APPENDIX A

Truro's Greenhouse Gas Emissions Inventory

Truro's Community Energy and Emissions Plan

EASTPOINT

Table of Contents

Figures

Tables

Executive Summary

Truro's Community and Corporate Greenhouse Gas (GHG) Inventories were developed to meet the requirements of Milestone 1 of the Partners for Climate Protection (PCP) Program.

Truro's Community Inventory provides an estimate of both energy use and GHG emissions attributable to key activities within the jurisdictional boundary of Truro, as well as specific trans-boundary activities generated as a result of community activities. The Corporate Inventory is a subset of the Community Inventory, and accounts for all activities taken directly by Truro's municipal government. The PCP Program requires Corporate (or Municipal) inventories, so that local governments can identify and manage emissions sources for which they have direct accountability.

The Community Inventory includes emissions from residential, commercial, institutional buildings, on-road transportation and community solid waste. The Corporate Inventory includes emissions from municipal buildings and facilities, fleet vehicles, water and wastewater infrastructure, streetlights and traffic signals, and municipal solid waste. Both inventories have a baseline calendar year of 2021, which aligns with Canada's 2021 Census data, as well as availability of historical data for the Town of Truro. In 2021, the Census population for Truro was 12,954.

Overall, the Town of Truro's Community GHG emissions for 2021 are estimated to be 308,823 tonnes of carbon dioxide equivalent (CO_2e), or approximately 23 tonnes CO_2e per capita. This is significantly higher than the estimated 2021 per capita emissions for both Nova Scotia (14.7 tCO_2e) and Canada (17.5 tCO_2e)[1]. However, Truro's emissions are much lower than per capita emissions in Alberta and Saskatchewan (57.6 tCO_2e and 56.8 tCO_2e, respectfully).

Truro's municipal operations resulted in an estimated 4,970 tonnes of emissions in the 2021 baseline year. Most corporate emissions came from municipal buildings and facilities (60.5%), followed by energy use by Truro's Water Treatment Plant (WTP) and associated pumping stations (21.9%). Fleet vehicles make up 11.1% of emissions, with streetlights and traffic signals contributing 6.0% and corporate solid waste making up the final 0.7% of corporate emissions.

The PCP Program -compliant GHG inventory totals for the Town of Truro are summarized below:

Table 1: Truro's 2021 Community Emissions by Sector

Baseline Community GHG Inventory Components	Annual Energy Consumption (GJ)	Annual GHG Emissions (Metric Tonnes of CO_2e)	Percentage of Community Emissions
Residential Energy Consumption	968,939	104,774	34.4%
Commercial/Institutional Energy Consumption	1,093,446	140,790	46.2%
Industry/Manufacturing Energy Consumption	171,679	14,048	4.6%
On-Road Transportation	549,754	37,802	12.4%

[1] NIR 2023.

Solid Waste	N/A	7,275	2.4%
TOTAL	**2,783,818**	**304,689**	

Figure 1:Truro's 2021 Community Emissions by Sector

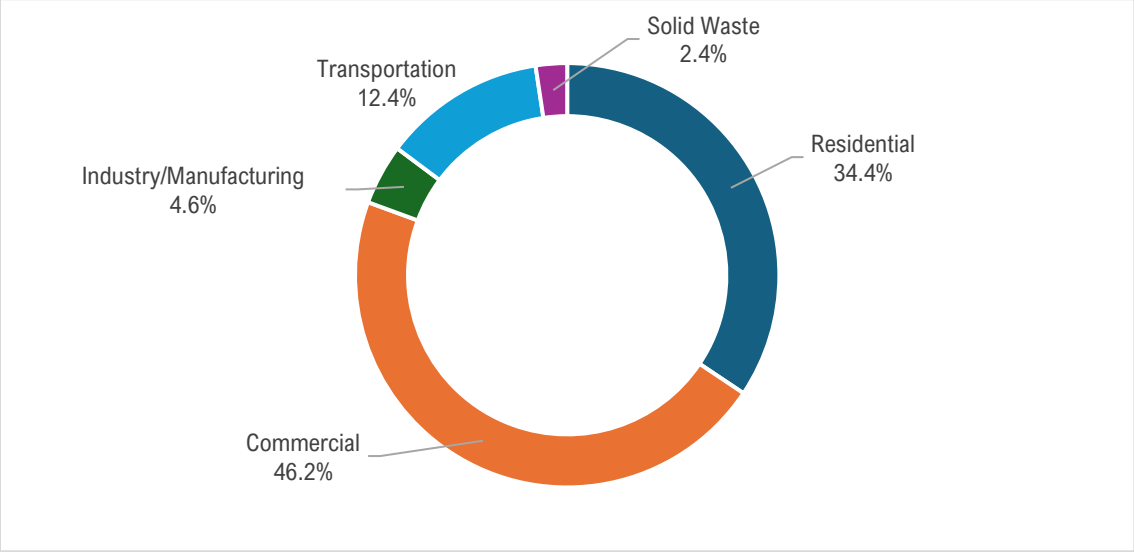
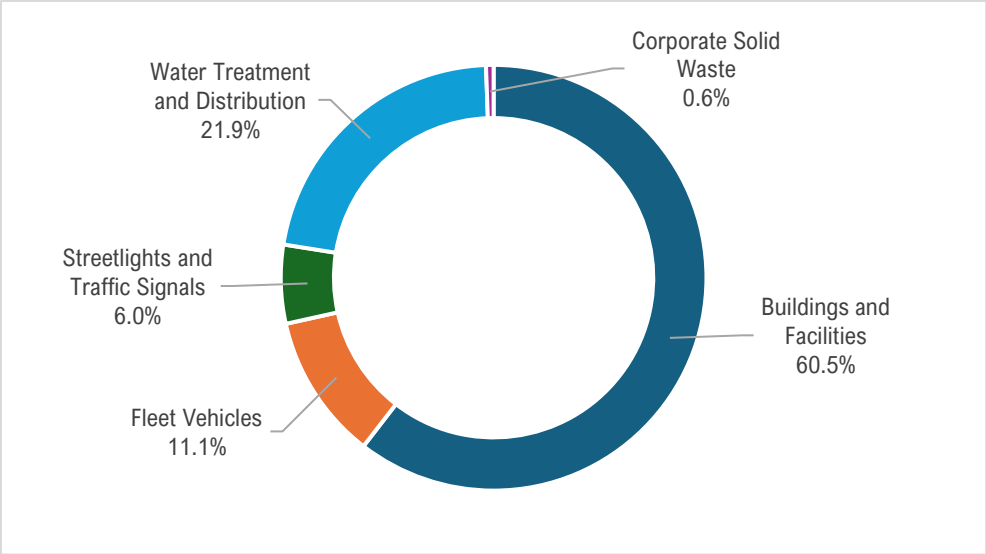


Table 2: Truro's 2021 Corporate Emissions by Sector

Baseline Corporate GHG Inventory Sectors	Annual Energy Consumption (GJ)	Annual GHG Emissions (Metric Tonnes of CO_2e)	Percentage of Corporate Emissions
Buildings and Facilities	24,388	3,005	60.5%
Fleet Vehicles	3,530	550	11.1%
Streetlights and Traffic Signals	1,811	297	6.0%
Water and Wastewater Infrastructure	6,643	1,090	21.9%
Solid Waste		28	0.6%
TOTAL	36,373	4,970	

Figure 2: Truro's 2021 Corporate Emissions by Sector



1 INTRODUCTION

Located in central Nova Scotia, Truro is the central population center of Colchester County. In 2021, the Town became a member of the Partners for Climate Protection (PCP) Program. The PCP Program consists of a five-step Milestone Framework that guides municipalities to act on rapid climate change by reducing emissions in their communities. Truro's Community and Corporate Greenhouse Gas (GHG) Inventories were developed to meet the requirements of Milestone 1 of the Partners for Climate Protection (PCP) Program. Below is a description of the Municipality of the Town of Truro and its commitment to the PCP Program.

1.1 The Town of Truro

Truro is located in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq People, and is subject to the Treaties of Peace and Friendship. Geographically located in central Nova Scotia, Truro serves as a key hub for the province. The 37.52 km^2 town is situated at the head of Cobequid Bay, part of the Bay of Fundy, and lies at the junction of major transportation routes, including highways and rail lines. The surrounding area is characterized by the fertile farmlands of the Annapolis Valley to the west and the Cobequid Mountains to the north, with the Salmon River running through the town.

Truro is often referred to as the "Hub of Nova Scotia" due to its central location and significance as a transportation and commercial center. In the broader context of Nova Scotia, Truro plays a crucial role as a regional service center, providing education, healthcare, and retail services to surrounding communities. It maintains strong ties to rural Nova Scotia while also adapting to the changing economic landscape, with efforts to attract new businesses and industries.

As of 2021, Truro had a census population of 12,954 residents (13,875 including Millbrook First Nation). The Town has made active efforts to increase density, with the number of people per square kilometer increasing from 320.5 to 345.3 between 2011 and 2021. Over that same period, the average annual population increased by 0.74% per year (approximately 96 people per year). Between 2016 and 2021 the Town grew by 5.7% while the greater Truro-Colchester region grew by 0.9%. These figures indicate that most of the recent growth in the area has been concentrated in the urban core of Truro. The number of private dwellings in Truro increased by almost 400 units, or 6.3 % from 2011 to 2021, rising from 6,263 dwellings in 2011 to 6,658 dwellings in 2021[2].

1.2 The Partners for Climate Protection Program

The Partners for Climate Protection (PCP) program is a network of Canadian municipal governments that have committed to reducing GHGs and to acting on climate change. The PCP program is administered by the Federation of Canadian Municipalities (FCM) in partnership with the International Council for Local Environmental Initiatives (ICLEI). Over 450 municipalities have made a public commitment to reduce emissions by joining the PCP. The PCP program consists of a five-milestone framework to guide

[2] 2021 Census of Population, Truro (Town)

municipalities in reducing GHG emissions at both the corporate and community levels. The five-milestone process includes:

- Milestone 1: Creating a greenhouse gas emissions inventory and forecast
- Milestone 2: Setting an emissions reduction target
- Milestone 3: Developing a local action plan
- Milestone 4: Implementing the local action plan or a set of activities
- Milestone 5: Monitoring progress and reporting results

Milestone 1 of the PCP program includes the completion of two GHG emissions inventories. The first is a Community Emissions Inventory, which accounts for emissions generated by all community activities within the jurisdictional boundaries of the Town of Truro. The second inventory is the Corporate GHG Inventory (a subset of the Community Inventory), which estimates the emissions for municipal government operations. This report covers both GHG inventories, in fulfillment of the requirements of Milestone 1.

2 METHODOLOGY

2.1 Standards and Guidelines

The following reference standards were used to develop Truro's Community and Corporate GHG inventories:

- PCP Protocol: *Canadian Supplement to the International Emissions Analysis Protocol* (2014). The PCP Protocol was used as the primary framework for GHG accounting and reporting guidelines for this GHG inventory.
- Global Protocol for Community-Scale Greenhouse Gas Inventories: *An Accounting Protocol for Cities, Version 1.1 (2021).* Created by the World Resources Institute, C40 Cities Climate Leadership Group and ICLEI – Local Governments for Sustainability (ICLEI), the GPC Protocol was used to provide further methodological guidance for various aspects of the inventories.

2.2 Baseline Year

The baseline year for both GHG inventories was chosen to be the 2021 calendar year. This facilitated use of publicly available government statistics for 2021, such as Canada's 2021 Census data and Natural Resources Canada's National Energy Use Database (NEUD). Additionally, the Town of Truro had implemented an Energy and Facilities Renewal project between 2019-2021 which resulted in energy and emissions savings in its most energy-intensive buildings and facilities. As part of the project, thorough accounting of the pre- and post- project energy consumption and operating costs of the Town's major municipal buildings were inventoried. This facilitated an accurate accounting of building and facilities-related emissions, which were the largest part of the Town's corporate GHG emissions profile. The 2021 baseline year will be used to project future business-as-usual (BAU) emissions and setting future GHG reduction targets.

2.3 Inventory Boundaries

The inventories account for all community emissions within the Municipality of the Town of Truro, with one notable exception. Millbrook is a Mi'kmaq First Nation located within the geographical boundary of Truro. The Mi'kmaq's traditional territory, Mi'kma'ki, covers the area now known as Nova Scotia, New Brunswick, Prince Edward Island, Newfoundland, the Gaspé peninsula in Quebec, and Northern Maine. This territory has not been ceded and is instead governed by the Treaties of Peace and Friendship. The Municipality of the Town of Truro provides some civic services to Millbrook but does not have jurisdictional authority over Millbrook as a sovereign First Nation.

PCP Protocol guidance states that "*a community GHG inventory should aim to capture emissions generated by all significant activities and sources within the jurisdictional boundary of the community.*" As such, in respect to Millbrook's sovereignty, Truro's Community Inventory has excluded emissions generated by Millbrook. However, emissions from civic services provided to Millbrook from Truro have been included as cross-boundary emissions. Millbrook is currently developing its own Comprehensive Community Plan, and Truro will continue to work collaboratively with Millbrook to advance the sustainability and climate goals of both communities.

2.4 Operational Boundaries

The Corporate (Municipal) GHG inventory outlines the GHG emissions generated by a local government's operations and services. Its purpose is to identify the emissions within a local government's direct control or influence, and for which the local government is accountable as a corporate entity. This inventory covers facilities and operations over which Truro has direct authority to introduce and implement operating policies.

The community GHG inventory estimates GHG emissions generated within the community, from all significant activities occurring within its jurisdictional boundaries. It is to be expected that municipalities may have only limited control or influence over certain community activities.

There are several points of clarification over elements of Truro's operational control of community activities:

- **Millbrook:** As previously mentioned, the municipality does not have jurisdictional authority over Millbrook First Nation, even though it is located within the Town's geographic boundary. Emissions from activities from within Millbrook have not been included in Truro's community inventory. Municipal services extended to Millbrook have been included in Truro's Corporate Inventory.
- **Solid Waste Collection:** Solid waste collection for the Town of Truro is contracted to Miller Waste Systems. As Truro has significant influence over this service contract, emissions from Miller Waste Systems' fleet service for Truro were accounted for in Truro's GHG inventory.
- **Landfill Emissions:** Colchester Waste Resource Management is responsible for processing recyclables, organics, and garbage generated within Truro and Colchester County, at the Colchester Waste Management Park in Kemptown, which is outside of Truro. Since Truro does not own or operate its own solid waste facilities, only the landfill emissions directly linked to Truro's community and corporate solid waste have been accounted for in Truro's community and corporate inventories.

- **Water and Wastewater Management:** Truro's Victoria Park Water Treatment Plant (WTP) provides drinking water for the Town of Truro, and the WTP and associated pumping stations have been included in the corporate inventory. Wastewater treatment for the Town of Truro occurs at the Central Colchester Wastewater Treatment Facility (CCWWTF), located just outside of Truro. As such, the CCWWTF has been previously included in the GHG inventory for the Municipality of Colchester and excluded from Truro's inventory.

- **Civic Services:** Truro operates its own Fire and Police Services, and provides winter snow clearing, street and sidewalk maintenance. Associated emissions have been accounted for in its corporate inventory.

- **The Rath-Eastlink Community Centre (RECC):** Located within the Town of Truro, the RECC is a joint owned venture of the Town of Truro and the Municipality of the County of Colchester. Each municipality has a 50% ownership stake, and the facility is operated as an independent not-for-profit society with a board of directors. For the purposes of Truro's corporate inventory, 50% of the RECC's energy and emissions were assigned to Truro, as it functionally has 50% operational control of the facility. 100% of the RECC's emissions were included in Truro's community inventory as it is within the Town's boundary.

2.5 Greenhouse Gases and Global Warming Potential

Truro's GHG inventories track three principal greenhouse gases: carbon Dioxide (CO_2), Methane (CH_4) and Nitrous Oxide (N_2O). All three gases have different levels of Global Warming Potential (GWP), which is a measure of how much energy the emission of 1 ton of a gas will absorb over a given period, relative to the emission of 1 ton of CO_2, expressed as a CO_2 equivalent (CO_2e). Using CO_2e as a metric allows simplification of the reporting of GHG emissions. Therefore, in this report, GHG emissions are reported in units of total mass (tonnes of CO_2 e). The Intergovernmental Panel on Climate Change (IPCC) provided the following 100-year GWPs in its Fifth Assessment Report:

Greenhouse Gas	Formula	Global Warming Potential
Carbon Dioxide	CO_2	1
Methane	CH_4	28
Nitrous oxide	N_2O	265

2.6 PCP Requirements for Emissions Inventories

The PCP Program and its associated GHG inventory protocol require specific activities (or sectors) be estimated in both corporate and community inventories. Certain activities are mandatory, while others are optional and can be included if a municipality chooses to track them. Optional categories have not been included in Truro's inventories due to lack of available data, or lack of activities in optional sectors. Activities captured in Truro's inventories are shown below:

Mandatory Corporate Inventory Sectors	Mandatory Community Inventory Sectors
Buildings and Facilities	Residential Energy Consumption
Fleet Vehicles	Commercial/Institutional Energy Consumption
Streetlights and Traffic Signals	Industrial Energy Consumption
Water and Wastewater Infrastructure	On-Road Transportation
Solid Waste	Local Public Transit Systems
	Solid Waste

2.7 Data Sources

Both the Community and Corporate Inventories were conducted using a spreadsheet developed by EastPoint, based on the PCP Protocol's guidance for compliant inventories with methodologies and adapted from the City Inventory Reporting and Information System (CIRIS) tool. CIRIS is an accessible and easy-to-use Excel-based tool for managing, calculating and reporting community GHG data. Based on the Global Protocol for Community-scale Greenhouse Gas Emission Inventories (GPC) standard, the tool facilitates transparent calculation and reporting of emissions for all sectors. CIRIS was created by C40, a global network of nearly 100 mayors of the world's leading cities that are united in action to confront the climate crisis. C40's Knowledge Hub connects people with the information they need to accelerate climate action in cities[3].

Whenever possible, activity data was collected by the Town of Truro and supplied to EastPoint for validation. In addition to data on the energy consumption of Truro's buildings, facilities, fleet vehicles, and other infrastructure, the Town was also able to provide current GIS data detailing square footage of all residential and commercial space types.

Gaps in data were filled through standard assumptions and estimates following the established methodologies in the PCP protocol and the GPC protocol, as needed. Other major sources of information are outlined in the table below.

[3] C40 Knowledge Hub

Table 3: Summary of Data Sources Used to Complete Truro's GHG Inventories

Data Source	Data Type	Data Use and Assumptions
Community Inventory		
Canada's 2021 Census of Population, Town of Truro[4].	Demographic and population statistics	Used to model energy consumption and building and transportation sectors.
Canada's National Inventory Report (NIR), 1990-2022[5].	Canada's National GHG emissions inventory contains emissions specific to Nova Scotian sectors as well as commonly used emissions factors for various fuel types	Used to determine standard emissions factors for various sources of GHG emissions.
Environment and Climate Change Canada's Greenhouse Gas and Air Pollutant Emissions Projections[6].	Historical and future GHG emissions from provincial electrical grids	ECCC updates Canada's GHG emissions projections annually, reflecting the latest historical data and updated future economic and energy market assumption. For historical emissions, the electricity emissions calculated by the ECCC model are in general alignment with those reported in the NIR but may differ slightly. Since the scope of the inventories included forecast of future emissions in a 10-year business as usual scenario, the ECCC emissions factors for historical and future electricity grid emissions were used for both GHG inventories to allow for consistent comparison of future reductions compared to the baseline.
Natural Resources Canada's National Energy Use Database (NEUD) [7]	Background analysis for energy and GHG indicators, statistics on energy consumption for various sectors	NUED provided activity data that was otherwise not available at the local level. Any provincial or regional data was downscaled to Truro based on population.

[4] Census Profile, 2021 Census of Population, Truro, Town
[5] National Inventory Report 1990 - 2022: Greenhouse Gas Sources and Sinks in Canada
[6] ECCC - Canada's Greenhouse Gas and Air Pollutant Emissions Projections, 2023
[7] NRCan's National Energy Use Database

Data Source	Data Type	Data Use and Assumptions
Community Inventory		
Comprehensive Energy Use Database (CUED)[8].	Sectoral energy consumption and GHG emissions data for residential, commercial, institutional, and transportation sectors	CUED provided activity data that was otherwise not available at the local level. Any provincial or regional data was downscaled to Truro based on population.
Google Environmental Insights Explorer (EIE)[9].	Vehicle kilometers travelled data	EIE is a freely available data and insights tool that uses exclusive data sources and modeling capabilities to help cities and regions measure emissions sources, run analyses, and identify strategies to reduce emissions. EIE was used to estimate emissions of all trips within city boundaries based on aggregated, anonymized Location History data. Data for Colchester County was downscaled to Truro based on population.
Statistics Canada Database, Vehicle Registrations by Type of Vehicle and Fuel Type, 2021[10].	Vehicle registration data for Nova Scotia	Used to estimate on-road transportation fuel consumption
Natural Resources Canada's Community Technology Assessment Platform (CTAP)[11].	Baseline energy data for Truro's residential sector	A tool developed by NRCan, CTAP was created to assist smaller municipalities, with less than 100,000 residents define a GHG baseline and retrofit programs for their residential building stock greenhouse gas (GHG) reductions.

[8] Comprehensive Energy Use Database
[9] Google EIE
[10] Statistics Canada Vehicle Registration Data Table: 23-10-0308-01
[11] CTAP - Community Technology Assessment Platform

Data Source	Data Type	Data Use and Assumptions
Community Inventory		
Nova Scotia's Landfill Waste Audit 2023 (Divert NS)[12].	Waste stream audits of all provincial landfills, including Colchester Balefill Facility.	Used to determine organic content within solid waste streams (*Community and corporate)*
Town of Truro Geographic information system (GIS) data	Square footage of all residential, commercial/institutional, and industrial properties in Truro.	Used to calculate energy use for various building sectors, as well as the corporate inventory.
Corporate Inventory		
Town of Truro Energy and Facility Renewal Report, 2019	Stationary combustion and electricity consumption data for all major energy-consuming municipal buildings.	Used to calculate building and facility energy consumption for municipal assets, including water treatment plant and pumping stations. Assumed 2019 data as proxy for 2021 baseline building energy consumption.
2021 Municipal Fleet Inventory	Inventory of all light-duty, medium-duty, and heavy-duty model vehicles in Truro's municipal fleet, including Fire, Police, Admin, Parks and Recreation and Public Works vehicles, along with fuel cost data.	Used to calculate GHG emissions from municipal fleet. Where fuel cost data was not available, assumptions were made for average annual mileage driven based on odometer data or proxy data from CUED average mileage for various vehicles. Assumed 2021 fleet was the same size as 2019 fleet based on purchase dates of vehicles.
Streetlight and Traffic Signal Inventory	Inventory of all streetlights and traffic signals, along with associated wattages.	Used to calculate electricity consumption from streetlights and traffic signals

[12] Nova Scotia's Landfill Waste Audit, 2023

2.8 Emissions Factors

Once data was collected, industry-standard emissions factors were applied to each energy source to calculate GHG emissions. The primary source of emissions factors was Canada's National Inventory Report, Part 2, where emissions factors for stationary and mobile combustion emissions were sourced. Grid electricity factors were sourced from Environment and Climate Change Canada's Greenhouse Gas and Air Pollutant Emissions Projections. ECCC updates Canada's GHG emissions projections annually, reflecting the latest historical data and updated future economic and energy market assumptions. For historical emissions, the electricity emissions calculated by the ECCC model are in general alignment with those reported in the NIR but differ slightly due to differences in calculation methodologies.

Since the scope of PCP Milestone 1 includes forecast of future emissions in a 10-year business as usual scenario, the ECCC emissions factors for historical and future electricity grid emissions were used for both GHG inventories to allow for consistent comparison of future reductions compared to the baseline.

Energy Source	Emission Factor
Electricity, 2021	**2021:** 590 g/kWh CO_2e **2030:** 84.6 g/kWh CO_2e
Heating Oil	**Residential (g/L):** CO_2: 2560 CH4: 0.026 N2O: 0.006 **Commercial (g/L):** CO_2: 2753 CH4: 0.026 N2O: 0.031 **Industrial (g/L):** CO_2: 2753 CH4: 0.006 N2O: 0.031
Propane	**Residential (g/L):** CO_2: 1515 CH4: 0.027 N2O: 0.108 **Other: CO_2 (g/L):** CO_2: 1515 CH4: 0.024 N2O: 0.108
Wood	**Residential (g/kg):** CO_2: 1715 CH4: 0.1 N2O: 0.07 **Commercial (g/kg):** CO_2: 1715 CH4: 0.1 N2O: 0.07 **Industrial (g/kg):** CO_2: 1539 CH4: 12.9 N2O: 0.12
Gasoline	**(g /L):** CO_2: 2316 CH4: 0.32 N2O: 0.66
Diesel	**(g / L):** CO_2: 2690.00 CH4 : 0.07 N2 O: 0.21

2.9 Emissions Quantification Calculation Methodologies

2.9.1 Community Emissions Inventory Methodologies

Below are summaries of the methodologies used to calculate the GHG emissions of various sectors of Truro's Corporate and Community Inventories.

Table 4: Community Inventory Calculation Methodologies

Metric	GHG Emissions Calculations	Data Sources
Residential Energy Consumption		
Emissions From Residential Energy Consumption – Stationary Fuel Combustion	Quantity of fuel consumed multiplied by emissions factors for various fuels	**Number of residential units:** 2021 Census of Population – Truro (Town) **Vintage, Floor Space, Type, EUI of Residential Housing Stock:** CUED: Residential Sector, Nova Scotia. Archetypes for Truro developed by NRCan through CTAP tool. **Emissions Factors:** NIR Annex 6.1, Emissions Factors for Fuel Combustion
Emissions from Residential Energy Consumption - Electricity	Quantity of electricity consumed multiplied by provincial grid emissions factor	**Electricity Consumption:** CTAP: Based on CUED values for Nova Scotian Building Stock and Archetypes for Truro developed by NRCan through CTAP tool. **Provincial Emission Factor:** Canada's Greenhouse Gas and Air Pollutant Emissions Projections – Electric Grid Intensities by Province
Commercial Energy Consumption		
Emissions From Commercial Energy Consumption – Stationary Fuel Combustion	Quantity of fuel consumed multiplied by emissions factors for various fuels	**Square footage of commercial building space:** Town of Truro GIS database **Energy Usage Intensities of Various Commercial Building Types, Secondary Energy Use by Energy Source:** CUED, Commercial/Institutional Sector, Atlantic Region

Metric	GHG Emissions Calculations	Data Sources
		Emissions Factors: NIR Annex 6.1, Emissions Factors for Fuel Combustion
Emissions from Commercial Energy Consumption – Electricity	Quantity of electricity consumed multiplied by provincial grid emissions factor	**Square footage of commercial building space:** Town of Truro GIS database **Energy Usage Intensities of Various Commercial Building Types, Secondary Energy Use by Energy Source:** CUED, Commercial/Institutional Sector, Atlantic Region **Provincial Emission Factor:** Canada's Greenhouse Gas and Air Pollutant Emissions Projections – Electric Grid Intensities by Province
Industrial Energy Consumption*		
Emissions From Industrial Energy Consumption – Stationary Fuel Combustion	Quantity of fuel consumed multiplied by emissions factors for various fuels	**Square footage of industrial building space*:** Town of Truro GIS database **Energy Usage Intensities of Various Commercial Building Types, Secondary Energy Use by Energy Source:** CUED, Industrial Sector Atlantic Region **Emissions Factors:** NIR Annex 6.1, Emissions Factors for Fuel Combustion
Emissions from Industrial Energy Consumption – Electricity	Quantity of electricity consumed multiplied by provincial grid emissions factor	**Square footage of industrial building space*:** Town of Truro GIS database **Energy Usage Intensities of Various Commercial Building Types, Secondary Energy Use by Energy Source:** CUED, Industrial Sector, Atlantic Region **Provincial Emission Factor:** Canada's Greenhouse Gas and Air Pollutant Emissions Projections – Electric Grid Intensities by Province

Metric	GHG Emissions Calculations	Data Sources
On-Road Transportation		
Emissions from on-road transportation	Quantity of fuel used multiplied by emission factor for fuel source	**Vehicle Kilometers Travelled:** Google Environmental Insights Explorer data for Colchester County, NS. Downscaled to Truro based on 2021 Census data for respective populations. **Vehicle and Fuel Types:** Statistics Canada Vehicle registrations, by type of vehicle and fuel type, NS 2021. Downscaled to Truro based on 2021 Census population **Average fuel consumption for on-road vehicles:** CUED, Transportation Sector, NS
Community Solid Waste	Methane Commitment Model for landfill gas emissions: $CO2e = 25 \bullet M \bullet L_0 (1 - f_{rec})$ (1−OX) CO_2e = Downstream GHG emission from methane associated with community solid waste sent to landfill L_0 = Methane generation potential (t CH_4/t waste) F_{rec}=Fraction of methane emissions recovered at the landfill	**Total Waste Landfilled:** Total Weight of Solid Waste Received by Colchester Balefill facility, 2021. Downscaled to Truro based on population. **Degradable Organic Carbon:** Divert NS 2023 Waste Audit Results, Colchester Balefill Facility

* The Town of Truro's GIS data does not differentiate between general commercial building space and industrial building space. Industrial building floor area was defined as "*manufacturing industries and construction*", and properties assigned to industrial square footage were determined through identification of local businesses with the Town of Truro.

2.9.2 Corporate Emissions Inventory Methodologies

Table 5: Corporate Emissions Calculation Methodologies

Metric	GHG Emissions Calculations	Data Sources
Buildings and Facilities		
Emissions from stationary fuel combustion	Quantity of fuel consumed multiplied by emissions factors for various fuels	**Fuel Consumption:** Utility invoices, Building Energy Report provided by Town of Truro **Emissions Factors:** NIR Annex 6.1, Emissions Factors for Fuel Combustion
Emissions from grid electricity	Quantity of electricity consumed multiplied by provincial grid emissions factor	**Fuel Consumption:** Utility invoices, Building Energy Report provided by Town of Truro **Provincial Emission Factor:** Canada's Greenhouse Gas and Air Pollutant Emissions Projections – Electric Grid Intensities by Province
Fleet Vehicles		
Emissions from combustion of motor fuels	Quantity of Fuel Used multiplied by various emissions factors	**Fuel Consumption:** Combination of fuel cost data and assumed mileage for municipal fleet, trip mileage data provided y service provider for solid waste collection **Emissions Factors:** NIR Table A6.1-15 Emission Factors for Energy Mobile Emissions Sources
Water and Wastewater Treatment		
Emissions from stationary combustion	None. Water Treatment Facility and pumping stations have no onsite combustion. Wastewater Treatment Facility Excluded from Inventory.	N/A

Metric	GHG Emissions Calculations	Data Sources
Emissions from grid electricity	Quantity of electricity consumed multiplied by provincial grid emissions factor	**Fuel Consumption:** Utility invoices, Building Energy Report provided by Town of Truro **Provincial Emission Factor:** Canada's Greenhouse Gas and Air Pollutant Emissions Projections – Electric Grid Intensities by Province
Corporate Solid Waste		
Emissions from solid waste produced by municipal buildings and facilities	Methane Commitment Model for landfill gas emissions: $CO2e = 25 \bullet M \bullet L_0 (1 - f_{rec})$ (1−OX) CO_2e = Downstream GHG emission from methane associated with community solid waste sent to landfill L_0 = Methane generation potential (t CH_4/t waste) F_{rec}=Fraction of methane emissions recovered at the landfill	**Total Waste Landfilled:** Total Weight of Solid Waste Received by Colchester Balefill facility, 2021. Downscaled to Truro's municipal buildings based on ratio of municipal square footage compared to total square footage from GIS data. **Degradable Organic Carbon:** Divert NS 2023 Waste Audit Results, Colchester Balefill Facility (ICI sector)

3 COMMUNITY GHG INVENTORY METHODOLOGY AND RESULTS

3.1 Summary

Overall, the Town of Truro's Community GHG emissions for 2021 are estimated to be 308,823 tonnes of carbon dioxide equivalent (CO_2e), or approximately 23.2 tonnes CO_2e per capita. This is significantly higher than the estimated 2021 per capita emissions for both Nova Scotia (14.7 $tCO_{2e)}$ and Canada (17.5 tCO_2e)[13]. However, Truro's emissions are much lower than per capita emissions in Alberta and Saskatchewan (57.6 tCO_2e and 56.8 tCO_2e, respectfully).

Truro's GHG emissions per capita being higher than the provincial average is likely due to a combination of factors. One reason is a relative lack of public transit and alternative transportation options in Truro compared to more metropolitan areas like Halifax or other major Canadian cities. Larger cities also benefit from more dense urban centers, which act as a multiplier for reduced on-road transportation emissions and space heating requirements.

Table 6: 2021 Community GHG Emissions by Sector

Community GHG Inventory Components	Annual Energy Consumption (GJ)	Annual GHG Emissions (Metric Tonnes of CO_2e)	Percentage of Community GHG Emissions
Residential Energy Consumption	968,939	104,774	34.4%
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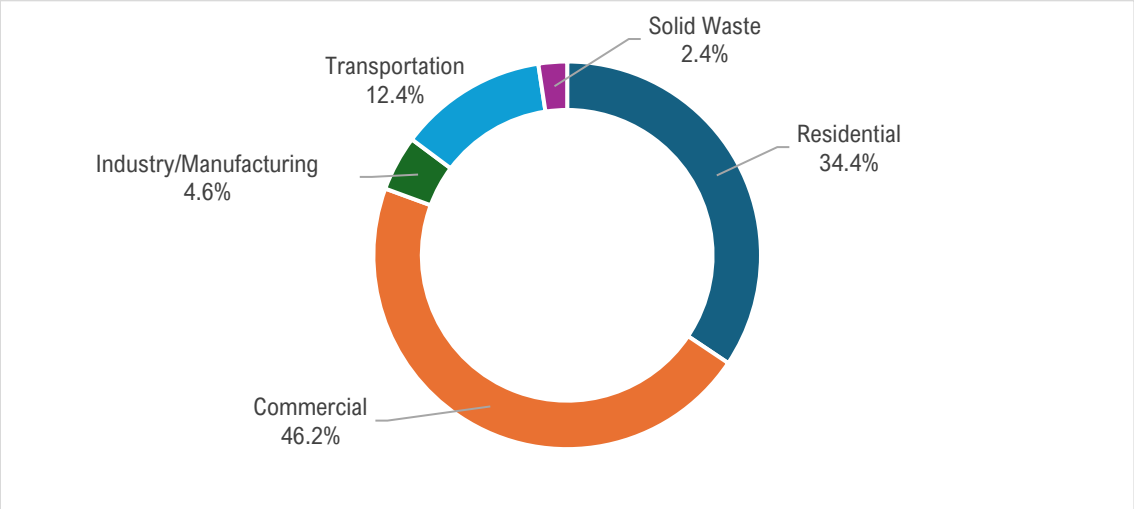
[13] NIR 2023.

Figure 3: 2021 Community GHG Emissions by Sector



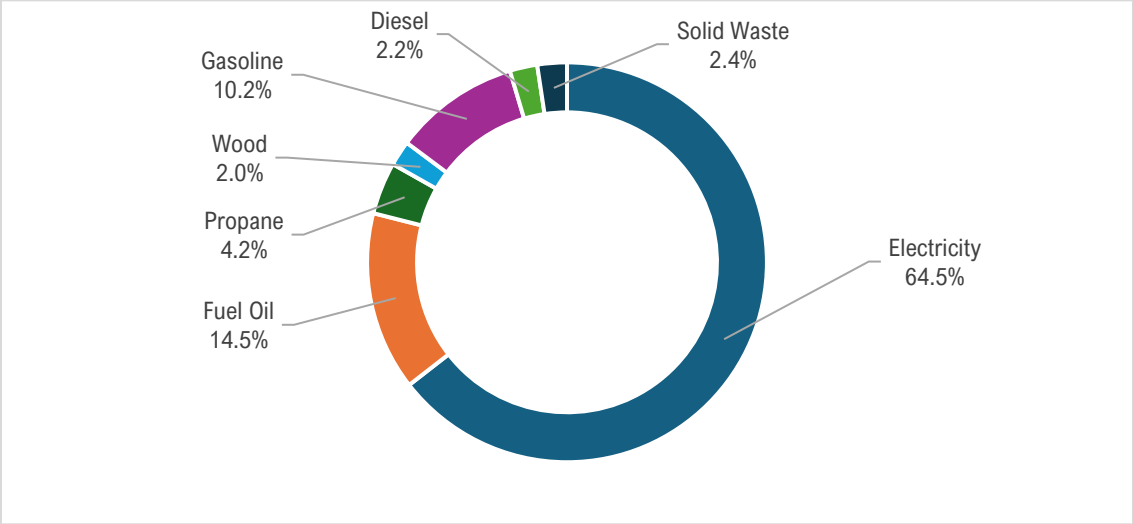
Electricity is the largest source of Truro's community GHG emissions (64.5%). This is due to the carbon intensity of Nova Scotia's electricity grid, which relies heavily on fossil fuels for power generation. Fuel oil is the second largest source of community emissions (14.5%), as Truro does not have access to natural gas for heating. Gasoline is the third largest source of community emissions (10.2%), which is due to the general public's reliance on personal vehicles for transportation.

Table 7: 2021 Community GHG Emissions by Source

Community Emissions Sources	Annual Energy Consumption (GJ)	Annual GHG Emissions (Metric Tonnes of CO_2e)	Percentage of Community Emissions
Electricity	1,197,815	196,476	64.5%
Fuel Oil	607,376	44,093	14.5%
Gasoline	462,435	31,020	10.2%
Propane	212,259	12,839	4.2%
Diesel	87,320	6,782	2.2%
*Wood**	216,614	6,204	*2.0%*
*Solid Waste***	*N/A*	*7,275*	*2.4%*
TOTAL	**2,783,818**	**304,689**	

*CO_2 emissions associated with biomass (wood, wood residuals, pellets) are a source of biogenic emissions, which are considered carbon neutral in the PCP protocol and are excluded from the community inventory. However, CH_4 and N_2O emissions from biomass combustion are anthropogenic and are included in the inventory.
**Solid waste is not an energy source but does contribute to community GHG emissions.

Figure 4: 2021 Community GHG Emissions by Source



3.2 Residential Sector

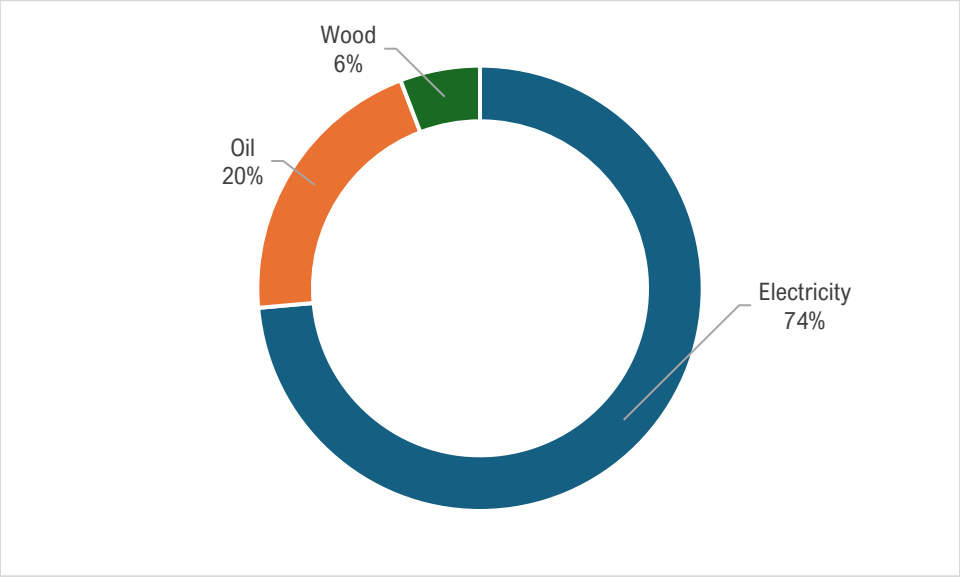
Residential Buildings make up approximately 34% of Truro's community emissions. There are three main energy sources for the residential sector: electricity, fuel oil, and wood. There is no natural gas pipeline in Truro, unlike other areas of Nova Scotia. Based on CUED data, propane is a minor contributor to residential energy usage (less than 0.2%) and has been excluded from the inventory. CUED data that assigned residential heating to natural gas was instead assigned to fuel oil.

Wood is a significant source of residential energy usage in Truro (21%), as many residents rely on wood as an affordable and relatively reliable source of heat. With regard to the community GHG inventory, CO_2 emissions associated with biomass (wood, wood residuals, pellets) are a source of biogenic emissions, which are considered carbon neutral in the PCP protocol and are excluded from the community inventory. However, CH_4 and N_2O emissions from biomass combustion are considered anthropogenic (originating from human activity) and are included in the inventory.

Figure 5: Residential GHG Emissions by Source

Residential Energy Source	Annual Energy Consumption (GJ)	Annual GHG Emissions (Metric Tonnes of CO_2e)	Percentage of Residential Emissions
Electricity	477,403	78,308	74%
Oil	290,888	20,289	20%
Wood	200,648	6,177	4%
TOTAL	**968,939**	**104,774**	**100%**

Figure 6: Residential GHG Emissions by Source



Baseline emissions for the residential sector were calculated using Natural Resources Canada's Community Technology Assessment Platform (CTAP), which was released in March 2024. CTAP was created to assist municipalities with less than 100,000 residents to establish GHG emissions baselines and develop decarbonization strategies for the residential buildings sector. CTAP uses a combination of publicly available data (NUED and CUED database values for provincial housing stock, census data for population and number of private dwellings) along with proprietary NRCan data (GITHUB inventory of over 6800 residential building archetypes over 1.5 million residential energy audits).

CTAP comes pre-populated with default data for 51 regions in Canada, containing building archetypes and weather data for various regions. There are three modeled regions for Nova Scotia, and one of the three regions is based Truro's local climate conditions. The 2021 baseline year was not available for modeling within CTAP, so the final estimates for energy consumption were scaled up by 0.25% to account for increases in housing stock between 2020 and 2021.

CTAP's results were validated through creation of an independent energy modeling analysis by EastPoint which also leveraged NUED, CUED, and 2021 Census data, combined with Truro's GIS mapping data estimates of residential square footage. Average square footage for Truro's residential properties was multiplied by CUED data for gross thermal requirements for various building types, vintages and primary fuel types to calculate estimated secondary energy consumption. All heating that was attributed to natural gas at a provincial level was assigned instead to fuel oil.

When compared to CTAP's results, the quantities were within an acceptable range of each other, with acknowledgement of CTAP's ability to pull local weather data and specific energy modeling data from their building archetype database likely contributing to a more accurate calculation methodology than solely using sectoral data. Therefore, CTAP's estimated energy use for the residential buildings sector was considered acceptable for the purposes of this inventory.

3.3 Commercial and Institutional Sector

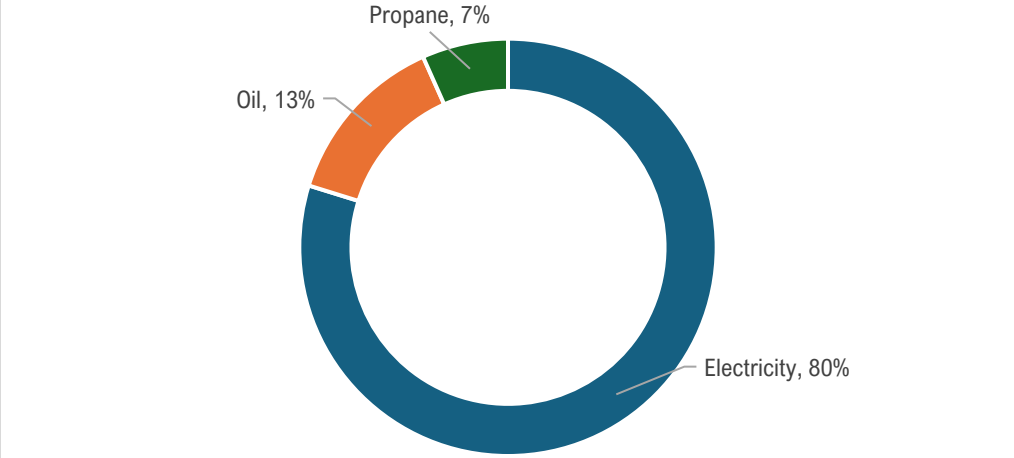
Commercial and Institutional buildings account for the largest contribution to Truro's community emissions (45.6%). This is consistent with Truro's GIS data, which shows that commercial and residential square footage is roughly the same within Truro, with commercial buildings having a higher average EUI than residential buildings. Truro is home to a large industrial park with a variety of different business types, as well as the Colchester East Hants Health Centre, several public schools that serve the greater Truro area, and the Truro Campus of Nova Scotia Community College.

The three main energy sources for the commercial and institutional sector: electricity, oil, and propane. Wood is not a statistically significant contributor to commercial and institutional energy use at the Atlantic region level according to CUED statistics, so wood use was excluded from the commercial and institutional category.

Table 8: Commercial and Institutional GHG Emissions by Source

Commercial Energy Source	Annual Energy Consumption (GJ)	Annual GHG Emissions (Metric Tonnes of CO_2e)	Percentage of Commercial Emissions
Electricity	685,218	112,396	80%
Oil	251,335	18,905	13%
Propane	156,893	9,490	7%
TOTAL	**1,093,446**	**140,790**	100%

Figure 7: Commercial and Institutional GHG Emissions by Source



Based on review of industry standard practices, it is typically challenging to estimate commercial sector GHG emissions in Atlantic Canada, since the CUED's data is aggregated for the entire Atlantic Canadian

region. Square footage and space type data aggregated at a regional level is typically downscaled to a local level based on population, which can lead to high margins of error.

For this project, commercial and institutional energy consumption was modeled based on the GIS data provided by the Town of Truro. GIS data for every property with existing commercial units was sorted into one of eight different space types; this was facilitated by the accuracy of the GIS data which tracked the names or uses of most commercial building entries along with number of commercial units in mixed-use building types. Spot checks were conducted based on addresses throughout the process to ensure that the GIS data accurately reflected current conditions.

Each space type was assigned energy use intensities and secondary energy source shares from the CUED database for the commercial/institutional sector Atlantic Canada. Any secondary energy use that the CUED attributed to natural gas was divided equally between fuel oil and propane. The CUED assigns a high percentage of commercial energy consumption in Atlantic Canada as coming from electricity, which paired with Nova Scotia's carbon-intensive electricity grid leads to electricity consumption being a major source of commercial GHG emissions.

EastPoint noted that since Truro's GIS data tracks gross floor area of the footprint of each building, the calculated square footage for each building potentially overestimates the amount of square footage for buildings with more than one floor. This is because it is unlikely that all floors in a building have the same square footage, especially buildings such as warehouses which typically have mezzanine spaces that only cover a small portion of gross floor area. Given that the GIS data was generally a much more accurate tool to estimate energy consumption, that CUED data aggregated at a regional level, this was considered an acceptable margin of error.

3.4 Industrial Emissions

Industrial emissions make up approximately 4.6% of Truro's community inventory. In similar fashion to commercial building emissions, manufacturing industry and construction square footage was determined through Truro's GIS data. EastPoint worked with the Town of Truro to identify local businesses that fit into the *Manufacturing Industry and Construction* space types (industries that involve the creation of a product or focus on the process of construction).

EastPoint conducted a desktop review of the businesses flagged as industrial in nature to identify how each business used energy and what types of fuel were used onsite. It was determined that both fuel sources and business types did not align well with CUED data on aggregated industrial sector data for the Atlantic region, which are more focused on larger industrial plants and facilities not found in Truro. Instead, EastPoint assigned energy sources based on CUED's data for disaggregated industrial industries at a Canadian level, specific to the type of facility at each location identified by Truro. A sensitivity analysis of estimated energy usage intensity was used to determine appropriate EUIs based on EastPoint's experience with commercial and industrial facilities.

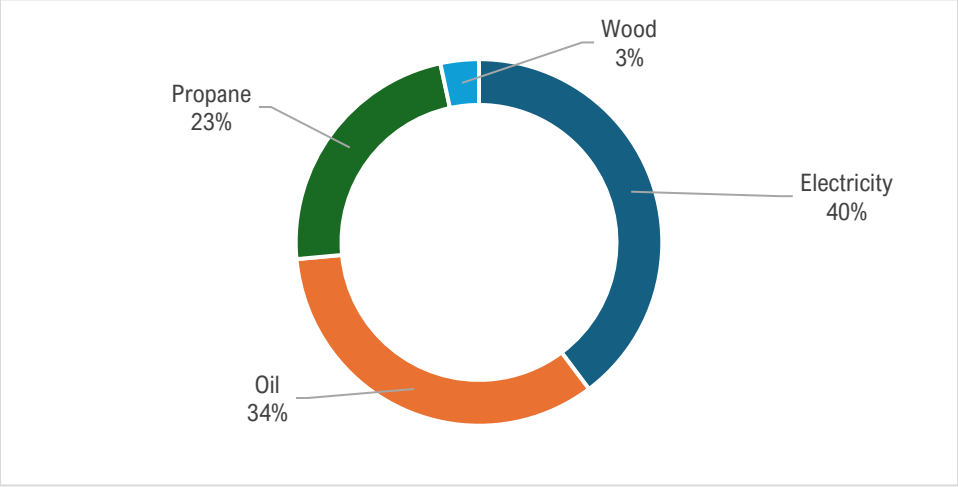
There is a moderate level of uncertainty introduced by assuming representative EUIs for Truro's facilities. In further iterations of the GHG inventory, it is recommended that industrial and manufacturing facilities in the Town be approached directly to better quantify their average annual energy consumption.

Table 9: Industrial GHG Emissions by Source

Industrial Energy Source	Annual Energy Consumption (GJ)	Annual GHG Emissions (Metric Tonnes of CO_2e)	Percentage of Industrial Emissions
Electricity	35,194	5,773	40%
Oil	65,152	4,906	34%
Propane	55,366	3,349	23%
Wood*	15,966	491.75	3%
TOTAL	**171,679**	**14,520**	100%

*CO_2 emissions associated with biomass (wood, wood residuals, pellets) are a source of biogenic emissions, which are considered carbon neutral in the PCP protocol and are excluded from the community inventory. However, CH_4 and N_2O emissions from biomass combustion are anthropogenic and are included in the inventory.

Figure 8: Industrial GHG Emissions by Source



3.5 Transportation Emissions

Transportation emissions contribute to approximately 13.4% of Truro's community GHG emissions. Calculation methodology involved leveraging vehicle kilometers travelled (VKT) data from Google's Environmental Insights Explorer (EIE). EIE uses aggregated anonymous location history data to determine VKT over all local roads in a given jurisdiction and provides an estimate of annual vehicle trips by mode and total vehicle distance traveled for a given year. EIE data is GPC protocol compliant; the data includes all trips within the Town's boundary, as well as 50% of outbound trips and 50% of inbound trips.

VKT data was not available for the Town of Truro but was available for Colchester County. Regional data for motor vehicle travel was downscaled based on population to provide an estimate of Truro's VKT. Since the

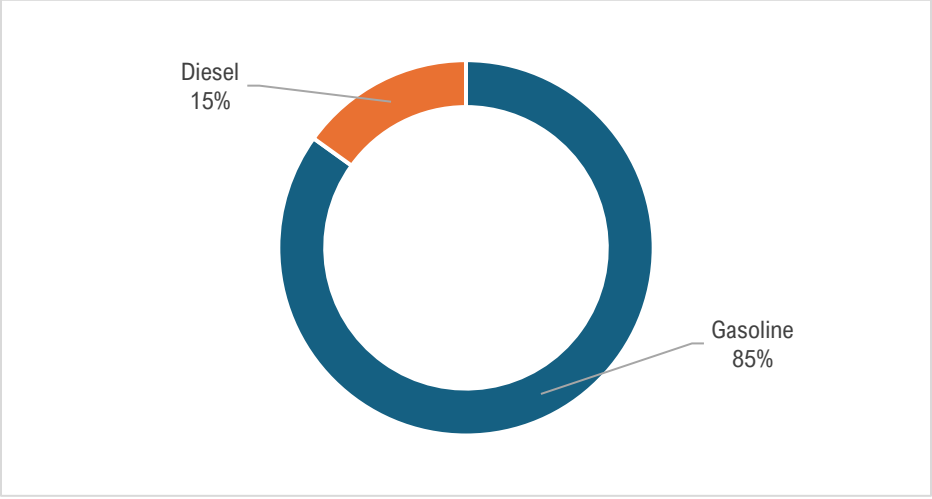
Town's 2021 baseline year occurred during the COVID-19 pandemic when travel patterns were disrupted, 2023 VKT data was used as proxy data to give a more accurate representation of a typical year. The VKT data was then assigned to various vehicle classes (light-duty vehicles, light duty trucks, heavy duty trucks, motorcycles) and fuel types (gasoline, diesel) based on Statistics Canada data for vehicle registrations in Nova Scotia for 2021. Next, CUED data for average fuel consumption for each vehicle type was used to calculate the estimated amount of fuel required by each vehicle type. Finally, total annual fuel consumption was multiplied by corresponding emissions factors to determine total emissions.

As expected, gasoline contributes most transportation sector emissions. This is because gasoline was the listed fuel source for approximately 93% of vehicles in Nova Scotia in 2021. Any electric vehicle battery charging was assumed to be a small fraction of overall transportation emissions as EVs were less than 1% of the overall NS vehicle stock in 2021. EV charging emissions were assumed to be captured in electricity consumption for the building sector.

Table 10: Community Transportation Emissions by Source

Transportation Fuel Source	Annual Energy Consumption (GJ)	Tonnes CO_2e	Percentage of Transportation Emissions
Gasoline	462,435	31,020	85%
Diesel	87,320	6,782	15%
TOTAL	**549,754**	**37,802**	**100%**

Figure 9: Community Transportation Emissions by Source



3.6 Community Solid Waste

Emissions from decomposition of organics sent to landfill contributed to 2.4% of Truro's baseline community emissions in 2021. When solid waste is landfilled, its organic components decompose over time into simpler carbon compounds by bacteria in an anaerobic (oxygen poor) environment generating CH4 and CO_2 emissions. The CO_2 emissions associated with the decomposition of the organic waste are of biogenic origin and are excluded from the GHG inventory. Landfill emissions are unique in that solid waste disposed in landfills generates emissions over many years.

Truro does not own or operate its own solid waste facilities. As per the PCP protocol, only the landfill emissions directly linked to Truro's annual community solid waste have been accounted for in Truro's community inventory. Divert NS conducted waste audits at every provincial landfill in 2023, and their waste audit report is a valuable source of information which allows for highly accurate estimation of community solid waste emissions.

Total annual tonnage of solid waste received at the Colchester Balefill facility in 2023 for both residential and ICI waste streams was downscaled to Truro based on population. 2023 data was used as a proxy year for 2021, as it was assumed the total quantity of waste was approximately similar between the two years. Overall landfill waste stream composition from the Divert NS waste audit of the Colchester Balefill facility was used to determine the degradable organic carbon content of the waste stream. This information was used to estimate the emissions from community solid waste using the Methane Commitment Model outlined in the PCP Protocol.

Table 11: Community Solid Waste Emissions by Source

Community Solid Waste Generated by Truro (Tonnes)	Annual GHG Emissions (Tonnes CO_2e)
4,920	7,275

4 CORPORATE GHG INVENTORY METHODOLOGY AND RESULTS

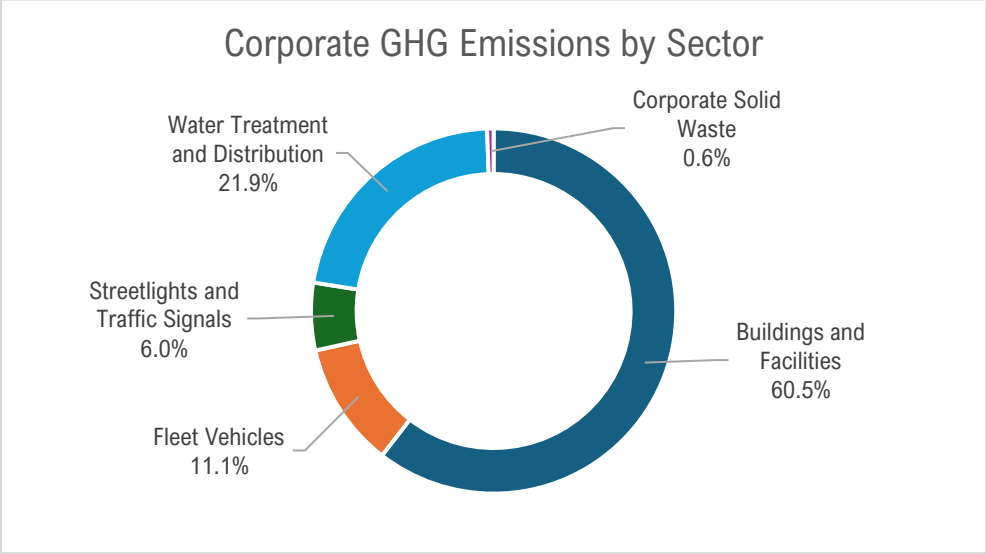
4.1 Summary

Truro's municipal operations resulted in an estimated 4,970 tonnes of emissions in the 2021 baseline year. Most corporate emissions came from municipal buildings and facilities (60.5%), followed by energy use by Truro's Water Treatment Plant (WTP) and associated pumping stations (21.9%). Fleet vehicles make up 13.2% of emissions, with streetlights and traffic signals contributing 6% and corporate solid waste making up the final 0.6% of corporate emissions.

Table 12: 2021 Corporate GHG Inventory by Sector

Corporate GHG Inventory Sectors	Annual Energy Consumption (GJ)	Annual GHG Emissions (Metric Tonnes of CO_2e)	Percentage of Corporate Emissions
Buildings and Facilities	24,388	3,005	60.5%
Fleet Vehicles	3,530	550	11.1%
Streetlights and Traffic Signals	1,811	297	6.0%
Water and Wastewater Infrastructure	6,643	1,090	21.9%
Solid Waste		28	0.6%
TOTAL	36,373	4,970	

Figure 10: 2021 Corporate GHG Inventory by Sector



The largest source of corporate emissions is electricity consumption (71.7%), because the Town's most energy-intensive buildings and systems, including its water treatment plant and the Rath-Eastlink Community Centre) are fully electrified. This is encouraging in terms of emissions reductions planning, as Truro's corporate emissions should drop significantly as the Nova Scotian electricity grid is decarbonized.

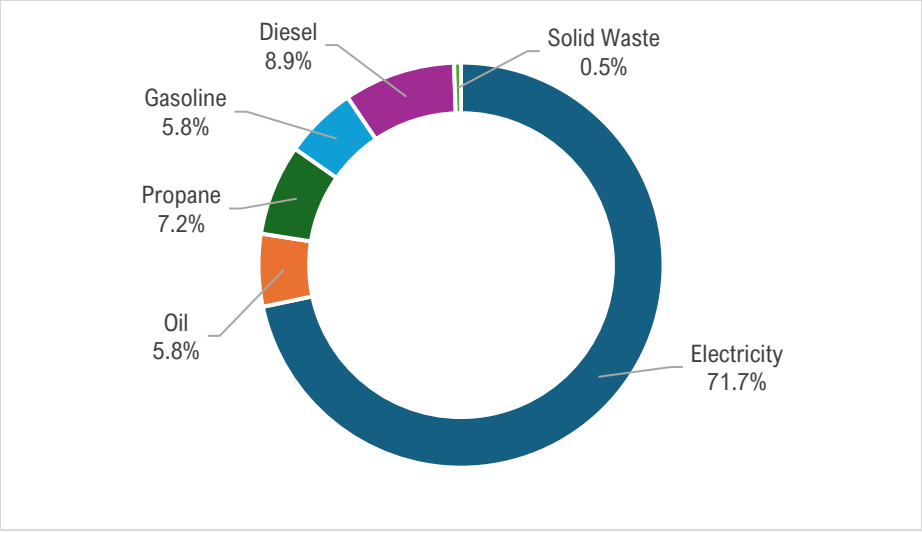
The next largest source of emissions is diesel fuel (8.9%), which is primarily used by medium- and heavy-duty fleet vehicles in Truro's Public Works fleet as well as by contracted solid waste collection. Propane contributes to 7.2% of corporate emissions, notably the Town has converted several buildings (Colchester Legion Stadium, Douglas Street Recreation Centre, Public Works Building) to high-efficiency propane boilers in recent years, which reduced emissions associated with heating oil use substantially. Gasoline and heating oil both contribute approximately 5.8% of corporate emissions, with corporate solid waste contributing 0.5%.

Table 13: 2021 Corporate GHG Emissions by Source

Corporate Emissions Sources	Annual Energy Consumption (GJ)	Annual GHG Emissions (Metric Tonnes of CO_2e)	Percentage of Corporate Emissions
Electricity	22,663	3,717	71.7%
Oil	3,983	300	5.8%
Propane	6,196	375	7.2%
Gasoline	3,096	225	5.8%
Diesel	435	325	8.9%
*Solid Waste**		*28*	*0.5%*
TOTAL	**36,373**	**4,970**	

*Solid waste is not an energy source but does contribute to community GHG emissions.

Figure 11: Corporate GHG Emissions by Energy Source



4.2 Buildings and Facilities Emissions

Truro's municipal buildings and facilities are responsible for 58% of Truro's corporate emissions. As the municipality operates several large facilities and buildings that provide essential public services and recreation opportunities to its residents, emissions from stationary combustion and electricity consumption at municipal facilities will be a primary focus of any future decarbonization efforts.

Community Recreation Facilities produce approximately 56% of total emissions in this sector. The largest contributor is the Rath-Eastlink Community Centre (RECC), which accounts for approximately 43% of Truro's building sector emissions. As noted in Section 2.4: Operational Boundaries, Truro shares joint-ownership of the RECC with the Municipality of Colchester, so 50% of its emissions have been assigned to Truro's corporate inventory. Since the RECC was built with a geothermal ground-source heat pump system, its heating and cooling is fully electrified and its GHG emissions are expected to decline over time as Nova Scotia's grid is decarbonized.

The next largest source of municipal building emissions is the Colchester Legion Stadium at 16%. The Legion Stadium has recently had a new propane heating system installed and as of 2024 is currently having a new refrigeration plant installed. Finally, the Douglas Street Recreation Center is a former school that has seen significant investment in energy efficiency since the Town took it over and contributes approximately 5% of corporate building emissions. The Truro Amateur Athletic Club Grounds accounts for less than 1% of emissions.

A group of municipal buildings located at or near Truro's Civic Square on Prince Street (Police Station, Fire Station, Public Library, Farmer's Market, and Town Hall) combine to produce approximately 35% of corporate building emissions.

Other remaining core municipal buildings, including the Public Works building in Truro's industrial park produce 8.4% of emissions, with accessory buildings contributing less than 0.5% of emissions in this sector.

Figure 12: Corporate GHG Emissions by Source

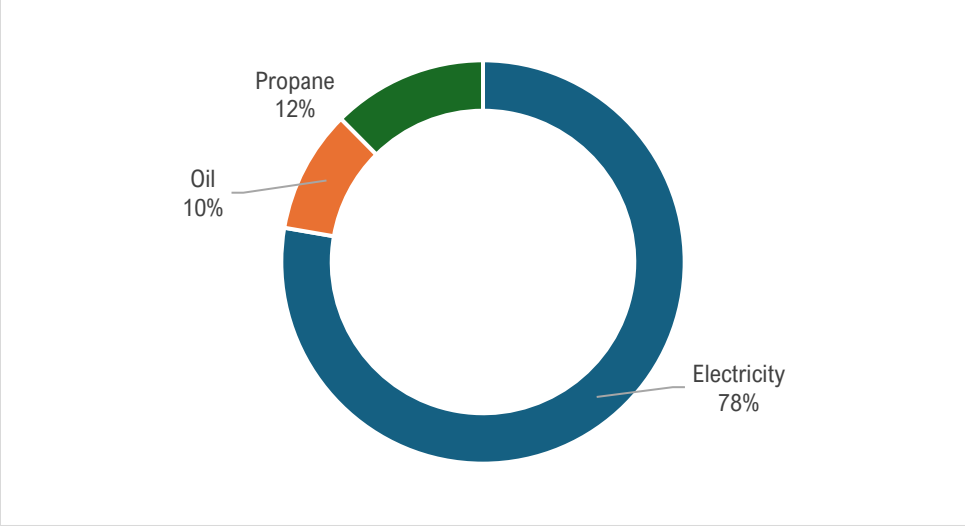
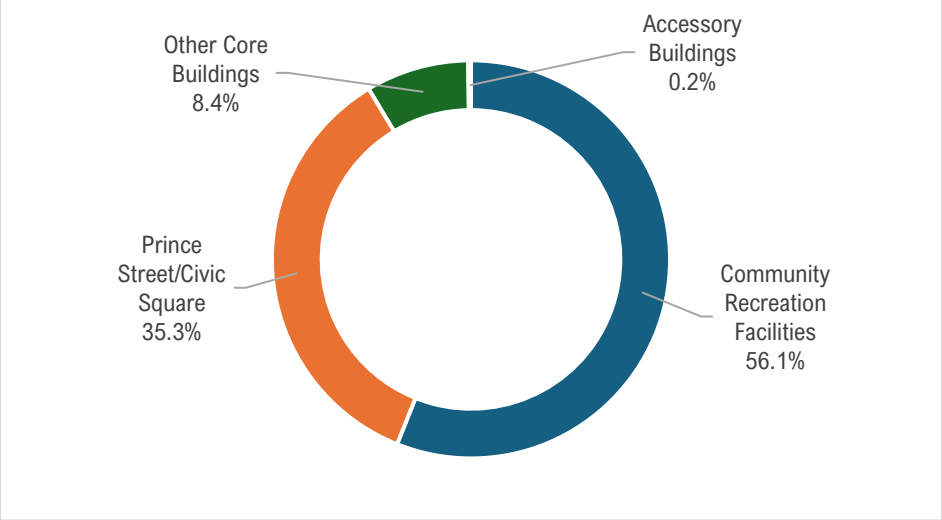


Table 14: 2021 Baseline Energy Consumption and GHG Emissions for Truro's Core Municipal Buildings

Facility	Electricity Use (kWh)	Fuel Oil (L)	Propane (L)	Total GHGs	Percentage of Building Sector Emissions
Town Hall	222,825	14,322	-	171	5.7%
Police Station	242,360	27,123	-	218	7.3%
New Fire Hall	125,040	23,625	-	139	4.6%
TAAC Building	9,993	4,097	-	17	0.6%
Willow Street Warehouse	9,917	-	-	6	0.2%
Old Fire Hall - Market	70,320	2,407	3,519	54	1.8%
Library (Old Normal College)	262,260	35,331	-	252	8.4%
Welcome Centre	21,250	-	-	13	0.4%
New Public Works	113,400	-	73,046	179	6.0%
Douglas Recreation Centre	61,840	-	68,664	142	4.7%
Colchester Legion Stadium	562,700	-	97,858	482	16.1%
Rath Eastlink CC	*4,327,200*	-	-	*2,555**	*42.6%*
Victoria Park Pool	72,450	-	-	43	1.4%
Accessory Buildings	9,044	-	-	5	0.2%
Total	**3,946,999**	**106,906**	**243,086**	**2,360**	

**Only 50% of the RECC's GHG emissions have been attributed to Truro's Corporate Inventory*

Figure 13: Corporate Inventory Building Emissions



The calculation of emissions from municipal buildings and facilities was based on Truro's GIS data as well as electricity and fuel use collected as part of a recent energy project. As part of an Energy Performance Contract (EPC) to improve energy efficiency and reduce emissions in 2019, a utility map was created that listed all utility accounts and electrical meters at Truro's most energy intensive sites. While creating the community GHG inventory, these buildings and Facilities were deemed Truro's "Core" building stock, which are estimated to account for the majority of municipal building energy consumption. The data used for the Core building stock's baseline was from January – December 2018. This was determined to be an accurate source of representative baseline building performance data for two reasons:

- Data for 2020 and 2021 was not representative of normal operations due to the impact of the COVID-19 pandemic.

- Since the EPC project was not completed until 2022, it was assumed that the guaranteed savings from the project would not be fully realized until after 2021.

Therefore, the EPC's project's baseline data for 2018 was assumed to be representative proxy data for the GHG inventory's baseline year of 2021. However, some corrections to the data were made to ensure an accurate GHG emissions baseline. Some municipal buildings underwent changes in heating fuel between 2018 and 2021. Notably, the Colchester Legion Stadium and the Public Works buildings had older fuel oil boilers replaced with new high-efficiency propane boilers. Heating fuel energy consumption was assigned to the new fuel source based on the differences in efficiency between the older and newer heating systems. This allowed for a more accurate representation of the fuel mix of Truro's buildings in the 2021 baseline.

Truro also owns a portfolio of smaller accessory buildings located throughout the Town, for which energy consumptions data was unavailable. Space types included storage facilities, outdoor shelters, sheds, and public gazebos. These accessory buildings were assumed to be fully electric. The total square footage of these facilities was captured from Truro's GIS data, and a general commercial EUI was applied to estimate energy consumption. Overall, this part of Truro's building portfolio is estimated to be less than 1% of their overall energy consumption.

4.3 Corporate Fleet Emissions

Truro's corporate fleet is responsible for approximately 11.1% of corporate emissions. Truro's fleet consists of light, medium and heavy-duty vehicles which support day-day operations of its administrative office, Parks and Recreation Department, Police and Fire Services, and its Public Works Department. The Public Works Department uses heavy-duty trucks and equipment to support municipal street and sidewalk work and snow clearing activities. The Parks and Recreation Department also uses smaller off-road vehicles for maintenance of public recreation areas such as Victoria Park.

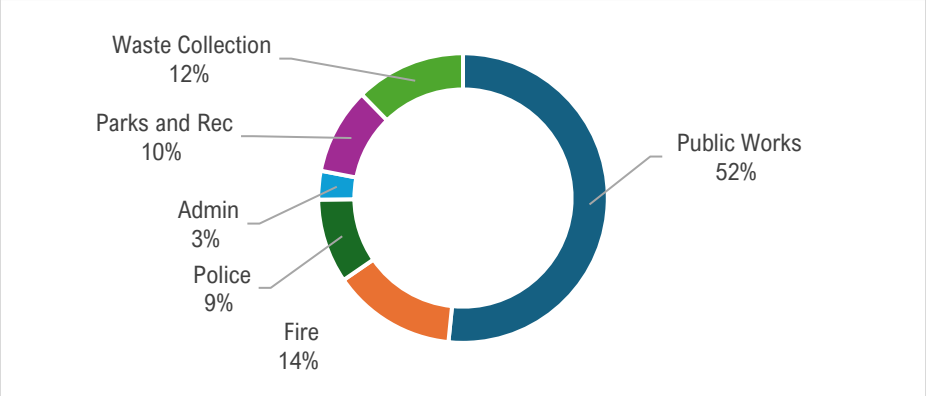
Fleet vehicle emissions were calculated through provided fuel cost data and fleet vehicle inventories from the Town of Truro's various departments. Fuel cost data was prorated to estimated fuel consumption by using average annual fuel costs for Nova Scotia in 2021. Where fuel cost data was not available, proxy data and average annual mileage data from Statistics Canada and the CUED was used to fill in any gaps.

The Public Works Department fleet is the largest contributor to corporate fleet emissions, which is due to the heavy-duty vehicles and equipment it uses to provide its services. Fire services and contracted solid waste collectors also use heavy-duty vehicles, which is reflected in the overall emissions of their fleets. As a result of heavy-duty vehicle use, diesel fuel is the main source of corporate fleet emissions.

Table 15: Corporate Fleet Vehicle Emissions by Fleet Division

Fleet Vehicles	Gas	Diesel	GHG Emissions (tCO_2e)	Percentage of Fleet Emissions
Public Works	33,792.94	76,925.78	285.65	52%
Fire Service	11,780.55	18,113.64	76.15	14%
Police Service	21,555.90	-	50.12	9%
Administration	7,335.69	-	17.06	3%
Parks and Recreation	22,161.00	-	51.52	10%
Waste Collection	-	25,686.37	69.15	12%
TOTAL	**96,626.08**	**120,725.79**	**549.64**	

Figure 14: Corporate Fleet Vehicle Emissions by Fleet Division



4.4 Corporate Solid Waste

Emissions from decomposition of landfilled organics in corporate solid waste are approximately 0.7% of corporate emissions. Historically, Truro operated a landfill inside Town limits, located off Young Street, near the current site of the Railyard Mountain Bike Park and Water Treatment Plant. This site was closed in 1997 and there is limited information available about the length of the site's operation or quantity of solid waste received. The expected lifecycle of landfill gas generation indicates that peak gas production usually occurs 5 to 7 years after waste is dumped, and almost all gas is produced within 20 years[14]. Based on the date of the site's closure, the expected production of landfill gas is estimated to be minimal. Due to a lack of data on the size of the landfill site and volume of waste generated, potential GHG emissions from the site have been excluded from the corporate inventory.

[14] https://www.epa.gov/lmop/basic-information-about-landfill-gas

Truro does not own or operate its own solid waste facility. All community solid waste is processed through Colchester Resource Waste Management, and the Colchester Waste Management Park is located in Kemptown, which is outside of Truro's town boundaries. According to the PCP Protocol, since Truro does not own or operate its own solid waste landfill, its corporate inventory must estimate GHG emissions based on the amount of solid waste collected from corporate waste bins during the baseline inventory year.

Data on total solid waste received from the Town of Truro was provided by Colchester Waste Management Park, along with waste stream data specific to the ICI (Institutional, Commercial, Industrial) sector in Truro. This data was used to estimate the average annual quantity of solid waste generated in Truro's ICI sector. This average value was then multiplied by the total square footage of the Town's Core building portfolio to estimate total quantity of solid waste generated by the Town's facilities in 2021. Estimated annual methane emissions resulting from organic waste decomposition in solid waste generated by Truro's corporate buildings were calculated using the methane commitment model method as described in the PCP protocol.

Table 16: Corporate Solid Waste Emissions

Corporate Solid Waste Generated by Truro (Tonnes)	Annual GHG Emissions (Tonnes CO_2e)
139	28

4.5 Streetlights and Traffic Signals

Streetlights and traffic signals contribute 6.8% of Truro's corporate emissions. Overall, 79% of emissions in this category are from streetlight operation, as the town has 1587 streetlights with an average annual electricity consumption of 251 kWh/year per fixture, while there are 398 traffic lights with an average annual electricity consumption of 263 kWh/year per fixture. It is expected that energy demand will increase over time as the city expands and creates new neighbourhoods and transportation routes, but overall GHG emissions are expected to decrease as the electricity grid becomes less carbon-intensive over time.

The Town of Truro's Engineering and Public Works Department provided a current inventory of all traffic signals and streetlights. Data provided included total fixture count and wattage (kW) of all fixtures. Conservative annual operating schedules were assumed for traffic signals (24hr operation) and streetlights (12 hours operation per day) to estimate total annual electricity demand. All traffic signals and most streetlights use LED fixtures.

Table 17: Corporate Streetlights and Traffic Signal Emissions

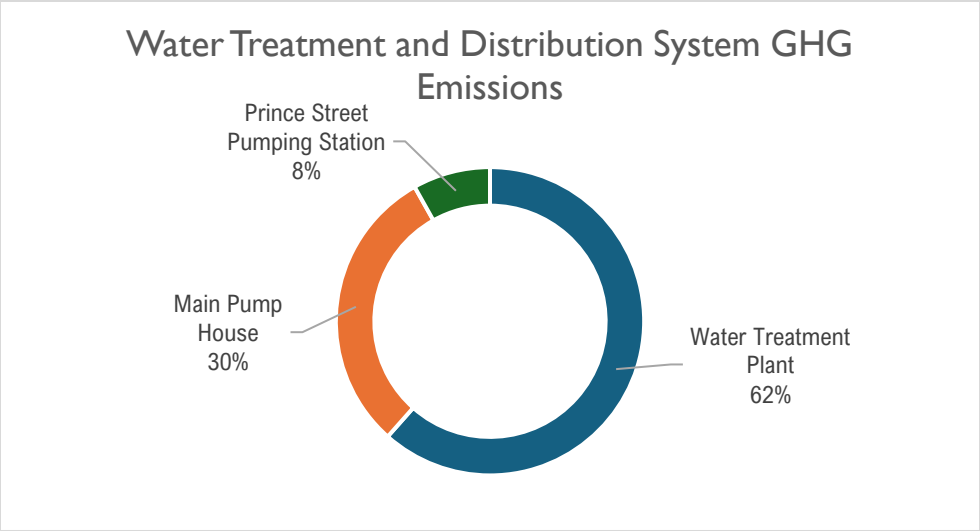
	Annual Energy Consumption (GJ)	Annual GHG Emissions (Tonnes CO_2e)	Percentage of Sectoral Emissions
Traffic Signals	377	62	21%
Streetlights	1,434	235	79%
Total	**1,811**	**297**	

4.6 Water and Wastewater

The water and wastewater category tracks energy consumption associated with the use of energy by municipal water and wastewater infrastructure. According to the PCP protocol, GHG emissions from infrastructure owned or operated by regional authorities or other municipalities can be excluded from the Corporate Inventory. While Truro operates its own water treatment plant and associated pumping stations, Truro's wastewater is treated at the Central Colchester Wastewater Treatment Facility (CCWWTF), which is owned and operated by Colchester County. Therefore, emissions from wastewater treatment have been excluded from Truro's Corporate Inventory.

Truro's water treatment and distribution systems represent 25.1% of Corporate GHG emissions. Truro's main source of emissions in this category is the Water Treatment Plant, located next to the Town's reservoir, near Victoria Park. The facility is heated electrically and houses equipment for producing potable water for the Town. The Main Pumphouse for the Treatment Plant is located approximately 500m away and houses large pumps that supply the water to the Plant. The Town also operates a Pumping Station on Prince Street which contains three large pumps for water distribution. Associated energy consumption is expected to scale proportionally with community growth, while emissions are expected to decrease gradually over the next 10 years as Nova Scotia's electricity grid becomes less carbon intensive.

Figure 15: Corporate Water Treatment and Distribution Emissions



5 BUSINESS AS USUAL (BAU) FORECAST

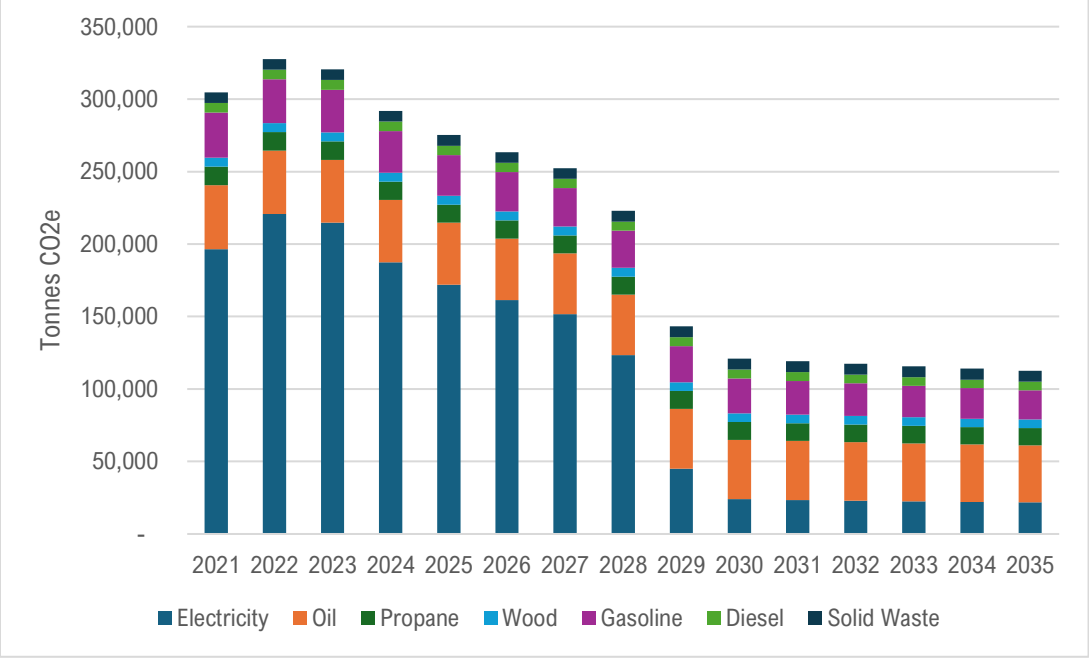
The PCP program requires a Business as Usual (BAU) forecast for approximately 10 years beyond the community's baseline. Since a goal of Truro's CEEP was a 10-year implementation plan with a timeline of 2025-2035, it was decided to forecast BAU emissions in 2035, which is 14 years past Truro's baseline year of 2021. Forecasting out to 2035 provides the Town of Truro an estimation of what their energy consumption and GHG emissions would look like if the Town took further mitigation measures are taken beyond their 2021 baseline. The BAU forecast represents emissions reductions likely to occur without municipal or local action. The main factors contributing to the BAU projection include gradual increases in population, decarbonization of the provincial electricity grid, increased fuel efficiency standards for new vehicles, and federally mandated electric vehicle sales.

Based on the forecast, if Truro takes no further action, community emissions are estimated to decrease by approximately 60% by 2035. This is largely due to legislated targets for grid electricity decarbonization, which Nova Scotia setting goals of 80% renewable electricity and no coal-fired power production by 2030.

Figure 16: 2021 Baseline Energy and Emissions Compared to Estimated 2035 Values

Year	Energy Use (kWh)	GHG Emissions (tCO_2e)
2021	2,783,818	304,689
2035	2,628,759	112,619

Figure 17: GHG Forecast to 2035 based on Business as Usual (BAU) Scenario



BAU Modeling Assumptions		
Metric	**Assumption**	**Source**
Population Growth	0.3% per year	2021 Truro-Colchester Housing Needs Assessment
Rate of Deep Energy Retrofits	0.8% of homes each year	2023 Efficiency NS Whitepaper – Deep Energy Retrofits in Nova Scotia
Rate of Residential and Commercial Solar	0.5% of buildings in 2021, scaling to 2% by 2035	2023 Canadian Market Outlook for Behind the Meter Solar
Vehicle Fuel Efficiency	0.35% Improvement each year	Based on past trends
Electricity Grid Intensity	2021: 590.5 gCO_2e/kWh 2030: 84.6 gCO_2e/kWh 2030-2035 Held Constant	ECCC Electricity Grid Intensity Projections, 2024 Nova Scotia Climate Plan
Electric Vehicle Adoption	2026 - 20% of new sales 2030 – 30% of new sales 2035 – 100% of new sales	Federal EV sales targets
New Construction	2% more efficient every 5 years	Based on current trends, assumes new national building codes are not adopted in Nova Scotia by 2035

APPENDIX B

Climate Profile: Town of Truro
Provided by ClimAtlantic

Truro's Community Energy and Emissions Plan

EASTPOINT

Climate Profile: Town of Truro

The information below shows historical and future climate information for the community. All data is from the national climate data portal, ClimateData.ca.

Temperature and precipitation data represent an average year across four periods of time, using the latest median results from international models (CMIP6). Results for the end of the century (2071-2100) are shown for both low emission (SSP2-4.5) and high emission scenarios (SSP5-8.5). Sea level rise (CMIP5) is shown for each decade, using the range of model results (5th-95th percentile) for a high scenario only (RCP8.5).

Temperature

Climate Index	1981-2010	2011-2040	2041-2070	2071-2100 [low]	2071-2100 [high]
Average temperature: Spring (°C)	4.3	5.7	7.4	7.4	9.2
Average temperature: Summer (°C)	17.5	18.8	20.6	20.7	23.4
Average temperature: Fall (°C)	8.9	10.1	12.0	12.0	14.4
Average temperature: Winter (°C)	-4.7	-3.0	-0.8	-0.9	1.3
Hottest day (°C)	30.7	32.0	33.6	34.2	36.2
Extremely hot days (> 29°C)	5 days	11 days	28 days	27 days	57 days
Coldest day (°C)	-25.7	-22.7	-19.0	-18.7	-14.3
Extremely cold days (< -15°C)	24 days	15 days	6 days	6 days	1 day
Ice days (entire day below 0°C)	54 days	41 days	27 days	26 days	14 days
Heating degree days	4314	3880	3335	3337	2822
Cooling degree days	126	204	349	346	652

Precipitation

Climate Index	1981-2010	2011-2040	2041-2070	2071-2100 [low]	2071-2100 [high]
Total precipitation: Spring (mm)	269	290	302	303	310
Total precipitation: Summer (mm)	256	272	280	273	281
Total precipitation: Fall (mm)	318	330	335	332	338
Total precipitation: Winter (mm)	326	344	364	365	396
Wet days (more than 1 mm)	144 days	145 days	144 days	145 days	142 days
Very wet days (more than 20 mm)	13 days	15 days	16 days	16 days	18 days
Maximum one-day precipitation (mm)	51	55	58	57	64

Sea level rise

Year	2010	2020	2030	2040	2050	2060	2070	2080	2090	2100
Minimum (5^{th} percentile, cm)	3	5	9	13	19	24	28	34	41	44
Median (50^{th} percentile, cm)	7	11	19	24	34	42	50	61	72	81
Maximum (95^{th} percentile, cm)	12	17	29	36	49	59	73	88	103	119

Glossary

Average temperature: Describes the average temperature for the 24-hour day. The average temperature is an environmental indicator with many applications in agriculture, engineering, health, energy management, recreation, and more.

Hottest day: Describes the warmest daytime temperature. In general, the hottest day of the year occurs during the summer months. When temperatures are very hot, people – especially the elderly – are much more likely to suffer from heat exhaustion and heat stroke. Many outdoor activities become dangerous or impossible in very high temperatures.

Extremely hot days: Describes the number of days where the daytime high temperature is warmer than 29°C. This temperature threshold is the typical criteria for issuing a heat warning in Nova Scotia.

Coldest day: Describes the lowest nighttime temperature. In general, the coldest day of the year occurs during the winter months. Cold temperatures affect our health and safety, determine what plants and animals can live in the area, limit or enable outdoor activities, define how we design our buildings and vehicles, and shape our transportation and energy use.

Extremely cold days: Describes the number of days where the lowest temperature of the day is colder than -15°C. This index gives an indication of the number of very cold days.

Ice days: Describe the number of days where the warmest temperature of the day is not above 0°C. In other words, this index indicates the number of days when temperatures have remained below freezing for the entire 24-hour period. This index is an indicator of the length and severity of the winter season.

Heating degree days: Gives an indication of the amount of space heating (e.g., from a furnace) that may be required to maintain comfortable conditions in a building during cooler months. When the daily average temperature is colder than the threshold temperature (18°C), heating degree days accumulate.

Cooling degree days: Gives an indication of the amount of space cooling (air conditioning) that may be required to maintain comfortable conditions in a building during warmer months. When the daily average temperature is hotter than the threshold temperature (18°C), cooling degree days accumulate.

Total precipitation: Describes the total amount of precipitation (rain and snow combined) that falls. Precipitation significantly impacts water availability, agricultural practices, electricity generation and wildfire suppression.

Wet days: Describes the number of days where at least 1 mm of precipitation falls. This index generally captures every day when there is measurable precipitation.

Very wet days: Describes the number of days where at least 20 mm of precipitation falls. Short duration, high intensity rainfall events may lead to flash flooding; heavy snowfall events disrupt transportation.

Maximum one-day precipitation: Describes the largest amount of precipitation that typically falls within a single 24-hour day. This index is commonly referred to as the average wettest day of the year.

Sea level change: The change in ocean level relative to land. Attributed to thermal expansion of water and meltwater from glaciers, ice caps, and ice sheets, along with vertical motion of the land. Projected sea level change is relative to 1986-2005 conditions.

APPENDIX C

Community Engagement Results

Truro's Community Energy and Emissions Plan

EASTPOINT

Community Engagement Results

Organizational sessions, interviews, workshops and a public survey were conducted to capture a diversity of community perspectives to shape understanding and ground planning efforts. This information is helping to shape plan goals, principals, strategies and the assessment of strategies.

One-hour sessions were organized with local organizations. A background document and presentation were sent in advance of the sessions. This information provided ideas on potential plan strategies to start the discussion. Notes were taken and sent back to the organization representative for confirmation. Sixteen organizations were contacted for sessions. Sessions were held with representatives of eleven organizations. Survey information was sent to all organizations. Notes were analyzed for themes (Table 1).

- Living Earth Council – Met and forwarded the survey
- BGC Truro & Colchester – Met and forwarded the survey
- Truro and Colchester Partnership for Economic Prosperity - Met and forwarded the survey
- Truro Housing Outreach Society – Met and forwarded the survey
- United Way of Colchester County - Met and forwarded the survey
- Steps on Arthur - Met and forwarded the survey
- Dal AC - Met and forwarded the survey
- Downtown Truro Business - Met and forwarded the survey
- Truro Farmers Market - Met and forwarded the survey
- Confederacy of Mainland Mi'kmaq - Met and forwarded the survey
- Millbrook First Nation planning staff - Met

Information on specific strategy options was gathered through focussed interviews/meetings.

- AREA
- Municipality of Colchester
- Roswall
- Efficiency One
- NS District Health Authority

- Climatlantic
- Departmental staff at Town of Truro

A Steering Committee with Town staff, Councillors and community members was created to provide advice on the Plan and planning process. Committee members provided guidance on groups to connect with, strategy ideas, and communications.

Town staff and planning team members attended the Low Carbon Leadership Conference in June to workshop strategy ideas around transportation management and learn and engage with participants working on similar planning efforts.

Table 1. Key Themes from Organizational Sessions

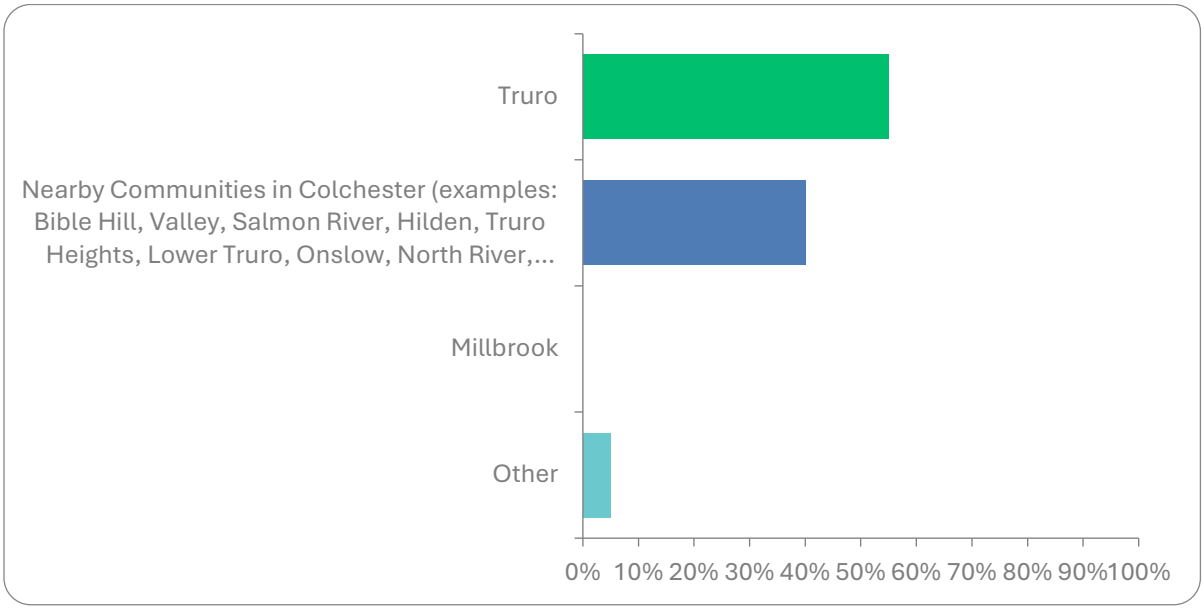
Plan Elements	Key Themes
Goals and Targets	• Affordability is top of mind. Policies and programs should not drive-up costs. Those most vulnerable will be impacted the greatest. • Targets need to be meaningful and outline practical action to get there. More substance less flash. • More education is important for individuals (such as navigating programs) and community-based initiatives such as social enterprises and volunteer efforts. • Connecting to community and active transportation plan goals make sense along with subsequent carbon goals.
Principals	• Affordability and energy equity were identified the most. • Other principles mentioned included collaboration, leadership, accountability, fairness, equity, diversity and inclusion, synergy and action. One comment was made that Collaboration shouldn't be at all costs.
Strategies: Buildings	• Rebates, grants and subsidies, community and contractor education, social enterprises and volunteer programs with a focus on equity were mentioned the most. • Other strategies identified by some included space utilization, green building standards, green revolving fund concept, incentives for meeting standards such as green space, density, affordability and environmental performance, renewables, and small district energy.
Strategies: Transportation	• Transit and safe, accessible and connected cycling and pedestrian infrastructure were the top mentions. Reasons were affordability, equity, and fair access.

Plan Elements	Key Themes
	• Transit and cycling were mentioned as providing commuter, living, health, recreational, and environmental benefits. Cycling is seen to be more accessible with e-bikes. • Few mentions for EV charging for business benefits.
Strategies: Natural Environment	• Some top mentions included urban tree planting for flooding, food, absorbing carbon, beauty, cooling, and biodiversity. • Other mentions included the tree replacement policy and developer incentives to save green space. • Indigenous Protected and Conserved Areas are an important strategy for the protection of the environment and cultural areas.
Strategies: Waste	• Free store was mentioned as a top strategy along with other activities to promote and expand programs for the reuse of items and recovery of food. • Some other mentions included sustainable procurement, promoting local farmers, using clean organics for farm fertilizer as opposed to mixed in with general waste, and more education.
Implementation	• Having staff and resources were listed as the most mentioned strategy. • Concerns that permit fees and other fees would impact affordability. • Some mentions that parking fees in certain areas could help fund transportation initiatives potentially.

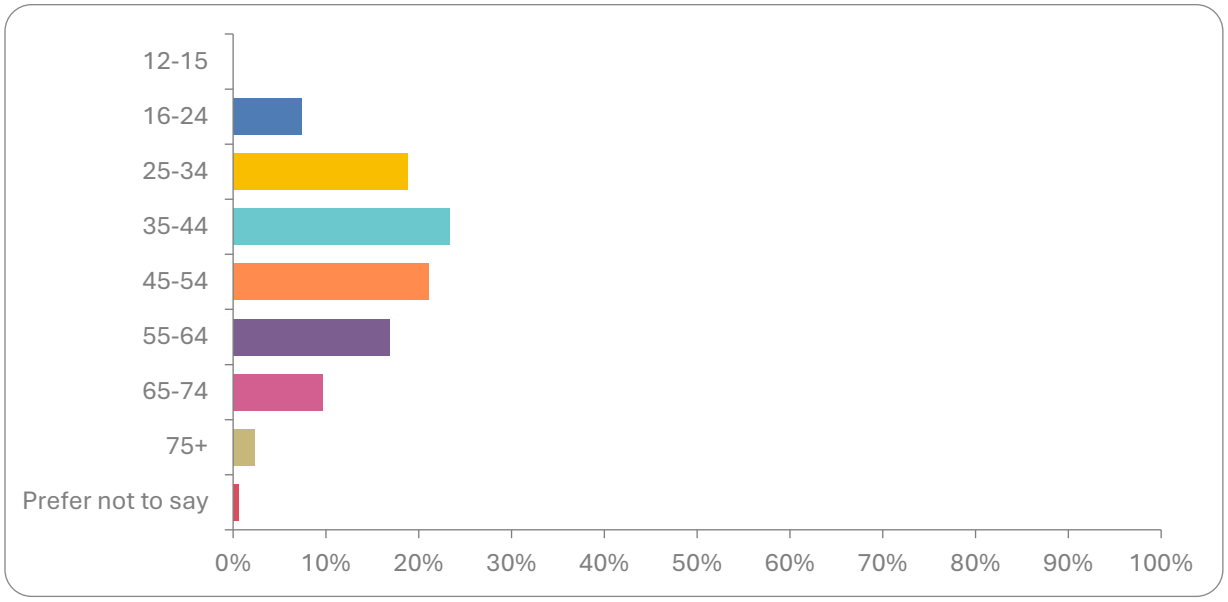
Public Survey Results

A public survey was promoted from June 3rd to June 23, 2024 through social media, organizations, and town promotional efforts. 485 Responses were received with 55% from Truro, 40% from nearby communities; and 5% from other locations. Participants provided feedback on their knowledge, concern and strategy ideas. Survey results confirmed trends seen in organizational meetings while offering some additional insights.

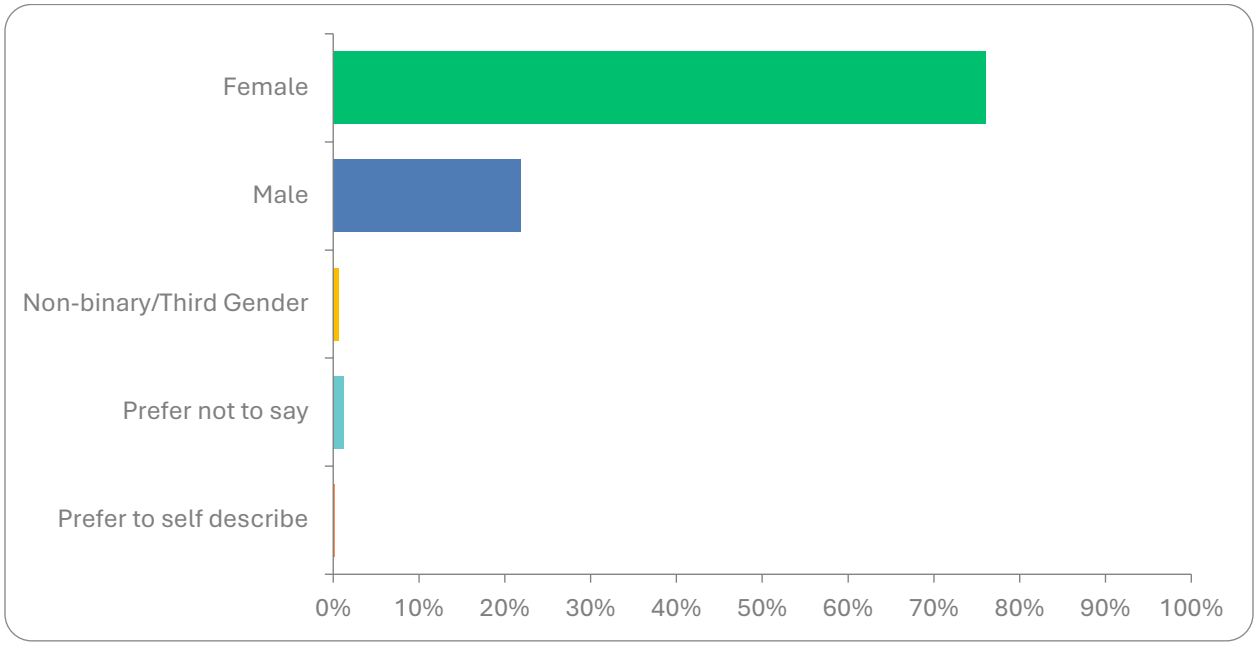
Q.1: Where Do You Live



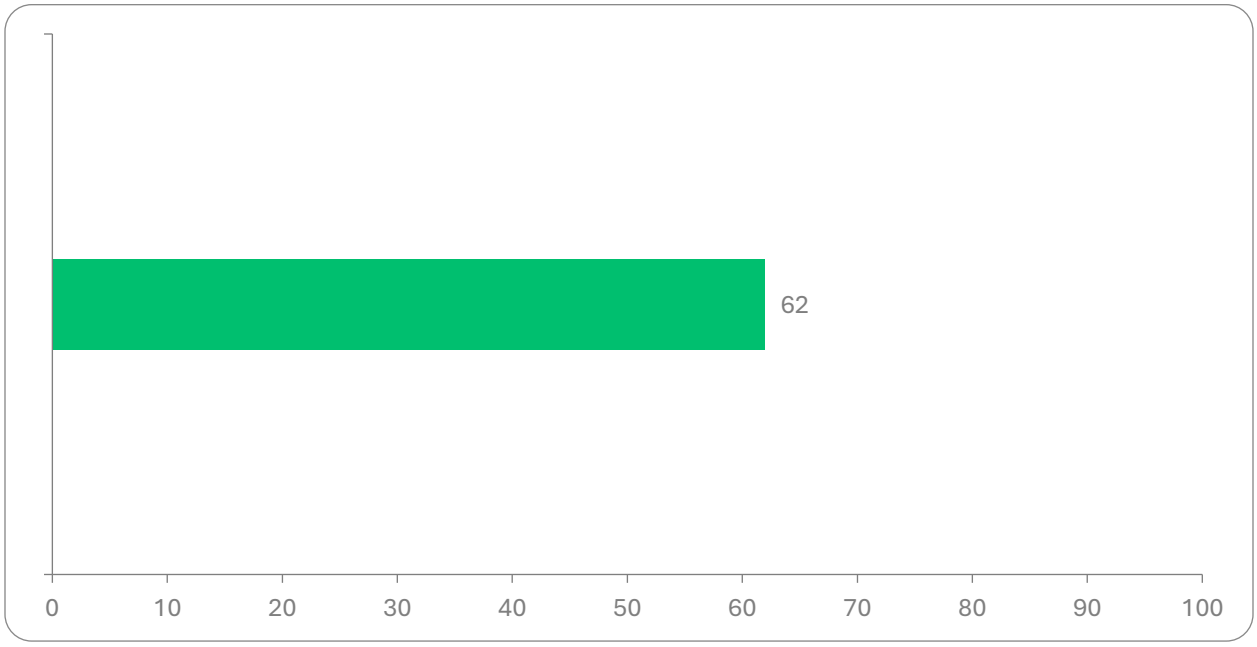
Q.2: What is your age?



Q.3: What is your gender?



Q4: How would you describe your knowledge of climate change?


62
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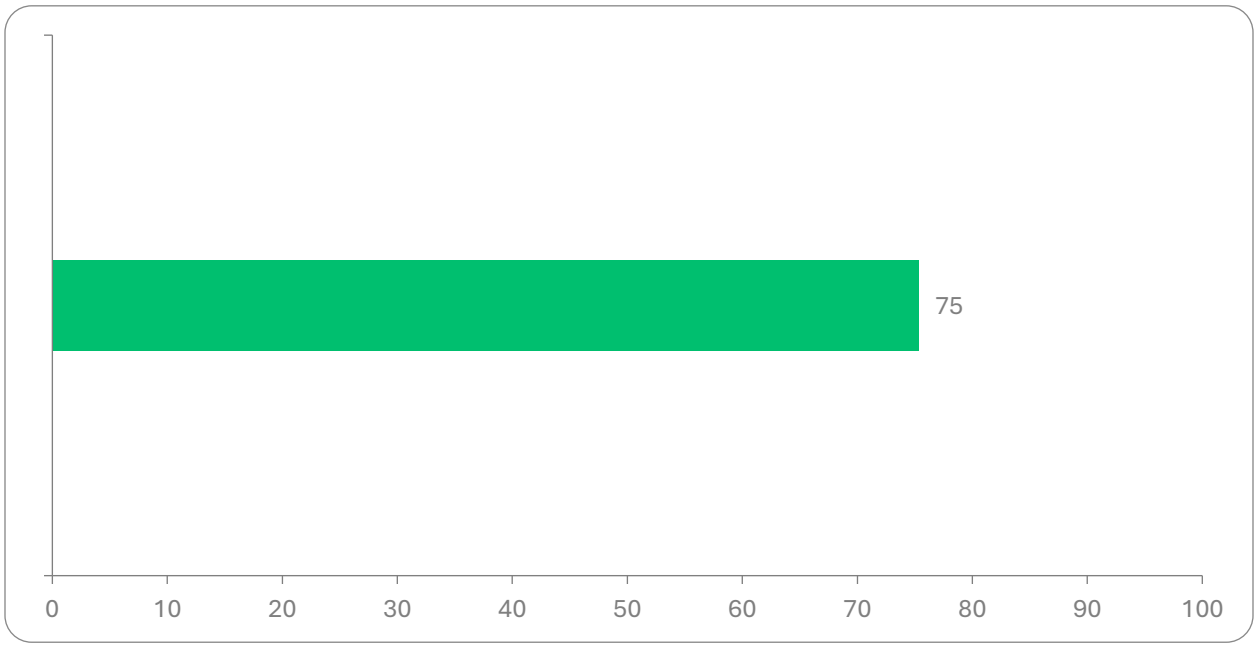
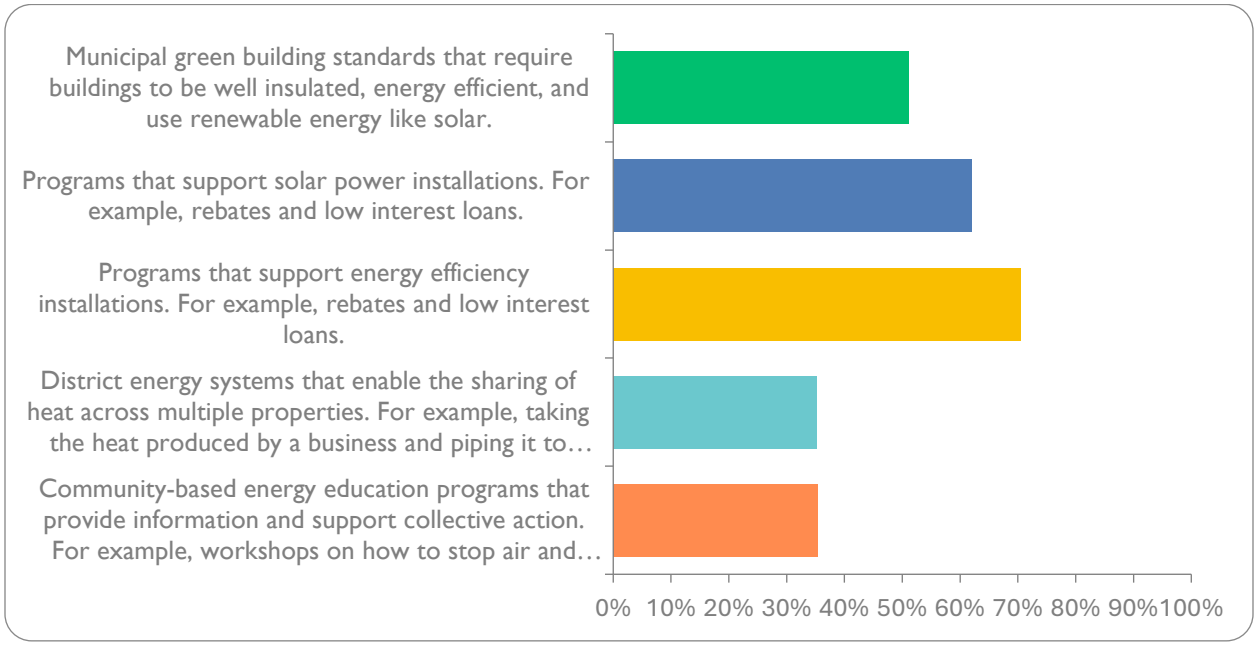
100

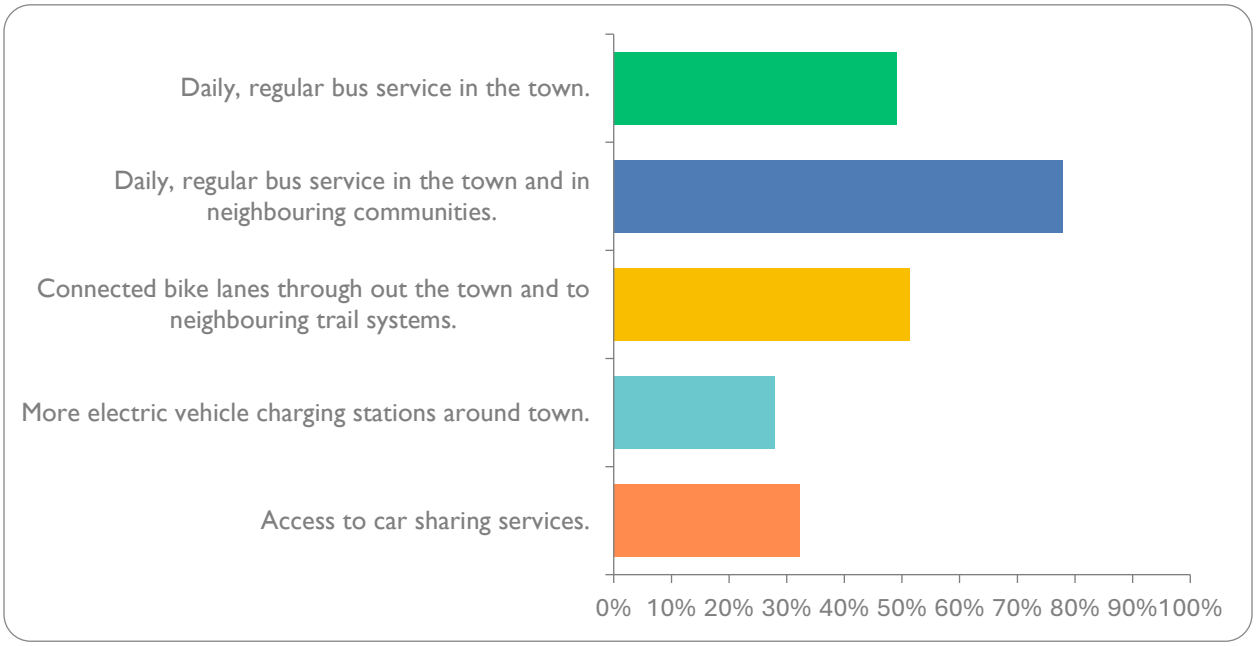
Q5: How would you describe your concern about climate change?



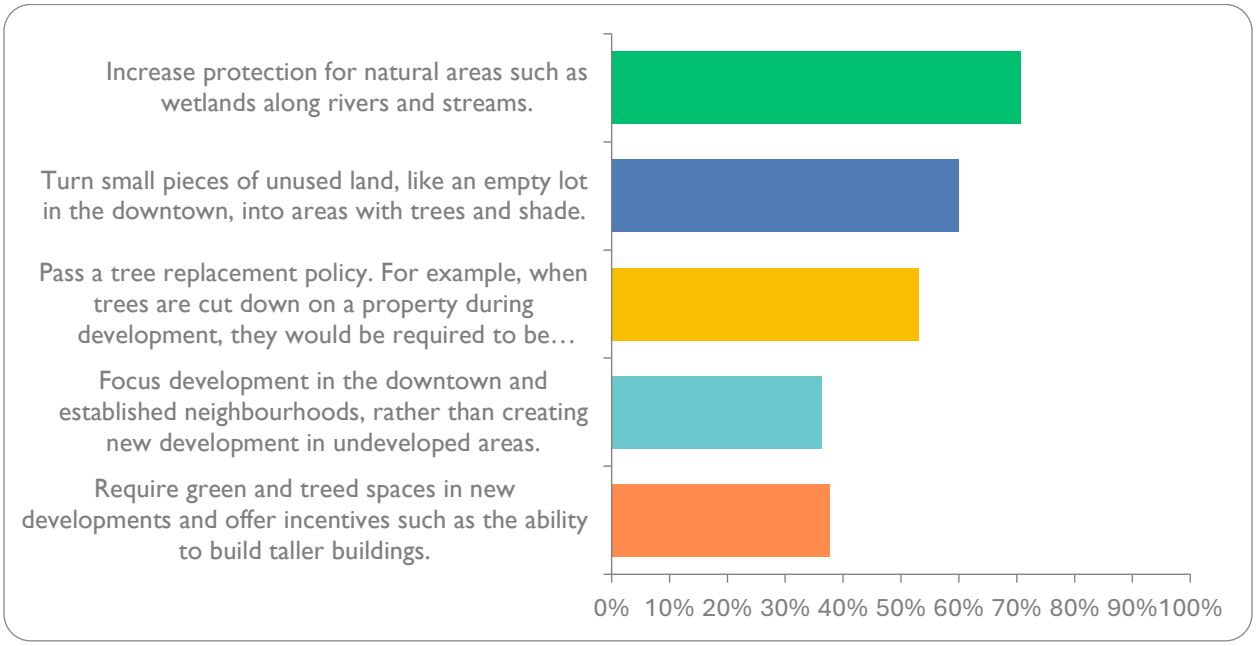
Q6: Buildings: Which actions are most important to you? [Check your top three.]



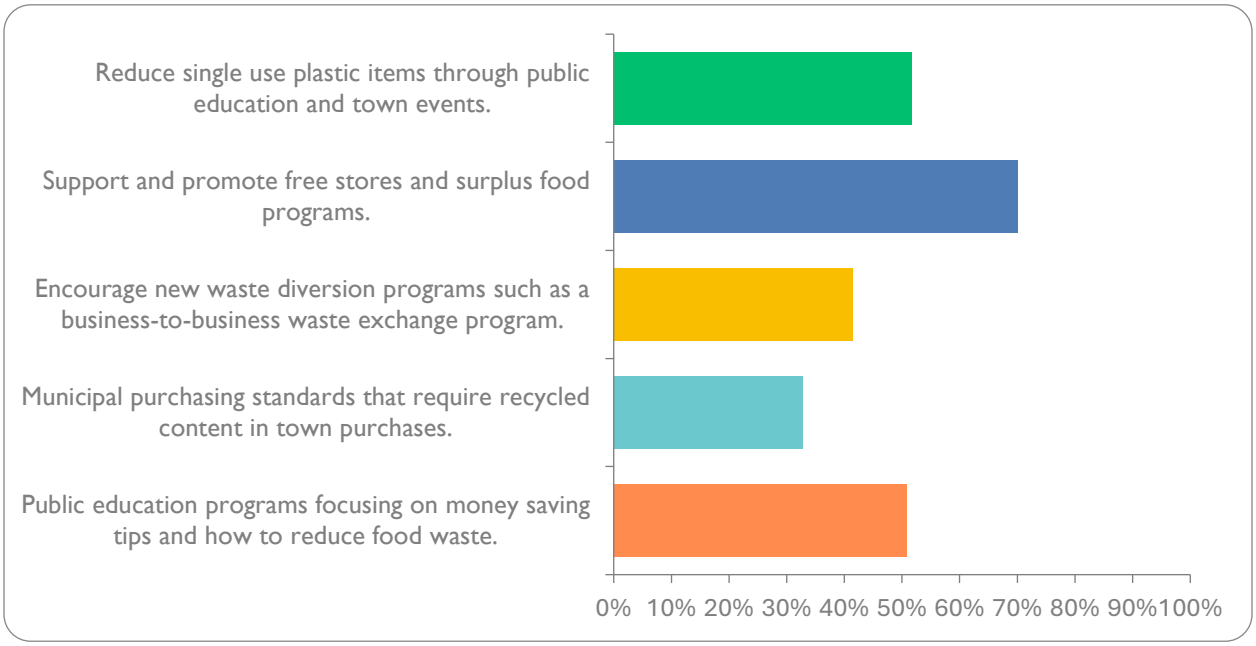
Q7: Transportation: Which services would be most important to you? [Check your top three.]



Q8: Land Use: Which actions are most important to you? [Check your top three.]



Q9: Waste: Which actions are most important to you? [Check your top three]



For Questions 6-9 some participants provided additional comments. Key themes included:

Buildings:

- More attractive rebates, interest free loans, and free energy assessments for individuals/non-profit.
- Business and industry need to act in proportion to their emissions and make reductions.
- Resources and programs for tenants who want to access energy saving measures. Truro/Colchester has a high rental population. Strategies like energy efficient appliances, weatherization and heat pumps. Rent control.
- More green spaces like green roofs, community gardens, edible fruit trees.
- Municipal driven standards, solar installations, district energy systems with waste wood and lower emissions fossil fuel use.

Transportation:

- Commuter rail and bus to Halifax and surrounding areas.
- Safer and enhanced infrastructure for walking, cycling and drivers including road maintenance. Complete streets approach prioritizing the most vulnerable road users.
- Car share services.
- Policies/programs that reduce vehicle congestion in the downtown.
- Affordability strategies for commuters of all types.

Land Use:

- Increase affordable housing.
- Make developments green including trees, pocket parks, natural buffer areas around areas like the reservoir, and shared spaces for food and recreation.
- Increase housing density and diversify– apartments, towers in denser areas, townhouses, semi- detached or small single-family homes with green spaces as well.
- Reuse unused buildings for residential living and affordable housing.
- Building and landscapes changes that are resilient to address extreme weather such as flooding and winds.
- Landscapes that support shared transportation such as car share spots and cycling infrastructure.
- Municipality - focus on existing stock.

Waste:

- More education about buying less, waste diversion and proper recycling/composting.
- More public waste diversion bins in Truro and surrounding area.
- Limit food waste through better diversion from stores and restaurants to those who need it.
- Bylaws and enforcement that deal with industrial pollution and support backyard and community food production.
- Different approaches – using land fill, recycling, landscape waste for heat generation; waste hauling price reductions for better diversion and affordability; have another truck to pick up reusable items at the curb and bring this to non-profits.

APPENDIX D

Modelling Scenario Assumptions

Truro's Community Energy and Emissions Plan

EASTPOINT

	Baseline (2021)	BAU	Ambitious	Transformational
Growth Factor (Used as proxy to model increases in activity over time)	0.3%/Year	0.3%/Year	0.3%/Year	0.3%/Year
Building Deep Energy Retrofits (Residential, commercial, industrial)	0% Baseline energy usage for various building types derived from NRCan's National Energy Use Database.	0.8%/Year (Deep energy retrofit includes: 50% energy reduction, fuel switching to heat pumps if applicable)	0.8%/Year in 2021 Rises to 2%/Year by 2030 Remains constant 2030-2050	0.8%/Year in 2021 Rises to 4%/Year by 2030 Achieves retrofits at 100% of existing buildings by 2050
New Building Construction Standards	No changes	New construction energy efficiency increases over time	New construction is net-zero energy *ready* by 2035 (80% better than current code requirements)	New construction is net-zero energy by 2035 (80% better than code, install or purchase renewable energy to get to net zero)
Vehicle Efficiency	No changes	New vehicle fuel efficiency improves over time (0.35%/year)	New vehicle fuel efficiency improves over time (0.35%/year)	New vehicle fuel efficiency improves over time (0.35%/year)
Electricity Grid Decarbonization	2021: 590.5 g/kWh	Nova Scotia's Electricity Grid Achieves its targets of 80% renewable power generation by 2030, then grid intensity	Nova Scotia's Electricity Grid Achieves its targets of 80% renewable power generation by 2030, then grid intensity remains constant at that level until 2050.	Nova Scotia's Electricity Grid Achieves its targets of 80% renewable power generation by 2030, then continues to decarbonize at rates projected by ECCC.

<table>
<tr><th></th><th>Baseline (2021)</th><th>BAU</th><th>Ambitious</th><th>Transformational</th></tr>
<tr><td></td><td></td><td>remains constant at that level until 2050.</td><td></td><td></td></tr>
<tr><td>Solid Waste Diversion</td><td>Diversion Rates from Divert NS 2023 Waste Audit</td><td>No change from baseline.</td><td>Organics and paper are 100% diverted from landfill by 2050</td><td>Organics and paper are 100% diverted from landfill by 2050</td></tr>
<tr><td>Transportation Mode Share</td><td>Mode share was assumed to be consistent with Truro's 2021 Census:<table><tr><td>Private Vehicles</td><td>87.5%</td></tr><tr><td>Public Transit</td><td>0.0%</td></tr><tr><td>Active Transit</td><td>12.5%</td></tr></table></td><td>No change from baseline.</td><td><table><tr><td></td><td>2035</td><td>2040</td><td>2050</td></tr><tr><td>Private Vehicles</td><td>81.5%</td><td>70.0%</td><td>70.0%</td></tr><tr><td>Public Transit</td><td>6.0%</td><td>15.0%</td><td>15.0%</td></tr><tr><td>Active Transit</td><td>12.5%</td><td>15.0%</td><td>15.0%</td></tr></table></td><td><table><tr><td></td><td>2035</td><td>2040</td><td>2050</td></tr><tr><td>Private Vehicles</td><td>81.5%</td><td>70.0%</td><td>65.0%</td></tr><tr><td>Public Transit</td><td>6.0%</td><td>15.0%</td><td>20.0%</td></tr><tr><td>Active Transit</td><td>12.5%</td><td>15.0%</td><td>15.0%</td></tr></table></td></tr>
<tr><td>Electric Vehicle Adoption</td><td>2021: EVs make up less than 1% of new vehicle sales</td><td>In line with current federal targets for light-duty vehicles:
10% of sales by 2025
30% of sales by 2030
100% after 2030</td><td>In line with current federal targets for light-duty vehicles:
10% of sales by 2025
30% of sales by 2030
100% after 2030</td><td>In line with current federal targets for light-duty vehicles:
10% of sales by 2025
30% of sales by 2030
100% after 2030</td></tr>
<tr><td>Rooftop Solar PV Installation</td><td>0.5% of buildings</td><td>2021: 0.5% of buildings.

Scales so that 1 in 12 buildings have rooftop solar by 2050</td><td>Scales so that 1 in 9 buildings have rooftop solar by 2050</td><td>Scales so that 1 in 3 buildings have rooftop solar by 2050</td></tr>
<tr><td>Community Solar PV</td><td>None</td><td>None</td><td>7.5 MW</td><td>7.5 MW</td></tr>
</table>

Data	Source
Truro's Anticipated Population Growth	Affordable Housing Needs & Supply Study Truro-Colchester, Nova Scotia 2021 Turner Drake and Partners Ltd.
Truro's Transportation Mode Share	Census Profile, 2021 Census of Population Truro, Town 2021
Current Rate of Deep Energy Retrofits, Nova Scotia	Deep Energy Retrofits in Nova Scotia EfficiencyOne and HRM 2023
Rooftop solar PV installations	Behind-the-Meter Solar: Canadian Market Outlook Prepare by Dunsky Energy + Climate Advisors for the Canadian Renewable Energy Association 2023
Sales Of Light-Duty Electric Vehicles	Canada's Electric Vehicle Availability Standard (regulated targets for zero-emission vehicles) Environment and Climate Change Canada
Solid Waste Diversion Rate, Colchester Solid Waste Facility	Nova Scotia's Landfill Waste Audit, 2023 March 2024 Divert NS

APPENDIX E

Action Selection Methodology

Truro's Community Energy and Emissions Plan

EASTPOINT

Action Identification and Selection Methodology

Throughout the initial phase of the project, the project team collected ideas and concepts for projects, policies, and programs that could be assessed for inclusion in the CEEP. Potential energy and emissions reductions "actions" Truro to take for energy and emissions reductions were identified through four main strategies:

Strategies	Summary
Situational Analysis	• Review of existing Federal, Provincial and Municipal Policies. • Meetings with existing municipal and potential partners.
Best Practice Review	• Review of 20+ climate plans from Canadian Cities and Municipalities, as well as existing Climate Planning Guidance from Nova Scotia and other Canadian jurisdictions. • Review of academic papers and reports on municipal climate planning • Attendance of industry events on climate planning in a municipal context.
Community Engagement	• Community meetings, interviews, survey responses, Steering Committee Feedback. • Identifies which actions and co-benefits are important and desirable within the local context.
Situational Analysis	• Review of existing Federal, Provincial and Municipal Policies. • Meetings with existing municipal staff and potential partners.
Baseline GHG Inventory	• The GHG inventory provides insight into major sources of emissions in the municipality, which facilitates analysis of opportunities for GHG emissions reductions.

Once a list of all potential actions was generated, a series of screening questions were asked to test the actions for alignment with the strategic direction of the CEEP. These questions were intended to sort out actions that would not fit within the strategic vision of the Plan. If actions received an answer of yes, they were screened out. Questions included:

- *Does this action increase emissions, directly or indirectly?*
- *Does this action lead to increased vulnerability to climate change, directly or indirectly?*
- *Could this action result in negative impacts to people/communities?*
- *Would this action impede other opportunities to reduce emissions?*

After the initial screening, a short list of the most strategically aligned actions were evaluated in further detail. The framework for action selection methodology was adapted from C40 Cities' Climate Leadership Action Selection and Prioritization Process (ASAP) tool[1]. The ASAP tool was designed to support communities in prioritizing climate actions through a comparison of benefits and technical challenges to implementation. Along with ASAP, C40 Cities created a process guide, which was adapted to suit the scope of this project. The three main factors used to prioritize actions for Truro's CEEP were: **primary benefits (energy and emissions reductions), community co-benefits, and feasibility.** Below, the action of creating a Property Assessed Clean Energy (PACE) program is used to demonstrate the action selection and prioritization process.

[1] (C40 Cities Climate Leadership Group, 2024)

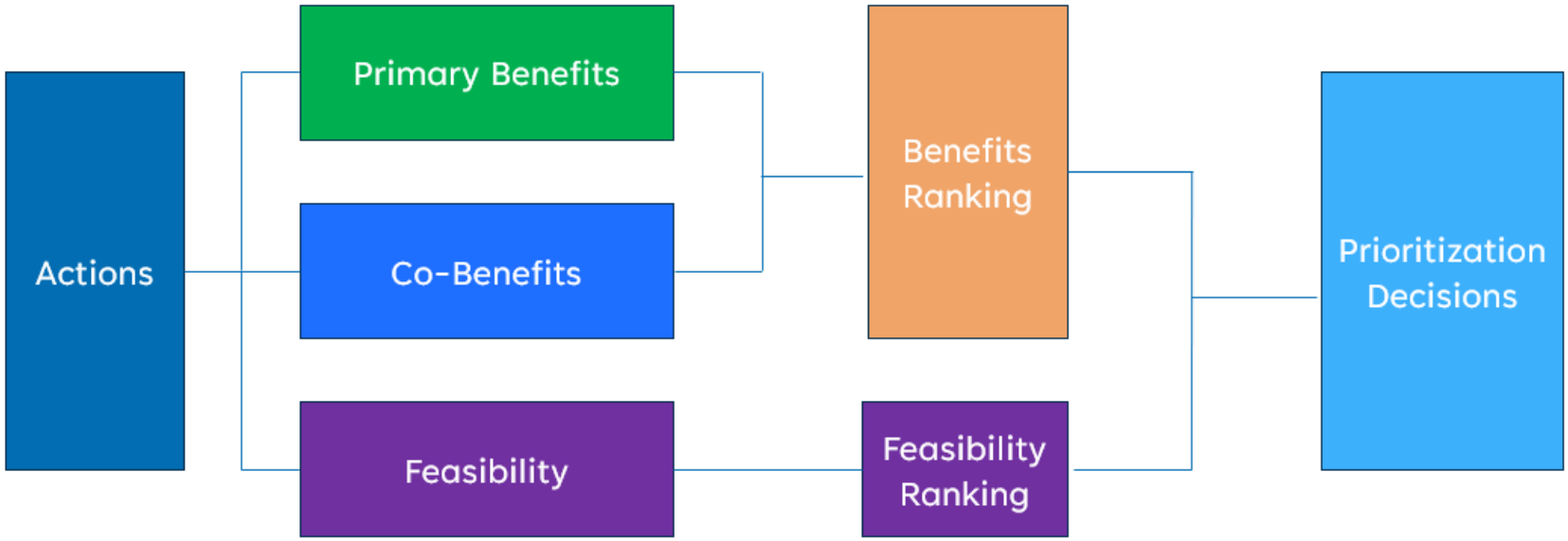


Figure 1: A Visualization of the Project's Action Selection Methodology

Primary Benefits

Energy efficiency and emissions reductions are often the core goals of the CEEP. Prioritizing these ensures that actions directly contribute to mitigating climate change, which is typically the main driver behind the plan. Energy use and emissions can also be measured and tracked over time. This allows for a clear assessment of progress toward targets, providing accountability and demonstrating the effectiveness of our actions. The following criteria were used to evaluate the primary benefits of potential actions:

- **Extent**: How widespread or scalable an action could be.
- **GHG Reduction Potential**: The overall opportunity for the action to generate GHG emissions reductions.
- **Uptake**: The rate or likelihood of adoption by stakeholders.
- **Impact**: The measurable effect on energy, emissions or cost reductions.

Table 1: Primary Benefits Assessment of a Home Energy Retrofit PACE Financing Program.

Primary Benefits: Home Energy Retrofit PACE Financing	
Extent	Retrofit financing available to 100% of homeowners, potentially targeted towards lower-income households.
GHG Reduction Potential	30 - 50% energy use reduction in homes, fuel switching away from oil to heat pumps has high impact on GHGs for individual homes.
Uptake	Currently 0.8% of homes per year receive deep energy retrofits. This rate increased in 2022 when the Canada Greener Homes Program offered expanded Federal grants and loans.
Impact	Direct decrease in heating fuel consumption, increase in electricity consumption. Lowers cost of living for homeowners.

Feasibility

A core principle of CEEP development was creating a plan that focuses on tangible, realistic actions that Truro can take given current legal, technological, and financial constraints. Once potential actions were evaluated for direct and co-benefits, the feasibility of implementing the actions was assessed so that only the most feasible actions were ultimately selected. Feasibility considerations included:

- **Municipal Sphere of Influence**: The extent to which the municipality can directly implement or influence the action.
- **Support and Partners**: The presence of community support, and potential partners who can help drive the action.
- **Financing and Funding**: The availability of financial resources or funding mechanisms to support the action's implementation.
- **Technological Readiness**: Whether the necessary technology is readily available, scalable, and proven for the proposed action.

Table 2: Feasibility Assessment of a Home Energy Retrofit PACE Financing Program.

Feasibility: Home Energy Retrofit PACE Financing	
Municipal Sphere of Influence	Truro can offer a program, promote and educate homeowners, but cannot force homeowners to renovate.
Support and Partners	Many Nova Scotian municipalities run successful PACE programs. Colchester already offers a successful PACE program (Cozy Colchester) which could be expanded to Truro.
Financing and Funding	FCM's Green Municipal fund provides up to $10 million through a combination of grants and loans.
Technological Readiness	Uses readily available and proven technologies (heat pumps, insulation, LEDs).

Co-Benefits

Once actions are shown to meet the goals of the CEEP, co-benefits provide a way to assess added value. Many energy or emissions reduction actions can also improve public health, equity, local economic development, and other social or environmental outcomes. Some co-benefits are challenging to quantify, as they cannot be tracked as objectively as energy or emissions without surveys, interviews, or case studies to capture community perceptions and values. However, as potential actions were evaluated, potential impacts on co-benefit categories covered in Section 3.2 Community Co-Benefits were assessed:

Affordability and Cost of Living

Implementing energy efficiency measures and transitioning to renewable energy sources can lower utility costs for residents and businesses. This reduction in energy costs directly translates to more affordable living, as households spend less on electricity, heating, and cooling.

Access to Renewable Energy

By increasing access to renewable energy sources such as solar, wind, and geothermal, these plans ensure that all community members can benefit from clean, reliable, and sustainable energy. Local renewable energy production also provides resiliency from price shocks that occur when communities are dependent on commodities such as fossil fuels that rely on global supply chains.

Accessibility

A focus on sustainable transportation options, such as public transit, cycling, and walking infrastructure, can improve mobility and accessibility within the community. These initiatives reduce reliance on personal vehicles, leading to lower greenhouse gas emissions and a reduction in traffic congestion. Improved public transit and active transportation infrastructure also make it easier for all residents, including those without cars, to access essential services, work, and recreation.

Public Health

Reducing emissions and transitioning to cleaner energy sources have direct health benefits. Lower levels of air pollution reduce the incidence of respiratory and cardiovascular diseases, leading to a healthier population. Additionally, initiatives that promote active

transportation and green spaces contribute to physical and mental well-being, making the community a more vibrant and healthier place to live.

Social Equity

A well-designed CEEP should address social equity by ensuring that all residents benefit from energy efficiency programs and clean energy initiatives, regardless of income level. By focusing on inclusive community engagement and equitable access to resources, these plans can help bridge gaps in energy access and reduce gaps in environmental quality, ensuring that vulnerable populations are not left behind in the transition to a net-zero future.

Preservation of the Natural Environment

By reducing reliance on fossil fuels and promoting sustainable land use practices, these plans help preserve local biodiversity, protect water resources, and reduce the community's overall ecological footprint. This not only enhances the natural environment but also ensures that future generations can enjoy the benefits of a healthy and thriving ecosystem.

Climate Change Adaptation

By enhancing infrastructure resilience, decentralizing and diversifying energy sources, protecting and restoring natural ecosystems, reducing energy demand, and fostering local energy ownership, CEEPs can equip communities with the tools they need to withstand and thrive in the face of a changing climate.

Table 3: Co-Benefits Assessment of a Home Energy Retrofit PACE Financing Program.

Co-Benefits: Home Energy Retrofit PACE Financing	
Affordability	PACE programs make energy-efficient upgrades more accessible to households that might not have the capital to invest in costly improvements. Over time, energyretrofits reduce energy bills, improving long-term affordability for homeowners by lowering energy consumption.
Access to Renewable Energy	By incorporating renewable energy into retrofits, homeowners can reduce reliance on fossil fuels, cut energy costs, and increase resilience to energy price fluctuations.
Accessibility	By providing equitable financing options and potentially offering grants or incentives for underserved groups, PACE can help overcome traditional barriers to retrofits.
Public Health	Health benefits include fewer respiratory issues, better temperature control, and improved overall well-being, particularly for elderly residents and children.
Social Equity	By prioritizing underserved or disadvantaged communities for retrofits, the program can help close the gap in energy costs and access to clean energy. It can also create jobs in these communities through energy retrofit projects.
Preservation of the Natural Environment	Deep energy retrofits help reduce overall energy consumption, which in turn lowers the demand for fossil fuels and decreases GHG emissions.
Climate Change Adaptation	Energy retrofits can make homes more resilient to extreme weather conditions, improving insulation, storm proofing, and energy systems' capacity to cope with climate events like heatwaves or storms.

Once actions were evaluated for primary benefits, co-benefits, and feasibility, a selection matrix was used to help identify which actions should be prioritized in the CEEP. Actions were plotted on a chart based on two key criteria—**Feasibility** (x-axis) and **Benefits to Truro** (y-axis):

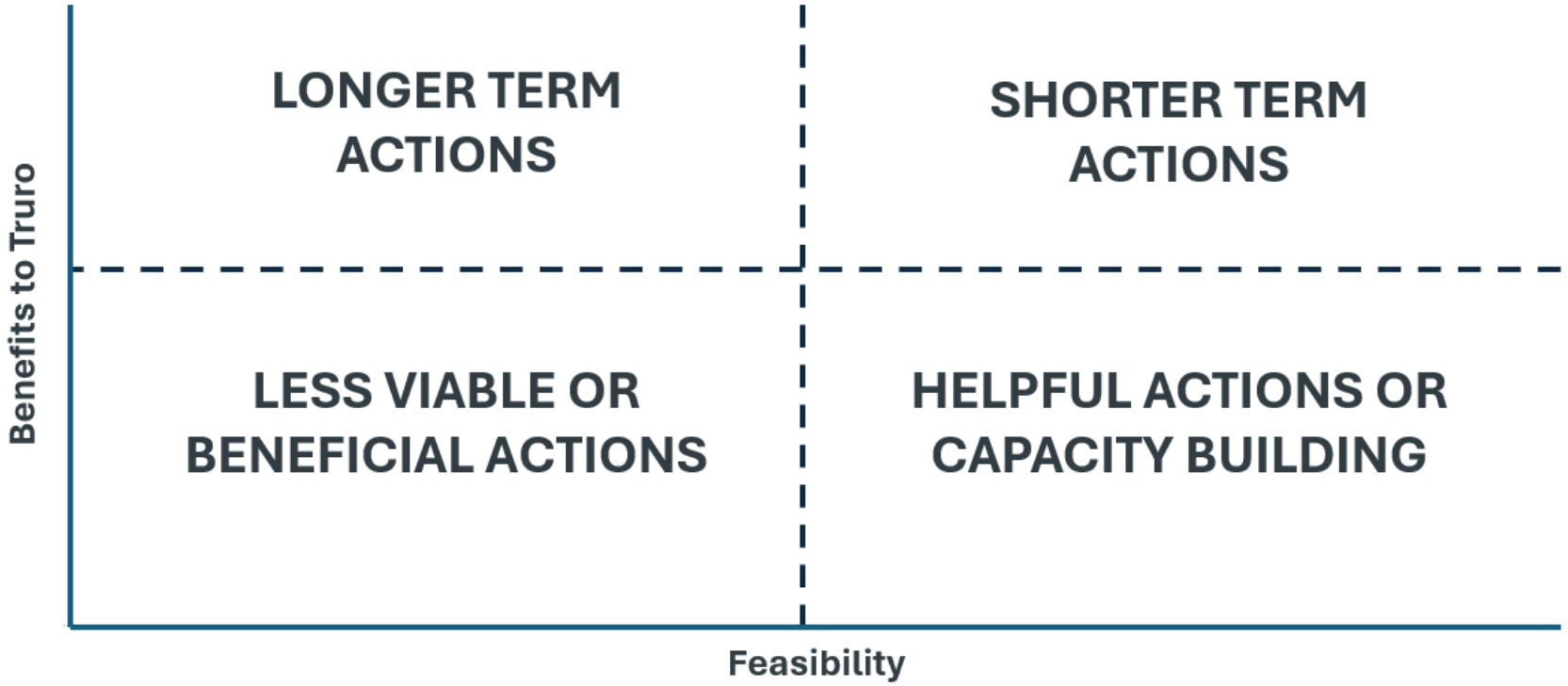


Figure 2: Action Prioritization Chart

1. Shorter-Term Actions (Top-Right Quadrant):

- **High Feasibility & Highly Beneficial**: Actions that fall into this quadrant are both easily implementable and highly beneficial to the municipality. These are the "quick wins" in terms of energy and emissions reductions and should be prioritized. Examples might include energy efficiency upgrades, community awareness campaigns, or quick-to-implement public transportation improvements.
- **Application**: These actions would typically be scheduled for immediate (1-2 years) or short-term (3-5 years) execution as they offer the most immediate return on investment and impact.

2. Longer-Term Actions (Top-Left Quadrant):

- **Low Feasibility & Highly Beneficial**: These actions promise significant benefits to Truro but may be more difficult or costly to implement in the near term. Such actions could include major infrastructure changes like district energy systems or large-scale renewable energy installations.
- **Application**: These could be medium-term (5-10 years) to long-term (10+ years) goals. If actions were deemed to be longer term, they were screened out of inclusion in the 10-year action plan. The municipality might focus on building capacity or securing funding and partnerships to make these actions more feasible over time. These actions may also require more detailed planning or feasibility studies before moving forward.

3. Helpful Actions or Capacity Building (Bottom-Right Quadrant):

- **High Feasibility & Low Benefits**: Actions in this quadrant are easy to implement but have relatively lower immediate benefits in terms of energy and emissions reductions. They may include capacity-building initiatives, small-scale pilot programs, or efforts that lay the groundwork for larger initiatives in the future.
- **Application**: While these actions may not produce large-scale emissions reductions right away, they can serve as important foundational steps. Capacity building, public engagement, or early-stage policy developments can be scheduled early on, as they are cost-effective and can support larger, more complex actions later.

4. Less Viable or Beneficial Actions (Bottom-Left Quadrant):

- **Low Feasibility & Low Benefits**: Actions in this quadrant are neither easy to implement nor particularly beneficial to Truro in the context of energy and emissions reductions. These might include technologies or policies that are not yet fully developed or cost-effective for the community.
- **Application**: These actions are the lowest priority and may not be included in the CEEP. The municipality might choose to revisit these actions if conditions change or if new funding opportunities make them more feasible or beneficial.

A municipality-led PACE program to help homeowners finance deep energy retrofits would be evaluated as highly feasible and highly beneficial, and therefore be placed in the "Shorter-Term Actions" quadrant and included in the CEEP.

APPENDIX F

CEEP Action Summary Tables

Truro's Community Energy and Emissions Plan

EASTPOINT

Community Actions

Financial Key

$ = $0 - $100,000

$$ = $100,000 - $1,000,000

$$$ = $1,000,000 - $10,000,000

$$$$ = $10,000,0000 +

#	ACTION	DESCRIPTION	JUSTIFICATION	TIMELINE	RESPONSIBLE PARTIES	COST IMPACTS	CO-BENEFITS
Goal 1: Improve Energy Efficiency in the Built Environment							
Target: Double the current pace of deep energy retrofits, targeting 2% of buildings per year by 2030.							
1	Partner with Colchester to expand their retrofit PACE Program (Cozy Colchester) to Truro.	Homeowners are provided low-interest loans to reduce their upfront costs for energy projects.	The Residential Sector accounts for approximately 34% of community emissions.	2025-2026	**Corporate Services** Colchester, FCM, Municipalities, NSFM, Clean Foundation	$$ Annually	Affordability Equity Adaptation
2	Pilot an Energy Navigator Program	Expert advice and guidance for homeowners to navigate home energy retrofits.	Accelerate the rate of retrofits or raise the average total energy savings of homes in the program.	2025-2026	**Planning and Development** Colchester, FCM, Municipalities, NSFM, Clean Foundation	$	Affordability Equity Adaptation
Target: By 2035, all new construction is net-zero energy ready.							
3	Advocate for adoption of 2020 National Model Codes.	Advocate for the adoption of the 2020 National Model Codes to accelerate the energy efficiency	2020 codes provide a pathway to make all new buildings consistent with	Ongoing	**Planning and Development** Province, NSFM	Staff Time	Adaptation Environment Accessibility

#	ACTION	DESCRIPTION	JUSTIFICATION	TIMELINE	RESPONSIBLE PARTIES	COST IMPACTS	CO-BENEFITS
		standards of new construction projects.	national net zero goals.				
Goal 2: Accelerate the Community Transition to Renewable Energy							
Objective: Reduce barriers for residents to access renewable electricity.							
4	Develop a community solar garden to provide community access to renewable electricity.	Provide renewable energy to residents at an affordable cost.	Electricity is currently the largest source of Truro's GHG emissions	2027-2030	**Engineering and Public Works** Planning and Development Corporate Services Province, FCM	$$	Access Equity Adaptation
5	Investigate Feasibility of renewable energy generation at former landfill site and Water Treatment Plant.	Adaptive reuse of a brownfield site for renewable energy production.	Reclaim space that is otherwise not suitable for development	2025-2026	**Planning and Development** Engineering and Public Works	$$	Environment Adaptation
Target: Install residential solar at a pace of 25 homes per year starting in 2026							
6	Partner with Colchester to expand their solar PACE Program (Solar Colchester) to residents of Truro	Homeowners are provided low-interest loans to reduce their upfront costs for solar projects.	Support community transition to renewable energy	2025-2026	**Corporate Services** Planning and Development Colchester, FCM, Municipalities, NSFM, Clean Foundation	$$ Annually	Access Equity Affordability
Goal 3: Reduce Emissions from Community Transportation							
Objective: Provide Supports for Low-Emission Transportation Choices							
7	Feasibility Study for Regional Public Transit System	Investigate feasibility, business case for public transit	Transportation is one of the largest sources of	2025-2026	**Planning and Development**	$$	Accessibility Health Equity

#	ACTION	DESCRIPTION	JUSTIFICATION	TIMELINE	RESPONSIBLE PARTIES	COST IMPACTS	CO-BENEFITS
			greenhouse gas emissions in Canada		Province, FCM, Colchester, Millbrook, CTCL		Affordability
8	Establish a Regional Public Transit System	Launch a public transit system for Truro in partnership with surrounding communities	There are increasing levels of support for rural transit systems at both provincial and federal levels.	2027-2030	**Planning and Development** Province, FCM, NSFM, CTCL, Debert, Millbrook	$$	Accessibility Health Equity Affordability
9	Implement Active Transportation Master Plan	Continue to implement the Active Transportation Plan	Create a transportation system that serves everyone, protects the environment, and supports a thriving, resilient economy	Ongoing	**Engineering and Public Works** **Planning and Development** Province, Colchester, Millbrook	$$ Annually	Accessibility Health Equity Affordability
10	Support Deployment of Electric Vehicle Charging Infrastructure	Enable and coordinate private sector investment, set policies and standards, and ensure equitable access to EV charging infrastructure.	Plan and prepare for adoption of EVs at a national level	Ongoing	**Corporate Services** Planning and Development Engineering and Public Works Province, FCM, NSFM	$ Annually	Accessibility Equity
Goal 4: Reduce Community Solid Waste Generation							
Target: Reduce community organic waste in landfill stream 10% by 2035							
11	Work with Divert NS and other partners to identify waste reduction opportunities in the community.	Collaborate with local food banks, nonprofits, and businesses to create or expand food rescue programs that	Organics decompose in landfills to produce methane, a powerful GHG.	Ongoing	**Parks, Recreation and Culture** Divert NS, Second Harvest	$	Environment

#	ACTION	DESCRIPTION	JUSTIFICATION	TIMELINE	RESPONSIBLE PARTIES	COST IMPACTS	CO-BENEFITS
		divert surplus food from businesses and households to those in need.					
12	Establish a community free store or reuse center.	Set up a space where community members can donate, borrow or take lightly used items that others no longer need.	Frequently requested during community engagement.	2025-2026	**Parks, Recreation and Culture** Divert NS, Second Harvest	$	Affordability Environment
Goal 5: Enhance Truro's Natural Environment							
Objective: Protect and Expand Tree Canopy and Green Spaces							
13	Pilot urban mini forests	Small-scale urban forests consisting of trees and shrubs	Mini forests offer mental health benefits, improve air quality, reduce runoff, prevent flooding and mitigate the heat island effect	2027-2030	**Engineering and Public Works** Parks, Recreation and Culture	$	Environment Health Adaptation
Goal 6: Educate and Engage the Community							
Objective: Foster collaboration with local businesses and homeowners to improve energy efficiency in the building sector							
14	Create an engagement campaign focused on community education around energy efficiency and GHG emissions reductions	Develop a community engagement campaign designed to educate and mobilize residents, businesses, and organizations around energy efficiency and (GHG) emissions reductions	To raise awareness, provide information, and foster community-wide participation in energy-saving activities	2025-2026	**Parks, Recreation and Culture** Planning and Development Efficiency NS, Truro Chamber of Commerce, Downtown Truro Partnership, Community Groups	Staff Time	Affordability Equity Access

#	ACTION	DESCRIPTION	JUSTIFICATION	TIMELINE	RESPONSIBLE PARTIES	COST IMPACTS	CO-BENEFITS
15	Launch a neighbourhood weatherization program	Partner with community organizations to provide financial assistance, materials, education, and technical support to homeowners	Helps homeowners make small home improvements to reduce energy consumption, save on utility costs, and improve the comfort of their homes.	2025-2026	**Parks, Recreation and Culture** Community groups, Clean Foundation, Efficiency NS	$	Affordability Equity Access

CORPORATE ACTIONS

#	ACTION	WHAT?	WHY?	WHEN?	WHO?	COST	CO-BENEFITS
GOAL 1: Improve Energy Efficiency in the Built Environment							
Target: Use existing municipal facilities as demonstration projects for GHG reduction, achieve net-zero emissions by 2040.							
1	Develop and implement a pathway to achieve 50% reduction in GHG emissions in Truro's major municipal buildings by 2035.	Conduct a feasibility study to identify the most cost-effective pathway to achieve a minimum 50% reduction in GHG emissions across its building portfolio by 2035.	Showcase the benefits of sustainable practices, inspire broader community adoption, and lead by example.	**Study:** 2025-2026 **Implement:** 2027-2035	**Engineering and Public Works** Province, FCM, NSFM, BTZx	$$$$	Adaptation Affordability
2	Develop and incentivize Green Development Standards.	Voluntary measures which encourage developers and builders to use sustainable design principles.	Drive industry to adapt new design and construction techniques, building the workforce of tomorrow.	2025 - 2026	**Planning and Development** Colchester, HRM	Staff Time	Adaptation Accessibility Equity Environment Adaptation
3	All new municipal buildings and major retrofits after 2030 are designed to be net-zero energy	A net-zero energy (NZE) building can produce as much clean energy as it consumes.	Prevent future carbon emissions from new municipal buildings.	2030	**Engineering and Public Works** FCM, NSFM, Province	$$ Per project	Adaptation Accessibility Equity Environment Adaptation

#	ACTION	WHAT?	WHY?	WHEN?	WHO?	COST	CO-BENEFITS
Goal 2: Accelerate the Community Transition to Renewable Energy							
Target: Municipal buildings use 100% renewable electricity by 2035.							
4	Use power purchase agreements to procure 100% renewable electricity from local sources to offset Municipal electricity emissions.	Purchase energy directly from renewable energy providers at a predetermined rate.	Shift the cost of renewable energy from capital to operational cost	2027-2030	**Corporate Services** Province Renewall	$ Added Utility Cost	Affordability Access
5	Install 1 MW of net-metered and behind the meter solar PV for use by municipal buildings.	Integrate renewable electricity into municipal operations.	Reduce emissions from electricity, operating costs.	2027-2030	**Engineering and Public Works** Corporate Services FCM, Province, ENS	$$$	Access Affordability Adaptation
Goal 3: Reduce Emissions from Community Transportation							
Target: Convert Municipal fleet to non-emitting vehicles by 2040							
6	Develop a Municipal Light-Duty Vehicle Electrification Strategy	A phased approach to transitioning municipal fleet to EVs	Reduce emissions from fleet vehicles	2025-2026	**Corporate Services** Engineering and Public Works FCM, Province	$	Affordability
7	Monitor opportunities for electrification of medium- and heavy-duty municipal fleet vehicles	Look out for opportunities to decarbonize larger vehicles and equipment	New technologies are emerging	Ongoing	**Corporate Services** Engineering and Public Works	Staff Time	Affordability

#	ACTION	WHAT?	WHY?	WHEN?	WHO?	COST	CO-BENEFITS
Goal 4: Reduce Community Solid Waste Generation							
Target: Reduce corporate organic waste in landfill stream 20% by 2035							
8	Create a zero-waste events guide and host sustainable community events.	Create a publicly accessible zero-waste event guide	Foster a culture of sustainability for its businesses and community organizations	2025-2026	**Parks, Recreation and Culture** Divert NS	Staff Time	Environment Adaptation
9	Pilot zero-waste certification at a municipal building.	Zero-waste means achieving greater than 90% diversion through waste reduction, reuse, recycling and composting.	demonstrate leadership in waste management culture at municipal facilities	2027-2030	**Corporate Services** Divert NS	$	Environment Adaptation
Goal 5: Enhance Truro's Natural Environment							
Objective: Protect and Expand Tree Canopy and Green Spaces							
10	Amend the Town's Tree Policy to require no net loss of biomass	If trees are disturbed, they should be transplanted or replaced to retain the same amount of net biomass.	Due to their many benefits to both mental and physical health, as well as their role in sequestering carbon	2025-2026	**Engineering and Public Works** Parks, Recreation and Culture	$ Annually	Environment Adaptation
Goal 6: Educate and Engage the Community							
Objective: Collaborate with local businesses and homeowners to improve energy efficiency in the building sector							
11	Create a community micro-grant program to support community innovation	Award small funding grants to project proposals that help solve existing issues, accelerate implementation of the CEEP, or drive community engagement around energy efficiency.	Supports innovative creators and local champions who have big ideas	2026	**Parks, Recreation and Culture** Community groups, Clean Foundation, Efficiency NS	$	Affordability Equity Access

Abbreviations

Colchester: Municipality of the County of Colchester

FCM: Federation of Canadian Municipalities

NSFM: Nova Scotia Federation of Municipalities

Province: Province of Nova Scotia

BTZx: Building to Zero Exchange

HRM: Halifax Regional Municipality

Renewall: Renewall Energy

ENS: Efficiency NS

Millbrook: Millbrook First Nation

CTCL: Colchester Transportation Cooperative Limited