

**BURLINGTON  
CLIMATE ACTION PLAN**

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## **What is a Climate Action Plan?**

A climate action plan is a detailed and strategic framework for measuring, planning, and reducing GHG emissions and reducing greenhouse gas emissions. Municipalities design and utilize climate action plans as customized roadmaps for making informed decisions and understanding how to achieve the largest and most cost-effective emissions reductions that are in alignment with other municipal goals. Climate action plans, in general, include an inventory of existing emissions, reduction goals or targets, and analyzed and prioritized reduction actions. A climate action plan also includes an implementation strategy that identifies required resources and funding mechanisms.

## **What is this plan about?**

This plan is an overview document to help everyone learn about Burlington's Climate Action Plan - how it was created, what its goals are, and what actions are being taken. Detailed research and reports are available at [www.burlingtonvt.gov/cap/](http://www.burlingtonvt.gov/cap/). This website also provides more details on the actions that individuals and organizations are taking or can take to implement change.

# BURLINGTON

## LEADING THE

**1996**

Burlington becomes one of the first cities to join the "Cities for Climate Protection" campaign organized by ICLEI

**2000**

Burlington's first Climate Action Plan is adopted by City Council in May.

**2009**

The City prepares a cost-carbon benefit analysis of 17 proposed mitigation actions

**2016**

The City will have stabilized its greenhouse gas emissions with the use of strategies presented in this plan.

**1998**

City Council passed a resolution setting a 2005 reduction target of 10% below 1990 levels

Mayor Clavelle forms the first Climate Protection Task Force.

**2008**

The City begins the update of its Climate Action Plan with the preparation of a new Greenhouse Gasses Inventory

Over 100 citizen participate in the generation of 200+ mitigation strategies

**2010**

The City creates a greenhouse gas emission tracking tool to easily allow City government to regularly track and record emission data

# WHY WE CARE?

## WHAT IS CLIMATE CHANGE ?

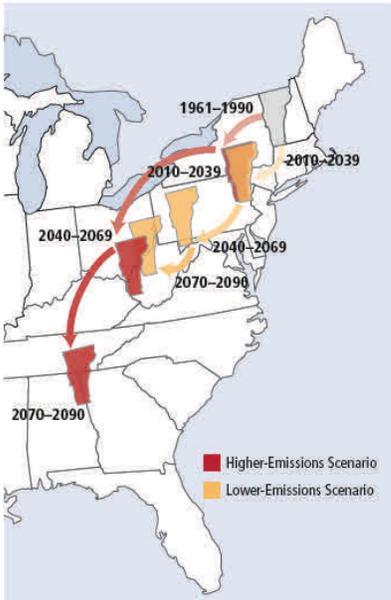
The greenhouse effect is the process by which the atmosphere traps some of the sun's energy, warming the Earth and moderating our climate. A human-driven increase in 'greenhouse gases' has enhanced this effect artificially. These greenhouse gases include carbon dioxide, produced by burning fossil fuels and through deforestation, methane, released from agriculture, animals and landfill sites, and nitrous oxide, resulting from agricultural production plus a variety of industrial chemicals.

## VERMONT'S CHANGING CLIMATE

From the Lake Champlain shore to the Connecticut River Valley, the climate of Vermont is changing. Records show that spring is arriving earlier, summers are growing hotter, and winters are becoming warmer and less snowy. These changes are consistent with global warming, an increasingly urgent phenomenon driven by heat-trapping emissions from human activities.

New state-of-the-art research shows that if global warming emissions continue to grow unabated, Vermont can expect dramatic changes in climate over the course of this century, with substantial impacts on vital aspects of the state's economy and character. If the rate of emissions is lowered, however, projections show that many of the changes will be far less dramatic. Emissions choices we make today—in Vermont, the Northeast, and worldwide—will help determine the climate our children and grandchildren will experience for their economy, environment, and quality of life.

**Temperature.** Average temperatures across the Northeast have risen more than 1.5 degrees Fahrenheit (°F) since 1970, with winter temperatures rising between 1970 and 2000. If higher emissions prevail, seasonal average temperatures across Vermont are projected to rise 9°F to 14°F in winter and 7°F to 14°F in summer by late-century, while lower emissions would result in less warming.



### Migrating State Climate

Changes in average summer heat index—a measure of how hot it actually feels, given temperature and humidity—could strongly affect quality of life in the future for residents of Vermont. Red arrows track what summers in Vermont could feel like over the course of the century under the higher-emissions scenario. Yellow arrows track what summers in the state could feel like under the lower-emissions scenario.



**Precipitation and winter snow.** The Northeast region is projected to see a decrease in precipitation on the order of 20 to 30 percent. Slightly greater decreases are projected under the higher-emissions scenario, which would also feature less winter precipitation falling as snow. Heavy, damaging rainfall events have already increased measurably across the region. Intense rains struck the region in 2011 during Irene, for example, causing significant damage. The frequency and severity of heavy rainfall events is expected to rise further under the higher-emissions scenario.

**Drought.** In this historically water-rich state, rising summer temperatures and decreasing summer rainfall are projected to increase the frequency of short-term (one to two weeks) drought events, particularly if higher emissions prevail. By late-century, for example, short-term drought events are projected to occur annually under the higher emissions scenario (compared with once every two to three years historically), increasing stress on both natural and managed ecosystems.

# IMPACTS OF CLIMATE CHANGE ON VERMONT AND B

## IMPACTS ON WINTER RECREATION

Snow and cold temperatures mean big business for the Green Mountain State. Vermont ski areas provide recreation for residents and visitors along with thousands of jobs, and contribute more than \$1.1 billion a year to the state's economy. But Vermont winters have already changed and, over the course of the century, may look and feel profoundly different.

**Snowmobiling.** Vermont is part of a six state network of snowmobile trails totaling 40,500 miles and contributing \$3 billion a year to the regional economy. Snowmobiling relies almost entirely on natural snowfall. Projected losses in natural snow cover and the impracticality of snowmaking on this vast system mean that Vermont's snowmobiling season could decline dramatically by late-century.

**Skiing.** Milder winters are expected to shorten the Vermont ski season and, under the higher-emissions scenario, the state's ski areas may no longer be viable by late-century.

**Lake ice.** Ice fishing and pond hockey are winter favorites in Vermont. However, global warming will render lake ice cover increasingly thin and shorten its duration. Ice cover duration on Lake Champlain has already declined in recent decades.

## IMPACTS ON FORESTS

Forests cover nearly 80 percent of the Vermont landscape, extending from the Northeast Kingdom to the outskirts of Bennington. The state's forest-related manufacturing, recreation, and tourism sectors contribute more than \$1.4 billion to the state's economy and provide jobs for many residents. These woodlands also provide wildlife habitat, protect watersheds, conserve soil, and store carbon. Climate change has the potential to dramatically alter the character of Vermont's forests.

The maple/beech/birch forests that dominate much of the state's landscape dazzle us each autumn with colorful foliage and provide sap for maple syrup. Ongoing winter warming is expected to further disrupt the pattern of freezing nights and warm days necessary for optimal maple syrup production, posing additional challenges to Vermont's \$11 million industry.



## IMPACTS ON AGRICULTURE

Agriculture has long been a vital part of Vermont's character and economy. Global warming will present both opportunities and challenges to Vermont's growers; for example, increases in the frequency of short-term drought (see p.2) could necessitate increased irrigation and operational costs, while a longer growing season could benefit those farmers seeking to invest in warmer weather crops that are currently hard to grow in the state.

By late-century, increasing summer temperatures and heat stress could depress the yields of some of Vermont's economically important cool-weather crops. Northward expansion of agricultural pests and weeds are expected to further impede crop production during this time frame, and potentially pressure farmers to increase their herbicide and pesticide use (or, in the case of organic farms, invest more heavily in labor-intensive weed and pest control). Under the lower-emissions scenario, crop impacts this century are expected to be relatively minor in Vermont.



## IMPACTS

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# CLIMATE CHANGE AND EQUITY

Equity and inclusion are a high priority for the City of Burlington. To respond to the complex and intertwined issues of climate change, the City must put forth a clear and unyielding effort to promote inclusion in all decision and policy-making processes and to apply an equity lens in order to create an integrated response that goes far beyond reducing carbon emissions. Addressing social equity will, in turn, help build resilient natural systems and neighborhoods. Some areas for consideration include:

- How can the City of Burlington build a more diverse and multi-disciplinary climate action stakeholder group?
- By evaluating emissions mitigation strategies with attention to issues of equity, how might planning and implementation of emission reduction projects be enhanced?
- In what ways does a more inclusive set of active stakeholders create a more effective and innovative emissions reduction plan?
- What are the synergies between equity and inclusion goals and climate action goals and how do these crossovers advance sustainability?
- How can the City of Burlington help ensure the safety and health of all of its citizens in the face of changing climate?

The City of Burlington has identified five key issues, which may present pressing equity issues either presently or in the future. These issues will be addressed in the future to create a more comprehensive and transparent plan of action.

## **Housing**

- ◆ Disparate concentrations of wealth in relation to floodplains and green space
- ◆ Individuals' financial ability to adapt and respond to climatic changes
- ◆ Access to energy efficient homes – including heating, cooling, and weatherization

## **Infrastructure and Transportation**

- ◆ Individuals' proximity to affordable, reliable public transportation
- ◆ Distance from town center and shopping centers proportional to levels of income and wealth

## **Extra-Community Impacts**

- ◆
- ◆

## **Food Security**

- ◆ Stability and viability of long-term, local agriculture
- ◆ Access to and affordability of fresh, local foods
- ◆ Community garden placement and supporting resources
- ◆ Home garden and composting education

## **Participation, outreach, and education**

- ◆ Equitable community involvement in policy and decision-making, zoning and land use planning
- ◆ Build on the work of the diverse stakeholders through a process designed to engage and inform all members of the community

The City of Burlington, through its climate mitigation and adaptation efforts, has already begun developing a comprehensive, integrated plan to address and deal with the issues of climate change and equity.

# WHERE ARE WE NOW WITH GOVERNMENT OPERATIONS

While based on extensive research and analysis, the Burlington Climate Action Plan is not a guarantee of success. It is a strategy based on the best information available today. But technology and markets change almost daily, which is why we need to be flexible. A strategy identified today may become obsolete, just as new technologies may emerge that weren't even considered in 2007. As a result, like Burlington's...

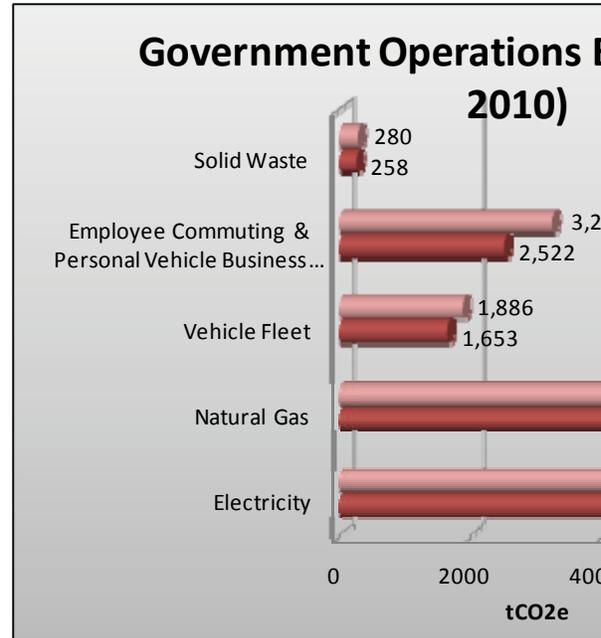
The City of Burlington's government operations generated 14,290.7 tCO<sub>2</sub>e in 2007 and 16,476.9 in 2012, a 15% increase. This cost the City over \$4.5 million in 2007 and around \$4.9 million in 2010, a 7% increase.

While electricity usage and emissions have decreased between 2007 and 2010, every other generation source has increased, with employee commute being highest with a 29% increase.

- In 2007, the City Government consumed around 21 million kWh of electricity, emitting 4,643.8 tCO<sub>2</sub>e. This decreased by 2% in 2010 to around 20 million kWh and 4,537.2 tCO<sub>2</sub>e.
- In 2007, the City Government consumed over 965,000 CCFs of natural gas, emitting 5,213.4 tCO<sub>2</sub>e. This increased by 25% in 2010 to over 1.2 million CCFs and 6,514.8 tCO<sub>2</sub>e.
- The City Government's vehicle fleet consumed around 184,000 gallons of diesel, biodiesel, and gasoline (23,957.1 MBTU) in 2007, emitting 1,653.3 tCO<sub>2</sub>e, which increased by 14% in 2010 when over 210,000 gallons (27,323.2 MBTU) were consumed and 1,885.9 tCO<sub>2</sub>e were generated.
- With over 5.9 million miles driven for commuting purposes in 2007 and over 420,000 miles driven in personal vehicles for business travel, employee commuting & personal vehicle business travel emitted 2,521.9 tCO<sub>2</sub>e. The average commute distance was 11 miles (one way) in 2007. In 2010, nearly 8.0 million miles were driven for commuting purposes and around 330,000 miles were driven in personal vehicles for business travel, employee commuting & personal vehicle business travel generated 3,259.0 tCO<sub>2</sub>e, a 29% increase from 2007. The average commute distance was 13 miles (one way) in 2010 and 75% of employees drove alone to work.
- The City Government's disposed over 1,600 tons of land filled waste in 2007, which generated 258.2 tCO<sub>2</sub>e. This increased to nearly 2,000 tons in 2010 and 280.0 tCO<sub>2</sub>e.

These results show that by improving the energy efficiency of City-owned buildings and encouraging City workers to use alternative modes of transportation, the City can have a strong impact on reducing the GHG emissions it generates every year. These types of initiatives would also have a positive impact on the health and well-being of the City and for its employees themselves.

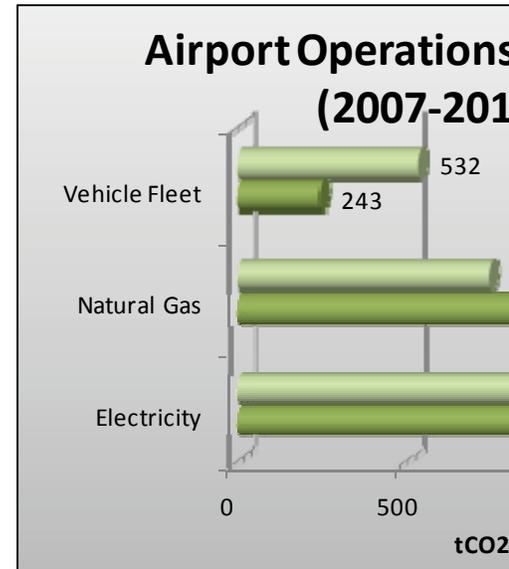
**NOTE:** The City followed the International Local Government Greenhouse Gas (GHG) Emissions Analysis Protocol developed by the Climate Registry for its 2007 and 2010 inventories.



# WHERE ARE WE NOW AT THE AIRPORT?

The City of Burlington's Airport generated 2,219.4 tCO<sub>2</sub>e in 2007 and 2,287.2 tCO<sub>2</sub>e, in 2010, a 3% increase. This cost the Airport \$963,300 in 2007 and \$947,339 in 2010, a 2% decrease. For more information on contact information for data and inputs and assumptions, please see appendices A and B.

- In 2007, the Airport consumed over 5.1 million kWh of electricity, emitting 1120.1 tCO<sub>2</sub>e. This decreased by 10% in 2010 to around 4.6 million kWh and 1,009.2 tCO<sub>2</sub>e.
- In 2007, the Airport consumed nearly 160,000 CCFs of natural gas, emitting 856.1 tCO<sub>2</sub>e. This decreased by 13% in 2010 to around 138,000 CCFs and 745.1 tCO<sub>2</sub>e.
- The Airport's vehicle fleet consumed around 25,000 gallons of diesel, biodiesel, and gasoline (3,493.3 MBTU) in 2007, emitting 249.2 tCO<sub>2</sub>e, which increased in 2010 to over 48,000 gallons (6,517.2 MBTU) were consumed and 543.5 tCO<sub>2</sub>e were generated.
- The Airport spent over \$963,000 in 2007 and over \$947,000 in 2010, a 2% decrease.

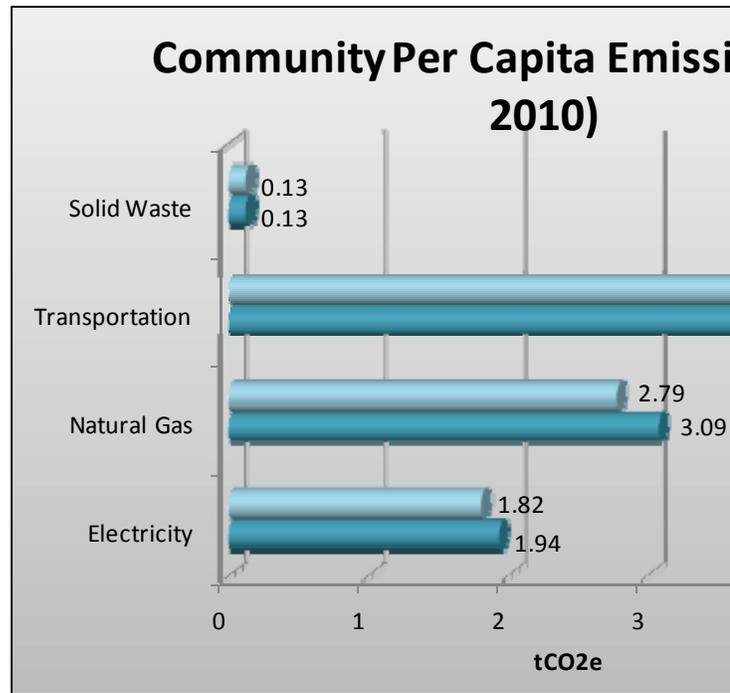


Over the past three years the airport has undertaken an aggressive energy efficiency project. Projects include: replacement of incandescent lighting with LEDs; replacement of terminal, roadway, parking lot lighting with CFL and LEDs; replacement of parking garage lighting with LEDs; conditioning and heating equipment with high efficiency units; replacement of terminal air handling units with high efficiency units; and replacement of terminal air handling unit controls to digital.

# WHERE ARE WE NOW WITH COMMUNITY EMISSIONS?

As a Community, the City of Burlington generated 380,762.3 tCO<sub>2</sub>e in 2007 and 404,778.6 tCO<sub>2</sub>e in 2010, a 6% increase. This cost the Community over \$78.9 million in 2007 and around \$76.0 million in 2010, a 4% decrease. In order to account for population growth in the future and allow for relative comparison between inventories, a per capita emission analysis has been found most helpful. The graph to the right presents the community inventory results per capita for both 2007 and 2010. The table below presents the total emissions for the community.

- In 2007, the Community consumed over 360.6 million kWh of electricity, emitting 79,664.2 tCO<sub>2</sub>e. This decreased by 4% in 2010 to around 346.2 million kWh and 76,474.4 tCO<sub>2</sub>e.
- In 2007, the Community consumed nearly 23.4 million CCFs of natural gas, emitting 126,496.0 tCO<sub>2</sub>e. This decreased by 7% in 2010 to nearly 21.7 million CCFs and 117,242.6 tCO<sub>2</sub>e.
- With over 259 million vehicle miles traveled (VMT) in 2007, Community transportation emitted 169,102.0 tCO<sub>2</sub>e. This increased by 24% in 2010, when 320 million VMT were driven and 205,487.0 tCO<sub>2</sub>e were generated. Transportation is the largest source of emissions generated by the Community. With emissions increasing by almost a quarter since 2007, much work is needed to reduce transportation emissions, including changing habits and enacting policies.
- The Community disposed of nearly 34,375 tons of landfilled waste in 2007, which generated 5,500.1 tCO<sub>2</sub>e. This increased by 1% in 2010 to 5,574.6 tCO<sub>2</sub>e.



Of the total Community GHG emissions, 44% was generated by Community transportation in 2007 and 51% in 2010, indicating that a reduction in annual vehicle miles traveled (VMT) by Burlington's residents could have the biggest impact on helping the city meet its emissions reduction target for 2020 and 2050.

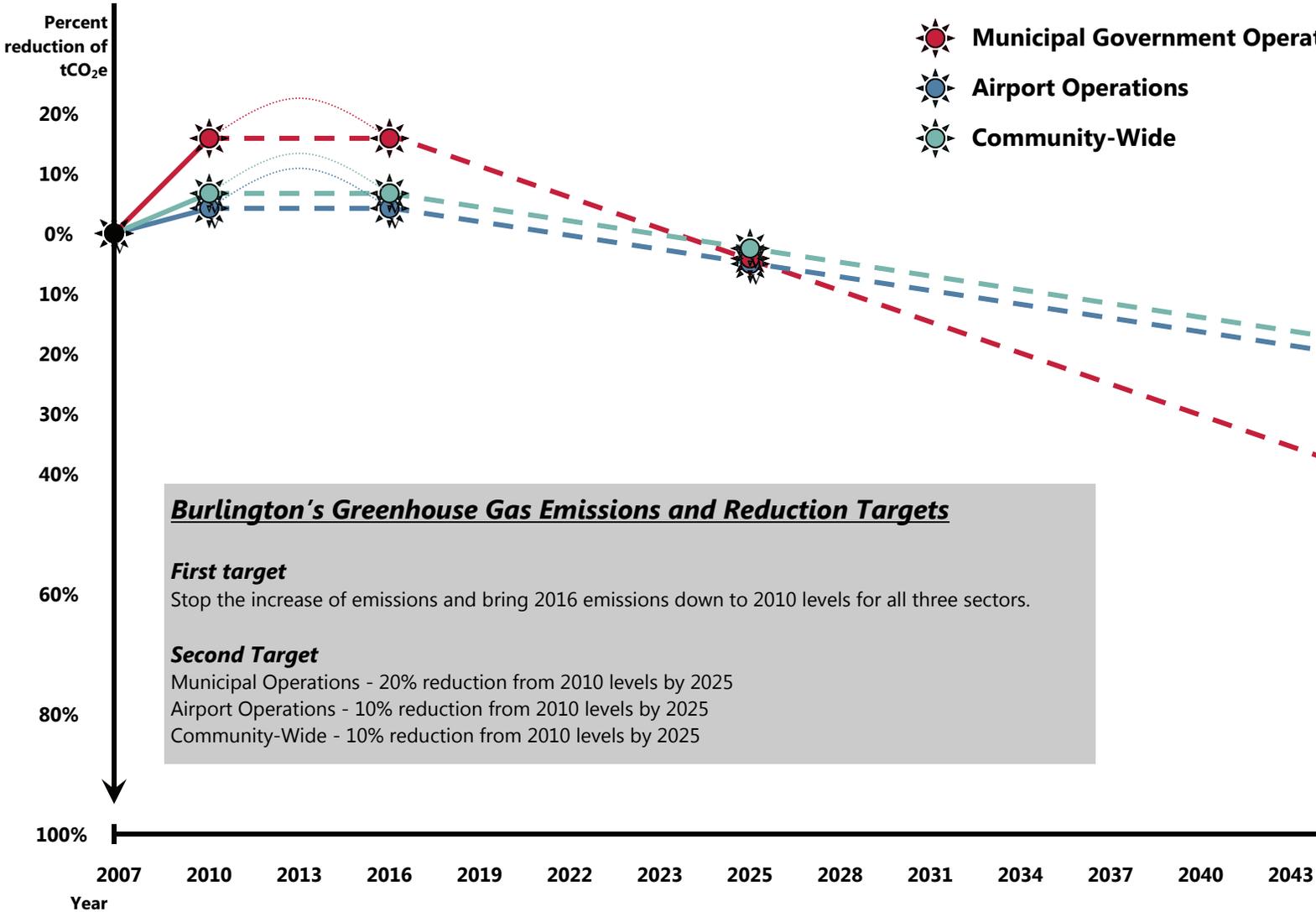
Community - 2007 and 2010 Total Emissions

Source	2007 GHG Emissions (tCO <sub>2</sub> e)	Percent of Total 2007 City Emissions	2010 GHG Emissions (tCO <sub>2</sub> e)
Electricity	79,664.2	21%	76,474.4
Natural Gas	126,496.0	33%	117,242.6
Transportation	169,102.0	44%	205,487.0
Solid Waste	5,500.1	1%	5,574.6
<b>TOTAL</b>	<b>380,762.3</b>	<b>100%</b>	<b>404,778.6</b>

Please note that percentages may not add up to 100% due to rounding.

# WHERE ARE WE GOING?

Burlington's overall goal is to reach a 20 percent reduction in greenhouse gas emissions from 2010 levels by 2025. Achieving this goal will require changes in many forms of harmful gases, such as nitrox oxide, which will improve overall air quality. The chart below shows the goals for all three sectors greatly.



# HOW CAN WE REDUCE OUR EMISSIONS?

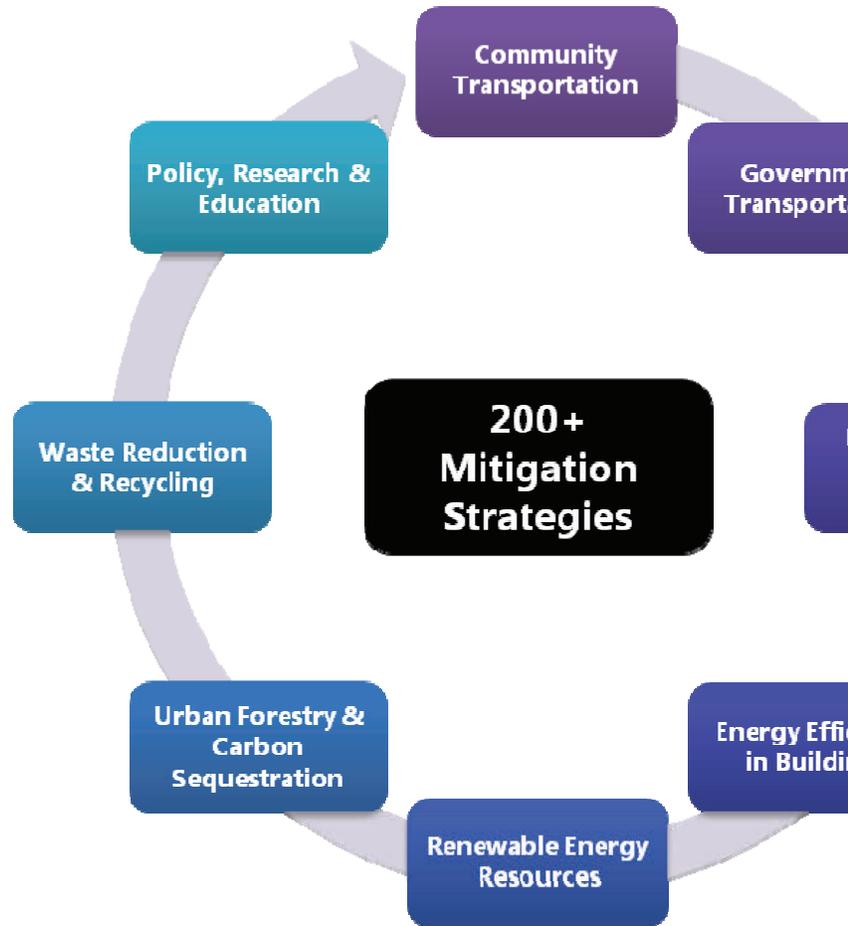
In the fall of 2008, the City launched a lengthy community process, reflective of Burlington's participatory decision-making and community engagement. Between September 2008 and February 2009, over 100 community volunteers and City staff gathered in eight working groups to discuss various themes and develop emissions mitigation strategies to meet our reduction targets.

The workgroups researched and brainstormed strategies to reduce the City's climate footprint. This work resulted in over 200 community-generated recommendations. These ideas were shared and vetted with the public at the December 2008 Legacy Town Meeting.

Each of the top strategies presented in this plan was carefully evaluated and chosen with the following criteria in mind:

- GHG Reduction Effectiveness
- Financial Performance/Cost Effectiveness
- Existing Implementation Capacity
- Available Funding/Financing
- Technical Feasibility
- Public Interest/Support
- Existing Momentum/Champion
- Local/Regional Economic Impact

After this evaluation, 36 strategies rose to the top and are included in this plan as first stages/steps to be implemented. The following pages of the plan, presents the overarching goals for each themes as well as the related proposed strategies.



# Goal 1: Reduce the annual amount of community-wide Miles Traveled (VMT) by 10%.

## Strategies

1. Improve bicycle and pedestrian infrastructure
2. Integrated transportation system improvements
3. Downtown Transportation Management Association (TMA)
4. Price on-street parking to maintain 80% occupancy
5. Develop infrastructure for fuel-efficient vehicles
6. Develop a new Citywide Bike/Pedestrian Network

Burlingtonians are busy people: they commute to work, drive to the store, visit health care providers, and travel to recreation and play. Currently, 51 percent of the city's greenhouse gas emissions is produced by cars, trucks and buses. (This inventory excludes emissions from air travel, an approach that mirrors that of most cities.) To lower emissions, a high-quality transportation system, including a robust public transit network, and amenities to support biking, walking, and car sharing, are key. This, coupled with support for alternative fuel vehicles, such as a network of charging stations for the area's nascent but growing electric vehicle population, will greatly reduce GHGs.

## Public Transit Solutions

Burlington is fortunate to have a variety of players involved in broadening our transportation options beyond the single occupancy vehicle. The Chittenden County Transportation Authority (CCTA) offers regular transit services to Burlington and surrounding communities. CCTA daily ridership has climbed 3.2% between 2010 and 2011, providing 2,510,959 total rides on LINK Express routes performed very well in 2011, with the Montpelier LINK ridership increasing by 21%, the Middlebury LINK and the St. Albans LINK Express ridership increasing by 9%. Continuing to work with CCTA on the expansion and increase of transit in the region and in Burlington is crucial to reducing future greenhouse gas emissions, allowing and encouraging more residents to use public transit.

## Walking, Biking and Car Sharing

If Burlingtonians make greater use of public transit and walk and ride bicycles more, they will drive less, achieving more significant reductions. Walking and biking are transportation choices that promote health and emit no greenhouse gases. The City aims to encourage more trips by providing additional and safe facilities. When driving is the best option for a particular trip, there are still opportunities to reduce vehicle miles traveled (VMT). Car sharing offers a great alternative to owning cars that both promote use of transit and reduce VMT. Research has shown that people who car share drive less. CarShare Vermont, Local Motion, and CATMA also offer support and resources around car sharing.

## Developing Communities Around Transit

Expanding transportation options alone is not enough. Burlington will need to grow its housing base and continue to develop amenities that people want and expect close to home. In fact, increasing the amount and diversity of housing within the city, particularly in the downtown area or on transit routes can help to address several important community objectives – reduction in energy consumption, decreased demand for parking, and social equity.

## Goal 2: Reduce the annual amount of municipal Vehicle Miles Traveled (VMT) by 10%

### Strategies

1. Implement government alternative employee commuting program
2. Implement government vehicle retirement program.
3. Government vehicle sharing/fleet management program.

While community-wide transportation generates a much larger amount of greenhouse gas emissions, over 205,000 versus 200,000 tons annually, employees do commute an estimated five millions miles annually and this number should not be disregarded. The City's fleet, coupled with Burlington's city fleet for day-to-day operations does represent an amount of emissions the city can more directly impact with new and improved policies and programs.

A comprehensive **employee commute reduction program**, aiming at encouraging employees to travel to work by alternative means of transportation, has been discussed and developed over the last few years but has yet to be fully vetted and implemented. Regional and local transit passes are available to all employees and the City has partnered with Local Motion on bike-commute trainings to encourage travel by bike. Bicycles have been made available to city staff for daily travel as well.

CarShare Vermont, one of the nation's first non-profit car sharing operations, is available to City staff who drive for work. Offering the use of fuel efficient CarShare Vermont vehicles to the city fleet, car rental, or personal vehicle use for work-related travel. Car sharing frees up city staff to take public transport to work by allowing them to use their own vehicles for private errands during the lunch hour.

The City should also consider every opportunity to better manage its vehicles are used to their full potential and that a larger proportion of the fleet use environmentally friendly fuels, particularly as new cars and trucks are purchased. For example, the City owns three compressed natural gas (CNG) recycling trucks that convert particulates into the air, making it a more environmentally sound fossil fuel alternative. Burlington owns its own CNG filling station, it's less expensive to fill up CNG vehicles than standard gasoline.

The Burlington Electric Department also recently purchased a biodiesel hybrid truck, a much more fuel efficient vehicle than standard gasoline. The efficiency of the current fleet usage and efficiency could provide opportunities for reduction of the fleet and increased fuel efficiency in thousands of dollars.



## Goal 3: Develop zoning, planning, city policy, and economic priorities that advocate for local food production.

### Strategies

1. Develop public-private partnerships and infrastructure for the processing, preserving and storage of locally produced food.
2. Create and implement policy for raising non-domesticated animals in city neighborhoods and agricultural areas.

As the cost of food and fuel increases there is mounting concern about food security. Food security is achieved when every person has consistent access to enough food to sustain a healthy life. Because the majority of food for the average American travels a long distance from farm to the plate, most families and communities, other than those who live on or near a farm, are in jeopardy if there is a disruption in the shipping supply chain.

By continuing to expand and grow Burlington's range of local food choices, we are not only reducing greenhouse gas emissions from the transportation of food from farm to plate, we are strengthening regional food security, building the local economy, and improving community health. Indeed the "co-benefits" of local food production, processing and consumption make the support of local food a winning proposition.

Fortunately, Burlington has a plethora of local food players. The Friends of Burlington Gardens, the Intervale Foundation, New Farms for New Americans, and Burlington's Parks and Recreation Department are just a few working on and supporting local food production and consumption. The Sustainable School Food Project, and the Burlington School Food Project, are working on education and to bring local food into area schools. Groups including UVM's Extension Service and Sustainable Agriculture Program, and the Urban Agricultural Task Force are addressing issues around policy, zoning, and research.

To create a more consistent supply of local products and enhance the local food supply chain there needs to be a variety of options for the products of local farmers. The City already benefits from a seasonal farmer's market, the Intervale Food Market, and activities at the Intervale Food Hub. There is the additional opportunity for a farmers market hall, street vendors selling locally-produced foods using and promoting local food products, additional retail outlets, joint marketing, and festivals celebrating local foods.



More attention is needed on the development of a robust public-private infrastructure for processing, preserving and storage. Not only with this open up new ways and means to engage in value-added activities can help spur economic development while lowering greenhouse gas emissions from the transportation of food. And while some work has gone into the support of non-domesticated animals, more to be done.

# Goal 4: Increase energy efficiency of all buildings within Burlington.

## Strategies

1. Require new residential construction to be Vermont Energy Star for Homes (VESH) qualified.
2. Implement BED Advanced Metered Infrastructure (AMI) program
3. Require new commercial construction to follow Core Performance guidelines
4. Implement the "PACE" (Property Assessed Clean Energy Program) for commercial and residential properties
5. Implement deep energy efficiency programs for commercial buildings
6. Replace existing streetlights with LED
7. Create a Green Roof policy and incentives
8. Revise and implement Time of Sale energy efficiency requirements
9. Implement the Environmental Preference Program city-wide

Burlington will continue to see an increase in its population, which is why improving energy performance in the majority of buildings is a target of the plan. Achieving this goal requires a concerted effort by government and its many public and private partners and property owners. Not only does increased building efficiency — and the efficiency of our infrastructure such as our City's water and sewer systems — save money, it can help spur the local economy by creating local employment for Burlingtonians.



Burlington's current success in energy efficiency can be attributed to two main programs: the Vermont Gas Service (VTGas) and the Burlington Electric Department (BED). Working in tandem, VTGas and BED have provided residents, businesses, and other Burlington-based entities with ways to reduce energy use. In Burlington, BED's energy efficiency programs are the result of a bond to fund energy efficiency program activities through 2002. Since 2003, BED customers (like all other Vermonters) have paid a small monthly Energy Efficiency Charge (EEC) that supports efficiency programs. When considered along with customers' direct costs, about \$30 million has been invested in energy efficiency programs over the last 19 years. This includes about \$13 million spent by BED and another \$17 million in expenditures by BED customers. The overall effect has been dramatic. Annual electricity consumption was about 2 percent greater than in 1989. Energy efficiency investments save Burlington consumers more than \$10.1 million annually.

Even though BED has seen much success with its energy efficiency programs over the years, there are more opportunities to improve energy efficiency. With Advanced Metered Infrastructure now being put in place throughout the city, property owners will have the power to monitor their energy consumption. Green buildings and green roofs should be incentivized; encouraging their creation on a more regular basis. A program such as "PACE" would also provide greater opportunities for efficiency and the creation of more jobs. There is always more work to be done!

# Goal 5: Increase the use of cleaner and renewable energy

## Strategies

1. Implement McNeil district heating project
2. Implement "Solar on Schools"
3. Implement BED "Renewable Energy Resource Rider" program
4. Implement a digester for organic waste
5. Implement a "Solar City" project on city buildings
6. Develop methane gas capture and use at wastewater treatment plants

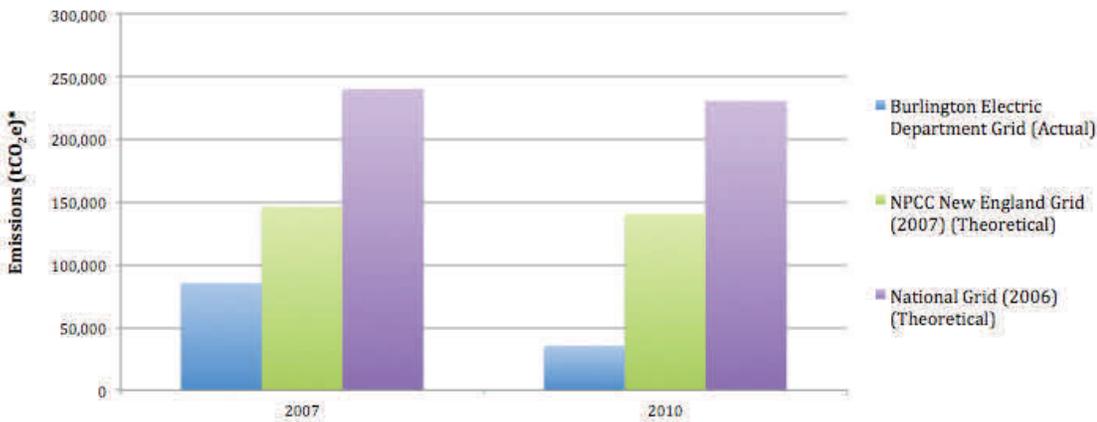
To address climate change, the world must require higher efficiency from existing energy sources and more to cleaner power sources. The previous goal focused on energy efficiency of buildings while this goal focuses on the sources of power, which included 46.5% of renewables in Burlington in 2011. Burlington's energy use priorities have long focused on developing more effective and economically viable Vermont based renewable energy alternatives including solar, wind and bio-mass energy sources, and a continued emphasis on conservation and efficiency programs.



The Burlington Electric Department is making strides in renewable energy generation. Continued work on this front — including work to source "clean" electricity — will not only protect us from the whimsical forces of the traditional energy market, but will go a long way in helping us reach our greenhouse gas reduction goals.

As a municipal department for the City of Burlington, Burlington Electric Department has a long history sourcing their electricity from renewable sources. This is reflected in the lower emissions from the Burlington Electric Department Grid, shown in blue in the graph below.

City of Burlington - 2007 and 2010 Electricity Emissions by Grid



Several projects/strategies have been implemented to increase the proportion of renewable energy sources the City purchases on an alternative energy rate plan to provide household-scale and commercial-scale families and businesses to reduce their reliance on the central grid. If the City and BED offer incentives such as grants or credits, businesses can increase their own power generation and reduce their use of the BED purchased power.

The 2007 Burlington Electric Department Grid emissions were applied to the 2007 usage and the 2010 Grid emissions were applied to the 2010 usage. The NPCC New England Grid provides cleaner electricity than the National Grid, but not as clean as the Burlington Electric Department Grid.

# Goal 6: Increase carbon storage and sequestration in existing forest fragments.

## Strategy

1. Increase the Urban Tree Canopy (UTC)

Research indicates that carbon sequestration — or the process by which carbon is captured and stored to avoid release in a sound and viable way to reduced greenhouse gasses. Because trees sequester carbon, Burlington is fortunate to have an estimated 40% of Burlington's land cover mass. Not only do trees sequester carbon, Burlington's urban forest, a mosaic of patches of the native forest, is a reflection of the city's health, well being, and livability. It is an important part of Burlington's special sense of place.

Our tree canopy offers additional benefits. The air and water are cleaner because the trees and plants remove pollution from the air and reduce runoff. Open spaces and urban stream corridors define a sense of space in our communities while providing a quiet respite from hectic urban life. Neighborhoods with tree-lined streets offer shade and protect us from inclement weather. Shoppers frequent shaded business districts where trees help save energy, reduce noise, and soften the hard edges of structures and paved areas.



Burlington has several key players, including Branch Out Burlington (BOB), working to protect, expand and grow our tree canopy. BOB's goal is to promote a vision of a city graced by a variety of beautiful and healthy trees, and a citizenry actively in support of the expansion and preservation of our urban forest.



## **Goal 7: Reduce the amount of waste sent to landfills from Burlington (businesses and residences).**

### **Strategies**

1. Implement residential organics collection program
2. Implement residential Pay As You Throw (PAYT) program
3. Require recycling bins at all public facilities and events
4. Eliminate use of plastic bags in the City purchases
5. Consolidate trash haulers by neighborhood
6. Require all construction and demolition sites to have recycling bins

Few Burlingtonians ever see where the city's waste goes, yet an estimated 34,000 tons of it winds up in landfills every year. We must reduce the amount of waste generated and sent to landfills. It is essential that both individuals and businesses join in the effort, and there are many opportunities to do so. Companies can reuse their industrial byproducts and can research methods to responsibly dispose of food and landscape waste. Residents can recycle packaging materials and learn about home composting.

To help individuals recycle, the City will continue to educate residents about recycling and roll out its "blue bin" program. Since 1992, recycling for residences and businesses in Burlington has been mandatory. The Department of Public Works provides curbside recycling collection for all residential properties, while private haulers provide recycling service for commercial properties and businesses.

The waste reduction goal also requires that Burlington restructure its methods of garbage pickup and transport. Hauling and disposing of waste releases significant amounts of CO<sub>2</sub>, mostly generated by trucks that service residential and commercial buildings. Currently, individuals and businesses contract with haulers themselves to pick up trash and compostable materials, while the City picks up recyclables. New approaches are being explored to reduce the amount of driving currently required to waste pickup.

Although the majority is generated at the community level, over 1,600 tons of this is generated by City government. Not only will reducing this waste reduce methane (another greenhouse gas), cutting down on waste will also reduce hauling costs. The City and other sectors are already doing a tremendous job at reducing the amount of waste that goes in the landfill. Still, we need to work on increasing the recycling rate and better promote composting among businesses and residents.

The City of Burlington began a waste reduction program in 2009, which has been greatly successful and is widely implemented. For example, by simply composting brown paper towels in the staff's City Hall restrooms, approximately 2,400 gallons has been diverted from the waste stream.

# MOVING FORWARD

Along with the more extensive information available at [www.burlingtonvt.gov/cap/](http://www.burlingtonvt.gov/cap/), the Burlington Climate Action Plan offers a variety of strategies that everyone who lives in, works in or visits Burlington can adopt to make a difference in our city and our lives. It is up to each of us to be thoughtful, persistent and committed.

Most of the actions in the Plan will provide net benefits to residents, businesses and other organizations. While we recognize that some goals are challenging, they can be achieved by working together, spending money wisely, accomplishing multiple objectives with one action, and harnessing new funds from federal, state and local government, along with utilities, foundations and corporations. As we move forward, progress must be continuously assessed and monitored. To help with that process, the City's Green Team has been formed to review our goals and to recommend revisions, adjustments and improvements.

The City of Burlington is committed to fostering partnerships to carry out each strategy recommended in the Plan, working with the community and community-based organizations and providing support and encouragement to partners. But you can get involved. You are part of the solution if you buy energy-efficient appliances, replace incandescent bulbs with CFLs, keep your car in top condition, air-dry your clothes and dishes, take shorter showers and turn off lights in unoccupied rooms, and walk or bike frequently as an alternative to driving. And when you encourage your friends and neighbors to do the same, you multiply the impact. This is a summary of the steps you can take to do your part.

⇒ Eliminate 10 miles of driving each week.	⇒ Keep your car tuned up and its tires properly inflated.
⇒ Reduce your heating temperature by three degrees.	⇒ Increase your cooling temperature by three degrees.
⇒ Turn off the water while you brush your teeth.	⇒ Install a low flow showerhead.
⇒ Replace your home air conditioner filter.	⇒ Replace all outdoor lights with solar lights.
⇒ Plug all appliances that use standby settings (like your TV and stereo) into power strips and turn off the power strips when not in use.	⇒ Recycle all paper, plastics, glass, tin and aluminum and fill your blue bin.
⇒ Replace incandescent bulbs with compact fluorescent bulbs (CFLs).	⇒ And much more...

# OUR STRATEGIES IN DETAILS

In order to achieve our municipal operations reduction targets, many if not all those strategies will need to be implemented. The process is to prioritize the following strategies and work on making them reality. Some will barely cost anything up front, others will require investment from the municipality. In the end most of the proposed strategies below will bear financial rewards in the reduction of costs or else simple cost reduction in a more energy efficient system or building.

## COMMUNITY TRANSPORTATION

**1. Improve bicycle and pedestrian infrastructure** - Build upon the Complete Streets guidance integrating on-street bicycle and pedestrian facilities into all future infrastructure improvements to City streets.

**2. Integrated transportation system improvements** - Build upon the City's Transportation Plan to implement several improvements to the integrated transportation system including the creation of a downtown transit center, Park and Ride and Auto Intercept lots to capture transit users entering City neighborhoods, and increased frequency of transit in corridors servicing downtown and auto intercept facilities.

**3. Downtown Transportation Management Association (TMA)** - Develop a downtown transportation management association that develops, and manages all employee transportation and parking programs, infrastructure, and related facilities. The goal of the TMA is to offer and improve cost-effective and convenient alternative transportation services while simultaneously reducing travel demand, reducing congestion and improving air quality.

**4. Price on-street parking to maintain 85% on-street parking utilization** - Increase on-street parking rates to market-based rates to maintain an 85% on-street parking utilization rate. This action will better relate parking supply with demand, increase the likelihood of parking spaces, reduce traffic congestion, improve air quality, and increase revenues for the City.

**5. Develop infrastructure for fuel-efficient vehicle** - This proposed action would develop infrastructure and incentives for fuel-efficient vehicles. This might include charging stations for electric and electric-hybrid vehicles and fueling stations for CNG and other alternative fuels.

**6. Develop a new Citywide Bike/Pedestrian Plan** - This proposed action would build upon the City's North/South Bike Plan by taking a comprehensive look at the City's existing bike/pedestrian infrastructure and designing and implementing necessary improvements.

## GOVERNMENT TRANSPORTATION

**1. Implement government alternative employee commuting program** - Reduce government employee commuting miles by encouraging employees to commute through emissions-free modes (telecommuting, walking, and biking), as well as less impactful modes (car sharing, and mass transit). It would also include incentives such as a parking cash-out program.

**2. Implement government vehicle retirement and replacement program** - Retire 5% of the government's vehicle fleet and replace the gasoline-powered vehicles with hybrids; retire twelve vehicles and replace 62 gas-powered vehicles with hybrids over a five year period.

**3. Government vehicle sharing/fleet management program** - Includes vehicle acquisition, assignment and maintenance with a focus on effectiveness and emissions reduction. Could also include other functions, such as vehicle financing, driver management, speed management, fuel management, health and safety management, regulatory compliance, and validating green initiatives.

## LOCAL GARDENS, FARMS AND FOOD PRODUCTION

**1. Public-private partnerships and infrastructure** - Develop public-private partnerships and infrastructure for the processing, preparation, and storage of locally produced foods.

**2. Policy for raising non-domesticated animals** - Create and adopt a clear and consistent policy for raising non-domesticated animals for egg, meat, and milk production, in city neighborhoods and urban agriculture areas.

## ENERGY EFFICIENCY IN BUILDINGS

**1. Require new residential construction to be Vermont Energy Star for Homes (VESH) qualified** - Require new residential construction to be Vermont Energy Star for Homes (VESH) qualified. VESH are designed and built using best practices to save energy by reducing thermal bypass, and by requiring high efficiency heating and appliances.

**2. Implement BED Advanced Metered Infrastructure (AMI) program** - BED will install smart meters in all buildings in the City of Burlington. Smart meters will replace all existing meters, provide data to BED and its customers in 15 minute intervals, and offer two-way communication. This better data will be combined with incentive(s) to reduce peak electricity use, cost, and emissions.

**3. Require new commercial construction to follow Core Performance guidelines** - Require new commercial construction to follow Core Performance guidelines, a program offered by BED, and Vermont Gas. Core Performance is a prescriptive guide to reduce energy use in commercial buildings by 20-30%.

**4. Implement the "POWER" program** - The POWER program will allow property owners to access long term municipal financing for energy efficiency and renewable energy improvements to their buildings. By opting into a special tax assessment district, property owners can pay for these improvements via property taxes over a period up to twenty years.

**5. Implement deep energy efficiency program in government buildings** - Perform deep energy efficiency improvements in all government buildings. Deep energy retrofits would include extensive renovations to existing structures that use the latest in energy-efficient technologies and results in significant energy reductions.

**6. Replace existing streetlights with LEDs** - Replace all existing streetlights (approximately 3,300) with LEDs over a 10-year period.

**7. Create a Green Roof policy and incentive program** - Require that all new flat roofs at or under 30 degree-pitch, both private and public, have to be vegetated. If old roofs have to be retrofitted, the building owner may be able to receive public financial support for a green roof.

**8. Revise and implement Time of Sale ordinance** - Build upon the existing residential rental housing time of sale energy efficiency ordinance by applying it to all residential and commercial buildings. Furthermore, it proposes that, as a condition of sale, all buildings must receive an energy inspection and rating that is available to prospective buyers.

**9. Implement the Environmental Preferable Purchasing (EPP) Policy city-wide** - Fully implement the City's existing environmental policy, requiring that it be applied to all procurement decisions city-wide.

## RENEWABLE ENERGY RESOURCES

**1. Implement McNeil district heating project** - Use McNeil power plant as a heat source for a district heating system that would use McNeil's efficiency, make use of some of its waste heat, and provide heat to consumers at a relatively low and predictable price.

**2. Implement "Solar on Schools"** - Put solar PV panels on the City of Burlington schools' roofs. The panels on seven schools will be operated by a private third-party development partner who can take advantage of federal and state tax credits, which the City can

**3. Implement BED "Renewable Energy Resource Rider" program** - Encourage residents and businesses to install solar PV panels by achieving through setting a predictable and stable rate above the retail cost of electricity, and therefore above the rate for standard electricity production.

**4. Implement a digester for organic waste** - Take community organic waste and manure from local farms to process in a strategic CHP facility. In addition to generating electricity and heat, this project would create a by-product to be sold as bulk compost/soil

**5. Implement a "Solar City" project on municipal buildings** - Install solar photovoltaic panels on appropriate city-owned buildings with the goal of providing 1MW aggregate power and helping to minimize the occurrence of peak load.

**6. Develop methane gas capture and Combined Heat and Power (CHP) potential at City's wastewater treatment plants** - Explore the potential for capturing methane gas and generating electricity and/or heat from the City's decentralized wastewater treatment

## URBAN FORESTRY AND CARBON SEQUESTRATION

**1. Increase the Urban Tree Canopy (UTC)** - This proposed action would increase the urban tree canopy (UTC) by planting a total of 100,000 trees per year and by maintaining the existing urban tree canopy. This would be achieved both on public and private property.

## WASTE REDUCTION AND RECYCLING

**2. Implement residential organics collection program** - Collect residential organic food waste (no yard waste) to be composted in a program modeled after the existing City residential recycling program, thus having a similar infrastructure and cost profile.

**3. Implement residential Pay As You Throw (PAYT) program** - Change the current residential collection payment system to a system in which residents pay per unit of trash collected. Programs like these result in a decrease of solid waste, as well as overall cost savings for residents. The current physical system would remain the same.

**4. Require recycling bins at all public facilities and events** - Require that recycling bins are available and maintained at all public facilities and events.

**5. Eliminate use of plastic bags in the City of Burlington for purchases** - Eliminate plastic bags by building on existing bring your own bag incentives. The action would require shoppers who don't bring their own totes to pay a fee for plastic bags.

## WASTE REDUCTION AND RECYCLING

**6. Consolidate trash haulers by neighborhood or district** - Consolidate trash haulers by neighborhood or district, thereby limiting the number of trucks driving through the city, reducing vehicle miles and congestion, and improving air quality.

**7. Require all construction and demolition projects to submit a waste management plan** - Require construction and demolition projects to submit a waste management plan. Such a plan would include: waste recycling, salvage or reuse goals; estimated types and amounts of materials or waste generated from the project site; proposed and intended disposal methods for these materials; and detailed instructions for subcontractors and laborers on how to safely separate or collect the materials at the job site.

## **ACKNOWLEDGEMENTS**

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