

Town of Topsham Climate Action Plan



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Submitted by:
Sustainable Topsham
(Sub-committee of the Conservation Commission)
100 Main Street
Topsham, ME 04086



Credits and Acknowledgements

Town Selectmen

Ron Riendeau
Don Russell
James Trusiani
Andrew Mason
Marie Brilliant

Town Staff

Jim Ashe, Town Manager
Robert Pontau, Public Works Director
Tim Young, Police Chief
Richard Roedner, Planning Director
Brian Stockdale, Fire Chief
Pam LeDuc, Parks and Recreation Director
Deb Fischer, Finance Director
Justin Hennessey, Assessing Director
Rod Melanson, Natural Resource - Assistant Planner

Sustainable Topsham Committee

Jane Scease
Victor Langelo
Christine Cole
Scott Smith
Bill Donovan
Denise Tepler
Grace Lewis McLaren
Victoria Boundy

Topsham Conservation Commission

Gary Fogg, Chair

Carla Rensenbrink
Victor Langelo
Grace Lewis McLaren
Jeff Plucker
Angela Twitchell

Bowdoin College

Members of the Environmental Studies Capstone Seminar are:

Krista Bahm
Jeffrey Bush
Allison Chan
Ross Cowman
Dylan Crawford
David Ruffin Funk
Larissa Gaias
Samuel Hankinson
Thai Ha-Ngoc
Maryellen Hearn
Jane Koopman
Molly Masterton
Ashley Peterson
Ilse Pukinskis
Colleen Sweeney
Drew Trafton

Professor Phil Camill and
Environmental Studies Coordinator Eileen Johnson

Thai Ha-Ngoc, Topsham Psi Upsilon Summer Intern
Charlie Cubeta, Topsham Psi Upsilon Summer Intern

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Introduction

1.1 Purpose of the Climate action Plan

The Town of Topsham understands that climate change has the potential to affect Topsham residents and businesses, as well as other communities around the world. The Town also recognizes that local governments play a strong role in limiting the impacts of climate change by reducing greenhouse gas emissions in their communities.

This Climate Action Plan includes existing and potential strategies (i.e., actions, projects, and programs) that the Town's government operations and the community can utilize to address climate change. After providing a brief background on climate change and its potential impacts, the plan focuses on Topsham's future efforts to reduce its greenhouse gas emissions and mitigate those impacts at the local level.

Through actions outlined in this plan, the community can experience lower energy bills, improved air quality, reduced emissions, and an enhanced quality of life. With the help of Bowdoin College students and faculty, the Town prepared a Greenhouse Gas Emissions Inventory and Climate Action recommendations. They begin an ongoing planning process to assess, plan, and mitigate climate change, as well as to consider adaptations as situations change.

Specific components of the Plan:

- Summary of the various regulations at the federal, state, and regional levels.
- Inventory of the Town's 2005 Greenhouse Gas Emissions, identifying sources of greenhouse gas emissions generated by both the community and the Town's government operations.
- Estimates of changes in these emissions over time and establishment of a target to reduce greenhouse gas emissions to 15% below 2005 levels by 2020.
- Development of strategies in energy use, transportation, land use, green purchasing, waste and water use that will be necessary to minimize Topsham's impacts on climate change and meet the established greenhouse gas emission reduction target



1.2 Relationship to the Comprehensive Plan

In the 2005 Comprehensive Plan, the Town adopted sustainable building and community policies that would reduce resource consumption and improve energy efficiency:

1. Minimize the environmental impacts of its operations, including energy efficiency, promoting recycling, and conserving resources.
2. Encourage affordable workforce housing and a development pattern that encourages people to walk.
3. Use green materials and resources.
4. Conserve water, especially in landscaping.
5. Encourage transportation alternatives to the private automobile.
6. Increase the use of renewable energy sources.

Though both the Comprehensive Plan and the Climate Action Plan are intended as long-range plans, the Climate Action Plan may be updated on a more regular basis to add and amend strategies when new information, policy guidance, and regulations regarding climate change evolve and new technologies are developed. It is intended that future updates to the Topsham Comprehensive Plan will integrate and reference this plan, instead of including the plan in the Comprehensive Plan itself.



1.3 Climate Change Background

A balance of naturally occurring gases dispersed in the atmosphere determines the Earth's climate by trapping infrared radiation (heat), a phenomenon known as the greenhouse effect. Significant evidence suggests that human activities are increasing the concentration of these gases (known as "greenhouse gases" or GHG) in the atmosphere, causing a rise in global average surface temperature and consequent global climate change. The greenhouse gases include carbon dioxide, methane, nitrous oxide, halocarbons, ozone, and water vapor. Each one has a different degree of impact on climate change. To compare different emission sources with mixed and varied compositions of several GHG, the term "carbon dioxide equivalent" or CO₂e is used. One metric ton of CO₂e may consist of any combination of GHG, and has the equivalent Global Warming Potential (GWP) as one metric ton of carbon dioxide (CO₂). According to EPA's April 2009, "Inventory of U.S. Greenhouse Gas Emissions," the majority of GHG emissions come from fossil fuel combustion, which in turn is used for electricity, transportation, industry, and heating, etc. Collectively, these gases intensify the natural greenhouse effect and cause the global average surface temperatures to rise. As a result, local and global climate patterns change. These changes in climate are expected to manifest themselves in a number of ways that might impact Topsham as well as local and regional weather patterns and species migration.

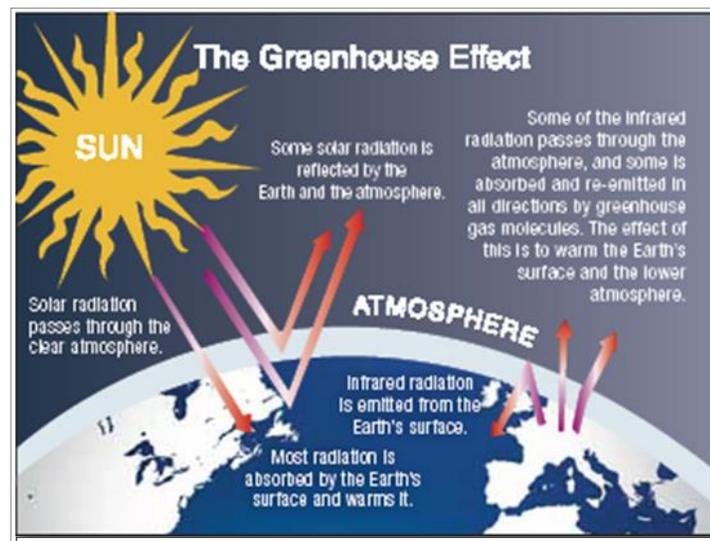


Figure 1: Greenhouse Effect

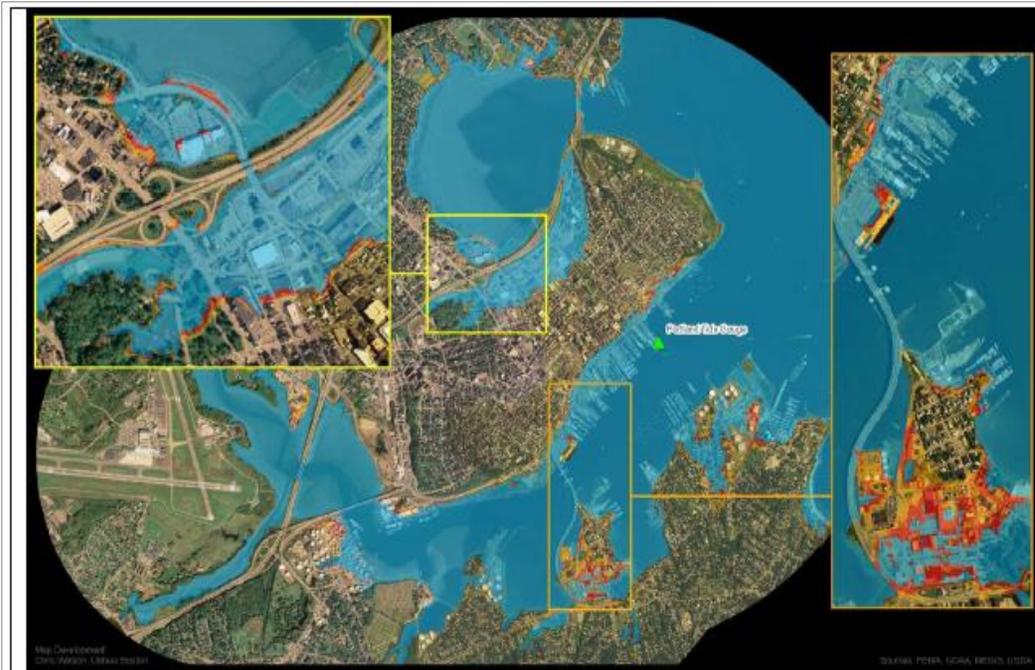
According to a 2007 Northeast Climate Impacts Assessment (NECIA) global warming could significantly impact Maine's water and forest resources.

The Report noted the following findings and potential risks to Maine¹:

By late this century, under the higher-emissions scenario:

- Winters in the Northeast could warm by 8°F to 12°F and summers by 6°F to 14°F above historic levels.
- The length of the winter snow season could be cut in half across northern New York, Vermont, New Hampshire, and Maine, and reduced to a week or two in southern parts of the region.
- Cities across the Northeast, which today experience few days above 100°F each summer, could average 20 such days per summer, and more southern cities such as Hartford and Philadelphia could average nearly 30 days.

¹ Northeast Climate Impacts Assessment (NECIA): Confronting Climate Change in the U.S. Northeast - <http://www.northeastclimateimpacts.org/pdf/confronting-climate-change-in-the-u-s-northeast.pdf>



Shading indicates estimated flood areas near Portland Harbor during a 100-year storm in the year 2100 under a higher coastal flooding scenario. This map was developed using a five-foot by five-foot raster-based digital elevation model (DEM) overlaid on recent aerial orthophotography. The future elevation of the 100-year flood is based on the current elevation of the 100-year flood added to projected SLR. The higher coastal flooding scenario includes regional SLR due to land subsidence, and the high end of the ranges of both regional dynamic SLR projected by Yin and others,^{xxxiv} and eustatic (global) SLR projected by Rahmstorf.^{xxxiv}

Under this higher coastal flooding scenario, the estimated elevation of the 100-year flood in 2100 is 14.3 feet relative to the North American Vertical Datum of 1988 (ft NAVD). The range of vertical error associated with the DEM (± 1.2 ft at a 95% confidence level) is represented by the red shading (lower interval; 13.1 to 14.3 ft NAVD) and the orange shading (upper interval; 14.3 to 15.2 ft NAVD). Blue shading represents areas located at elevations below 13.1 ft NAVD, including both land and water bodies. Buildings, building shadows, other objects and open water bodies observed in the underlying orthophotography may cause the shading to appear darker in these areas. Horizontal error associated with the DEM is approximately ± 3.3 ft.

- Short-term (one- to three-month) droughts could occur as frequently as once each summer in the area of the Catskills and the Adirondacks, and across the New England states.
 - Hot summer conditions could arrive three weeks earlier and last three weeks longer into the fall.
 - Global average sea level is conservatively projected to rise one to two feet.

Sea Level Rise

The Figure to the left shows a scenario of sea level rise from a 100 year storm event in Portland Maine under continuing emission trends for the year 2100.

In Topsham, flooding events of this nature would transform the existing wetland and river areas, as well as create stormwater issues that are perhaps inconceivable today. Our current floodplain mapping and floodplain ordinance are consistent with current state standards. Floodplain regulations should be considered with the knowledge that flooding and floodplain areas will likely be more extensive than expected because of higher sea levels

Source:

http://www.cascobay.usm.maine.edu/pdfs/Climate_Change_in_Casco_Bay.pdf

1.4 Climate change mitigation activities in Topsham

The Town has established a commitment to reducing its contribution to climate change and preparing for the potential impacts from climate change through pursuit of strategic partnerships and early actions. In 2008, a number of community organizations, including the Conservation Commission, agreed to sponsor formation of a new group (now known as Sustainable Topsham) dedicated to reducing energy consumption and building a sustainable community. With funding from the New England Grassroots Environment Fund, the Town became a member of the *International Council for Local Environmental Initiatives* (ICLEI), which assists municipalities to create goals for reducing GHG emissions and city-specific plans to reach these targets. ICLEI is an international nonprofit association of local governments that are dedicated to addressing environmental problems through cumulative local actions. Partnership with a Bowdoin College internship program and capstone semester class contributed much of the GHG inventory and analysis. Their work enabled the Town to begin to develop a climate action plan.

As noted, the Town already plans to pursue mitigation by adopting land-use policies that create a more walkable community, promoting alternative transportation options and energy use, increasing energy efficiency and recycling efforts, and encouraging sustainable building practices. The Town has taken a number of initiatives in recent years to reduce greenhouse gas emissions, including:

- Town Manager enacted energy reduction policy in all departments. Although not a formalized procedure, energy consumption awareness has become embedded in routine activities by town staff.
 - The new Municipal Complex has motion sensors on all lighting and plumbing, and temperature control devices throughout.
- All Municipal Facilities have undertaken energy audits
 - Grant award enabled replacement of high energy lighting (metal halide) with T-8 Fluorescent
 - 2011 Energy retrofits save thousands of dollars annually in electricity costs in the Transfer Station, Public Library, and DPW Facility
- Town Partnered with the Maine Green Energy Alliance to educate homeowners about energy audits and weatherization rebates
- Solid Waste disposal moved to single stream recycling (studies show that recycling increases under this model)
- The school district, with help of Bill Donovan, has undertaken a variety of measures to reduce their energy use- including turning off unused computers, changing to more efficient lighting, increasing recycling, and ensuring that buses do not idle unnecessarily.

1.5 Regulation of Climate Change – Federal, State and Regional Levels

In the United States, GHG regulation is still very limited. While efforts in the last decade have increased to monitor GHG use, there has still yet to be a comprehensive policy to limit GHG emissions.

Federal: The US Government signed, but did not ratify, the Kyoto Protocol, a 1997 international agreement among industrialized countries to reduce GHGs by an average of 5% of 1990 levels. At the Copenhagen Conference in 2009, the US failed to reach an international agreement to set binding targets for GHG reductions; more recently, in July of 2010, the US Senate abandoned a bill to place a cap on carbon emissions. Despite these setbacks in GHG emissions control, the EPA has programs in place to monitor emissions. In 2008, the EPA passed a law that requires facilities that emit 25,000 tons or more of GHGs to submit an annual report. The EPA also produces an annual GHG Inventory that seeks to account for all of the GHGs emitted in the US in a given year.

State: In 2003, then Governor John Baldacci passed goals to reduce emissions to specific targets in 2010 and 2020. He was heralded as being an environmental leader for state governments, with his emissions targets a source of general success. In 2008, Maine emitted 17% less GHGs than it did in 2003. In 2008, Baldacci also passed the Wood-to-Energy initiative, which seeks to develop wood as a source of heating energy, and replace foreign oil imports with wood produced in Maine- a renewable source of energy.

Regional: Maine is part of the Regional Greenhouse Gas Initiative (RGGI), the only operating cap and trade program for carbon in the nation. RGGI only applies to electricity generation units that have a capacity of 25 megawatts or more. As a result, only six facilities fall under RGGI regulations in Maine. These facilities are auctioned permits with the money raised going toward energy efficiency improvements in the state. Joining Maine in RGGI are, Maryland, Delaware, New Jersey, New York, Connecticut, Rhode Island, Massachusetts, and Vermont.

Local: In 2009, students from Bowdoin College worked with town employees to produce a preliminary climate action plan for Topsham. The report recommended decreasing 2008 GHG emissions by 20% by 2020 and 80% by 2050. The report especially advised reductions in the transportation sector.

Topsham Greenhouse Gas Emissions

2.1 Topsham Profile

Nestled along the banks of the Androscoggin River and the mouth of Merrymeeting Bay, Topsham is a community of approximately 8,800 residents in Mid-Coast Maine. Located in Sagadahoc County, Topsham borders Brunswick to the south, Bowdoin and Bowdoinham to the north, and Lisbon and Durham to the northwest. The town's 3,720 households are spread across its 35.4 square miles, of which 32 square miles are land and 3.4 square miles are water. Land use in Topsham is diverse. The town includes a number of historic homes at the center of the village, new assisted-living developments, farms, quarries, locally owned shops, big-box retail stores, and large swaths of rural areas. The Pejepscot Mills and Bisson Farm are representative of the town's industrial and agricultural legacy, which stretched back into the early 18th century. Officially incorporated in 1764, the region was once home to the Pejepscot Abenaki Indians.

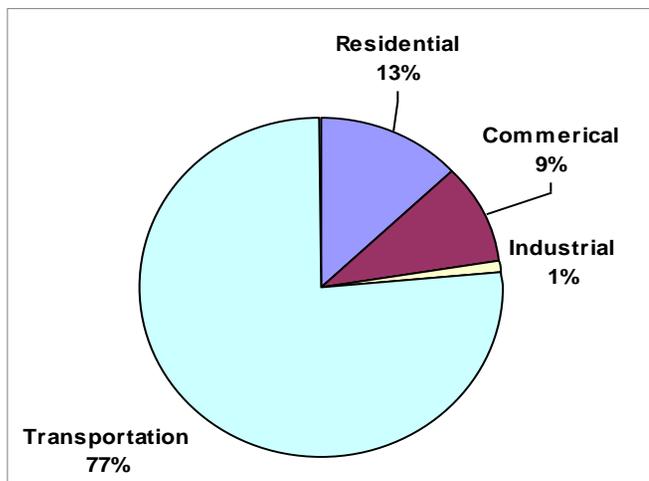


The town's natural and cultural landmarks produce a sense of a genuine New England community. The Topsham Fairgrounds are located near the center of town and are home to the annual Topsham Fair, which has been entertaining Mainers and tourists alike for over 150 years. The swinging pedestrian bridge that spans the Androscoggin River is a unique architectural feature and point of pride for the town's residents. The Cathance River and its watershed add important recreational and aesthetic value to the town. Other areas of interest include many hiking trails, most notably is the stretch of trails along the Cathance River from the town managed Head of Tide Park to the Cathance River Nature Preserve.

2.2 - 2008 Greenhouse Gas Emissions Inventory

Using ICLEI software Bowdoin College students conducted a 2009 analysis of Topsham’s total CO₂e. The study found that the town emitted 125,970 tons of CO₂e in 2008.² A finding of particular note was that 69.5% of Topsham’s community emissions resulted from the transportation sector. Commercial and residential emissions were second and third in volume, with 15.0% and 14.3% respectively. The following table provides a more detailed breakdown of the 2008 baseline carbon inventory.

Topsham Community Emissions by Sector

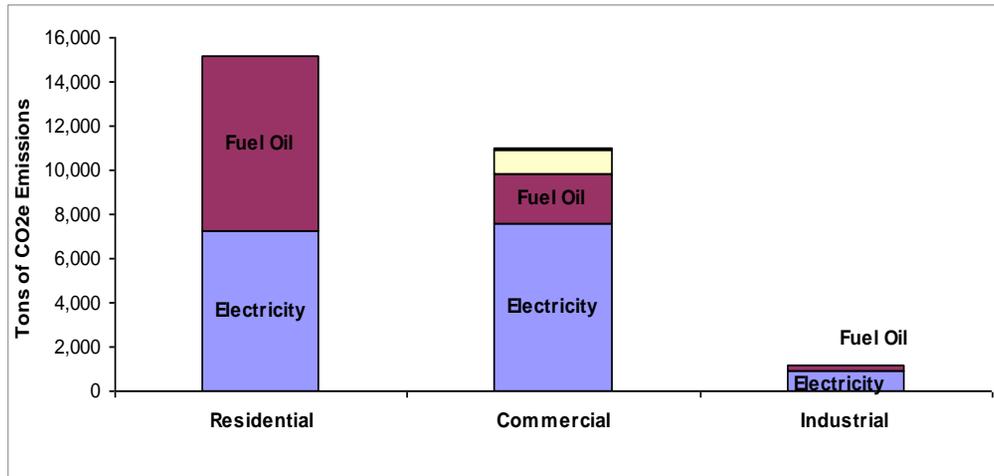


Emissions by Sector (tons CO₂e):	
Transportation-	88,908 tons
Residential-	15,194 tons
Commercial-	10,979 tons
Industrial-	1,149 tons
Waste-	68 tons (less than 1%, <i>not included</i>)

******Transportation is the big piece: Gasoline and diesel fuel create the most emissions.***

² Bowdoin College, “Topsham Climate Action Plan,” 2009. energy.gpcog.info/wp-content/uploads/.../Step-3-Report-2010-Topsham.doc

Topsham Community's Stationary Emissions

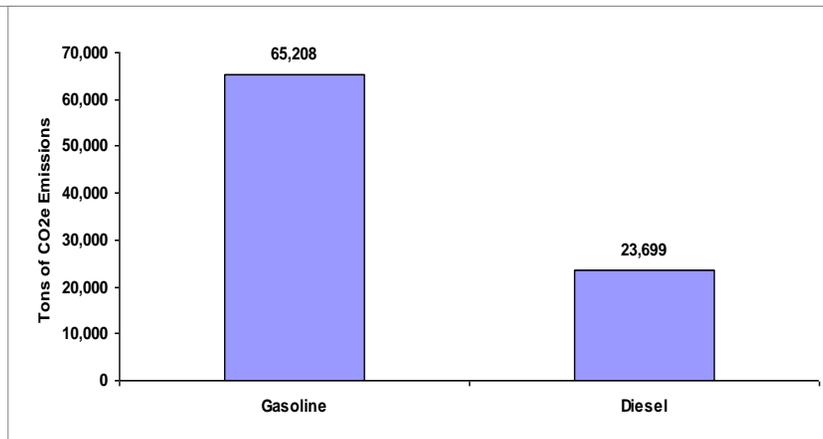


Emissions by Source (tons CO2e):

- Gasoline: 65,209 tons
- Diesel: 23,700 tons
- Electricity: 15,776 tons
- Fuel Oil: 10,371 tons
- Natural Gas: 1,131 tons
- Kerosene: 44 tons (less than 1%)
- Paper Products and Food Waste: 84 tons (less than 1%)

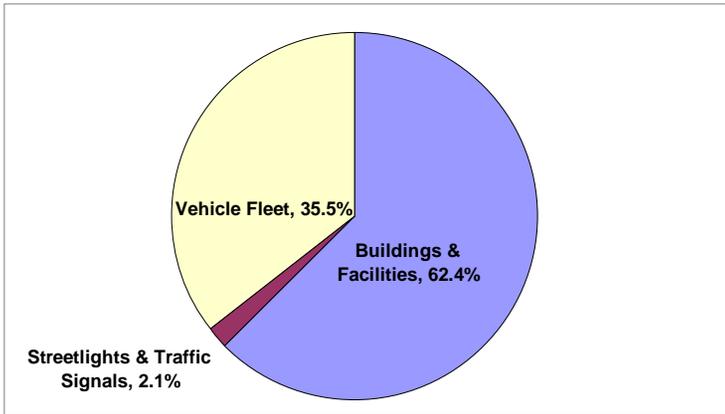
Breaking the emissions up into sector and source shows that homes are the highest emitter because of fuel oil and electricity use

Topsham Community's Mobile Emissions



- Vehicle emissions are 76% of total community emissions as currently calculated.
- Mobile Emissions Breakdown: 56% gasoline and 20.4% diesel fuel.

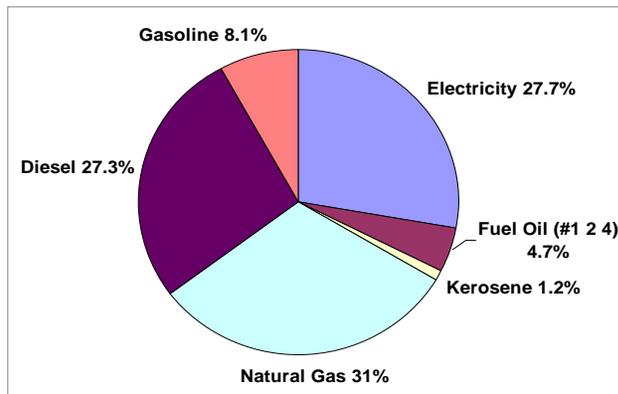
Topsham Government Sector Emissions (%CO₂e)



Emissions by Sector (tons CO₂e):
Buildings & Facilities- 2,281 tons
Vehicle Fleet- 1,295 tons
Streetlights and Traffic Signals- 76 tons

The Buildings and Facilities sector of the Topsham Government makes up the most carbon emissions

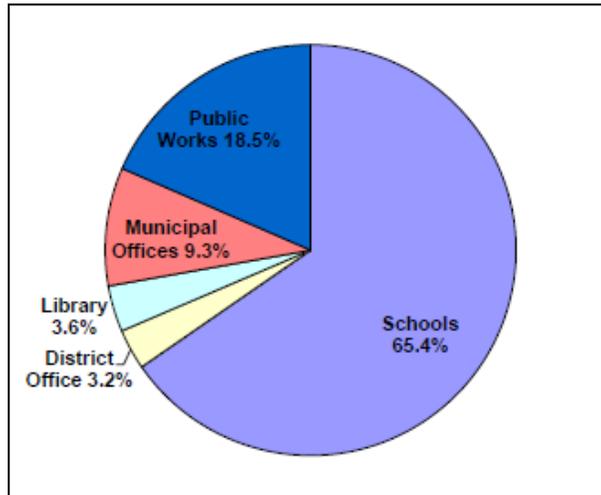
Topsham Government Fuel Sources (%CO₂e)



Government Fuel Sources (tons CO₂e):
Natural Gas- 1,131 tons
Electricity- 1,010 tons
Diesel- 998 tons
Gasoline- 298 tons
Fuel Oil (#1 2 4) - 172 tons
Kerosene- 44 tons

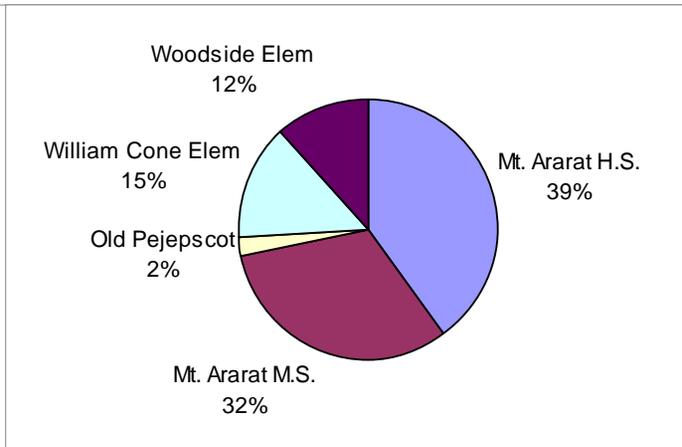
• The main fuel source for the Topsham Government is Natural Gas (31%), followed closely by Electricity (27.7%) and Diesel (27.3%)

Topsham Government Buildings and Facilities Emissions (% CO₂e)



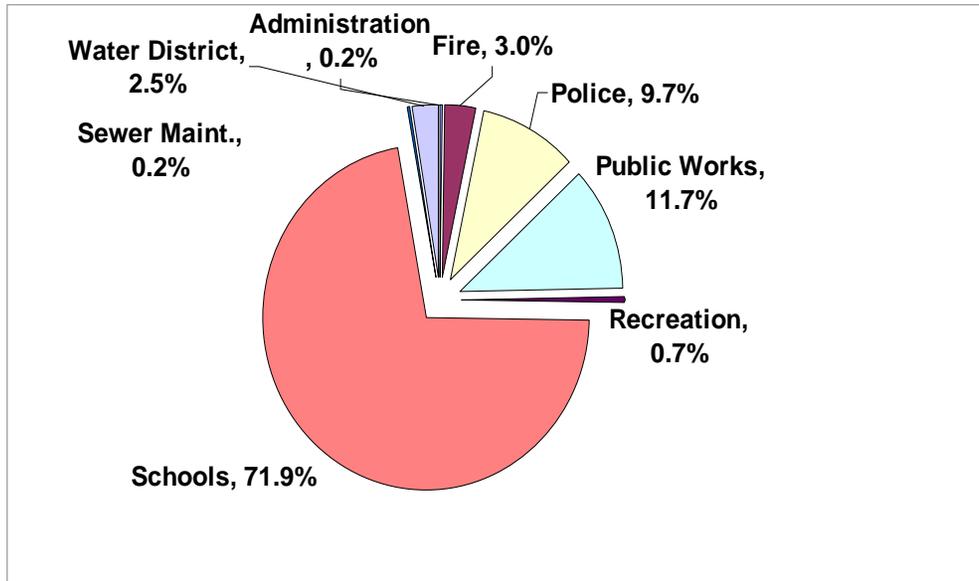
Emissions by Facility (tons CO₂e)
Schools: 1,616 tons
Public Works: 457 tons
Municipal Offices: 230 tons
Library: 90 tons
District Office: 79 tons

Government Stationary Emissions: Topsham School District



Emissions by School (tons CO₂e):
Mt. Ararat H.S. 600 tons
Mt. Ararat M.S. 480 tons
Woodside Elementary 176 tons
William Cone Elementary 219 tons
Old Pejepsco 30 tons

Government Vehicle Fleet Emissions



Equiv. CO2 (tons)

Administration:	3
Fire:	39
Police:	126
Public Works:	152
Recreation:	9
Schools:	931
Sewer District:	3
Water District:	32

School vehicles are the largest source of government vehicle fleet emissions.

Main Points:

- **Transportation is the highest emitting sector (77%) for Topsham overall.**
- **The residential sector is roughly split between fuel oil and electricity emissions.**
- **Government emissions are dominated by those of buildings and facilities.**
- **Schools are the highest government emitters for both buildings and vehicle fleets.**

2.3 Forecast for 2020 Emissions

Transportation Emissions:

The number of vehicle miles travelled has increased steadily in recent decades. A transportation study done for the redevelopment of the former Brunswick Naval Air Station predicted an increase of 0.5% per year for local traffic through 2020, which would yield an increase of 6.2% in transportation fuel usage if no other changes were made. Increases in the CAFE standards are expected starting in 2012.³ The new standards and historical sales-weighted average fuel efficiency from the Bureau of Transportation Statistics⁴ lead to the following estimates in improvements in passenger car and light truck fuel efficiency. The age distribution of vehicles was approximated from the EPA Moves 2010 Highway Vehicle Population and Activity Data.⁵

Passenger Vehicle Age	% of Vehicles	2008 Fuel Efficiency (mpg)	2020 Fuel Efficiency (mpg)	Reduction
0-4 years	30%	30.3	37.8	20.0%
5-8 years	25%	29.0	34.7	16.4%
9-12 years	25%	28.6	33.0	13.3%
13+ years	20%	28.2	29.8	5.4%
Overall Passenger Car				14.5%

³ http://www.nhtsa.gov/staticfiles/rulemaking/pdf/cale/CAFE-GHG_Fact_Sheet.pdf

⁴ http://www.bts.gov/publications/national_transportation_statistics/html/table_04_23.html

⁵ <http://www.epa.gov/otag/models/moves/420r10026.pdf>

Light Truck Vehicle Age	% of Vehicles	2008 Fuel Efficiency (mpg)	2020 Fuel Efficiency (mpg)	Reduction
0-3 years	25%	22.6	28.8	21.5%
4-7 years	25%	21.6	26.7	19.1%
8-11 years	25%	21.0	25.1	16.3%
12+ years	25%	20.8	22.1	5.9%
Overall Light Truck				15.7%

According to the National Automobile Dealers Association's Data 2011 report⁶, about 51.7% of new vehicle sales have been light trucks since the year 2000. For future projections we'll assume a 50% split between cars and light trucks. This yields a 15.1% reduction in fuel consumption based on improving vehicle efficiencies. When combined with the expected increase in vehicle miles travelled, we'd expect an 8.9% reduction in transportation fuel usage by 2020.

Residential Emissions:

Gains in energy efficiency over the last 30 years has been largely offset by increases in the number of households and increased usage of appliances⁷. The future likely means a level energy usage by households if there are no changes in usage patterns.

Maine is a member of the Regional Greenhouse Gas Initiative, RGGI. This regional agreement requires member states to cap GHG emissions from electric power generation and reduce those emissions 10% by 2018. Currently 14% of Topsham's emissions are from electricity. The percentage of electricity we use is likely to increase based on the historical trend of increasing use of appliances, particularly home electronics. The increased usage would likely wipe out any reductions in emissions from RGGI.

⁶ <http://www.nada.org/Publications/NADADATA/2011/default>

⁷ <http://www.eia.gov/consumption/residential/>

2.4 Greenhouse Gas Emissions Reduction Target

A 20% reduction in emissions is an achievable target and is consistent with the targets that other communities have set. To achieve this goal Topsham will need to do more than rely on national energy efficiency measures in vehicles and homes. The expected increase in transportation efficiency will only represent half of the reduction. Reductions in vehicle usage and a switch to clean energy vehicles will be required to meet the 20% target.

A 20% reduction in residential energy usage can be achieved with aggressive weatherization, some adoption of solar and replacements of older appliances. In section 3.4 we'll show how improvements in efficiency will get us most of the way to our 20% target. Conversion of a small percentage of homes to solar energy and geothermal can provide the remaining reduction.

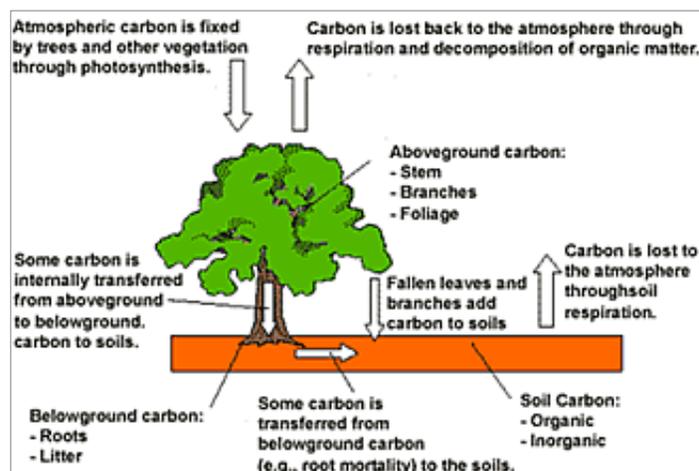
3.1 Summary of Greenhouse Gas Reduction Strategies

The mitigation measures presented in this chapter, as summarized in the tables below, achieve greenhouse gas emissions reductions in the community of 9,439 metric tons CO₂e or approximately 8.1% below the 2008 baseline. When state and national reductions are added, emissions in Topsham would be approximately 21% below 2008 levels -- enough to allow the Town to surpass a reduction target of 20% below the 2008 baseline by 2020. A wide range of programs that exceed the Town’s reduction goal have been included to allow for the consideration and prioritization of each program, based on its estimated cost, annual savings, and GHG reduction benefit, during the consideration of new programs, development projects, and funding opportunities.

Table 3: Mitigation Measures for Community Emissions

Mitigation Measure	Tons CO ₂ e	Reduction %
Reduced vehicle usage	4,445	3.82%
National CAFE standards	13,425	11.54%
Green building and weatherization	3,272	2.81%
Installation of renewable energy systems	273	0.23%
Appliance and lighting upgrades	1,377	1.18%
Regional Greenhouse Gas Initiative	1,577	1.36%
Planting 600 new trees	72	.06%
Total	24,369	21.00%

3.2 Natural Systems, Sequestration and Carbon Offset



8

Carbon sequestration is the process of removing carbon from the atmosphere and depositing it in a new reservoir. Plants and trees remove atmospheric carbon naturally through photosynthesis- they take carbon dioxide from the air and mixing it with sunlight to produce glucose and oxygen. Through this process, a huge pool of carbon is stored in forest biomass. As rising CO2 levels have prompted concern about global climate change, humans have engineered artificial ways to sequester carbon. For instance, carbon capture and storage is a developing technology that removes atmospheric CO2 from the air by pumping it into underground chambers.

General Recommendations:

1. Develop policies and programs that regulate the removal and replacement of significant trees.
2. Support the Tree Committee’s efforts to develop and implement a community-wide tree planting program for streets and parks to significantly increase the carbon storage potential of trees and other vegetation in the community.
3. Support the Tree Committee’s efforts in forest management planning on town-owned properties.
4. To the extent possible, require new development to be planned around existing trees and require new or replacement tree planting as carbon offsets where increased intensity of use, development or activity results in increased GHG emissions.
5. Support the preservation and creation of conservation areas, such as those with tree cover, that provide carbon sequestration benefits.
6. Encourage the creation of community gardens, including possible use of surplus Town properties.
7. Consider fiscal impacts of purchasing carbon offsets before participating in these programs.
8. Monitor extent of forested land cover in Topsham.

8 [Source: [US Environmental Protection Agency \(EPA\)](https://www.epa.gov/carbon)]

3.3 Land Use and Transportation

Transportation and land use development are strongly interrelated. The more suburban the development (i.e., low density housing which causes residents to live further from town centers), the less viable are public transit systems and other alternative modes of transportation such as walking or biking, and the more dependent residents become on the automobile. Studies have shown that people who live near transit drive between 20 and 40% less and that low-density suburban development generates twice as much GHG emissions per capita than a more dense urban development pattern. As a result, the transportation sector is one of the largest sources of GHG emissions. Though the State of Maine is known for its environmental consciousness, it is also known for its low-density developments, dispersed homes, multi-vehicle households, and consumerism. It also ranks among the highest in the U.S. in terms of per capita GHG emissions.



Recommended Actions

There is no single action that will enable Topsham to meet its GHG emissions target for 2020. Therefore we recommend a number of small actions that will put the town on a path to reducing its energy and emissions in the long run.

1. Reduce GHG emissions through the General Plan and project review processes.
 - a. Promote compact and efficient development, such as orienting new development to capitalize on access to alternate modes of transportation and local services and shopping.
 - b. Encourage the existing development transfer offset program to allow denser development closer to town services.
 - c. Promote the development of workforce housing for local employees and second units for in-home providers of childcare, healthcare and building and grounds maintenance.
 - d. Make reductions in vehicle miles traveled (VMT) and the use of alternative transportation high-priority criteria in the evaluation of policy, program and project alternatives.
2. Encourage bicycling and walking as a safe and efficient means to travel around Topsham.
 - a. Provide and maintain shared use paths as identified in the Topsham Trails Plan (2005).
 - b. Improve bicycle and pedestrian safety at intersections and install bicycle loop detectors at signalized intersections to help cyclists trip the traffic signal.
 - c. Install traffic calming measures to control speeding and improve pedestrian and cyclist safety.
 - d. Implement "Complete Streets" policies to ensure the needs of bicyclists, pedestrians and the disabled are considered in the transportation element of any new capital improvement or development project.

- e. Install sidewalks and pathways where feasible.
 - f. Provide bicycle parking at large Town-sponsored events and encourage hosts of large events to do the same.
 - h. Encourage employers to provide bicycle parking, shower and changing facilities for employees in their development plans and as a component in all commuting and traffic demand management programs.
 - i. Promote “Share the Road” strategies to improve bicycle safety and improve compliance with traffic laws.
 - j. Participate in programs that encourage bicycling and walking, such as Safe Routes to School programs.
3. Support and promote public transit.
- a. Work with neighboring towns, organizations, regional transit providers/ planners (Midcoast Council of Governments - MCOG) and the Maine Department of Transportation to increase both the frequency and types of transit services available to Topsham residents, employees and visitors.
 - b. Work with transit providers/ planners (MCOG and the Brunswick Explorer) to develop an expanded bus service in Topsham.
4. Support and promote ridesharing and car sharing programs.
- a. Encourage the creation of a system to facilitate informal carpools for Topsham commuters, a local “Go Maine” if you will.
 - c. Work with the MCOG to develop a community car sharing program, when determined to be feasible.
5. Educate residents and employees about the health and environmental benefits of walking, cycling, taking public transit and ridesharing, and provide information to assist in these modes of travel
6. Support and promote local farmers markets.
7. Encourage the use of fuel-efficient and low GHG-emitting vehicles and driver behaviors.
- a. Encourage private development to provide prioritized parking for hybrid, electric and carpool vehicles.
 - b. Adopt and implement a policy requiring limitations on idling for commercial vehicles, construction vehicles, buses and other similar vehicles, beyond state law, where feasible.
8. Purchase or lease low or zero-emissions vehicles and the most fuel efficient models possible for the Town fleet, including police patrol cars and construction vehicles.
9. Provide Town employees with incentives to use alternatives to single occupant auto commuting, such as transit incentives, bicycle facilities, ridesharing services and subsidies, flexible schedules and telecommuting when practical.
10. Increase ownership of plug-in electric vehicles (EV) by providing EV charging station infrastructure, where appropriate, and encouraging property owners and developers to install EV charging stations in commercial and residential projects.



3.4 Sustainable Building, Energy Efficiency and Renewable Energy



Green building refers to construction development practices take into consideration the environmental impacts of building, including the type of materials used, general sustainability, energy efficiency, water use, accessibility to transportation, and effects on natural areas and wildlife. An example of green building in practice is the Leadership in Energy and Environmental Design (LEED) certification, which is granted to structures that meet specific green building standards.

According to the U.S. Department of Energy, buildings account for approximately 39% of total energy use, over 12% of the total water consumption, 68% of total electricity consumption, and 38% of all carbon dioxide emissions annually in the United States.

With energy prices likely to double between 2008 and 2020, green building design is likely to dominate in the next decade. Many technologies like passive solar design and geothermal heat pumps can be incorporated into new construction at much lower costs than retrofitting existing buildings. A combination of technologies can be incorporated into a new building to reduce its carbon energy demands to near zero. The payback for any added cost would be under 10 years by 2020. With very little new construction expected in the immediate future, we'd expect that 75% of new buildings added by 2020 will have ½ or less the emissions of new buildings in 2008.

LEED standards for new construction will help hold back the increase in building energy usage. Upgrades to existing buildings will provide the bulk of the reductions call for in this plan. Good estimates of the number of homes that are inadequately insulated are hard to find. On the low end there is the Energy Information Administration's 2001 survey results.¹⁰ 50% of households indicated that their home was drafty some, most or all the time. Other estimates by the Natural Resources Council of Maine are that 75% of homes could use weatherization. Conservatively we estimate that 50% of the homes and businesses in Topsham could reduce their heating energy usage by 25% with weatherization and energy upgrades. This would result in a 12.5% reduction in overall energy usage in the residential and commercial sector.

The first step to improving a building's energy efficiency is to conduct an energy audit. An audit provides a cost benefit analysis of each improvement. The results of the Energy Information Administration indicates that a majority of households believe their homes to be well or adequately insulated.⁹ This fact will make the task of convincing people to get an energy audit difficult.

¹⁰ <http://www.eia.gov/FTP/ROOT/features/insulation.pdf>

The second largest reduction could come from energy efficient appliances and lighting. In New England 3% of a home's energy usage is for refrigeration.¹¹ Replacing all the old refrigerators would cut this to 1/3 current levels for a 2% reduction overall. Replacing a washer with a high efficiency model would cut energy used to heat water. Over 15% of a home's energy usage is for heating hot water. Reducing the hot water used with a high efficiency washer would result in a 2% reduction. Both refrigerators and washers have high penetration already so improvements in efficiency aren't likely to wipe out with increases in the number of households using them.

Higher penetration of energy efficient lighting could produce a significant reduction in emissions. In 2008 70% of households had installed 1 or more CFL lamps. In Maine the average is about 5 CFLs per household. However, the total socket saturation is was only 11%.¹² CFL lamps consume 1/4 the energy of incandescent lamps. Since new efficiency standards for lighting take effect in 2012, we'd expect a high saturation of CFL and LED lamps by 2020. Estimates of household energy usage for lighting vary widely. We'll use the EnergyStar program's estimate of 12%.¹³ Replacement of 55% of the remaining sockets will result in a maximum of 5% reduction in overall energy consumption.

To reach our target, some conversion to clean energy will be needed. The cost of residential solar energy systems has declined significantly in the last two years. This trend is likely to continue. Each home that converts to solar would get 30% of their energy needs with no emissions. Should 3.3% (128) of the homes in Topsham install solar PV and/or solar hot water systems there would be a 1% reduction in energy from other sources like the electric grid, oil and gas. The bulk of the solar will replace power from the grid. About ½ of Central Maine Power's standard offer electricity is produced from carbon sources. So the net reduction here is 0.5%.

In Topsham, there could be a number of ways to support green building. Examples include:

- Land use plans generate designs that guide people toward more sustainable lifestyles.
- Encourage further weatherization (and winterization- see Habitat for Humanity for more info)
- PACE
- Publicize green building techniques and builders using them.
- A public display on the town website of buildings, or even houses, that have installed significant retrofits and the attributed cost savings of these energy improvements.

¹¹ <http://www.eia.gov/consumption/residential/data/2005/c&e/summary/pdf/tableus12.pdf>

¹² http://www.energystar.gov/ia/products/downloads/CFL_Market_Profile.pdf

¹³ http://www.energystar.gov/index.cfm?c=products.pr_save_energy_at_home

3.5 Purchasing

By adopting environmentally preferable purchasing standards and policies, Topsham can measurably reduce its GHG emissions, while benefiting from reduced toxic exposures, pollution prevention, and, in many instances, reduced operating costs. Often, purchases that are environmentally preferable are also less expensive. These include:

- energy star certified appliances,
- high-efficiency lighting and HVAC units,
- duplexing printers, and more.

Many durable manufactured goods – from computers to motor vehicles — embody much of the energy used (and carbon emitted) over their life span in their initial production. Optimizing purchasing schedules according to ongoing needs assessment, rather than a fixed replacement schedule, can lower the environmental burden and cost.



Recommended Actions

1. Prioritize purchases of products and services with superior environmental performance and purchase Energy Star-rated office equipment and appliances.
2. Implement operational policies to reduce energy use and conserve resources, such as setting the printer’s default option to duplex printing. Continue to shut off computers and imaging equipment at night.
3. Purchase products only when needed and not solely on a replacement schedule.
4. Create an interdepartmental Sustainability Team to review and implement a Sustainable Purchasing Policy & Implementation Plan. Engage Town staff in support and implementation of green purchasing goals and processes.
8. Provide each Town department with an easy reference binder for finding “sustainable” products and distributors.
9. Continue to purchase office paper with 30% recycled content.

Recommended Actions

1. Adopt a policy to achieve zero waste going to landfills.
2. Provide education and publicity about reducing waste and available recycling services.
3. Review and revise the Town’s franchise agreement with its waste hauler to ensure waste reduction and diversion rates are maximized.
4. Promote commercial and residential composting.
 - a. Partner with Master Gardeners, Cooperative Extensions, and others to provide education and resources to residents on backyard and curbside composting.
 - b. Explore commercial and residential food waste collection in Topsham to create centrally located facilities to compost all green and food waste. Currently Topsham composts yard wastes.
5. Strengthen recycling programs, purchasing policies, and employee education at Town facilities.

3.7 Water and Wastewater

Although water supply in Maine is fairly stable at this time, our changing climate may actually introduce the Northeast to drought conditions not seen before. At a minimum, towns may have difficulty in ensuring that drinking water capacities are met for their citizens. In addition, demand for water for residential and agricultural irrigation rises with warmer temperatures. The actual impacts of the climate-induced change in water quality, quantity and demand will depend on the changes in water policy and operations, and on the water use patterns of all communities.

Currently, the Brunswick Topsham Water District provides residents with drinking water supplies from their facility off of the River Road in Topsham. The BTWD has developed aquifer protection overlay zones in both towns with the help of the municipalities. The zones largely overlay aquifer recharge areas, some of which have already seen much residential development.



<http://www.yardscaping.org/>

Recommended Actions

1. Assess, maintain and repair existing plumbing fixtures, pipes and irrigation systems in all Town buildings and facilities to minimize water use, including landscaping. As feasible, upgrade and retrofit agency plumbing and irrigation systems with state-of-the-art water conserving technology.
2. Plant materials native to Maine, and encourage the use of drought-tolerant plant material.
3. Minimize turf areas and avoid narrow turf areas, such as in parking strips.

4. Consider water heater upgrade incentives.
5. Conduct water audits on remodels and new homes.
6. Adopt a retrofit program to encourage or require installation of water conservation measures in existing businesses and homes.
7. Provide education about water conservation and available programs and incentives.
8. Allow for the use of grey water for irrigation and other suitable uses to decrease the amount of potable water need by the community.
9. Work cooperatively with identified partners that participate in water conservation outreach programs.

4. PLAN IMPLEMENTATION

Topsham recognizes that responding to and preparing for climate change is a critical step toward a sustainable future. The Town's early actions to reduce its contribution to climate change reflect the Town's history and commitment to decrease the impacts of day-to-day activities on the natural environment while enhancing its vibrant quality of life. Mitigating climate change will require everyone — residents, businesses, government agencies and nonprofit organizations — to work together to implement this plan.

This plan provides a strategy to achieve emission reductions that will achieve the Town's target of xx% below 2008 emissions by the year 2020. A wide range of programs that exceed the Town's reduction goal have been included to allow for the evaluation and prioritization of potential programs and capital improvement projects as new program and funding opportunities arise. Successful implementation of the plan will require that staff and the Town Selectmen identify and commit resources to climate change mitigation activities, and to monitor and report on progress towards meeting emissions reduction goals.

Recommended Actions

1. Monitor and report on the Town's progress annually.
2. Update the baseline greenhouse gas emissions inventory every five years, beginning in 2013.
3. Continue and expand public and private partnerships that support implementation of the Climate Action Plan
4. Identify funding sources for recommended actions, and pursue local, regional, state and federal grants as appropriate.
5. Review and update the Climate Action Plan every five years.
6. Amend the Climate Action Plan as necessary to comply with state regulations.