

## SECTION

## 01

## Introduction



The town of Peterborough has long been a leader in municipal sustainability efforts and renewable energy. While this Renewable Energy Plan is the most ambitious step in its commitment to reduce greenhouse gases, Peterborough has been working to lower carbon emissions since the 1990's. From large renewable energy projects to energy conservation policies, the town has earned a reputation of being at the forefront of sustainable development. Below are some highlights:

- The Town has upgraded its street lights twice, first with metal halide lights in 1999 and more recently, with highly efficient LEDs.
- As early as 2006, the town started replacing fossil fuel furnaces with lower emission wood pellet boilers. Such boiler systems currently provide heat in several municipal buildings including the Town House, the Highway Garage, the Police Department, the Library, and the Community Center.
- In 2007 the Select Board issued a 5% carbon reduction challenge and the staff finished up a study on policies that could result in lower energy use.
- The policy study led to the adoption of an Anti-Idling Policy.
- The town conducted an energy audit of the Town House and then made insulation improvements.
- After its new wastewater treatment plant (WWTP) became operational in 2012, the Town applied for a grant to build a 1MW solar array to provide electricity for the WWTP.
- The 1MW array came online in 2014, earning Peterborough the title, "Greenest Town in New Hampshire."
- In 2021, the newly renovated Library opened. The redesign included a 71.6 kW rooftop solar array, a wood chip boiler heating system, an adsorption chiller cooling system, a well insulated building envelope, lighting with daylight and occupancy sensors, and infrastructure to add EV chargers to the parking lot.
- ConVal High School installed a 300 kW rooftop solar array in 2021.
- The Town of Peterborough added EV charging to its new municipal downtown parking lot in 2022.

# GHG EMISSIONS IN PETERBOROUGH

## 24,001

Metric tons CO<sub>2</sub>e in  
2021 from vehicle use

## 21,923

Metric tons CO<sub>2</sub>e in  
2021 from electricity  
use

## 25,068

Metric tons CO<sub>2</sub>e in  
2021 from building  
heating

## 614

Metric tons CO<sub>2</sub>e in  
2021 from solid  
waste

Sources: see Peterborough GHG Inventory

[Click here to  
return to TOC](#)



## Peterborough's Commitment to Renewable Energy

At Peterborough's 2021 Town Meeting residents voted overwhelmingly (with 74% in favor) to pass a Warrant Article committing the town to transition to 100% renewable sources of electricity by 2030 and for all other energy needs by 2050. The Peterborough Renewable Energy Planning (PREP) Team was appointed by the Peterborough Select Board to research and write a general action plan to meet this goal.

PREP is made up of Peterborough citizen volunteers, many with years of experience in the energy field. They have spent the last year researching possible solutions to help Peterborough reach its goals. This plan is the product of the PREP team's efforts.

**What Are GHGs?**

A greenhouse gas (GHG) is a molecule in the atmosphere which does not react to light energy in the visible range, but does react to light energy in the infrared range, like that which is emitted from the Earth after being warmed by the sun. The most common greenhouse gases include carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O).

**Why do GHGs Matter?**

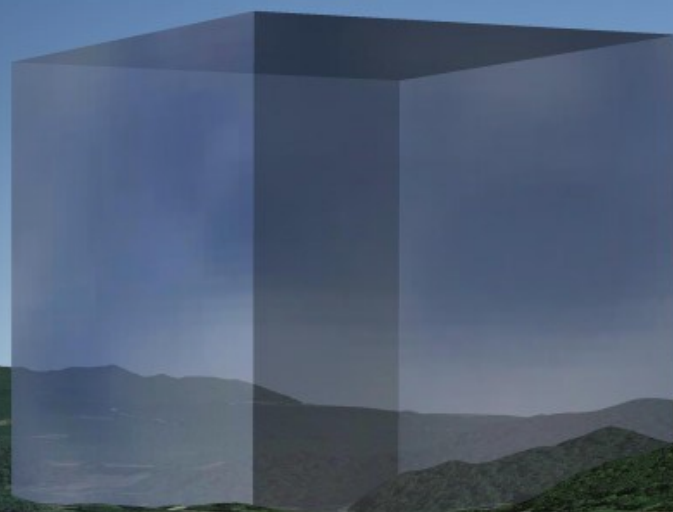
GHGs let the sun's light shine onto the Earth's surface, but they trap the heat that reflects back up into the atmosphere. In this way, they act like the insulating glass walls of a greenhouse. The more GHGs there are, the more heat that is trapped in our atmosphere and the more we experience the impacts of global warming.

**What can we do to reduce GHGs?**

Greenhouse gases can be reduced by making changes to the key greenhouse gas sectors throughout our community—particularly through the reduction and elimination of fossil fuel combustion and the advancement of clean energy sources.

**How Large Are Community wide GHG Emissions?**

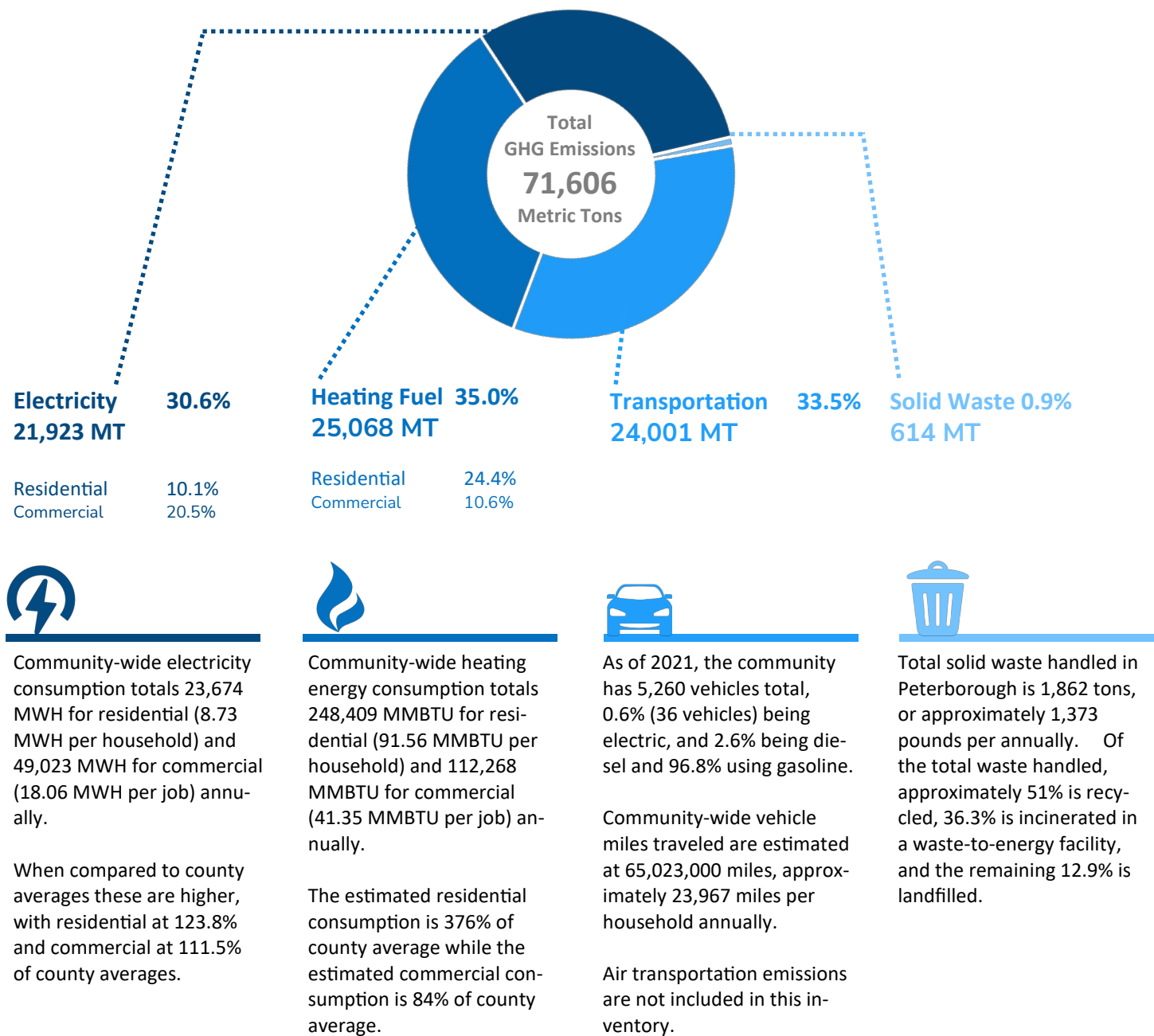
The community's total emissions for 2021 are equal to **1.4 Billion** cubic feet of man-made greenhouse gas. This volume of atmosphere is equal to a cube **1,120** feet on each face—seen here from approximately 1.5 miles away on Route 202



### Peterborough GHG Emissions Overview

Community-wide GHG emissions for the Town of Peterborough amount to 71,606 Metric Tons for the year 2021.

The community’s population is 6,661 and the community supports 2,715 jobs. This means that on a per-capita basis, the town’s GHG emissions equal 10.75 Metric Tons.





# The Plan

The Peterborough Renewable Energy Plan:

addresses

**4 SECTORS**

of community-wide focus

through

**18 STRATEGIES**

to achieve goals

supported by

**108 ACTIONS**

detailing steps to be  
taken

over an

**8-YEAR**

Implementation  
timeframe

## Renewable Energy Plan as Living Plan

This Renewable Energy Plan is intended as a “living plan” rather than a static document. This means that the implementation phase of this plan should be characterized by intermittent measurement of progress and plan adjustments. As a “living plan,” the 2030 goals should be seen as a guiding constant and recognition should be given that initial implementation actions may not yet fully achieve long-term plan goals. Intermittent plan progress measurements and adjustments should identify additional actions, or increases in action implementation targets, as needed to meet the ultimate 2030 plan goals.

## Implementation is For Everyone

The causes and impacts of climate change are broad. Solving it must be equally broad. Some actions will need to be led by Town Select Board, Town departments, and/or the business community. In addition, there are some things that households and individuals can do to make an impact. Ultimately, achieving the visionary goals outlined in this plan will require engagement and a sense of responsibility not only by the Town of Peterborough leadership and staff, but by the community itself as well. It is critical for all to remain engaged and active, advancing and advocating for actions you feel are important.

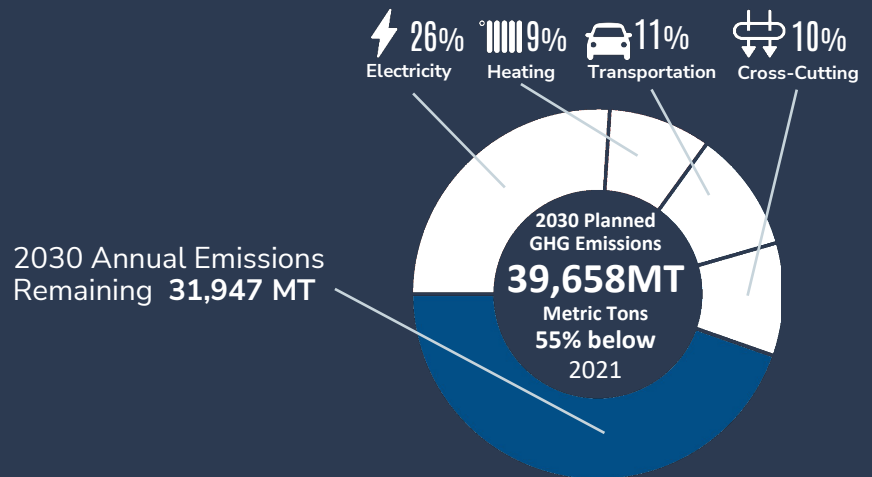
## Next Steps and Implementation

This Peterborough Renewable Energy Plan is only the beginning of an on-going process to evaluate and advance the community’s overall renewable energy goals. The plan includes an Implementation and Cross Cutting Actions section providing detailed actions in a framework for launching, guiding, monitoring, and evaluating the execution of this plan.

# Peterborough's Planned Carbon Reduction

Projected Town-wide GHG reductions from REP implementation

The strategies outlined in this plan are projected to eliminate 39,658 metric tons of GHG emissions annually by 2030. The chart to the right shows each sector's share of emission reductions.



## Plan Framework

This plan is structured around a unifying framework organized by four community-wide sectors as outlined to the right. Each of these sector areas is described in a separate section with background considerations on the subject covered. Sectors have over-arching strategies established to meet 2030 goals and detailed actions for implementation.

**Strategies:** specific statements of direction that expand on the sustainability vision and GHG reduction goals and guide decisions about future public policy, community investment, and actions.

**Actions:** are detailed items that should be completed in order to carry out the vision and strategies identified in the plan.



### Cross-Cutting

Cross-Cutting Actions are foundational or organizational recommendations that apply to some or all of the other sectors.



### Electricity

Achieving 100% Renewable Electricity community-wide by 2030.



### Heating

Reducing GHG emission associated with community-wide building heating.



### Transportation and Land Use

Addressing GHG emissions from on and off-road vehicles and related land use policies.

The Town of Peterborough is committed to environmental stewardship and sustainability. In 2009, the Town adopted the Strategic Plan for Sustainability, prepared by the Joint Oversight Committee on Sustainability. This plan provided the Town with an overall framework for addressing a variety of sustainability initiatives.

In 2019, the Town of Peterborough Common Council passed a resolution which set a goal of reaching carbon neutrality community wide, in both energy and transportation by 2050.

In August 2021, the Town engaged paleBLUEdot for the development of a Renewable Energy Plan outlining strategies and actions to support achieving its climate goals. This report plan is the result and was developed in collaboration with the Town’s Renewable Energy Planning Team.

This Renewable Energy Plan builds on the success of the Town’s 2009 sustainability plan and establishes strategies and actions through 2030 paving a path toward the Town’s long-term carbon neutrality goal. Achieving community-wide greenhouse gas (GHG) reductions and addressing the impacts of climate change requires addressing considerations across a wide range of sectors. This Renewable Energy Plan includes nine community-wide sectors. Each sector has over-arching Strategic Goals (or “Strategies”) established to meet 2030 goals and is organized for detailed implementation Actions.

The Challenge

The complex systems that make up modern civilization result in stressors on the delicate balance of our ecosystems. The combustion of fossil fuels is warming Earth’s atmosphere and changing our climate. Climate change is already affecting Peterborough and its impacts are projected to become much more severe in the coming decades<sup>2</sup>. These impacts also contribute to additional strain on vulnerable populations, social systems, and overall community resilience<sup>3</sup>.

The Opportunity

Transformation of our energy system is essential in order to stop burning fossil fuels. This transition presents an opportunity for Peterborough. Directing our energy investments into renewable sources will make them more resilient and provide for local job creation.<sup>4,5</sup> Innovation, technology, and collective social change inherent in climate action can also support greater community abundance and shared equity.

The Process

The work that went into the Peterborough Renewable Energy Plan:

11 month  
planning timeframe

46  
planning team  
members

15  
community partner  
groups engaged

722  
community members  
providing input

5  
foundational research  
study documents

2  
on-line community in-  
put survey efforts

**GHG Emission Reduction Goal in Global Context**

To validate the Town’s emissions reduction goal, the recommendations of the International Panel on Climate Change (IPCC) were considered. The scientific consensus of recent IPCC recommendations is that it is necessary to reduce global GHG emissions at a pace that will limit global warming to 1.5°C or no more than 2°C above pre-industrial levels. This is considered to be the threshold for dangerous climate impacts.

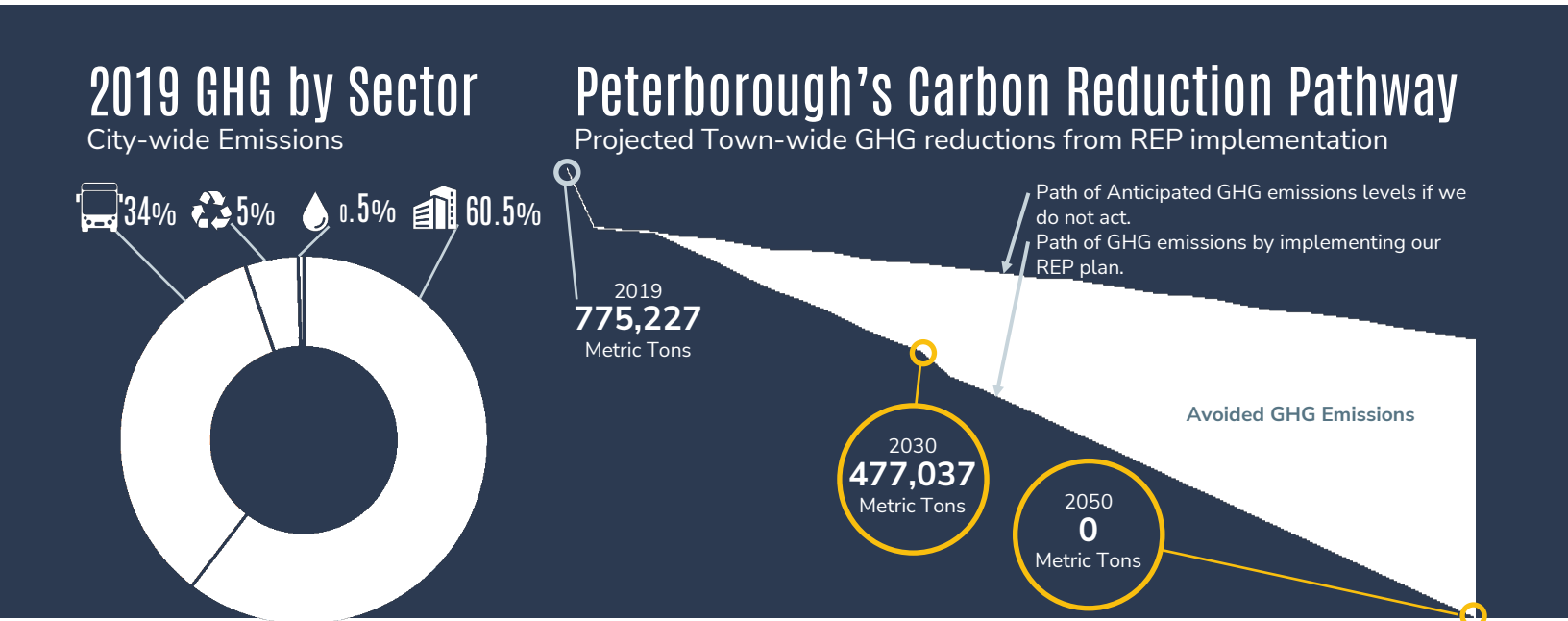
The UNEP Emissions Gap Report published in November 2019 asserts that by 2030, global greenhouse gas (GHG) emissions will need to be 25% to 55% lower to put the world on the pathway to limiting global warming to below 2°C or 1.5°C respectively by 2030<sup>6</sup>.

**Our Carbon Reduction Goal**

This plan seeks to re-affirm the Town’s commitment to reduce GHG emissions while aligning with the recommendations of the IPCC. These commitments were accounted for in the formulation of appropriate carbon reduction goals for Peterborough:



**The Town of Peterborough’s GHG emission reduction goals are to reduce community-wide GHG emissions by 40% to 50% below 2019 levels by 2030 and achieve carbon neutrality by 2050.**





### Co- Benefits of Renewable Energy Planning

According to the World Health Organization, studies are increasingly showing that the implementation of climate policies leads to both cost savings and improvement in health. The actions communities take to reduce greenhouse gas emissions in various sectors, including housing, transportation, and energy have many co-benefits that go beyond climate change mitigation. These co-benefits to climate planning include reduced air pollution, substantial human health gains and reduced health risks, increased resource efficiency, improved local economic security, and improved resilience of ecosystems and our built environment.<sup>1,2,3,4</sup> These benefits result in positive financial impacts as well as improved quality of life and natural resources.

### Positive Financial Impacts

Many climate actions have a direct positive financial impact (e.g. savings from reduced fuel consumption). Many actions also have significant indirect financial impacts. Studies show that air pollution benefits of climate actions can cover a significant part of the cost of those initiatives.<sup>5</sup> Still others help avoid costs through increased resilience such as reducing dependence on fossil fuels – estimated at \$5 per metric ton of GHG reduction.<sup>6</sup> Health benefits may offer the most significant financial opportunity. One study estimated global average health co-benefits of \$58-380 per metric ton of GHG.

### Improved Quality of Life

The actions included in this and other Renewable Energy Plans support a continued improvement to the community's quality of life. Studies indicate that successful implementation of many climate actions will result in increased mobility options, job creation, and reductions in poverty and inequality.<sup>8</sup>

### Improved Natural Resources

Addressing global warming could help lessen the harmful impacts of climate change on the ecosystems that now provide us with multiple benefits.<sup>9</sup> Increasing the Peterborough's community wide tree canopy to meet the goals of this Renewable Energy Plan, for instance, could increase the economic benefit provided by the Town's trees by as much as \$250,000 annually while other actions can result in improved access to greenspace for residents.<sup>10</sup>

### Common Co-Benefits of Climate Planning

Reduced Costs



Improved Air Quality



Improved Energy Resilience



Reduced Pollution



Improved Public Health



Jobs / Economic Development



Safer Streets



Reduced Traffic Congestion



Protected / Enhanced Ecosystems



Improved Community Resilience



Improved Mobility



Improved Social Connectivity



Improved Community Equity



Improved Quality of Life



### Climate Change in New Hampshire

Climate change is a global phenomenon that creates local impacts. It presents one of the most profound challenges of our time. A broad international consensus exists among atmospheric scientists that the Earth's climate system is being destabilized in response to elevated levels of greenhouse gas emissions in the atmosphere. Two changes to New Hampshire's climate are occurring already: shorter winters with fewer cold extremes, and more heavy and extreme precipitation.

### Climate Change in Peterborough

The climate in the Town of Peterborough has already changed. From 1980 through 2018, the Town has experienced an increase in annual average temperature, an increase in the number of days above 95 degrees, an increase in the number of heavy rain events, and a decrease in the number of days below 32 degrees.<sup>12,13</sup>

Some of the most significant changes in the climate relate to variability. Climate variability can be seen in the changes in annual precipitation for Peterborough. Overall annual precipitation has increased; however, this increase is not evenly distributed throughout the year. Fall and winter precipitation have increased up to 15.5%, while spring and summer precipitation have remained nearly unchanged.<sup>14,15</sup>

The Town's climate is anticipated to continue to warm through this century and beyond. Precipitation is anticipated to likely increase in all seasons particularly in the spring and fall. The primary changes to climate characteristics for the Town include:

- Warmer annual average temperatures with a more significant warming in winter months
- Increase in extreme heat days
- Increase in heavy rain fall events with increase in flood potential
- Increase in time between precipitation with increase in drought potential
- Greater variability in temperature and precipita-

## Looking Back

From 1980 through 2018, Peterborough has experienced:

Increase in annual average temperature:	<b>1.62°</b>
Increase in annual precipitation:	<b>4.3%</b>
Increase in heavy precipitation	<b>34%</b>
Increase in days >95:	<b>2 days</b>
Decrease in days <32:	<b>-8 days</b>
Growing season:	<b>+9 days</b>

## Looking Forward

By 2100 Peterborough can anticipate:<sup>12, 19</sup>

Increase in annual average temperature:	<b>6°-12°F</b>
Increase in annual precipitation:	<b>+15%</b>
Increase in heavy precipitation	<b>30%</b>
Increase in days >95:	<b>50 days</b>
Decrease in days <32:	<b>-45 days</b>
Growing season:	<b>+43 days</b>
Air Conditioning Demand:	<b>+178%</b>

## Economic Risk of Climate Change to Peterborough by 2100

Future economic and social impacts of climate change include impacts to agriculture (including food costs), energy costs, labor impacts, death rates, and crime impacts among others. The estimated economic impacts for Peterborough are:<sup>16</sup>

**\$34,470,809**

Annual Cost Impact  
(in 2018 dollars)\*

\* Figure does not include increased healthcare costs due to increased illness and disease, nor increased property damage due to increased extreme weather events.

## Social Cost of Carbon

“Social Cost of Carbon” is a measure of the share of climate change economic harm and impacts from emitting one ton of carbon dioxide into the atmosphere. In 2021, New Hampshire state legislators proposed an initial cost of carbon in Assembly Bill 766 of:

**\$50\***  
Per Ton

## Climate Risks to Peterborough

The projected changes to the Town’s climate in the coming decades represent potential risks to residents. These risks are inequitably felt and are particularly acute in populations especially vulnerable to them such as children, seniors, and those with disabilities (see the Peterborough Climate Vulnerability Assessment for more information). Below are some of the more significant risks to the Town’s population:

### Extreme Heat and Weather:

Certain groups of people are more at risk for stress, health impacts, or death related to extreme weather events including tornadoes, wind storms, lightning, winter storms, hail storms, and cold waves. Vulnerability to heat stress can be increased by certain variables including the presence of health conditions like diabetes and heart conditions, demographic and socioeconomic factors, and surrounding land cover.

### Air Quality

Climate change is expected to affect air quality through several pathways including production and potency of allergens and pollen, and increased regional concentrations of ozone, increased potential of smoke from wildfires, and increased particulate air pollution and dust.

### Flooding

According to the latest National Climate Assessment, the frequency of heavy precipitation events has already increased for the nation as a whole as well as for New Hampshire specifically. These heavy rain events are projected to increase throughout New Hampshire. Increases in both extreme precipitation and total precipitation are likely to increasingly contribute to over-bank flooding (river and lake flooding) as well as flash flooding.

### Food Insecurity

Climate change is likely to destabilize cropping systems, interrupt transportation networks and trigger food shortages and spikes in food cost.

### Infrastructure Failure

Extreme weather events, flooding and flash flooding, as well as increasing daily stresses caused by increasing climate variability, all represent potential causes of failure of our aging infrastructure. Power outages, road damage, bridge collapse, and water infrastructure failure each represent significant physical climate risks to the community - especially individuals who are climate vulnerable.





### Our Carbon Reduction Goal

This plan seeks to re-affirm the Town's commitment to reduce GHG emissions while aligning with the recommendations of the IPCC. These commitments were accounted for in the formulation of appropriate carbon reduction goals for Peterborough:

**The Town of Peterborough's GHG emission reduction goals are to reduce community-wide GHG emissions by 40% to 50% below 2019 levels by 2030 and achieve carbon neutrality by 2050.\***

This community-wide goal is reflected in strategies established for individual sectors. Sector goals related to GHG emissions reductions are designed to balance reduction across all sectors and achieve the overall emissions goals set forth for the community. The goals seek to strike a balance between achievability while also stretching for improvement beyond business-as-usual.

\* Net zero emissions refers to a community for which, on an annual basis, all greenhouse gas emissions resulting from community-wide operations are offset by carbon-free energy production .

### Survey of Peer Regional Community Carbon Reduction Goals

Albert Lea	Reduction in City operations and community-wide emissions of 25% below 2019 levels by 2030 and 80% below by 2040
Burnsville	Reduce community-wide GHG emissions 40% below 2005 levels by 2030 and 80% below 2005 levels by 2050
Duluth	80% reduction in GHG by 2050 from municipal operations compared to 2008 levels
Eau Claire	100% renewable energy and <i>carbon neutrality</i> by 2050
Madison	100% renewable energy and net-zero emissions by 2030
Maplewood	Reducing greenhouse gas emissions to 20 percent of the City's 2015 baseline levels by 2050 (an 80 percent reduction).
Milwaukee	By 2030, Milwaukee aims to reduce community-wide net greenhouse gas emissions by at least 45% and net zero GHG emissions By 2050, or sooner.
Minneapolis	100% renewable energy for city operations by 2022 and citywide electricity by 2030
Rochester	100% renewable energy citywide by 2031 across all sectors
Shakopee Mdewakanton Sioux Community	To achieve community wide Net Zero emissions.
St Louis Park	100% renewable electricity citywide by 2030, carbon neutrality by 2040
St Paul	Carbon neutral municipal operations by 2030, carbon neutral citywide by 2050
Winona	Carbon neutral citywide by 2050
Eau Claire	100% renewable energy and <i>carbon neutrality</i> by 2050



# IMAGINE THE YEAR 2050

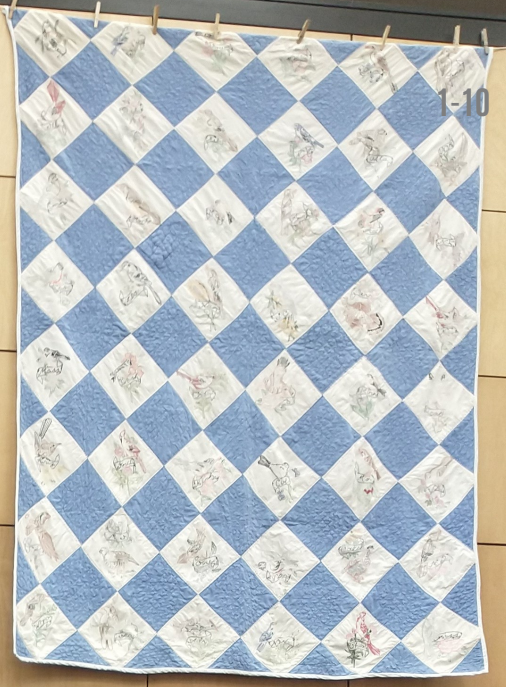
What does a carbon-neutral La Crosse look like to you?



## TELL US!

The City of La Crosse Climate Action Planning committee wants to hear from you! Scan the QR code to provide input in the form of stories, art, poems, and to learn more.





**LAND RECOGNITION**

The La Crosse Public Library acknowledges that it occupies the territory of the Ho-Chunk Nation, who have inhabited this land since 1848. We honor the Ho-Chunk people and their traditions, and we are committed to supporting their efforts to preserve their culture and language.

**DIGITAL LITERACY FOR JOB SEEKERS**

Free classes for job seekers. Learn basic computer skills, resume writing, and job search strategies.

**THE DRIFT**

March 1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th, 10th, 11th, 12th, 13th, 14th, 15th, 16th, 17th, 18th, 19th, 20th, 21st, 22nd, 23rd, 24th, 25th, 26th, 27th, 28th, 29th, 30th, 31st.

**YOGA FOR ALL**

Free yoga classes for all ages and abilities. Classes are held at the La Crosse Public Library.

**TECH HELP**

Free tech help for seniors. Learn how to use a computer, smartphone, and tablet.

**March 1st - 31st**

Free tech help for seniors. Learn how to use a computer, smartphone, and tablet.

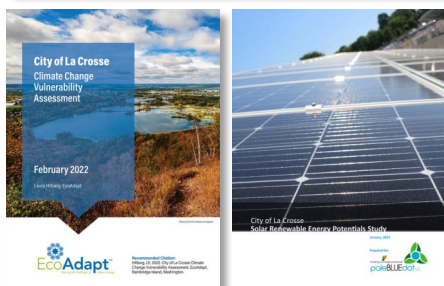
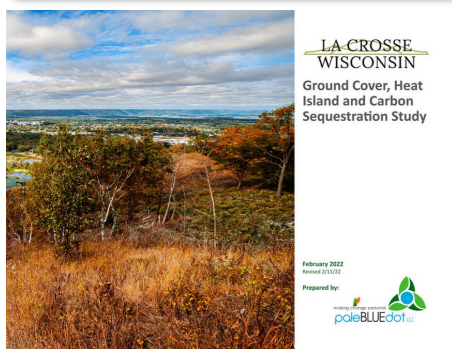
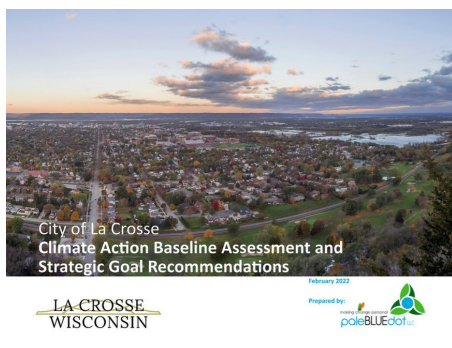
**March 1st - 31st**

Free tech help for seniors. Learn how to use a computer, smartphone, and tablet.

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## The Process

The REP was developed in collaboration with a 46 person planning team of community members, business community members, institutional representatives, Town commissions, and Town of Peterborough staff. The planning team was organized into sub-teams aligned with each of the sectors included in this plan (see Plan Framework). The plan was developed through a number of planning workshops from January 2022 through July 2022. The goals and actions identified in the Renewable Energy Plan are grounded in community input, expert analysis, and best practices from other cities throughout the United States. Strategic goals and detailed actions were developed, refined, prioritized, and finalized by the Planning Team through a series of workshop meetings. The result of this process is a collaboratively created, co-authored Renewable Energy Plan which directly integrates the voices of Peterborough residents, businesses, Town staff, and representatives of under-resourced communities within the Town.

## Research Based Renewable Energy Plan

In support of establishing the goals, strategies, and actions included in this plan, paleBLUEDot also produced a Greenhouse Gas Inventory, a Climate Vulnerability Assessment, a Town-wide Renewable Energy Potentials Study, a community wide Ground Cover, Tree Canopy, and Carbon Sequestration Study, and a Climate Action Baseline Assessment. These assessments created the foundation of the Renewable Energy Planning process.

## Community Engagement

The goal of the Peterborough REP community engagement effort was to cultivate community co-ownership by engaging them early, often, at various levels, in diverse ways, and facilitating or supporting their participation in decision-making. A significant percent of the engagement effort was focused on engaging traditionally under-resourced communities who are most vulnerable to the risks and impact of climate change—see “Equity and Inclusion”.

### Community Engagement Approach

Supporting this engagement goal, the community engagement approach occurred over two phases. The initial phase focused broadly on community concerns, ideas, and general climate plan input while the second phase focused on providing community members with an opportunity to review and give feedback on the Draft Renewable Energy Plan. Both phases of engagement included inviting community members to take part in REP planning activities that varied in level of commitment and time needed for participation. This tiered engagement was meant to meet community members, particularly under-resourced communities, where they are and supply opportunities for them to take part at their level of interest, time, and capacity. Listed in level of time and commitment needed, the engagement opportunities were:

**Participating on Renewable Energy Planning Team:** This was the most time intensive engagement opportunity and empowered community members to directly shape the REP by working monthly with Town staff and leaders.

**Hosting Community Input Session:** Community members worked with the paleBLUEdot team to recruit and host an in-person or virtual listening session where community members gave their input on the plan.

**Participating in Community Input Session:** Community participants attended an input session to discuss climate action and give their feedback on the plan.

**Completing Survey:** Participants provided their input by completing an on-line survey.

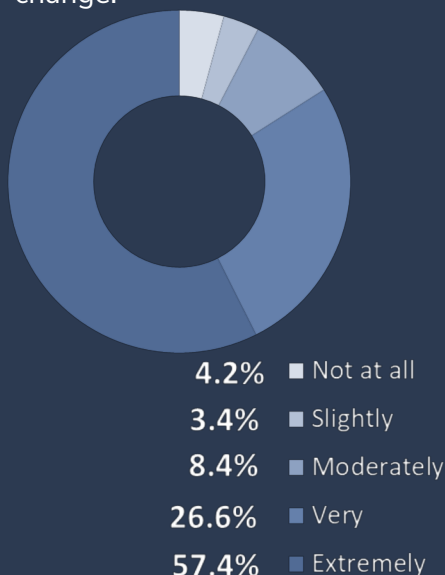
### Finding Community Champions

The first step in engaging community was to identify which communities were already easy to engage and which communities were harder to reach. Through conversation with Peterborough staff and Census Quick Facts we found Peterborough likely under-resourced communities to include communities of color, low material wealth seniors, low material wealth people with disabilities, and renters.

The paleBLUEdot team conducted four rounds of interviews with 12 individuals representing community partners. These one-on-one interviews provided an opportunity for focused input into the planning process while helping to identify representatives within Peterborough's under-resourced communities who might participate in the planning core team and/or listening sessions. As a result of this engagement effort, four community champions were identified who each convened one or two Community Input Sessions. These sessions supported opportunities for in-depth group dialogue from 32 Peterborough residents from under-resourced communities enabling their carefully considered input and feedback in the development of the Peterborough Renewable Energy Plan.

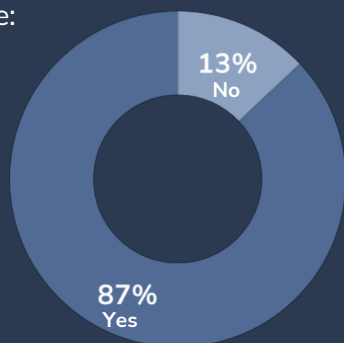
### Peterborough Concern Over Climate Change Impacts

According to the Town's Climate Change Survey, 92% of respondents are moderately, very, or extremely concerned over potential impacts of climate change:



### Peterborough Impacted by Climate Change

According to the Town's Climate Change Survey, 87% of respondents have been personally impacted by the effects of climate change:



### Engaging Peterborough's Youth

The community engagement process included a specific focus on connecting with Peterborough's youth. As with the broader community engagement effort, this began with outreach and one-on-one interviews with potential youth community champions. Early in the engagement effort, youth-connected community partners were engaged, including Peterborough Public Library. Through these outreach efforts, a Youth Climate Forum was designed (event pending fall of 2022).

### Finalizing Peterborough Plan Actions

A preliminary draft of actions were reviewed against action screening criteria which enabled the Planning Team to evaluate, refine, finalize, and prioritize the actions to be incorporated in the final Renewable Energy Plan. The screening criteria were established by the REP Planning Team early in the process and included:

- **Impact/Effectiveness of Implementation:** How likely is it to achieve the goal? Will it impact a large portion of the targeted emissions sector or population? How likely is it the action will work to address the goal? Is this addressing a high-priority vulnerability or a major source of emissions?
- **Equity of Implementation:** Will this action positively support advancing equity within the community? Will it address an existing inequity in the community, such as disproportionate poor air quality, access to transit, flood risk, etc? Does the action address the needs of vulnerable and historically marginalized populations? Does the action reduce vulnerability for all populations? Is it fair? Are there unintended consequences of action?
- **Support:** How likely is the proposal to be adopted by the Town or community? Is it politically feasible? Is there community support? Is it consistent with the Town's priorities and readiness to implement?
- **Overall Cost to Benefit:** Does this action have a good overall cost-to-benefit potential? Overall cost-to-benefit should include benefits relative to GHG emissions reductions (cost of carbon), and other direct benefits such as operational cost savings or community savings, but also co-benefits such as economic development potential, quality of life potential, health benefits, and avoided costs including avoided costs of "business as

### Equity Focused Community Engagement

During the planning process, four focus group listening sessions as well as a series of one-on-one interviews with community liaisons were organized to begin to build relationships, deepen understanding of needs, and identify best ways to partner to broaden engagement within underrepresented communities. These focus group listening sessions occurred in two phases.

The goal of the first phase was to gain insight into community members' perspectives on climate change as well as ideas on potential solutions and considerations the Town should incorporate into the plan. The second phase occurred following the development of the Draft Renewable Energy Plan with the goal of collecting input on the draft plan overall as well as insight on potential equity concerns and opportunities. This second phase also sought to identify potential resources and partners who may be well positioned to engage with the Town during the implementation phase of the Renewable Energy Plan to support refinement of equity considerations and community engagement with traditionally underrepresented communities.

### Action Equity Impact Review

In addition to the screening criteria, actions included in the plan were reviewed for equity impacts using the paleBLUEdot Equity Assessment Tool. The tool provided REP Team members with a framework which reviewed each subject action against three equity considerations. Actions were then re-crafted based on the findings of the REP Team members. The equity assessment considerations used were:

- What are the potential positive impacts/ benefits/ access opportunities created by this action? Who will benefit?
- What are the potential negative impacts/ consequences/ barriers created by this action? Who will be affected by these?
- Are there other equity factors to consider? (inclusive language, supportive services needed, etc)

### Inclusion and Equity in REP Actions

Climate change disproportionately impacts Peterborough's most vulnerable community members including low-income and disadvantaged populations, marginalized ethnic groups, racial minorities, the elderly, the very young, and those facing challenges to their health. At the same time, innovative climate action can be a powerful avenue toward reducing inequality, sparking economic growth, and expanding income opportunities.

Therefore, the strategies and actions throughout this Renewable Energy Plan have been developed with the goal of simultaneously addressing the threat of climate change while seeking out the benefits and opportunities created by climate action for reducing inequality. As the impacts of climate change increase, so does the need to implement effective strategies and actions that ensure equity and empowerment for all in Peterborough.



# STRATEGIES

## Our Climate Action Strategies

The following is a summary of the strategies detail through this plan:



### Transportation and Mobility

Addressing GHG emissions from and resilience of on and off-road vehicles and equipment.

**TM 1: Decrease commuter and community-wide VMT by 5% by 2030.**

**TM 2: Increase public transit access and commuter ridership from 1.6% to 3% by 2030.**

**TM 3: Increase battery electric vehicle (BEV) utilization to 20% of community wide rolling stock by 2030.**

**TM 4: Establish viable bio and/or renewable diesel sources to serve community by 2025. Achieve 50% community-wide diesel consumption replacement with bio and/or renewable diesel by 2030.**

**TM 5: Improve the comfort and safety of walking and biking within the Town of Peterborough.**

**TM 6: Achieve 30% conversion of municipal operations gasoline and e10 gasoline vehicles and equipment within municipal fleet to EV's by 2030. Achieve 100% conversion by 2040.**

**TM 7: Increase fuel efficiency of remaining municipal operations combustion engine fleet by 10% by 2030.**

**TM 8: Reduce Town-wide off-road and lawn equipment annual emissions.**



### Land Use and Housing

Addressing climate resilience of housing stock and climate mitigation and adaptation potential of land use patterns.

**LH 1: Increase average population per developed acre by 5% by 2030.** (focusing increases in areas most likely to advance all goals of this REP including increased public transportation, climate resilience, etc.).

**LH 2: Increase community resilience to increased flooding and flash flooding caused by Climate Change.**

**LH 3: Update community plans, zoning, and design standards to increase housing and community resilience to the impacts of climate change, including flooding and extreme temperatures.**

**LH 4: Update community plans, zoning, and design standards to mitigate heat island and micro-heat island impacts, particularly for populations most vulnerable.**

**LH 5: Reduce share of population living in high energy poverty from 16.4% to 11.4% by 2030.**

## Using This Plan

This Renewable Energy Plan includes an implementation framework designed to achieve community-wide goals for greenhouse gas reduction and climate adaptation and resilience. The plan is structured around a unifying framework organized by eight community-wide sectors.

Each of these sector areas is described in a separate section with background considerations on the subject covered. Sectors have over-arching strategies established to meet 2030 goals and detailed actions for implementation. Sector actions primarily focus on Climate Mitigation, Climate Adaptation, or both:

**Strategies:** specific statements of direction that expand on the sustainability vision and GHG reduction goals and guide decisions about future public policy, community investment, and actions.

**Actions:** are detailed items that should be completed in order to carry out the vision and strategies identified in the plan.



### Buildings and Energy

Addressing GHG emissions from and resilience of our building stock and building energy supply.

**BE 1:** Reduce community-wide residential, commercial, educational, and industrial building energy consumption by 15% by 2030. (electricity and natural gas).

**BE 2:** Increase adoption of high performance building construction technology, achieving 10% Net Zero of new construction households and commercial properties community wide by 2030.

**BE 3:** Achieve 10% residential and commercial and industrial building "fuel switching" from on-site fossil fuel combustion to electrification by 2030.

**BE 4:** Increase renewable energy from 0.24% to 5% of Townwide residential and commercial electric use by 2030.

**BE 5:** Increase resilience of Townwide building stock to the impacts of climate change.

**BE 6:** Improve total municipal building energy efficiency by 15% by 2030 (electricity and natural gas).

**BE 7:** Achieve 10% municipal building thermal "fuel switching" from on-site fossil fuel combustion to electrification by 2030.

**BE 8:** Increase on-site renewable energy from 0.57% to 7.5% of Town operations electricity consumption by 2030.



### Waste Management

Addressing GHG emissions from waste management and improved community resilience through waste reduction.

**WM 1:** Decrease total per REPita municipal solid waste handled by 5% or more by 2030.

**WM 2:** Achieve 50% organics landfill waste diversion, including food waste reduction, by 2030.

**WM 3:** Increase recycling from 12.8% to 20% of total MSW handled by 2030.

**WM 4:** Increase diversion of potential recoverables by 15% by 2030.



### Water and Wastewater

Increasing resilience of our water supply and reducing GHG emissions associated with wastewater treatment.

**W 1:** Promote increased water conservation Townwide with a targeted reduction of 6.5% by 2030.

**W 2:** Reduce wastewater generation Town Wide with a targeted reduction of 5% by 2030.

**W 3:** Improve the resilience of the Town's water, wastewater, and stormwater infrastructure to flooding, particularly in high-risk areas.



### Strategies as Minimum Goals

As aspirational goals, the Peterborough Renewable Energy Plan's strategies and goals should be understood as minimums. The intent, ideally, is that implementation of the Renewable Energy Plan will ultimately exceed the goals set forth in the plan.

# STRATEGIES

## Our Climate Action Strategies

The following is a summary of the strategies detail through this plan:



### Local Food and Agriculture

Increasing resilience of our food systems and improving food access and security.

**LF 1:** Increase production of and access to local food, particularly serving low income and food insecure individuals

**LF 2:** Reduce food waste and hunger, achieve a 50% reduction in food insecurity community-wide by 2030.

**LF3:** Protect and preserve agricultural land while increasing its resilience to climate shocks.



### Greenspace, Trees, and Ecosystems

Improving community adaptation through improved green infrastructure and addressing ecosystem resilience.

**GS 1:** Increase Town-wide tree cover from 30% to 32.5% by 2030 and 35% by 2040.

**GS 2:** Increase pollinator supportiveness of lawns and grasslands in Town of Peterborough and achieve a 5% turf replacement with native grasses and wildflowers by 2030.

**GS 3:** Reduce heat island effect through Townwide “dark” impervious surface coverage from 10.4% to 8% by 2030 and 5% by 2040.

**GS 4:** Increase climate resilience of Town’s parks and open spaces.



### Health and Safety

Improving community resilience through healthy community connections, infrastructure, and systems.

**HS 1 :** Assist the City’s Flooding, Extreme Heat, Air Quality, Power/Infrastructure Failure, and Food Insecurity vulnerable population in preparing for and mitigating climate change impacts.

**HS 2:** Reduce current and projected extreme heat and weather impacts on the community, particularly on the most vulnerable population.

**HS 3:** Ensure that the City’s mission critical, emergency services and health care facilities are prepared for impacts of climate change.



### Economy

Increasing the preparedness of our businesses and workforce and leveraging economic advantage of climate action.

**E 1:** REPtire local economic potential of climate action.

**E 2:** Support the development of the community’s workforce to be well-positioned to pivot towards the shifting needs and new opportunities of the Climate Economy.

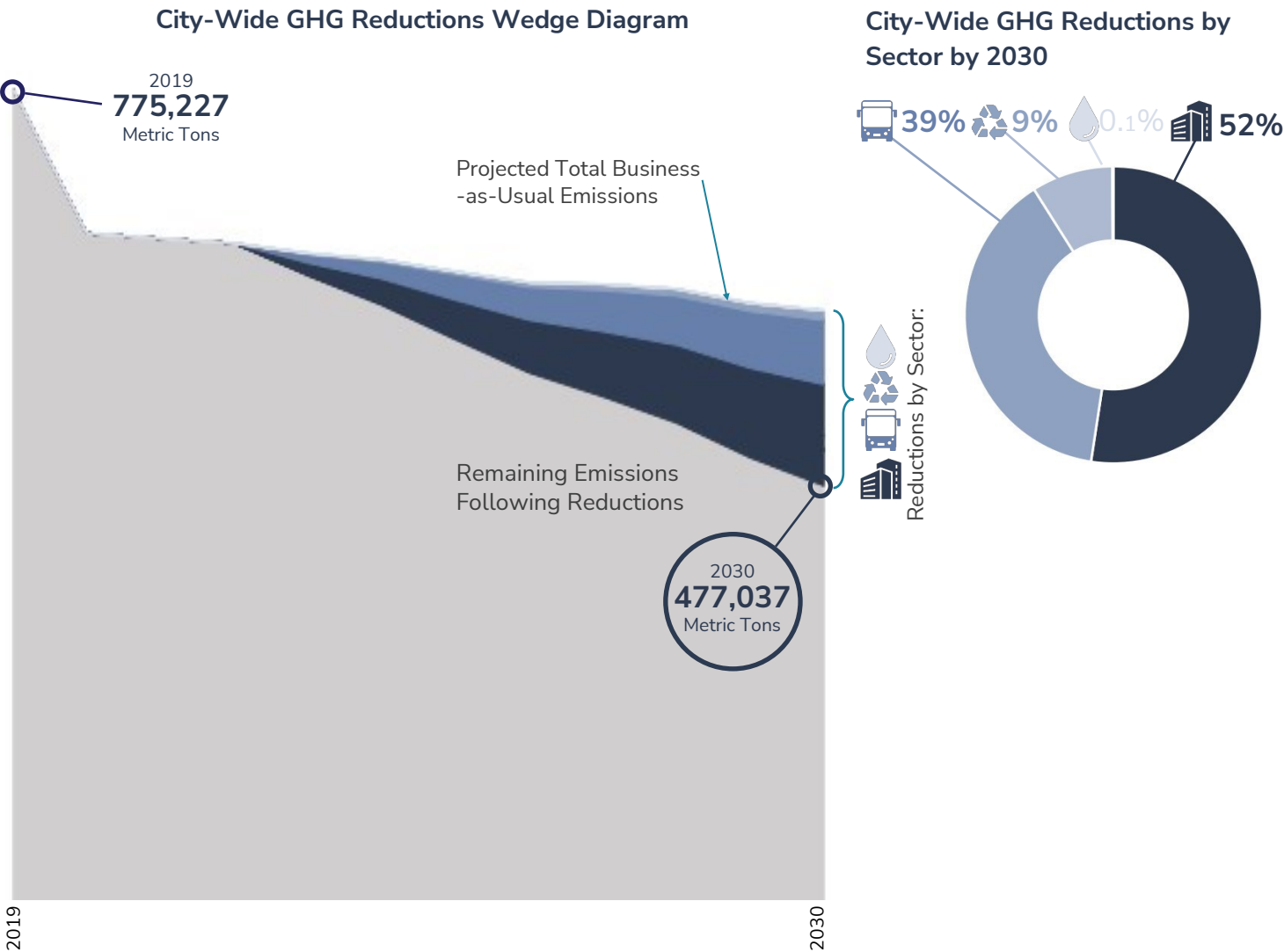
**E 3:** Support/incentivize local businesses and agricultural operations in building marketplace climate resilience.

**E 4:** Establish sustainable financing for the City’s climate action imple-



Estimated Town-Wide GHG Reductions Included In This Plan

Long-term emission reduction potentials of the strategies and actions included in this plan have been modeled based on projected energy and fuel reductions and adoption rates of renewable energy and low/ no emission transportation modes outlined in the strategies and actions. From this modeling, we know that with the successful implementation of this Renewable Energy Plan, Town-wide annual GHG emissions are projected to drop 298,190 metric tons below 2019 levels by 2030. The potential cumulative GHG emissions reductions over the 8 year implementation period are estimated at as much as 1,000,000 metric tons - an elimination of over **19.8 billion cubic feet** of human-made greenhouse gas atmosphere resulting from this Re-





## Cumulative Economic Savings Potential of Implementing the REP Through 2030

### Transportation Economic Potential\*:

Sector Savings: \$291,079,847

Sector Cost Increases: -\$13,964,002

**Potential Sector Net Cost Savings:**

**\$277,115,846**

### Buildings + Energy Economic Potential\*:

Sector Savings: \$192,021,745

Sector Cost Increases: -\$158,952,930

**Potential Sector Net Cost Savings:**

**+ \$33,068,815**

### Waste Reduction Economic Potential\*:

Residential Savings: \$10,499,340

Commercial Savings: \$2,566,505

**Potential Sector Net Cost Savings:**

**+ \$13,379,345**

Social Cost of Avoided Carbon:

**+ \$50,525,494**

Cumulative Community-  
Wide Savings Potential:

**= \$361,293,392\***

\* Value does not include avoided costs associated with extreme weather events, economic potential of job creation, nor new business potential represented in the Renewable Energy Plan actions. (see Appendix for more)

