

Greenhouse Gas Emissions Reduction Guide and Toolkit for Municipalities



Table of Contents

Introduction.....	5
Laying the Foundation	7
Step 1: Preparation.....	9
Step 2: Inventories	13
Step 3: Target Setting.....	17
Step 4: Engaging the Community.....	27
Step 5: Actions and Big Moves	43
Step 6: Implementation	58
Step 7: Tracking Progress.....	67
Appendix A: Terms and Concepts.....	72
Appendix B: GHG Emissions Factors for Various Sources in New Brunswick.	74
Appendix C: Sample Community Engagement Framework	78
Appendix D: Sample Terms of Reference for Climate Action Working Group	80
Appendix E: Sample Community Priorities Survey..	84
Appendix F: Sample Indicators for Tracking Progress	89

Acknowledgements

TERRITORIAL ACKNOWLEDGEMENT

The land on which we work and gather is the traditional unceded territory of the Wolastoqiyik (W last kewiyik / Maliseet), Mi'kmaq and Peskotomuhkati Peoples, whose ancestors signed "Treaties of Peace and Friendship" with the British Crown in the 1700s. The treaties recognized Mi'kmaq and Wolastoqiyik title and established the rules for what was to be an ongoing relationship between nations.

FUNDER ACKNOWLEDGEMENT

UMNB would like to acknowledge the generous funding from the Environmental Trust Fund for this project.

GLOSSARY OF TERMS

ACRONYM	DEFINITION
API	Application programming interface
BAU	Business as usual
CAP	Climate Action Plan
CO ₂ e	Carbon dioxide equivalents
EUI	Energy use intensity
FCM	Federation of Canadian Municipalities
GHG	Greenhouse gas emissions
GPC	Global Protocol for Community-Scale GHG Emissions Inventories
IPCC	Intergovernmental Panel on Climate Change
IRR	Internal rate of return
MAC	Marginal abatement cost
MP	Municipal Plan
NGO	Non governmental organization
NPV	Net present value
PCP	Partners for Climate Protection
ROI	Return on investment

Introduction

Guide for Readers

The GHG Emission Reduction Guide has been prepared as practical support for municipalities on climate action planning.

The Guide has two core objectives: (1) to explain the opportunities for municipal policies and actions to reduce energy and GHG emissions and (2) to provide guidance on how to incorporate consideration of energy and GHG emissions into municipal activities of all types.

Throughout the Guide there are:

- Case studies from municipalities;
- Quick tools and templates
- Links to Resources; and
- Methods and frameworks to help your work

Toolkit: Ready-to-go solutions

This guide and the appendices contain samples and templates as a starting point.

OBJECTIVE	TOOL	SECTION AND PAGE
GHG inventories	Guidelines and recommendations for creating a GHG inventory.	Chapter 3
	New Brunswick emissions factors for calculating emissions.	Appendix B
Target setting	Sample targets for the community, including sample targets for key emitting sectors.	Chapter 4

OBJECTIVE	TOOL	SECTION AND PAGE
Community engagement	Step-by-step guide to developing a community engagement strategy, including examples of engagement activities.	Chapter 5
	Sample community engagement framework.	Appendix B
	Sample terms of reference for a climate action working group.	Appendix C
	Sample community priorities survey.	Appendix D
Communicating your climate action plan	Tips and guidelines for communicating about climate action and winning support from key stakeholder and the public.	Chapter 6
Climate actions	Sample climate actions with targets that can be adopted as part of a climate action plan and guidelines for implementing them. Recommendations relate to 5 key sectors: buildings, industry, renewable energy, transportation, and waste.	Chapter 7
Implementation	Sample 5-year implementation plan.	Chapter 8
	Guidelines for creating a climate lens.	Chapter 8
Monitoring and evaluation	Guidelines on how to create a monitoring and evaluation plan, including a basic approach that can be adopted out of the box.	Chapter 9
	A comprehensive list of indicators for tracking progress and developing a custom monitoring and evaluation approach.	Appendix E

Laying the Foundation

1.1 Questions Covered

- What are the benefits and opportunities in mitigating climate change?
- What are the consequences of not taking climate action?
- What is the role of the municipality?

1.2 The Opportunity for Climate Action

Taking climate action is an opportunity that can significantly enhance quality of life for your residents. Actions that reduce emissions often directly correspond with policies that improve community health and well-being, improve economic prosperity, reduce poverty, and more.

In fact, the additional benefits of climate action can far exceed the impact on emissions! For example, one report that reviewed more than a dozen studies of GHG mitigation policies found the quality of life improvement value of just one co-benefit—reducing air pollution—often equaled or exceeded the benefit of the emissions reduction itself.¹

The benefits of GHG mitigation include:

- **Improved health:** Reducing fossil fuel combustion reduces pollution and improves air quality. Policies that encourage walking and biking instead of driving increase physical activity. Deep energy efficiency retrofits to buildings can improve indoor air quality.
- **Economic prosperity:** Investments in emissions reduction create jobs, business opportunities, and stimulate sectors such as construction, transport, and renewable energy. Climate action is also correlated with improving a community's reputation and brand, which can attract businesses and more residents.
- **Decreasing energy poverty:** Improving the energy efficiency of buildings can reduce household energy costs, easing energy poverty, which affects more than 35% of households in New Brunswick.²
- **Intergenerational equity:** Avoiding GHG emissions today reduces the impact of climate change on future generations.
- **Meanwhile, the cost of not acting is high.** Many municipal decisions can have impacts for generations. The environmental impacts of infrastructure investments and land-use plans can “lock-in” emissions levels and limit your community's future options by increasing the cost of changing course.

¹ OECD. (2000). Ancillary Benefits and Costs of Greenhouse Gas Mitigation. OECD Publishing.

² CUSP. (Oct. 2019). Energy Poverty in Canada: a CUSP Backgrounder. Retrieved from <https://www.energypoverty.ca/backgrounder.pdf>.

1.3 The Role of Municipalities

Municipalities have a big impact on the level of greenhouse gas (GHG) emissions in the communities, if mostly indirect. However, often the impacts of municipal policies and practices on GHG emissions are not recognized or taken into account.

Many municipal planning decisions you make today will shape environmental impacts 100 years from now – or even longer, in the case of infrastructure investments and land-use plans. Decisions made today can significantly limit future options and increase future costs for future decisions. That makes the longest term decisions among the most urgent.

Municipalities across Canada are taking creative approaches to climate action in areas that were not always considered within the municipal domain. Examples include delivering building retrofits, incentivizing zero carbon buildings, and coordinating renewable energy purchases. These activities continue the long tradition of municipalities responding to societal challenges.

Community energy and emissions planning begins by developing an understanding of the community’s current GHG emissions and identifying ways the municipality can (and often already does!) have an influence. It provides an assessment of how your policies and practices are having an impact, and provides a plan to make a difference.

Municipal Goals and Objectives Align

The goals of community planning and reducing GHG emissions are often aligned. In fact, lots of the GHG emission reduction that has already taken place has been a side effect of trends and measures driven by goals other than GHG emission reduction. For example, local economic development, job creation and self-reliance strategies may result in energy efficiency developments. Public health and beautification measures that promote active transportation, green roofs, and urban trees may also reduce greenhouse gas emissions.

1.4 Resources

RESOURCES	DESCRIPTION
Climate Caucus	Climate Caucus (CC) is a non-partisan network of 300+ local elected climate leaders in Canada driving system change to transform our communities in ten years.
Deep Dive: Powering Climate Action: Cities as Global Changemakers	A document that helps the municipality think though the influence it has on the broader community.

Step 1: Preparation

BEST PRACTICE: DEVELOP A CLIMATE ACTION PLAN

Rationale: A climate action plan is a comprehensive document that will outline the specific actions that a community will undertake to reduce greenhouse gas emissions. Action planning can help guide investments, the allocation of resources and the implementation of policies. A climate action plan also ensures that the community is investment ready, as plans can have requirements for funding from other levels of governments.

2.1 Questions Covered

- How does a community plan for climate action?
- What are the key steps?

2.2 Overview

The purpose of this section is to provide guidance on creating a climate action plan.

A climate action plan is a pathway to achieving GHG emission targets. Action planning can help guide investments, allocation of resources, and implementation of policies. A climate action plan also ensures the community is investment-ready for funding from other levels of governments.

There are typically six stages in developing a climate action plan. Each of the six stages have specific outcomes. In combination, these outcomes form the municipality's plan, which incorporates the GHG inventory and GHG emissions reduction targets. The climate action plan creates a strategy to help the community meet its GHG reduction goals.

Table 1. The stages and outcomes of the climate action plan

STAGE	OUTCOMES
Preparation	<ul style="list-style-type: none"> • Understanding the big picture process • Identify plan objectives and potential partners • Develop a terms of reference
Inventories	<ul style="list-style-type: none"> • GHG inventory (corporate and community)
Target setting	<ul style="list-style-type: none"> • GHG target setting
Actions and scenarios	<ul style="list-style-type: none"> • Actions catalogues • Communication and Engagement

STAGE	OUTCOMES
Implementation	<ul style="list-style-type: none"> • Policies and mechanisms analysis • Integration with the Municipal Plan and other policies, plans and strategies • Engagement plan Execution • Investment strategy
Monitoring and evaluation	<ul style="list-style-type: none"> • Monitoring and evaluation framework

2.3 Climate Action Plan Process Explained

The process below aligns with FCM's Partners for Climate Protection (PCP) five milestone framework:

1. Preparation: Identify plan objectives, partners, data sources, and approach. If hiring a consultant, secure funding and develop terms of reference. Plans can also be developed by municipal staff or a volunteer committee; a template to support that option is included.
2. GHG Inventory: Complete an energy use and emissions production inventory (including sources, amounts) for a base year. This provides the basis for future scenarios development, and creates a reference for measuring future inventories and the effect of policies and actions.
3. Target setting: set targets for municipal operations and/or the community as a whole.
4. Action and scenarios: Identify actions which reduce GHG emissions in consultation with the community. Evaluate the GHG impacts of the actions in order to identify a pathway or scenario which achieves the target.
5. Implementation: Identify strategies to implement the actions, including funding, partners, responsibilities, and timelines.
6. Monitoring and evaluation: Monitor the impact of the programs and policies in order to apply lessons learned, adapt, and track progress.

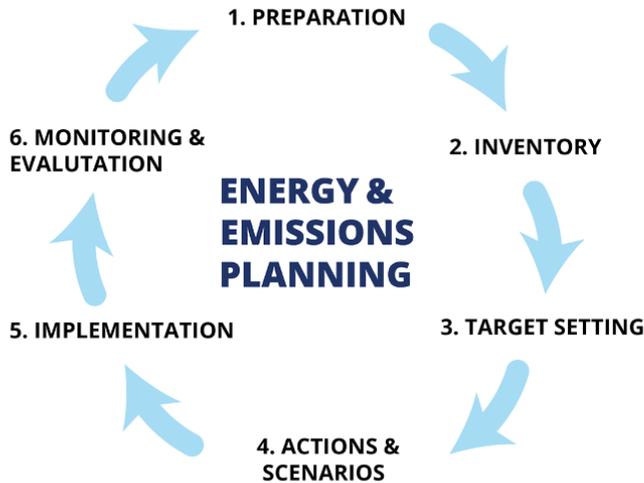


Figure 1. The energy and emissions planning process. The cycle is continuous as the planning process needs to be updated at regular intervals to measure progress and manage effective action implementation.

2.4 Resources

ORGANIZATIONS	DESCRIPTION
FCM Partners for Climate Protection (PCP)	A long-standing program that supports the Climate Action Planning process for municipalities. Municipalities can join the program and access resources, including a planning tool
Global Covenant of Mayors	A global platform to support climate action by municipalities.
Clean Air Partnership	A charitable organization that convene networks, lead research and knowledge transfer, and catalyze transformative action.

DOCUMENTS	DESCRIPTION
BC Climate Action Toolkit	A comprehensive hub of Climate Action Planning resources for B.C. municipalities. The resources are applicable to N.B. municipalities.
DEEP DIVE: Government of Ontario Community Emissions Reduction Planning	A comprehensive guide on Climate Action Planning for the Ontario context. The process described aligns with this guidebook.

DOCUMENTS	DESCRIPTION
Carbon Neutral Cities Alliance Framework for Long-Term Deep Carbon Reduction Planning	A guide on developing ambitious climate action plans targeted to cities but applicable to municipalities of all sizes.
Plan Framework	A sample framework for a climate action plan prepared by the Carbon Neutral Cities Alliance.

Step 2: Inventories

BEST PRACTICE: PREPARING AN INVENTORY OF COMMUNITY GHG EMISSIONS.

Rationale: The inventory details the major sources of emissions in the community, in order to guide action planning selection to achieve emissions reduction.

3.1 Questions Covered

What are the benefits of GHG emission inventories?

What are the key principles of inventories?

What are the sources of energy?

How do I communicate the inventory?

3.2 Overview

“What is measured is managed”.

GHG inventories can help local governments understand ongoing and major sources of emissions; identify areas to focus activities; establish and track progress toward community goals; refine or redesign existing projects; or facilitate decision-making about future policies or goals.

Developing an inventory is the first major step in developing a climate action plan. There are two main types of GHG inventories: corporate and community. A corporate inventory calculates the GHG emissions from municipal operations only. A community inventory measures emissions generated by key activity categories within municipal boundaries.

The Partners for Climate Protection (PCP) guide (linked in Section 2.4 Resources) provides instructions to develop a comprehensive GHG inventory.

Some communities may not be ready to go through the PCP process, or might focus on a corporate plan first, or may hire a consultant. This guide is designed to complement the PCP process.

3.2.1 BENEFITS OF INVENTORIES

- **Understand your emitting sectors:** Identifying which sectors and end uses are responsible for the most emissions mean they can be prioritized for action. For example, if the majority of GHG emissions are from transportation, actions such as encouraging active transportation, developing an EV charging network, or corporate fleet electrification could be prioritized.
- **Unlock financing and funding:** A GHG inventory is a minimum requirement to access funding from FCM and other infrastructure funding sources. Some funding sources may ask how an investment will reduce emissions or show compliance with climate action.

- **Identify and share progress:** As a local government implements climate actions, an inventory allows the community to identify and share progress as GHG emissions begin to decline and the inventory is updated.

3.3 Creating the Inventory

Under either the community or corporate approach, local governments may consider partnering with other communities in their region to complete their GHG inventory. For local government operations inventories, partnerships can provide mutual technical assistance and allow the sharing of resources, lessons learned, or best practices. For community GHG inventories, local governments can also partner with community organizations to estimate regional GHG emissions.

This option can be valuable for small communities that may not have the capacity or resources to conduct inventories independently or that may want to collaborate with other communities on the resulting emissions reduction activities. In the case where partnerships are limited or no relevant partner can provide the needed data, a local government may choose to hire a consultant to complete the GHG inventory.

3.3.1 RESOURCES FOR CREATING INVENTORIES

Table 2. Resources for communities conducting their own inventories

RESOURCES	DESCRIPTION
Partners for Climate Protection Milestone Tool (PCP)	A web-based tool for GHG inventories and projections for community and corporate inventories. Pre-populated with assumptions for each province.
C40 Cities: Reporting GHG emissions inventories	<p>City Inventory Reporting and Information System (CIRIS) is an accessible, easy-to-use and flexible Excel-based tool for managing and reporting city GHG inventory data. Based on the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC) standard, CIRIS facilitates a transparent calculation and reporting of emissions for all sectors:</p> <ul style="list-style-type: none"> • Stationary energy • Transportation • Waste • Industrial processes and product use (IPPU) • Agriculture, forestry and other land use (AFOLU)
Advanced: Global Protocol for Community-Scale GHG Emissions Inventory	The international standard on how to undertake GHG inventories.

RESOURCES	DESCRIPTION
GHG Emission Factors for New Brunswick	Appendix B.

Quick Tool: Municipal Energy and Emissions Database (MEED) (Forthcoming)

The Municipal Energy and Emissions Database (MEED) is a free tool that will: develop an energy and emissions inventory for each municipality in Canada, and make these inventories openly and freely available to download and view with web-based visualizations.

This project will develop and deploy an integrated geospatial platform that tracks GHG emissions for each municipality in Canada using advanced data processing, integrating diverse open data sets in a common data visualization framework. The MEED platform will be open source, incorporate access across platforms, and be available in English and French. GHG inventories can be directly uploaded to programs such as PCP and the Global Covenant of Mayors.

All municipalities will find value in this offering but in particular small-to-medium sized municipalities (i.e., populations anywhere from 55 and up) will gain access to this inventory tool otherwise out of their financial and staffing reach.

On June 1st, 2021, access your communities personalized GHG inventory at meed.info

3.4 Communicating the Inventory

Reporting the results of an inventory keeps residents informed of your activities and shares where the community as a whole need to focus its efforts. Below are examples of what to report and where.

What to communicate

- The top 2 or 3 emitting sectors (e.g. transport, industry) and their proportions of GHG emissions
- Activities or sectors that consume the greatest energy
- The actions that will reduce the most energy or GHG emissions.
- Total expenditure on energy services

Where to report:

- The community's Climate Action Plan website, or general website
- Council Reports
- Municipal Plans
- Partners for Climate Protection Milestone Reporting
- Global Covenant for Mayors, Cities & Reporting

Step 3: Target Setting

SAMPLE ACTION: ADOPT A GHG TARGET THAT ALIGNS WITH LIMITING GLOBAL WARMING TO BELOW 2°C, OR IDEALLY BELOW 1.5°C.

Rationale: Adopting emission reductions targets communicates the intentions and shared direction of the community. Aligning the target with science signals that the community is seeking to do its fair share to act on climate change.

This section outlines basic and advanced approaches to target setting which also includes suggested activities for involving the community in the decision.

4.1 Questions Covered

- Why set a target?
- What are examples of targets?
- How to involve the community in this target setting exercise?

4.2 Why Set a Target?

Setting a community target can be driven by a strong climate-conscious presence from citizens, the corporation (municipality), or local politicians. Emission reductions targets establish the community's level of ambition and provide the rationale for climate action to take place; they represent the climate goals of the community.

Perth-Andover, NB, Net-Zero Municipal GHG emissions by 2035

Perth-Andover has seen the effects of climate effects as ice floods washed over buildings, private property, and public spaces. With a warming climate, the Town is anticipating greater flood activities and has declared ambitious targets to reduce GHG emissions and mitigate climate change.

To start this work, the community will reduce corporate GHG emissions to net-zero levels by 2035. For the community, the Climate Action Plan aims for a target of a 17% reduction in GHG emissions from a 2015 baseline by 2025 and a 34% reduction by 2035.

Perth Andover is aiming to eliminate fossil fuels from space heating by promoting the use of heat pumps and partners with their electrical utility to provide a rental program. Retrofit measures to community buildings also benefit the community; The savings on electricity and heating result in free skating and swimming for residents.

Read more: [Perth-Andover aims for net-zero carbon emissions by 2035 | CBC News](#)

Municipal Plan: perth-andover.com

4.3 Community Target Approaches

4.3.1. BASE APPROACH: ADOPT THE FEDERAL GOVERNMENT OF CANADA'S TARGET OF NET-ZERO GHG EMISSIONS BY 2050

In 2020, the federal government committed to a climate target of net-zero GHG emissions by 2050. This target is Canada's response to the United Nations Framework Convention on Climate Change (UNFCCC) 2016 Paris Agreement.³

Interim Targets

Setting interim targets is an important part of any target. At minimum, the community is recommended to have an interim target for 2030 and 2040. Higher frequencies are more likely to be effective in keeping the attention of the public and decision-makers.

Interim targets that track to the federal government's target look like reductions of 3-5% per year. Over the next 30 years, a 3% annual reduction in GHG emissions will result in 90% reduction from 2020 levels, which will surpass the province's current target.

- Interim Target for 2030: 30% below 2020 levels
- Interim Target for 2040: 60% below 2020 levels
- Interim Target for 2050: 90% below 2020 levels

Several approaches to developing a climate target are provided in this section. However, striving for the most ambitious target possible is recommended. This would mean going beyond the provincial target of 5 MTCO₂e by 2050.

³ The Paris Agreement. (n.d.). United Nations Framework Convention on Climate Change. Retrieved March 2021 from: <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>

4.3.2 SCIENCE-BASED AND FAIR SHARE TARGETS

A “science-based” target is close to the Federal Government’s commitment of net-zero emissions by 2050, and responds to the 2016 UN Paris Agreement, to which Canada is a party. It sets out to limit global warming to significantly below 2°C, with a goal of staying within 1.5°C.⁴ A special report released by the Intergovernmental Panel on Climate Change in 2018⁵ has found that 1.5°C is more likely to be the point at which some humans and ecosystems reach their maximum adaptive capacity. The IPCC estimates that human activities have caused approximately 1.0°C of global warming above pre-industrial levels, which is likely to exceed 1.5°C sometime between 2030 and 2052 without serious mitigation actions.⁶

To stay within the 1.5°C boundary, much stricter emissions reductions would be required by 2050 than the previous generation of 80% below 1990 levels. A science-based target requires not only reaching net-zero carbon dioxide (CO₂) emissions globally by around 2050, but also, staying within a global carbon emissions budget;⁷ This means a strict timeline for steeply declining global emissions before 2050.

4.3.3 THE FAIR SHARE APPROACH⁸

A fair share approach to setting a climate target takes the global equity impact of emitting carbon into practical consideration:

- Historical emissions: The underlying context of this approach is that nations that have been industrialized for longer periods have emitted more historically and are therefore responsible for reducing a greater number of emissions.
- Capacity to act: Industrialized countries like Canada also have the capacity to respond to climate change more rapidly than developing countries
- Future Generations: There is a duty of current generations towards future ones, so that they too can have a per-capita carbon budget that is reasonable and achievable. Replenishing the ecosystem and protecting it are core principles of providing for future generations.
- The process to align municipal emission reductions targets with a fair share approach has three main steps.

⁴ Ibid.

⁵ IPCC, 2018: Summary for Policymakers. In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. World Meteorological Organization: Geneva, Switzerland. Retrieved from: <http://www.ipcc.ch/report/sr15/>

⁶ IPCC. (2018) Technical Summary. In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. World Meteorological Organization: Geneva, Switzerland. Retrieved from: <https://www.ipcc.ch/sr15/technical-summary>

⁷ Ibid. (With concurrent deep reductions in emissions of non-CO₂ forcers, particularly methane (CH₄)).

⁸ Science-based climate targets: A Guide for Cities. (Nov. 2020). Global Commons Alliance. Retrieved from: [SBTs-for-cities-guide-nov-2020.pdf](https://www.sbt-for-cities-guide-nov-2020.pdf) (sciencebasedtargetsnetwork.org)

Step 1: Identify or develop a population projection until 2050 for the municipality. Population projections can be available from the federal government until 2050.⁹ Estimates are available until 2043, and a straight-line assumption can be made.

Step 2: Apply a reduction trajectory to 2015 baseline per capita emissions until 2030. Under the fair share approach, choose a -70% to -75% reduction from 2015 levels. Target an emission reductions level to -90% or greater for 2050.

Step 3: Set multiple per capita targets aligned with the community's projected population.

4.3.4 CARBON BUDGET

The most effective approach for achieving science-based or fair-share targets is known as a Carbon Budget. A Carbon Budget is a way of managing annual carbon emissions using the same principles as setting a financial budget. Carbon budgets track a jurisdiction's annual progress on emissions relative to its targets and identify carbon surpluses or deficits. A short-term target on carbon emissions is established and strategies for carbon restraint that keep the municipality in that budget are developed.

To create a carbon budget, a GHG target is assigned every five years. The emission reductions target in each five-year period will become a key planning consideration for the municipality, and the identification and development of projects and initiatives will be informed by the target. In the first phase, the carbon budget will not be carried over to future reporting periods. From the second phase on, the carbon budget will become cumulative in its application. If there is a surplus of GHG reductions, the jurisdiction can carry those reductions to a future period. If there is a deficit (meaning the interim target is not met), the municipality will then have to focus on achieving deeper reductions in future periods.

The emission reductions target is what constitutes a carbon budget for the municipality for each time period—the total amount of carbon all emissions-producing activity in the municipality allowed. These activities cannot exceed the emissions allowed in the carbon budget if the emission reductions targets are to be achieved.

More reading:

ARUP, & C40. (n.d.). Deadline 2020. <http://www.c40.org/researches/deadline-2020>

City of Edmonton, Carbon Budget Framework: https://www.cleanairpartnership.org/cac/wp-content/uploads/2020/09/Edmonton_Updated-1.pdf

⁹ Statistics Canada. Table 17-10-0009-01 Population estimates, quarterly.

4.4 Other Targets

Some municipalities may elect to adopt alternate targets, with either a more aggressive timeline or deeper emission reductions. Examples of these alternate targets include 100% renewable energy or net-zero GHG emissions before 2050. The table below details other community targets that may be more compelling for the community storytelling.

Table 3. Additional community targets

SECTORAL TARGET	SAMPLE TARGETS
Co-benefits: Equity	<ul style="list-style-type: none"> • No citizen of the town will be in “energy poverty” by 20__ • 100% of social housing units will have deep energy retrofits by 20__
Energy based target	<ul style="list-style-type: none"> • The community will be powered by 100% renewable energy by 20__
Increase ambition and leadership	<ul style="list-style-type: none"> • The community will achieve net-zero GHG emissions by 2040 (or 2030) • All municipal services will be carbon-neutral by 2040
Co-Benefits: Employment and economic development	<ul style="list-style-type: none"> • The community will have X% of their workforce in the green sector by 20__ – • The community will be powered by 100% local energy by 20__

Further Reading: West Kootenays (British Columbia) 100% renewable energy target

<https://westkootenayrenewableenergy.ca/>

Nine Kootenay Governments have pledged to reach 100% renewable energy by 2050 in community energy uses. They have worked together to reflect the connections among West Kootenay communities, share resources, and promote future collaboration.

4.5 Broader Community: Targets by Sector

A community plan may include actions that address emission reductions in major emitting sectors, including buildings, the energy system, transportation, waste, and agriculture, forestry and land-use. If one of these sectors is not a major source of GHG emissions, as identified in the GHG inventory, the municipality may decide to set it aside.

Table 4. The quick guide list: 20 sample municipal energy and emissions strategies.

	TARGET	STRATEGY	IMPACT	ESTIMATED MAGNITUDE OF GHG REDUCTIONS
LAND USE				
1	x% of new development occurs in designated infill lands or near the town centre	Land-use planning enables broader deployment of transit and increased proximity for walking and cycling.	Reduce energy consumption	Low
TRANSPORTATION				
2	Improve transit linkages to reach x% of the population	Enhanced transit can displace vehicle use and achieves economies of scale.	Reduce energy consumption, fuel switch	Low
3	Improve cycling and walking infrastructure for all ages and abilities	New infrastructure can provide conditions that enable people to walk and cycle as opposed to drive.	Reduce energy consumption	Low
4	Increased adoption of electric vehicles	Electric vehicles are more efficient than gasoline powered vehicles and result in fewer GHG emissions.	Reduce energy consumption, fuel switch	Medium - high
BUILDINGS				
Future buildings				
5	Meet zero emissions buildings target for new buildings by 2030	It is more cost effective to build high efficiency buildings than to retrofit them afterwards.	Reduce energy consumption	Low ^[10]
Existing buildings				
6	By 2050, x% of buildings have completed a deep energy retrofit.	The existing building stock needs to be retrofit to minimize energy consumption, particularly electricity in order to offset additional electricity demand for electric vehicles.	Reduce energy consumption	High
	Retrofit x% of commercial buildings by 2050		Reduce energy consumption	High

	TARGET	STRATEGY	IMPACT	ESTIMATED MAGNITUDE OF GHG REDUCTIONS
7	By 2050, x% of buildings use heat-pumps or low-carbon energy for space heating.	Electric heat pumps are an efficient way to use electricity to displace natural gas or fuel-oil for heating.	Fuel switch	High
9	Re-commission commercial or industrial buildings	Re-commissioning represents a tune-up of the building systems to ensure they are operating at maximum efficiency.	Reduce energy consumption	Low-medium
MUNICIPAL / CORPORATE TARGETS				
9	Retrofit x% of municipal buildings by 2035	Minimize energy consumption of municipal buildings, and save money while doing so.	Reduce energy consumption	Low
10	Choose low-carbon fuel systems or electricity for 100% of municipal buildings by 2030	Continue efforts for efficiency by choosing heat-pumps, or use geothermal heating and cooling for municipal buildings.	Fuel switch	Low
11	Convert 100% of municipal fleet to electricity by 2035	Electric vehicles are more efficient than gasoline powered vehicles and result in fewer GHG emissions.	Reduce energy consumption, fuel switch	Low
ENERGY SYSTEMS				
12	x% of new developments after 2030 have rooftop solar PV	Solar PV can be integrated into the built environment, displacing electricity from the grid from non-renewable sources.	Generate renewable energy	Low
13	x% of existing buildings have rooftop solar PV by 2050		Generate renewable energy	Low-medium
15	Install distributed energy storage	Energy storage increases the efficiency with which distributed renewable such as solar PV can be used.	Improve energy: Store renewable energy	Low
16	Displace the use of natural gas as much as possible through renewable natural gas and hydrogen	Renewable natural gas and hydrogen can be used in industry to displace natural gas consumption. Both fuel sources can also be introduced into distribution networks.[11]	Fuel switch	Variable

	TARGET	STRATEGY	IMPACT	ESTIMATED MAGNITUDE OF GHG REDUCTIONS
INDUSTRY				
17	Improve efficiency of industrial processes by x% by 2050.	Industries have a vested interest to save money in their process. Electrification of process is worth exploring where possible.	Reduce energy consumption	Variable
WASTE				
18	Increase waste diversion rates	Waste which goes to a landfill results in GHG emissions.	Reduce waste	Medium
19	Generate biogas from wastewater	Methane resulting from wastewater treatment can be transformed into a renewable energy source.	Generate renewable energy	Low
AGRICULTURE, FORESTRY AND LAND-USE				
20	Increase forest area or restore wetlands	Forests and wetlands absorb and store carbon from the atmosphere.	Increase storage of carbon	Low

4.6 Getting Community Input on Community Targets

Encouraging community input to set a climate target is an important way to increase community support and inform the public about the challenge at hand. Table x describes activities can help reveal important community considerations for targets and lead to developing a climate narrative that resonates with the public.

Table 5. Activities related to community target setting

ACTIVITY	DESCRIPTION	TARGET-SETTING OUTCOME
GHG inventory	During the process of the GHG inventory, insight regarding the activities are emitting the most GHGs (I.e. Transport/commuting, heating homes, industrial process) will be revealed.	The municipality will share the results of the inventory through several mediums (social media, surveying, town halls, focus groups) and discuss whether alternative targets might be important to the community
Community Lecture: Science -based targets	Hosting a community lecture from a local climate expert or from a nearby university on science-based targets.	The lecture will inform the community on global trends, strategies, and policies with discussion on how to translate to the local scale. Discussion, interviews, or surveying will determine whether to employ a science-based target
Surveying: Community Priorities for co-benefits[12]	A community survey is broadcast digitally. The survey asks participants to rank several co-benefits within emitting sectors, and for the community as a whole. Criteria include: Equity, jobs, investment opportunities, air quality, access to nature,	An understanding of community priorities can help develop a narrative of how to reach and inspire the community further. <ul style="list-style-type: none"> • A focus on equity can create a goal to reduce energy poverty • A focus on economic development can create a target for investments for green-sector employment
Community Mapping	Staff, town council, stakeholders, or interested members of public are invited to provide information on resources and how they can be employed to take climate action	If the community has notable assets such as a trained workforce, warehouse space, local energy generation capacity, a compact layout, or a logistical advantage it can help create a contextual target such as: 100% local energy for the community, a retrofit industry or supply chain, a location for waste recovery, or an active transportation goal.

ACTIVITY	DESCRIPTION	TARGET-SETTING OUTCOME
Strengths-weaknesses-opportunities-threats (SWOT Analysis)	Staff, town council, stakeholders, or interested members of the community take part in a workshop identifying key elements of their identity.	Identifying the community's strengths and opportunities can lead to the development of alternative targets. Threats identification can also lead to more ambitious targets such as net-zero GHG emissions. Identification of weaknesses are unlikely to help develop a climate target, but will identify asks from the community's network or other levels of government.

Further Reading: SWOT Analysis. The SWOT analysis has been a routine procedure at many businesses for years (tamu.edu)

Community Mapping for Climate Action: <https://www.weadapt.org/knowledge-base/adaptation-decision-making/atk-resource-mapping-tool>

4.7 More Resources

RESOURCES	DESCRIPTION
Science-based targets for cities	This report provides overviews for several different science-based climate targets and the methodology on how to calculate these targets.
C40: Deadline 2020	Deadline 2020 is the first significant road map for achieving the Paris Agreement, outlining the pace, scale and prioritization of action needed by C40 member cities over the next 5 years and beyond.

Step 4: Engaging the Community

5.1 Questions Covered

- Who should be engaged during the creation of an emissions reduction plan?
- What strategies should be used for engagement?
- How can engagement contribute to climate actions?
- How can the community communicate climate actions to the public and stakeholders?

5.2 Define Objectives

Successful climate action is a community-wide effort that requires engagement from community members and businesses. Active community stakeholder engagement during the development of the plan can help ensure it is shaped by the insights of the broader community, in addition to generating widespread public support for climate action.

Objectives for public and stakeholder engagement include:

1. Informing and educating, and building public capacity;
2. Collecting input;
3. Engaging and empowering citizens through democratic processes;
4. Identifying community champions and influencers; and
5. Developing community support.

5.3 Identify Stakeholders

The municipality can map out those people who are champions and/or have other interests in reducing emissions or supporting the energy transition and invite them to participate in a committee, focus group, or other mechanism. Stakeholders include:

- The general public;
- Subject matter experts;
- Electricity, natural gas, and other utilities/energy suppliers (e.g., propane, wood, oil);
- Construction and real estate sectors;
- Advocacy organizations;
- Non-profit and community organizations;
- Municipal departments and Council;
- Representatives of vulnerable populations;

- Public health organizations; and
- Business and industry.

Municipalities should also host discussions with local First Nations as a part of the development of emission reductions actions, and invite them to participate in shaping the emission reduction plan. Consultations should be carried out in a manner that is appropriate for the local context.

5.4 Best Practices in Public Engagement

The International Association of Public Participation (IAP2) has developed a spectrum of public participation detailing different levels of engagement. The framework can help guide how to engage with different stakeholders and stakeholder groups and provide transparency on the objectives and scope of the engagement.

Table 6. The IAP2 spectrum of engagement.¹⁰

	INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER
Purpose	To deliver information to the public that articulates the need for a plan, describes the planning process, and expresses the desired outcomes.	To collect public feedback and suggestions for the plan or its components.	To engage the public in a manner that ensures public concerns are properly considered and addressed in the plan.	To partner with the public in policy development and decision-making in the plan.	To place the final policy development and decision-making in the hands of citizens.
Example Mechanisms	Newsletter, website, lectures, media coverage, videos.	Focus groups, surveys/polls, public meetings.	Workshops, interactive websites, interactive meetings.	Participatory decision-making, advisory committees, citizen committees.	Participatory budgeting, citizen juries, citizen decision committees.

¹⁰ This table is based on the IAP2 Spectrum of Public Participation. Retrieved from: <https://www.iap2.org/>

The Spectrum can be used as a tool to plan and assess engagement activities. For example, the general public might be communicated to at the Inform level through the distribution of information about the planning process at the outset of the plan and at the Consult level through surveys about preferences on potential actions. Additionally, a smaller subset of the public (e.g., those who display high levels of interest and/or influence) might be engaged at the Involve level through workshops seeking their input or at the Collaborate level through a citizens committee tasked with guiding the creation of the plan. The techniques can be chosen based on municipal capacity and overall engagement objectives.

5.5 Engagement Techniques

Emission reduction plans are far-reaching. Actions typically affect buildings, land use, transportation, waste management, social equity, economic development, and more. The process of developing the plans therefore has the potential to engage the majority of citizens.

The table below describes engagement tactics that relate to each level of the spectrum and how they might be applied during the climate planning process.

Table 7. Levels of Engagement and Sample Activities.¹¹

IAP2 SPECTRUM LEVEL OF ENGAGEMENT	SAMPLE TACTICS	SAMPLE USE
Inform	Planning project website	A project website can house project background information, local climate issue information, ways to engage in the planning process, reports and project updates, a schedule of events, social media feeds, etc. It can be updated throughout the planning process.
	Web newsletter and social media posts	Distribution of project information, updates, and invitations in web newsletter format to municipal and partner contacts. The web newsletter can be emailed, posted to social media, and hosted on the project website.
	Media coverage	Project promotion through municipal staff interviews with TV/radio, press releases

¹¹ This table is based on the IAP2 Spectrum of Public Participation. Retrieved from: <https://www.iap2.org/>

IAP2 SPECTRUM LEVEL OF ENGAGEMENT	SAMPLE TACTICS	SAMPLE USE
Consult	Focus groups	Engage representatives of a public sector to provide feedback on how to address an issue or respond to a plan proposal.
	Surveys and polls	Post a multiple-choice survey on social media and the project website to gather feedback on a project issue.
	Public meetings	Host a public meeting with small group discussions to identify the issues the plan should address.
Involve	Workshops	Host a public workshop to develop policy ideas or discuss proposed policy.
	Crowd-sourcing web platforms	Use interactive websites to visualize and solicit feedback on policy options.
	Interactive meetings	Host meetings in which participants play key presentation and leadership roles.
Collaborate	Participatory decision-making process	Host a decision-making process, such as voting, to determine the direction of a plan, the content of a policy, or the manner of a policy's implementation.
	Advisory committee	Establish an advisory committee with public and stakeholder membership that directs the planning process and has democratic inputs to the plan.
Empower	Participatory budgeting process	Host a process that enables the public to determine how budget is allocated amongst plan actions.
	Citizen decision committees	Establish citizen decision committees that have—through democratic processes—the power to decide on plan content, policy direction, actions to be taken, and plan implementation mechanics.

5.5.2 WEBSITE AND SOCIAL MEDIA

Websites and social media can play a variety of roles during the engagement process. At minimum, these tools should be used to inform the general public about the emission reductions plan development process. At the most basic level, the municipality can create a page on its website that covers basic details about the plan, such as:

- When the project begins and when it will be completed;
- The objectives of the process;
- Results of the latest GHG inventory;
- How climate action can help the community; and
- How the public can provide feedback during the process.

These basic details can also be shared on the municipality's social media channels. During the plan creation process, the website and social media channels can also be used to share updates and public input opportunities.

5.5.3 WORKING GROUPS AND ADVISORY COMMITTEES

Working groups and advisory committees can help municipalities spur climate action, provide valuable input, and even create elements of the plan. In doing so, they can help ease the burden on municipalities with limited resources and help create citizen buy-in for emissions reduction.

Working groups and advisory committees should be made up of a cross-section of relevant stakeholders in order to ensure a sufficiently diverse range of perspectives that are representative of the municipality are at the table. One approach is to opt for multiple working groups and advisory committees depending on their needs and the structure of climate planning and implementation. So, for example, there might be a technical group that brings together technical experts, such as local climate experts, representatives of utilities, and relevant City department heads, while a community input committee brings together a group of people representative of local demographics to weigh in on climate actions. Other municipalities opt to have one working group or advisory committee that brings together a cross section of stakeholders.

The first step in creating a working group or advisory committee is to create a terms of reference that details the objectives, and role and authority of the group. Potential roles for the group may include hosting public engagement events, identifying local issues and concerns, researching and recommending actions, coordinating programs and championing the efforts in the broader community. A sample terms of reference can be found in Appendix E[MOU13].

A best practice is to allocate an honorarium for working group participants. This helps ensure representation from those who might not be able to participate otherwise (e.g. members of low-income marginalized groups).

Case Study: Mayor’s Roundtable on Climate Change, Sackville, NB

In 2019, the Town of Sackville declared a climate emergency in response to climate strike events organized by local students and, as part of its response, committed to establish the Mayor’s Roundtable on Climate Change. The Roundtable brings together about 25 volunteers, along with the Mayor, Deputy Mayor, councillors and Town staff, to “provide advice and guidance to the Town of Sackville in improving its efforts to mitigate and adapt to climate change, and to design long-term structures to sustain those efforts.” Members include youth, academics, professional experts, and community stakeholders, such as staff and faculty from Mount Allison University and representatives of local schools and non-profit organizations (e.g. Ducks Unlimited, EOS Eco-Energy).

The group has supported public engagement and shaped the Town’s climate action work. For example, the Roundtable hosted a public forum to get ideas from the public on how the Town could improve its climate mitigation and adaptation work. Based on the ideas put forward, it recommended priorities for the Town moving forward. One of these was to hire a full-time climate change coordinator. The Town is currently exploring whether the idea would be worthwhile and has applied to grants to fund such a role as part of a pilot project.

5.5.4 PEER LEARNING GROUP

Peer learning groups that meet regularly (e.g. weekly, monthly, etc.) to discuss and learn about climate challenges in the community can generate excitement around and deepen the community’s understanding of emission reduction action. These groups can be volunteer-run and led with support from the municipality, which might initiate the creation of the group, provide resources to support meetings (e.g., a physical space, snacks, or access to a virtual meeting platform), and help spread the word. Meetings can include informal opportunities for meeting and chatting, as well as formal activities.

Possible formal activities include:

- A meet-and-greet with the staff member leading the municipality’s Climate Action Plan ;
- Film screenings and discussions featuring films that talk about the challenge of climate action, such as Anthropocene, Climate Change: The Facts (David Attenborough); and
- Presentations by local experts on renewable energy, retrofits, electric vehicles, district energy.

5.5.5 YOUTH ROUNDTABLE

The municipality can work with schools, colleges and youth groups to form a youth roundtable which advises the mayor and council on climate action. This mechanism provides a forum for youth voices and supports youth engagement in the municipality.

5.5.6 BUSINESS NETWORKS AND ALLIANCES

Several cities have created municipality-business climate alliances that enable municipalities and businesses to work together to reduce emissions and co-create solutions to climate challenges.¹² For example, municipalities can work with the local chamber of commerce or other community groups to create a network that brings businesses together to talk emission reduction problems and how to solve them. These groups can identify opportunities for collaboration, barriers to action and share experiences.

Case Study: Bridgewater Energy Partnership

In the Town of Bridgewater, Nova Scotia, the Bridgewater Energy and Partnership brings together local businesses and organizations ranging from a power company to public libraries to a pharmacy, to work on energy sustainability and support the Town's Community Energy and Emissions Plan. Members meet for bi-monthly workshops to work on actions that provide immediate benefits, as well as to provide input on initiatives and policies related to energy.

The Partnership has been an important supporter of the Town's work. A related initiative, the Living Energy Laboratory, spurred innovation by inviting Bridgewater citizens, businesses, and students to create projects to support the local energy economy. Projects were awarded small cash prizes and resources to help them scale.

¹² Kazemi, R. et. al. 2019. City-Business Climate Alliances: A step-by-step guide for developing successful collaborations. Carbon Disclosure Project.

5.5.7 EDUCATIONAL EVENTS AND TOURS

Municipalities can partner with community organizations, peer-learning groups, businesses, and others to offer tours that highlight emission reduction solutions and give the public and other stakeholders a learning opportunity. For example, a municipality can work with local businesses to offer tours of a geoexchange heat pump installation, a solar installation, a biodigester at a farm or other climate solutions.

Case Study: Draft-proofing Parties in the Tantramar Region

From 2018 to 2020, EOS Eco-Energy, a non-profit based in Sackville, used funding from Environment and Climate Change Canada to run community draft-proofing parties in the Tantramar Region. Draft-proofing is an affordable way to improve energy efficiency and reduce energy bills. At these parties, EOS would supply tools, materials, food, and a certified energy advisor, who would teach attendees about how to draft-proof their homes. Then, they would work together to draft-proof the homeowner's house.¹³

5.6 Resources

RESOURCES	DESCRIPTION
Infiltration Manual: Pushing For Ambitious Climate Action at the Municipal Level	The Infiltration Manual aims to demystify municipal governance structures and provide youth with practical knowledge and tools on how to take climate action at the local level.
C40 Cities Playbook: Inclusive Community Engagement	A guidebook on strategies to engage community members.
Deep Dive: Camden, UK's Citizen Assembly	This document describes the process and results of how Camden Citizens' Assembly on the Climate Crisis brought together over 50 randomly selected residents from Camden during July 2019 to develop an approach for how Camden can best tackle the climate crisis.

¹³ EOS Eco-Energy Inc. (n.d.) Draft-Proofing Work Parties. Retrieved Mar. 2021. Retrieved from: <https://eosecoenergy.com/en/party/>

Step 4: Communicating with the Community

BEST PRACTICE: CREATE A WEBSITE ON COMMUNITY'S CLIMATE ACTION ACTIVITIES AND BENEFITS.

Rationale: Develop a standalone website or a section on the municipality's existing website that highlights the climate action activities and benefits. Include content in social media feeds and community newsletters that describes the benefits of climate action for the community. The community needs to tell its story, so that people feel empowered as opposed to overwhelmed.

6.1 Questions Covered

- How can you tell the community's climate action story?
- How can you make a business case for climate action?

6.2 An Opportunity to Improve Quality of Life

The most successful emissions reduction plans are supported by enthusiastic, engaged, and excited communities. Telling the story of emissions reduction and how it connects to the daily lives of those in your community can help generate support among the general public, other stakeholders, and elected officials.

Apart from emission reduction, climate action has a range of benefits that improve quality of life. In fact, economists have found that, when the co-benefits are taken into account, the benefits of emission reduction actions often outweigh the cost.

Research indicates that people are more likely to want to avoid a loss even if it means they will gain more in the long term - a bias known as 'loss aversion'.¹⁴ It is essentially twice as painful for us to lose something than it is to gain something. Framing climate messages in terms of the gain (rather than the loss) can help avoid the loss aversion bias. In addition, messages tend to be more engaging when discussed in terms of anecdotes and stories, rather than graphs and statistics. Climate Outreach, a non-profit that has studied engagement best practices, recommends focusing on building engagement "from the 'values-up' rather than downwards from the 'big numbers' of the climate change policy discourse."¹⁵

¹⁴ Decision Lab. (n.d.). Why do we buy insurance? Loss aversion explained. Retrieved March 2021 from: <https://thedecisionlab.com/biases/loss-aversion/>

¹⁵ Clarke, J. et. al. (Oct. 2018). Public engagement for a 1.5°C world: Shifting gear and scaling up. Climate Outreach: Oxford. Retrieved from: <https://climateoutreach.org/reports/ipcc-public-engagement-1-5c/>

A realistic understanding of costs and other data is critical for implementing and prioritizing emission reduction actions. Framing actions as investments and focusing on the opportunities—for health, quality of life, resilience, economic prosperity, and more—can help community members from across the political spectrum focus on their vision for the future and how emission reduction action fits into it.

With this in mind, the municipality should consider the diverse ways in which emission reduction actions can benefit their community and frame action on those terms. Table 8 details common co-benefits of emission reduction actions that can be a focus of public and stakeholder engagement, while section 6.3 addresses how to make a business case for emission reduction actions.

Box: Six Tips for Talking about Climate Change¹⁶

1. Highlight shared agreement on the need to act: Canadians recognize the seriousness of climate change and want to see their governments respond. They believe the climate is changing and that Canadians have already experienced climate impacts.¹⁷ Use inclusive, collective pronouns like “we” and “us” to communicate about the issue and community concern. For example: people like us are worried about climate change.
2. Make it about the here and now: Focus on what climate action means for the community, the people living there now, and the generations to come. Narratives that focus on the role of climate action in safeguarding our future tend to resonate better with the public than ones focused on international obligations.
3. Focus on tangible actions: Create a sense of momentum by highlighting actions and successes as they happen, setting intermediate targets, reporting on progress annually, and connecting co-benefits to the values and needs of the community.
4. Connect the dots between emission reductions action and core values: Climate action outcomes and concerns of emissions reduction relate to themes that matter to voters of all backgrounds. These include reducing waste, a clean environment, saving public funds, and fulfilling our responsibilities to the next generation.
5. Build trust with familiar faces: Work with people that are known and trusted by the general public, as well as stakeholder groups, to engage the public and tell the story of climate action. Trusted messengers can range from community workers to the head of the local chamber of commerce.
6. Avoid jargon: Communicate in plain language and make sure any technical terms you do use are clearly defined. This will help the audience focus on the issue, rather than bogging them down in information they don’t understand and to which they cannot relate.

¹⁶ Most of these tips are adapted from: Shaw, C., Corner, A., and Clarke, J. (May 2019). Are the public ready for net zero? Recommendations for building a positive public discourse. Climate Outreach. Oxford. Retrieved from: <https://climateoutreach.org/reports/report-are-the-public-ready-for-net-zero/>

¹⁷ Mildemberger, M. and Lachapelle, E. (Sept. 5, 2019). “Canadians in every riding support climate action, new research shows”. The Conversation. Retrieved from: <https://theconversation.com/canadians-in-every-riding-support-climate-action-new-research-shows-122918>

Table 8. Common co-benefits of emission reduction actions.

CO-BENEFIT	DESCRIPTION	RELEVANT ACTIONS/POLICIES
Health		
Better air quality	Decreased combustion of fossil fuels reduces air pollution.	<ul style="list-style-type: none"> • Increased adoption of EVs. • Enhanced transit. • Improved walking and cycling infrastructure.
Increased physical activity	Policies that encourage walking, cycling, and using public transit increase physical activity.	<ul style="list-style-type: none"> • Land-use planning that enables broader deployment of transit and increased walking and cycling.
Improved indoor environment	Energy efficiency and zero-emissions building standards retrofits improve indoor air quality.	<ul style="list-style-type: none"> • Retrofit existing dwellings and commercial buildings. • Zero-emissions building code for new buildings. • Recommission commercial or industrial buildings.
Economic prosperity		
Economic development	Investments in policies that support the low-carbon economy create jobs and business opportunities, while spurring innovation.	<ul style="list-style-type: none"> • Investments and policies and that support renewable energy development; energy-efficient buildings (retrofits, zero-emissions building code, etc.); and improving efficiency of industrial processes.
Household and business savings	Increased energy efficiency can reduce household and business energy costs and offset any additional costs that arise from renewable energy.	<ul style="list-style-type: none"> • Investments and policies that support energy-efficient buildings (retrofits, zero-emissions building code, etc.) and improving efficiency of industrial processes.
Improved reputation	Emission reductions actions can improve a community's reputation, drawing new residents and businesses.	<ul style="list-style-type: none"> • Emission reduction plan and communication strategy.
Equity and Community Prosperity		
Reduced energy poverty	Increased energy efficiency may reduce household energy costs and decrease the burden of energy poverty. Access to renewable energy decreases reliance on fossil fuels with volatile prices.	<ul style="list-style-type: none"> • Investments and policies and that support energy-efficient buildings homes (retrofits, zero-emissions building code, etc.).
Improved and/or increased access to infrastructure, goods, and services	Land-use patterns that support reduced driving and denser development make work, recreation, stores, and other places people go in their daily lives more accessible.	<ul style="list-style-type: none"> • Land-use planning that enables broader deployment of transit and increased walking and cycling.

CO-BENEFIT	DESCRIPTION	RELEVANT ACTIONS/POLICIES
Improved and/or increased greenspace	Policies that preserve or enhance forest area, wetlands, and other greenspaces for carbon sequestration provide outdoor recreation opportunities.	<ul style="list-style-type: none"> • Increase forest area or restore wetlands. • Tree planting. • Zero-emissions building standards and land-use regulations that support green roofs, tree planting, and other features that enhance greenery.
Benefits for vulnerable groups, including low-income, elderly, and children	Vulnerable groups, such as low-income families, seniors, and children benefit disproportionately from climate action. For example, seniors and children are among those whose health suffers most from air pollution. Land-use planning that supports public transit, walking, and cycling makes it easier for those who cannot afford or use a car. Reductions in energy costs help lift a burdensome expense for low-income households.	<ul style="list-style-type: none"> • Land-use policy to incentivize compact, complete communities that target increased green spaces (parks), public transit, neighbourhood walkability and cycling infrastructure. • Energy efficiency building retrofit incentivization programs (often through federal/provincial partnership programs) • Renewable energy retrofit incentivization programs (often through federal/provincial partnership programs)
Intergenerational equity	Avoided GHG emissions reduces the impact of climate change on future generations.	<ul style="list-style-type: none"> • All actions and policies that contribute to emission reductions.

Case Study: Energize Bridgewater

The Town of Bridgewater, a community of 8,500 in Nova Scotia, is implementing a community energy and emissions plan shaped by concerns about energy poverty. Many residents face burdensome energy bills, especially during the winter months.

The municipality's narrative and community engagement related to the plan—called Energize Bridgewater—focuses on the benefits of addressing challenges related to local energy systems. Mayor David Mitchell describes Energize Bridgewater as "a direct investment in our own community, with energy savings benefiting everyone in Bridgewater."

The table below details examples of communications materials produced in relation to Energize Bridgewater.

Website example

<http://www.energizebridgewater.ca/>

Community Narrative	<p>The Energize Bridgewater website summarizes the value proposition of the plan as follows: Bridgewater, Nova Scotia, has a bold idea: by moving the entire community toward efficient, clean energy, we can make the community wealthier and healthier, and improve the environment. Through dramatic improvements in the energy efficiency of its housing stock, commercial buildings, and institutional facilities, the introduction of large-scale renewable energy technologies, and making improvements to transportation systems, Bridgewater can have access to cheaper, cleaner, and more secure local energy.</p> <p>The challenge of energy poverty is also discussed in detail as a one that will be directly addressed by the Energize Bridgewater Plan:</p> <ul style="list-style-type: none"> • More households in Atlantic Canada experience energy poverty than anywhere else in the country, and Bridgewater is no exception. A household lives in a state of energy poverty when it spends more than 10% of its monthly income on energy services. A household does not need to be low-income to experience energy poverty. Utility bills that spike in the winter can catch people unaware and make it difficult to budget. When households are experiencing energy poverty, people may be forced to choose between paying utility bills, buying groceries, or purchasing medication.
Energize Nova Scotia Discovery Fair	<p>The Town hosted a day-long fair that targeted business owners with multiple speakers and stories of success related to clean energy. An overview of the event can be found here: http://www.energizebridgewater.ca/discovery-fair-schedule/</p>
Regular updates	<p>The Town regularly published news on its CEEP to update the community on implementation, new initiatives, and community events. An example of a newsletter can be found here: https://www.bridgewater.ca/document-library/sustainability/sustainable-bridgewater/1684-energize-bridgewater-december-zine/file</p>
Community-made video	<p>A team of young adults spent four months creating a short documentary on energy poverty in Bridgewater through a collaboration between three local organizations, the HeartWood Centre for Community Youth Development, Picnic Studios, and the Lunenburg District Office, Community Services.</p> <p>The documentary discusses the problem, focusing on the community's older building stock and residents hit with large energy bills to heat their homes, as well as how transformational change can occur.</p> <p>View it on Youtube: https://youtu.be/WZRL-jeC_qc</p>

6.3 Making a Business Case for Climate Action

Factors municipalities can consider when making a business case for climate action include:

- Energy savings,
- Maintenance savings,
- Keeping energy dollars within the community, and
- New business opportunities in the green economy.

6.3.1 ENERGY SAVINGS

Every year, Canadian spend billions of dollars on energy. Even in small communities, the costs add up. In 2015, a small community of less than 20,000 spent as much as \$80 million on energy, including bills for heating and cooling, lighting, transportation, manufacturing, and industrial production.¹⁸ Through gains in energy efficiency and designing communities so that households and businesses need less energy to run, emission reductions action can create significant savings for all. Relatively low energy costs can also help communities retain and attract businesses.

6.3.2 KEEPING ENERGY DOLLARS WITHIN THE COMMUNITY

Most of the money that small communities spend on energy leaves those communities. Local renewable energy developments offer an opportunity to transform that pattern and create economic development opportunities while reducing emissions. Such developments may have high upfront costs, but, in the long run, they can generate profits and ensure affordable energy sources with predictable prices.

6.3.3 OPPORTUNITIES IN THE GREEN ECONOMY

Emission reductions investments—like spending on retrofits, construction, low-carbon vehicles, and renewable energy developments—have been proven to save money while creating jobs and offering other returns. In addition, policies and regulations that foster the low-carbon economy stimulate innovation among businesses.

For example, investments in energy efficiency are expected to create more than 100,000 jobs across Canada every year until 2030.¹⁹ An American study estimates that 4.5 jobs are created for every US\$ 1.5 million spent on residential and commercial retrofits.²⁰ In addition, every \$1 spent on efficiency programs in Canada creates savings of \$3-5 for Canadians. Businesses, in turn, invest some of these savings, in the economy, creating jobs in retail sales, travel/tourism and food services, manufacturing, construction and professional services.²¹

¹⁸ Cairns, S. and Baylin-Stern, A. (Feb. 2016). COMMUNITY ENERGY PLANNING: The Value Proposition. QUEST. Retrieved from: https://questcanada.org/wp-content/uploads/2018/08/Community-Energy-Planning-The-Value-Proposition_Full_Report_2016.pdf

¹⁹ Efficiency Canada. (May 2018). Less is More. Retrieved from: https://www.energycanada.org/wp-content/uploads/2018/05/Report_LessIsMore_EconomicImpactStudy-2018-05-01.pdf

²⁰ Haley, B. (Mar. 28, 2020). "Energy efficiency's role in Canada's economic recovery". Retrieved from: <https://www.energycanada.org/covid-19-part-2-energy-efficiencys-role-in-canadas-economic-recovery/>

²¹ Malone, L., Howland, J. et. al. (March 2014). Energy Efficiency: Engine of Economic Growth in Canada. Acadia Center: Ottawa. Retrieved from: http://acadiacenter.org/wp-content/uploads/2014/11/ENEAcadiaCenter_EnergyEfficiencyEngineofEconomicGrowthinCanada_EN_FINAL_2014_1114.pdf

Case Study: Emission reductions create economic opportunities in Sussex

When the Town of Sussex took an interest in emission reductions actions in 2005, it was motivated by the opportunity to save money. It identified opportunities to reduce energy costs at different municipal facilities, such as the Town Hall, a wastewater treatment facility, and the local arena, and engaged consultants to figure out how to reduce their energy footprint. The initiative generated significant savings across the Town's facilities. For example, the Town changed the lighting system and modified how ice was cooled and maintained at the arena to reduce annual energy costs by more than \$10,000 a year. The Town looks for smart investments that reduce emissions, save money, and fit into its asset management plan.

The Town has since identified emission reductions actions that would support the local economy, including a geothermal energy opportunity that would draw heat from defunct mines, solar energy development, and opportunities to improve energy efficiency. The Town identified these actions through two concurrent processes: the development of corporate and community Climate Action Plans, which were adopted in 2017,²² and the development of an economic development strategy (in response to the closure of a mine that in 2016 that put 430 people in the region out of work).²³ Stakeholder engagement during these processes, including work with the District Chamber of Commerce, played a key role in identifying the economic development opportunities.

6.4 Discussing Trade-offs

Emission reductions actions offer opportunities to improve quality of life; however, they also involve trade-offs. Municipalities should acknowledge and identify these and consider how to ameliorate them as a part of their efforts. Trade-off questions can be discussed during public and stakeholder engagement processes; the municipality should also strive to address them as a part of ongoing communications efforts.

For example, the transition to the low-carbon economy is expected to create jobs in emerging sectors, while shifting some employment (e.g. from fossil fuels to renewables), transforming other existing jobs, and eliminating others altogether (e.g. mechanics specialized in combustion vehicles).

In other cases, such as renewable energy development, the municipality (or another investor) may have to incur high upfront costs, but generate long-term savings or profits. Similarly, homeowners who retrofit their homes may also face high upfront costs, but accrue savings in the long-term.

²² Both plans were adopted in 2017. To learn more about the Town of Sussex' climate action plans, visit: <https://sussex.ca/sussex-is-going-green/>

²³ To learn more about the Town of Sussex' economic development strategy, visit: <https://sussex.ca/documents/economic-development-strategy-post-mine-closure/>

It is important for municipalities to address community members concerns' about such challenges in engagement efforts. Focusing on the vision for the community and the benefits the changes will ultimately generate can be a helpful way to contextualize short-term costs, job losses, and other changes.

Municipalities can also consider investing in a detailed analysis of the trade-offs, such as by hiring a consulting firm to model costs, savings, and other factors out into the future, and calculate the exact costs and returns of investments in emission reductions. Such analyses can provide the municipality with comprehensive data to assist with long-term planning and implementation.

6.5 Resources

RESOURCES	DESCRIPTION
Community Energy Planning: The Value Proposition	A report that analyses the value of community energy planning.
Climate Outreach	AUK charity that focuses on communicating climate change, has developed a number of useful guides on public engagement.
Climate Visuals	Climate Visuals is an image library for telling the story of climate change, its impacts, and solutions. Many images are available to use for free under Creative Commons licenses.

Step 5: Actions and Big Moves

BEST PRACTICE: APPLY KEY ACTIONS TO REDUCE THE GREATEST AMOUNT OF GHGS PER SECTOR IN YOUR COMMUNITY.

Rationale: The community needs to take concrete actions that demonstrate results.

7.1 Questions Covered

- Why should these actions be considered first compared to others?
- What are the targets and actions that will have the biggest impact in reducing GHG emissions?
- What steps can my community begin to take in the short term?

7.2 What To Do First

Follow the “Reduce-Improve-Switch” paradigm. Avoiding energy consumption is the top priority, followed by improving energy efficiency improvements, and finally by making a switch to low-carbon energy sources to meet the remaining demand. The logic of this approach is that by avoiding energy consumption in the first place means retrofit requirements (improve) and the need to generate renewable energy (switch) are both reduced. By contrast, if the switch occurred first, the capacity of the renewable energy installed would be greater, which would mean higher costs; and once “improve” and “reduce” had been implemented, renewable energy capacity would be greater than demand. Table *** describes this framework for sample actions in different sectors.

Table ***. [MOU20] Reduce, Improve, Shift framework for community energy and emissions planning.

SAMPLE ACTIONS			
	Buildings	Transportation	Waste
REDUCE Reduce energy consumption and optimize energy demand.	Build efficient and low carbon new buildings.	Build compact, complete communities and transit-oriented development. In rural areas, develop nodes or village centres.	Implement strategies to prevent the creation of waste.

SAMPLE ACTIONS

IMPROVE Increase energy use efficiency.	Upgrade to energy efficient lighting systems. Perform energy retrofits for existing buildings. Introduce energy storage and district energy.	Improve fuel efficiency of the vehicle fleet.	Improve the efficiency of waste collection practices.
SWITCH Shift to low carbon energy sources.	Source energy from renewable sources.	Switch to electric vehicles that use renewable energy sources.	Collect fugitive emissions from landfills for use as renewable natural gas.

This workflow also prioritizes improvements to long-lasting infrastructure that can ‘lock-in’ energy consumption patterns for many decades, and takes advantage of opportunities to align proposed investments with the natural turnover of infrastructure and buildings.

7.3 5 Actions to Reduce GHGs

For small communities, there are a common set of climate actions that will have a large impact on the GHG emissions that are produced in its jurisdiction. The actions can be scaled up or down in ambition depending on community context, the recommendations of an advisory committee, or the level of ambition of council.

The Big 5 Actions that are presented here are:

- Building retrofits;
- Low-carbon industry;
- Low-carbon transportation;
- Local clean energy generation; and
- Zero waste communities.

The analysis provides recommended community targets for each big move as well as the key actions or next steps a community can take.

Funding and financing steps are provided under Part 8. Implementation.

7.3.1 ZERO-CARBON BUILDING RETROFITS

Table 9. Zero-carbon building retrofit targets and next steps

SUGGESTED BIG MOVE TARGET(S)	KEY ACTIONS / NEXT STEPS
<ol style="list-style-type: none"> 1. By 2050, 80-100% of buildings have completed a deep energy retrofit 	<ol style="list-style-type: none"> 1. Develop an inventory for all buildings by age, and target oldest buildings for prioritizing retrofit incentives
<ol style="list-style-type: none"> 2. By 2050, 100% of buildings use heat-pumps or low-carbon energy, including RNG, for space heating. 	<ol style="list-style-type: none"> 2. Partner with other UMN communities to pull together resources to create incentives and deploy workforce and materials 3. Pilot a deep energy retrofit by 2025 4. Fuel-switch all municipal buildings to heat pumps by 2030 5. Switch central buildings in town centres to ground-source geothermal heating. 6. Streamline building permit process for retrofits, including solar PV and heat pump installation 7. Fuel-switch swimming pool and ice rinks to geothermal heating sources

Overview

Building renewal is a critical component of any community Climate Action Plan, as the current stock is generally anticipated to remain intact over the following 30-year period.

New buildings are encouraged to be as efficient as possible. Existing buildings should be retrofitted to improve their efficiency and performance to reduce demand for heating and electricity. After efficiency measures, space and water heating should switch to low-carbon energy. Air-source heat-pumps can often meet the needs of individual buildings, generating three or more units of heat for each unit of electricity and can provide cooling for the summer period, an added benefit. Where building clusters exist, it may be more cost effective to choose ground-source heat pumps or geothermal heating. In this transformation, zero-emissions buildings can become the norm by 2050.

The retrofit procedure must be accessible to residents to begin, as well as financially affordable, and rapid in order to get community take-up. The municipality can provide leadership and collaborate with a range of community partners to scale up this effort; however, it is expected that the majority of investments will come from the private sector and building owners. Strategies to enable retrofits across a jurisdiction are identified in the implementation and 5-year action plan section.

Success in this big move means there will be a boost to jobs in the community, an accompanying rise of economic development potential, residents will pay less for heating and electricity, and buildings will be more comfortable for occupants.

Heat pumps with natural refrigerants

Heat pumps are a highly efficient technology for generating heating and cooling. A heat pump uses 1 unit of electricity to make up to 5 units of heating or cooling. The most efficient natural gas furnace uses one unit of natural gas to make 0.97 units of heat. Heat pumps require a refrigerant and while the refrigerants are confined, if released at the end of life are a potent greenhouse gas. Heat pumps using natural refrigerants, such as CO₂, eliminate this risk. These heat pumps are common in Japan and have been recently introduced to Canada.

Case Study: No Sweat Heat Pumps- A Collaboration

The Towns of Berwick, Antigonish and Mahone Bay have partnered on a One-Stop-Heat-Pump-Shop. The program includes financing, maintenance and cleaning to ensure the process is as easy as possible. More information: <https://heatpumpprogram.ca/>

Key Partners

Success of the building retrofit big move is contingent on partnership. The municipality will need to be a leader to commence action on this big move, but is not expected to be the primary funder of retrofits across the community nor supply the labour to complete the retrofit.

Table 10. Buildings retrofits partners and roles

PARTNER	ROLE IN THE BIG MOVE
Municipality	<ul style="list-style-type: none"> • Apply for financing and funding from various parties including FCM and infrastructure Canada • Investigate and apply financing mechanisms • Retrofit corporate building stock
Utility Company / NB Power	<ul style="list-style-type: none"> • Provide financing options and grants for efficiency • Permit net-metering, and encourage rooftop solar PV energy generation • Provide assistance programs for heat-pumps
Construction / Trades Industry	<ul style="list-style-type: none"> • Provide supply chain and workforce to complete retrofits • Innovate to meet high-performance energy standards in a standardized and rapid approach • Hold working groups on high-performance building standards

PARTNER	ROLE IN THE BIG MOVE
Community Businesses	<ul style="list-style-type: none"> • Participate in retrofit programs • Be ambassadors for zero-carbon building operations • Participate in creating business cases for retrofits and rooftop solar generation • Provide grant money and financing for retrofits where it makes economic sense
Province of NB / Federal Government	<ul style="list-style-type: none"> • Organize training periods for builders to understand high-efficiency building practice • Be leaders in providing funding and financing for retrofits • Set public policy on renewable energy generation
Residents	<ul style="list-style-type: none"> • Provide input on design of retrofit program to ensure convenience • Participate in the program

7.3.2 LOW-CARBON INDUSTRY

Table 11. Low-carbon building retrofit targets and next steps

SUGGESTED BIG MOVE TARGET(S)	KEY ACTIONS / NEXT STEPS
<ol style="list-style-type: none"> 1. Improve industrial process efficiency by 50% by 2050 2. By 2050, displace fossil fuels for all industrial processes to electricity 	<ol style="list-style-type: none"> 1. Identify local renewable energy generation capacity and partner with industry and other stakeholders to deploy the energy progressively. 2. Study the business case for “Combined-heat and power systems” that use low carbon fuels such as renewable natural gas, biogas, or hydrogen fuel cells. 3. Use heat-pumps and heat recovery systems for process heat demand to the highest possible extent. 4. Research best practices and implement carbon capture technologies where possible by 2025. 5. Create a joint-purchase agreement to purchase electric vehicles 6. Explore opportunities to develop a local use for sustainable forestry by-products

Overview

Small communities that have prominent industrial activity in forestry, mining, or other natural resource extraction face a distinct challenge related to emission reductions: industry may be the largest source of emissions in the community, depending on emitting-relating activity or fuel-source. Partnerships and creativity can help communities design interventions to overcome this challenge.

The province’s current carbon pricing scheme focuses on industrial carbon emissions, which will push industries to reduce GHG emissions to protect their bottom line. Under this approach, industry will be incentivized to keep its processes as efficient as possible and upgrade boilers,

systems, and buildings regularly. Within this context, a community target of improving industrial process efficiency by 50% is ambitious, but not unachievable. As a first step, a municipality can work with industry to jointly establish the target and develop actions to work towards it.

Another area where industry and the municipality can collaborate is renewable energy. Generating electricity through solar PV or wind can help keep industry's costs low, while also creating jobs and a new source of power for the wider community. As an added benefit, the dollars spent on energy will be retained in the community. Using combined-heat-and power systems can also be a shared venture to increase local energy capacity and encourage use of low-carbon fuel sources, such as RNG, biomass (see the zero-waste big move), or hydrogen.

Key Partners

A municipality has limited control over industrial processes and the resulting GHG emissions but can still stimulate innovation and change for increased community well-being. The natural partner in this big move is the industry itself, but the province and federal government are also providing critical regulation. The private sector and utilities can also be engaged in fuel-switching efforts.

Table 12. Low-carbon industry partners and roles

PARTNER	ROLE IN THE BIG MOVE
Municipality	<ul style="list-style-type: none"> • Stimulate opportunities for renewable energy, carbon capture, and CHP systems • Zoning adjacent lands to permit renewable energy generation • Prepare and publish business cases for low carbon technologies • Inform and engage public with options for low-carbon industry and increased economic development
Utility Company / NB Power	<ul style="list-style-type: none"> • Provide financing options and grants for efficiency measures • Permit renewable energy generation and provide funding • Assist in grid-tied generation infrastructure • Partner on installation and operation of CHP systems
Industrial sector	<ul style="list-style-type: none"> • Respond to carbon pricing policy and adjust process accordingly • Jointly declare a net-zero GHG emissions target by 2050 • Provide capital for renewable power generation • Investigate carbon capture technologies and apply to avoid carbon pricing
Community Businesses	<ul style="list-style-type: none"> • Where possible partner with the municipalities, utilities, and industry to develop renewable energy and thereby a new revenue stream. • Supply low carbon fuel (Biomass, RNG, biogas, and hydrogen)
Province of NB / Federal Government	<ul style="list-style-type: none"> • Set a carbon pricing scheme that fairly prices carbon to the industrial sector • Continue to provide innovation dollars for industries to decarbonize • Create efficiency mandates for sectors across the province

7.3.3 GENERATE RENEWABLE ENERGY

Table 13. Actions and targets to assist in generating renewable energy

SUGGESTED BIG MOVE TARGET(S)	KEY ACTIONS / NEXT STEPS
<ol style="list-style-type: none"> 1. By 2050, 50% of existing buildings have been fitted with rooftop solar PV 	<ol style="list-style-type: none"> 1. Develop a renewable energy co-operative with other UMNB or neighbouring communities
<ol style="list-style-type: none"> 2. Install 5MW of ground-mount solar PV every 5 years to 2050 	<ol style="list-style-type: none"> 2. Update zoning by-laws to facilitate rooftop Solar PV if required
<ol style="list-style-type: none"> 3. Install 5MW of wind energy every 5 years to 2050 	<ol style="list-style-type: none"> 3. UMNB communities collectively lobby New Brunswick government to generate energy locally
	<ol style="list-style-type: none"> 4. Create an RFP to invite applications on energy storage systems to further enable local generation
	<ol style="list-style-type: none"> 5. Create a community energy storage plan.

Overview

Renewable energy is critical in facilitating the growth of carbon-free energy consumption in electric vehicles, electric space heating, and industrial processes. Generation from rooftop solar PV, ground solar PV, and wind reduce carbon intensity from electricity.²⁴ Geothermal heating can also be used for energy and heating a variety of building types and end-uses including ice rinks and swimming pools.

The generation of large amounts of local renewable energy has four major purposes:

1. To respond to the growing demand for electrification that will occur naturally through growth of electric vehicles;
2. To respond to further efforts towards electrification of space heating through, primarily via heat-pumps;
3. To provide enough clean energy to displace GHG emissions associated with electricity in New Brunswick; and
4. To create economic development pathways through keeping energy dollars within the community (dollars re-invested)²⁵ and new ventures, including green-hydrogen development.²⁶

Renewable energy use can be augmented by deploying energy storage systems to meet peak demand loads, and enable use when there isn't prime wind or solar generating periods such as cloudy or non-windy days.

²⁴ Decarbonizing electricity generation, which is one of the biggest emitters in New Brunswick, is critical to emission reductions in the province.

²⁵ A large proportion of energy dollars spent primarily on gasoline, fuel oil, and natural gas typically leave a town's boundary and cannot be re-invested into community ventures.

²⁶ Green hydrogen, a type of hydrogen generated through renewable energy, is a promising fuel source due to its portability and function for space heating, as well as transport that requires higher loads (i.e., freight vehicles, cargo ships, and airplanes).

Case Study: Geothermal Energy in Springhill, Nova Scotia

About 50 homes and businesses in the Town of Springhill in Cumberland County, Nova Scotia, are heated by geothermal energy, a low-carbon energy source, from flooded, defunct coal mines.²⁷ The mines contain about 4,000,000 m³ of water that is heated by the rocks and conveyed to heat pumps to meet heating and cooling demand. Although it is more expensive to install heat pumps than conventional oil furnaces, the technology offers significant long-term savings because of lower operations costs.²⁸

The Town has been using geothermal energy for more than 25 years. The Town began exploring the potential of the resource in 1985, when a feasibility study indicated geothermal energy could provide significant savings.²⁹ In 1989, Ropak Can-Am, a manufacturer of plastic packaging products, became the first business to draw heat from the mines, which enabled it to save \$45,000 per year.³⁰ The Cumberland County Energy Authority is now looking to develop an industrial park powered by the energy source.³¹

²⁷ Wright, J. (March 2, 2017). "What Sussex can learn from Springhill: geothermal heats up". CBC News. Retrieved from <https://www.cbc.ca/news/canada/new-brunswick/springhill-geothermal-1.4006309>

²⁸ Jessop, A. "Geothermal Energy from Old Mines at Springhill, Nova Scotia, Canada". Retrieved from <https://www.geothermal-energy.org/pdf/IGAstandard/WGC/1995/1-jessop2.pdf>

²⁹ Ibid.

³⁰ Dabbas, M. (2018). Examining the Potential of Utilizing Geothermal Energy From Ejected Mine Water Towards Mine Heating and Preliminary Assessment of Deep Lake Cooling Systems for Deep Underground Mines. [Master's thesis, McGill University]. MacAskill, D. & Power, C. Researching the Geothermal Potential of the Former Springhill Mine. (Nov. 2015). Report to the Cumberland Energy Authority.

³¹ SaltWire Network. (May 24, 2018). "Springhill getting aggressive developing geothermal resource". Retrieved from: <https://www.saltwire.com/news/springhill-getting-aggressive-developing-geothermal-resource-212803/>; Patil, Anjali. (Sept. 26, 2015). "Springhill geothermal researchers eye opportunities". CBC. Retrieved from: <https://www.cbc.ca/news/canada/nova-scotia/springhill-geothermal-project-public-1.3244157>. Cumberland Energy Authority. (n.d.). Renewable Energy. Retrieved from: <https://cumberland-energy-authority.ca/renewable-energy.html#Geothermal>.

Key Partners

Success of the renewable energy big move is contingent on partnership. The municipality will need to be a leader to commence action on this big move but is not expected to be the primary funder of renewable energy across the community.

Table 14. Renewable energy development partners and roles

PARTNER	ROLE IN THE BIG MOVE
Municipality	<ul style="list-style-type: none"> • Apply for financing and funding from various parties including FCM and infrastructure Canada. • Zone and designate lands for renewable energy generation. • Develop and participate in a renewable energy cooperative. • Lead the effort by installing Solar PV on all municipal buildings at an accelerated rate.
Utility Company / NB Power	<ul style="list-style-type: none"> • Permit net-metering and virtual net-metering across the province to stimulate investment in renewables. • Create a Feed-in-Tariff program to stimulate investments • Provide infrastructure funding for grid-tied renewable generation and the generation terminals • Commit to net-zero GHG target by 2050
Construction / Trades Industry	<ul style="list-style-type: none"> • Provide supply chain and workforce to install renewable energy
Community Businesses	<ul style="list-style-type: none"> • Place rooftop solar PV on buildings and privately held lands • Participate and invest in ventures of a renewable energy cooperative • Lobby government for incentives and funding to generate local low carbon energy
Province of NB / Federal Government	<ul style="list-style-type: none"> • Key funding partner, to be lobbied in short run
Residents	<ul style="list-style-type: none"> • Install rooftop solar PV on homes • Advocate to their local representative for better public policy, more incentives, and funding to generate low carbon energy.

7.3.4 LOW-CARBON TRANSPORTATION

Table 15. Low-carbon transportation targets and next steps

SUGGESTED BIG MOVE TARGET(S)	KEY ACTIONS / NEXT STEPS
<ol style="list-style-type: none"> 1. By 2035, 100% of municipal vehicles and transit are electric 2. By 2040, 100% of new vehicles sales are electric (In line with federal government targets) 3. Launch an EV carshare system which includes electric bicycles. 	<ol style="list-style-type: none"> 1. Install chargers in town/city centre locations and public buildings in next 5 years 2. Investigate a shared fleet of EVs and electric bikes for city (Corporate) and public use. 3. With other UMN B organizations, industries, and delivery companies submit a joint RFP to purchase electric vehicles in next 5 years 4. Provide subsidies for electric bicycles, or provide a municipally shared service for community members to access and use. 5. Create an eco-zone to prohibit gas/diesel powered vehicles in the city centre.

Overview

Transportation is often the largest source of GHG emissions in a community that doesn't have a major industry in its boundary. Achieving a GHG emissions target requires a transformative shift to zero-carbon transportation and a change in how citizens move around the city. This transformation of the transportation system prioritizes fuel-switching personal vehicles from gasoline and diesel fuel to electric. A parallel shift should be occurring with commercial vehicles. Local delivery vehicles can easily switch to electric and will have an incentive to do so to save costs.

Considering the reduce-improve-switch framework, a primary step is to remove demand from vehicle trips in the first place, and encourage walking and cycling. Small communities do not differ from large ones where good infrastructure for walking and cycling can encourage active transport. Targeting a higher share of non-vehicle transportation should be encouraged. If the community has services as much as 10km from home, an E-bike can be used and the municipality can support this through a rental program or through the local library.

The municipality can lead the electrification initiative by targeting a conversion to EVs for municipal vehicles earlier than 2040. The municipality can also create opportunities for other stakeholders to renew their fleet by issuing a joint-RFP (see box below). EV chargers are necessary for this transition, and setting up a network at municipal sites in the town and in adjacent towns can reduce or eliminate "range-anxiety" from making trips that are longer in distance, although the average trip length is typically 10-15km in most Canadian contexts.³²

³² Plug 'N Drive Canada. (n.d.). "Electric Vehicle FAQ". Retrieved March 2021 from: <https://www.plugndrive.ca/electric-vehicle-faq/>

More Reading

Massive EV order from U.S .Municipalities. Electrek. 2017

<https://electrek.co/2017/03/15/electric-vehicle-order-114000-vehicles-40-companies-competing/>

Key Partners

The municipality can show leadership in this big move by electrifying its own fleet first, and also installing EV charging stations at town facilities. Residents will play a key role in this transition, as private vehicle use will be the largest source of GHG emissions in the community.

Table 16. Low-carbon transportation partners and roles

PARTNER	ROLE IN THE BIG MOVE
Municipality	<ul style="list-style-type: none"> • Electrify personal fleet, and transit fleet (if applicable) ahead of 2050 • Install EV charging stations in town and coordinate with other municipalities for creating an EV network
Utility Company / NB Power	<ul style="list-style-type: none"> • Fund EV charging stations
Community Businesses	<ul style="list-style-type: none"> • Gas stations can show leadership by installing charging stations next to pumps • Other businesses, specifically lodges and hotels can install chargers on their property • Participate in any RFPs from the municipality to order electric vehicles
Province of NB / Federal Government	<ul style="list-style-type: none"> • Increase funding and incentives for electric vehicles and electric bikes • Set a target of transit electrification
Residents	<ul style="list-style-type: none"> • Take-up provincial and federal incentives to purchases EVs and personal chargers • Reduce vehicle trips in general and consider cycling, walking, and e-bikes

7.3.5 DIVERT ORGANIC WASTE/ZERO-WASTE POLICY

Table 17. Zero waste targets and next steps

RECOMMENDED BIG MOVE TARGET(S)	KEY ACTIONS / NEXT STEPS
<ol style="list-style-type: none"> 1. By 2050, 95% of organic waste is sent to an anaerobic digester 2. By 2050, 100% of wastewater is treated at a plant that captures methane and converts it to usable biogas or renewable natural gas. 	<ol style="list-style-type: none"> 1. Locate an opportunity to put an Anaerobic Digester where multiple municipalities can transfer organic waste, near a landfill gas capture site, or in combination with a wastewater treatment plant. 2. Implement a community-wide organic waste collection service. 3. Provide start-up financing for a zero waste community bulk store with local or New Brunswick foods as a priority

Overview

After waste diversion, interventions to capture emissions from organic waste and convert it useful energy can eliminate most waste GHG emissions. If separated during collection, organic waste can be converted into a clean energy source through a process called anaerobic digestion (AD), which breaks down organic material biologically.

New Brunswick already has several landfill gas capture systems in place, but enabling AD is a higher order of climate action as the process produces more biogas per tonne of waste, captures more methane, and does not have large associated environmental restoration tasks.³³

This action will be best implemented by forming a partnership from a number of small and large municipalities across New Brunswick and utility companies as up-front capital for an anaerobic digester is high. The AD can be located adjacent to landfill gas capture systems that may exist or wastewater treatment plans to increase economies of scale and reduce transportation needs for consolidating waste.

Once the biogas and RNG is extracted, it can be used to fuel a variety of different end uses in the city. The dehydrated waste can also be used as a source of rich compost for gardening or local food production.

Key Partners

Many waste programs are under the purview of the municipality, but there should be interest in creating waste to energy sites from the private sector and utilities.

³³ Technavio. (July 13, 2014). "Anaerobic Digestion vs. Landfill Technologies in the Biogas Market". Technavio Blog. Retrieved from: <https://blog.technavio.com/blog/anaerobic-digestion-vs-landfill-technologies-in-the-biogas-market>

Table 18. Zero waste partners and roles

PARTNER	ROLE IN THE BIG MOVE
Municipality	<ul style="list-style-type: none"> • Apply for financing and funding from various parties including FCM and infrastructure Canada • Investigate and apply financing mechanisms • Retrofit corporate building stock
Utility Company / NB Power	<ul style="list-style-type: none"> • Provide funding for Anaerobic Digesters for small towns or central routing points
Community Businesses	<ul style="list-style-type: none"> • Participate in waste diversion programs and organic waste collection • Invest in local anaerobic digester systems • Create zero-waste products
Province of NB / Federal Government	<ul style="list-style-type: none"> • Provide funding for anaerobic digesters in small communities or to create a digester amongst clusters of small communities.
Residents	<ul style="list-style-type: none"> • Reduce waste consumption • Participate in zero waste groups or community composting programs

Case study: North Cowichan Climate Action and Energy Plan.

North Cowichan is a small rural municipality on Vancouver Island, British Columbia. The District considered mitigation and adaptation actions in the same plan.

Table 19. Mitigation actions

SECTOR	MITIGATION ACTIONS
Transportation	1. Create a transportation planning program with dedicated staff 1a. Implement a Smarter Travel Choices Program 1b. Establish a taxi-bus rural public transit system 1c. Increase community biodiesel purchases and require municipal fleet biodiesel use 1d. Join Project Get Ready and transition the municipal fleet to electric vehicles
Land-use	2. Ensure strict Implementation of OCP Development Guidelines
Renewable Energy	3. Employ municipal energy policy mechanisms 4. Implement a community solar energy program 5. Establish a municipal energy utility
Buildings	6. Reduce municipal building energy use
Agriculture	7. Create an agricultural development centre
Sequestration	8. Increase North Cowichan's forest area
Implementation	9. Establish a green revolving loan fund

Step 6: Implementation

BEST PRACTICE: LAUNCH A PARTNERSHIP WITH ANOTHER MUNICIPALITY OR COMMUNITY ORGANIZATION.

Rationale: Decarbonization requires a whole-of-community effort. There are many benefits to be gained by working with other communities in terms of additional expertise, economy of scale, and building networks.

QUESTIONS COVERED

- How can climate change be integrated into decision-making?
- How can we deliver climate actions?
- What are some sources of funding?

8.1 Overview

This section outlines how to implement your climate action plan. It includes

- A sample 5-year implementation plan;
- A suggested approach to applying a climate lens to decision-making;
- Suggested options to consider for financing climate action; and
- Case studies on successful climate action collaboration.

8.2 Five-year Implementation Plan

Emission reductions implementation plans typically identify priorities for the short-term (1 to 5 years), medium term (10 years), and beyond. The following table provides a sample five-year implementation plan for you to customize.

Table 20. Summarized Five-year implementation program.

PROGRAMS	KEY PARTNERS	DESCRIPTION	RESOURCES/ PRECEDENTS	KEY BARRIER(S)	SUGGESTED FIRST STEPS
Program 1: Zero-carbon building retrofit program: Transforming existing buildings	Government of Canada Construction/ building industry Federation of Canadian Municipalities (FCM) UMNB municipalities	The deep retrofits program is envisioned as a partnership between the provincial and federal governments, utilities, industry, and higher education. A financing package is developed using a Property Assessed Clean Energy (PACE) or Local Improvement Charge (LIC) mechanism, combined with incentives from other levels of government and the utilities, with investment raised through a combination of community bonds and green bonds. Retrofits are targeted to groups of buildings, such as neighborhoods and sectors (e.g., restaurants, grocery stores, etc.), as opposed to individual buildings, to pool risk and develop larger, more sophisticated projects. Renewable energy, solar PV, energy storage, and air and ground-source heat pumps are included in the program.	Precedents: Guelph, Ontario GEERS program, Energy Efficiency for Homes Retrofit Program, ³⁴ Perth-Andover heat pump rental program.] Resources: FCM community energy efficiency financing. Property-Assessed Clean Energy (PACE) Program in New Brunswick as a means of financing for private property owners to implement energy efficiency and renewable energy improvements.	No systematic approach to large-scale retrofits to achieve economies of scale.	<ul style="list-style-type: none"> • Leadership Opportunity: Retrofit one municipal building to net-zero by 2022. • Pilot program to retrofit a group of older buildings and consider a conversion to multi-family. • Provide start-up financing for municipalities to do pilot deep retrofits in their communities, prioritizing social or non-profit housing. • Work with trades programs, local colleges, and builders to provide training on deep energy retrofits and heat pump installations.

³⁴ Government of Canada. (Feb. 2, 2021). "Energy efficiency for homes". Retrieved from: <https://www.nrcan.gc.ca/energy-efficiency/homes/20546>

PROGRAMS	KEY PARTNERS	DESCRIPTION	RESOURCES/ PRECEDENTS	KEY BARRIER(S)	SUGGESTED FIRST STEPS
Program 2: Local renewable energy: Stimulating local renewable energy projects	Canada Renewable Energy Association Co-op Federation of Canada Utilities (NB Power or other) Large building owners Municipalities First Nations groups Industrial sector	The membership of the co-operative includes the region, municipalities, utilities, industries, and other partners. The co-operative advocates for, develops, commissions, and finances projects, depending on which strategy is appropriate to a particular context. The co-operative is technology agnostic with a mandate to work on district energy, wind, solar, storage, and geothermal. Financing comes from community bonds, loans, and grants from various levels of government.	Precedents: New Brunswick's Large Industrial Renewable Energy Purchase Program Brunswick permits 40MW of generation at an identified site, and an additional 40MW when the project is led by First Nations. ³⁵ Geothermal energy production in Springhill, NS. ³⁶ The West Kootenay 100% Renewable Energy Plan, Kootenays, BC. ³⁷	Long-term investments required by local entities that deliver community benefits.	<ul style="list-style-type: none"> • Leadership Opportunity: Lobby the provincial government to plan for a decarbonized provincial energy grid ahead of 2050. • Update zoning bylaws to permit solar PV on existing and new buildings. • Identify sites for potential microgrids and submit RFPs to private sector investors. • Identify sites for local generation and zone them appropriately. • Scale up use of hydrogen in the natural gas distribution network and follow. • Identify large rooftops in the community and prioritize them for Solar PV installation. • Create a communications campaign for renewable energy and dispelling associated myths with production and operation. • Identify possibilities for generation in partnership with industrial partners to lower their carbon pricing costs, if present.

³⁵ Government of New Brunswick. (n.d.) "Community Renewable Energy". Retrieved March 2021 from: <https://www2.gnb.ca/content/gnb/en/departments/erd/energy/content/renewable/content/CommunityRenewableEnergy.html>

³⁶ Province of Nova Scotia. (n.d.) "Geothermal Energy in Nova Scotia". Retrieved March 2021 from: <https://energy.novascotia.ca/renewables/geothermal-energy>

³⁷ "The West Kootenay 100% Renewable Energy Plan". (2020). Retrieved from: <https://westkootenayrenewableenergy.ca/downloads/>

PROGRAMS	KEY PARTNERS	DESCRIPTION	RESOURCES/ PRECEDENTS	KEY BARRIER(S)	SUGGESTED FIRST STEPS
Program 3: Low-Carbon Transportation: Encouraging the adoption of electric vehicles	Vehicle manufacturers/ dealers Municipalities Private businesses with large fleets Transit authorities Provincial/ federal Governments	The joint venture is established as a technical working group with representatives from each of the relevant organizations. The first deliverable is a five-year action plan/ roadmap for electric vehicles in the region.	Precedents: New Brunswick’s Climate Change Action Plan suggests 30,000 EVs on the road by 2030 and supporting infrastructure Resources: Federal government subsidy for EVs. City of North Vancouver’s Electric Vehicle Strategy. ³⁸	Lack of infrastructure and trust in a new technology. Lack of restrictions on personal vehicles that emit GHGs.	<ul style="list-style-type: none"> • Development of an EV strategy which prescribes locations for chargers. • Zoning updates to require EV charging in new buildings. • Joint RFP/purchase of EV fleet amongst large fleet owners. • Explore limiting fossil-fuel powered vehicles in town centres by creating zones where electric vehicles can only access, otherwise termed “Eco-zones”
Program 4: Zero Waste	Municipalities Regional authorities First Nations groups	Opening up anaerobic digesters in small communities creates opportunities to develop biogas and RNG as a new energy source. Within a framework of mitigating climate change, the option to reduce travel of waste and treat it centrally is preferred.	Precedents: Fredericton, NB: Landfill gas capture project ³⁹ Resources: N.B. Climate Change framework: Reducing emissions from waste	Waste disposed outside of community. Up-front capital required for installation of anaerobic digester.	<ul style="list-style-type: none"> • Leadership Opportunity: Prioritize development of anaerobic digester in the community and complete it in the next 5 years. • Work with local utilities, with note to natural gas providers of partnership opportunities on generating RNG and Biogas. • Begin collecting organic waste from homes and commercial buildings in 2021.

³⁸ “Electric Vehicles”. 2018. City of North Vancouver. Retrieved from: Electric Vehicles | City of North Vancouver (cnv.org)

³⁹ “Landfill Gas Capture System” n.d. Carbon Zero Projects. Retrieved from: Fredericton, NB - Landfill Gas Capture Project - Carbonzero.ca

PROGRAMS	KEY PARTNERS	DESCRIPTION	RESOURCES/ PRECEDENTS	KEY BARRIER(S)	SUGGESTED FIRST STEPS
Program 5: Compact land-use policies and natural spaces	Municipalities Development Community	Compact land use has not been identified as a big move for climate action in the context of a small community, but is encouraged for its ability to reduce energy consumption and GHG emissions from travel. Designating areas as infill and away from climate risks, such as flooding, will reduce outwards expansion and ensure a sustainable community in the long term.	Precedents: New Brunswick Climate Change Action Plan “planning smart, low carbon communities” Resources: Perth-Andover Municipal Plan update. ⁴⁰	Lack of consideration of energy and GHG emissions in land-use planning.	<ul style="list-style-type: none"> • Disincentivize outwards expansion through increased development costs outside town centre boundary. • Require GHG assessments in new road infrastructure and subdivision plans. • Begin to limit new single-detached housing to ensure 20% or less is detached by 2050. • Implement tree coverage targets by city into the Municipal Plans.

8.3 Climate Lens for Decision-Making

A climate lens is a tool to help municipal decision-makers consider the emission reduction impact of municipal decisions and investments. A climate lens can take many forms. A municipality may integrate it into existing decision-making documents, such as staff reports, or create an additional tool to be integrated into existing workflows. Municipalities can choose an approach that is viable and useful within the local context.

The climate lens should be tied to metrics from the municipality’s monitoring and evaluation framework to enable decision-makers to reflect on how decisions and investments contribute to detract from emission reduction goals. Effective climate lenses help guide decision-makers make clear decisions that move them toward their emission reductions targets.

The table below provides a sample decision-making checklist for municipal projects.

CATEGORY	RATIONALE
GHG impact: Reduction/Increase	At a glance indication of whether the expenditure increases or decreases GHG emissions.
Action achieves x% of the corporate target to retrofit buildings.	Situates the impact of the action on the relevant sector.
Action saves/increases X tCO ₂ e of the remaining gap of Y tCO ₂ e between 2020-2050.	Indicator of the relative magnitude of emissions reduction in comparison with the emission reductions target.

⁴⁰ “Municipal Plan” (2020). Village of Perth-Andover. Retrieved from: MUNICIPAL_PLAN_-_Village_of_Perth-AndoverFINAL.pdf (perth-andover.com)

CATEGORY	RATIONALE
Project saves/increases \$X for each tonne of GHG emissions reduced between 2020-2050.	Indicator of whether the measure saves money or costs money per tonne of GHG emissions reduced.

8.5 Financing Climate Action

The required capital to finance climate change will be mobilized from a variety of sources including the public and private sectors. Examples of the mechanisms that can be used to raise the funds are as follows:

TIERS	POSSIBLE OPTIONS	DESCRIPTION
Tier 1 - Fast and relatively simple	Debt	Will need to be assessed alongside other investment initiatives and stakeholder appetite for additional debt.
	Government transfers	Transfers from federal and provincial governments such as the gas tax can be used to finance climate actions. The federal government also has grant programs dedicated to climate action.
	Federation of Canadian Municipalities	FCM offers a number of programs that can be used to finance climate action.
Tier 2 - More challenging	Reduced fees	Reduced or eliminated fees can be used for building inspections of net zero homes, solar PV installations or EV charging installations.
	Revolving Loan Fund	A fund which finances retrofits and energy efficiency measures; savings are returned to the fund to finance additional actions.
	Utility Bill Financing	NB Power currently offers the Total Home Energy Savings Program, a rebate for home energy upgrades including solar PV.
	PACE/CEIP Financing	The municipality can advocate to the NB government to enable Property Assessed Clean Energy (PACE) financing to finance the incremental cost of net zero new construction, deep retrofits, solar PV installations and/or EV charging stations.
	Mobilization of carbon tax revenues	The municipality can advocate to the NB and Federal governments to allocate of the carbon tax fees collected to municipalities for climate action

Tier 3 - Novel solutions	Green Bank	A structure gaining traction in the public sector to finance climate action. The structure is focussed on leveraging public investments to attract private dollars for GHG emissions reductions. Also recycles capital by using investment returns for new projects.
	Community bonds	The municipality or a partner organization can issue low denomination bonds (which can be accessed by a broad swatch of the population to finance low carbon projects. This allows citizens to invest directly in climate action projects and if the denomination is low enough, allows people to build a credit rating.
	'Municipal Energy Corporation'	Creation of an arms-length entity similar to what the City of Saint Albert is currently exploring.
	Climate bonds	Debt tied to GHG emissions reductions issued either directly by the City or in partnership with the Provincial government. Allows the City to tap into rapidly growing sources of clean energy finance issued by pension funds, insurance companies and other more strictly regulated investors. Also sends a signal which can help the City attract capital more broadly.

8.6 Collaborating on Implementation

Collaboration between municipalities and other community partners is a key strategy for effective climate action implementation. Communities can identify collaboration opportunities and appropriate partnerships based on the actions they choose to implement. This guide includes some materials to help kickstart the process, including case studies of successful collaboration, a sample five-year implementation plan, and guidance on obtaining funding.

Municipal collaboration, between small and medium size cities, on climate action has the potential to deliver emission reductions on par with larger cities by leveraging the ability to pool resources, build capacity, and grow political influence. Collaboration, used effectively by small- and medium-sized municipalities, may ultimately level the climate action resources playing field.

Collaboration of this type also advantages the creativity and resourcefulness of small- and medium-sized municipalities by encouraging unconventional partnerships and initiatives not found in larger cities. These partnerships can go beyond other municipalities to include (but are not limited to) community organizations, non-governmental organizations, the UMNB itself, businesses, and community champions who share the community's vision for climate action.

Case Study: Collaboration on Climate Action in Sackville, New Brunswick

In the Town of Sackville, where staff work on climate mitigation and adaptation off of the side of their desks, collaborations have proven critical to climate action. The Town is part of a region that is particularly vulnerable to flooding linked to climate change. It began responding to this challenge in 2009 in partnership with other municipalities and organizations in the Tantramar region. For example, in 2014 and 2015, Eos Eco-Energy, a non-profit focused on solutions to climate change, brought communities across the region, including Sackville, together for the Tantramar Regional Adaptation Collaborative, which worked on a collaborative approach to adaptation actions.

Since then, EOS helped create Sackville's climate mitigation plan and has supported regional collaborations related to emission reductions. For example, EOS bulk purchased energy saving items, such as LED light bulbs, programmable thermostats, low-flow showerheads, and clotheslines, for municipalities in the region.

Case Study: UMNb Climate Change and Energy Initiative

In 2017, UMNb launched the Climate Change and Energy Initiative, which brought together 11 municipalities to create GHG inventories and Climate Action Plans for municipal and community-wide emission reductions. Participants included the City of Saint John; the Towns of Quispamsis, Rothesay, Woodstock, Sussex, Grand Bay/Westfield, and Dalhousie; and the Villages of Perth-Andover, Petitcodiac, McAdam, and Rexton. The municipalities received support from UMNb and QUEST through the initiative, which was funded by the Green Municipal Fund, and were able to participate in the Federation of Canadian Municipalities' Partners for Climate Protection Program. In addition to providing technical resources and expertise, the initiative gave participants an opportunity to learn from and connect with other municipalities working on emission reductions.

Further reading: No Sweat Heat Pumps- A Collaboration

The Towns of Antigonish, Berwick, and Mahone Bay partnered to create the Alternative Resource Energy Authority (AREA), which built a wind farm. As of 2018, the Ellershouse Wind Farm has a ten turbine, 23.5 MW facility supplying power to the grid. Learn more: <https://www.areans.ca/>

Further reading: Better together How cities can collaborate for faster, more effective climate action.

C40 Implementation Guide: https://www.c40knowledgehub.org/s/article/Better-together-How-cities-can-collaborate-for-faster-more-effective-climate-action?language=en_US

8.7 Resources

RESOURCES	DESCRIPTION
Deep Dive: Funding and Financing Climate Action Plans	A report for the Urban Sustainable Directors Networks that explores a full range of strategies to finance climate action. Many are currently applicable to NB municipalities.
Energy Efficiency Financing Tools for the Canadian Context	This report details strategies that can be used for financing energy efficiency programs.

Step 7: Tracking Progress

BEST PRACTICE: DEVELOP A TRACKING PROGRAM TO MONITOR EFFECTIVENESS OF CLIMATE ACTIONS

Rationale: Monitoring and reporting is critical to ensuring that the municipality and community at large can learn from its experience and adapt accordingly. For example, if actions are not achieving sufficient reductions, new efforts are required. If a retrofit program is successful, it can be expanded.

9.1 Questions Covered

- How do we create an effective monitoring and evaluation plan?
- How can we best communicate our results through ongoing engagement?

9.2 Creating a Monitoring and Evaluation Plan

Municipalities can pursue monitoring and evaluation approaches with different levels of complexity and resource requirements. At the most basic level, a municipality can report on whether or not it implemented the actions detailed in its plan (a pass/fail report). At the other end of the spectrum, municipalities can pursue a resource-intensive approach incorporating frequent tracking (multiple times per year) of indicators, along with departmental roles and responsibilities update. This chapter focuses on a middle-of-the-road approach that involves reporting annually on a streamlined set of indicators that can help municipalities tell the story of their impact.

9.2.1 MONITORING AND EVALUATION TIMELINES

A monitoring and evaluation plan should be created during the development of emissions reductions actions to help the municipality define the progress it is seeking and set it up to track the effectiveness of its actions. The monitoring and evaluation plan should detail:

- The metrics the municipality will use to assess progress,
- How frequently it will complete these assessments, and
- Who is responsible for carrying them out.

Typical monitoring and evaluation activities include annual work plan reviews, annual indicators report, updating GHG inventories, and updating the emissions reductions plan. These activities are summarized in the following table.

Table 21. Monitoring and evaluation activities.

ACTIVITY	PURPOSE	DESCRIPTION	FREQUENCY
Annual work plan and review	To review work to date and set annual priorities	Annual report that: <ul style="list-style-type: none"> • Reviews the previous year's work, • Identifies emission reductions priorities for the following year, and • Contains a work plan detailing activities to achieve them, including responsible parties, the budget, and a schedule. 	Annual
Annual indicator report	To track impact and effectiveness of actions	Annual report that: <ul style="list-style-type: none"> • Reports on selected indicators, • Uses these indicators to assess the effectiveness of actions to date with respect to emission reductions goals, and • Discusses the co-benefits of actions to date. 	Annual
Inventory update	To update GHG inventory to measure progress	Re-calculate corporate and/or community GHG emissions	Annual
Update the emission reductions plan	To update emission reductions plan	Review the emission reductions plan and update it to reflect current realities	Every 5 years

Municipalities should update their GHG inventory at regular intervals, track other indicators related to the impact of their actions and policies, and decide how the findings will affect their implementation. Some information can be tracked on shorter timelines (e.g., annually) while other things can be monitored on longer timelines (e.g., every two to five years).

For example, municipal staff could submit a yearly report to Council on key interventions implemented that year, along with a summary of select indicators, and priorities for the following year, with more in-depth updates, including an update of the emission reductions plan, every five years. These cycles can also align with updates to the emission reductions plan. For example, the municipality could revisit its implementation plan every year and commit to updating the emission reductions plan every five years based on the outcome of monitoring and evaluation activities. At the same time, the municipality might also wish to do a review of federal and provincial policies and programs at regular intervals to identify regulations that could affect their emission reductions plan, as well as opportunities, such as funding. Figure[MOU36] X depicts an example of a monitoring and evaluation cycle.

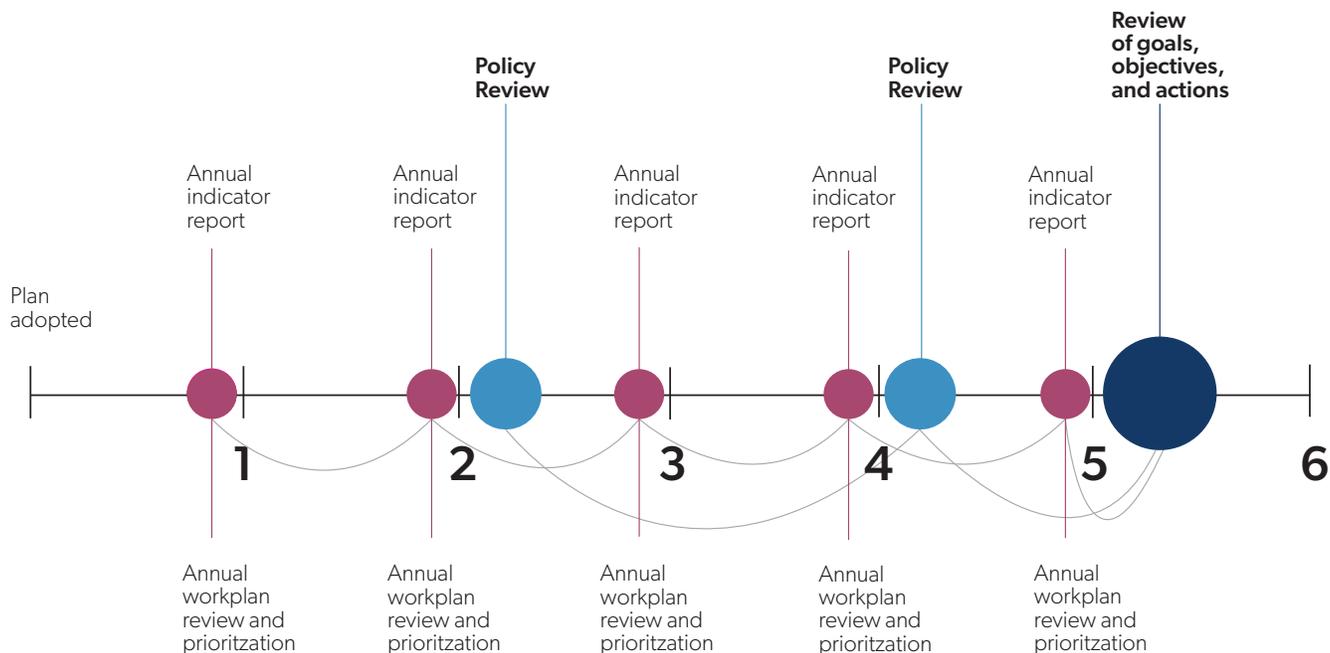


Figure 22. This diagram depicts a five-year monitoring and evaluation cycle for an emission reductions plan. In this example, an indicator report and work plan review are submitted to Council annually. Every second year, there is a policy review of provincial and national policies that could affect the plan and offer opportunities (e.g. funding). In the fifth year, the activities culminate in a review of progress and update of the emission reductions plan. The size of the circles represents the magnitude of effort required to complete the activities.

Case Study: Climate Action Revenue Incentive Program (CARIP)

Each year the Government of BC sends a survey to municipalities under the CARIP. The survey collects information on corporate, community-wide and adaptation actions for the following themes: buildings and lighting; energy generation; greenspace; planning and land use; solid waste; transportation; water and wastewater; and adaptation actions. Municipalities also report on the status of the GHG impacts of their corporate operations. If they report, the municipality receives a carbon tax rebate. Details of the program are available: https://www2.gov.bc.ca/assets/gov/british-columbians-our-governments/local-governments/planning-land-use/carip_claims_program_guide.pdf

9.3 A Streamlined Approach: 6 Key Indicators

Even a handful of indicators tracked annually can help a municipality tell the story of climate action. This section details a streamlined approach for a short annual monitoring and evaluation report (2-3 pages).

The report would consist of three sections:

1. A summary of actions completed to date;
2. Reporting on six key indicators, along with an analysis of what they illustrate; and
3. Climate action priorities and commitments for the following year.

Table 21 summarizes the recommended indicators.

Table 23. Recommended indicators for a streamlined approach.

ACTION AREA	RECOMMENDED INDICATOR	ADDITIONAL/ALTERNATE INDICATORS	RATIONALE	POTENTIAL DATA SOURCE
Buildings (energy efficiency)	\$ value of energy efficiency retrofit incentives used	# of buildings retrofitted, by type (household, residential, etc.)	Indication of trends in energy efficiency in buildings.	Building permits.
Buildings (energy efficiency)	Total energy consumption by fuel type (electricity, natural gas, oil, etc.), in GJ	Total energy consumption by fuel type (electricity, natural gas, oil, etc.) with electricity in kWh and fossil fuels (natural gas, oil, etc.) in m3	Indication of trends in energy use in buildings.	Utilities (NB Power).
Transport	# of EV charging stations	# of EVs in the community	Indication of progress on EV ownership and infrastructure.	Municipal data.
Renewable energy	Local energy sources in MW	# of solar PV installed, by building type (residential commercial, etc.) # of ground-mount solar panels installed	Indication of progress in renewable energy development	Utilities (NB Power); Department of Energy and Mines, Natural Resources Development Ministry; building permits (for solar installations).

ACTION AREA	RECOMMENDED INDICATOR	ADDITIONAL/ALTERNATE INDICATORS	RATIONALE	POTENTIAL DATA SOURCE
Waste	% waste diverted from landfill	% of homes and businesses with organic waste pickup	Indication of progress on decreasing emissions from solid waste by diverting it to low-carbon waste streams.	Municipal data.
Energy poverty	# of households that access municipal emergency energy funding		Indication of how improving energy efficiency and access to renewables is affecting energy poverty.	Municipal data.
Green Economy	# of businesses in the green economy	# of jobs in the green economy	Indication of expansion of the low-carbon economy.	Business licensing data

Appendix G includes a more comprehensive overview of potential indicators for those municipalities wishing to take a more comprehensive approach or amend the streamlined approach with alternate or additional indicators.

9.4 Ongoing Engagement

Communicating the outcome of monitoring and evaluation activities to the public and stakeholders is important for keeping them engaged with emission reductions actions and for accountability. Ideally, the completion of monitoring and evaluation activities, including annual reports, should be accompanied by engagement meetings (or another process) involving Council, senior staff, relevant stakeholders (e.g. utilities), and advisory groups (e.g. climate action committee) to assess progress to date and prioritize policies and actions moving forward.

Engagement can be further enhanced by sharing progress with the general public. Relevant actions include:

- Publishing annual monitoring and evaluation reports on the municipality's website;
- Sharing key findings through relevant communications channels, such as social media, blogs, and newsletters; and
- A public presentation or storytelling night on progress to date.
- Such engagement efforts can show the public the progress that has been made and highlight how they can continue to support emission reductions in their communities.

Appendix A: Terms and Concepts

Anthropogenic emissions	Emissions of greenhouse gases (GHGs), precursors of GHGs, and aerosols caused by human activities. These activities include the burning of fossil fuels, deforestation, land use and land-use changes (LULUC), livestock production, fertilization, waste management, and industrial processes.
Carbon dioxide	A naturally occurring gas, CO ₂ is also a by-product of burning fossil fuels, burning biomass, land-use changes (LUC), and industrial processes (e.g., cement production). It is the principal anthropogenic GHG contributing to climate change. It is the reference gas against which other GHGs are measured.
Carbon price	The price for avoided or released carbon dioxide (CO ₂) or CO ₂ -equivalent emissions. This may refer to the rate of a carbon tax or the price of emission permits.
Carbon sequestration	The process of storing carbon in a carbon sink, such as natural lands, forested areas, and soils. The future may permit carbon sequestration technology.
Cumulative emissions	The total amount of emissions released over a specified period of time.
Decarbonization	The process by which countries, individuals, or other entities aim to achieve zero fossil carbon existence. Typically refers to a reduction of the carbon emissions associated with electricity, industry, and transport.
Fossil fuels	Carbon-based fuels from fossil hydrocarbon deposits, including coal, oil, and natural gas.
Green infrastructure	The interconnected set of natural and constructed ecological systems, green spaces, and other landscape features. It includes planted and indigenous trees, wetlands, parks, green open spaces, and original grassland and woodlands, as well as building and street-level design interventions that incorporate vegetation.
Greenhouse gas (GHG)	Greenhouse gases are those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of terrestrial radiation emitted by the Earth's surface, the atmosphere itself and by clouds. This property causes the greenhouse effect.
Heat pump	An electrical device that extracts heat or cold from outside air or the ground to heat or cool an interior space. Heat pumps are significantly more energy efficient than even the most efficient natural gas furnace.
Lock-in	A situation in which the future development of a system, including infrastructure, technologies, investments, institutions, and behavioural norms, is determined or constrained ("locked in") by historic developments.

Mitigation measures	In climate policy, mitigation measures are technologies, processes or practices that contribute to mitigation, such as renewable energy technologies, waste minimization processes, and commuting on public transport.
Net-zero emissions	Net-zero emissions are achieved when anthropogenic emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period. Where multiple greenhouse gases are involved, the quantification of net-zero emissions depends on the climate metric chosen to compare emissions of different gases (such as global warming potential, global temperature change potential, and others, as well as the chosen time horizon).
Net-zero energy	Refers to a community-scale system or aspect of the built environment that produces as much energy as it consumes. This can be applied to a neighbourhood or building.
Paris Agreement	The Paris Agreement under the United Nations Framework Convention on Climate Change (UNFCCC) was adopted in December 2015 in Paris, France, by 196 countries at the 21st session of the Conference of the Parties (COP) to the UNFCCC. One of its goals is “holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels” to significantly reduce the risks and impacts of climate change.
Photovoltaic	A device that generates electricity directly from sunlight via an electronic process that occurs naturally in certain types of material, called semiconductors. Electrons in these materials are freed by solar energy and can be induced to travel through an electrical circuit, powering electrical devices or sending electricity to the grid.
Scenario	A plausible description of how the future may develop based on a coherent and internally consistent set of assumptions about key driving forces (e.g., rate of technological change, prices) and relationships. Note that scenarios are neither predictions nor forecasts, but are used to provide a view of the implications of developments and actions.

Appendix B: GHG Emissions Factors for Various Sources in New Brunswick.

Emission Factors are pulled from the Canadian Energy Systems simulator (CANess). The tool is an integrated, multi-fuel, multi-sector model with detailed accounting for the sources and uses of energy and the GHG emissions across Canada.

Energy content units		TJ/gL	TJ/kWh	TJ/ML	TJ/ML	TJ/ML	TJ/ML	TJ/ML	TJ/ML	TJ/ML	TJ/kt	
		39.03	0.000004	35	38.3	38.8	42.5	37.68	25.31	18		
Emissions factor units		g CO2eq /m3	g CO2eq /kWh	g COeq/L	g COeq/L	g COeq/L	g COeq/L	g COeq/L	g COeq/L	g COeq/L	g CO2eq/ kg	
GPC reference number	Scope	GHG emissions source (by Sector and sub-sector)		Natural gas	Electricity	Gasoline	Diesel	Light fuel oil	Heavy fuel oil	Kerosene	Propane	Wood
STATIONARY ENERGY SOURCES												
I												
I.1		Residential buildings	1912.69	272.17	0	0	0	0	0	2562.67	1548.1	478.19
I.2		Commercial and institutional buildings/ facilities	1912.69	272.17	0	0	0	2763.12	3177.01	0	1548	478.19
I.3		Manufacturing industry and construction	1912.09	272.17	0	0	2813.72	2762.44	3179.15	2569.44	1548	22.27
I.4		Energy industries	0	272.17	0	0	0	0	0	0	0	0
I.4.4	1	Emissions from energy generation supplied to the grid	1912.09	272.17	2321.96	2813.72	2762.44	3179.15	2569.44	1548	22.27	

GREENHOUSE GAS EMISSION REDUCTION GUIDE & TOOLKIT FOR MUNICIPALITIES

	Energy content units	TJ/gL	TJ/kWh	TJ/ML	TJ/ML	TJ/ML	TJ/ML	TJ/ML	TJ/ML	TJ/ML	TJ/kt
I.5	Agriculture, forestry, and fishing activities	0	272.17	0	0	0	0	0	0	0	0
I.6	Non-specified sources	0	272.17	0	0	0	0	0	0	0	0
I.7	Fugitive emissions from mining, processing, storage, and transportation of coal	0	272.17	0	0	0	0	0	0	0	0
I.8	Fugitive emissions from oil and natural gas systems	0	272.17	0	0	0	0	0	0	0	0
II	TRANSPORTATION	0	272.17	0	0	0	0	0	0	0	0
II.1	On-road transportation	2240.53	272.17	2327.32	2757.29	0	0	0	1545.1	0	0
II.2	Railways	0	272.17	0	0	0	0	0	0	0	0
II.3	Water-borne navigation	0	272.17	0	0	0	0	0	0	0	0
II.4	Aviation	0	272.17	0	0	0	0	0	0	0	0
II.5	Off-road	0	272.17	0	0	0	0	0	0	0	0
III	WASTE	0	272.17	0	0	0	0	0	0	0	0
III.1	Solid waste disposal	0	272.17	0	0	0	0	0	0	0	0

		Energy content units	TJ/gL	TJ/kWh	TJ/ML	TJ/ML	TJ/ML	TJ/ML	TJ/ML	TJ/ML	TJ/kt
III.2		Biological treatment of waste	0	272.17	0	0	0	0	0	0	0
III.3		Incineration and open burning	0	272.17	0	0	0	0	0	0	0
III.4		Wastewater treatment and discharge	0	272.17	0	0	0	0	0	0	0
IV		INDUSTRIAL PROCESSES AND PRODUCT USE (IPPU)	0	272.17	0	0	0	0	0	0	0
IV.1	1	Emissions from industrial processes occurring within the city boundary	0	272.17	0	0	0	0	0	0	0
IV.2	1	Emissions from product use occurring within the city boundary	0	272.17	0	0	0	0	0	0	0
V		AGRICULTURE, FORESTRY AND LAND USE (AFOLU)	0	272.17	0	0	0	0	0	0	0
V.1	1	Emissions from livestock within the city boundary	0	272.17	0	0	0	0	0	0	0

		Energy content units	TJ/gL	TJ/kWh	TJ/ML	TJ/kt						
V.2	1	Emissions from land within the city boundary	0	272.17	0	0	0	0	0	0	0	0
V.3	1	Emissions from aggregate sources and non-CO2 emission sources on land within the city boundary	0	272.17	0	0	0	0	0	0	0	0
VI		OTHER SCOPE 3	0	272.17	0	0	0	0	0	0	0	0
VI.1	3	Other Scope 3	0	272.17	0	0	0	0	0	0	0	0

Appendix C: Sample Community Engagement Framework

Context

State the goals and targets of the Climate Action Plan in this section. 1-2 paragraphs maximum.

The Issues

Acknowledge local issues that could affect/inform the direction of the Climate Action Plan .

Purpose of Engagement

The purpose of engaging stakeholders as a part of the Climate Action Plan is to work directly with the interested and affected parties in order to ensure a feasible, ambitious, and effective plan is created. Specifically, it must lead to a net-zero greenhouse gas emission reductions outcome. Aspects of the Town's policies and bylaws that will be considered within the engagement, and potentially changed/updated include:

Plan A

Plan B

Plan C

Etc.

Engagement Objectives

This engagement plan seeks to achieve several objectives in order to support meaningful, community-centred engagement. Principally, the engagement seeks to:

1. Build understanding about the process necessary to achieve net-zero greenhouse gas emissions,
2. Facilitate inclusive conversations among stakeholders in order to document community concerns and aspirations, and
3. Use community input as part of a collaborative problem-solving process with all stakeholders, in order to address the challenges in getting to net zero.

This requires the Town of [NAME] to deliver certain outputs (tangible deliverables) and outcomes (changes in understanding, perspective, relationships, level of trust, etc.). Both the outputs and outcomes will support the Town of [NAME] and stakeholders in reviewing and adjusting the Climate Action Plan to achievable levels.

Objective 1: To inform and, more importantly, to educate stakeholders about the pressing need

for actions that are ambitious and achievable to reach net-zero greenhouse gas emissions.

Outcome: a governance advisory committee, with internal and external members, is established.

Outcome: stakeholders understand the extent of planning and fiscal opportunities/needs necessary for the Climate Action Plan to succeed.

Outcome: stakeholders understand the history of how the current need for a new plan came about.

Outcome: stakeholders know how to get engaged.

Outcome: stakeholders are motivated and participate in engagement opportunities.

Output: communications materials are created to educate and inform stakeholders about the strategy process and opportunities for input.

Objective 2: To collaborate with the citizen stakeholder committee to guide the creation and implementation of the Climate Action Plan .

Outcome: the stakeholder working group transitions into a long-term body responsible for the oversight of plan implementation.

Output: terms of reference or planning document (like a memorandum of understanding) for the new implementation body.

Objective 3: To inform stakeholders about how their involvement led the creation of the Climate Action Plan .

Outcome: stakeholders understand and accept challenges, changes, or trade-offs that are required to create an ambitious plan that can take the Town’s greenhouse gas emissions to net-zero.

Outcome: stakeholders can see they have impacted decision-making.

Output: appropriate communications to stakeholders summarizing input and how it influenced plan decisions (a ‘What we Heard’ summary report).

Output: final presentation to the advisory committee and the Town of [NAME].

Engagement Timeline Template

Activity	Roles	Engagement objective	Timeline/target deadline

Appendix D: Sample Terms of Reference for Climate Action Working Group

1.0 BACKGROUND

In response to the direction signed by Town Council on DATE, the Town is developing a Climate Action Plan (CAP), which includes:

- a) Climate Action Committee (CAC)
 - A committee to assist the creation of the Town-wide greenhouse gas (GHG) emission reductions plan to achieve the net-zero by 2030 target.

The Town seeks to establish the Climate Action Committee (CAC) to advise and influence the development and implementation of the CAP. The CAC is supported by Town staff.

2.0 PURPOSE

The purpose of the CAC is to serve as an advisory role to provide staff with assistance and advice on the development of the CAP and support and influence its implementation within the Community. The CAC will convene a team of community champions and sector experts to:

- a) Earn community buy-in for the goals and strategies of the CAP, including approval by the Town Council;
- b) Grow the capacity of the community to implement the CAP; and
- c) Motivate the public and community stakeholders to act.

The nature and scope of the identified solutions will require action that extends well-beyond government and include business owners, homeowners, and community leaders. Rooted in the community, the CAC helps ensure non-governmental action is taken and holds the municipality accountable, leading a combined effort in the successful implementation of the CAP.

3.0 MANDATE

The CAC mandate is to provide a forum for community-based oversight of the CAP planning process and to report regularly to the community and Council during the development and implementation of the CAP.

The CAC serves as a sounding board for Town staff established through the CAP planning process, providing strategic guidance, challenge and support of pathways forward, as well as sharing technical advice, community knowledge and networks.

With the support of staff, the CAC provides an ongoing forum for consultation and feedback to the public and Council at key points through the development of the CAP.

4.0 DELEGATED AUTHORITY

The CAC does not have any delegated authority and has no authority to direct staff. Any recommendations requiring implementation must first be considered by Council through a staff report.

The CAC will be facilitated by designated Town staff. Staff from all departments may attend meetings as required.

5.0 MEMBERSHIP

The Town will invite members of the community to participate in the CAC. The membership of the CAC will be based on involvement and role in institutions and organizations within different areas crucial to the development and implementation of the CAP.

The CAC will consist of members, plus their alternate representatives, from the following sectors:

Council membership

Town staff

Members representing priority sectors:

- o Building/development industry
- o Local energy utilities
- o Green economy
- o Transportation
- o Post-secondary institutions

CAC member core competencies include:

Communicator	Able to share ideas and describe what is already known and what is being discovered to diverse audiences.
Community Translator	Understands the different language used by stakeholders and serves as a bridge between the various communities and groups with an interest in the initiative.
Lifelong Learner	Desire to deepen understanding of complex social and economic issues that take complex solutions.
Politically Astute	Broad non-partisan understanding of political and social issues influencing the public policy environment.
Strategic	Seeks continuous improvement and is a future thinker. Understands the lay of the land and can work within it.
Practical	Can manage the details and get things done on time.

Membership is voluntary. It is required that members must understand and agree to the terms and conditions outlined in these Terms of Reference

5.0 ROLES AND RESPONSIBILITIES

Chair

A Council representative will co-chair, with another member to be determined.

The responsibilities of the CAC chair are as follows:

- Setting the agenda for each meeting and ensuring that supporting materials are delivered to members in advance of meetings,
- Making the purpose of each meeting clear to members,
- Ensuring that meeting agenda items and objectives are met,
- Encouraging broad participation from all CAC members in group discussions, and
- Ending each meeting with a summary of decisions and assignments as well as collecting new business items for future meetings.

Administrative Support

Town staff members will provide support in the development of the Agenda, coordinate the work-plan, meet timelines and commitments, and support the Chair and committee members in facilitating the meeting.

Members

The responsibilities of all CAC membership include:

- Understanding the goals, objectives, and desired outcomes of the CA;
- Understanding and representing the diverse interests of community stakeholders;
- Taking a genuine interest in the project's outcomes and overall success;
- Actively participating in meetings through attendance, discussion, and review of minutes, papers and other Steering Committee documents;
- Supporting open discussion and debate and encouraging fellow members to provide their perspectives; and
- Acting on opportunities to communicate positively about the CAP.

6.0 COMMITTEE PROCEDURES

Meetings

Meetings are to be scheduled every X weeks. Special meetings to be scheduled as required. Meetings will be conducted on a formal basis and be recorded.

Quorum

A majority (50% plus 1) of all members shall constitute a quorum.

Agendas

An agenda is to be prepared for meetings with relevant documentation attached and distributed to members, preferably at least one week prior to the meetings.

Minutes/Action Items

Minutes of the meeting will be forwarded to members within two weeks after the meeting.

The Minutes will record the following:

- Date and location of meeting,
- Attendees and absentees,
- Agenda items discussed,
- Action items (including responsibility and timeframe), and
- Decisions taken (including rationale for decisions).

Minutes of the preceding meeting will be confirmed at each meeting. The process will include a review of the action items outstanding.

Voting/Motions

Members of the CAC must declare any pecuniary interest they may have in any matter under consideration by the Subcommittee and must abstain from any discussion or voting on the matter. In the event of a tie vote, the motion is lost.

Vacant Seat

The position of a member of the CAC becomes vacant if the member is absent from three (3) consecutive meetings without being authorized to do so by a recommendation of the CAC.

Town Policies, Guidelines and Procedures

Members of the CAC will adhere to all Town policies, guidelines and administrative procedures.

Members of the CAC will not make any personal use of privileged and/or confidential information, and adhere to provincial privacy legislation.

Members shall not use or release any documents and/or information in any form that may prejudice the Town, cause damage to the Town, be used against the Town and/or be detrimental to the Town's reputation and/or to any of the parties that compose the membership of the Committee.

Appendix E: Sample Community Priorities Survey

Purpose (for internal use)

The purpose of the crowdsourcing survey is to invite the community to prioritize criteria for selecting low-carbon actions (i.e. economic development or lowest cost actions, public health or resiliency, etc.).

The results of this survey will be used in later stages of Climate Action Plan development when finalizing actions and prioritizing short-, medium- and long-term actions. Specifically, the results of this survey will be used as a weighted input during a multi-criteria analysis workshop that will be undertaken with the CAP working groups. The results of this crowdsourcing survey will be used to provide an indication to working group members of the public's heavily weighted criteria.

The survey will be posted during a 4-6 week period between Month and Month, 2021.

Should the current pandemic make public surveys unfeasible during May and April, the working groups can still go ahead with slight alterations.

Engagement Objective

To involve the residents of Community in the prioritization of low-carbon action selection criteria, via online survey, by Month/day/year.

ONLINE SURVEY 2: Have your say! Help shape Community's Climate Action Plan (CAP)

Your feedback will help working groups identify priority low-carbon actions for the City when they meet for intensive workshops in late spring/early summer of 2020. If you'd like to participate in one of these more intensive sessions, please provide your email below.

Crowdsourcing Survey What do you think should be prioritized in COMMUNITY Energy and Emissions Plan?

Choose up to 3 answers in each of the following 8 questions.

1. For COMMUNITY-WIDE climate actions, I believe the most important priorities is/are:
 1. Creating local JOBS and ECONOMIC ACTIVITY
 2. Reducing the MOST GREENHOUSE GAS emissions
 3. The best RETURN ON INVESTMENT for greenhouse gas emission reductions per dollar spent
 4. The COST associated with low carbon actions for the community
 5. The EASE & SPEED that the action can be applied
 6. The resulting DESIGN and AESTHETICS in the community
 7. The LIFESTYLE & HEALTH impacts, such as improved air quality, public safety, community health and wellness

8. The FAIRNESS & UNBIASED method in which actions will affect the community
9. The amount of LOCAL RENEWABLE ENERGY used
10. Other:_____
1. For retrofitting EXISTING buildings, I believe the most important priorities for designing low-carbon actions is/are:
 1. Creating local JOBS and ECONOMIC ACTIVITY
 2. Reducing the MOST GHG emissions
 3. The best RETURN ON INVESTMENT for greenhouse gas emission reductions per dollar spent
4. The COST associated with retrofit activity to the community
5. The EASE & SPEED that the action can be applied
6. The resulting DESIGN and AESTHETICS for existing buildings
7. The LIFESTYLE & HEALTH impacts, such as improved indoor air quality and building safety
8. The FAIRNESS & UNBIASED method in ensuring all income levels are able to own/rent within energy efficient buildings
9. The amount of LOCAL RENEWABLE ENERGY used in the buildings
10. Other:_____
2. For NEW buildings, I believe the most important priorities for designing low-carbon actions is/are:
 1. Creating local JOBS and ECONOMIC ACTIVITY
 2. Reducing the MOST GHG emissions
 3. The EASE & SPEED that the action can be applied
 4. The best RETURN ON INVESTMENT for greenhouse gas emission reductions per dollar spent
5. The COST associated with new energy efficient buildings to the community
6. The DESIGN and AESTHETICS of the new buildings
7. The LIFESTYLE & HEALTH impacts, such as improved indoor air quality and building safety
8. The FAIRNESS & UNBIASED method in allowing all income levels to access energy efficient

buildings

9. The amount of LOCAL RENEWABLE ENERGY used in the buildings

10. Other:_____

3. For ACTIVE and PUBLIC TRANSPORTATION, I believe the most important priorities for designing low-carbon actions is/are:

1. Creating local JOBS and ECONOMIC ACTIVITY
2. Reducing the MOST GHG emissions
3. The best RETURN ON INVESTMENT for greenhouse gas emission reductions per dollar spent on active and public transport
4. The COST associated with increased transit and active transport infrastructure to the community
5. The EASE & SPEED that the action can be applied
6. The DESIGN and AESTHETICS involved in increased active transport and transit
7. The LIFESTYLE & HEALTH impacts, such as reduced air pollution, access to greenspace, access to cycle lanes and facilities
8. The FAIRNESS & UNBIASED method in allowing all income levels to access the new transit service and infrastructure
9. Other:_____

4. For PERSONAL & COMMERCIAL VEHICLES, I believe the most important priorities for designing low-carbon actions is/are:

1. Creating local JOBS and ECONOMIC ACTIVITY
2. Reducing the MOST GHG emissions
3. The EASE & SPEED that the action can be applied
4. The best RETURN ON INVESTMENT for greenhouse gas emission reductions per dollar spent
5. The COST associated with low-carbon vehicles to the community
6. The LIFESTYLE & HEALTH impacts such as reduced air pollution and noise
7. The FAIRNESS & UNBIASED method in allowing all income levels to access low-carbon vehicles

8. The amount of LOCAL RENEWABLE ENERGY used to power low-carbon vehicles
9. Other:_____
1. For RENEWABLE ENERGY, I believe the most important priorities for designing low carbon actions is/are:
 1. JOBS created in the deployment and operations of renewables in Thunder Bay
 2. Reducing the MOST GHG emissions
 3. The EASE & SPEED that the action can be applied
 4. The best RETURN ON INVESTMENT for greenhouse gas emission reductions per dollar spent on renewables
5. The COST associated with producing renewable energy to the community
6. The PLACEMENT, DESIGN, and AESTHETICS of the renewable energy infrastructure
7. The LIFESTYLE & HEALTH impacts such as reduced air pollution, exhaust, reduced fuel leaks, etc.
8. The FAIRNESS & UNBIASED method in allowing all income levels to access the renewable energy
9. Other:_____
1. For WASTE and WASTEWATER, I believe the most important priorities for designing low carbon actions is/are:
 1. Creating local JOBS and ECONOMIC ACTIVITY
 2. Reducing the MOST GHG emissions
 3. The EASE & SPEED that the action can be applied
 4. The best RETURN ON INVESTMENT for greenhouse gas emission reductions per dollar spent
5. The COST associated with reduced waste and wastewater GHG emissions
6. The AESTHETICS and DESIGN resulting from waste and wastewater treatment
7. The LIFESTYLE & HEALTH impacts such as reduced pollution in the community
8. The amount of LOCAL RENEWABLE ENERGY produced from the treatment of waste and wastewater
9. Other:_____
1. Natural Gas is the dominant fuel source for HEATING of buildings in COMMUNITY, I believe the most important priorities to consider when fuel switching away from fossil fuel sources is/are:
 1. Creating local JOBS and ECONOMIC ACTIVITY

- 2. Reducing the MOST GHG emissions
- 3. The EASE & SPEED that the action can be applied
The COST associated with fuel switching to the community
- 4. The best RETURN ON INVESTMENT for greenhouse gas emission reductions per dollar spent
The DESIGN and AESTHETICS resulting from fuel switching away from fossil fuels
- 5. The LIFESTYLE & HEALTH impacts such as air quality, reduced fuel leaks, etc.
- 6. The FAIRNESS & UNBIASED method in allowing all income levels to access fossil-fuel-free heating
- 7. The amount of LOCAL RENEWABLE ENERGY used to heat homes
- 8. Other:_____
- 1. I would like to add the following for consideration for the prioritization and selection of carbon reduction actions for achieving Communities net zero target: _____

Appendix F: Sample Indicators for Tracking Progress

Municipalities can add to or amend the streamlined approach detailed in Section 11 with additional indicators relevant to the local context, or build a more complex monitoring and evaluation approach with numerous indicators. This appendix details additional indicators for consideration that can be divided into three categories: effectiveness indicators, impact indicators, and learning indicators.

Effectiveness indicators help answer whether the municipality is achieving its objectives.

Impact indicators help explore the impact emission reductions actions are having on the community.

Learning Indicators consider whether the local government is incorporating the knowledge it has gained during the creation and implementation of the plan to date.

Effectiveness Indicators

Effective indicators are used to evaluate whether or not the policies or actions the municipality is implementing are having the intended effect. The indicators should be selected based on the specific actions the municipality intends to implement. Table X details effectiveness indicators for a variety of climate actions, including the Big 5 Actions described in chapter 8.

Table 9. Recommended indicators for emission reductions actions.

ACTION AREA	RECOMMENDED TARGET(S)	INDICATOR(S)	TREND BEING TRACKED	POTENTIAL DATA SOURCES
Land use				
Dense development	%+ of new development occurs in designated infill lands or near the town centre.	% of dwellings that are downtown (versus on the periphery) % of non-residential floorspace downtown (versus on the periphery) (Downtown and periphery can be defined as appropriate for the municipality.)	An indication of where land-use planning is increasing density, which reduces energy consumption and enables walking, cycling, and transit.	Building permits and GIS analysis
Transportation				
Transit accessibility	Improve transit linkages to reach 100% of the population.	% or # of dwellings within 400m of a transit stop	Indication of transit accessibility.	GIS layers of transit and building footprint
		Total and per capita transit trips	Indication of whether or not non-vehicular trips are increasing.	Statistics Canada

ACTION AREA	RECOMMENDED TARGET(S)	INDICATOR(S)	TREND BEING TRACKED	POTENTIAL DATA SOURCES
Active transportation	Improve cycling and walking infrastructure for all ages and abilities.	Additional km walked and cycled per capita (relative to previous/base year) Length of physically separated cycling lanes Length of walking paths and sidewalks	Indication of improvements in cycling and walking infrastructure.	Survey
Increase adoption of electric vehicles	BIG 5 ACTION: By 2040, % of new vehicles sales are electric.	# of EVs in the community % of vehicles sold that are EVs # of EV chargers installed	Indication of growth of EV ridership and infrastructure.	Municipal data
	BIG 5 ACTION: Launch an EV carshare system which includes electric bicycles.	Whether or not municipality has created EV carshare system. # of trips by cars in the system # of trips by bikes in the system % of population that uses the system	Indication of uptake of carshare system.	Municipal data
Buildings				
Future buildings	Meet zero-emissions building code by 2030.	% of buildings that are constructed according to zero-emissions building code	Indication of trends in construction of zero-carbon buildings.	Building permits

ACTION AREA	RECOMMENDED TARGET(S)	INDICATOR(S)	TREND BEING TRACKED	POTENTIAL DATA SOURCES
Existing buildings	<p>BIG 5 ACTION: By 2050, % of buildings have completed a deep energy retrofit. Retrofit % of commercial buildings by 2050.</p> <p>Re-commission commercial or industrial buildings.</p>	<p># of deep retrofits # of shallow retrofits \$ value of retrofit incentives used % of households/businesses that take up relevant retrofit incentives Average Thermal Energy Demand Intensity (TEDI) per retrofitted building</p>	<p>Indication of progress towards energy efficiency.</p>	<p>Building permits Utilities Municipal data</p>
	<p>BIG 5 ACTION: By 2050, 100% of buildings use heat-pumps or low-carbon energy, including RNG, for space heating.</p>	<p>Total energy consumption by fuel type (electricity, natural gas, oil, etc.), in GJ Total energy consumption by fuel type (electricity, natural gas, oil, etc.) with electricity in kWh and fossil fuels (natural gas, oil, etc.) in m3</p>	<p>Indication of trends in energy use in buildings.</p>	<p>Utilities (NB Power)</p>

Energy systems

ACTION AREA	RECOMMENDED TARGET(S)	INDICATOR(S)	TREND BEING TRACKED	POTENTIAL DATA SOURCES
Generate renewable energy	% of new developments after 2030 have rooftop solar PV. BIG 5 ACTION: By 2050, % of existing buildings have been fitted with rooftop solar PV.	% of new developments of rooftop solar PV % of buildings with rooftop solar PV # of solar PV installed on existing buildings	Indication of growth of renewable energy.	Building permits
	Install distributed energy storage.	% of buildings with distributed energy storage.		Building permits.
	BIG 5 ACTION: Install 5MW of ground-mount solar PV every 5 years to 2050.	MW of ground-mount solar installed		Municipal permits
	BIG 5 ACTION: Install 5MW of wind energy every 5 years to 2050.	MW of wind energy installed		Utility
Decrease use of fossil fuels	Displace the use of natural gas as much as possible through renewable natural gas and hydrogen.	Total energy consumption by sector for electricity and relevant fossil fuels (e.g., natural gas, oil, gasoline, etc.) in GJ	Indication of trends in energy use.	NB Power Natural gas suppliers
		Annual or monthly energy price by fuel (electricity, natural gas, gasoline, diesel) (\$/GJ)	Indication of opportunities for energy savings and uptake of renewable energy (among households, municipality, and businesses).	NB Power Natural gas suppliers New Brunswick Energy and Utilities Board gasbuddy.com.

ACTION AREA	RECOMMENDED TARGET(S)	INDICATOR(S)	TREND BEING TRACKED	POTENTIAL DATA SOURCES
-------------	-----------------------	--------------	---------------------	------------------------

Industry

Low-carbon industry	BIG 5 ACTION: Improve industrial process efficiency by % by 2050.	Total energy consumption for electricity and relevant fossil fuels (e.g., natural gas, oil, gasoline, etc.) in GJ	Indication of trends in energy use.	NB Power Natural gas suppliers
	BIG 5 ACTION: By 2050, displace fossil fuels for all industrial processes to electricity.			

Waste

Divert organic waste	BIG 5 ACTION: By 2050, 95% of organic waste is sent to an anaerobic digester	Total solid waste by composition	Indication of major sources of waste.	Municipality or regional government data.
		% solid waste diverted from landfill	Indication of success of diversion efforts.	
		% solid waste to landfill	Indication of waste that will contribute to GHG emissions.	
Divert organic waste	BIG 5 ACTION: By 2050, % of wastewater is treated at a plant that captures methane and converts it to usable biogas or renewable natural gas.	Whether the municipality has access to a wastewater treatment plant that meets the required conditions % of wastewater treated at a plant that captures methane and converts it to biogas or RNG	Indication of progress in reducing wastewater emissions.	

ACTION AREA	RECOMMENDED TARGET(S)	INDICATOR(S)	TREND BEING TRACKED	POTENTIAL DATA SOURCES
Agriculture, Forestry, and Land Use				
Carbon sequestration	Increase forest area or restore wetlands.	% of land covered by forest or wetlands	Indication of trends in forest and wetland management.	Municipal data
Enhancing/increasing green space	N/A	# of trees planted. m ² of greenspace	Indication of trends in preservation and management of greenspace.	Municipal data
Municipal/Corporate				
Low-carbon transportation	BIG 5 ACTION: By 2050, % of municipal vehicles and transit are electric.	% of municipally-owned vehicles that are electric or zero carbon	Indication of municipal progress and leadership by the municipality.	Municipal data
Zero-carbon buildings	Retrofit % of municipal buildings by 2035.	% or # of municipal buildings retrofit	Indication of municipal progress and leadership by the municipality.	Municipal data
		Average energy use intensity of municipal buildings (GJ/m ²)	Measure of the energy performance of the building stock.	Municipal data
	Choose low-carbon fuel systems or electricity for 100% of municipal buildings by 2030	Total energy consumption by fuel (electricity, natural gas, gasoline, diesel, other) in GJ	Indication of increase or decrease in efficiency of municipal buildings	Municipal data

Impact Indicators

Impact indicators track macro factors that drive GHG emissions and related trends.

Table 10. Recommended impact indicators.

CATEGORY	INDICATOR
Energy performance	<ul style="list-style-type: none"> Total annual energy use (terajoules) Per capita annual energy efficiency (gigajoules per capita)
Economic impact	<ul style="list-style-type: none"> Total annual energy costs (\$) Per capita or per household annual energy expenditures (\$ per capita/household)Percentage change in per capita or per household energy expenditures from previous year(s)
Emissions impact	<ul style="list-style-type: none"> Total annual GHG emissions (tonnes CO₂e) Percentage change in total GHG emissions from GHG inventory base year Average annual GHG contribution (tonnes CO₂e per person) Percentage change in per capita GHG emissions from GHG inventory base year

Learning Indicators

Learning indicators can help assess how the municipality's work and organizational practices are influenced by the emission reductions plan.

Table 11. Recommended learning indicators.

INDICATOR	TREND	DATA SOURCE
% of major planning activities that included consideration of energy efficiency and GHG emissions.	Indication of extent to which emission reductions considerations are embedded in municipal practices.	Assessment of plans completed (neighbourhood, community, transportation, etc).
# of tenders that consider energy efficiency and GHG emissions.	Indication of extent to which emission reductions considerations are embedded in municipal practices.	Assessment of tenders issued.

INDICATOR	TREND	DATA SOURCE
Description of major infrastructures projects that includes a GHG mitigation aspect.	Indication of how municipal expenditures are contributing to GHG emission reductions.	Assessment of infrastructure projects.
