

The Climate Action Plan

A Plan to Save Energy and Reduce
Greenhouse Gas Emissions

*Town of Brattleboro, Vermont
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Cities for Climate Protection Campaign
International Council of Local Environmental Initiatives

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Executive Summary

On January 8, 2002, the Town of Brattleboro Selectboard passed a resolution committing Town government, businesses and citizens to take steps to reduce emissions of greenhouse gases that are causing global climate change. In doing so, the Town joined a group of more than 550 cities and counties around the world who are taking part in the Cities for Climate Protection Campaign, sponsored by the International Council for Local Environmental Initiatives (ICLEI).

The Cities for Climate Protection Campaign follows a 'Five Milestone' Process:
1) Complete a Greenhouse Gas Emissions Inventory and Report; 2) Set an Emissions Reduction Target; 3) Complete a Local Climate Action Plan to Reduce Greenhouse Gas Emissions; 4) Implement the Local Climate Action Plan; and 5) Monitor the Impact of Emissions Reductions Measures.

The Greenhouse Gas Inventory Report was completed in the summer of 2002. This report indicated that in 2000, 195,520 tons of eCO₂ were released from sources in Brattleboro. The Town has set a goal of reducing overall emissions by 10% below 2000 levels by 2010. In order to reach this target, 19,552 tons of eCO₂ will have to be eliminated over the next seven years. More specifically, the Town has committed to reducing emissions from Town-owned buildings and operations by 20% below 2000 levels by 2010, requiring a decrease of 680 tons of eCO₂.

This document demonstrates the completion of the third Milestone – the drafting of a Local Climate Action Plan. Brattleboro's Climate Action Plan is an outline of measures that the Town has already undertaken, and measures that the Town is encouraged to take, in order to achieve the greenhouse gas reduction targets by 2010. Measures in the Plan are designed to increase energy efficiency and reduce traffic and solid waste volumes, while raising the public's awareness of solutions to global climate change. The Plan presents information on implementation costs, financial savings and investment payback periods; co-benefits of the measure aside from the emissions reductions; and success stories from other municipalities that have undertaken similar projects.

The Brattleboro Climate Protection Task Force, working with Town officials, is charged with the task of determining which measures are most appropriate for the Town to implement in the next several years. The Task Force will continue as a working entity to help coordinate the implementation of these measures.

The Task Force recommends that the Town pursue a two-part strategy to achieve the reduction targets:

- 1) Provide leadership through municipal buildings and operations
- 2) Develop and lead a public education program and Ten Percent Challenge Campaign

Table 1 highlights several measures outlined in the Plan that have large CO₂ savings and/or short payback periods on investments that the Town makes on emission reduction technologies or programs.

Actions taken to reduce greenhouse gas emissions not only contribute to the overall regional and global mitigation of climate change, but also provide the Town with many local benefits: increased financial savings through energy efficiency, the creation of new jobs, and improved air quality.

Table 1 Selected Emissions Reduction Measures

Measure	Status	Estimated Annual CO ₂ Reduction (Tons)	Estimated Annual Cost Savings	Estimated Implementation Cost	Payback
LED Traffic Signals	Existing	negligible	\$1,500	\$1,785	1.2 years
Convert Remaining Signals to LED	Proposed	negligible	\$3,773	\$4,480	1.2 years
10% Challenge Energy Efficiency Program - Residential	Proposed	3793 tons	\$819,392	\$5,000	0 years
10% Challenge Energy Efficiency Program – Commercial	Proposed	780 tons	\$44,423	\$2,000	0 years
Efficiency Upgrades to Town Buildings	Proposed	136 tons	\$64,901	\$0	0 years
Efficiency Upgrades to School Buildings	Proposed	55 tons	\$14,489	\$0	0 years
Wood-Chip Heating System at Brattleboro Union High School	Planned	378 tons	\$55,000	\$300,000	5.5 years
Conversion of Town Fleet Vehicles to Biodiesel	Proposed	72 tons	\$0	\$5,545	0 years
Use of Compact Fluorescents in Residences	Proposed	negligible	\$146,678	\$77,632	0 years
Use of Compact Fluorescents in Commercial Buildings	Proposed	negligible	\$4,280,631		
Bicycling Outreach Program	Proposed	7 tons	\$563	\$0	0 years
Brattleboro-Bennington Bus Line	Proposed	421 tons	\$45,624		
TOTAL		5642 tons	\$5,476,974	\$396,442	
Establish Energy Efficiency/ Environmental Coordinator Position	Proposed	4764 tons (These figures are not included in totals because they reflect measures already accounted for in the Table)	\$937,768 (These figures are not included in totals because they reflect measures already accounted for in the Table)	\$16,000	0 years

1.1.1 Introduction

The Cities for Climate Protection (CCP) Campaign focuses on sources and quantities of greenhouse gas emissions resulting from the burning of fossil fuels and recommends actions to reduce those emissions at the municipal level. The emissions reduction efforts are aimed at two primary greenhouse gases: CO₂ and methane. CO₂ is released when fossil fuels - such as oil, coal and natural gas - are burned. Methane is emitted in urban areas when garbage and waste products decompose, primarily in landfills. There is widespread scientific agreement that the increasing quantity of these gases in the atmosphere is causing temperatures to rise and increasing the frequency and severity of extreme weather events. The accumulation of these greenhouse gases is a major threat to the climate stability of the earth. No other issue threatens our planet with such dramatic, far-reaching impacts, and no other issue is so clearly a worldwide problem. At the same time, many of the most promising solutions to climate change are local initiatives that the Town can control.

This Local Action Plan on Climate Change outlines measures that the Town of Brattleboro can take to reduce greenhouse gas emissions from municipal and community sources. The first part of the document presents further information on climate change and outlines potential impacts of the phenomenon in Brattleboro and across the globe. Next, the Plan describes the Town's involvement with the CCP campaign, and discusses the CCP Milestones that have already been completed. A brief discussion of the methodology used to select and quantify the impacts of the greenhouse gas reduction measures precedes descriptions of the actual measures in more detail.

1.2.1 Climate Change

There is a consensus among the mainstream scientific community that changes in our climate are occurring now, and that human activities are the primary cause. The world's leading scientists predict that global average temperature will rise from 2.7 to 11 degrees F. within our children's lifetimes. Already, effects of climate change are being seen, from melting of the Arctic permafrost, to the gradual disappearance of glaciers worldwide, to rising sea levels around islands and other low-lying areas. Erratic weather and extreme events such as droughts, floods, heat waves, avalanches and hurricanes are becoming more common.

The primary cause of global climate change is the burning of fossil fuels such as petroleum, coal, and natural gas through the activities of modern industrial societies. These activities release gases such as carbon dioxide and methane that accumulate in the atmosphere and trap the sun's heat, thereby warming the earth - the so-called "greenhouse effect". The greenhouse effect is essential for life on earth, but rapidly increasing levels of greenhouse gases during the past 200 years are now destabilizing the climate. Average global temperature has risen an unprecedented 1-2 degrees F during this period. Carbon dioxide concentrations in the atmosphere have reached their highest level in 160,000 years, and are rising at a rate 500 times higher than ever before in history.

In Vermont, the effects of climate change over the next century are likely to be significant. They may include the migration of our northern hardwood forests northward to cooler areas, effectively ending the \$13.4 million maple sugaring industry and curtailing the fall foliage season, which contributes \$1.1 billion to Vermont's economy. The \$1.1 billion skiing industry will be hard-hit, as warmer winters bring less snow, fewer tourists, and less tax money. We will have to cope with hotter summers and more frequent floods, droughts, and intense storms, with more money diverted to repair damage from these events. Our natural resources will likely experience a broad range of negative trends and losses, and ecological diversity will decline. As members of the world community, we will have to deal with challenges involving food security, human health, water resources, and disruptions to natural systems.

The world is beginning to respond to this massive environmental problem. Though action has been slow at the national level, local governments, states, and regions are addressing the challenge of reducing greenhouse gases in a number of creative ways. Policies that encourage energy conservation and waste reduction are often more effective at the municipal or county level, and can be implemented quickly. Additional benefits for a community include savings in energy costs, improvements in air quality, and

increased livability. Our hope is that more and more communities will join this campaign as it progresses, and begin to make significant reductions in the level of climate-changing gases now being produced.

1.3.1 The Cities for Climate Protection Campaign

The Cities for Climate Protection Campaign is a global project of the International Council for Local Environmental Initiatives (ICLEI), which is a membership association of local governments dedicated to the prevention and solution of global environmental problems through local action. This Campaign was established by ICLEI in 1993 at an international summit of municipal leaders held at the U.N. Headquarters in New York. Over the past ten years the CCP has engaged over 550 municipal governments, including over 130 in the U.S., in a worldwide effort to slow the earth's warming. Other participating cities in our region include Keene, NH, Amherst, MA, and Burlington, VT.

1.3.2 The Five Milestone Process

The Cities for Climate Protection Campaign follows a 'Five Milestone' process:

- Milestone One: Conduct a Greenhouse Gas Emissions Inventory
- Milestone Two: Set a Greenhouse Gas Emissions Reduction Target
- Milestone Three: Develop a Local Climate Action Plan
- Milestone Four: Implement the Local Climate Action Plan
- Milestone Five: Monitor Emissions Reductions

1.3.3 The Greenhouse Gas Emissions Inventory and Reduction Target

The Town has already completed Milestones One and Two. In 2002, it conducted a Greenhouse Gas Emissions Inventory for the baseline year of 2000. The main sources examined in this inventory were residential and commercial energy use, transportation and solid waste. The results of the inventory show that the Town was responsible for 195,520 tons of eCO₂ (equivalent CO₂ levels representing total quantity of methane and CO₂ emissions resulting from energy used, fuel used and landfilled waste) in 2000.

Table 1 Total Greenhouse Gas (GHG) Emissions in Brattleboro

Year	Tons eCO ₂	Energy Use (BTUs)	Per Capita Emissions
2000	195,520	2,762,409	16.3 tons/person
2010 (“business as usual” forecast)	191,827	2,717,322	16.0 tons/person
2010 (emissions target achieved)	175,968	2,492,671	14.7 tons/person

Source: Town of Brattleboro Greenhouse Gas Inventory, Cameron 2002

The Reduction Target is the specific GHG reduction goal that the Town aims to achieve by a designated year. Brattleboro has set a Reduction Target of lowering overall emissions in 2010 to 10% below the total amount of emissions released in 2000. In order to reach this target, a reduction of 19,552 tons of eCO₂ will be required.

More specifically, the Town has committed to reducing emissions from Town-owned buildings and operations by 20% by 2010. The Town generated 3401 tons of eCO₂ in FY 2001, and will need to reduce its emissions by 680 tons to achieve a 20% reduction by 2010.

1.4.1 The Local Action Plan

The objective of the Brattleboro Climate Action Plan is to identify actions that the community can undertake to reduce greenhouse gas emissions. The combined benefits of existing, pending and newly proposed measures identified in this plan aim to reduce Brattleboro’s annual emissions to 10% below 2000 levels by the year 2010.

The Plan does not provide detailed instructions on how to carry out each of the proposed measures. Since the beginning of the Town's involvement with the CCP campaign, information and resources on greenhouse gas reduction measures has been collected. This material, while relevant and important, was not included in the Plan in the interests of keeping the document to a manageable size. Once the Plan has been adopted however, these materials will serve as excellent reference sources for the actual implementation of proposed measures.

The Action Plan was reviewed by the Brattleboro Climate Protection Task Force, comprised of a cross-section of community leaders with expertise or interest in energy issues. In addition to providing input during the research and development of the proposed measures, the Task Force reviewed and evaluated each of the proposed measures based on the following criteria:

- Cost of initial implementation and annual operation
- CO2 reduction capability
- Environmental impacts
- Public and political support
- Feasibility of the measure

This Plan recommends that the Town pursue a two-part strategy to achieve the reduction targets:

Strategy 1: Provide Leadership through Municipal Buildings and Operations

By working to significantly reduce its own emissions, the Town of Brattleboro is leading the community's climate protection efforts, and is setting an example for residents, businesses, and institutions.

Strategy 2: Develop and Lead a Public Education Program and Ten Percent Challenge Campaign

Public education is essential to generating broad-based community activity and support for climate protection efforts. Brattleboro Climate Protection and the Town should continue and strengthen their efforts to inform residents, businesses, and institutions about opportunities to protect the climate, and to work with these groups to implement efficiency measures. The Task Force recommends that the Selectboard and Town support the development and implementation of a Ten Percent Challenge Campaign. This campaign would provide a means of recognizing individual and collective actions, while helping to encourage and track the community's progress toward its climate protection goals.

Upon approval of the Local Action Plan by the Selectboard, the Task Force will work with Town officials and with community members to prioritize and help to implement measures in the Climate Action Plan.

1.4.2 Organization of the Plan

The measures in the Plan are grouped according to the following categories:

- Municipal Transportation and Community Transportation
- Municipal Energy and Community Energy
- Municipal Waste and Community Waste
- Comprehensive and Other Measures

Each section of the plan outlines existing, as well as newly proposed measures:

Existing Measures: These are either current initiatives that are being implemented, or are in the developmental stage. These measures primarily consist of efforts to conserve energy or reduce waste. However, programs with goals other than energy conservation and waste reduction that have greenhouse reduction benefits are also recognized.

Proposed Measures: These are new initiatives that have not yet been considered for implementation. Many of them follow the example of emission reduction efforts in other communities, but have been restructured to address the unique needs of Brattleboro.

Each measure listing contains the following information:

- A description of the measure
- Amount of CO₂ and financial savings to be gained
- Implementation costs and payback period. It should be noted that the length of many payback periods will decrease as emissions reduction technology becomes less expensive and as the necessary infrastructure for many of the proposed measures becomes more widely available.
- Co-benefits that result from implementation, aside from the reduction of greenhouse gas emissions
- Success stories from other municipalities that have undertaken a similar project
- In each section, existing measures are outlined first, followed by proposed measures. In some cases, a follow-up measure is proposed, in which the impact of the Town increasing its efforts in a particular area is evaluated. In cases where it was difficult to quantify the impact of the measure in terms of emissions reductions and financial savings, these measures have been left until the end of the appropriate section.

The impact of the measures on greenhouse gas emissions and financial expenditures was calculated, using special software developed by Torrie Smith Associates. The software covers both municipal and community-wide greenhouse gas emissions from energy use and waste. Data on energy consumption is entered into the software, which then converts it to emissions of eCO₂. Data on municipal and community energy use came from Town staff, government documents and experts in the fields of transportation, waste and energy use. Where specific data was unavailable, attempts were made to base calculations on averages or estimates from similar projects or measures. The methodologies used to calculate the impact of measures are listed in Appendix B, Measure Quantification Notes. This Appendix also lists all assumptions and data sources used in the calculations.

Table 2 2000 Brattleboro Emissions by Sector

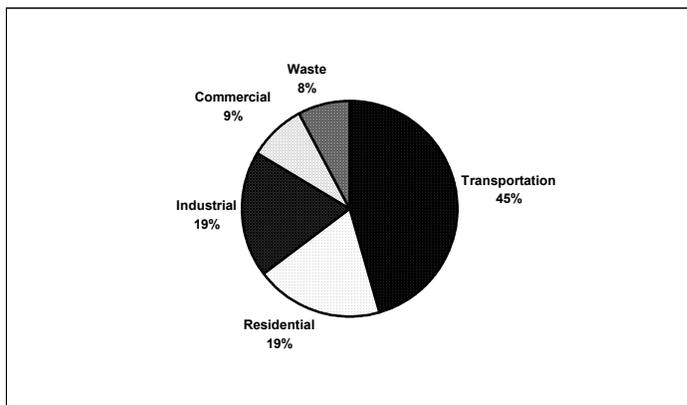
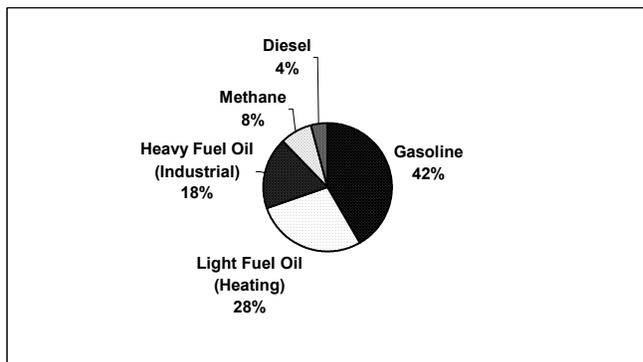


Table 3 2000 Brattleboro Emissions by Source



Police Units on Bicycle

Municipal Transportation

Measure Status: Existing

Responsible Department: Police

CO2 Savings: **12 tons**

Financial Savings by 2010 (Fuel and Maintenance Only): **\$12,740**

The Brattleboro Police Department currently has four bicycles that are used for patrols. These patrols operate nine months out of the year, with heaviest use during the summer months. The police bicycle program has resulted in many benefits for Brattleboro. Moving police out of cars and onto bicycles reduces municipal fuel use and provides visible evidence that bicycling is a legitimate option for transportation. Bike police also have a positive impact on crime, as bicycles are more difficult to spot than cruisers, and allow access to areas inaccessible to cars. In addition, the patrols are good for public relations, as they make police more approachable and can be used for special events. The four mountain bikes have contributed to the annual elimination of 12 tons of CO2 and savings of \$1,820 in avoided fuel costs.

Cost of bikes (2 bought new, 2 found property): $2 \times \$1,000 = \$2,000$

Average maintenance cost of automobile: $14,000 \times \$0.13$ (cost per mile) = \$1,820

Total Implementation Cost: \$2,000

Financial Savings from avoided fuel costs - \$1,820/year

Payback: 1.1 years

Co-Benefits

- Reduce traffic congestion
- Reduce air pollution emissions that contribute to visibility degradation and health problems
- Promote healthy forms of transportation, police officers are more physically fit
- Good for community relations – police officers become more approachable
- Police able to patrol areas unreachable by car
- Can influence helmet use and adherence to bicycle traffic and safety rules

Success Stories

The City of Los Angeles has 250 officers who patrol on bicycles. These bicycles have displaced 125 squad cars and resulted in an annual reduction of 1,111 tons of CO2

Conversion of Fleet Vehicles to Biodiesel

Municipal Transportation

Measure status: Proposed

Responsible Departments: Public Works, Fire, Planning Services

CO2 Savings: **72 tons**

The Town could use biodiesel in diesel vehicles used by the Highway Department, Fire Department, and the Beeline bus service. Biodiesel is a clean, renewable diesel fuel substitute produced from agricultural resources such as soybeans or rapeseed. Vegetable oil from these plants, either used or virgin, is processed with lye and methanol to form biodiesel. It can be burned in any standard, unmodified diesel engine, most commonly as a 20% blend. Current biodiesel fleets have reported operational consistency over extended periods of use – engine performance, payload power and range are completely unaltered. If Brattleboro's 32 heavy trucks, equipment vehicles and buses currently running on diesel were fueled with biodiesel, 72 tons of CO2 could be eliminated. The Town should also investigate low sulfur diesel, which reduces the particulate emissions associated with conventional diesel.

- There is no cost to convert engines to run on biodiesel fuel.
- A 20% blend of biodiesel costs an average of \$.20/gallon more than petroleum diesel. However, when the improved health effects and cost of meeting tougher emissions standards are considered, an emissions system based on biodiesel may be the best option. Meanwhile, there is a great deal of research underway that is exploring ways to reduce the cost of biodiesel.

Co-Benefits

- Reduces particulate emissions
- Does not require special storage
- No engine modifications necessary
- Non-toxic to plants, animals and humans
- Biodegradable fuel
- Renewable energy source

Success Stories

The City of Keene, NH and Keene State College run many of their diesel vehicles on biodiesel, with good success. The Windham Solid Waste Management District recently began using biodiesel in some of their equipment.

Efficient Vehicles Ordinance

Municipal Transportation

Measure Status: Proposed
Responsible Department: Selectboard
CO2 Savings: Unknown

The Town of Brattleboro could pass an ordinance requiring that all new vehicles purchased by the Town for municipal use are the most fuel-efficient vehicle allowable for the job. Current vehicles in every department would be evaluated to determine if the size and the fuel type of the vehicles are appropriate based on the frequency and the type of usage. Where feasible, the Town would purchase smaller vehicles for each department. When upgrading the fleet, the Town would take into account the main use of the vehicle and will purchase the smallest and most fuel-efficient vehicle in the class required for the job.

The Towns of Arlington and Amherst, Massachusetts have passed similar ordinances.

Hybrid Gas/Electric Vehicles in Town Fleet

Municipal Transportation

Measure Status: Proposed
Responsible Department: Public Works and Planning Services
CO2 Savings in 2010: Unknown

The Town of Brattleboro should encourage the use of hybrid and electric vehicles in the Town vehicle fleet, including the Beeline bus service, wherever feasible. These vehicles would make the most sense for uses that do not require extra power or high speeds, such as parking vans.

Co-Benefits

- More efficient use of taxpayer dollars
- Fuel cost savings can be used for other Public Works projects/needs
- Reduces consumption of non-renewable resources
- Encourages market for alternative fuels
- Sets example for residents and other communities – Showcases Brattleboro as innovative leader
- Reduce air pollution emissions that contribute to visibility degradation and health problems

Success Stories

EVermont, a non-profit organization that promotes the use of alternative-fueled vehicles in Vermont, is testing a Solectria/ Bluebird hybrid diesel-electric school bus in partnership with the University of Vermont. The bus is scheduled to begin operating in Burlington in October 2003.

Bicycling/Walking Outreach Program

Community Transportation

Measure Status: Existing
Responsible Department: Windham Regional Commission
CO2 Savings: **7 tons**
Annual Savings: **\$563**

The four greatest impediments for commuters choosing cycling or walking to work for errands are safety, weather, distance, and inadequate facilities for storage or changing at destinations. While Brattleboro cannot control weather or people's commuting distance, the Town benefits from the walk-ability of its downtown and bike-ability of some roads in the area. In locations such as downtown where the infrastructure is in place, bicycling and walking trips can take the place of certain auto trips.

Improvements such as new and expanded bike paths, wider road shoulders, bicycle storage facilities, safe sidewalks, and crossings can encourage more bicycling and walking in and around Brattleboro. The Windham Regional Commission's Bike/Pedestrian committee sponsors a week-long series of events each spring to promote increased bicycling and walking. Shifting an additional 10 trips from single-occupant automobiles to bicycles through the bicycle outreach program and new bike paths could reduce up to 14,052 pounds of CO2 a year and could save Brattleboro commuters up to \$563 a year in fuel savings.

Calculations:

- 10 reduced round trips per day – or 20 total auto trips reduced per day
- Trips would average 2 miles each (distance from downtown to most residential locations)
- Each day 40 vehicle miles (20 total trips x 2 miles each) would be removed from the network.
- The 40 vehicle miles equate to roughly 1.9 fewer gallons of fuel burned each day (40 miles / 21 mpg)
- The 1.9 fewer gallons of fuel burned each day equates to 38.5 pounds of CO2 each day, or approximately 7.03 tons of CO2 over a year.
- The 1.9 fewer gallons of fuel burned each day equates to \$2.35 saved each day, or approximately \$563 per year.

Co-Benefits

- Reduces traffic congestion, increased social interaction and community building from decreased traffic.
- Reduces air pollution emissions that contribute to visibility degradation and health problems.
- Decreases dependency on foreign oil.
- Promotes a healthy form of transportation.
- Increases safety for cyclists and walkers.
- Showcases the city as bicycle friendly and livable.

Success Stories

The City of Seattle, WA wrote a comprehensive Bike Plan to ensure that safe access and parking facilities would be provided for cyclists throughout the city, as well as to encourage more people to cycle. The City has 28 miles of bike trails, 14 miles of striped bike lanes, and about 90 miles of signed routes. A study conducted before and after a project that added bicycle lanes to both sides of a street that linked to Seattle's downtown showed that 14,500 single occupancy vehicle miles traveled were avoided and that 7 tons of CO2 were eliminated as a result of the improvements.

Town and Regional Bus Service

Community Transportation

Measure Status: Existing, could be expanded
Responsible Department: Planning Services
CO2 Savings: Unknown

The Town of Brattleboro currently operates the Town bus system, called the Beeline. There are plans to expand the number of buses running in order to reduce the headways (time between buses), and possibly to reconfigure the route setup to create loops. Long-term plans are to have three buses running on three separate loops, connecting at a central hub at the Town's new transit center. The buses will make connections at the train station and at planned park-and-ride facilities at each exit on I-91. These changes should make the bus service more practical and convenient as an alternative to car use. There is currently a regional service between Brattleboro and Bellows Falls, with plans to add a connection to a Brattleboro-Bennington route. Another possibility is a bus line serving the West River Valley (Route 30).

Bicycle Paths

Community Transportation

Measure Status: Planned
Responsible Department: Public Works
CO2 Savings: Unknown

The planned Whetstone Brook Pathway will run from Main Street to Sunset Lake Road by way of the Downtown Transportation Center, Living Memorial Park, and the Academy School. As the first stage of the project, a pedestrian bridge over Whetstone Brook was completed in Summer 2003.

The Connecticut River Pathway will run from the Fort Hill Bridge just south of the Vernon Road wastewater treatment plant north to the Hinsdale Bridge and to the Veteran's Memorial (North) Bridge on Putney Road, just across from the beginning of the West River Trail. The Fort Hill Bridge would connect over the Connecticut River to the extensive New Hampshire trail system. Once the new Hinsdale Bridge is constructed about 1/8 mile south of the existing bridge, the existing truss bridges will be turned over to bicycle/pedestrian use. This project will be completed in approximately 10 years.

Brattleboro – Bennington Bus Line

Community Transportation

Measure Status: Planned
Responsible Department: Windham Regional Commission
CO2 Savings: **421 tons**
Annual Financial Savings in avoided fuel costs: **\$45,624**

This proposed regional bus line would operate between Brattleboro and Bennington, with stops in Marlboro, Wilmington, Dover, Searsburg, and Woodford.

A Brattleboro-to-Bennington Feasibility Study was completed in March 2001. Since then there have been no new action steps towards connecting the two towns via public transit. In February 2003, the Vermont Department of Transportation alerted all Regional Planning Commissions that no new projects will receive funding, at least in the next six months. Funding could change in FY04 (beginning July 1, 2003).

No Idling Campaign

Community Transportation

Measure Status: Proposed
Responsible Department: Brattleboro Climate Protection, Selectboard
CO2 Savings: Unknown

The Town could institute a “no-idling” public education campaign and require a clause in its contracts with construction firms prohibiting idling. Idling a car or truck for more than ten seconds uses more fuel than restarting the engine. Idling wastes money, damages the environment, and has a negative effect on human health. Children are particularly vulnerable to the air pollution caused by vehicle emissions because they breathe faster than adults and inhale more air per pound of body weight. In addition, there is a direct correlation between air pollution and asthma in children, which has significantly increased in recent years.

Vehicle idling is responsible for millions of dollars per year in wasted fuel. Idling for 10 minutes per day wastes an average of 26 gallons of gasoline per year. An average individual can expect to save more than \$40 per year by simply turning off their engine.

Contrary to popular belief, idling is an ineffective way to warm up a car and can actually damage an engine. The best way to warm up an engine is to drive the car.

As part of the Main Street Reconstruction Project, a computerized, closed-loop system to coordinate traffic signals is planned. This will result in more efficient pedestrian and traffic flow, with less idling and delay. This project is scheduled to begin in 2007.

Compact Development Zoning Ordinances

Community Transportation

Measure Status: Existing
Responsible Department: Planning Services
CO2 Savings: Unknown

Brattleboro is characteristics of the network of compact, walkable, mixed-use centers and neighborhoods in older cities and towns scattered throughout New England. Many of these centers were historically connected by rail transit and still reflect land-use patterns that were enabled by these strong connections. Brattleboro's overall land-use pattern contributes to the goals of a sustainable community and region by supporting a variety of transportation choices; creating walkable, close-knit mixed neighborhoods, and intertwining the built environment with open space, farmland, and natural beauty.

There are many connections that can be made between land-use patterns and climate change. Mixed-use development and zoning is designed to permit a variety of community activities, locales and services to co-exist in close proximity, thereby reducing the need for extensive automotive travel. Transit-oriented development brings potential riders closer to transit facilities rather than building away from population centers and making people more dependent on roads and automobiles. Put simply, if people live in close proximity to employment, retail, services, and entertainment, they won't need to drive as much. Fewer miles mean less greenhouse gas emissions.

Another beneficial impact of mixed-use and transit-oriented development is to reduce the need for excess parking. Excess parking has costs for all of us. For an individual housing development, excess-parking requirements drive up costs and reduce the potential for amenities such as open space. Open space in Brattleboro provides a variety of environmental and aesthetic benefits including more opportunity for landscaping with woody plants to promote the absorption of CO2. Paved land tends to reduce adjacent property values, increases water pollution and storm water flooding, reduces visual and acoustic privacy and causes urban heat islands (increased local temperature).

On a larger scale, excess parking contributes to traffic congestion and ironically even encourages more car ownership. Numerous studies have shown that higher land use densities are essential to reduce rates of car ownership and miles driven. Generous parking requirements encourage automobile dependency and urban sprawl by increasing the amount of land needed per unit, thus making lower priced urban periphery land relatively more attractive than higher priced, but more accessible, urban locations.

The Town of Brattleboro encourages Planned Unit Developments, Planned Residential Developments, and mixed uses. The downtown (Urban Center) zoning was recently amended to eliminate minimum lot coverage percentage and setbacks, and reduce the minimum lot size. There are minimum new building height requirements, and a ban on new private off-street parking. These measures encourage compact development, discourage sprawl, and can lessen the amount of time that motorists spend on our roads.

Lobby for Increased Federal/State CAFÉ Standards

Community Transportation

Measure status: Proposed

Responsible Department: Selectboard, Brattleboro Climate Protection

CO2 Savings in 2015: **27,206 tons**

Savings in 2015: **\$3,741,756**

This measure evaluates the impact of lobbying for increased CAFÉ (Corporate Average Fuel Economy) standards, to 45 mpg for cars and 35 mpg for light trucks. The fuel economy of the average new passenger vehicle peaked in 1988 and is now less than it was 10 years ago. The stagnation of CAFÉ standards since 1985, doubling of the annual vehicle miles traveled in the last 25 years, and the recent explosion of SUV and light truck sales have eaten away at the nation's fuel efficiency. To reverse these trends and provide benefits to consumers and the environment, fuel economy standards need to be increased to over 40 mpg by 2010 and 55 mpg by 2020.

A fleet of cars and light trucks that reach 40 mpg will cost consumers only about \$1000 to \$2000 extra per vehicle. However, the \$2500 to \$5300 saved on fuel over the life of the vehicle will more than compensate the consumer.

In July 2002, California passed landmark legislation requiring the California Air Resources Board to develop carbon pollution (greenhouse gas) standards for vehicles in model year 2009 and beyond. The standards will apply to automakers' fleet averages, rather than each individual vehicle, and carmakers will be able to partially achieve the standards by reducing pollution from non-auto sources (e.g. factories, etc.). Californians will continue to choose and purchase vehicles of their choice. Other states may follow suit with their own legislation to reduce greenhouse gas emissions.

Co-Benefits

- Cost savings to consumers
- Reduces air pollution emissions that contribute to visibility degradation and health problems
- Decreases dependency on foreign fossil fuel resources
- Encourages innovation and energy efficient technology from automakers, creates new jobs in the automotive industry.

Success Stories

Raising the CAFÉ standards to 45 mpg for cars and 35 mpg for light trucks would save the United States over \$200 billion in petroleum costs over the next ten years, and would save American families about \$590 annually, for a net savings of \$60 billion per year, according to a 1998 Surface Transportation Policy Project.

Wood-Chip Heating System at Brattleboro Union High School

Municipal Energy

Measure status: Planned
Responsible Organization: WSESU
CO2 Savings: **378 tons** (average)
Annual Savings: **\$55,000 (approximate)**
Payback: **5.5 years**

The Windham Southeast Supervisory Union is in the process of renovating the Brattleboro Union High School and Middle School campus on Fairground Road, with completion expected by Fall 2006. In addition to structural energy-efficiency improvements, there are plans to install a district heating system that burns scrap wood chips, replacing the current oil-fired system. These changes will help the school to achieve a 75-80% reduction in emissions.

The estimated start-up cost for the wood-chip system is \$600,000. However, 50% of the cost will be paid by the state of Vermont, bringing the initial local investment to \$300,000. Assuming oil prices of \$0.93 per gallon and wood-chip prices of \$27 per ton and given preliminary estimates of the building heating loads, the wood-chip system is projected to save approximately \$55,000 per year, resulting in a simple payback period of about 5.5 years.

Performance Contracting with an ESCO for Building Efficiency Upgrades - Town

Municipal Energy

Measure Status: Proposed
 Responsible Department: Brattleboro Climate Protection
 CO2 Savings: **136 tons**
 Financial Savings: **\$64,901**

Performance contracting is a means by which a municipality, business, or institution can make its buildings more energy efficient and save money, with no up-front investment and minimal risk. The Town of Brattleboro would contract with an Energy Services Company (ESCO) to perform energy audits and retrofits on Town-owned buildings. The costs of the work would be paid from the guaranteed energy savings resulting from the retrofits, and the ESCO would be responsible for maintenance. The Town could also take advantage of financial incentives from Efficiency Vermont. Assuming a 10% reduction in energy use, the Town would save \$64,901 annually. The savings from this program could be used to establish a revolving energy efficiency fund, to pay for future energy investments in municipal buildings and operations that develop as technology improves.

The following table illustrates proposed building efficiency measures the Town of Brattleboro would implement.

General Municipal Building Efficiency Measures Proposed for 2010

Building Component	Recommendation Highlights
Heating, Ventilation, and Air Conditioning Systems	Bring all systems up to a minimum operating efficiency level, perform building and system seal-up, install efficient control systems, analyze cost-effectiveness of heat recovery ventilation, establish a comprehensive maintenance protocol and train/inform building employees on energy efficiency strategies.
Water Heating Systems	Analyze systems for cost-effective efficiency improvements and fuel conversions, insulate piping and tanks, reduce temperature set-points where appropriate and install low-flow fixtures.
Lighting	Perform lighting assessment and implement alternate lighting strategies where appropriate, improve task lighting, install occupancy sensors and lighting controls where appropriate.
Motors	Implement protocol to install premium efficiency motors at time of replacement, and analyze motors larger than 1 HP for proper sizing and efficiency, replace where cost-effective.
Office Equipment	Implement buying strategy of Energy Star equipment and Products and environmentally sensitive office products, and implement awareness campaigns to encourage "thoughtful" consumption of equipment and products.
New Technologies	Investigate and support cost-effective heat recovery, renewable fuel and cogeneration opportunities, support and provide leadership for the development of a municipal energy system.

Performance Contracting with an ESCO for Building Efficiency Upgrades - WSESU

Municipal Energy

Measure Status: Proposed
 Responsible Department: Brattleboro Climate Protection
 CO2 Savings: **55 tons**
 Financial Savings: **\$14,489**

Performance contracting is a means by which a municipality, business, or institution can make its buildings more energy efficient and save money, with no up-front investment and minimal risk. The Windham Southeast Supervisory Union would contract with an Energy Services Company (ESCO) to perform energy audits and retrofits on WSESU-owned buildings, excluding Brattleboro Union High School and Brattleboro Area Middle

School, which are undergoing renovation. The costs of the work would be paid from the guaranteed energy savings resulting from the retrofits, and the ESCO would be responsible for maintenance. WSESU could also take advantage of financial incentives from Efficiency Vermont. Assuming a 10% reduction in energy use, WSESU would save \$14,489 annually.

The following table illustrates proposed building efficiency measures WSESU would implement.

General Municipal Building Efficiency Measures Proposed for 2010

Building Component	Recommendation Highlights
Heating, Ventilation, and Air Conditioning Systems	Bring all systems up to a minimum operating efficiency level, perform building and system seal-up, install efficient control systems, analyze cost-effectiveness of heat recovery ventilation, establish a comprehensive maintenance protocol and train/inform building employees on energy efficiency strategies.
Water Heating Systems	Analyze systems for cost-effective efficiency improvements and fuel conversions, insulate piping and tanks, reduce temperature set-points where appropriate and install low-flow fixtures.
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Office Equipment	Implement buying strategy of Energy Star equipment and Products and environmentally sensitive office products, and implement awareness campaigns to encourage "thoughtful" consumption of equipment and products.
New Technologies	Investigate and support cost-effective heat recovery, renewable fuel and cogeneration opportunities, support and provide leadership for the development of a municipal energy system.

LED Traffic Signals

Municipal Energy

Measure status: Existing
Responsible Department: Public Works
CO2 Savings: negligible
Financial Savings by 2010: **\$29,400** (conservative estimate)

The Public Works Department installed LED (light-emitting diode) lights for the traffic signals at the Canal St./Fairground Rd., High St./Oak St., and Vernon St./Morningside intersections in early 2002. This project was partially funded with a grant from Efficiency Vermont. LED lights use 80 to 90% less energy than conventional incandescent bulbs. In addition, LED lights last 5-6 times longer than conventional lights, needing replacement every 7-10 years, rather than every 1.5 years.

The conversion resulted in an annual saving of \$1500. If all Town-owned signals were converted to LED lights, the total annual savings would be at least \$4900. Converting pedestrian signals in the downtown area to LED lighting would result in even greater savings.

Life-cycle cost comparison: For a seven-year life, five red incandescent signals cost \$5 to purchase, and have an energy cost of \$475, for a total cost of \$480. One red LED signal costs \$87 to purchase, and has an energy cost of \$20, for a total cost of \$107.

- Cost of converting remaining traffic signals to LED: \$4480 (with Efficiency Vermont incentives)
- Annual financial savings from reduced energy use: \$3773
- Payback: **1.2 years**

Co-benefits

- Saves taxpayer dollars
- Reduces preventative maintenance costs
- Reduces costs of emergency relamping
- Reduces liability of accidents due to burned-out signals
- Saves in disposal of used lightbulbs
- Excellent opportunity to lead by example, investing in a highly cost-effective energy savings measure

Success Stories

After a successful pilot project, the city of Philadelphia decided to install red LEDs in all 2,900 intersections. The new signals used 83% less energy and required 6 times less maintenance than incandescent lights. These savings amounted to \$800,000 annually and have a simple payback of about 4 years. This measure resulted in a 41,490-ton decrease in CO2 emissions.

Municipal Use of Solar Electricity

Municipal Energy

Measure Status: Proposed
Responsible Department: Public Works
CO2 Savings: negligible
Annual Financial Savings: **\$320**

The installation of solar photovoltaic panels on municipal buildings could provide many environmental and economic benefits to the Town. Photovoltaics provide electricity from the sun's rays using superconductor technology. Photovoltaic systems can be used to power lights, appliances, and business equipment. A PV system is a way to guarantee reliable and uninterrupted power at a time when energy shortages are becoming commonplace. While the technology for municipal solar use exists today, there are many barriers, due mostly to the high cost of installation, that stand in the way of this measure. However, programs like the federal Million Solar Roofs initiative are working to overcome barriers such as the lack of consumer and professional knowledge about solar technologies, limited number of qualified solar installers, high system cost, limited financing options and infrastructure barriers to grid-tied systems. This measure anticipates that the Municipal Center will be installed with a 2 kw PV system.

Average implementation cost of PV system: \$11.25/watt. One 2 kw PV system would cost \$11.25 x 2,000 = \$22,500 to install

Financial savings from reduced electricity use: \$320.4

Payback: 70 years. There are many funding opportunities and tax incentives available to municipalities that make the installation of solar technology more economically feasible.

Co-Benefits

- Creates market for renewable energy
- Reduces production of highly toxic nuclear waste
- Sets example for residents and other Municipalities
- Promotes local and independent sources of Electricity
- Decreases dependency on foreign fossil fuels
- Saves on utility bills, reduces vulnerability to fuel price spikes
- Reduces adverse environmental impacts associated with conventional forms of electricity generation

Success Stories

Massachusetts Electric Company teamed up with the city of Medford, Massachusetts to encourage businesses and residents to install solar energy panels on their roofs. Photovoltaic systems were installed at Medford City Hall and Medford High School. Students learn about solar electric systems through solar demonstrations at the high school while officials at city hall are using their systems to learn how the sun can help them save money on their electric bills.

10% Challenge Energy Efficiency Campaign – Residential

Community Energy

Measure Status: Proposed

Responsible Department: Brattleboro Climate Protection

CO2 Savings: **3793 tons**

Financial Savings: **\$813,392**

This measure seeks to achieve a 10% reduction in home energy consumption with the implementation of a residential energy efficiency campaign. This program would support Efficiency Vermont's rebates for lighting and appliances, and SEVCA's weatherization program for low-income residents. It would include energy education and outreach efforts to citizens and schoolchildren, and involve the creation of informational material and workshops that outline available resources, contacts and strategies for energy efficiency. If the program resulted in a 10% decrease in energy consumption in Brattleboro residences, 3793 tons of CO2 would be eliminated and an annual financial savings of \$834,392 could be achieved.

- Implementation of program cost: \$5,000 for educational materials and coordination of workshops.
- Financial Savings (\$834,392) – (\$5,000 + \$16,000 salary) = \$813,392
- Payback: 0 years

Co-Benefits

- Creates market for renewable energy
- Reduces air pollution emissions that contribute to visibility degradation and health problems
- Promotes local and independent sources of electricity
- Decreases dependency on foreign fossil fuel resources
- Saves on utility bills, reduces vulnerability to fuel price spikes

Success Stories

The City of Burlington, VT has instituted a 10% Challenge Campaign aimed at individuals, businesses, and City government. Challenge participants use a website-based calculator to estimate their emissions and track progress toward reduction. Posters, business cards, and materials have helped to create a strong "brand" recognition of the 10% Challenge by the public.

Home Energy Program

Community Energy

Measure Status: Proposed

Responsible Department: Brattleboro Climate Protection

CO2 Savings: Accounted for in other measures

Brattleboro Climate Protection could develop a traveling briefcase containing energy efficient light bulbs and information on energy saving programs and appliances. Trained volunteers would carry these door to door to:

- Assist homeowners in ordering compact fluorescent bulbs and other conservation products
- Conduct an energy survey to determine types, sources and costs of energy used and conservation and efficiency opportunities
- Test appliance efficiency with wattmeters, and provide information on new efficient appliances
- Provide information on conservation, efficiency, and renewables programs

This program would operate as part of the 10% Challenge Residential Energy Program.

Green Lawn Campaign

Community Energy

Measure Status: Proposed

Responsible Department: Brattleboro Climate Protection

CO2 Savings: Accounted for in other measures

This program would encourage alternative lawn care methods for homeowners. These could include:

- Allowing a portion of lawns to go to meadow and wildflowers
- Where appropriate, using a push or electric mower rather than a gas-powered mower

Workshops, possibly organized in conjunction with gardening stores and environmental organizations, would provide information on the benefits of alternative lawn care.

This campaign would operate as part of the 10% Challenge Residential Energy Program.

Bulk Fuel Purchase Club

Community Energy

Measure Status: Proposed

Responsible Department: Brattleboro Climate Protection

CO2 Savings: Accounted for in other measures

Brattleboro Climate Protection could organize an Energy Club to help members save money on their heating oil purchases and reduce the amount of energy they are using. Members would fill out and return a home energy survey to BCP and agree to participate in a follow-up phone consultation on ways to conserve energy and use it more efficiently. The lower fuel prices from buying through the club would act as an incentive to encourage members to use less energy, which will help them reduce their energy costs even more. Most members who implement the efficiency recommendations should be able to cut a quarter to a third off their current overall energy use.

This measure would be implemented as part of the 10% Challenge Residential Energy Program.

Use of Compact Fluorescent Lightbulbs in Residences

Community Energy

Measure Status: Proposed
Responsible Department: Brattleboro Climate Protection
CO2 Savings in 2010: negligible
Annual Financial Savings: **\$146,678.20**

This measure evaluates the impact of Brattleboro residents converting conventional incandescent lightbulbs to compact fluorescents for their home lighting needs. Incandescent lightbulbs waste a lot of electricity through the heat that the bulbs produce. A fluorescent bulb produces much less heat and as a result can be four to six times as efficient as incandescent bulbs. A 15-watt compact fluorescent provides the same amount of light as a 60-watt incandescent. If Brattleboro residents converted their lightbulbs to compact fluorescents, it could result in \$101,395.21 in annual financial savings.

- Life-cycle cost comparison of incandescents vs. compact fluorescents: For 10,000-hour life, ten 60-watt incandescent bulbs cost \$5 to purchase and have an estimated energy cost of \$36 for a total cost of \$41. For a 10,000-hour life, one 15-watt compact fluorescent bulb costs \$3.23 to purchase, has a disposal cost of \$.75 and an energy cost of \$9 for a total cost of \$12.98. (Source: www.mge.com/business/saving/lighting.htm.)
- Payback: Immediate

This measure would operate as part of the 10% Challenge Residential Energy Program.

Co-Benefits

- Financial savings for businesses
- Lightbulbs last longer than conventional bulbs, saves time and money spent replacing burnt-out bulbs
- Compact fluorescents operate at a lower temperature than incandescent bulbs; can help to lower cooling costs.

Success Stories

Harmony Library in Fort Collins, CO installed 26-watt Energy Star compact fluorescents in place of 75-watt incandescent bulbs. The project saves \$12,000 in annual operating costs.

10% Challenge Energy Efficiency Campaign– Commercial

Community Energy

Measure Status: Proposed
Responsible Department: Brattleboro Climate Protection
CO2 Savings: **780 tons**
Financial Savings: **\$46,423**

This measure seeks to achieve a 10% reduction in energy consumption among Brattleboro businesses with the implementation of a 10% Challenge Campaign to encourage energy efficiency. The program would provide information about efficient lighting, HVAC and hot water, co-generation, performance contracting and financial incentives. The Town could issue a certification or award to businesses that initiate emissions reduction activities with regard to energy conservation or waste prevention. The award would serve as public recognition of the efforts of local businesses and industry to lessen the impact of their activities on the environment. This program will not only help local businesses save money through reduced energy consumption, but the award will serve as advertising that will help attract new customers. If 50% of businesses in Brattleboro committed to a 10% reduction in energy consumption through this program, it would result in the elimination of 780 tons of CO2 and financial savings of \$46,423.

As the first step in this program, the BCP Task Force is organizing an energy-efficiency workshop for facilities managers in Fall 2003.

Cost of awards recognition materials: \$2000
Annual savings: \$46,423
Payback: 0 years

Co-Benefits

- Serves as a form of advertising for business & industry
- Reduces air pollution emissions that contribute to visibility degradation and health problems
- Improves comfort in buildings
- Financial savings for business & industry
- Businesses gain competitive advantage, attract new customers, enhance customer loyalty and other materials for company advertising, and are automatically eligible for the prestigious Outstanding Achievement in Pollution Prevention Award sponsored by the U.S. Small Business Administration.

Success Stories

The EcoStar Business Awards Program administered by the Montana Pollution Prevention Program recognizes businesses that are taking environmentally friendly steps to reduce waste, maximize efficiency, and create a safer work environment. EcoStar Awards winners are featured in press releases, receive a certificate of recognition

Use of Compact Fluorescent Lightbulbs in Businesses

Community Energy

Measure Status: Proposed

Responsible Department: Brattleboro Climate Protection

CO2 Savings in 2010: negligible

Annual Financial Savings: **\$4,280,631**

This measure evaluates the impact of Brattleboro business owners converting conventional incandescent lightbulbs to compact fluorescents for their office lighting needs. Incandescent lightbulbs waste a lot of electricity through the heat that the bulbs produce. A fluorescent bulb produces much less heat and as a result can be four to six times as efficient as incandescent bulbs. A 15-watt compact fluorescent provides the same amount of light as a 60-watt incandescent. If Brattleboro businesses converted their conventional lightbulbs to compact fluorescents, it could result in \$4,280,631 in annual energy savings.

- Life-cycle cost comparison of incandescents vs. compact fluorescents: For 10,000-hour life, ten 60-watt incandescent bulbs cost \$5 to purchase and have an estimated energy cost of \$36 for a total cost of \$41. For a 10,000-hour life, one 15-watt compact fluorescent bulb costs \$3.23 to purchase, has a disposal cost of \$.75 and an energy cost of \$9 for a total cost of \$12.98. (Source: www.mge.com/business/saving/lighting.htm.)
- Payback: Immediate

This measure would operate as part of the 10% Challenge Commercial Energy Program.

Co-Benefits

- Financial savings for businesses
- Lightbulbs last longer than conventional bulbs, money spent replacing burnt-out bulbs
- Compact fluorescents operate at a lower temperature than incandescent bulbs; can help to lower cooling costs.

Success Stories

Harmony Library in Fort Collins, CO installed 26-watt Energy Star compact time and fluorescents in place of 75-watt incandescent bulbs. The project saves \$12,000 in annual operating costs.

District Energy for Downtown Brattleboro

Community Energy

Measure Status: Proposed
Responsible Department: Multiple
CO2 Savings: Unknown

District energy systems use one or more central plants to provide heat or cooling to multiple buildings. This approach replaces individual, building-based boilers, furnaces, and cooling systems. With a district energy system, thermal energy – in the form of hot water, steam, or chilled water – is distributed by underground pipelines from the central plants to each of the connected buildings. Energy is extracted at the buildings and the water comes back to the central plants, through return pipes, to be heated or cooled again.

District energy plants can be designed to produce electrical power as well as energy for heating and cooling. This is called combined heat and power, or CHP. CHP plants are able to get more usable energy out of the input fuel than a plant that produces only electricity.

District energy is a good candidate for a downtown business district. Benefits to the community include:

1. **Fuel flexibility** and access to locally produced renewable fuels such as biomass.
2. **Low, predictable energy costs**, through bulk purchasing, access to the least-costly fuels, and efficient operation.
3. **Better air quality** – uncontrolled stack emissions from individual boilers are replaced by emission from a single well-managed plant.
4. **Community revitalization** – district energy infrastructure and stable rates improve a community's business climate, make local businesses more competitive, and help to revitalize downtowns and urban core areas so they can better compete with suburban sprawl.

Customer advantages include:

1. **Simplified operation** - with district heating, the individual building owner does not need to own and maintain a heating plant, or to procure and store fuel on-site.
2. **Reliability** – district energy systems have an unparalleled record of reliable service to users.
3. **Price stability** – compared to the purchase of fossil fuels by individual users, a central district energy system offers customers long-term price stability.

Establish VOLT Loan Program

Community Energy

Measure Status: Proposed
Responsible Department: Brattleboro Climate Protection
CO2 Savings: Unknown

Brattleboro may be in a position to take advantage of a Fannie Mae loan program that can provide up to \$20,000 per homeowner in unsecured consumer credit at very reasonable rates for the purpose of implementing efficiency upgrades to their homes. The program, known as the VOLT program, has been in operation for several years in a number of states and communities around the country, but is still a largely untapped resource.

VOLT programs are operating in Los Angeles, San Francisco, Tampa, and numerous other communities, including Meriden, Connecticut. In San Francisco the program has funded more than \$80 million in loans to over 12,000 households. The program would give a big boost to local economic development by creating jobs for the installation of energy efficiency improvements, and would keep money from leaving the community by helping reduce payments for gas, electricity, and other forms of energy that are often imported from other states.

If the program were implemented and vigorously promoted here in Brattleboro, it could bring millions of dollars of long-term capital investment into our community and set the stage for an independent and sustainable energy future for the town.

The Town of Brattleboro could establish an agency inside Town government that can act as the sponsor and administrator of the program. This agency could also be used at a later time to oversee any other energy-related initiatives.

Initial cost: \$10,000

Purchase of Environmentally Preferable Products

Municipal Solid Waste

Measure Status: Proposed
Responsible Department: Multiple
CO2 Savings in 2010: Unknown

Purchasing policies can greatly affect the environmental impact of operations from government entities. State and local governments purchase more than \$1 trillion in goods and services each year, according to Governing Magazine. The EPA has developed an Energy Star labeling program for energy efficient Equipment and appliances. Each Energy Star computer and monitor saves \$15 To \$25 per year in energy costs.

Products made from recycled materials should be preferred over those made from virgin materials when impacts of quality and cost are not excessive.

The Town of Brattleboro should include in their Environmentally Preferred Products: janitorial and cleaning products, vehicle products and building products (recycled lumber, plastic)

Municipal departments should practice bulk purchasing of energy-efficient and Recycled content products.

Co-Benefits

- Saves taxpayer dollars
- Good opportunity to lead by example, showcase Brattleboro's commitment to energy efficiency and solid waste reduction.
- Encourage market for green products
- Educates Town's staff about energy efficiency

Success Stories

In 1998, Metropolitan King County, Washington, saved an estimated \$600,000 by purchasing recycled materials such as toner cartridges (\$300,000 savings), re-treaded tires (\$77,000 savings), and shredded wood-waste for temporary road surfaces, landscaping, and erosion control (\$65,000 savings).

Methane Recovery System at Landfill

Community Solid Waste

Measure Status: Existing
Responsible Department: Windham Solid Waste Management District
CO2 Savings: **44,598 tons**

Methane, a colorless, odorless gas produced as a by-product of solid waste breakdown, is 33 times stronger as a greenhouse gas than carbon dioxide. The major source of methane emissions in Brattleboro is the 33-acre Old Ferry Road landfill, which operated from the 1950's to 1995. The closed landfill contains an estimated 1.5 million tons of waste. In 1982, a methane recovery facility was constructed. Three converted diesel engines burn the methane gas to generate approximately 400 KWH electricity per year, which is conducted back into the power grid for sale to Central Vermont Public Service.

Recycling Program

Community Solid Waste

Measure Status: Existing
Responsible Department: Windham Solid Waste Management District
CO2 Savings: **3708 tons**

The Windham Solid Waste Management District operates a weekly curbside recycling program serving both residential and municipal areas. In addition, recyclable materials from commercial buildings are collected by approximately ten private haulers and delivered to the recycling center on Old Ferry Road. The materials recycled include newspapers, phone books, mixed paper, corrugated cardboard, glass bottles and jars, aluminum, steel, tin, and plastic containers. In 2000, 2096 tons of paper and containers were collected from Brattleboro residences, businesses, and institutions.

Home Composting Program

Community Solid Waste

Measure Status: Existing
Responsible Department: Windham Solid Waste Management District
CO2 Savings: **59 tons**

The Windham Solid Waste Management District provides composting bins for sale to the public. Based on statewide statistics, Brattleboro households divert approximately 244 tons of food waste and 68 tons of yard waste per year through composting.

“Pay As You Throw” Solid Waste Disposal

Community Solid Waste

Measure Status: Proposed

Responsible Department: Windham Solid Waste Management District

CO2 Savings: Unknown

In communities with pay-as-you-throw programs (also known as unit pricing or variable-rate pricing), residents are charged for the collection of municipal solid waste—ordinary household trash—based on the amount they throw away. This creates a direct economic incentive to recycle more and to generate less waste.

Traditionally, residents pay for waste collection through property taxes or a fixed fee, regardless of how much—or how little—trash they generate. Pay-as-you-throw (PAYT) breaks with tradition by treating trash services just like electricity, gas, and other utilities. Households pay a variable rate depending on the amount of service they use.

Most communities with PAYT charge residents a fee for each bag or can of waste they generate. In a small number of communities, residents are billed based on the weight of their trash. Either way, these programs are simple and fair. The less individuals throw away, the less they pay.

Communities with PAYT programs in place have reported significant increases in recycling and reductions in waste, due primarily to the waste reduction incentive created by PAYT. Less waste and more recycling mean that fewer natural resources need to be extracted. In addition, greenhouse gas emissions associated with the manufacture, distribution, use, and subsequent disposal of products are reduced as a result of the increased recycling and waste reduction PAYT encourages.

PAYT is an effective tool for communities struggling to cope with soaring municipal solid waste management expenses. Well-designed programs generate the revenues communities need to cover their solid waste costs, including the costs of such complementary programs as recycling and composting. Residents benefit, too, because they have the opportunity to take control of their trash bills.

One of the most important advantages of a variable-rate program may be its inherent fairness. When the cost of managing trash is hidden in taxes or charged at a flat rate, residents who recycle and prevent waste subsidize their neighbors' wastefulness. Under PAYT, residents pay only for what they throw away.

Climate Change Outreach and Education

Community Comprehensive

Measure Status: Existing, could be expanded
Responsible Department: Brattleboro Climate Protection
CO2 Savings: Accounted for in other measures

Brattleboro should partner with existing environmental education programs such as that at the Bonnyvale Environmental Education Center to develop and implement an education program on climate change to be incorporated into the public school curriculum. This curriculum will be catered to different age groups and could be a useful tool for general outreach about the BCP program. Programs in school could incorporate hands-on learning projects such as monitoring light usage in school or having students monitor automobile usage at home. The BCP Director could also pursue grant-writing and utilizing funding opportunities such as the Human-I-Tees and Schools Go Green grants that are available for environmentally oriented projects.

The Town should encourage organizations such as Clean Air/Cool Planet to get involved with institutions of higher learning in the area.

Building outreach and awareness of climate change can also extend beyond the classroom. In this respect, resources that discuss specific climate change issues with a focus on positive solutions could be compiled for all Brattleboro residents. This may include inserts in tax bills, public displays, tabling at local events, continuous public forums, press coverage, and citizen participation in the CCP process. Such outreach activities are instrumental in generating interest in Brattleboro's involvement with climate change efforts.

While greenhouse gas emissions reductions that might result from this measure are not easily quantified, continued efforts to expand a climate change education and outreach program will have a significant impact on emissions in the Town. The administration of such a program could become the responsibility of the Energy Efficiency Coordinator, should Brattleboro create this position.

Co-Benefits

- Develops understanding of importance of environmental issues among school children.
- Children can pass lessons on to families, resulting in an increase in sustainable behavior throughout the community.
- Outreach events to the general public can highlight local efforts, show residents what Brattleboro is doing to save energy and money.

Success Stories

The Cool Schools Initiative in Toronto is a program managed by the Clean Air Partnership that provides curriculum and funding to Toronto area schools that agree to make education on climate change a fundamental part of the learning experience. Over 80 schools are involved in the program. Some measures the Cool Schools have implemented include the creation of a green outdoor classroom, a Walk to School award program, and a no-idling campaign.

Establish Energy Efficiency/ Environmental Coordinator Position

Community Comprehensive

Measure Status: Proposed
Responsible Department: Selectboard
CO2 Savings: Accounted for in other measures

Brattleboro should implement measures to ensure that the emissions reduction measures outlined in this Action Plan actually become reality. Too many plans of this nature end up collecting dust on bookshelves. One way to ensure the completion of the five milestones of the CCP Campaign would be to hire a full or part-time Energy Efficiency/ Environmental Coordinator.

This person would assume direct responsibility for measures such as the 10% Challenge Program and the Outreach and Education Program, and would serve as an organizer and catalyst for the implementation of other measures. The individual would be charged with maintaining the emissions inventory on CCP software so that the Town can measure its progress towards the emissions reduction target, and could also assume responsibilities not directly related to the CCP Campaign, such as assisting with other planning duties. In general, the role of the Energy Efficiency/Environmental Coordinator would be to protect and improve environmental quality in Brattleboro through programs and projects that prevent pollution, encourage environmentally friendly alternatives, and promote energy efficiency. The savings from these programs could fund the position.

- Implementation costs: \$10,000 for EEC x 1.6 (to account for hiring, administrative, and support costs) = \$16,000
- Implementation cost of the two measures mentioned above for which the EEC would assume responsibility: \$7,000
- Financial savings to Brattleboro residents from the two measures for which the EEC would assume responsibility: \$881,378
- **Amount that Brattleboro would save by hiring an EEC: \$858,378**

Co-Benefits

- Financial savings for Brattleboro
- Ensures completion of CCP Campaign and achievement of emissions reduction target
- Showcases Brattleboro as an environmental steward in the community and the state

Success Stories

The City of Somerville, MA employs a full- time Environmental Coordinator

The City of Medford, MA employs a full- time Energy Efficiency Coordinator

Street Tree Planting

Community
Other

Measure Status: Existing
Responsible Department: Tree Board
CO2 Savings: Unknown, but could be large

Trees play an important role in our community that goes well beyond aesthetics. Their shade helps to offset air conditioning use in the summer, and they can reduce heating costs by blocking cold winds in the winter. Stormwater absorbed by city trees can lock up pollutants that would otherwise end up in the Connecticut River. And because of their ability to absorb carbon dioxide and produce oxygen, trees have aptly been called the “lungs of the planet.”

Co-Benefits

- Reduce air pollution emissions that contribute to visibility degradation and health problems.

Success Stories

A City of Tucson, Arizona study demonstrated that for every dollar spent to maintain trees, \$2.62 worth of benefits are returned in energy savings, dust reduction and the slowing of stormwater runoff.

Appendix A: Measures Quantification Notes

Performance Contracting with an ESCO for Efficiency Upgrades – Town of Brattleboro

Page Number in Action Plan:

Town's Energy Costs in FY 2001:

Electricity - \$546,587
Fuel Oil - 102,425
Gasoline - 35,131
Diesel Fuel - 21,752

Total - \$705,895

Assuming a conservative estimate of 10% savings in heating and lighting costs through a performance contract, the Town would save \$64,901 annually:

$$\$546,587 + 102,425 = 649,012 \times 10\% = \$64,901$$

Distribution of heating and lighting costs:

Streetlights	39%
WWTP – Vernon Rd.	19%
WWTP – Pleasant Valley Rd.	8%
Municipal Building	7%
Skating Rink	7%
Gibson-Aiken Center	4%
Brooks Memorial Library	4%
Public Works Garage	3%
Other	9%

10% Challenge Energy Efficiency Program – Residential

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This measure seeks to achieve a 10% reduction in home energy consumption with the implementation of a residential energy conservation program. To calculate the impact of this measure on emissions, the following methodology was used:

Residential energy use in 2000 (from Greenhouse Gas Inventory):

Electricity: 32,058,763 kwh

Heating oil: 3,156,736 gallons

Natural gas: 131,965 therms

LPG: 118,218 gallons

A 10% reduction in energy use would be:

Electricity: 3,205,876 kwh @.128/kwh = \$410,352.12

Heating oil: 315,674 gallons @1.26/gal = \$397,749.24

Natural gas: 13,196 therms @.98/therm = \$12,932.08

LPG: 11,822 gallons @1.13/gal = \$13,358.86

CO2 reduction: 3793 tons

Savings: \$834,392

These figures were entered into the CCP Software as Potential Energy Reductions. Implementation cost estimated as \$5,000 for educational materials and coordination of workshops. \$16,000 for one part-time Environmental Coordinator to administer the program (cost accounted for in the Environmental Coordinator Position measure).

Use of Compact Fluorescent Lightbulbs in Residences Page Number in Action Plan: 23

Residential Electricity usage in 2000: 32,058,763 kwh

Number of households in 2000: 5364. Therefore electricity usage/household:

$32,058,763/5364 = 5976.652$ kwh

Lighting accounts for approximately 7% of a household's energy budget

www.iclei.org/efacts/home_eff.htm)

7% of 5976.652 = 418.36564 kwh

Compact fluorescents produce about 4 times more illumination/watt than traditional incandescent bulbs.

Replacing conventional bulbs with CFs can reduce electricity usage attributed to lighting by at least 50%.

$418.36564 \text{ kwh} \times 5364 \text{ households} = 2,244,113.2$ kwh

50% of 2,244,113.2 = 1,122,056.6

Difference = 1,122,056.6 kwh

Average cost per kwh = \$0.113

Savings = **\$126,792.39/year**

Implementation cost:

Assume that the typical Brattleboro residence has 20 light fixtures, which are in use for an average of 5 hours per day, or 1865 hours per year.

For a 10,000-hour life, ten 60-watt incandescent bulbs cost \$5 to purchase and have an estimated energy cost of \$36 for a total cost of \$41. For a 10,000-hour life, one 15-watt compact fluorescent costs \$3.23 to purchase through Efficiency Vermont's rebate program, has a disposal cost of \$.75 and an energy cost of \$9, for a total cost of \$12.98. (source:

www.mge.com/business/saving/lighting.htm).

10,000 hours = 5.5 years of use.

Retail bulb costs for 10 60-watt bulbs: $5 \times 20 \text{ fixtures}/5.5 \text{ years} = \$18.18/\text{year} \times 5364 \text{ households} =$
\$97,517.52

Retail bulb costs for one CF: $\$3.98 \times 20 \text{ fixtures}/5.5 \text{ years} = \$14.47/\text{year} \times 5364 =$ \$77,631.71

Difference = **\$19,885.81/year**

Total Savings = \$146,678.20

10% Challenge Energy Efficiency Program: Commercial
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Calculations were based on statistics from the Energy Information Administration's Commercial Buildings Energy Consumption Survey (1999). It is assumed that the goal of 50% of Brattleboro businesses committing to a 10% reduction in energy usage would not be achieved until 2010.

According to the Town Lister's Office, there were 460 commercial properties in Brattleboro in 2000. The energy usage in 2000 for these properties was:

130,478,161 kwh electricity
1,335,223 gallons of light fuel oil

Thus, on average per property basis,

283,648 average kwh/property
2902 average gallons/property

Therefore, a 10% reduction in energy use per property would mean a reduction of:

28,365 kwh reduction in electricity
290 gallons reduction in oil

50% of 460 properties = 230 properties

Average price of: (conservative estimate)

Electricity: \$0.11/kwh

Heating oil: \$0.87/gallon

Therefore, the potential energy reductions for the 230 commercial properties;

6,523,950 kwh electricity = **\$717,634** savings
66,700 gallons oil = **768 tons** CO2 reduction by 2015 = **\$58,029** savings

Implementation cost: \$16,000 for salary of Environmental Coordinator to administer the program (cost accounted for in separate measure); \$2000 for recognition and awards.

Use of Compact Fluorescent Lightbulbs in Commercial Buildings

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Commercial Electricity Usage in 2000: 130,478,161 kwh

Number of establishments in 2000: 460. Therefore, electricity usage/establishment:

$130,478,161 / 460 = 283,648.176$ kwh

Lighting accounts for approximately 46% of a commercial establishment's energy budget

(www.eia.doe.gov/emeu/cbecs/cbec-eu3.html) – Table 3.

$46\% \text{ of } 283,648.176 = 130,598.261$ kwh

Compact fluorescents produce about 4 times more illumination/watt than traditional incandescent bulbs.

Replacing conventional bulbs with CF's can reduce electricity usage attributed to lighting by at least 50%.

$130,598.261 \text{ kwh} \times 460 = 60,144,251$ kwh

$50\% \text{ of } 60,144,251 = 30,072,125$ kwh

Difference = **37,881,690 kwh**

Replace standard 4-foot or 8-foot fluorescent lamps with energy-efficient lamps and electronic ballasts that save even more energy.

Average cost per kwh = \$0.113

Savings = $37,881,690 \times .113 = \mathbf{\$4,280,631}$