any one town. It is important that Westborough's plans to shift LDV purchases to electric options are coordinated and informed by the plans of neighboring communities and the broader Central Massachusetts region. Partnering offers an opportunity to form networks with other the regional communities for both planning and engaging with State Representatives, which will allow a mutually beneficial exchange of information and coordination of efforts.

### *Discussion*

The Sustainability Coordinator with other Town officials should work with local, regional and state level organizations to develop policy recommendations which will help Westborough and the neighboring communities to successfully transition to EVs. Policies that have been discussed elsewhere in this section are needed regionally, not just in Westborough. Westborough can benefit from the shared experience and the larger scale of a regional effort while also providing an example of what other communities should do to promote the transition to EVs consistent with state goals.

As stated earlier, a large part of the adoption of EVs by consumers will be driven by federal and state legislation. Government programs are expected to continue to provide financial incentives for EV purchase, and regulations affecting charging station infrastructure development. Networking with regional municipalities will help:

- develop plans for regional traffic studies;
- share best-practices from other towns and tools; and
- track GHG emissions from vehicles.

Also, through collaboration with neighboring towns, Westborough can increase its influence with the relevant state policy makers to influence local programs and EV regulations. Regional collaboration may be beneficial in the selection criterion for state and federal grants.

### *Timing*

Networking and collaboration is a long-term continuous effort which is expected to be valuable on an ongoing basis. The CAP Task Force recommends that Westborough implement this strategy immediately and that the Sustainability Coordinator develop and manage networking activities.

### *Resources, Responsible Parties and Next Steps*

The Sustainability Coordinator can act as a liaison on transportation electrification issues with neighboring towns, MAPC, CMRPC, Mass DOT, and other such regional organizations.

## Strategy 5 - Electrification of the Municipal Fleet

### *Summary*

The Municipal Fleet of vehicles is a relatively small proportion (1.2%) of the total GHG emissions produced by the Transportation Sector. However, electrifying this fleet offers an opportunity for the Town to lead

by example. The Town can gradually modernize the fleet with EVs by replacing existing ICE vehicles as they reach end of service life. Westborough can use of state government subsidies and grants to help offset some of the capital layouts for a replacement program.

### *Discussion*

Over the next 5 years, the Town can serve as a role model for the town residents and businesses by adopting EVs for the municipal fleet including school buses, Police and Fire vehicles, and DPW trucks as EV models that meet the operational demands of Town departments become available, as long as the total cost of ownership is economically justified. Westborough should establish a Vehicle Electrification Plan which the Town can use to communicate the importance of transitioning to EVs and the economic and technical feasibility of doing so in the near term. ICE Vehicles should be replaced as part of the normal fleet replacement cycle.

*Westborough's proactive approach across a range of vehicle types in converting to an electric fleet will encourage residents to consider EVs when purchasing their next vehicle*

The Commonwealth and other agencies make available grants for pilot programs from time-to-time.<sup>10</sup> The Sustainability Coordinator should spearhead a streamlined method for applying for such grants.

### *Timing*

The Town should develop a Vehicle Electrification Plan in 2022 with implementation continuing through 2030.

### *Resources, Responsible Parties and Next Steps*

The DPW and the School Board will be responsible for implementing this strategy.

## Strategy 6 - Task Force for Autonomous Vehicles

### *Summary*

In the next decade or two, Autonomous Vehicles will become more accepted and widely adopted. Autonomous Vehicles may render significant portions of the traffic infrastructure obsolete and/or may require new infrastructure such as 5G network links. Advanced methods of traffic control may become available which enhance safety, efficiency, and emissions compared to current solutions.

In the next 3 years, Westborough, neighboring towns, and regional agencies should establish a task force to study and develop policies for adoption of Autonomous Vehicles. The work should be phased to ensure that the town is not investing in infrastructure which may be rendered obsolete and replaced in a short time, thus avoiding waste and facilitating proper allocation of town resources for the long-term. This forward-looking plan will also position Westborough to move to a modern transportation system which does not depend on fossil fuels.

### *Goal References & Footnotes*

<sup>1</sup> "ZEV Commission Meeting #10, October 2020", <https://www.mass.gov/service-details/zero-emission-vehicle-zev-commission, 2020>

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<sup>3</sup> Westborough Town Assessor

<sup>4</sup> <https://mor-ev.org/>, 2020

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## Goal: Energy Efficiency

***Implement energy efficiency measures to achieve a 10% reduction (2017 baseline) in the energy consumed within new and existing buildings by 2030.***

The Commonwealth has established a 2030 target for a 48% reduction in GHG emissions from the Building sector and 35% GHG reduction from the Electricity sector below the 2017 baseline<sup>1</sup>. Westborough's Building Electrification and Clean Sources of Electricity Goals will match these percentage reductions through CAP strategies. The contribution from the Energy Efficiency Goal is estimated to be about 15,000 MtCO<sub>2</sub>e/year by 2030, or 10% of the reductions described in the Building and Electricity sector goals<sup>2</sup>.

Building energy consumption made up 64% of Westborough's community wide GHG emissions in 2017 (comprised of Building Heating at 36% and Electricity 28% - see Sect 3. GHG Inventory).

Westborough should aggressively implement efficiency measures to significantly reduce its energy consumption and GHG emissions in an affordable manner

***Energy efficiency retrofit of buildings, heat pumps, environmental control systems, and appliance upgrades will generate a positive return on the initial investment due to energy saved over time.***

Eversource and National Grid fund the Mass Save energy efficiency programs for all ratepayers through fees earmarked in utility bills. However, it takes initiative by individual property owners to utilize these programs to realize any benefit from these incremental costs. The Town should focus on establishing relationships with Mass Save and existing statewide programs that help individual building owners improve their building envelopes and offer financial incentives to upgrade appliances and environment management equipment.

All measures taken to improve the efficiency of a structure's envelope today will conserve energy and increase the building's readiness for full electrification when fossil fuel systems reach the end of their service life. In addition to improving the thermal efficiency of a building envelope, property owners can reduce electricity consumption by upgrading electric lights, home appliances, and environment control systems. Installation of smart home technologies further reduces energy consumption via control systems that manage living environments based on the habits and preferences of the occupants.

As the electric grid becomes progressively less carbon intensive, energy efficiency measures will remain highly effective. Energy efficiency improvements reward property owners with higher home value, lower energy cost, more comfortable living space, and better resilience to warmer summers. Since Westborough businesses generate 65% of GHG emissions from all structures, efficiency programs that target commercial, industrial, and manufacturing facilities are critical to lower GHG emissions overall.

***Westborough should take advantage of all state and utility incentive programs that accelerate transition to high efficiency building envelopes and heat pumps.***

The cost of building efficiency projects will typically generate a positive return on investment based on the net present value of the energy saved over the remaining lifecycle of the building.

Economically disadvantaged residents, both homeowners and tenants, are eligible for significant financial assistance to offset the cost to implement home energy efficiency measures. These programs also have accommodations for ratepayers with language barriers that have typically inhibited non-English speakers from taking advantage of them. It is important to note that 45% of Westborough's residents rent their housing unit.

## Strategy 1: Implement Mass Save weatherization and energy efficiency projects

### *Summary*

Mass Save is a statewide energy efficiency program, funded by ratepayers, and operated by Eversource and National Grid in Westborough. The organization provides free energy audits to residential and small business owners to facilitate the implementation of energy efficiency solutions for buildings. By partnering with Mass Save, Westborough can raise citizen awareness of steps they can take to reduce energy consumption, especially in underserved communities. By increasing the use of property energy audits, Westborough will see declines in energy consumption as more homes and businesses implement weatherization measures.

The plan is to implement weatherization measures in 2% of residential housing units and complete Small Business Turnkey projects in 5% of eligible utility customers through the Mass Save Municipal Partnership<sup>3</sup> during 2021.

### *Discussion*

The Mass Save Municipal Partnership is designed to leverage local knowledge, trusted relationships, and local climate action volunteer groups to raise awareness of the benefits of energy efficiency across the community. The program gateway is a no-charge energy efficiency audit offered to ratepayers, whether they own or rent. Based on the home energy audit report, a Mass Save expert will recommend upgrades to the building envelope, heat and hot water systems, lighting, and appliances. Mass Save has is a complementary program designed for the needs of Small Business ratepayers as well.

*Knowledge transfer about home energy efficiency, supported by financial incentives, empowers residents and businesses to improve their property's building envelope.*

Westborough's successful participation in the Municipal Partnership 2021 program will accelerate the implementation of home energy efficiency measures for all residents and small businesses. Proactive community outreach by local volunteers who are trusted voices in the community will target lower income residents, especially seniors and non-English speakers, who are owners of single-family homes, as well as renters. These ratepayers are underrepresented based on past participation in Mass Save programs. The additional resources and funds from the Municipal Partnership will help Westborough offer the underserved community extra assistance to streamline the process to undertake a clean energy upgrade of their homes and businesses.<sup>3</sup>

### *Costs & Funding*

Mass Save programs are funded in part by the energy efficiency charge on all gas and electric utility bills. There are no charges for Mass Save residential or small business energy assessments for any ratepaying property owner or renter. Property owners may or may not have to pay for efficiency measures they wish to implement; their out-of-pocket costs will depend on the programs in which they participate and the efficiency measures that they choose.

Three types of cost savings are available to ratepayers who complete a Home Energy Assessment and choose to make one or more of the improvements in their customized energy report.



1. Instant savings efficiency products provided at no charge if authorized by the Energy Specialist. Offers include LED lightbulbs, smart power strips, smart thermostats, and low flow showerheads and faucet aerators.
2. Weatherization – air sealing and insulation improvements that are funded by Mass Save up to 100%.
3. Equipment and Appliance Upgrades – Up to \$2,750 in equipment and appliance rebates for space heating, hot water, and cooling systems, high efficiency lighting, and home appliances are available.

The property owner can also obtain 0% interest financing for any out-of-pocket costs incurred to implement recommended efficiency measures, including insulation, heating and cooling systems, water heaters and other approved measures to upgrade the efficiency of the building envelope.

Additionally, Mass Save has Income Eligible Programs for low- and moderate-income residential accounts including no cost equipment and services for the lowest income category. <sup>4</sup>

Programs that involve up-front costs provide net savings over time due to the reductions in energy use. The participants in the program bear risks that projected future savings may not be accurate and other risks typical with service suppliers and contractors; however, these programs have a history of rapid payback.

### *Timing*

The Town signed and submitted a Memorandum of Understanding for the Mass Save Municipal Partnership campaign in Westborough for 2021 to the Program Administrators in January 2021. The Mass Save program will operate through the 2021 calendar year. With respect to energy switching to central, air source, and ground heat pumps, the Massachusetts draft Clean Energy and Climate Plan 2030 calls for Mass Save to develop increased incentives in 2022-2024.

As a Municipal Partner, Westborough must plan and execute 12 months of public education and outreach, such as marketing or events, to drive measurable participation in Mass Save program initiatives.

### *Resources, Responsible Parties and Next Steps*

The Mass Municipal Partnership assigns two Program Administrators from co-sponsors National Grid and Eversource, to assist Westborough with the annual campaign. South Middlesex Opportunity Council will assist Westborough citizens seeking Income Eligible Program assistance. Kim Foster, Asst. Town Manager is the municipal lead for the Town of Westborough.

Sustainable Westborough's Building Heat team will manage the community outreach campaign, recruit liaison resources in the community, and maintain reporting on program uptake activities.

On an ongoing basis, the Sustainability Coordinator will be responsible for seeking out experienced, proven program providers, like Mass Save, to ensure building owners have direct access at nominal charge to qualified energy assessment services every year. The Sustainability Coordinator will be responsible for submitting grant applications to program administrators on a timely basis and track the approval and engagement process.

## Strategy 2: Assist Westborough's largest GHG-emitting C&I businesses to participate in energy efficiency programs

### *Summary*

The Sustainability Coordinator with the support of EDC and Sustainable Westborough should meet with the top 20 GHG-emitting commercial and industrial businesses to learn what they are doing to improve their energy efficiency and lower GHG emissions. As warranted, the Sustainability Coordinator should offer general assistance to identify applicable state programs and services including engaging energy service professionals that will help the company reduce their greenhouse gas emissions.

### *Discussion*

Commercial and industrial businesses account for approximately 76% of Westborough's electricity GHG emissions and 56% of building heating emissions.

By meeting with the largest energy consumers in the business community to understand their current strategies for energy management the Town can establish a relationship based on a common interest to increase energy efficiency and reduce operational costs. The meeting objective will be to gather information about the company's energy priorities and concerns, including the age of the building envelope and existing environment management systems.

Any company plans to replace fossil fuels for space heat or hot water should be noted and the Town should explain the advantages of electrification and available state programs. Based on the current profile of the company's

***Focus community outreach on the top commercial, industrial, and manufacturing energy consumers and engage them in efforts to improve the efficiency of their properties and reduce GHG emissions.***

site, the Town can assist in contacting State agencies that offer program assistance in decarbonization efforts for commercial or industrial facilities. From the discovery meetings, the Town can publish case studies to acknowledge the clean energy leaders and educate the other commercial and industrial building owners about measures other local companies have taken to reduce GHG emissions with proven results.

### *Costs*

The cost of this program is reflected in the time and effort by the Sustainability Coordinator, EDC resources, and Sustainable Westborough volunteers to schedule and conduct meetings, complete meeting reports, assemble and write case studies, and manage the relationships with key contacts at the targeted businesses going forward.

### *Timing*

The identification of the top carbon-emitting businesses and the initial meetings can occur in 2021. Depending on the state of the pandemic, meetings could be in person or by video conference.

### *Resources, Responsible Parties and Next Steps*

The Sustainability Coordinator in partnership with the Economic Development Coordinator, Assessor and Town Planner will need to identify the largest GHG-emitting businesses. These people, in conjunction with a representative from the Economic Development Committee, should meet with those businesses to learn what they are doing to improve their energy efficiency and encourage them to reduce their greenhouse gas emissions as warranted. Sustainable Westborough can participate and support this effort including developing case studies to publicize the leaders in implementing energy efficiency.

### Strategy 3: Lead by example on municipal building performance.

#### *Summary*

The Town should update the energy reduction plan that was developed as part of the Green Communities application, then prioritize projects for next 5 years. The Town should update this plan on an annual basis until it completes retro commissioning (electrify heat and hot water systems) and deep energy retrofit (improve building envelope) in all municipal buildings. Retro-commissioning work involves a close examination of existing energy systems with the goal to improve how building equipment and systems functions together.

#### *Discussion*

Westborough's municipal facilities contribute just 2.3% of town wide GHG emissions; however, it is still valuable for the Town to demonstrate leadership by implementing measures to minimize existing building energy usage. The Town should conduct updated energy audits of each facility, and then develop plans for deep energy retrofit (such as whole building insulation or air sealing improvements), and retro commissioning for schools and other large facilities. In parallel, Westborough should evaluate the suitability of constructing renewable energy facilities onsite at the municipal property. As retrofits and renewable energy projects are completed, Westborough should promote these buildings as models for other buildings in the community, by publishing annual energy use disclosure reports.

#### *Costs*

The Town would need to estimate assessment, design, and capital improvement costs, as well as facilities staff time in order to define the scope of the effort and to prioritize the municipal properties based on energy consumption, age of envelope, and energy systems. Most of these capital improvement projects qualify for Green Community Program funding which would significantly reduce upfront costs to the Town and reduce energy costs in the future.

#### *Timing*

For budgetary reasons and resource constraints, the Town should prioritize and sequence projects to upgrade each facility in the 5-year capital plan. All facility upgrades for building energy performance should be targeted for completion by 2030.

#### *Resources, Responsible Parties and Next Steps*

The Facilities managers for Town and School buildings would each lead the overall planning and prioritization of their properties; contract with the energy services companies; and liaise with the project manager for each site from initiation through completion.

The Town should engage a professional energy services management firm with experience in schools and other large municipal buildings to supervise the work. Depending on project cost, three bids may be needed for the contractors providing the labor and materials to complete the work.

Energy auditors, building engineers, the School Committee, the Building Department and DPW will all be involved in the efforts.

Next step is for the town and school Facilities Managers to update the energy reduction plans and identify the priorities for the next 5 years.

*Goal References & Footnotes*

<sup>1</sup> <https://www.mass.gov/info-details/massachusetts-clean-energy-and-climate-plan-for-2030>

<sup>2</sup> The calculation is 10% of the baseline estimated reductions described in the Building and Electricity sections, 87,000 MtCO<sub>2</sub>e + 67,000 MtCO<sub>2</sub>e respectively.

<sup>3</sup> <https://www.massave.com/learn/partners/municipal-partnership>

<sup>4</sup> <https://www.massave.com/en/saving/income-based-offers/income-eligible-programs>

## Section 5 - Secondary Goals and Strategies

### Goal: Building Energy Use Tracking

**Develop reports that track energy type and usage levels for space heat, cooling and hot water in Westborough's buildings.**

The Town government currently has very little insight into the type or amount of energy that is consumed to heat and cool local buildings. Based on the aggregate data collected from utilities and state databases, the emissions from burning fossil fuels in buildings represents about 36% of Westborough's GHG emissions (87,028 MTCO<sub>2</sub>e/yr in 2017). An additional unknown amount of GHG emissions is associated with the electricity used for heating and cooling buildings. To reduce these emissions, Westborough needs better, more granular data at the individual property level.

#### Strategy 1: Implement processes to collect and report energy consumption data

##### *Discussion*

Town government should implement policies and procedures to systemically collect energy consumption data which is already recorded within existing processes such as building permits, then develop reports of selected data elements that will increase Town visibility into energy use.

Information about residences and businesses is shared with the Town in the normal course of filing paperwork such as building permits, tax abatements, fire safety inspections, etc. The Sustainability Coordinator should define the types of data elements that are desired and work with Town department heads to define all available sources. The data will likely be limited to the fuel types for each building. However, the town government should endeavor to capture all data supporting the objective of providing greater ability to target programs for reduction of building GHG emissions. Town IT should define a periodic process for pulling this available data together while respecting all data privacy policies.

With an understanding of the current availability of data, the Sustainability Coordinator with town department heads should modify forms used in existing processes to increase the data capture. If needed, the town government could modify privacy policies to explicitly allow use of all the available data without exposing Personally Identifiable Information to unqualified individuals.

##### *Costs and Responsibilities*

Westborough Town staff, led by the IT Department, will undertake the discovery effort needed to identify sources of energy consumption data imbedded in existing processes. The IT Department is the accountable party to lead the project, reporting periodically to the Sustainability Coordinator on project status.

A community volunteer (possibly from Sustainable Westborough) with subject matter expertise to develop the project scope and objectives in collaboration with the Sustainability Coordinator will function as point person. This community volunteer will be available to the Town during the discovery project to review deliverables and provide recommendations.

##### *Timing*

The purpose of the strategy's initial phase (about 6-9 months) will be to identify and report data extracted from existing municipal processes. The Town's IT department will be asked to provide an estimate of the

effort for this discovery phase and a timetable to operationalize the collection and reporting of selected data elements. The report should include an assessment of feasibility to standardize collection and reporting, and any policy or legal barriers to aggregate the identified data elements. The deliverable will be a proposal which will include the action plan, sequence of tasks, and timetable to operationalize the collection and reporting process.

## Strategy 2: Annually publish Municipal Building Energy Disclosure reports

### Discussion

The town government should lead by example by issuing a Municipal Building Energy Disclosure report annually for every building which will include Building Energy Use Intensity metrics for all Municipal and School Buildings. The report should include findings about the consumption and emissions patterns over the prior period. This report should also make recommendations about future energy efficiency and emissions improvements to be including in the Municipal Energy Reduction Plan. There are two main benefits of this effort:

- (1) Municipal Building Energy Disclosure reports can be used in discussions with owners of large buildings in Westborough to encourage efficiency and fossil fuel replacement. (see the C&I engagement discussed below).
- (2) The Town can use this report to establish municipal building goals and policies to guide future building construction investments that will minimize remediation costs.

### Costs and Responsibilities

Staff time only, possibly Sustainable Westborough volunteer time if the committee continues ownership of Town energy information data.

### Timing

Westborough should annually publish Energy Use Intensity data immediately on all major buildings. Table 1 shows a sample of the Energy Use Intensity data for schools. Development of public facing Municipal Building Energy Disclosure report for discussions with C&I accounts will take longer. Establishing long term policies will take a year.

Facility	Natural Gas Use Therms	Electricity Use KWh	Total Energy MMBTU	Area Sq Ft	EUI kBtu/sqft
Fales ES	30,370	188,880	3,681	52,400	70.24
Hastings ES		825,000	2,815	75,000	37.53
Armstrong ES	30,946	286,320	4,072	69,000	59.01
Mill Pond IS	52,477	985,400	8,610	152,000	56.64
Gibbons MS	47,768	484,000	6,428	108,308	59.35
Westborough HS	92,459	2,050,500	16,242	288,000	56.40

*Median for Schools statewide in MEI – 64.0 kBtu/sqft  
MMBTU Conversion – 1 Therm = 0.1 MMBTU, 1kWh = 0.03412 MMBTU*

Table 1 - Westborough Schools Energy Use Intensity - FY2019

## Strategy 3: Develop and promote voluntary C&I Building Energy Disclosure reports

### *Discussion*

MAPC has developed a Net Zero Buildings Playbook that provides guidance to municipalities on how to transition to clean heating and cooling.<sup>1</sup>

The first 2 recommended actions are:

- Develop an emissions performance standard. Building performance standards (BPS) are policy mechanisms that municipalities and states can use to set high-level thresholds for building performance.... [p8]
- Adopt a building energy use disclosure policy. This policy is an important enabling action that many communities are already using to drive emissions reductions in the building sector across New England and throughout the United States. [p12]

The Town should work with state agencies and Westborough's statehouse delegation to advocate for statewide Building performance standards appropriate for buildings of different age, construction type, and usage type. The Town should develop and implement a Building Energy Disclosure report program replicating best practices from similar towns (see examples in References). This program, which should focus on the largest businesses, can be voluntary until market conditions or state driven standards require changes. These reports should be published publicly. The Town should highlight companies who have successfully improved energy utilization in a significant manner, relative to benchmarks from state or federal records. Westborough should recognize companies who reduced energy consumption and/or eliminated the use of fossil fuels through investments in energy efficiency, renewables and/or electrification.

The data from these reports should be consolidated into the town tracking process discussed in Strategy 1 above.

### *Costs and Responsibilities*

Sustainability Coordinator in collaboration with EDC, Chamber of Commerce and Sustainable Westborough Building Subcommittee are responsible for this strategy. The costs are limited to town staff time.

### *Timing*

For the next year or two, Westborough should focus most time and energy on Strategy 1 and 2. For this strategy, the town should evaluate best practices and emerging state standards relating to building energy disclosure to ensure that the program fits within norms.

## Strategy 4: Investigate residential energy use and efficiency reporting options

### *Discussion*

The components of this strategy are:

- Develop a draft Building Energy Use Disclosure ordinance for consideration by Town stakeholders.
- Determine the minimum building size threshold using assessor's data to ensure that the highest emitting commercial and multifamily buildings are included.
- Include a provision for voluntary reporting by residential property owners.

This strategy should start with a review of the Commonwealth's administrative and legislative history and future plans concerning residential energy use disclosure.

Massachusetts DOER has developed a **Home Energy Scorecard** that works with both the U.S. Department of Energy Home Energy Score designed for existing homes and the Residential Energy Services Network (RESNET) Home Energy Rating System (HERS) ratings used in most newer homes and, if implemented, would help inform homeowners and renters alike of the potential improvements in efficiency and GHG reduction opportunities in their homes.<sup>2</sup>

Governor Baker has advocated to make use of this tool mandatory, although it has not been approved by the legislature.<sup>3</sup>

Based on this review of state policies and programs, the Town should consider developing and implementing fully voluntary residential energy use disclosure practice for an initial implementation phase. The program should provide about 2-3 years advance notice and phase in with voluntary processes for about 2 years to ensure the process is fair, clear and accurate. After this experience consider shifting to a mandatory program.

The data from these reports should be consolidated into the town tracking process discussed in Strategy 1 above.

### *Costs and Responsibilities*

The Sustainability Coordinator in collaboration with Sustainable Westborough Building Subcommittee are responsible for this strategy. The costs are limited to town staff time.

### *Timing*

Study phase should be through the 2021-2022 legislative session.

### *Goal References & Footnotes*

<sup>1</sup>[https://www.mapc.org/wp-content/uploads/2021/01/FINAL-Playbook\\_Net-Zero-Buildings-Chapter.pdf](https://www.mapc.org/wp-content/uploads/2021/01/FINAL-Playbook_Net-Zero-Buildings-Chapter.pdf)

<sup>2</sup> <https://www.mass.gov/service-details/home-mpg-energy-performance-scores>

<sup>3</sup> <https://www.mass.gov/news/baker-polito-administration-files-legislation-to-improve-residents-access-to-home-energy>

**Strategies for Energy Savings in Buildings:** American Council for an Energy-Efficient Economy (ACEEE)

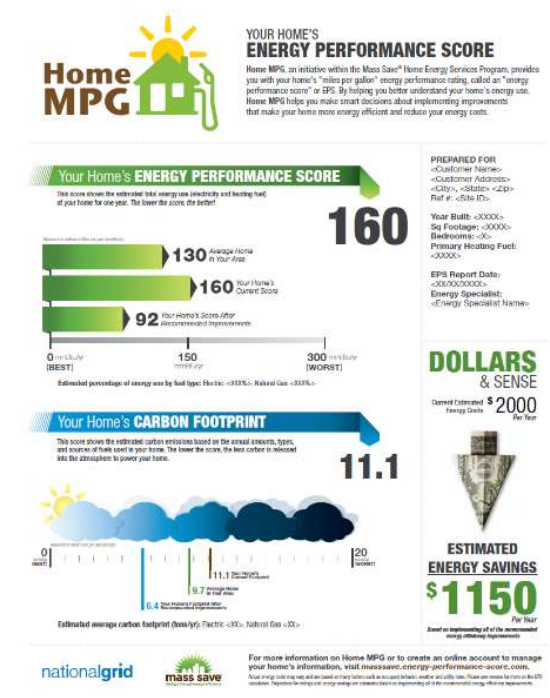
<https://www.aceee.org/toolkit/2020/02/strategies-energy-savings-buildings>

**Local and Community Initiatives:** American Council for an Energy-Efficient Economy (ACEEE)

<https://www.aceee.org/topic/local-and-community-initiatives>

**Building Energy Reporting and Disclosure Ordinance (BERDO):** Boston

<https://www.boston.gov/departments/environment/building-energy-reporting-and-disclosure-ordinance>





**Building Energy Use Disclosure Ordinance:** Cambridge

<https://www.cambridgema.gov/CDD/zoninganddevelopment/sustainablebldgs/buildingenergydisclosureordinance.aspx>

**State and Local Energy Benchmarking and Disclosure Policy:** US Department of Energy

<https://www.energy.gov/eere/slsc/state-and-local-energy-benchmarking-and-disclosure-policy>

**Building Energy Benchmarking:** Northeast Energy Efficiency Partnerships (NEEP)

<https://neep.org/tags/building-energy-benchmarking>

## Goal: Improve Public Transportation Options

To make public transit more attractive than individual vehicles for daily transportation needs in Westborough, the Town needs to:

- expand existing public transportation facilities and implement new programs;
- Build a Priority List of projects for public transportation with the goal of implementing 50% of them by 2030 for the transportation components of the Master Plan; and
- make the town more traversable via public transit by promoting and expanding use of existing facilities and by developing/participating in new public transportation networks.

### Strategy 1: Promote and expand the Via bus service.

#### *Summary*

The Via bus service that is currently operating in Westborough is not widely known and many of those who know that it exists are not aware of how to utilize the service.

#### *Discussion*

Unlike traditional bus networks that rely on routes and schedules, the new WRTA shuttles in Westborough allow passengers to hail a shared ride right when they need it. The program therefore does not utilize traditional bus stops and has no set schedule. As a result, potential users are unaware of Via as an option for local shopping and commuting trips. The Town needs to advertise the availability of the service and how to use it in order for Via to succeed and thus decrease Town residents' reliance on personal vehicles.

To raise awareness, the Town should use various methods, such as:

- an advertising campaign utilizing the electronic billboards, town website, email and the digital sign;
- utilizing flyers explaining and promoting the service in town buildings and distribute them to residents with their water and/or tax bills; and
- asking local businesses and destinations to post flyers and posters.

#### *Costs*

Assuming that most of the advertising material already exists, or could be developed in house, the costs would initially be minimal. If initial efforts prove unsuccessful, it may be prudent to hire a professional to assist with marketing.

#### *Timing*

The evaluation of this service needs to be given significant time (2+years) to allow awareness to grow. This evaluation window needs to extend well beyond the end of the pandemic concerns about shared vehicles.

## Strategy 2: Advocate MBTA for expanded MBTA Commuter Rail Service

### *Summary*

The Westborough Commuter Rail Station often operates at capacity. Providing additional parking, promoting alternative methods for accessing the station (Bike, Pedestrian, Via), and increasing capacity on the train are crucial to increasing usage of the Commuter Rail and thereby reducing the use of personal vehicles.

### *Discussion*

In 2018, the average number of commuters embarking or disembarking from the Westborough Commuter Rail Station on a weekday was approximately 1200 and 1100 respectively, according to MBTA data.<sup>1</sup>

Based on data from the MAPC GHG Tool (Section 2), in 2017, 12,274 the passenger cars in Westborough travelled 31.3 miles per day on average, producing 59,906 MtCO<sub>2</sub>e annually. Therefore, each new Commuter rail rider would effectively remove 0.0134 MtCO<sub>2</sub>e per vehicle per day.

The Town would need to implement a combination of strategies to increase capacity and usage of the Commuter Rail Station:

1. Provide safer and more convenient pedestrian routes within one mile of the station.
2. Provide safer and more convenient bicycle accommodations within a reasonable biking distance of the station.
3. Ensure there are adequate secure facilities for leaving bicycles at the station as well as provisions for users to bring bicycles onto the train.
4. Provide additional vehicular parking at the station.
5. Lobby the MBTA to provide additional service on the Worcester line.

### *Costs*

Committing to capital projects usually involves the Town paying for design services while construction costs are often paid using State or Federal funds. In order to properly pursue strategies for increasing service, the Town would likely need to hire a dedicated individual to lobby State/regional agencies and/or have the Sustainability Coordinator partner with other communities to pursue this strategy.

### *Timing*

Certain strategies that involve roadway bike lanes or expansion of the sidewalk network could be completed in the next few years (see Secondary Goal – Bike and Pedestrian). Strategies involving larger capital projects such as the reconstruction of local roadways or the construction of parking lots or multi-use trails would need to start soon if they are to be completed in the next decade.

## Strategy 3: Develop/Participate in Alternative Regional Transit Services

### *Summary*

Commuters to locations outside of Westborough or along the Framingham/Worcester MBTA Commuter Rail have no mass transit options. A Bus service along the I-495 corridor, or revival of the Route 9 (Boston to Worcester) bus service would provide a popular alternative.

### *Discussion*

Given that the MBTA system has various priorities that may not be conducive to increasing capacity as much as the community may want, the Town should examine the possibility of trying to revive an east-west bus corridor along Route 9 or I-90. Likewise, bus service along the I-495 corridor, coupled with local ride sharing, bike/e-bike sharing and bus service could serve to reduce dependence on personal vehicles, and alleviate regional congestion. Whereas this strategy involves multi-town planning and collaboration, Westborough should enlist the support of regional groups like CMRPC, Chamber of Commerce and 495/MetroWest Partnership to fund the study and to engage other municipalities.

### *Costs*

In order to properly pursue strategies for new transit routes the Town would need to hire a dedicated individual to lobby State/regional agencies, contact private bus companies, participate in potential ridership studies and coordinate with other communities. As stated above, the Town's regional partner organizations should be engaged to help drive this planning.

### *Timing*

The Town could immediately initiate investigation into the feasibility of or participation in implementing new and/or expanded transit corridors, if the town can find a willing regional partner or hire an individual to undertake those duties. Successful completion would take significant time (5+ years) because the Town would be dependent on other agencies and communities.

### *Goal References & Footnotes*

<sup>1</sup> <https://mbta-massdot.opendata.arcgis.com/datasets/mbta-commuter-rail-ridership-by-trip-season-route-line-and-stop>

## Goal: Improve Bike and Pedestrian Infrastructure

Plan and build infrastructure to facilitate safe transportation for bike-riders and pedestrians in Westborough and its neighboring towns. Implement 50% of a Priority List of projects by 2030.

Make the town more bicycle and pedestrian friendly by promoting the construction of new sidewalks and addition of bike lanes. Develop a roadmap and prioritized list of projects as part of the transportation components of the Master Plan.

This goal dovetails with the Transportation goal of increasing the use of public transit. With better and safer access pedestrian and cyclist access to the MBTA, as well local and regional bus services, residents would have alternatives to personal cars and trucks to access public transit.

### Strategy 1: Implement a process to prioritize bike and pedestrian infrastructure improvements.

#### *Summary*

Making the town safer and more attractive for pedestrians and cyclists will provide incentive for residents to use alternative ways for getting to schools, downtown and shopping areas rather than automobiles.

#### *Discussion*

In early 2021, the town became a participant in the Massachusetts Department of Transportation Complete Streets Program. According to the Complete Streets Funding Program Guidance: “the program looks to the municipality to determine its Complete Streets needs and prioritize its Complete Streets infrastructure projects through the development of a Complete Streets Prioritization Plan.” The Prioritization Plan is an initial list of potential projects ranging in scale and scope created through input from a consultant, town staff, and residents. The Plan is a living document. As projects are completed, they are removed. As new projects are identified, they can be added.

The Board of Selectmen identified the Active Transportation and Safety Committee (ATSC) as the agent responsible for collecting input and providing recommendations for bike and pedestrian improvements. The Prioritization Plan developed through the Complete Streets will become the tool for capturing new requirements. The ATSC will provide the town recommendations on which projects to pursue.

The Complete Streets program is just one avenue for securing grant funding to support bike and pedestrian infrastructure improvements. There are other programs to be explored based on the type and scale of the project. Other programs include the Mass DOT Transportation Improvement Program,<sup>1</sup> Safe Routes to School Program,<sup>2</sup> and the Mass Trails program.<sup>3</sup>

Although most Westborough Schools for K-3 grades are in or adjacent to residential neighborhoods, schools for 4-6 grade, 7-8 grades and high school are for the whole town. For all schools, major roads and intersections in Westborough make it difficult, if not impossible for students to safely walk or bike ride to schools. Speed limits are too high in some areas, sidewalks do not exist, and intersections are not pedestrian friendly. The rotary is a case in point. Students are fearful of passing through it to get to the high school.

The School Committee and the Complete Street program should collaborate on development of a policy and implementation plan to make all schools bike-friendly and accessible for all students.

Another component of this strategy is to survey residents to find out how many people have bicycles, where they live and how they use them. The Open Space and Recreation Committee successfully used

online and paper surveys to document how local environmental justice communities utilized local open space and recreational resources in Westborough. The same technique could be used to get more robust data on bicycle use in Westborough for planning purposes.

### *Costs*

The Town identified over 50 projects during the development of the initial Prioritization Plan. The cost to implement all of the identified projects is several million dollars. Although all of the projects may not be pursued, the Plan at least provides the town an initial idea of the costs associated with this strategy.

By becoming a Complete Streets Program participant, the town was able to develop the Prioritization Plan via funding from a \$38,000 grant. In the summer of 2020, the town funded the construction of over a dozen ADA-compliant sidewalk ramps through a \$79,000 Mass DOT Shared Streets and Spaces grant. More grant opportunities are likely to be available in the future. Having a prioritized plan from which to select projects will allow the town to quickly jump on grant opportunities.

### *Timing*

Many of the state grant programs associated with bike and pedestrian improvements have a submission window once per fiscal year. Projects selected to be funded through a grant are typically expected to be complete within the following fiscal year.

## Strategy 2: Use the “Corridor Study” Process

### *Summary*

A Corridor Study is a planning methodology that evaluates a roadway in order to develop a framework and strategies for improving multimodal safety and mobility, that is, autos, pedestrians, and cyclists.

### *Discussion*

The CAP Task Force recommends a Corridor Study for several main arteries through town, such as East and West Main Streets, South Street, Fisher Street, Milk Street, Ruggles Street and Otis Street. These streets are used primarily by cars. Pedestrian and cyclists’ needs have been considered secondary or not addressed at all.

A Corridor Study uses a systems-based approach to address multimodal safety and mobility through short and medium-term improvements (immediate to 10 years). These improvements can include bike lanes, new sidewalks, narrower travel lanes and speed restrictions. The Corridor Studies that address streets which cross Route 9 will address the challenges of getting bike and pedestrian traffic across the state highway. Such a study is underway along Otis Street where the new Amazon Research Center is being built.

The town can use the Otis Street study as a model for a Corridor Study framework which can also be leveraged for other main arteries identified in the Complete Streets program. This systemic approach can identify projects and priorities that can make roads better suited for all users.

### *Costs*

For planning purposes, the estimated cost to conduct a corridor study is \$75,000 to \$100,000.

### *Timing*

Corridor Studies of the top 5 main arteries in the town could be performed over the next 3 years with others to be completed soon thereafter.

*Goal References and Footnotes*

<sup>1</sup> <https://www.mass.gov/service-details/state-transportation-improvement-program-stip>

<sup>2</sup> <https://www.mass.gov/safe-routes-to-school>

<sup>3</sup> <https://www.mass.gov/guides/recreational-trails-program>

## Goal: Protect and Expand the Natural Environment

The natural environment provides mechanisms for: sequestering carbon; mitigating stormwater runoff; improving water and air quality; providing health and safety benefits to residents; lowering cooling costs for shaded buildings; encouraging biodiversity and habitat growth; and enhancing the aesthetics and vibrancy of the community.

This goal is not identified as a Primary Goal since actual GHG reduction associated with the goal is difficult to accurately measure and the timelines associated with any actions are lengthy, such as the life of a tree. However, the strategies pursued in support of this goal provide climate benefits to the town and demonstrate the Town's commitment to considering and implementing all options to positively affect the environment. In addition, the strategies included herein are frequently undertaken by civic groups and student organizations. Offering opportunities for these organizations and others like them to be involved in the execution of the CAP is an important aspect of the CAP Community Engagement process.

Two strategies are identified to support this goal. Strategy 1 focuses on the acquisition and protection of large open spaces while Strategy 2 encourages sustainable practices associated with the natural environment.

### Strategy 1: Identify funding mechanisms to protect and acquire additional open space

#### *Summary*

Acquiring and preserving open space is a means of preventing increase in GHG emissions due to residential and commercial development.

#### *Discussion*

For every acre of land not converted to a single-family home, 30 MtCO<sub>2</sub>e/year of GHG emissions is avoided.<sup>5</sup> For every acre of land not converted to commercial/industrial use, 108MtCO<sub>2</sub>e /year of GHG emissions is avoided per acre for a typical Westborough building<sup>1</sup>.

The Town of Westborough 2018 Open Space and Recreation Plan (OSRP) shows about 520 acres of agricultural use listed as Chapter 61. About 500 acres of which would be desirable to acquire if the property owner decides to sell. The Town has first right of refusal on Chapter 61 land. The OSRP lists about 980 acres of unprotected private land of interest, about 300 acres of which would be desirable to acquire.

If the Town were able to acquire one percent of the desirable land per year, or 8 acres, the minimum avoided emissions would be equivalent to 240 MtCO<sub>2</sub>e per year (compared to 8 residential Single-Family homes) and maximum avoided would be 864 MtCO<sub>2</sub>e per year (8 typical Westborough Commercial-Industrial buildings).

After 10 years acquiring land, the avoided GHG emissions would range from a minimum of 13,200 MtCO<sub>2</sub>e per year (residential Single-Family home) to a maximum of 47,520 MtCO<sub>2</sub>e per year (Commercial-Industrial 3-floor building).

Additionally, permanently protected open space can provide other climate resilience benefits, including flood storage and local nature-based recreation opportunities that encourage residents to travel less.



### *Costs*

During FY 2020, the Town purchased two large open space parcels totaling 96 acres for a combined price of \$3.3 million or approximately \$34,000 per acre.

Per the discussion above, 8 acres, or 1% of available open space, would cost approximately \$272,000 per year.

### *Funding*

There are two ways to generate funds for land acquisition.

The first method would be for Westborough to adopt the Community Preservation Act (CPA).<sup>3</sup> The CPA would allow Westborough to create a local Community Preservation Fund that could be used for open space protection, historic preservation, and recreation. It would be funded through a property tax surcharge of up to 3%, as well as the statewide Community Preservation Trust Fund, which disburses funds to CPA municipalities annually. Westborough would have to adopt CPA by ballot referendum. Note that a CPA referendum failed in 2008, but is being reconsidered by the Town as of 2021.

The second method would be for the Town to include an annual contribution to the Open Space Preservation Fund. The fund was created and funded a few decades ago, but no process of replenishing it was ever devised. It was depleted in FY 2020.

### *Timing*

The Town should investigate methods of funding open space purchases on an annual basis.

### *Responsible Parties*

The lead for this strategy will be the Sustainability Coordinator. Multiple town departments will be involved to address legal aspects, funding, management, and maintenance. The Conservation Commission, Open Space Committee, and other land-focused organizations will also be involved with this strategy.

### *Next Steps*

- Identify and investigate potential sites for purchase.
- Research and pursue grant opportunities as a source of funding future purchases.
- Communicate and educate the community on the value of purchasing identified sites.
- Initiate process for seeking town meeting approval.
- Identify who will maintain and care for the property once purchased and associated maintenance costs.

## Strategy 2: Educate and promote sustainable landscaping and tree canopy

### *Summary*

Sustainable practices and increased tree canopy enable natural environmental processes that contribute to GHG reduction.

### *Discussion*

Sustainable landscaping infrastructure and trees are a means for absorbing and sequestering GHG. Landscape features also reduce stormwater runoff and erosion by allowing precipitation to soak into the earth. Some large canopy trees can absorb upwards of 1,000 gallons of rainwater in a year. This process prevents pollutants from entering Westborough's streams and rivers and reduces the burden on the stormwater drainage systems in the town. Additionally, reducing the amount of water impacting Westborough's public utilities, primarily the town's stormwater and sewer systems, reduces GHG contributions from energy used at pumping stations and equipment used to maintain stormwater infrastructure.

### *Cost and Funding*

Costs associated with this strategy are relatively low. The Town should leverage volunteer expertise within the community.

Appropriate species selection for tree plantings should consider long term maintenance requirements to avoid or mitigate recurring maintenance costs. For example, selecting a native species that does not produce leaves or identifying a planting location that does not require the collection and disposal of leaves will mitigate costs associated with leaf collection. In addition, climate resilience and tolerance to pollutants like road salt should be considered in species selection.

### *Timing*

The Town should investigate opportunities for initiating this strategy in FY22.

### *Responsible Parties*

The lead for town staff support to this strategy will be the DPW. Sustainable Westborough or a designated volunteer group will lead efforts to educate and promote the benefits of sustainable landscaping.

This strategy relies heavily on volunteer, school, and other civic organizations, which can be guided by the open space assessment.

### *Next Steps*

1. Assess town owned open space to determine where active forest management and tree planting is most appropriate and identify the appropriate species of tree to be planted. Provide this information to civic, student, and other groups who want to investigate and plant trees but do not know where to start and do not know if the town is supportive.
2. Encourage a town wide goal of planting at least 250 trees every year. Encourage participation from residents and businesses including town property and private. Capitalize on the town's membership in Tree City USA. Collaborate with the Conservation Department to identify areas of priority invasive plant removal that could be re-planted with native trees and other vegetation.

3. Develop a guide to be added to the Sustainable Westborough pages on the Town website that guides residents on how to conduct sustainable landscaping. See Concord's model <sup>4</sup> or Lexington's Tree Management Manual <sup>5</sup>.
4. Offer information sessions to residents on the benefits of sustainable landscaping and tree planting. Include instruction on how to maintain and nurture trees.
5. Engage residents, civic groups, schools, and businesses through social media and town platforms. Provide literature and other resources to inform decision making in regards to landscaping. Collaborate with the Conservation Department, which has developed relationships with the Westborough Community Land Trust and Sudbury Valley Trust, to engage volunteers in invasive plant management and habitat restoration.

### *Section References & Footnotes*

<sup>1</sup> Environmental Protection Agency: [www3.epa.gov/carbon-footprint-calculator](http://www3.epa.gov/carbon-footprint-calculator). Assumes a single family home, 4 residents, 2 cars, for zip code 01581 of 66,000 lbs/year or 30 MtCO<sub>2</sub>e/year.

<sup>2</sup> Calculations based on Westborough 2017 GHG Inventory for Commercial and Industrial buildings of 100,034 MtCO<sub>2</sub>e/year, divided by the total square feet of C & I buildings (11,575,168 sf), obtained from the Tax Assessor's office to obtain a value of 0.0086 MtCO<sub>2</sub>e/sf. A building footprint was calculated by dividing the square footage of floor space by the number of floors in a building. The ratio of building footprint to site ratio was determined by dividing the building footprint by the number of property acres. When applied to R&D, office-professional, office, industrial and light industrial, the average building to site ratio was 0.14, or 0.14 acre or 6,267 sf of building footprint per property acre. This value, multiplied by 0.0086 MtCO<sub>2</sub>e/sf, yielded 108 MtCO<sub>2</sub>e per acre for a two floor C&I building (the average number of floors in Westborough being 1.6, rounded up to 2).

<sup>3</sup> <https://www.communitypreservation.org/about>

<sup>4</sup> <https://concordma.gov/DocumentCenter/View/23326/Sustainable-Landscaping-Handbook-Dec-2019>

<sup>5</sup> [https://www.lexingtonma.gov/sites/g/files/vyhlf3351/f/uploads/lex\\_tree\\_manual\\_11\\_29\\_12final\\_small.pdf](https://www.lexingtonma.gov/sites/g/files/vyhlf3351/f/uploads/lex_tree_manual_11_29_12final_small.pdf)

Green Infrastructure Overview, American Society of Landscape Architects,  
<https://www.asla.org/ContentDetail.aspx?id=43532#:~:text=From%20the%20broadest%20environment%20benefits,wildlife%20habitat%3B%20decreasing%20solar%20heat>

Forest Adaptation Resources: Climate Change Tools and Approaches for Land Managers, 2nd edition -  
USDA Forest Service

## Goal: Reduce residential and municipal waste by 30% by 2030

**Consistent with goals of the Massachusetts 2030 Solid Waste Master Plan, the goal for Westborough is to reduce residential and municipal waste 30% by 2030.**

Westborough's residential and municipal waste is currently collected at a transfer station, then transported by truck to a plant for incineration. The Town's initial focus is on residential and municipal waste as commercial waste management, including apartment waste management, is not regulated by the Town. The Town expects to realize a reduction in greenhouse gas emissions by reducing the amount of trash that is incinerated at the Wheelabrator Waste-to-Energy powerplant in Millbury, MA.

If Westborough can reduce its waste 30% by 2030, the result will be a 11,391 MtCO<sub>2</sub>e Greenhouse Gas (GHG) emissions reduction cumulative through 2030. This result is based on the following assumptions:

1. Assume that the Westborough waste from FY-20 to FY-29 without any initiatives to reduce waste, will match the waste recorded in FY-20 of 4,529 tons /year (Except for FY-21 which is 20% higher due to increase in trash production on account of COVID 19).<sup>1</sup>
2. Waste is reduced gradually over time, starting at 5% below FY-20 in FY-22 and ramping to 30% below FY-20 in FY-29.
3. The GHG emissions reduction is modeled on diverting a mix of 25% mixed recyclables and 75% mixed organics out of the existing waste stream.<sup>2</sup>

Note that a significant risk to achieving the proposed 30% reduction in waste by 2030 and associated GHG reduction is the accessibility and ease of use of a waste transfer station in town. It provides a low cost option for trash disposal, which likely contributes to Westborough's much higher trash volume than neighboring towns. The table below provides a comparison for calendar year 2018:

	Westborough	Grafton	Northborough	Shrewsbury
<b>Trash Disposal ton/yr (CY 2018)</b>	4,531	3,121	1,919	6,692
<b>Total # of Households served by the municipal program</b>	2,700	4,650	4,943	10,170
<b>Pounds Trash per Household</b>	3,356	1,342	776	1,316

### Strategy 1: Offer composting services at the Transfer Station.

#### *Summary*

Diverting Transfer Station waste reduces GHG emissions by reducing the amount of trash that is incinerated.

#### *Discussion*

Environmental Protection Agency data indicates that almost 28% of waste is organic with 15.2% attributed to food and 13.1% attributed to yard waste.<sup>3</sup>

The Massachusetts Department of Environmental Protection 2030 strategic plan lists organic waste as having the greatest diversion potential. The DEP plans to reduce organic waste disposal statewide 500K tons/year by 2030.

Starting in October 2020, residents can bring food waste to the Transfer Station. The food waste is transported commercially to third-party providers who convert the food waste to biogas using anaerobic

digestion processes. The food waste left over from this process is called “digestate,” which can be used as a fertilizer.

### *Cost and Funding*

The program is currently funded by the Department of Public Health as part of the fees paid to the transfer station operator for handling waste brought to the transfer station. The cost to compost is \$80/ton which is less than the \$110/ton tipping fee that Westborough pays to dispose of solid waste at Wheelabrator.

### *Timing*

Composting services at the transfer station started in October, 2020.

### *Resources, Responsible Parties and Next Steps*

Education of residents is one of the most important aspects of the program so that as many residents as possible who use the transfer station take advantage of the composting option. Zero Waste Westborough and other community groups focused on sustainability issues will continue to work with the Board of Health to raise awareness that this option is now available and to promote the benefits composting provides.

## Strategy 2: Increase single family household adoption of curbside composting

### *Summary*

Diverting organic curbside waste reduces GHG emissions by reducing the amount of trash that is incinerated. Westborough should increase single family household adoption of curbside composting by promoting third-party composting services until a town-sponsored curbside composting service is offered.

### *Discussion*

Black Earth composting service began curbside service in Westborough in mid-2020. Curbside composting allows a resident to put food, newspaper, cardboard and yard waste in a bin at their curb for pickup. Promoting third-party composting services will provide an alternative for town residents who prefer not to bring the composting to the Transfer Station. As of January 11, 2021, approximately 55 families in Westborough use Black Earth’s composting service which reduces Westborough’s waste stream.

### *Cost and Funding*

There are no costs to the town for curbside composting at this time since curbside composting is not sponsored by the town. As of January 11<sup>th</sup>, 2021, Black Earth charges \$99.99 every six months for curbside composting.

### *Timing*

Black Earth began providing composting services in Westborough in mid-2020.

### *Resources, Responsible Parties and Next Steps*

Westborough should have an integrated education program on the benefits of composting which includes both the transfer station option and the Black Earth option. Education is critical to increasing adoption of both.

### Strategy 3: Implement town-sponsored curbside trash/recycle/composting in FY 2023

#### *Summary*

A town sponsored trash/recycle/composting service that is properly structured in terms of the bin size for each type of waste and frequency of pick-up would divert food waste and recycled materials that are currently incinerated. Westborough should investigate offering a town sponsored trash-recycle-composting curbside option for potential implementation in FY 2023.

#### *Discussion*

Offering a town sponsored trash/recycle/composting curbside option would likely result in the greatest waste reduction. Note that the town already pays for the incineration fees for residents who use the transfer station operator's curbside program as well as those who dispose waste directly at the transfer station. Timing for this new initiative is FY 2023.

#### *Cost and Funding*

Westborough budgets approximately \$700,000 per year for waste handling and incineration. An integrated curbside program could potentially reduce this cost. The Town would need to model the costs of a town sponsored trash/recycle/composting curbside option and research funding options. Funding would likely need to come from a combination of quarterly fees and funding from the tax base, like the current program.

#### *Timing*

Proposed timing is FY 2023, which commences in July 2022.

#### *Resources, Responsible Parties and Next Steps*

To effectively execute this current strategy, the Waste Reduction Task Force will need to engage with the Board of Health, Board of Selectmen, and town residents to bring this proposal forward.

### Strategy 4: Implement composting at all Westborough public schools starting FY 2023

#### *Summary*

Diverting organic waste from school cafeterias would reduce GHG emissions by reducing the amount of trash that is incinerated. The Sustainability Coordinator should work with the School Department to implement composting at all Westborough public schools starting in FY 2023.

#### *Discussion*

The school system likely generates more waste than any other municipal operation because the number of students, teachers, and school staff is much larger than the number of people working for other departments in the town.

#### *Cost and Funding*

The Town would need to research the costs of offering composting at the schools, but would not likely cost the School Department more since the school is already paying for waste to be handled.

### *Timing*

Proposed timing is FY 2023 with composting being available at the schools starting in September 2022.

### *Resources, Responsible Parties and Next Steps*

To effectively execute this current strategy, the Waste Reduction Task Force will need to engage with the School Department, and Board of Health to bring this proposal forward.

### *Goal References & Footnotes*

<sup>1</sup> Waste Reduction Task Force analysis

(<https://drive.google.com/file/d/1Rlrzd6oUoRUSzQ01RknAhpYHjdPMLWB7/view?usp=sharing>)

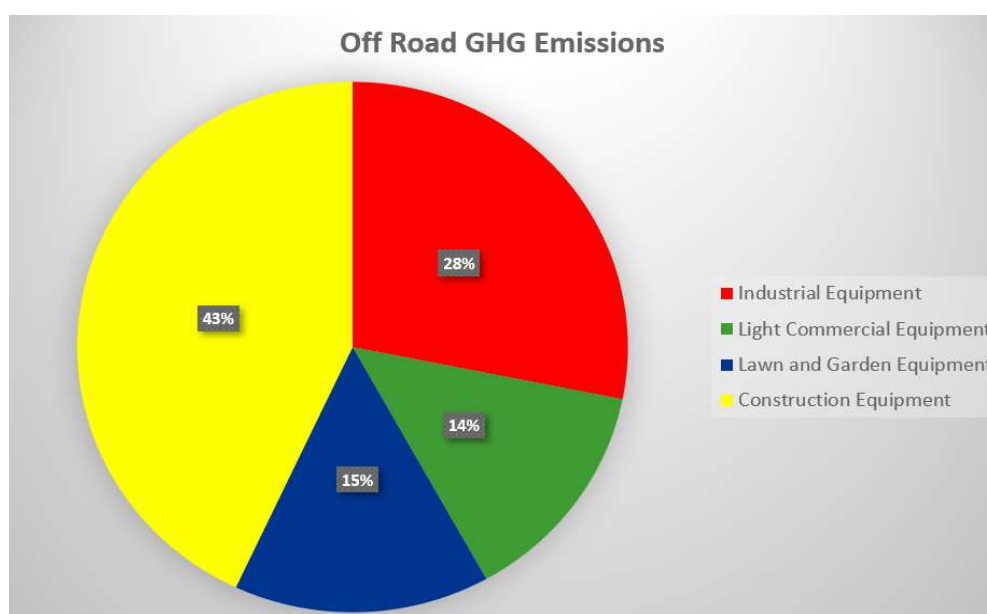
<sup>2</sup> EPA Waste Reduction Model (WARM) Version 15 (<https://www.epa.gov/warm/versions-waste-reduction-model-warm#15>)

<sup>3</sup> <https://archive.epa.gov/epawaste/nonhaz/municipal/web/html/>

## Goal: Off Road Emissions Reduction

Off Road emissions come from construction, landscaping, and other uses of fossil fuel in commercial, industrial, and manufacturing processes. The Greenhouse Gas Inventory (Section 2) estimates the emissions for this sub-sector to be about 8,677 MT CO<sub>2</sub>e/yr or about 3.6% of Westborough's emissions. Although Off Road emissions are not a current priority due to this source's size, to achieve NetZero by 2050 this source of emissions cannot be ignored.

The human activities included in Off Road emissions are not clearly described in the data sources used by the MAPC Greenhouse Gas Inventory tool. Therefore, the Town needs more research to understand what specific activities contribute to the reported Off Road emissions in Westborough so that it can implement effective reduction strategies.



### Strategy 1: By 2025, develop a plan for reduction of Off Road Emissions.

The recently announced CECP 2030 has no clear programs or actions which provide clear guidance to Westborough for reducing Off Road emissions at the source. The Commonwealth set a relatively small target of 5% reduction for this sector between 2017 and 2030 as compared to a 26-48% reduction for other sectors.

The Town should defer goal setting for Off Road sources for 2-3 years as it focuses on larger higher priority emissions sources. In 2024-2025 the Town should reassess the emissions data in the Off Road sector and, if appropriate, develop a reduction goal with accompanying strategies informed by the contributing activities in Westborough.

When engaging with the Industrial and Manufacturing businesses in Westborough about the reduction goals discussed elsewhere in this plan, the Town should try to gain clearer insight into the commercial activities that contribute to Off Road emissions. The Town can then validate the data reported in the MAPC GHG Inventory tool.



## Part 3 - Administration

## Section 6 – Community Engagement

### Voices of Westborough

The success of this Climate Action Plan will depend on the actions of thousands of individual members of the community over the years and decades ahead. Although most people in Westborough are concerned about climate change, their life circumstance – age, family, education, career experiences, business, residence, future plans and often most important Economics – will dictate when and how they respond to the strategies and programs discussed in this plan. As such, the Town must recognize and adjust to these diverse needs and goals as the plan is rolled out.

The Task Force was conscious of the challenge to constructively engage Westborough residents and business people as the complexity of plan implementation emerged during the development process. The Task Force believes that expressing diverse voices from the community is helpful to understand the plan and the factors to consider when asking residents and businesses to support the recommended climate actions. Appendix A, the Voices of Westborough, contains a small sampling of comments and perspectives on local climate action gathered from what residents and business owners told us during the development of the plan. The perspectives offered in the Voices of Westborough section are not intended to be a representative sample of the community's attitudes about climate action, but rather to highlight the unique perspectives offered by individual residents and business owners with diverse interests and life circumstances. There are a thousand other stories that will come out in the years ahead so these stories should not be thought of as exhaustive but indicative of the range of community attitudes about climate change. The Task Force gathered these stories during one-on-one interviews with individuals who agreed to share their thoughts anonymously. The interviewees words were not captured verbatim, and they have been edited for brevity.

For Westborough and Massachusetts to be successful everyone needs to transition, so the Town needs to think expansively and sensitively as it moves into the implementation in the years ahead.

**[Note: The Task Force plans to collect about 12 +/- interviews for inclusion in the published version of the CAP and anticipates having a web presence that will allow the number and spectrum of these stories to expand over time after publication.]**

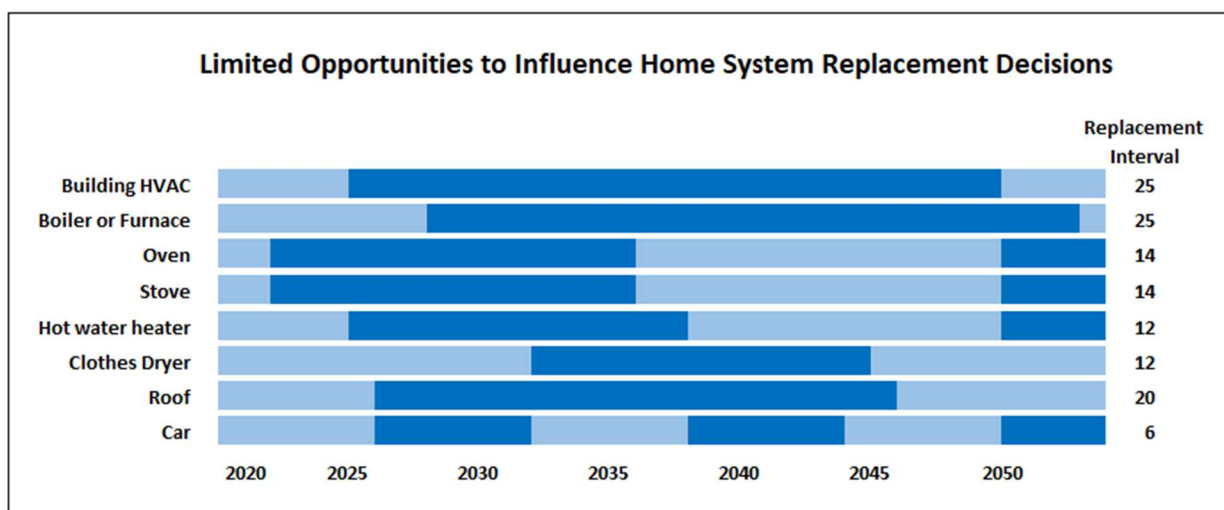
### Timeliness of Information

Conventional thinking suggests that the global climate is not affected by a single person's choices about where they live, how they heat or cool their shelter, what they buy in goods and services, or how they transport themselves from one place to another. However, reversing the impacts of man-made climate change will require **everyone** to consider the impact that her or his daily decisions, both large and small, have on the environment and to **take action** motivated by these insights. The reality is that individual choices taken **collectively** determine the impact, good or bad, on the environment. Given the trajectory of man-made climate change, it is urgent that the Town take measures to educate everyone in Westborough about the impact of GHG emissions on the environment and to offer reasonable options to act to reduce or eliminate these climate changing emissions. Consistent, sustained community outreach on certain climate issues and opportunities is needed to persuade residents and businesses that clean energy options can deliver greater value at a cost equivalent to fossil fuel alternatives.

The barrier to making more climate-friendly decisions is often a lack of knowledge about the alternatives or a perception that a solution friendly to the environment will cost significantly more or deliver less value. The limited experience most Westborough residents have with relatively new technologies such as Electric Vehicles, Air Source Heat Pumps and Renewable Energy Credits, means that many people are not able to consider alternatives with lower GHG emissions when making a major purchase decision.

*The barrier to making more climate-friendly decisions is often a lack of knowledge about the alternatives or a perception that a solution friendly to the environment will cost significantly more or deliver less value.*

This Climate Action Plan emphasizes community outreach in strategies supporting each goal so that Westborough’s residents and businesses have sufficient background information to fairly evaluate lower emissions options when making major purchases. Westborough Town government will not, and in most cases cannot, dictate what vehicles, heating systems, or electricity supply should be chosen by private citizens. However, most Westborough residents are concerned about the impact of climate change and are willing to and often anxious to make cost-effective, low-emissions choices.



More than any other factor, the effective implementation of the Climate Action Plan will depend on making current, complete, and accurate information about new carbon reducing technologies available to residents and business owners on timely basis.

The good news is that information does not need to be developed from scratch because these technologies are central to the Commonwealth’s strategy to meet its GHG emissions reduction goals. The Commonwealth has many resources and programs to support marketing and incentivizing these 2050 GHG emissions compliant technologies. Westborough has an opportunity over the next decade to leverage state educational programs and financial incentives that raise awareness among residents and business to choose climate friendly options for building heat & cooling, and transportation.

Timeliness of information is critically important. As discussed in the Mass CECP, particularly for buildings, a property owner’s purchase timeframe will be dictated by the date when their legacy fossil fuel space heat or hot water system reaches the end of its service life – typically once every 25 years. At the time of that replacement purchase, they will spend money on equipment that will determine the property owner’s fuel costs and the **emissions for the next 20-30 years**.

There will be initial and operating cost differences when comparing fossil-fuel replacement equipment with zero-emission 2050-compliant technologies but the end of service life for a piece of equipment will almost always be the most cost-effective time to switch from one type of equipment to another.

Therefore, there likely will come a time when property owners who purchase fossil fuel space heat or hot water equipment in the next decade will be forced to prematurely replace those systems with a low or no carbon alternative if and when their legacy system becomes non-compliant with State or Federal government regulations. Under this scenario, the cost of a new fossil fuel heating system today will not include the significant future expense to install a new GHG emissions compliant system before the end of its service life.

When considering strategies for promotion of electric vehicles, there are similar considerations to buildings, but on a shorter cycle. In addition, an owner's decision to replace a vehicle more often voluntary, rather than due to end of service life. However, similar to building equipment, **timely information** about electric vehicle options and advantages at the time of purchase is essential to promote growth of electric vehicle purchases by Westborough residents.

*Westborough has an opportunity over the next decade to leverage State educational programs and financial incentives that raise awareness among residents and business to choose climate friendly options.*

The Town needs to promote the Westborough Climate Action Plan strategies for buildings and passenger vehicles as well as proactively vet and distribute the best available information for residents and businesses to support owner's decisions when replacement is required. The Mass CECP states "Any system or piece of infrastructure that has a useful life that extends to or beyond 2050 and is being installed or replaced in the next decade either needs to align with the Commonwealth's decarbonization pathways or will need to be replaced before the end of its useful life."

## Outreach Strategy and Tactics

Effective community engagement on climate actions cannot rest on a single approach. Westborough will likely need different strategies for residents, business owners, renters, homeowners and others. Some demographic groups require special consideration, such as independently living senior homeowners on lower fixed incomes and residents who do not speak English. In addition, the Town will require different outreach tactics suitable for reaching a large percentage of the target audience different reduction goals and the supporting strategies. Westborough's engagement plan must be enlightened and adapted for all of this diversity.

Effective methods employed in Westborough and other towns, include the following:

**Climate Action Website** including:

- Glossary of terms.
- State programs supporting different technology adoption.
- Westborough reference data, neighbor testimonials, and case studies based on the experience of people and business owners in the community.
- Westborough specific programs and contact information, such as Westborough Power Choice.
- Volunteer service opportunities for climate action.
- Event Calendar.

**Case Studies to explain the economic and implementation details for adoption of different low or no carbon technologies.** When possible, the case study should be based in Westborough or similar community. Case studies should be 1-2 pages and target non-technical individuals.

**Webinars and/or in person workshops led by subject matter experts.** These events can be in collaboration with other towns. They can also be focused on homeowners or residents with the level of

detail a buyer needs to make informed decisions. The Town should seek out experts from commercial contractors, service organizations, or equipment vendors and provide them a forum to share insights, showcase recommend solutions, and facilitate next steps for residents and business owners to solicit bids for products and services. The Town can design events as panel discussions to provide a diversity of perspectives on a given topic.

**Energy Fairs** organized by the Town in partnership with neighboring towns, can bring experts from many technology fields can increase the awareness of residents to options they might not have considered otherwise. An Energy Fair should include vendors with a regional target market and technical depth, together in one place for residents to maximize the dissemination of technical information and contacts. Organizations like CMRPC, 495/MetroWest Partnership, and the Chamber of Commerce, can be sponsors and assist in promoting these events.

**Climate presentation programs and speakers to address civic groups.** Sustainable Westborough and other volunteer organizations with climate action, environmental, or sustainability missions should strive to maintain continuous high level of visibility about the Town's climate commitment. They can build awareness of upcoming events by finding as many opportunities as possible to speak to the community including tabling at town wide gatherings, PSAs on Westborough TV, participation in TV shows such as Frank and Mary and flyers/posters around town.

Westborough should develop a collection of **Climate Action Ambassadors** who are willing to speak to organizations or individuals on specific topics. This local, first person testimony from early adopters and/or technical experts can be highly influential in gaining acceptance early in the adoption lifecycle of a new technology.

For visibility and credibility across the diverse Westborough community, the Town needs to provide full endorsement and branding for these outreach strategies to be effective. Therefore, a Sustainability Coordinator is needed to be the Town's point of contact for the community on climate outreach. A knowledgeable person in Town government is needed to provide leadership, to coordinate resources, and to monitor execution of outreach activities.

*The Commonwealth summarized their feelings about this in the CECP: "The strategies to achieve emissions reductions in the 2020s necessitate influencing millions of smaller transitions over the next 10 years. It will take action at all levels of government and in all sectors of the economy... continued action by local governments across the Commonwealth is required..."*

Westborough will also require many volunteers to organize and promote events, design the collateral, and support execution of Community Engagement strategies. The breadth of skills the Town need will include marketing and sales skills to promote events and well as technical skills in each of the subject areas. Sustainable Westborough can be the focal point for these volunteers and will need to draw on the time and talent of volunteers from the aligned organizations and the community at large.

## Section 7- Governance

### Introduction

Implementation of the Climate Action Plan will require a significant commitment by the community which will challenge the status quo as the community strives to achieve very dramatic changes to reduce greenhouse gas emissions. This Climate Action Plan is an initial point-in-time statement of the CAP Task Force's intentions. The plan will evolve over time, informed by:

- experience and community feedback from the implementation of strategies;
- evolving state programs and law changes;
- insights and best practices from other communities; and
- changing technology innovations and economics.

This plan will require changes by all stakeholders in the community including residents, businesses and municipal government. The community commitment needed for successful implementation of this plan will require a variety of people working in coordination across a number of key roles on an ongoing basis. At a management level, the effort will require administrative leadership by the Town staff. Many other towns have had good success by establishing a new position to provide the focus for these diverse activities. Within this document the CAP Task Force will be using the term Sustainability Coordinator for this role but other towns and cities have used different titles and job descriptions (See Appendix XX for examples).

The Town will also need volunteers from the community to execute the many activities needed for successful implementation of the defined projects, programs and strategies outlined in the plan. Sustainable Westborough can play a leading role in implementing this plan in partnership with the Sustainability Coordinator. The Climate Action Plan implementation will also need the support of many other town boards and committees.

There are many non-government organizations in Westborough who are concerned about climate change and can play vital roles in enabling, supporting and communicating the needed changes as the community works to reduce the Town's greenhouse gas emissions. The Town should also encourage the participation of young adults and school students who naturally have a progressively larger stake in ensuring that climate change is addressed.

With this broad scope, the leadership and focal point for this effort needs to reside within the Town government. With the scope of work discussed throughout this document, the CAP Task Force expects that the Sustainability Coordinator will need to be a new position. However, to get started, it may be appropriate to make this a new assignment for an existing employee or a part-time position the town shared with one or more neighboring towns.

### Town Government - Staff roles

#### *Sustainability Coordinator*

The Sustainability Coordinator will manage the execution of the Climate Action Plan across departments, boards, committees and the general public to lead strategic planning, to monitor and report on progress, and to provide visible sponsorship of implementation to the community and statehouse leaders. The

Town's Sustainability Coordinator should be the lead to engage with this network of town and community organizations and their volunteers who contribute their time and expertise to drive results.

The Sustainability Coordinator will build on the progress of existing sustainability initiatives underway, while developing and administering new programs, policies and initiatives to achieve the Town's goals defined in this Climate Action Plan. The role requires coordinating efforts among Town staff, Sustainable Westborough, and other boards and committees to influence all market segments including municipal operations, schools, residents and businesses. The Sustainability Coordinator could also be responsible for activities needed to ensure resilience to climate changes such as the MVP program.

Key responsibilities would include:

- Defining and managing a communication process among stakeholders including the Town Manager, Board of Selectmen, Sustainable Westborough and others.
- Generating periodic reports, formal and informal, on progress toward goals, both GHG goals and project goals
- Driving grant applications
- Maintaining visibility of all short and medium term plans and activities
- Representing the Town with residents, businesses, National Grid and state agencies concerning climate activities
- Assisting businesses and residents on how to participate in state programs
- Coordinating between solar generation developers looking to sell their electricity and businesses and residents seeking to purchase electricity from clean sources

The Sustainability Coordinator with support from the Town Manager and Sustainable Westborough will need to partner with National Grid in an ongoing process of communications concerning the changing demands on the electric distribution system. As discussed in this plan, the necessary reduction of GHG emissions will require rapid and significant changes in distributed renewable electricity generation, and electrification of building heating and personal vehicles. These changes must be aligned both technically and in time with changes by National Grid's local electric distribution system. This partnership can also include participating as early adopters of pilot technology programs that National Grid develops for the future grid.

## Department Heads

Town government should provide support for this plan within the normal administrative functions of every department. Examples of these administrative functions:

- Purchasing decisions that can impact GHG emissions directly
- Establishing regulations or policies that influence residential or business GHG emissions
- Recommending changes in internal municipal operations and policies and on new bylaws or regulations that will help achieve goals or strategies within this plan to the Sustainability Coordinator and/or Town Manager

- Communicating to residents or businesses in order to help increase awareness within the community concerning Westborough's Climate Action Plan
- Purchasing electricity from clean sources for their facilities

The role of a department head varies significantly by department, but every department head should be aware of the goals and strategies of the Town within this plan and able to represent the town on climate topics in their engagement with residents and businesses.

The School Superintendent and the DPW Director have direct responsibility for buildings and equipment that generate the majority of direct GHG emissions from the municipal sector. These departments have building managers responsible for operations of their facilities and for the Green Communities program energy reduction plan. Therefore, the departments can lead by example for the community in general and businesses in particular.

The new Fales School provides an excellent example of building to a NetZero construction standard. A case study such as Fales school could be used to showcase both the technology and the economic analysis that justified the cost premium to construct a NetZero new school building. The decision to build the new Fales school to a NetZero standard, makes the School Department both an example and a valuable asset in driving the essential change to efficient building construction within the community.

### *Sustainable Westborough*

Sustainable Westborough has evolved from its original goal of obtaining Green Communities status for Westborough and led the process of forming the Climate Action Plan Task Force. As its members have concern and knowledge about the issues that are addressed in this plan, Sustainable Westborough is the best positioned volunteer town committee to support execution of this plan.

However, taking on the scope of activities in this plan will require changes to Sustainable Westborough's charter. The committee will also require organizational changes and expansion of its volunteer pool. The Climate Action Plan Task Force members can support this effort by continuing the work that they started in the CAP Working Groups. By joining Sustainable Westborough, Task Force members can ensure that this work will continue within Sustainable Westborough without loss of knowledge and momentum.

At this time, the CAP Task Force proposes that the activities within Sustainable Westborough should be organized around 5+/- sector focused subcommittees. In collaboration with the Sustainability Coordinator, each subcommittee would be responsible for a portion of the goals and strategies within this plan and defining a work plan whose activities can be started immediately or in the short term. The work plan would encompass a collection of time-bound, focused projects that could be used to pull together volunteers with particular domain knowledge or interests.

In addition to these subcommittees, Sustainable Westborough will continue to provide external facing communications to residents and businesses concerning the activities of the organization including the expanded scope due to the Climate Action Plan. Coordination of communications activities among the subcommittee leads and the leaders of the communication work will be critical. Details of this coordination is will be determined as part of the proposed organizational changes.



## Sector focused subcommittees Key Goals and Activities

### *Electricity*

- Clean Sources (includes Westborough Power Choice)
- National Grid Alignment

### *Transportation*

- EV's
- Public Transportation
- Bike and Pedestrian (includes existing efforts including Complete Streets)

### *Building*

- Electrification
- Energy Efficiency (includes heating, lighting and other electric loads)
- Building Energy Use Disclosure

### *Natural Environment*

- Tree and Open Space
- Waste Management (existing Waste Management Task Force)

### *Green Communities and Municipal Operations*

- Annual reporting and Green Community Grant Applications
- Support Town with obtaining grants for municipal operations

### *Communications*

- Manage website, social media, email distribution list
- Assist other subcommittees in event promotion and development of collateral

## Aligned organizations

- 1) Other Town Board and Committees
  - Municipal Building Committee
  - Waste Management Task Force
  - Active Transportation & Safety (Previously Biking and Pedestrian committee)
  - Economic Development Committee
  - Conservation Commission and Open Space Preservation Committee
  - Westborough TV
  - Westborough Public Library
- 2) Westborough community organizations
  - Westborough Community Land Trust
  - Rotary Club of Westborough Committee of the Environment (COTE)
- 3) Regional organizations
  - Multi-Town Sustainability Collaboration - Westborough is part of a collaborative effort with 9 other communities in the MetroWest area including: Arlington, Ashland, Concord, Framingham, Medfield, Natick, Holliston, Sherborn, Wayland and Westborough.

- Regional planning agencies - CMRPC and MAPC.
- Chamber of Commerce
- 495/MetroWest Partnership
- Sierra Club

## Plan Progress Reports, Updates and Revision

This Climate Action Plan is the first instance of a plan for Westborough on climate change mitigation. The CAP Task Force recommends the Town take on goals not previously addressed by the town and that it moves into new activities and programs. Therefore, it is particularly important that the Sustainability Coordinator develop a regular update schedule to others in Town Government consistent with their administrative roles. The Sustainability Coordinator should provide these updates as follows:

- Town Manager - Monthly status reports
- Board of Selectmen - Semi-Annual progress reports
- Town Meeting - Annual town updates

Monthly status reports should be project level status including progress on key deliverables, ability to achieve outcomes on planned dates and barriers to progress. Semi-Annual progress reports should include high level summaries of project statuses, projections for achievement of CAP Goals, identification of new opportunities and/or new strategies and requests for funding, resources, policies and/or bylaw proposals. Annual town updates should provide updates on activities since the previous town update and should include updates (if possible) on the GHG Inventory report by sector and market segment.

As discussed earlier in the report, the state is constantly reviewing and updating their goals, plans, policies, and laws as information emerges from climate science, green technology, and the economy which define new threats and opportunities. Westborough needs to be operationally flexible to respond to these changes through the administrative processes discussed above.

The town should have a regular cadence of review and revision for the entire Climate Action Plan. The CAP Task Force recommends that the town use this current version long enough to understand the strengths and weaknesses of the strategies and methods discussed here, but not so long as to miss emergent opportunities and approaches. As such, the CAP Task Force recommends the Town write and approve a complete Version 2 of the Climate Action Plan within two years (April 2023).

## Section 8 - Conclusion

Based on a detailed Greenhouse Gas Inventory analysis, the Westborough Climate Action Plan identified four primary goals to decrease GHG emissions. Successful implementation of the strategies associated with each of these goals will provide Westborough the means to do its part to meet the goals defined in the Commonwealth's Global Warming Solutions Act of 2008, Interim Clean Energy and Climate Plan for 2030, and the Decarbonization Roadmap to 2050.

**Primary goals** are those that were aligned with the largest sources of emissions identified in the Westborough GHG Inventory (see Section 2 of this plan) and had the greatest potential to reduce them. These goals are:

- Clean-Energy Sourced Electricity
- Building Electrification
- Transportation Electrification
- Energy Efficiency

In addition, the plan contains several **secondary goals**, which from an environmental perspective, are a collective good, but do not have as significant an impact on GHG reduction. These goals are:

- Building Energy Use Tracking
- Increase Public Transportation Use
- Increase Bike and Pedestrian Infrastructure
- Protection and Expansion of Natural Environment
- Waste Management
- Energy Efficiency of Off Road Equipment and Construction

In order for the plan to work, the Town will need both sustained **community engagement** and **governance** by committed members of Town government and residents.

Effective community engagement on climate actions cannot rest on a single approach. Westborough will likely need different strategies for business owners, renters, and homeowners. To engage a large percentage of the businesses and residents will need to be devised and validated overtime. Westborough's engagement plan must be enlightened and adapted for all of this diversity.

Implementing the CAP will require a significant commitment by the entire community to challenge status quo approaches as the community strives to achieve very dramatic changes to reduce GHG emissions. The Town needs a variety of people from the Westborough community to support successful implementation of this climate action plan.

Based on the experience of other Massachusetts cities and towns, a Sustainability Coordinator on Town staff functioning as a CAP program manager can significantly improve the efficiency and effectiveness of strategy execution. In addition, Sustainable Westborough can play a lead role to implement this plan in partnership with a Sustainability Coordinator. Other community groups will be critical to spreading the information and the workload as well.

# Appendices

## Appendix 1 – Voices of Westborough

The success of this Climate Action Plan will depend on the actions of thousands of individual members of the community over the years and decades ahead. Although most people in Westborough are concerned about climate change, their life circumstance – Age, Family, Education, Career Experiences, Business, Residence, Future Plans and often most important Economics – will dictate when and how they respond to the strategies and programs discussed in this plan. The following are a small sampling of comments and perspectives we have heard during the development of the plan.

For Westborough and Massachusetts to be successful everyone needs to transition, so the Town need to think expansively and sensitively as it moves into the implementation in the years ahead.

***[Note: The Task Force plans to collect about 12 +/- interviews for inclusion in the published version of the CAP. We anticipate having a web presence that will allow the number and spectrum of these stories to expand over time after publication.]***

### Voice of Westborough

My husband and I grew up in Westborough and moved back about 8 years ago. We live in a 70-year-old cape and added an addition about 5 years ago to provide room for our 4 kids.

We recently had an issue with our propane furnace when we could smell some exhaust in the basement. The HVAC guy who installed it said we were out of warranty and was quoting many thousands to fix it. If we had to replace the furnace, we wanted to go to a heat pump and found that Mass Save has good rebates. I was hoping to find ways to eliminate the high cost of propane which has been running over \$700/month and we go through about \$500 of wood pellets per year. Our long-term plan is to someday to put solar on the roof and go to an electric heat pump for the whole house. They are supposed to be efficient and we would love to reduce our carbon emissions.

My husband's municipal salary, which is all we have at this time and a 6-person household allowed us to qualify for special rebates through a Mass Save income-based assistance program. We were put on an emergency repair list so they immediately sent their HVAC guy over who identified the problem and spec'ed out a replacement propane system at no cost. This was huge because this furnace replacement was completely unplanned and excessively expensive.

The Mass Save folks said that we could not get a heat pump because the program we were in does not support fuel switching. The HVAC guy also said that the pellet stove does not qualify as a secondary source for use with heat pumps. Since it was not free, we did not pursue this further.

It was great to get the furnace replaced for free but we are still stuck with propane. We went through \$700 over a recent 2-week span since the replacement.

### Voice of Westborough

My wife and I have lived in Westborough for over 35 years. We raised 2 kids and we now have a grandson in the schools. I am very concerned about climate change, not so much for me but for the kids who will be most impacted.

The most important thing the town can do is in the school system, both in teaching about climate change as well as in modeling practices such as efficiency and clean energy. At almost 70 years old, my belief is that I am not going to be able to fix it. It will be the teenagers of today who will be in the prime of their careers and they will pick up the mantle in 10-15 years, if we educate them appropriately. The new Fales school is a good example of energy efficient construction and that strategy should be applied, certainly, to every new building. And the town should budget and retrofit all of the town buildings as an example to the community of what everyone should be doing. I'd also like to see the town phase in new energy efficient building codes for all new construction.

I don't know much about the state's plans but I am pleased that they are being aggressive. There will be significant changes to industries as we move to the cleaner technology and they will figure it out pretty quickly. I don't see any negative effects of moving fast and I am happy to pay more money to help the climate.

### Voice of Westborough

I have been in the plumbing industry for over 50 years and have lived in Westborough for 42 years. My first experience with heat pumps was in the early 70's when they migrated up from south. These worked to about 32F before switching to resistance heating which was very expensive. I never installed one at that time, but I tore a lot out! But the technology has changed a lot since then. Mitsubishi and LG make good mini splits that are good down to 20F without the electric resistance backup.

I do a lot of high-end residential work which are fully spec'd by architects who don't like look of air handlers for the mini-splits. They also don't want to see equipment around building we may have to put blinders around the equipment to get the neighbors to approve.

Every year the tech changes. I have not kept up on the latest in heat pumps. I did install a system that was rated to work down to 4F which must have worked pretty well or I would have heard from them.

There are lots of old buildings with poor insulation and leaky. A new code for better super insulation would be really great. I added close cell foam in my roof rafters, works great. It was helpful when they started requiring the blower door tests. Even with that I've seen a lot of leaky houses that are hard to repair up to spec. Existing houses will be difficult for both insulation and heat pump upgrades. We can't have regulations that force an elderly woman whose furnace goes out to upgrade to geothermal or a heat pump.

Good idea to have a program in town to help residents learn about the state's plans for code changes and heat pump incentives. Great idea, welcome it - particularly residential.

### Voice of Westborough

I know the ultimate goal is spread out over the years, but I have a problem with the plan of virtually making fossil fuels infeasible to use.

My own experience is having oil, propane, solar panels and heat pumps, and pellet stove - it takes the combination of all these things to keep my house affordably warm. I upgraded my furnace to a more efficient one, same as my wood stove. I bet I have invested close to \$100,000 making my home as energy efficient as possible.

My 2 heat pumps heat my bedroom and my kitchen. I figure if I had heat pumps installed in the rest of my house my electric bill is going to quadruple. I am paying \$200/month for 10 years for the solar panels, \$150/month for 5 years for the heat pumps....and I am not sure why but my electric bill has skyrocketed recently. So as much as I would like to, I have no intention of getting more heat pumps.

I don't even use a full tank of fuel oil a year, and I don't want to be penalized for still needing fossil fuels to support my heat in these cold New England winters. So, my point is that every house is going to be different as to what will work for them and they shouldn't get penalized for using oil.

..... *More Stories to Come* .....

## Appendix 2 – Town Meeting Warrant Article

### ARTICLE 11: Climate Change Action Resolution (Sustainable Westborough)

To see if the town will vote to request that the Town Manager create a Task Force to develop a comprehensive Climate Action Plan by Annual Town Meeting 2021 to define Westborough's path to 100% Renewable Energy with the goal of making Westborough a truly sustainable community. The Climate Action Plan shall include policies, procedures and sources of funding to accelerate the transition to renewable energy and to improve the resilience of the town to climate changes including: (a) consider climate change in all appropriate decisions and planning processes; (b) take action to prepare for the impacts of a changing climate; (c) take actions to ensure Westborough meets its portion of the requirements of the Massachusetts Global Warming Solutions Act; (d) endeavor to move Westborough municipal operations to 100% renewable electricity by 2035 or another date approved by the Board of Selectmen.

*Article Information – Sustainable Westborough is presenting a resolution for the Town. A resolution is non-binding but a vote in favor will provide the Town direction on how it moves forward by stating a goal for climate change action. The motion for the Article requires a simple majority vote.*

**Motion: Peter Dunbeck,** I move that the Town vote to approve the article as printed in the warrant.

Quantum of Vote: Simple Majority

Mark Silverberg, Weld St Moved the Question

VOTE

Yes=222

No=9

VOTE

Y=206

N=24

Motion carries, majority vote



## Appendix 3 – CAP Charter, Goals and Reporting Structure



TOWN OF WESTBOROUGH

MASSACHUSETTS

34 West Main St.

Westborough MA 01581

(508) 871-5100

April 6, 2020

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### Climate Action Plan Task Force

#### Charter, Goals and Reporting Structure

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##### *Charter*

The purpose of the Task Force is to create a Climate Action Plan (CAP) for Westborough which will dramatically and continuously reduce greenhouse gas (GHG) emissions community wide for the next 30 years.

The CAP's purpose is to define a set of actions for the town which will guide the entire community on a transition that addresses climate change related issues.

The CAP's overarching goals will be to achieve:

- A 40% town-wide emissions reduction by 2030 (or greater reduction if the State sets a stricter goal); and
- An 80% town-wide emissions reduction by 2050 (or greater reduction if the State sets a stricter goal).

The reduction goals will be based on a 1990 baseline.

The CAP will address municipal, residential, industrial and commercial sources of GHG emissions including, but not limited to, buildings, transportation and electric supply.

It will:

- Establish measurable objectives;

- Propose and prioritize recommendations, programs, implementation strategies, timelines and benchmarks for reducing GHG emissions;
- Define proposed roles and responsibilities for implementing activities;
- Estimate implementation expenses; and
- Identify proposed funding sources.

Upon approval by the BOS, the CAP should nest with the Master Plan as an action plan to be completed and implemented.

Since the CAP is intended to be a dynamic document, it will have greater specifics on activities for years 1 to 5. It will set goals for each half decade to 2050 along with more general plans for achieving those goals. The CAP will be written with the intent that it should be updated every five years or more frequently if circumstances warrant.

Since Task Force's primary purpose is to develop the CAP, it will avoid the temptation to solve problems on which other organizations are working through interorganizational agreements on roles of each organization.

### *Goals*

To meet the objectives as put forth in the charter, the Task Force has defined the following goals:

- 1) Issue an initial report that includes the charter, objectives and a work plan by May 2020.
- 2) Establish 1990 and current GHG emissions baselines using a methodology that can be replicated annually over the next 30 years to track progress.
- 3) Thoroughly evaluate other communities' plans and extract details that the Task Force could use.
- 4) Issue a progress report by November 2020.
- 5) Create an email inbox so that the public may submit written input.
- 6) Schedule formal and informal outreach to ensure that the plan is aligned with the community.
- 7) Schedule formal updates to the Board of Selectmen (BOS), School Committee, Finance Committee and other groups. The updates, as open meetings, will be an opportunity for residents to be informed and to provide input. The following formal updates are planned:
  - a) An initial update on Task Force progress and next steps.
  - b) A later update to provide a summary of a draft CAP with the opportunity for BOS/other input before going final.
- 8) Participate in ad hoc meetings among Selectmen, the Town Manager and Task Force members to address specific issues.
- 9) Issue a final plan for submission to the BOS by March 1, 2021.

To meet these goals, the Task Force will meet at least once each month and more frequently if warranted to complete its work in a timely manner;

### *Reporting & Implementation Structure*

- All access, planning, and reporting to the BOS will be run and managed by the Town Manager as the Task Force is a committee and direct report to the Town Manager.

- The BOS will decide whether to approve the CAP. After a vote of approval, it will be the responsibility of the appropriate organizations to implement actions in accordance with the CAP's timelines.
- The implementation of actions involving Town government will occur through the existing Town budget and departmental management processes.
- Sustainable Westborough could be designated to monitor and report to the Town Manager on whether implementation is proceeding on track.

## Appendix 4 – Towns with Sustainability Coordinators

### *List of Towns with staff positions to support Sustainability and Energy programs.*

As discussed in the Governance section, a critical success factor is defining clear roles and responsibilities for administration, execution and updating of the plan in the years and decades ahead. While the scope of this work will require actions by many town departments, by residents and by businesses in town, the task force recommendation is that a Sustainability Coordinator or a similar position must be created to develop and administer new programs, policies and initiatives to achieve the Town's goals defined in the plan. This position would include the coordination of efforts among Town staff, Sustainable Westborough, and other boards and committees. The following list of towns with similar positions can be used to evaluate organizational models that might be most appropriate for Westborough.

- Natick – Sustainability Coordinator - Jillian Wilson Martin - <https://www.natickma.gov/964/Sustainability>
- Arlington - Energy Manager, Ken Pruitt - <https://www.arlingtonma.gov/Home/Components/BusinessDirectory/BusinessDirectory/106/4?alpha=E>
- Lexington - Stella Carr - Sustainability Director - <https://www.lexingtonma.gov/home/news/lexingtons-first-sustainability-director-begins-work>
- Ashland - Frank Nakashian - Sustainability Coordinator - <https://www.ashlandmass.com/750/Sustainability>
- Framingham - Shawn Luz - <https://www.framinghamma.gov/directory.aspx?eid=452>
- Concord - Kate Hanley - Director of Sustainability - <https://concordma.gov/2108/Sustainability>
- Acton – TBH - Sustainability Director - <https://patch.com/massachusetts/acton/acton-adds-sustainability-director-position>
- Melrose – Martha Grover - Sustainability Manager - <https://www.cityofmelrose.org/energy-commission>
- Holliston - Matt Zettek - Sustainability Coordinator (contractor)
- Sherborn - Dorothea von Herder - Sustainability Coordinator
- Weston - TBH - Sustainability Coordinator - <https://www.westonma.gov/Jobs.aspx?UniqueId=99&From=All&CommunityJobs=False&JobID=Sustainability-Coordinator-Town-of-West-78>

## Appendix 5 – Terms, Acronyms and Definitions

### *Short-hand Reference - commonly used nouns in the CAP document*

**Commonwealth** – short reference for Massachusetts State government including all the legislative, executive, and judicial branches that comprise the government entity.

**Municipalities** – the governments entities for towns and cities outside Westborough

**Property owner** – a resident or non-resident, in control of the maintenance decisions on any type of structure

**Residents** – any person who identifies their primary shelter in Westborough.

**State** – where capitalized, another term for the Commonwealth of Massachusetts.

**Town** – short reference to Town of Westborough government entity

### *Terms used to reference different categories of GHG emissions:*

**MA – EEA** Refers to 4 main **Sectors** of Emissions:

1. Transportation
2. Buildings
3. Electricity
4. Industrial & Non Energy

In the CECP, EEA break downs emissions by **Sectors**, into a combined **Equipment or Subsectors**

In the MAPC GHG Inventory Tool, they have 3 main **Sectors**, with **Sub-Sectors**, as follows:

1. **Stationary Energy**
  - a. Residential
  - b. Commercial, Industrial, & Manufacturing
  - c. Construction & Landscaping
  - d. Energy Industries
2. **Transportation**
  - a. On-road Vehicles
  - b. Railways
3. **Waste**
  - a. Solid Waste
  - b. Wastewater

### *Acronym Key – (source: MAPC GHG Inventory Guide)*

°C – Degrees Celsius

°F – Degrees Fahrenheit

**ASHP** - Air-Source Heat Pump

**BEV** – Battery Electric Vehicle

**CCS** – Carbon Capture and Storage

**CDR** – Carbon Dioxide Removal

**CECP** – Clean Energy and Climate Plan

**CES**- Clean Energy Standard

**CES-E** – Clean Energy Standard (Existing)

**CH<sub>4</sub>** – Methane

**CNG** – Compressed Natural Gas

**CO<sub>2</sub>** – Carbon Dioxide

**CO<sub>2</sub>e** – Carbon Dioxide Equivalent  
**DCFC** – direct current fast charging  
**DOER** – Massachusetts Department of Energy Resources  
**DPU** – Massachusetts Department of Public Utilities  
**DER** – Distributed Energy Resources  
**EDC** – electric distribution company  
**EEA** – Massachusetts Executive Office of Energy and Environmental Affairs  
**EJ** – environmental justice  
**EPA** – Environmental Protection Agency  
**EOEEA** – Executive Office of Energy and Environmental Affairs  
**EVSE** – electric vehicle supply equipment  
**EV** – Electric Vehicle  
**GHG** – Greenhouse Gas  
**GSHP** – Ground-Source Heat Pump  
**GPC** – Global Protocol for Community-Scale Greenhouse Gas Inventories (also referred to as Global Protocol)  
**GW** – gigawatt  
**GWP** – Global Warming Potential  
**GWSA** – Global Warming Solutions Act of 2008  
**HFC** – hydrofluorocarbon (a greenhouse gas)  
**kWh** – kilowatt hour  
**IAC** – GWSA Implementation Advisory Committee  
**ICE** – Internal Combustion Engine  
**ICEV** – internal combustion engine vehicle (i.e., gasoline or diesel powered)  
**IOU** – Investor Owned Utility  
**ISO** – Independent System Operator  
**LDV** – Light-Duty Vehicle, typically a passenger car or truck  
**MassCEC** – Massachusetts Clean Energy Center  
**MassDEP or DEP** – Massachusetts Department of Environmental Protection  
**MAVC** – Massachusetts Vehicle Census  
**MDHDV** – Medium- and Heavy- Duty Vehicle, typically vehicles with 6-18 wheels used for commercial or industrial applications.  
**MEPA** – Massachusetts Environmental Policy Act  
**MEI** – Mass Energy Insight  
**MMTCO<sub>2</sub>e** – Million Metric ton of CO<sub>2</sub>e  
**MOVES** – Motor Vehicle Emission Simulator  
**MLP** – municipal light plant  
**MPG** – Miles Per Gallon  
**MT** – Metric Ton  
**MWC** – municipal waste combustor  
**MWRA** – Massachusetts Water Resources Authority  
**MW** – megawatt  
**N<sub>2</sub>O** – Nitrous Oxide  
**NAICS** – North American Industry Classification System  
**PM<sub>2.5</sub>** – Particulate Matter (2.5 micrometers or less)  
**PV** - Photovoltaic  
**R TA** – Regional Transit Authority  
**RPS** – Renewable Energy Portfolio Standard

**SF6** – sulfur hexafluoride (a greenhouse gas)  
**SMART** – Solar Massachusetts Renewable Target  
**TWh** – terawatt hour  
**VMT** – Vehicle Miles Travelled  
**W** - Watt  
**Wh** – Watt-hour  
**ZEV** – Zero Emissions Vehicle

## *Definitions*

### **Carbon dioxide (CO<sub>2</sub>)**

The chemical compound carbon dioxide (also known by its shorthand CO<sub>2</sub>) is the primary greenhouse gas and driver of climate change. It's an integral part of life cycles on earth, produced through animal respiration (including human respiration) and absorbed by plants to fuel their growth, to name just two ways. Human activities are drastically altering the carbon cycle in many ways. Two of the most impactful are: one, by burning fossil fuels and adding more carbon dioxide into the atmosphere; and two, by affecting the ability of natural sinks (like forests) to remove carbon dioxide from the atmosphere.

### **Greenhouse Gas**

A greenhouse gas is a chemical compound found in the Earth's atmosphere, such as carbon dioxide, methane, water vapor, and other human-made gases. These gases allow much of the solar radiation to enter the atmosphere, where the energy strikes the Earth and warms the surface. Some of this energy is reflected back towards space as infrared radiation. A portion of this outgoing radiation bounces off the greenhouse gases, trapping the radiation in the atmosphere in the form of heat. The more greenhouse gas molecules there are in the atmosphere, the more heat is trapped, and the warmer it will become.

### **Emissions**

In the climate change space, emissions refer to greenhouse gases released into the air that are produced by numerous activities, including burning fossil fuels, industrial agriculture, and melting permafrost, to name a few. These gases cause heat to be trapped in the atmosphere, slowly increasing the Earth's temperature over time.

### **Weather vs Climate**

It's all about timing when it comes to differentiating weather and climate. Weather refers to atmospheric conditions in the short term, including changes in temperature, humidity, precipitation, cloudiness, brightness, wind, and visibility.

While the weather is always changing, especially over the short term, climate is the average of weather patterns over a longer period of time (usually 30 or more years). So the next time you hear someone question climate change by saying, "You know it's freezing outside, right?", you can gladly explain the difference between weather and climate.

### **Global warming vs climate change**

Many people use these two terms interchangeably, but it's important to acknowledge the differences. Global warming is an increase in the Earth's **average surface temperature** from human-made greenhouse gas emissions.

On the other hand, climate change refers to the **long-term changes in the Earth's climate**, or a region on Earth, and includes more than just the average surface temperature. For example, variations in the amount of snow, sea levels, and sea ice can all be consequences of climate change.

### **Fossil Fuels**

Fossil fuels are sources of non-renewable energy, formed from the remains of living organisms that were buried millions of years ago. Burning fossil fuels like coal and oil to produce energy is where the majority of greenhouse gases originate. As the world has developed and demand for energy has grown, we've burned more fossil fuels, causing more greenhouse gases to be trapped in the atmosphere and air temperatures to rise

### **Sea-Level Rise**

Sea-level rise as it relates to climate change is caused by two major factors. First, more water is released into the ocean as glaciers and land ice melts. Second, the ocean expands as ocean temperatures increase. Both of these consequences of climate change are accelerating sea-level rise around the world, putting millions of people who live in coastal communities at risk.

### **Global average temperature**

Global average temperature is a long-term look at the Earth's temperature, usually over the course of 30 years, on land and sea. Because weather patterns vary, causing temperatures to be higher or lower than average from time to time due to factors like ocean processes, cloud variability, volcanic activity, and other natural cycles, scientists take a longer-term view in order to consider all of the year-to-year changes.

### **Renewable energy**

Renewable energy is energy that comes from naturally replenished resources, such as sunlight, wind, waves, and geothermal heat. By the end of 2014, renewables were estimated to make up almost 28% of the world's power generating capacity, enough to supply almost 23% of global electricity. Because renewables don't produce the greenhouse gases driving climate change, shifting away from fossil fuels to renewables to power our lives will put us on the path to a safe, sustainable planet for future generations.

### **COP and UNFCCC**

These two abbreviations are best described together as they work hand-in-hand. The United Nations Framework Convention on Climate Change (UNFCCC) is an environmental treaty that nations joined in 1992, with the goal of stabilizing greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous human interference with the climate system.

Meanwhile, the Conference of the Parties (COP) to the UNFCCC is a yearly international climate conference where nations assess progress and determine next steps for action through the UNFCCC treaty. This year marks the 21st Conference of the Parties (COP 21), which will be held in Paris beginning November 30. Here, a historic global agreement to reduce greenhouse gas emissions is on the table and, if passed, will mark a landmark achievement in the fight against climate change.

### **INDC**

INDC stands for "Intended Nationally Determined Contribution." In preparation for the UN climate talks later this year, countries have outlined what actions they intend to take beginning in 2020 under a proposed global climate agreement. These plans are known as INDCs, which will play a big part in moving us forward on the path toward a low-carbon, clean energy future.



**IPCC**

IPCC is the acronym for the Intergovernmental Panel on Climate Change. First set up in 1988 under two UN organizations, the IPCC surveys the research on climate change happening all around the world and reports to the public about the current state of our scientific knowledge.

**PPM**

PPM stands for “parts per million,” which is a way of expressing the concentration of one component in the larger sample. Climate scientists and activists use the term to describe the concentration of pollutants, like carbon dioxide or methane, in the atmosphere. Many scientists agree that carbon dioxide levels should be at 350 PPM to be considered safe; we’re at about 400 PPM right now and this number is growing by approximately 2 PPM each year

**Pre-Industrial Levels of Carbon Dioxide**

Pre-industrial levels of carbon dioxide refers to carbon dioxide concentration in the atmosphere prior to the start of the Industrial Revolution. Scientists estimate these pre-industrial levels were about 280 PPM, well below where we are today.

**Methane**

Methane is a chemical compound that’s the main component of natural gas, a common fossil fuel source. Just like carbon dioxide, methane is a greenhouse gas that traps heat in the atmosphere. Methane accounts for about 10 percent of all US greenhouse gas emissions (using 2013 figures), second only to carbon dioxide.

Many people don’t understand the negative effects of methane as an alternative to other fossil fuels. While methane doesn’t stay in the atmosphere as long as carbon dioxide, it absorbs 84 times more heat, making it very harmful to the climate.

**Mitigation**

Mitigation refers to an action that will reduce or prevent greenhouse gas emissions, such as planting trees in order to absorb more CO<sub>2</sub>. It can also include developing and deploying new technologies, using renewable energies like wind and solar, or making older equipment more energy efficient.