

Stow Climate Action Plan

Draft 1/5/2024

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Town of Stow

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Dear Community Members,

I am pleased to endorse this comprehensive Climate Action Plan (CAP) put forth by our Green Advisory Committee (GAC). The GAC was established by the Select Board in 2021 to spearhead sustainability efforts in the Town of Stow. Once formed, the GAC embarked on an ambitious effort to develop a comprehensive CAP.

Over the last several years, the Town adopted the Stretch Energy Code, the Select Board adopted a Municipal Fossil Fuel Policy for new and majorly renovated municipal buildings, and at the 2023 Annual Town Meeting, our voters overwhelmingly adopted the Specialized Energy Code. Each one of these tasks has been another step forward in the Town's pursuit of a greener community. This CAP takes yet another step further and outlines the Town's goals for reducing greenhouse gases from now until 2030 and to prepare Stow and our residents for continued sustainability.

Climate change is here and is one of the most pressing challenges of our time. Over the last few years, we have experienced extraordinary amounts of rainfall, fluctuating temperatures, and severe storms. The time is now to build a resilient future for our Town and our future generations.

This CAP is the result of countless hours of work by our dedicated volunteers on the Green Advisory Committee and to whom we owe a debt of gratitude. I am proud to join them in asserting Stow's commitment to take action on climate change and I look forward to working with all parties to implement this CAP to ensure we are and stay resilient to a continually changing climate.

Very truly yours,

Denise M. Dembkoski
Town Administrator

Acknowledgements

To be added

Call to Action

The earth's climate is changing. We can see these changes in our everyday lives. There are more severe weather events (heatwaves, storms, flooding, droughts), loss of species, more invasive species (plants, insects) and more pressure on agriculture and the production of food. The vast majority of climate scientists agree that humans are causing global warming and climate change. The major contributor to climate change is the generation of carbon dioxide and other greenhouse gasses from the burning of fossil fuels (oil, gas, coal, etc). We all have a part to play in preserving our planet for our children and future generations.

In recognition of the need to reduce climate change, Massachusetts has established ambitious goals for the reduction of greenhouse gas emissions. To achieve those goals, the state needs every town and resident to make decisions that lower these emissions.

Stow town leaders have taken up the challenge. The Green Advisory Committee was established to advise the Select Board and residents on actions the town can take to meet the state's goals. The town has begun investing in equipment and infrastructure improvements which will reduce the town's use of fossil fuels, reduce energy costs and make the town more resilient to future climate change effects.

The town can provide guidance and set an example, but achieving our goals is up to each of us. Our homes and vehicles are responsible for most of the town's greenhouse gas emissions. If Stow, and Massachusetts, are to reduce emissions to a carbon neutral level, every individual needs to make decisions starting now to reduce their reliance on fossil fuels.

There are many ways we, as individuals, can reduce our use of fossil fuels. Some of these actions have a large impact on reducing greenhouse gasses such as heating with a heat pump, buying an electric or hybrid vehicle, or installing solar panels. In making these changes and technology investments, you can significantly reduce your carbon footprint and save energy costs. We encourage you to consider investing in these technologies as you can.

The above activities can be expensive and may not be options for every Stow resident. However, even if you are not able to invest in these green technologies, you can still play an important part in fighting climate change. By looking at your daily routines and the purchasing decisions you make, you may find ways to reduce your use of fossil fuels. Some potential steps are using public transport whenever possible, carpooling, and finding ways to reduce your use of a car. Other ways to reduce your carbon footprint are insulating your house, replacing windows, replacing gas powered tools and equipment with electric powered equipment. This list is not exhaustive. We recommend you visit the Energize Stow website¹ for suggestions and other resources. Your decision on climate change will make a difference for generations to come.

¹Energize Stow website: <https://community.massenergize.org/Stow>

How to Navigate the Stow Climate Action Plan

The Stow Climate Action Plan (CAP) is a roadmap for Stow to achieve specific greenhouse gas reductions and to prepare the town for the impacts of climate change. The focus of the Stow CAP is actions we will take through 2030. The plan will be updated periodically to incorporate changes and updates and to report on progress.

The initial sections of the CAP establish the baseline of where we stand today, the high level targets and strategy, and actions we have already taken. The CAP then identifies the key areas where action is needed to achieve our 2030 goals.

- Buildings
- Transportation
- Energy
- Natural Solutions
- Adaptation and Resilience²

For each of these areas, there is an Outline which provides additional information about the sector, including its impact on the town's greenhouse gas emissions. Each Outline concludes with a set of Priority Actions to achieve the goal along with Indicators of Success which are how we will measure our progress.

Following the Outlines are the Action Plans. The Action Plans take each of the Priority Actions identified in the Outline and expands them to a plan which identifies tasks, responsibilities, challenges, and potential financial resources to accomplish each Priority Action.

The introductory sections provide background for the areas where we must take action to meet our 2030 goals. The Outlines and Action Plans focus on particular areas of action and can be read independently.

² See Stow Municipal Vulnerability Plan: [Technical Assistance in Preparing a Watershed-Based Water Quality Guidance Document and Applying it to Pilot Projects with Loc \(stow-ma.gov\)](#), 2022 Plan Update: [2022_05_12_mvp_summary.pdf \(stow-ma.gov\)](#)

Stow Plans that Complement the Climate Action Plan

Climate action, both to reduce the severity of climate change and prepare for the impacts of climate change is a priority for the entire town. The Stow Climate Action Plan is complemented by and integrated with other key municipal planning activities.

Stow Master Plan³	Stow's 2010 Master Plan directs equitable and sustainable development. The Comprehensive Plan, currently in development, updates the Master Plan and addresses topics such as housing, land use, transportation, economic development, open space and recreation, municipal facilities and services, and implementation.
Stow Open Space and Recreation Plan⁴	<p>The Open Space and Recreation Plan summarizes the progress that the Town has made in providing for its open space and recreation needs and sets forth goals and specific action items.</p> <p>The Natural Solutions section of this Climate Action Plan looks to the Open Space Plan for many of the actions identified.</p>
Stow MVP Plan⁵	<p>The 2018 Municipal Vulnerability Preparedness (MVP) Plan establishes a baseline climate change and natural hazard vulnerability assessment and establishes specific actions for addressing priority hazards in Stow. In 2022, the Stow MVP plan was updated to reflect actions taken to date.</p> <p>The Adaptation and Resilience section of this Climate Action Plan relies on the findings of the Stow MVP plan.</p>
Stow Complete Street Prioritization Plan⁶	<p>The Stow Complete Street Prioritization Plan provides safe and accessible travel alternatives for all modes— walking, biking, transit, and motorized vehicles.</p> <p>The Complete Streets Plan made a significant contribution to the Mobility/Transportation section of the Climate Action Plan.</p>
Stow Housing Production Plan⁷	Stow's Housing Production Plan (HPP) creates a vision for the future of the town's housing and to address housing needs. The 2016 HPP is in the process of being updated.

³ Stow Master Plan Update: [Microsoft Word - FINAL PLAN.doc \(stow-ma.gov\)](#)

⁴ Stow Open Space and Recreation Plan Sections 1 - 4: [2023 draft stow osrp sections 1-4 may 2023 pdf.pdf \(stow-ma.gov\)](#), Sections 5 - 11: [stow-ma.gov/sites/g/files/vyhlif1286/f/uploads/2023_draft_stow_osrp_sec_5-11-_may_2023_draft.pdf](#)

⁵ Stow Municipal Vulnerability Plan: [Technical Assistance in Preparing a Watershed-Based Water Quality Guidance Document and Applying it to Pilot Projects with Loc \(stow-ma.gov\)](#), 2022 Plan Update: [2022_05_12_mvp_summary.pdf \(stow-ma.gov\)](#)

⁶ Stow Complete Streets Prioritization Plan: [hsh_stow_cspp_final_report_20180504.pdf \(stow-ma.gov\)](#)

⁷ Stow Housing Production Plan: [Microsoft Word - Stow HPP Final Draft 8.2.16.docx \(stow-ma.gov\)](#)

Glossary

Carbon Sequestration	Removal of Carbon Dioxide (CO ₂) from the atmosphere. Trees remove CO ₂ from the atmosphere through photosynthesis. Carbon sequestration can be used to offset greenhouse gas emissions.
CAP	Climate Action Plan
CO₂	Carbon Dioxide. CO ₂ is the primary greenhouse gas responsible for climate change. CO ₂ is generated from burning fossil fuels such as gasoline, fuel oil, natural gas, and diesel. CO ₂ is also generated by industrial processes such as the production of cement as well as from the decomposition of organic matter such as trees.
CO₂e	CO ₂ e is the abbreviation for 'carbon dioxide equivalent.' CO ₂ e is used to measure and compare emissions from different greenhouse gasses such as methane and nitrous oxide based on how severely they contribute to global warming.
Electrification	Electrification is the conversion of a system to the use of electricity. Examples include switching from gasoline powered cars to electric vehicles and changing home heating from fuel oil or gas to electric powered heat pumps. Electrification is a key strategy in achieving our greenhouse gas reduction targets as electricity is more efficient and emits far less greenhouse gas than other fuels. In addition, as more clean electricity is produced (e.g., solar and wind power) the reduction in greenhouse gas continually improves.
Emissions Factor	The emissions factor is the amount of greenhouse gas emitted per unit of energy for a fuel. The emissions factor for fossil fuels (gasoline, fuel oil, natural gas, diesel) is a fixed value. For electricity, the emissions factor depends on how the electricity is generated. For solar, wind, hydroelectric, and nuclear, the emissions factor is near zero. For electricity generated by natural gas, coal, or fuel oil, the emission factor is high. The state is reducing the emissions factor of electricity statewide by replacing, over time, the generation of electricity using fossil fuels. This means that greenhouse gas emissions of a product which uses electricity for energy (e.g., a refrigerator) will decrease over time.
EV	Electric vehicle. An EV uses an electric motor powered by batteries.
Fossil fuels	Fossil fuels are the remains of plants and animals formed over millions of years. They include material such as coal, oil, and natural gas and can be burned to produce energy. Burning fossil fuels produces carbon dioxide (CO ₂) which is the primary cause of climate change.

GAC	The Stow Green Advisory Committee.
Greenhouse gas	Greenhouse gases are gases—like carbon dioxide (CO ₂), methane, and nitrous oxide—that keep the Earth warmer than it would be without them. This is called the “greenhouse effect”. Up to a point, the greenhouse effect is not a bad thing. Without it, our planet would be too cold for life as we know it. But if the amount of greenhouse gases in the atmosphere changes, the strength of the greenhouse effect changes too. This is the cause of human-made climate change: by adding greenhouse gases to the atmosphere, we are trapping more heat, and the entire planet gets warmer.
Greenhouse gas inventory	A greenhouse gas inventory quantifies the amount of greenhouse gases released by human sources within a defined boundary over the course of a year. Common sources in community-wide inventories include transportation, buildings, and energy.
GHG	GHG is the abbreviation for greenhouse gas (see above definition of greenhouse gas).
HLPD	Hudson Light & Power Department. HLPD is Stow’s electric utility.
Heat pump	A heat pump is a device that transfers heat from a cool space to a warm space. In cold weather a heat pump can move heat from the cool outdoors to warm a house. A heat pump will also work in reverse in warm weather - moving heat from the house to the outdoors to cool the house. As they transfer heat rather than generating heat, heat pumps are more energy-efficient than other ways of heating a home
MTCO₂e	Metric ton of carbon dioxide equivalent. MTCO ₂ e is used to compare the emissions from different greenhouse gases. To put this in perspective, a typical gasoline powered car emits between 4 and 5 MTCO ₂ e per year.
Net Zero	Completely negating the amount of greenhouse gases produced by human activity, to be achieved by reducing emissions and implementing methods of absorbing carbon dioxide from the atmosphere. Massachusetts law required Net Zero be achieved by 2050 and be accomplished by reducing emissions by at least 85%.
PHEV	Plug-in hybrid electric vehicle. A PHEV can run with either batteries or gasoline. Typically, a PHEV uses a battery for shorter distances and gasoline for longer trips.
SCT	Stow Conservation Trust

How Does Climate Change Impact Us Locally?

Climate change is occurring at a global, national, and state level, and we are feeling the effects locally. Though climate change is occurring worldwide, its impact varies from region to region. Stow is already facing impacts of climate change such as more hot days, drought, and intense storms. In fact, the temperature increase in Massachusetts has been greater than the country as a whole⁸.

Humanity's accelerated burning of fossil fuels and deforestation has led to rapid increases of greenhouse gasses in the atmosphere and global warming. This warmer air holds more moisture, which results in more intense storms and flooding. Climate science tells us that the impacts of climate change will increase in the years ahead. However, the severity depends on the actions we take. We have the means to reduce the impact of climate change.

The Stow Climate Action Plan is a guiding document for the town, its residents, government, and businesses, for moderating the impact of climate change as well as adapting to the changes ahead.

Temperature and precipitation

The average temperature in Massachusetts has increased by over 3°F since 1900 and average annual precipitation has increased by about 10% during this period⁹. With rising temperatures, winters are shorter with earlier springs. Changes to our climate include more extreme weather events such as heavy downpours, intense storms, and more frequent periods of extreme hot weather along with periods of drought.

Climate impacts

These changes in our climate will impact our lives in a variety of ways.

- Increases in vector-borne diseases, such as lyme disease from overwintering ticks, and bacterial infections like West Nile virus and Eastern Equine Encephalitis (EEE) from mosquitos.
- Increase in heat-related illnesses, particularly elderly adults and very young children.
- Impact the health and resilience of existing forests
- Disruption to businesses and schools as a result of extreme weather events.
- Infrastructure damage, blocked roadways, power outages.

⁸ What Climate Change Means for Massachusetts:

<https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-ma.pdf>

⁹ Massachusetts Climate Summary:

<https://statesummaries.ncics.org/chapter/ma/#:~:text=Temperatures%20in%20Massachusetts%20have%20risen,beginning%20of%20the%2020th%20century.>

- Impacts in Stow as a result of climate related issues elsewhere. Such as reduced air quality from forest fires.

Climate Snapshot: Lake Boon

Lake Boon covers about 163 acres in the towns of Stow and Hudson. The lake has residences along much of the shoreline, provides recreation (beaches, swimming, boating, and fishing), and is a water source for the SUASCO watershed. Climate impacts on the lake include:

- More days with temperatures over 90F and fewer days of freezing have impacted Lake Boon, with temperatures up to 3F warmer than in the past.
- Longer, warmer, growing seasons that encourage increases in algae blooms and invasive weed growth, and an uptake in cyanobacteria growth (a recent development in the lake).
- Intense storms cause more surface runoff from the land into the lake, such as lawn fertilizers, pet waste, organic matter such as leaf litter, and pollutants from septic systems.
- Increased nutrients in the water which aid algal blooms, which, combined with hotter temperatures, can result in fish kills and lake usage restrictions.*

*Sustainable Stow Climate Talks, Wednesday, August 18, 2021, "How May Climate Change Impact Lake Boon", Dan Barstow, David Gray, and Kirk Westphal

Stow Greenhouse Gas Emissions, Targets, and High-Level Strategy

The Stow Climate Action Plan establishes greenhouse gas emissions reduction targets that align the town with the statewide targets signed into law in March 2021¹⁰. The state law establishes greenhouse gas limits to be met every five years up to 2050 when “net zero¹¹” emissions are achieved. The focus of the Stow Climate Action Plan is the state’s greenhouse gas targets for 2030, when greenhouse gas emissions must be 50% below the state’s 1990 baseline¹².

2030 was selected as the focus of our Climate Action Plan because it is close enough to enable concrete strategies to be selected and adopted. A detailed look beyond 2030 will be left for a future update of the Climate Action Plan.

Stow’s Baseline Greenhouse Gas Inventory

A greenhouse gas inventory is an accounting of all sources of greenhouse gas emissions¹³. With the support of MAPC (Metropolitan Area Planning Council), a greenhouse gas emissions inventory was developed for Stow in 2020. At that time the most recent data available was for 2017, and this is the “baseline” year for Stow against which our greenhouse gas emissions reductions are measured¹⁴. To meet the state’s 2030 greenhouse gas emissions targets, emissions in Stow would need to be reduced by 36%.

¹⁰ An Act Creating A Next-Generation Roadmap for Massachusetts Climate Policy:
<https://malegislature.gov/Laws/SessionLaws/Acts/2021/Chapter8>

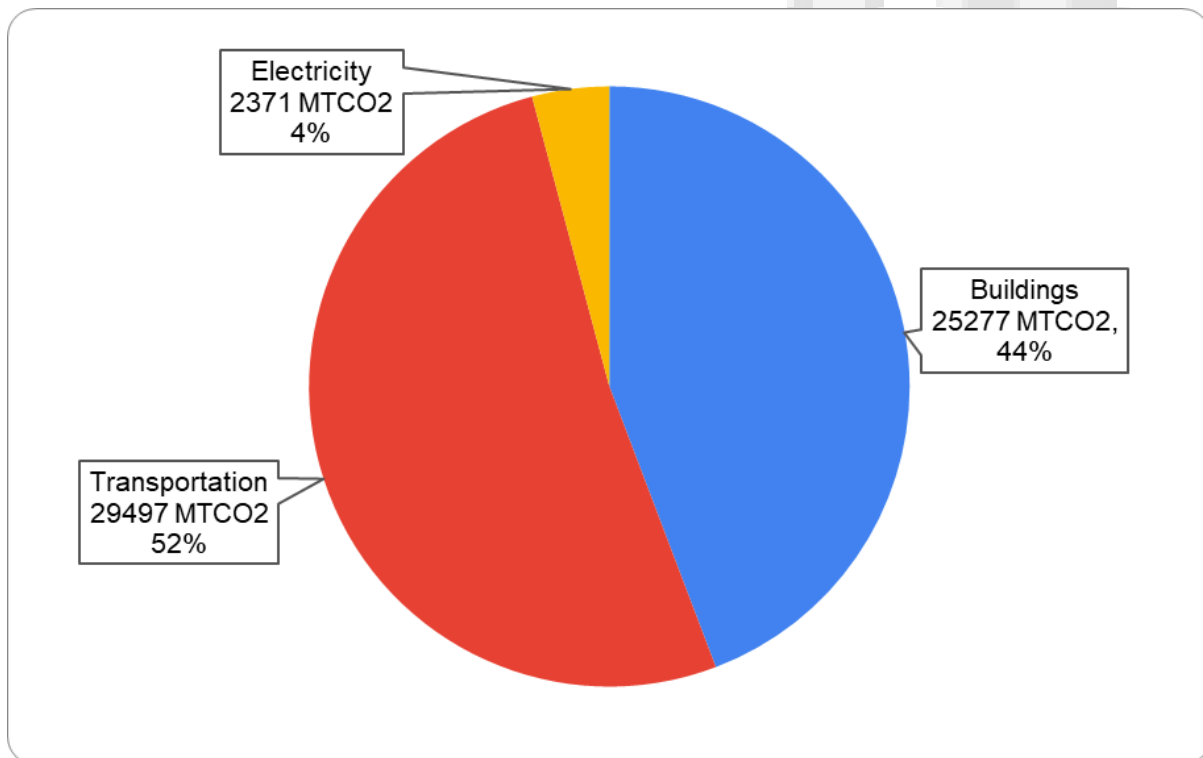
¹¹ Net zero greenhouse gas emissions means that any residual emissions are offset by “negative emissions” (e.g., carbon removal from the atmosphere from forests).

¹² Stow does not have a greenhouse gas emissions inventory for 1990. Stow’s baseline greenhouse gas inventory is based on data from 2017. To align with the state targets, the state’s 2017 emissions are used to establish the reduction needed from our 2017 baseline year. This results in an emissions reduction of 36% in 2030.

¹³ The greenhouse gas inventory accounts for greenhouse emissions generated in a region as well as greenhouse gas emissions from electric use. It does not include emissions from sources outside the region but used within the region. Examples include the emissions associated with the production of goods manufactured outside the region (e.g., household items used in Stow but manufactured elsewhere) or food produced outside Stow but purchased in Stow). The greenhouse gas emissions associated with these items are assigned to the region where they were produced.

¹⁴ To align with the state targets, the state’s 2017 emissions are used to establish the reduction needed from our 2017 baseline year. This results in an emissions reduction of 36% in 2030.

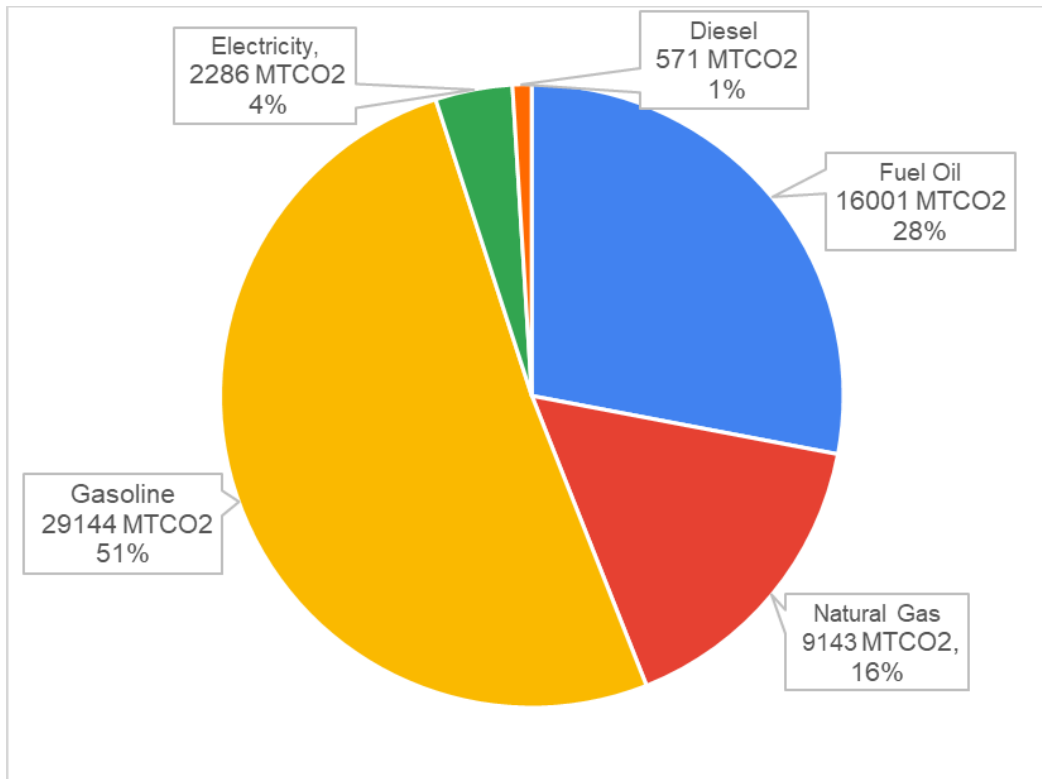
Total Stow greenhouse gas emissions in 2017 were 57,145 MT CO₂e¹⁵. The two pie charts below show Stow's baseline greenhouse gas emissions emissions by sector and by fuel. The two sectors which account for the majority of Stow's greenhouse gas emissions are transportation and buildings. When viewed by fuel, the combustion of gasoline for transportation and fuel oil and natural gas for building heating, hot water, and appliances are the major contributors to the town's emissions.



Stow 2017 Greenhouse Gas Emissions by Sector¹⁶

¹⁵ The term CO₂e is used because not all greenhouse gas emissions are carbon dioxide. To account for greenhouse gas from other sources (e.g. methane and nitrous oxide), these emissions are converted to the equivalent warming potential of carbon dioxide. The greenhouse gas inventory for Stow was not able to measure emissions other than from CO₂ due to lack of data. It is believed emissions from other greenhouse gasses are small compared to CO₂.

¹⁶ Greenhouse gas emissions from electricity are broken out as a separate sector in this chart. Nearly all use of electricity in Stow is in buildings (e.g., lighting, appliances, electronics, air conditioning, heating, and hot water)



Stow 2017 Greenhouse Gas Emissions by Fuel

Carbon Sequestration

In addition to the sources of greenhouse gas emissions discussed above, there are “sinks” of greenhouse gas. A sink removes greenhouse gas from the atmosphere. The primary sink is forests. As trees grow, CO₂ is removed from the atmosphere and stored in the wood and soil. This process is called carbon sequestration.

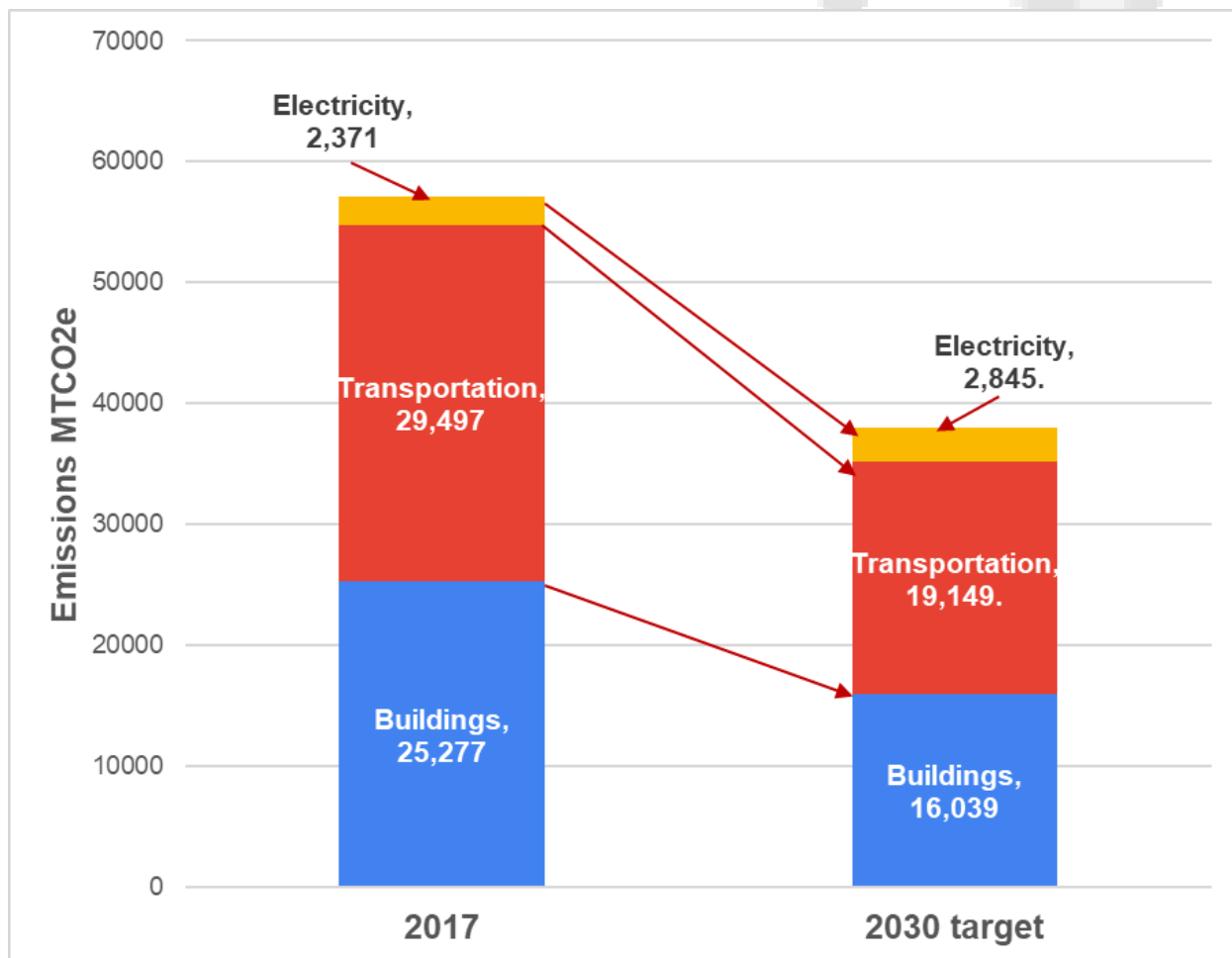
The Stow greenhouse gas inventory does not include carbon sequestration but, as discussed in the Natural Solutions section, it is estimated that forests in Stow sequester about a quarter of our total greenhouse gas emissions. The state target of “net zero” greenhouse gas emissions by 2050 assumes that it will not be possible to entirely eliminate all emissions by mid-century and the remaining residual emissions will be offset by carbon sinks, primarily forests.¹⁷

Similarly, it is probable that Stow will also not entirely eliminate all sources of greenhouse gas emissions by mid-century and therefore preserving and, if possible, increasing tree cover and other natural means of sequestering carbon will be key to achieving our long term goal.

¹⁷ The state’s 2050 net-zero target requires a reduction of at least 85% of GHG emissions.

2030 Targets for Greenhouse Gas Emissions

The emissions targets for Stow in 2030 are calculated by starting with 2017 emissions and reducing them by the same percentage as the state's goal. The illustration below shows total greenhouse gas emissions and emissions for the major sectors - transportation and buildings for 2017 and the goals for 2030.¹⁸

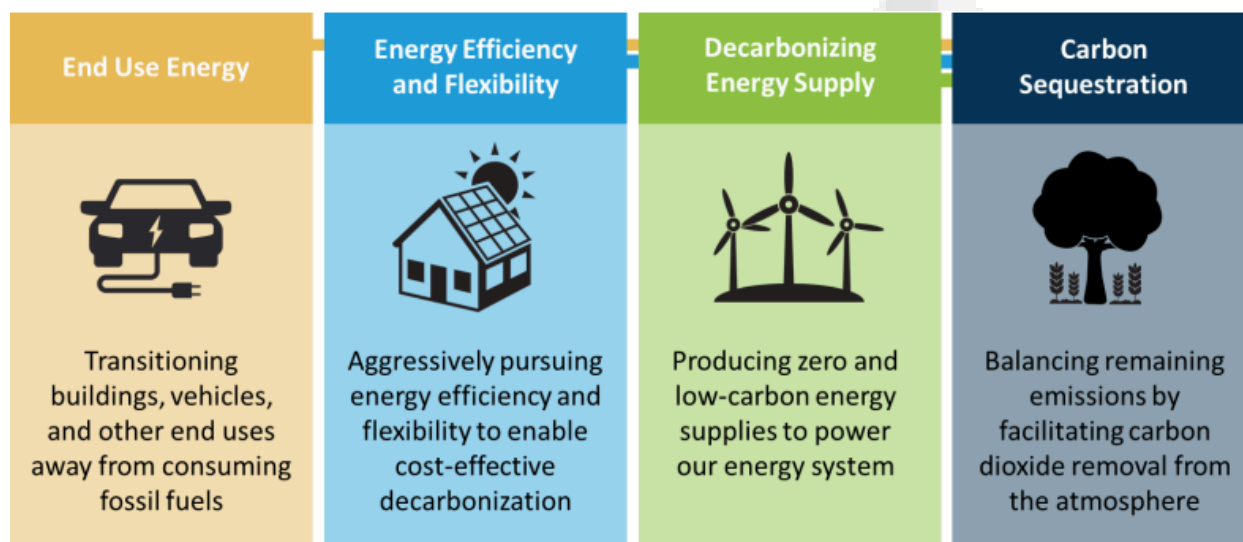


Stow Emissions Reductions to 2030

¹⁸ The state has an overall emissions reduction target from 2017 to 2030 of 36%. This includes a reduction of 37% in the building sector and 35% in the transportation sector and the Stow targets for these two sectors are the same. However, the Stow target does not reflect the state's emissions reduction in the electric sector. This is because the electricity from our utility, Hudson Light & Power, already exceeds the state's targets for emissions from the generation of electricity in 2030..

High Level Strategy for 2030

The figure below illustrates the state's key "Pillars of Decarbonization" which contribute to achieving the goal of Net-Zero greenhouse gas emissions in 2050.



Massachusetts Key Pillars of Decarbonization¹⁹

To achieve the greenhouse gas emissions reduction targets for 2030, Stow will focus on these pillars which can be summarized as switching from fossil fuels to clean electricity for our major sources of greenhouse gas emissions and preserving and enhancing our open space.

For transportation, this means a key to achieving the target is switching from internal combustion engine vehicles to electric or plug-in hybrid vehicles. Vehicles which are powered by electric motors are not only much more efficient than those using gasoline, they also generate dramatically lower greenhouse gas emissions when the electricity comes from sources that don't themselves generate greenhouse gas (e.g., wind, solar, hydropower, nuclear)²⁰.

Similarly, for buildings, switching from fuel oil or natural gas for heating, hot water and appliances to electricity is both more efficient and dramatically lowers greenhouse gas emissions. As will be described in the Buildings section of the plan, the largest energy use is for heating. Switching all or most heating from fossil fuel furnaces and boilers to efficient electric heat pumps lowers the cost of heating and cooling while reducing emissions.

¹⁹ Massachusetts Clean Energy and Climate Plan for 2025 and 2030 (page 6):
<https://www.mass.gov/doc/clean-energy-and-climate-plan-for-2025-and-2030/download>

²⁰ As discussed in the Energy section below, our utility, Hudson Light & Power, provides nearly all electricity from sources which don't generate greenhouse gas.

Community Profile²¹

As we consider what are the key climate actions that the town needs to take, we need to understand the nature of the town and the population. Also, we need to consider who will be impacted by natural and climate hazards. Here's a snapshot of Stow's demographics.

The town of Stow is a small rural community that prides itself on its rural nature. Residents frequently make decisions related to zoning, home construction and development based on ensuring that the rural character of the town is preserved.

About 41% of the land in Stow is conservation land or otherwise restricted from building. Stow has ten farms and orchards. In addition, several residents raise cattle, horses, goats, or sheep while others use their acreage to grow and harvest hay.

There are 7,190 residents in Stow with a median age of 40. Stow is 85.7% white, about 5.7% Asian, 3.6% Hispanic and 1.4% black.²² Stow does not meet any of the state's criteria to be considered an Environmental Justice Community (EJ) which will have implications for funding and incentives that are dedicated to EJ communities.²³

Based on 2021 data²⁴ roughly 52% of the population is between the ages of 25-64 with about 26.5% under the age of 18. The next largest category is those over 65 representing 16%.

The average household income is \$168,973 with the median being \$147,841. Only 3% of Stow residents are considered below the poverty level while for Massachusetts as a whole 10.4% of residents are below the poverty level.²⁵

There are 2,646 households in Stow. The vast majority are owner occupied with 14% rentals. Almost three quarters of the homes were built in the last 60 years. Different age homes were built with different approaches to energy use and will require different approaches to reducing that energy use and fossil fuel emissions.

²¹ The Demographic data there was gathered from the **latest U.S. Census Bureau release** as well as the 2021 American Community Survey.

²² Data is from the 2021 American Community Survey 5-year estimate.

²³ Definition of Environment Justice Communities

<https://www.mass.gov/info-details/environmental-justice-populations-in-massachusetts>

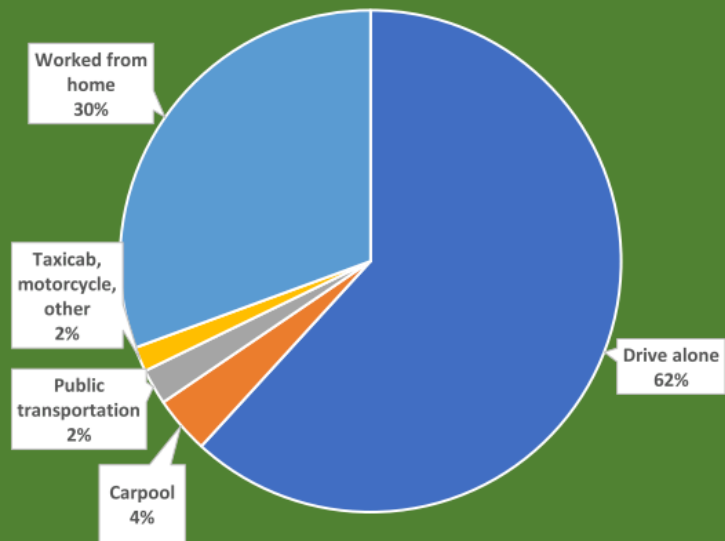
²⁴ Data is from the 2021 American Community Survey 5-year estimate.

²⁵ Data from 2022 Statista <https://www.statista.com/statistics/205475/poverty-rate-in-massachusetts/>

Climate Snapshot: Getting to work

For Stow residents who commute to work, the average commute time is 36 minutes. As shown in the chart, only 2% use public transportation while most drive by themselves.*

*U.S. Census: [ZCTA5 01775 - Census Bureau Profile](#)



Equity Considerations

It is important that everyone in town can be part of transitioning to clean energy. The plan realizes the challenges low and moderate income residents face when considering buying electric vehicles or installing heat pumps in their home. The upfront cost can be prohibitive. Throughout the plan, these concerns have been considered and target actions recommended.

Climate Action and Community Engagement in Stow

Stow has a long history of sustainability, and an engaged community that continues to push for actions that protect and preserve the Town's rich natural resources and speed the shift towards cleaner and greener technology and development in response to climate change.

Actions to date

- 1977 to present: Stow Conservation Trust established and has protected 433 acres of forest in addition to over 1600 acres of land acquired by the town and under the control of the Stow Conservation Commission.
- 2009: Volunteers started Sustainable Stow to support Stow's work on energy efficiency, green energy, and environmental protection
- 2014: Stow Solar Challenge. One of the most successful community solar initiatives in the state. 276 residents (13% of households) expressed interest in solar and 59 households installed rooftop solar.
- 2015: Stow designated a Green Community by the state. Stow was one of the first communities served by a municipal light plant to receive Green Community designation. To date, the Town has received \$393,000 in Green Community grants.
- 2019: Stow/Hudson HeatSmart initiative. 193 Stow residents inquired about heat pumps for their home and 53 households had heat pumps installed.
- 2020: Stow achieves Green Communities target of a 20% reduction in municipal energy use.
- 2021: Select Board establishes Green Advisory Committee to align the town with the state's greenhouse gas reduction targets.
- 2022: Stow awarded \$1.1 million state grant to help with the preservation and restoration of over 100 acres of Stow Acres.
- 2023: Stow becomes the 16th community in the state to adopt the Specialized Energy Code to reduce greenhouse gas emissions from new construction.
- 2023: Select Board adopts a policy requiring clean energy in new and renovated municipal buildings

Community Engagement in Climate Action Plan

In November of 2022, the Green Advisory Committee (GAC) created and distributed a survey to the town of Stow residents to assess their general attitude about climate change and its impact on themselves and the town. In addition, the survey asked what actions they personally had taken, the barriers they encountered and finally what community actions they would prioritize.

The survey was conducted between November and December. Three hundred and eleven residents responded. The results are detailed in the appendix and were to inform the recommendations that are made in the Climate Action Plan developed by the GAC.

As part of the Stow's annual Springfest event in June of 2023, the GAC set up a table and solicited feedback from residents on priorities and challenges in helping the town reduce its carbon emissions. In keeping with the town's deep appreciation for the town's rural character, a majority of the residents prioritized keeping and managing the woodland areas.

Plan at a Glance

The Stow Climate Action Plan is a roadmap for the town to achieve specific goals to reduce our greenhouse gas emissions and help us prepare for the impacts of climate change. Stow's goals are aligned with those of the state's 2021 "Climate Roadmap"²⁶ legislation. Although the state legislation sets targets through 2050, Stow's Climate Action Plan focuses on the targets for 2030 to ensure concrete actions are taken over the next several years to get us on the right path.

The plan is divided into sections where each section covers an area where action is needed to achieve our goals²⁷. These sections, also called sectors, are listed below along with some of the key goals.

Buildings

- Switching a significant number of our existing homes and buildings from fossil fuels (fuel oil, gas, and propane) for heating to electric heat pumps.
- Ensure nearly all new buildings in town are well insulated and all-electric.

Transportation and mobility

- 19% of vehicles in Stow will be all-electric or plug-in hybrids by 2030.
- An increase in alternative modes of transportation such as walking and bicycling.

Energy

- Advocate with our utility, Hudson Light & Power, to continue to provide affordable, reliable, and clean electricity.
- Advocate for additional sources of clean electricity such as solar, wind, and storage.

Natural solutions

- Protect existing open space, forests, wetlands, agriculture, and water resources.
- Pursue approaches for increasing protected open space.

Adaptation and resilience

- Increase resiliency of critical town infrastructure - roads and electric service.
- Maintain and increase the health of wetlands, agriculture and water resources.

²⁶ An Act Creating A Next-Generation Roadmap for Massachusetts Climate Policy:
<https://malegislature.gov/Laws/SessionLaws/Acts/2021/Chapter8>

²⁷ The sections of the Stow Climate Action Plan align with the state's climate plan. See the Massachusetts Clean Energy and Climate Plan: [download \(mass.gov\)](#)

Sector Outlines

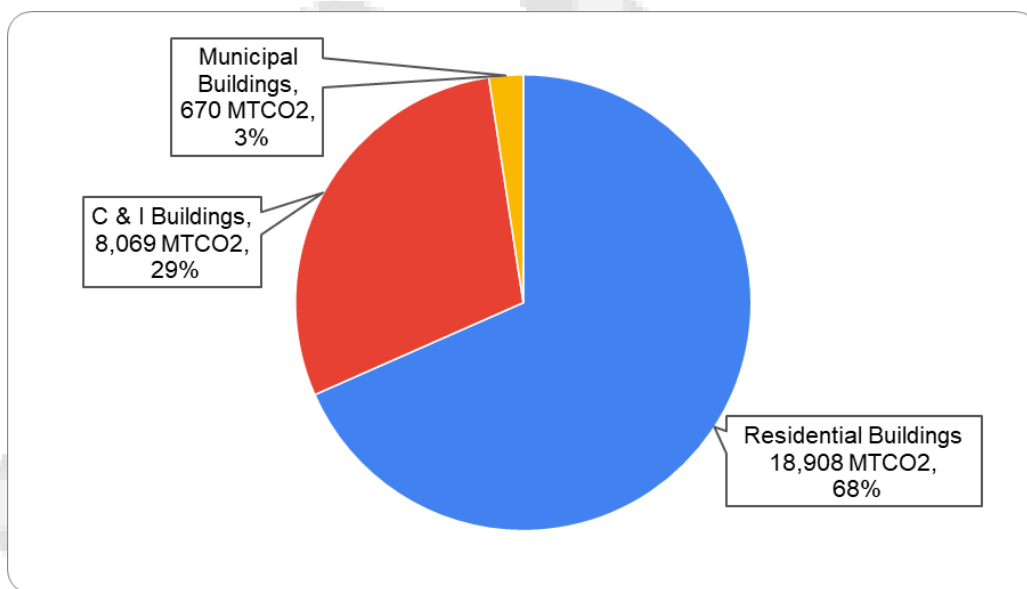
Below is the Outline for each of the sectors listed above.

The Outline provides additional information about the sector, including its impact on the town's greenhouse gas emissions. It also includes a Baseline, actions which have already been undertaken, and the 2030 goals. The Outline concludes with a set of Priority Actions to achieve these goals along with Indicators of Success which are how we will measure our progress.

Buildings

Description

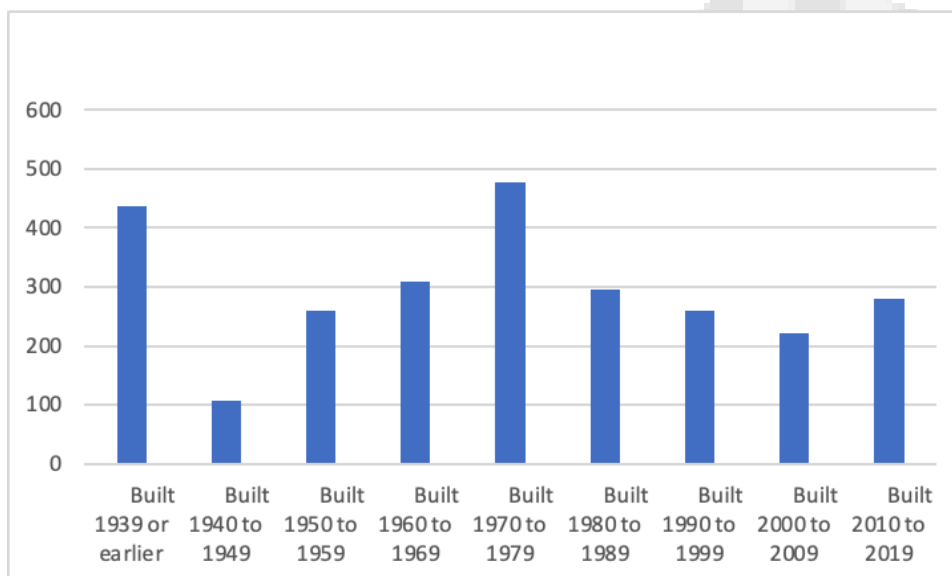
This section discusses the climate change considerations for residential, municipal, and commercial/industrial (C&I) buildings in Stow. Building emissions for each of the building types is shown in the figure below. Residential buildings are the largest contributor of GHG emissions. These building categories have different energy use characteristics. C&I buildings primarily use natural gas while the majority of homes use fuel oil. New building construction and existing buildings need differing approaches because they are regulated and funded differently. New construction is more efficient because it is constructed to updated building codes, and they can be heated and cooled with heat pumps at little or no additional cost²⁸. Existing buildings may need to be weatherized with additional insulation and converted to heat pumps which generally costs more to retrofit than installation in new construction.



Building GHG Emissions in MTCO₂e from Building sector sources

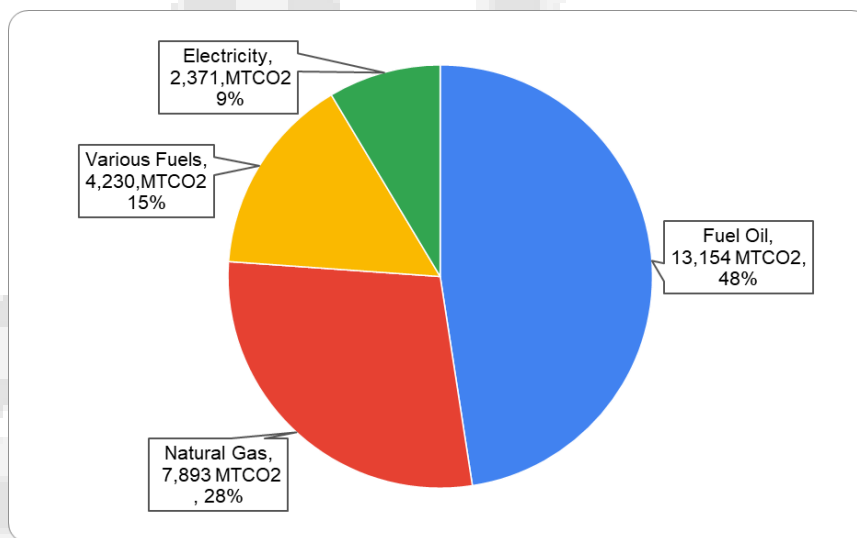
²⁸ Stow has adopted the "Specialized Energy Code" which encourages all-electric new construction.

Residential buildings are a major contributor to GHG emissions in Stow. In Stow²⁹, there are 2,646 households with 85% representing family units. Eighty-six percent of the homes are owner occupied while 14% are renter occupied. About 40% of the homes in Stow were built after 1980. Thirty percent were built between 1960-1979 and 16% were built before 1939. The rest of the homes were built between 1940 and 1960. Different ages of homes may require different strategies for retrofitting to heat pumps.



Number of Residential Houses built in Stow by decade

The Stow emissions inventory determined energy sources used across all building types. The proportion of emission from each energy type is shown in the figure below.



Building GHG Emissions in MTCO₂e from each energy type

²⁹ Data is from the 2021 American Community Survey 5-year estimate.

The primary approach to reduce the GHG emissions from the buildings sector is the use of heat pumps for heating, cooling and hot water along with building weatherization to reduce energy used for heating and cooling. This approach takes advantage of the low carbon electricity available in Stow from Hudson Light & Power. Because Hudson Light & Power offers low rates and heat pumps are highly efficient, they cost less than oil, gas, or propane heating sources to operate.

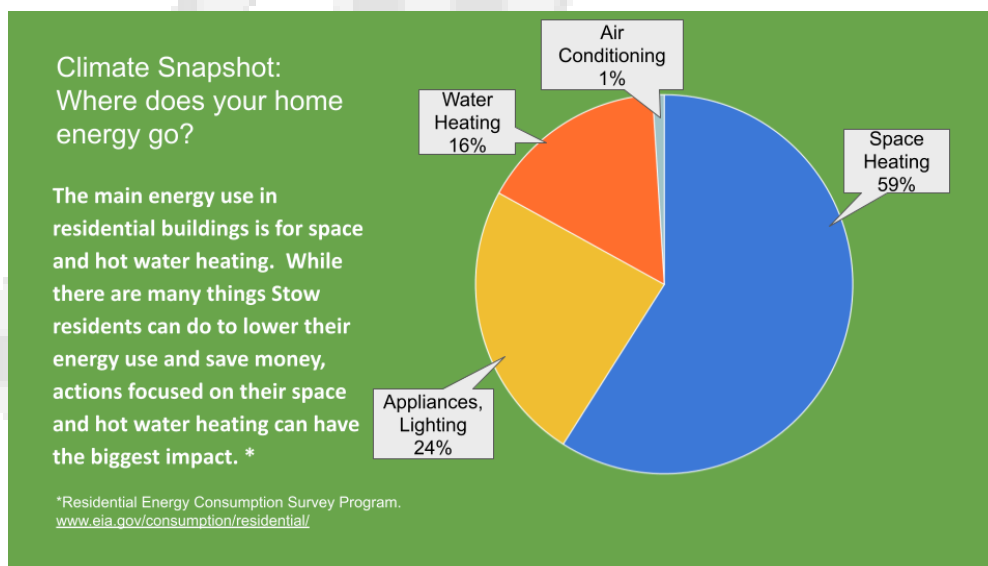
Goal

Reduce the GHG emissions from buildings by 37% by 2030, relative to the 2017 baseline, to align Stow with the statewide 2030 building emissions target.

Climate Impacts/Considerations

Buildings contribute 48% of the GHG emissions from the Town of Stow. There are several considerations that drive the approach to reduce GHG emissions from buildings:

- Stow obtains electricity from Hudson Light & Power which has one of the lowest rates in the state and has long term contracts with over 80% fossil fuel free generation.
- Each sub-sector of buildings has different requirements and needs different approaches. Different approaches will likely need to be taken for new and existing residential homes as well as for commercial, industrial and municipal buildings. For example, different focused programs could encourage developers to build new residences with heat pumps and other programs could encourage existing home owners to convert to heat pumps.
- The major contributors to GHG emissions in Stow are from existing residential buildings using fuel oil (47.6% of buildings emissions) and natural gas emissions (28.5% of buildings emissions), hence these should be a primary focus of GHG emission reduction programs.



Baseline

The Stow emissions inventory provides a baseline of emissions from buildings. This baseline will be used to measure progress into the future. The GHG inventory provides the following emission amounts by building type:

Building Type	Total Emissions (MT CO ₂ e)	Percent of Building Emissions	Percent of Total Emissions
Residential	18,908	68.5%	33.1%
Commercial/Industrial	8,069	29.1%	14.1%
Municipal	670	2.4%	1.2%

Actions to-date

- 2017-2021: During this timeframe the Stow Town Building, Police station, Highway department office, Randall library and the Cemetery department have been fully or partially converted to heat pumps. Stow received \$388,000 in Green Communities grants to support this work.
- 2019: The HeatSmart program was conducted to promote heat pump conversion in residential buildings - 193 households showed interest by requesting a site visit and 53 households had heat pumps installed.
- 2020: Stow Town greenhouse gas emissions inventory based on 2017 data was completed
- 2021: Stow achieves Green Communities target of a 20% reduction in energy use for municipal buildings.
- 2022: Hudson Light & Power offers rebate for construction of all electric homes
- 2023: Stow becomes the 16th community in the state to adopt the Specialized Energy Code to reduce greenhouse gas emissions from new construction.
- 2023: Select Board adopts a policy requiring clean energy in new and renovated municipal buildings

Priority Actions

Based on the climate impacts and considerations from the list above and given the baseline emissions described, the general approach to reduce GHG emissions from buildings is to promote the conversion of buildings to heat pumps to leverage the low rate and clean electricity provided by Hudson Light & Power and to promote increased energy efficiency. Given this approach, the following priority actions need to be taken.

Action ID	Action Name	GHG Reduction	Resilience
B1	Increase utilization of heat pumps and energy efficiency in existing residential buildings	++ ³⁰	+
B2	Promote energy efficient, all-electric new construction	++	+
B3	Improve utilization of heat pumps and energy efficiency in existing municipal, commercial and industrial buildings	++	+
B4	Create and track metrics to monitor progress	+	N/A

Indicators of Success

Given that our primary focus is on electrifying buildings and the use of heat pumps to reduce the reliance on fossil fuels, the indicators of success focus on the reduction of GHG emissions and the number of heat pump conversions completed.

Indicator	Baseline Data	2030 Target
Buildings GHG emissions	27,647 MT CO ₂ e	17,417 MT CO ₂ e (37% reduction)
Number of buildings using heat pumps	Small	~1000 ³¹

³⁰ The number of “+” gives a relative level of impact of the action.

³¹ This number is an overall indicator of progress towards reducing GHG emissions. The actual reduction will depend on factors such as for an existing home retrofit how much the heat pump replaces the existing fossil fuel system emissions.

Mobility/Transportation

Description

Transportation represents about half of all greenhouse gas emissions in our town and 94% of that is from personal passenger vehicles. To align with the state's emissions reduction target, Stow's emissions in the transportation sector should be reduced by 34% by 2030. Stow's action plan, therefore, will focus on encouraging movement towards electric vehicles. With the availability of low cost, clean electricity from our local utility (Hudson Light & Power), this transition can have a significant impact on the overall greenhouse gas emissions in Stow.³²

The Stow Climate Action Plan concentrates on three areas for transportation: (1) Accelerate the adoption of Electric Vehicles (EVs) & plug-in hybrids (PHEV)³³; (2) Develop plans to transition municipal vehicles to EVs or plug-in hybrids and; (3) Encourage alternative modes of transportation

Goal

The goal for the transportation section of this plan is to accelerate the transition of vehicles in our town to EVs or PHEVs thus helping to reduce greenhouse gas (GHG) emissions while at the same time continuing to improve and expand transportation alternatives to personal vehicles.

Climate Impacts/Considerations

There are several considerations that can help drive the approach to reduce GHG emissions:

- Seventy-seven percent of the households in Stow have two or more vehicles.
- Eighty-six percent of homes are owner occupied. which provides the potential to charge an EV at home.
- For Stow residents who commute to work, 94% travel by car and only 3% reported taking public transportation. There are 30% of residents who work from home.³⁴

There are a number of positive trends that can help facilitate the transition to EVs. Over half of the respondents to our survey reported owning or planning to own an EV. In a Massachusetts statewide survey, a majority of Massachusetts' voters indicated that they are likely to buy an

³² See the Energy section for a discussion on potential future costs and availability of electricity.

³³ An Electric Vehicle runs on electricity while a plug in hybrid has a gas back-up engine.

³⁴ Stow data from U.S. Census: [ZCTA5 01775 - Census Bureau Profile](#)

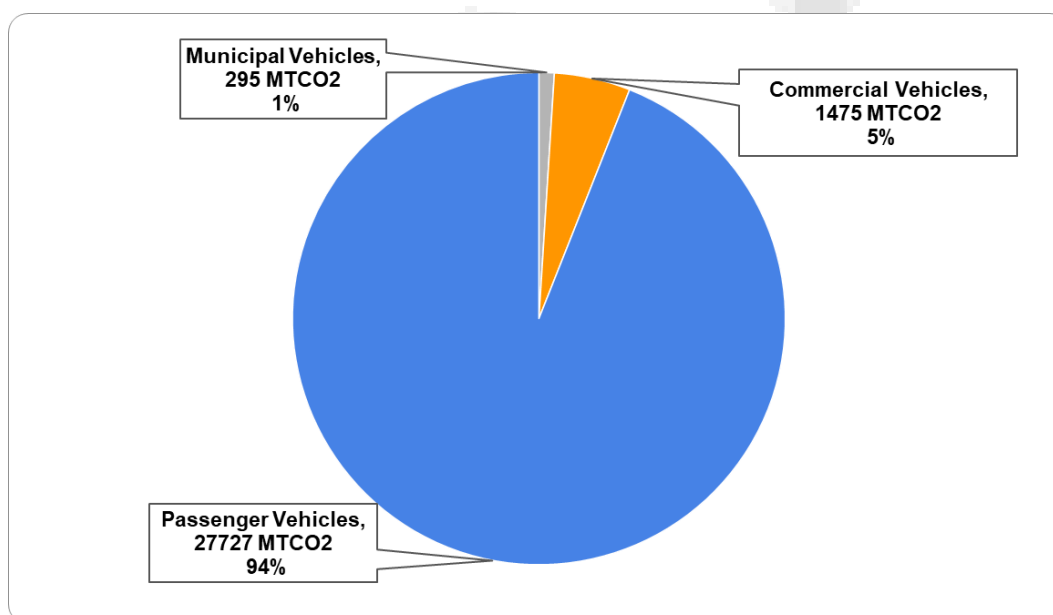
electric vehicle in the next 5 years³⁵ Nationwide EVs represent 8.4% of all new car sales as of the first quarter of 2023. This is a significant increase over the previous years.³⁶

In addition, Massachusetts plans to ban the sale of new gas-powered vehicles by 2035. The state's CECP (Clean Energy and Climate Plan) for 2030 includes a target of 19% of all vehicles being electric.³⁷ This will be a significant step towards reducing greenhouse gas emissions.

Significant incentives are being offered for the purchasing of electric vehicles through the State's MOR-EV program and the Federal government's Inflation Reduction Act. Also, the cost of some EVs and PHEVs are decreasing.

Baseline

The greenhouse gas inventory conducted in 2020 revealed that transportation accounted for 51.6% (29,497 MTCO₂) of Stow's total Greenhouse Gas emissions. Approximately 94% of transportation greenhouse gas emissions are from passenger vehicles. If we look at fuel types, emission for gasoline is 97.4% while diesel is 2.6%.



Stow Vehicle Emissions by Vehicle Type

³⁵ The survey was conducted by Green Energy Consumer Alliance and Coltura. EV numbers include fully electric vehicles and plug-in hybrid electric vehicles.

³⁶ - Cleantechnica

<https://cleantechnica.com/2023/11/13/electric-vehicle-sales-continue-to-grow-despite-what-some-automakers-are-saying/#:~:text=EV%20sale%20in%20the%20US,and%20over%2025%25%20in%20California.>

³⁷ Appendix to 2025 and 2030 Clean Energy and Climate Plan - page 158:

<https://www.mass.gov/doc/appendices-to-the-clean-energy-and-climate-plan-for-2025-and-2030/download>

There are 7174 registered vehicles in Stow in 2021 of which 64 are municipal vehicles.³⁸

As of January 2023, there were 557 electric or hybrid vehicles in town; 125 are EVs, 351 are hybrids and 81 are PHEVs. The total number of electrical vehicles and hybrids now represents 8.4% of the total number of vehicles in our town.³⁹

Climate Snapshot: How do electric vehicles compare?

For Stow residents, electric vehicles (EVs) are far more economical to drive while dramatically reducing greenhouse gas emissions. An average new car with a standard gasoline engine costs about three times as much for fuel as an EV and emits twenty times more greenhouse gas. On an annual basis this is \$1100 dollars more in fuel cost and 9000 pounds more CO2*.

*Gasoline car: 25.4 mpg, \$3.58 per gallon, EV .354 kWh/mile, \$0.13/kWh, 104 lbs CO2/MWh

Actions to-date

The Town of Stow has been committed to maintaining the rural character of the town and has prioritized making the town safe for alternative modes of transportation. Specifically, the town has focused on being part of MassDOT Complete Streets Program which provides funding for towns to build sidewalks, bike paths, safer crossings and other opportunities to holistically improve transportation options to users of all ages and abilities.

- In 2015, the town adopted a fuel efficient vehicles standard for all municipal vehicles.
- In March of 2016, the town approved a Complete Street policy and a town committee was established. With funding from MassDOT the committee, Stow has begun to implement their plan prioritizing various areas in town.
- In 2020, Stow formed a Complete Streets Committee who developed a policy and prioritization plan. They have since implemented the plan creating bike lanes, sidewalks on Route 117. They will continue to implement the plan in their priority areas.

³⁸ Note: the data is based on invoices sent out and may be an undercount. Also, about 201 vehicles are exempt from excise tax.

³⁹ MassDOT Vehicle Census Data for January 2023: <https://geodot-homepage-massdot.hub.arcgis.com/pages/massveh>

- In 2021, the Stow Police Department purchased two hybrid police cars and ordered an all electric vehicle in 2023. The Building Department is exploring the purchase of an all electric van.
- In 2023, the Planning Department worked with Montachusett Regional Transit Authority (MART) to develop a routed ride service and an on-demand service for the Town of Stow. It will assist individuals with transportation to and from Stow common.

Priority Actions

Passenger vehicles are the primary source of greenhouse gas emissions in Stow. Therefore, the greatest impact on reducing greenhouse gas emissions is for more Stow residents to purchase EVs or plug-in hybrids. The primary strategy will be greater education for Stow residents about the relative benefits and choices for EVs, and our town will require new infrastructure (e.g., charging stations) to support and encourage the adoption of EVs.

For equity and comprehensiveness of the plan, transitioning municipal vehicles, encouraging alternative modes of transportation including biking, walking and shuttle services.⁴⁰ As the availability of state and federal rebates and incentives for electric vehicles increase and the cost of EVs, plug-in hybrids and the used EV market matures, chances for success are greatly increased. It should be noted that given the high number of personal vehicles in town and an increase in remote working alternatives, it is unlikely that the use of public transportation will be significant by 2030.

Action ID	Action Name	GHG Reduction	Resilience
M1	Accelerate the adoption of EVs & PHEVs	+++ ⁴¹	N/A
M2	Develop plans to transition municipal vehicles to EVs or PHEVs	+	N/A
M3	Encourage alternative modes of transportation.	+	N/A

Indicators of Success

⁴⁰ Currently, there is no electric alternative to some municipal vehicles such as those used by the Highway and Fire departments.

⁴¹ The + and ++ indicate a general level of impact of the action ++ indicating a larger impact than +.

In 2020, Stow had 7174 privately owned vehicles. According to MAPC data, these vehicles generate approximately 30,000 MTCO₂ annually. In order to align Stow with the state's target for the transportation sector, Stow's annual emissions should be reduced from 30,000 MTCO₂ to 19,000 MTCO₂ in 2030.

Indicator	Baseline Data	2030 Target
GHG emissions	29,497 MTCO ₂ per year	19,149 MTCO ₂ per year
Number of registered electric vehicle (EVs or PHEVs)	173 ⁴²	1400 ⁴³

⁴² Number is based on the 2017 data.

⁴³ It is assumed that the total number of vehicles and VMT (vehicle miles traveled) remain the same.

Energy

Description

The baseline (2017) energy emissions for Stow are 57,145 MT CO₂e per year⁴⁴ all from energy use. Burning fossil fuels (fuel oil, natural gas, gasoline, and diesel) for transportation and building heating and hot water accounts for 95% of Stow's greenhouse gas (GHG) emissions while electricity accounts for only 5%. The reason that electricity is a small portion of overall GHG emissions is that Stow's electricity comes primarily from generating sources that produce little or no GHG emissions.

The primary strategy for reducing GHG emissions both statewide and in Stow is shifting energy use from fossil fuels with their high GHG emissions to clean electricity. Electricity from our utility, Hudson Light & Power (HLPD), is key to meeting Stow's emissions reduction goals.

Goal

Provide Stow with clean, reliable, and affordable electricity while supporting the increased electric demand resulting from the transition of buildings and transportation from fossil fuels to electricity.

Climate Impacts/Considerations

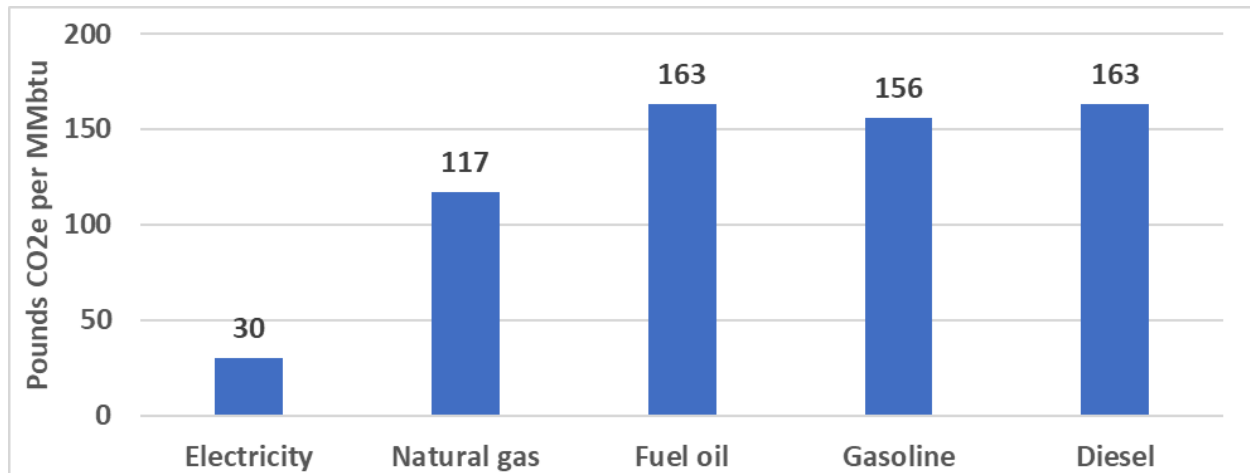
Increasing energy efficiency through means such as driving cars with better gas mileage or improving our home's insulation, will lower Stow's greenhouse gas emissions. Also changes in lifestyle such as combining trips, walking or riding a bicycle will also make a significant contribution in reducing emissions. But these changes, though very important, will not be sufficient to achieve our greenhouse emissions reduction targets for 2030 and beyond.

The primary strategy for reducing greenhouse gas emissions is 'fuel switching' from fossil fuels, gasoline, diesel, fuel oil, and natural gas to clean electricity. There are two main reasons for adopting this strategy.

Electricity generation produces much lower greenhouse gas emissions for the same amount of energy as fossil fuels. This is particularly the case for electricity from our utility Hudson Light & Power, where over 80% of our electricity is from sources that generate little or no greenhouse gas - nuclear, hydropower, and solar. The figure below illustrates greenhouse gas emissions per unit of energy for the different sources of energy used in Stow.

⁴⁴ Stow Emissions Inventory - 2017 baseline:

<https://docs.google.com/spreadsheets/d/1WYqN6sJFwtD2g8AthijkQez-zq3R3S5W/edit?usp=sharing&ouid=109125803346097011436&rtpof=true&sd=true>



CO₂ Emissions Per Unit of Energy for Different Energy Sources

(Note: Emissions from electricity are for Hudson Light & Power)

Electricity is also far more efficient than fossil fuels for transportation and building heating. For transportation a conventional gasoline engine is roughly 40% efficient, while electric motors approach 95% efficiency. Electrically-powered heat pumps are also far more efficient than fossil fuels for heating. An electric heat pump will deliver up to three times the amount of building heating as natural gas or fuel oil for the same amount of energy⁴⁵.

The lower greenhouse gas emissions from electricity combined with the much higher efficiency of electricity compared to fossil fuels, results in dramatically lower emissions.

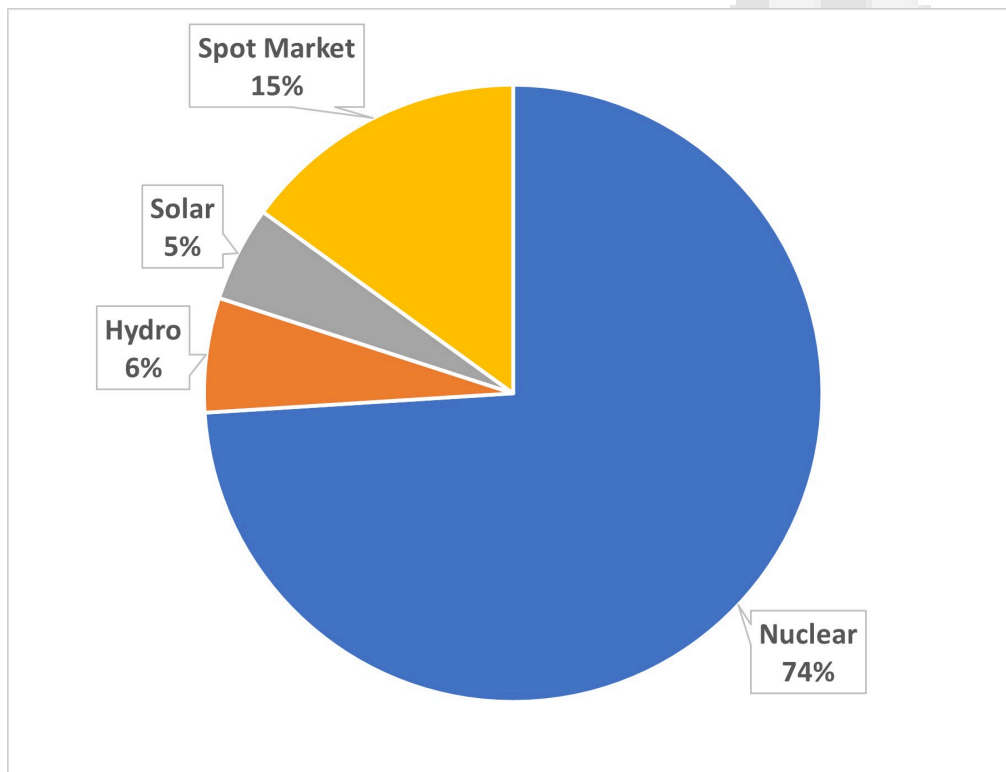
Because the use of clean energy is more efficient than the direct use of fossil fuels, total energy use in Stow will decrease as we transition from fossil fuels to electricity - the decrease in the use of fossil fuels for energy will be much greater than the increase in the use of electricity which replaces fossil fuels. Nonetheless, as we transition to new uses for electricity, Stow's total use of electricity will increase significantly. To achieve our overall greenhouse gas emissions reduction target for 2030 it is projected that demand for electricity will increase by about 20%.

To make the transition from fossil fuels to electricity, the cost of electricity should be competitive to or lower than using fossil fuels. Our electric utility has one of the lowest electric rates in the state.

⁴⁵ Heat Pump Systems: [Heat Pump Systems | Department of Energy](#)

Baseline

The low GHG emissions for HLPD is a result of the mix of generating resources. About 85% of the electricity from HLPD is from nuclear, hydropower, and solar - resources which generate low or no GHG emissions. These resources are under contract with HLPD for the next 20 to 30 years.



Hudson Light & Power Resource Mix (typical)

The solar in the figure above is from two utility scale solar installations; a 2.5 MW solar field in Stow and a 6.5 MW solar field on the border of Stow and Hudson. Not shown in the figure is solar power generated from residential installations and used directly by the building. Stow has approximately 1 MW of rooftop solar installed.

Actions to-date

Over the last few years, HLPD has introduced or increased incentives for customers as well as partnered with representatives from Stow and Hudson to enable the success of community initiatives. In addition, HLPD has undertaken projects to ensure the increased demand for electricity will be supported.

- In 2019, HLPD doubled their rebate for residential heat pumps and provided community outreach during the Stow and Hudson HeatSmart initiative.
- In 2020 HLPD switched a second distribution line for primary use by Stow which will help support the projected increased demand for electricity while adding resiliency.
- In 2021, HLPD established a community liaison to work with Stow and Hudson in order to explore ways to support the communities greenhouse gas emissions reduction targets.
- In 2022, HLPD introduced an incentive for developers to build all-electric homes⁴⁶.
- In 2022, HLPD doubled the available municipal rebates and increased the scope of projects which qualify for the rebates⁴⁷. Residential rebates for heat pumps were increased and additional rebates were added for electric yard equipment.
- In 2023, work is underway for an additional transmission line to the HLPD substation which will increase total capacity and resiliency while lowering costs.

Priority Actions

Currently customers of HLPD benefit from both one of the lowest electric rates in the state as well as one of the cleanest sources of electricity. In order for Stow to meet its emissions reduction targets, our electricity must remain both clean and affordable while supporting higher total demand for electricity as a result of switching from fossil fuels to electricity for buildings and transportation. The Priority Actions listed below are to be implemented by our utility, HLPD, along with the residents of Stow and Hudson.

Action ID	Action Name	GHG Reduction	Resilience
E1	Provide clean, reliable and affordable electricity which is sufficient to meet higher demand.	++	+
E2	Support transition from fossil fuels to electricity	++	+

Indicators of Success

To achieve our 2030 GHG emissions target, electricity must remain clean and affordable. In addition, more incentives are needed to encourage the switch from fossil fuels to electricity.

⁴⁶ HLPD all-electric home rebate: Hudson Light & Power Department (usrfiles.com)

⁴⁷ HLPD municipal energy efficiency rebate program: Hudson Light & Power Department (usrfiles.com)

Indicator	Baseline Data	2030 Target
GHG emissions	104 lbs CO ₂ e per MWh	104 lbs CO ₂ e per MWh ⁴⁸
Electric rate	\$0.13/kWh	Between \$0.13 and \$0.15/kWh ⁴⁹
Rebates and incentives for transition to electricity	HLPD incentives along with state and federal incentives	Sufficient to encourage transition from fossil fuels to electricity and meet our greenhouse gas emissions reduction targets for 2030.

⁴⁸ 104 lbs CO₂e per MWh is the emissions factor for HLPD. It exceeds the state's target for clean electricity for 2030.

⁴⁹ HLPD has one of the lowest rates for electricity in the state. The goal is to maintain our affordable electricity to encourage the transition from fossil fuels to electricity.

Natural Solutions

Description

Natural Solutions apply to both the town's forests and open spaces as well as land used for agriculture. Climate action planning is needed as these areas are at risk due to development (reduced acres of forested land) and changes in climate. Forests, including trees/plants/soils have a high profile in the Stow Climate Action Plan as they remove and store carbon from the atmosphere, by converting carbon dioxide to oxygen, and they improve our resilience to the impacts of climate change and support biodiversity.

Agriculture has prominence both as a local source of food and because of its contribution to the historic and rural feel of the town.

Goal

A primary goal of the Climate Action Plan is to maintain and enhance the ability of our open space, particularly forests, to remove and store carbon from the atmosphere. This goal requires preserving and, if possible, enhancing our open space. Though Stow residents have a sense that much of the town is forest and other open space, in fact only 38% of town land is protected. Carbon storage is one of many important benefits of our open space. Others include.

- Habitat - plants, animals. Biodiversity.
- Town character, contributing to a rural feel.
- Water storage, water protection from runoff by filtering.
- Health benefits for people, including cooler temperatures provided by shade, areas for active and passive recreation, providing a way to directly connect to nature.

In a similar way, agricultural land should be maintained and protected from development.

Climate Impacts/Considerations

From a climate impact importance, forests are a crucial component. Forests sequester carbon from the atmosphere and are a natural way to offset GHG emissions.

Climate change adds stress to the forested land. Conditions may become more wet or dry, invasive insects and plants may thrive and put healthy forests at risk. Warmer winters may allow more deer and possible overgrazing. Maintaining forests and seeing that they are healthy and resilient increases the effectiveness of their role.

Baselines

A start to analyzing forest and land benefits is to estimate the share of the town land that is both protected from future development and is primarily forest. This breakdown is important since protected land in most cases, has a higher degree of tree cover and cannot be developed. A GHG model for this area yielded a CO₂ sequestration of 6,579, MTCO₂ per year. This amount of CO₂ absorbed from the atmosphere offsets 11.5% of the 57,144 MTCO₂ per year of total townwide GHG emissions⁵⁰.

If all the town's land is included, the total sequestration more than doubles to 13,263 MTCO₂ per year which offsets 23% to total GHG emissions⁵¹.

The town is fortunate to have an existing agricultural business base that both provides local food and employment. Some farmland is used for food crops - both sold at farm stands and sold through CSA (Community Supported Agriculture) shares. A significant number of farm acres are present in orchard land. The town's Community Gardens, and smaller backyard farms also are important contributors to the agricultural base.

Existing mechanisms for protection of agricultural land:

- State of MA APR Program, (Agricultural Preservation Restriction) - Shelburne Farm as an example. Ownership maintained, funds given to owner, land usage restricted to agricultural uses.
- Conservation Restriction: a mechanism where farmers retain ownership, receive funds, in exchange for a permanent restriction from development - like Carver Hill Orchards.
- Chapter Programs, where low property tax is given in exchange for an agreement not to develop a parcel for a certain length of time.
- Town Owned, where the town owns the land and leases to a farmer – example is the agricultural land at Captain Sargent Farm where the Stow Conservation Commission leases land to an owner who has created a Christmas tree farm.

Actions to-date

The many benefits of our open space and agricultural land are recognized and valued by the town. The Stow Conservation Commission, the Stow Conservation Trust, the Open Space Committee, and resident support have had notable success in preserving town land.

- Historically, Stow has been proactive in protecting open space. The town, through its Conservation Commission, and a partnership with our local land trust has been effective.

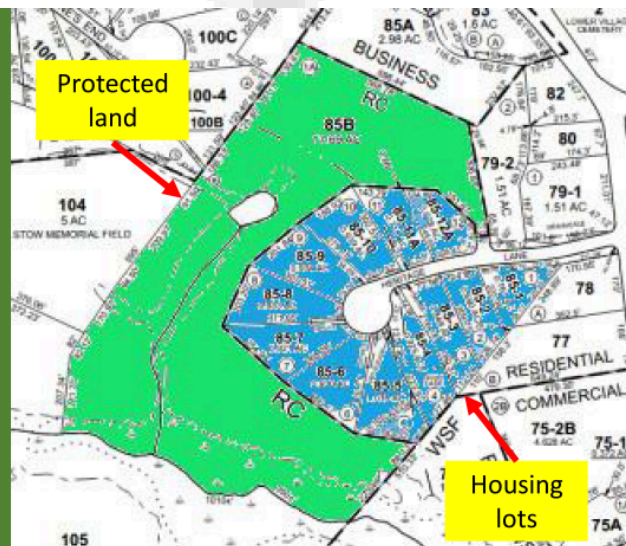
⁵⁰ For this calculation 2017, the baseline year GHG emissions is used.

⁵¹ See the Natural Solutions appendix for a description of the sequestration model.

- Stow was an early adopter of the Community Preservation Act (CPA). Funds have been used for Open Space and Recreation Use. Stow entered the CPA program in 2001 and over time has received \$ 4.5M in matching funds.
- Stow has a successful grant history including Self Help Matching Fund programs, Agricultural Preservation Act funds, and Conservation Restriction funds/programs. Two recent additions are at Hallock Point Road and at the Stow Acres Golf Course.
- With coordination at the state and federal level, the Assabet River Wildlife Refuge was created in September 2000; this converted a polluted Superfund site into a protected, forested parcel. The Refuge is nearly 10% of the town's area.
- The town's adoption of Planned Conservation Development zoning has been successfully used by developments. This program allows homes in a subdivision to be built on a smaller lot size in exchange for seeing that 60% of the land area be permanently set aside for conservation.

Climate Snapshot: Heritage Lane

Heritage Lane is a subdivision of twelve homes. Lots were created under Planned Conservation Zoning with compact area for the house lots and 17.7 acres of protected land adjacent to the Town Forest



Priority Actions

The climate action plan's natural solutions targets shares many goals with the Stow's Open Space and Recreation Plan⁵². Where this is the case, the Priority Action listed below references Section 8 of the Open Space Plan - *Goals and Actions*.

Action ID	Action Name	GHG Reduction	Resilience
N1	Increase the total land acreage protected from future development. (see Section 8 of the Open Space Plan)	++	+
N2	Adopt approaches to maintain forest health and resilience under climate change. (see Section 8 of the Open Space Plan)	+	++
N3	Protect agricultural lands to preserve and enhance Stow's agricultural base (see Section 8 of Open Space Plan)	+	++
N4	Provide homeowners with information for sustainable landscaping and to enhance tree and forest areas on their house lots.	+	+
N5	Refine methods to estimate and measure carbon sequestration and storage across the town.	+	N/A
N6	Evaluate the option for active management of forest lands for carbon sequestration, biodiversity, and resilience.	++	+

⁵² Stow Open Space and Recreation Plan - 2023:
<https://www.stow-ma.gov/conservation-commission/pages/open-space-and-recreation-plan-2023-review-draft>

Climate Snapshot: Sustainable Landscaping

Consider converting portions of your lawn to naturalized vegetation, wildlife-friendly plants, and trees *

* See the Energize Stow website for ideas to implement sustainable landscaping - <https://community.massenergize.org/Stow>

Indicators of Success

Indicator	Baseline Data	2030 Target
Protect Open Space	4,422 acres	Protect priority parcels identified in the Open Space Plan
Forest Cover	60%	Maintain forested land while supporting sustainable development

Adaptation and Resilience

Description

The Adaptation and Resilience section presents areas of concern for Stow as a result of the effects of climate change as well as actions we should take to prepare for these impacts. Unlike the earlier sections of the Climate Action Plan, which speak to areas where we will act to reduce the impacts of climate change, this section focuses on how we will prepare for these impacts.

Goal

Augment Stow's ability to adapt to the hazards presented by climate change.

Climate Impacts/Considerations

The Stow Municipal Vulnerability Preparedness Plan (Stow MVP) is the guiding document for Adaptation and Resiliency for the Town of Stow. The Stow MVP was prepared in June 2018⁵³ and updated in 2022⁵⁴. These documents provide details of the concerns and remedies for Adaptation and Resilience. This section provides a summary of those findings.

Hazards

The top hazards identified were all weather-related impacts of climate change:

- Drought
- Severe storms
- Extreme temperatures

Areas of concern

These hazards affect many areas of life and vulnerability for the Town of Stow. The major areas of concern identified by the Stow MVP are:

- Resilience of the town's residential and fire suppression water supplies;
- Stress on stormwater management infrastructure and culverts;
- Condition of Stow's bridges and dams;
- Long term viability of commercial farming and potential affect on future land use;
- Potential isolation and emergency access issues for certain neighborhoods and ecosystems;
- Need for improved hazard preparation and planning to improve emergency services and communication to vulnerable populations;

⁵³ Town of Stow Community Resilience Summary of Findings:

https://www.stow-ma.gov/sites/g/files/vyhlif1286/f/uploads/final_stow_mvp_report_with_appendices.pdf

⁵⁴ MVP Preparedness Program Town of Stow Final Report Summary and Action Update:

[2022_05_12_mvp_summary.pdf \(stow-ma.gov\)](https://www.stow-ma.gov/sites/g/files/vyhlif1286/f/uploads/2022_05_12_mvp_summary.pdf)

Baseline

The Stow MVP identified existing assets and areas of strength that may direct future steps.

- Emergency Services, including updated shelter plans, modern facilities, existence of Minuteman Airfield, historically strong emergency response capabilities, and existing fire fighting cisterns;
- Conservation areas and the ecosystem services they provide;
- Locally managed electric utility in Hudson Light & Power;
- Regional Health Care system;
- Commitment to community involvement and strong capacity of volunteers, staff and residents.

Actions to-date

Below is a partial list of actions undertaken or underway to address the major areas of concern. For additional detail and a comprehensive list, see the 2022 Stow MVP Action Update.

- The Stow Acres Climate Resiliency Master Plan is being developed with support from a \$1.1 million dollar MVP grant.
- The Gleasondale bridge reconstruction has been completed.
- The Lake Boon dam is in the planning stages for reconstruction.

Priority Actions

The Priority Actions listed below are detailed in Section 6 of the Stow MVP - Recommendations To Improve Resilience⁵⁵. Oversight and implementation of these actions is the responsibility of the town Planning and Conservation departments.

Action ID	Action	GHG Reduction	Resilience
A1	Create a Water Supply Vulnerability Assessment	n/a	++
A2	Update the Hazard Mitigation Plan	n/a	++

⁵⁵ Town of Stow Community Resilience Summary of Findings:
https://www.stow-ma.gov/sites/g/files/vyhlif1286/f/uploads/final_stow_mvp_report_with_appendices.pdf

A3	Develop a Hazard Transportation and Communication Plan	n/a	++
A4	Develop programs for resiliency of the farming community	+	++
A5	Perform a stormwater infrastructure assessment	n/a	++
A6	Update bylaws to require multiple access routes for new development	n/a	++
A7	Maintain and improve the health of wetlands, streams, and water bodies	n/a	++
A8	Increase redundancy and resiliency of electrical distribution network	n/a	++

Action Plans

The sections below are the Action Plans which describe the implementation of the climate action plan. For each of the sectors in the plan a set of Priority Actions was identified in the sector Outline. The implementation of these Priority Actions is described below including.

- Implementation steps and champions
- Challenges
- Potential funding sources
- Equity considerations

Buildings Action Plans

The priority actions for this sector are listed below and detailed in the following pages:

- B1: Increase utilization of heat pumps and energy efficiency in existing residential buildings
- B2: Promote energy efficient, all-electric new construction
- B3: Improve utilization of heat pumps and energy efficiency in existing municipal, commercial and industrial buildings
- B4: Create and track metrics to determine progress

B1: Increase utilization of heat pumps and energy efficiency in existing residential buildings

Description

The major source of greenhouse gas emissions for residential buildings is heating which burns either fuel oil or natural gas in the furnace or boiler. The main approach to mitigate this GHG source is through energy efficiency and increased use of heat pumps. This approach is especially advantageous in Stow because the electric source, Hudson Light and Power, provides Stow with one of the lowest cost and cleanest electricity in the state. The main focus of this action is to promote the conversion of existing residential homes to heat pumps for space heating and domestic hot water and to weatherize homes through added insulation and air sealing.

Champion

The Stow Green Advisory Committee and/or a sub-committee

Implementation Tasks

Implementation Tasks	Time Frame	Key Partners
1. Promote general public awareness of the cost benefits of weatherization and converting to heat pumps. Homeowners should have a retrofit plan for when their current system is ready to be replaced.	On going	Sustainable Stow

2. Investigate and document the resident heating configurations and potential approaches to convert each configuration to utilize heat pumps. Homes heated with heating oil, propane, or electric resistance heating may utilize different approaches for best economy, efficiency and effectiveness.	Q2 2024	GAC with support from state agencies.
3. Ensure homeowners have easy access to understandable information about funding incentives, cost estimates for conversion to heat pumps and operational savings.	Q3 2024	GAC with other organizations and agencies as a clearinghouse of information.

Potential Financial Resources

Funding Organization	Funding Program Name	Potential Amount	Purpose
HLPD	Heat Pump Water Heater rebate	\$750 ⁵⁶	For installation of residential hot water heat pump
HLPD	Heat Pump rebate	Up to \$1,750 ⁵⁷	For installation of residential heat pump for space heating
Federal	IRA (Inflation Reduction Act)	Various ⁵⁸	Tax credits and rebates for heat pumps, heat pump water heaters, weatherization.
Mass. State	Green Bank	TBD	Low interest loans for energy improvements

⁵⁶ HLPD heat pump water heater rebate: [Microsoft Word - rcs policy - HLPD Residential Heat Pump Water Heater Rebate Program - master.docx \(usrfiles.com\)](#)

⁵⁷ HLPD heat pump rebate: [Microsoft Word - Proposal April 2023 HLPD Residential Heating-Cooling Rebate Program \(usrfiles.com\)](#)

⁵⁸ Tax credits and rebates with IRA: [How much money can you get with the Inflation Reduction Act? — Rewiring America](#)

Mass. State	MassSave	TBD ⁵⁹	Potential to include municipal light plants under the MassSave program
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Challenges

Challenge	Mitigation
Existing home owners resist heat pump conversion because of high cost	Most homeowners are primarily motivated by a financial advantage. Helping the environment is secondary. Therefore financial incentives of various types are necessary to motivate homeowners to convert to heat pumps. This could include grants, low/no interest loans, programs with preferred contractor and special pricing
Homeowners are reluctant to convert if their existing heating system is still functioning	Awareness program to prepare homeowners to convert when the opportunity arises that their current heat system needs replacing. Encourage and help homeowners to develop a "retrofit plan" to enable conversion when their existing furnace or boiler requires replacement. Avoid the situation where a failed system requires immediate replacement and the easiest path is with another fossil fuel heating system.
Rebate programs are too complicated for homeowners to understand and hence are not motivating for people to convert	Public awareness campaign and information sources (written and/or online) to summarize the available rebate programs
Concern over heat pump dependency on electric power to run	All modern home heating systems require electric power to operate. This includes fuel oil fired furnaces and propane heating systems. A heat pump home heating system does not increase dependency on electric power to heat your home.

⁵⁹ If your home is heated with gas, you qualify for many Mass Save incentives.

Equity Consideration

Equity Concern	Potential Mitigation
Low to moderate income homeowners have additional cost considerations to support heat pump conversions.	Ensure low and moderate income households are aware of state and federal programs to assist in purchasing and financing the retrofit. Awareness of tiered income based incentives.

Tracking Progress

Expected Results	Tracking Metric
Number of existing residence conversions to heat pumps for space heating and the rate of conversion	Percent of existing residences converted to heat pumps and the rate of conversion including whether it is a whole-home or partial-home conversion.
Number of hot water heat pump conversions and the rate of conversion	Percent of existing hot water heaters converted to heat pumps and the rate of conversion
GHG reduction from existing residential homes.	GHG inventory for existing homes over time. Need to include the level of retrofit that replaces the existing fossil fuel system.

Engaging with the Community

Engagement Activity	Target Audience	Expected Outcome
Library seminars	Town wide	Raise awareness of climate concerns, gather feedback from residents.
Cooler Climate fair	School age students and their parents, Town wide	Raise awareness of climate concerns, gather feedback from residents.

Springfest booth	Town wide	Raise awareness of climate concerns, gather feedback from residents.
Publish climate articles in various media outlets	Town Wide	Increased community involvement and engagement in climate issues, sharing information and tracking progress. Potential sources: local newspaper, EnergizeStow, social media, town website.

B2: Promote energy efficient, all-electric new construction

Description

As new housing units are developed in Stow we want to assure that they do not significantly add to the existing GHG generation in the town. By promoting all electric new buildings and energy efficient construction, the town will limit increases in GHG generation on the buildings baseline. To support this action and the goal for new construction, in 2023 Stow became the 16th community in the state to adopt the Specialized Energy Code to reduce greenhouse emissions from new construction. The Specialized Energy Code motivates builders to build highly efficient, all electric buildings.

Champion

The Stow Green Advisory Committee and/or a sub-committee

Implementation Tasks

Implementation Task	Time Frame	Key Partners
1. Work with developers to promote all electric new homes and promote the HLPD all-electric rebate	On going	Planning Board, Building department
2. Work with State and local agencies (such as HLPD) to provide increasing rebates for new all electric housing units	On going	Green Hudson
3. Work with developers of new industrial/commercial buildings to promote all-electric energy source	On going	Other Stow Town departments such as Building and Planning

Potential Financial Resources

Funding Organization	Funding Program Name	Potential Amount	Purpose
HLPD	All-Electric Home Incentive Rebate Program for Developers	\$2,750 per unit	Encourage developers to construct all electric homes and apartments

Challenges

Challenge	Mitigation
Most developers are not experienced building energy efficient, all-electric homes	Connect developers with the needed experience with developers who need assurances
Limited heat pump pool of skilled contractors	Lobby the state to provide training resources. Lobby the Voc-Tech schools to provide programs for training on heat pumps.
Builders may choose to build in other towns that have not passed the Specialized Building Code	Help developers understand that Stow has one of lowest cost electricity providers in the state, which reduces the operating costs of all electric buildings.
Builders may decide to continue to build fossil fuel buildings with high energy efficiency which still meets the Specialized Building code	Demonstrate to builders that the electric rates in Stow provide a significant opportunity to reduce operating costs of all electric buildings.
Low and moderate income households may not want to purchase new energy efficient heat pump homes because of the concern that they will have higher electric utility bills	Educate builders, real estate brokers and low and moderate income households that high efficiency heat pump homes will have reduced overall energy costs.

Equity Consideration

Equity Concern	Potential Mitigation
The perceived cost to develop all electric homes is more expensive and therefore not practical for affordable housing units	Increase developer awareness of all electric costs and practicality. HLPD rebates. Shared knowledge with developers who have already been successful with all electric homes that are considered affordable..
The high cost and volatility of fossil fuels threatens low and moderate income households to cover home heating costs	The electric rates in Stow are one of the lowest in the state and HLPD has long term contracts that allow them to maintain reasonable stable rates.

Tracking Progress

Expected Results	Tracking Metric
All new homes built in Stow will be energy efficient and all electric	Number of all electric homes built and the percent of all electric to fossil fuel homes.
All new industrial/commercial buildings built in Stow will be energy efficient and all electric	Number of all electric industrial/commercial buildings built and the percent of electric industrial/commercial buildings in Stow
Increased energy efficiency of newly constructed homes	The average HERS ⁶⁰ index of each residential building type, over time.

Engaging with the Community

Engagement Activity	Target Audience	Expected Outcome
Promote the value of all electric homes	Residential home developers, local realtors and home buying public	Stow is a good new home market for all electric, heat pump homes
Connecting developers with other developers who have experience with all electric homes	Residential home developers	All new homes built in Stow are all electric

⁶⁰ The Home Energy Rating System (HERS[®] Index) is the industry standard by which a home's energy efficiency is measures. It is also the nationally recognized system for inspecting and calculating a home's energy performance.

B3: Improve utilization of heat pumps and energy efficiency in existing municipal, commercial and industrial buildings

Description

Commercial, industrial and municipal buildings contribute about 15% of Stow town emissions. In 2023, the Stow Selectboard adopted a policy requiring clean energy in new and renovated municipal buildings. Several municipal buildings have already installed heat pumps (Town Building, Police station, Highway Department office) and have reduced their GHG emissions. Other town buildings (such as the schools) and the commercial/industrial buildings in town need to reduce their emissions in order for the town to meet GHG emissions goals.

Champion

The Stow Green Advisory Committee and/or a sub-committee

Implementation Tasks

Implementation Task	Time Frame	Key Partners
1. Promote awareness among business community of GHG emissions from municipal, commercial and industrial buildings	On going	Sustainable Stow
2. Work with building developers and the EDIC (Stow Economic Development and Industrial Commission) to promote energy efficiency new builds and heat pump conversions in existing buildings	On going	Sustainable Stow, EDIC
3. Research State and Federal grants for energy efficiency and heat pump conversion	On going	EDIC
4. Promote conversion of the existing schools in town to heat pumps. Encourage the development of a retrofit plan for the school.	Q3 2024	School board and local building department

Potential Financial Resources

Funding Organization	Funding Program Name	Potential Amount	Purpose
HLPD	Commercial and Industrial Energy Efficiency Rebate Program ⁶¹	Up to \$30,000 per year	For energy efficiency measures including heat pump retrofits in municipal buildings
Green Communities	Green Communities Competitive grant awards	Up to \$500,000	Weatherization and heat pump retrofits for municipal buildings
Federal and state incentives	Federal: IRA State: TBD	TBD	Weatherization and heat pump retrofits for municipal buildings

Challenges

Challenge	Mitigation
Current economic environment limits commercial and industrial companies from funding retrofit projects without significant return on investment	Develop return on investment cost models to support the value of the conversion to heat pump and/or energy efficiencies

Equity Consideration

Equity Concern	Potential Mitigation
Historically disadvantaged business owners will not get the equal opportunity to get support to make retrofit or energy improvements	Identify State and Federal programs to support historically disadvantaged businesses with energy efficiency upgrades

⁶¹ Hudson Light & Power Rebates: [Rebates | Hudson Light & Power](#)

Tracking Progress

Expected Results	Tracking Metric
GHG emissions from existing commercial and industrial buildings is reduced	GHG inventory for commercial and industrial buildings over time
GHG emissions from existing municipal buildings is reduced	GHG inventory for municipal buildings over time
GHG generation from school buildings is reduced	GHG inventory for school buildings over time

Engaging with the Community

Engagement Activity	Target Audience	Expected Outcome
Work with the EDIC to promote heat pump conversion and energy efficiency in local commercial/industrial buildings	EDIC	Motivated business owners to lower their GHG emissions

B4: Create and track metrics to determine progress

Description

GHG generation has multiple sources with multiple owners. Each situation has a different set of challenges and motivations. A good collection of metrics are necessary to be able to track progress, recognize where this effort is being successful and where this effort needs additional support to meet the goals.

Champion

The Stow Green Advisory Committee and/or a sub-committee

Implementation Tasks

Implementation Task	Time Frame	Key Partners
1. Promote public awareness of GHG emissions and the value of tracking with metrics	Q3 2024	Sustainable Stow
2. Implement mechanisms where the community can see the metrics and their progress. Implement mechanisms where the community can self-report metric data (e.g. hot water heat pump installation).	Q4 2024	Sustainable Stow
3. Research metrics used by the state and other towns and organizations that could be used for Stow	Q3 2024	
4. Investigate mechanisms to track fossil fuel use in homes.	On Going	

Challenges

Challenge	Mitigation
Homeowners and businesses may be hesitant to share fuel use information.	Identify a representative sample of homeowners who are willing to share annual fuel use. Commit to anonymizing the collected data.
Metrics can be complicated and hard to understand	Identify metrics that are easy to understand and that have a full explanation of what they mean and of the assumptions that were used to create the metric

Equity Consideration

Equity Concern	Potential Mitigation
Some community groups might feel left out of the progress and benefits of this effort	Develop metrics that illustrate the progress and advantages of all population segments as well as the whole town population

Tracking Progress

Expected Results	Tracking Metric
Each sector has defined metrics with good explanations that are published and updated regularly	Check list of metrics published, documentation and update status

Engaging with the Community

Engagement Activity	Target Audience	Expected Outcome
Metrics are published in EnergizeStow for the community to view	whole town	Improved community engagement and drive to improve.
The community can self-report updated data to the metrics	whole town	Curated self-report data should be more timely than other collection mechanisms.

Mobility/Transportation Action Plans

M1: Accelerate the adoption of electric vehicles (EVs) and plug-in hybrids (PHEVs)

M2: Develop plans to transition municipal vehicles to EVs or PHEVs

M3: Encourage alternative modes of transportation

M1: Accelerate the Adoption of Electric Vehicles (EVs) & Plug-in Hybrids (PHEVs)

Description

Transportation represents half of Stow's greenhouse gas emissions (GHG) with most emissions coming from personal vehicles. The number of registered EVs, PHEVs and hybrids in Stow has been increasing and now represents 8.4% of all registered vehicles. To meet the target for greenhouse gas emissions for 2030 the rate of adoption needs to accelerate. The recent MassDOT vehicle census data shows that the majority of electric vehicles are hybrids followed by EVs and PHEVs.⁶² The strategy will be to increase the number of EVs and PHEVs through education.

Champion

The Green Advisory Committee and/or subcommittee.

Implementation Tasks

Implementation Task	Time Frame	Key Partners
1. Create an action on Energize Stow Website to purchase an EV or PHEV	2024	Sustainable Stow
2. Participate in the Cooler Climate Fair	2025	Sustainable Stow Energy Consumer Alliance
3. Have a ride and drive event at Springfest	2024	Springfest Committee Police Chief
4. Work with Pilot Grove, Elizabeth Brook and Meeting House to install electric charging stations	2024	Hudson Light and Power Department (HLPD)

⁶² MassDOT Vehicle Census Data shows that January 2023, Stow had 125 EVs, 351 Hybrids and 81 PHEVs registered in the state.

5. Create another electric vehicle talk as one of the talks at the monthly Sustainable Stow Library Series	2024	Sustainable Stow Energy Consumer Alliance
6. Investigate potential locations for charging stations.	2025	Planning Department

Potential Financial Resources

Funding Organization	Funding Program Name	Potential Amount	Purpose
Massachusetts	MOR-EV	\$3000-\$5000	To encourage purchase of EVs, PHEVs new or used
Federal Government	Inflation Reduction Act	Up to \$7500 tax credit per vehicle (limited to certain brands)	To encourage purchase of EVs, PHEVs and increase US manufacturing of EVs
Hudson Light and Power	Residential Electric Car Battery Charger	\$500 rebate for Level 2 charger	Encourage installation of Level 2 home chargers
Hudson Light and Power	Off-peak incentive program	Lower electricity charge	Encourage charging vehicles at off-peak times
Hudson Light and Power	EV Smart (WI-FI capable) level 2 charger rebate - affordable housing entities	\$500 per charger up to \$2000	Encourages charging options at affordable housing.

Challenges

Challenge	Mitigation
Concerns about finding charging stations if taking a long trip	<ul style="list-style-type: none">-Encourage the purchase of PHEVs-Provide information on the currently available apps that highlight charging stations and the different providers--During ride and drive events have owners share personal experiences of their road trips- Build EV charging station infrastructure supported by federal incentives.
Cost of EVs	<ul style="list-style-type: none">-Emphasize the point of sale rebate for new and used EVs from the State-Investigate and publicize the used EV market.- Educate residents on total cost of ownership. EVs have much lower maintenance and fuel costs than gas powered vehicles.-Provide residences with an information sheet that will include a means of assessing the Total Cost of Ownership (TCO) for replacing a current vehicle with an EV or plug-in hybrid vehicle.
Multi family Units	<ul style="list-style-type: none">-Work with owners and HLPD to install charging stations at the units.-Increase access to publicly available charging stations

Equity Consideration

Equity Concern	Potential Mitigation
Low and moderate income residents often do not have the disposable income to purchase an electric vehicle.	Provide information on the used EV market and the specific state incentives.
Low and moderate income residents as well as senior citizens may not be living in their own home or able to charge a car.	Investigate providing public charging stations and charging stations at apartment buildings.

Tracking Progress

Expected Results	Tracking Metric
Increase purchase of EVs and PHEVs	MassDOT Vehicle Census Data
Increase access to publically available charging stations	Number of charging stations at apartment, municipal and retail buildings

Engaging with the Community

Engagement Activity	Target Audience	Expected Outcome
Create an action on the Energize Stow Website	Town Residents	Individual Residents and teams will be informed and more willing to buy EVs or PHEVs.
Library seminars/Publish articles in the Stow/Bolton Independent/Social Media	Town-wide	Raise awareness of climate concerns, gather feedback from residents.
Cooler Climate fair	School age students and their parents, town-wide	Raise awareness of climate actions and gather feedback from residents.

Springfest booth	Town-wide	Raise awareness of climate actions and gather feedback from residents.
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M2: Develop Plans to Transition Municipal Vehicles to EVs or PHEVs

Description

Municipal vehicles represent only 1.4% of the town's transportation greenhouse gas emissions. However, these vehicles are generally more "visible" and serve as an example of the town's commitment. Both the police and building department have begun to acquire electric and hybrid vehicles.

Potential conversions to EVs could include the large Council on Aging (COA) van which is also being used by the recreational department to transport kids to events. It is the oldest car in their fleet. The highway, cemetery and fire departments have a variety of vehicles ranging from heavy trucks to mowing equipment and fire trucks. At this point, the technology has not been developed to replace these with zero emissions vehicles.

Champion

Green Advisory Committee and other town departments and committee

Implementation Tasks

Implementation Task	Time Frame	Key Partners
1. Work with COA to investigate and prepare a proposal for the purchasing of an EV van.	2024	COA Town Manager Select Board
2. Explore the installation of Level 2 charging stations at the elementary and middle schools in stow.	2024	School superintendents

Potential Actions

School Buses Currently, school buses are contracted by the Regional Districts on an annual basis. Bus routes often cross districts and towns twice a day. All buses servicing the three towns (Stow, Bolton and Lancaster) are diesel operated. Working with the other towns a subcommittee could be established to 1) survey the bus companies as to their intentions of going electric, (2) investigate funding sources, and (3) talk with the regional contracting office about putting in the contract incentives or requirements around using electric school buses. .

Potential Financial Resources

Funding Organization	Funding Program Name	Potential Amount	Purpose
Hudson Light & Power	Municipal chargers	Up to \$30,000 per year ⁶³	Support the installation of municipal chargers
Green Community Grants	Electric and hybrid vehicles	Up to \$15,000 per vehicle.	To facilitate energy efficiency in municipalities
Green Community Grants	Municipal chargers	Up to \$7,500 per charging station.	To facilitate the energy efficiency in municipalities
MASS EVIP program	Municipal chargers	Up to \$50,000 per municipal building.	To facilitate the building of public charging capability in municipalities

Challenges

Challenge	Mitigation
Purchasing of any municipal vehicle must be approved at town meeting	Work with individual departments so that they can plan for the purchase in their annual budget.
The operation of a municipal vehicle is contingent on having an ability to charge.	Work to develop cost estimates, site location and funding for installing charging stations.

⁶³ \$30,000 is total per year for Stow for all qualified energy efficiency measures.

Tracking Progress

Expected Results	Tracking Metric
Number of municipal vehicles that are electric or hybrid.	Data from the highway department and town administration.

Engaging with the Community

Engagement Activity	Target Audience	Expected Outcome
Publicize the town's purchase of electric vehicles through newspaper articles, town website and social media	town-wide	Inform residents that the town is leading by example

M3: Encourage Alternative Modes of Transportation

Description

MassDOT initiated a Complete Street Funding program to encourage municipalities to evaluate the streets in their municipality and develop a plan to make them safe and accessible for all modes of travel including walking, biking, transit and vehicles for people of all ages and abilities.

The Complete Streets Committee of Stow advises the Select Board, as well as the Highway and Planning Departments as appropriate, in applying Complete Streets principles to Stow's roadway network on an ongoing basis. They use information from public outreach and Town Planning documents, including the Complete Streets Prioritization Plan. The Complete Streets Committee will provide informed judgment regarding the desirability and feasibility of applying these principles, make recommendations for the purpose of complying with the Town of Stow Complete Streets Policy, and guide the Town's efforts in developing and implementing traffic safety policies and interventions throughout Stow.⁶⁴

The Council on Aging currently provides a shuttle service for seniors in the town to local events and shopping areas. They have also experimented with providing ride service for doctor appointments. They will be looking into expanding that program, if there is interest.

Champion

Complete Streets Committee

⁶⁴ <https://www.stow-ma.gov/complete-streets-committee>

Energy Action Plans

E1: Provide clean, reliable and affordable electricity which is sufficient to meet higher demand.

E2: Support transition from fossil fuels to electricity

E1: Provide clean, reliable and affordable electricity which is sufficient to meet higher demand

Description

Stow has one of the lowest electric rates in the state with electricity generated with low greenhouse gas emissions. To meet our 2030 emissions target, there must be a significant conversion of both transportation and building heating from fossil fuels to electricity.

Converting from fossil fuels to electricity will significantly increase use of electricity - by as much as 20% by 2030. The challenge is to maintain low electric rates, reliable service, and clean electricity while at the same time, meeting increased demand for electricity.

Champion

Hudson Light & Power (HLPD) and town departments and residents

Implementation Tasks

Implementation Task	Time Frame	Key Partners
Develop and review plans for future power sources and power distribution.	2024	HLPD, GAC, Green Hudson
Review opportunities and incentives for local renewable energy generation.	2024	HLPD, GAC, Green Hudson
Add new transmission line from Sudbury substation	2025	HLPD
Install utility scale battery storage for “peak shaving”	2025	HLPD

Potential Financial Resources

Funding Organization	Funding Program Name	Potential Amount	Purpose
HLPD customers	General funding for HLPD operations	A function of electric rates and electric demand	Ongoing electric service, upgrades, and incentives.
Federal incentive	Inflation Reduction Act (IRA)	Various	Support clean energy (e.g., storage, renewable generation)

Challenges

Challenge	Mitigation
Electric infrastructure to retrofit existing buildings and build new all-electric buildings	Resolve production and supply chain delays. Federal initiatives to increase utility transformer production
Increase local solar installations	Review regulations and incentives for private and commercial solar.

Tracking Progress

Expected Results	Tracking Metric
Electricity is affordable and less expensive than using fossil fuels	Electric rates
Electricity is generated using low GHG emissions sources	Emissions factor (amount of CO2 generated per unit of electricity generated)
Electricity is reliable	Industry metrics for tracking number and length of outages.

Engaging with the Community

Engagement Activity	Target Audience	Expected Outcome
Energy fairs	Stow and Hudson residents	Provide information on incentives and initiatives. Promote electrification.
Newsletter inserts and periodic articles in the Stow Independent.	Stow and Hudson residents	Provide information on incentives and initiatives.. Promote electrification.
Periodic reports to the Stow Select Board	Stow Select Board	The Select Board participates in and supports activities.

E2: Support Transition from Fossil Fuels to Electricity

Description

Stow's electric utility, Hudson Light & Power (HLPD), provides one of the lowest electric rates in the state. These low electric rates are an incentive to switch to electricity from fossil fuels since operating costs are lower. However, there are substantial upfront costs associated with making the switch (e.g., the cost of heat pumps). For many customers, these upfront costs are a barrier to making the switch to electricity.

In addition, the switch to electricity, particularly for building heating, is not yet well understood by many residents. Outreach and education is needed to accelerate the transition.

Champion

Traditionally, the electric utilities have been the source of most incentives for energy efficiency and electrification measures for buildings, while state and federal programs have provided the bulk of incentives for the electrification of vehicles. For buildings, Mass Save⁶⁵ is the program used by the large Investor Owned Utilities (IOUs - e.g., Eversource, National Grid), while each municipal light plant develops its own incentive program⁶⁶.

⁶⁵ Mass Save: <https://www.masssave.com/en>

⁶⁶ Customers served by municipal light plants for electricity but use natural gas provided by one of investor owned utilities do qualify for many of the Mass Save incentives.

Going forward, incentives will be provided at the federal and state level as well as through the utilities themselves. The state published the Commission on Clean Heat Final Report⁶⁷ which endorses what is called a “Clearinghouse”. The Clearinghouse would be a “one stop shop” for all federal and state building incentives. In particular, the existing Mass Save program may be restructured to reside within the Clearinghouse rather than operated by the large utilities. As envisioned, it would.

It is recommended that the state adopt uniform building incentives accessed through a single channel rather than the existing patchwork. It will be the work of the state administration to follow through with this recommendation⁶⁸.

In this period of rapid change, the source of financial incentives is evolving. The Implementation Tasks listed below, reflect actions that may be taken by our utility, HLPD. Incentives at the state and federal level are covered in the Action Plans for Buildings and Transportation.

Implementation Tasks

Implementation Task	Time Frame	Key Partners
1. Track evolving incentives	Ongoing	Stow Green Advisory Committee
2. Encourage HLPD to continue to implement cost effective incentives.	Ongoing	HLPD, Stow Green Advisory Committee, Green Hudson
3. Ensure Stow residents are informed of available incentives and have tools to evaluate the benefits of electrification for buildings and transportation	Ongoing	HLPD, Sustainable Stow, Green Advisory Committee

⁶⁷ Massachusetts Commission on Clean Heat Final Report:
<https://greenribboncommission.org/document/massachusetts-commission-on-clean-heatfinal-report/>

⁶⁸ The Mass Save program runs in three year cycles. The current cycle runs from 2022 through 2024. It is not anticipated that the Clearinghouse will be put into effect prior to the end of the current Mass Save three year cycle.

Potential Financial Resources

Funding Organization	Funding Program Name	Potential Amount	Purpose
HLPD	REECIP (Renewable Energy and Energy Conservation Incentive Program)	Various ⁶⁹ .	Rebates for energy efficiency measures (e.g., solar, heat pumps, EV chargers),

Challenges

Challenge	Mitigation
Retrofitting existing homes to heat pumps is complex.	Provide support for residents to use home retrofit service.
Maintain affordable electric rates while providing enhanced incentives.	Added electric use from building and transportation electrification should provide payback to cover enhanced incentives.

Equity Consideration

Equity Concern	Potential Mitigation
With available incentives, up front costs may still be prohibitive for low and moderate income residents	Provide zero or low interest loans for energy efficiency and electrification projects.

⁶⁹ Hudson Light and Power rebates: <https://www.hudsonlight.com/rebates>

Tracking Progress

Expected Results	Tracking Metric
Sufficient adoption of electric vehicles and heat pumps for buildings to meet 2030 emission reduction targets.	Metrics provided in the Transportation and Building sections of this document.

Engaging with the Community

Engagement Activity	Target Audience	Expected Outcome
HLPD flyers, Energize Stow website, Stow Independent, social media.	All residents	Resident awareness and education.
Special events and initiatives to educate and encourage participation (e.g., Cooler Climate Fair, Spring Fest)	All residents	Engage residents through town events.
Municipal “leading by example”	All residents	Town demonstrates commitment through actions directly under their control.

Natural Solutions Action Plans

N1: Increase the total land acreage protected from future development.

N2: Adopt approaches to maintain forest health and resilience under climate change.

N3: Protect agricultural lands to preserve and enhance Stow's agricultural base

(For Actions N1, N 2, and N 3: See Section 8 of Open Space Plan⁷⁰)

N4: Provide homeowners with information for sustainable landscaping and enhance tree and forest areas on their house lots.

N5: Refine methods to estimate and measure carbon sequestration and storage across the town.

N6: Evaluate the option for active management of forest lands for carbon sequestration, biodiversity, and resilience.

N4: Provide residents with tools and information for sustainable landscaping and to enhance tree and forest areas on their house lots.

Description

Individual homeowners can make a substantial contribution to our climate, biodiversity, and resilience goals through sustainable landscaping practices on their house lots.

Implementation Tasks

Implementation Task	Time Frame	Key Partners
Provide residents advice on how to landscape their yards and suggestions for wildlife-friendly plantings.	ongoing	Sustainable Stow.
Promote awareness of Invasive Plants. Encourage residents to pull/control invasives.	ongoing	Stow Conservation Trust and Sustainable Stow.
Promote basic forest/tree projects homeowners can perform.	ongoing	Stow Conservation Trust and Sustainable Stow.

⁷⁰ Stow Open Space and Recreation Plan - 2023:

<https://www.stow-ma.gov/conservation-commission/pages/open-space-and-recreation-plan-2023-review-draft>

Challenges

Challenge	Mitigation
Residents may not view their individual contribution as meaningful.	Demonstrate the impact (e.g., pollinator pathways).

Engaging with the Community

Engagement Activity	Target Audience	Expected Outcome
Energize Stow website	All residents	engagement/awareness
Sustainable Stow video series	All residents	engagement/awareness
Special events and initiatives to educate and encourage participation (e.g., Cooler Climate Fair, Spring Fest)	All residents	Engage residents through town events.

N5: Explore best methods to estimate or measure carbon sequestration and storage across the town.

Description

A model created by the GAC estimates the rate of sequestration of greenhouse gases (GHG) across the town. The model makes an assumption about the rate at which GHG are sequestered for fully forested land and another assumption for the sequestration provided by other non-forested areas. The sequestration rate varies by multiple factors including tree age, tree species/health/density. Different references can be found that assume different sequestration rates.

Given the importance of the calculation, it is worthwhile to continue to refine the assumptions used in the model.

Champion

The Stow Green Advisory Committee

Implementation Tasks

Implementation Task	Time Frame	Key Partners
Revisit the sequestration model as more information is known or different assumptions are promoted across climate change and forestry science.	Ongoing	Stow GAC

Challenges

Challenge	Mitigation
This is an area where consensus is unlikely to be achieved.	Be aware that modeling is imperfect.

N6: Evaluate the option for active management of forest lands for carbon sequestration, biodiversity, and resilience.

There may be a benefit to actively managing forest land. Forests and the carbon sequestration provided are the primary means to offset remaining greenhouse gas emissions. There may be an option to perform degrees of active management so as to protect the forests and maximize the benefit.

Active management might begin with an inventory of what is present and include thinning, cutting, planting, and/or monitoring and control of invasive insects and plants.

Implementation Tasks

Implementation Task	Time Frame	Key Partners
Evaluate best available data on potential benefits of active management of forest land	2025	SCT Conservation Commission
Consider employing forest management on some town owned and SCT parcels	by 2030	SCT Conservation Commission

Potential Financial Resources

Funding Organization	Funding Program Name	Potential Amount	Purpose
MA Department of Conservation and Recreation (DCR)	Forest Climate Stewardship	Reimbursement	Create Stewardship/Management plans per parcel.
Private and Regional funding. Such as CISMA ⁷¹	Invasive Control Grants	varied	Invasive control.
Federal and state incentives	Forest Service	varied	Invasive control.

Challenges

Challenge	Mitigation
There are differing views on the benefits of active forest management.	Ongoing discussion and followup to new program availability.
Who would pay for the work? What are the potential cost-benefits	Take advantage of available grants and engage volunteers.

⁷¹ (Cooperative Invasive Species Management Area - The Town of Stow and SCT are part of this area invasives organization).: <https://cisma-suasco.org/>

Adaptation and Resilience Action Plans

The Priority Actions identified in the Adaptation and Resilience Outline are detailed in Section 6 of the Stow MVP (Stow Municipal Vulnerability Preparedness Plan) - Recommendations To Improve Resilience⁷². Refer to this document and the 2022 update⁷³ of the Stow MVP plan for the plans. Oversight and implementation of these actions is the responsibility of the town Planning and Conservation departments.

⁷² Town of Stow Community Resilience Summary of Findings:
https://www.stow-ma.gov/sites/g/files/vyhlif1286/f/uploads/final_stow_mvp_report_with_appendices.pdf

⁷³ MVP Preparedness Program Town of Stow Final Report Summary and Action Update:
[2022_05_12_mvp_summary.pdf \(stow-ma.gov\)](https://www.stow-ma.gov/sites/g/files/vyhlif1286/f/uploads/2022_05_12_mvp_summary.pdf)