

# Milestone# 1

## Niagara Region 2018 Corporate Baseline GHG Emissions Inventory Report Summary

March 2023

Prepared by ICLEI Canada



## Contents

|                                                          |    |
|----------------------------------------------------------|----|
| Introduction .....                                       | 1  |
| Partners for Climate Protection .....                    | 1  |
| Baseline Energy and Emissions Profile.....               | 2  |
| Corporate 2018 Energy and Emissions Profile.....         | 3  |
| Municipal Buildings and Facilities .....                 | 4  |
| Corporate Vehicle Fleet & Equipment.....                 | 5  |
| Outdoor Lighting and Traffic Signals .....               | 6  |
| Water & Wastewater.....                                  | 6  |
| Solid Waste .....                                        | 7  |
| Business-as-Usual Energy Use GHG Emissions Forecast..... | 8  |
| Business-as-Usual Cost Projections .....                 | 10 |
| Monitoring and Reporting .....                           | 10 |

## Figures

|                                                                                                                                                 |    |
|-------------------------------------------------------------------------------------------------------------------------------------------------|----|
| Figure 1: The PCP Five-Milestone Framework.....                                                                                                 | 1  |
| Figure 2: Projected municipal energy use under a business-as-usual scenario by sector to 2051.....                                              | 9  |
| Figure 3: Projected municipal GHG emissions under a business-as-usual scenario by sector to 2051 .....                                          | 9  |
| Figure 4: Projection of energy expenditures under a business-as-usual scenario, under a low and high-cost scenario for the Niagara Region ..... | 10 |

## Tables

|                                                                                                      |   |
|------------------------------------------------------------------------------------------------------|---|
| Table 1: Total scope 1 and 2 municipal energy use, energy costs and GHG emissions in 2018.....       | 3 |
| Table 2: Total scope 3 municipal energy use, energy costs, and GHG emissions in 2018 .....           | 3 |
| Table 3: Total scope 1 and 2 municipal energy consumption and costs by fuel type in 2018.....        | 4 |
| Table 4: Total municipal building energy consumption, costs and GHG emissions by asset in 2018 ..... | 4 |
| Table 5: Municipal fleet fuel use, energy costs, and GHG emissions in 2018.....                      | 6 |

## Niagara Region 2018 Corporate GHG Inventory Summary

|                                                                                                           |   |
|-----------------------------------------------------------------------------------------------------------|---|
| Table 6: Municipal vehicle fleet fuel use and GHG emissions by vehicle type .....                         | 6 |
| Table 7: Water and wastewater treatment process total energy use, emissions and energy costs in 2018..... | 7 |
| Table 8: Non-treatment process related energy use, costs and emissions .....                              | 7 |

## Introduction

This document is a summary of the Niagara Region (the Region) 2018 Corporate Baseline Greenhouse Gas (GHG) Emissions Inventory. The GHG Emissions Inventory (Hereon referred to as the Inventory) encompasses data on municipal energy use and GHG emissions, in addition to a business-as-usual emissions forecast for Niagara Region's corporate operations.

## Partners for Climate Protection

The Region's Inventory was developed in compliance with the Partners for Climate Protection (PCP) program requirements. PCP is a partnership between the Federation of Canadian Municipalities (FCM) and ICLEI Canada – Local Governments for Sustainability. This program helps local government reduce municipal emissions by guiding municipalities through a five-step Milestone Framework (Figure 1).

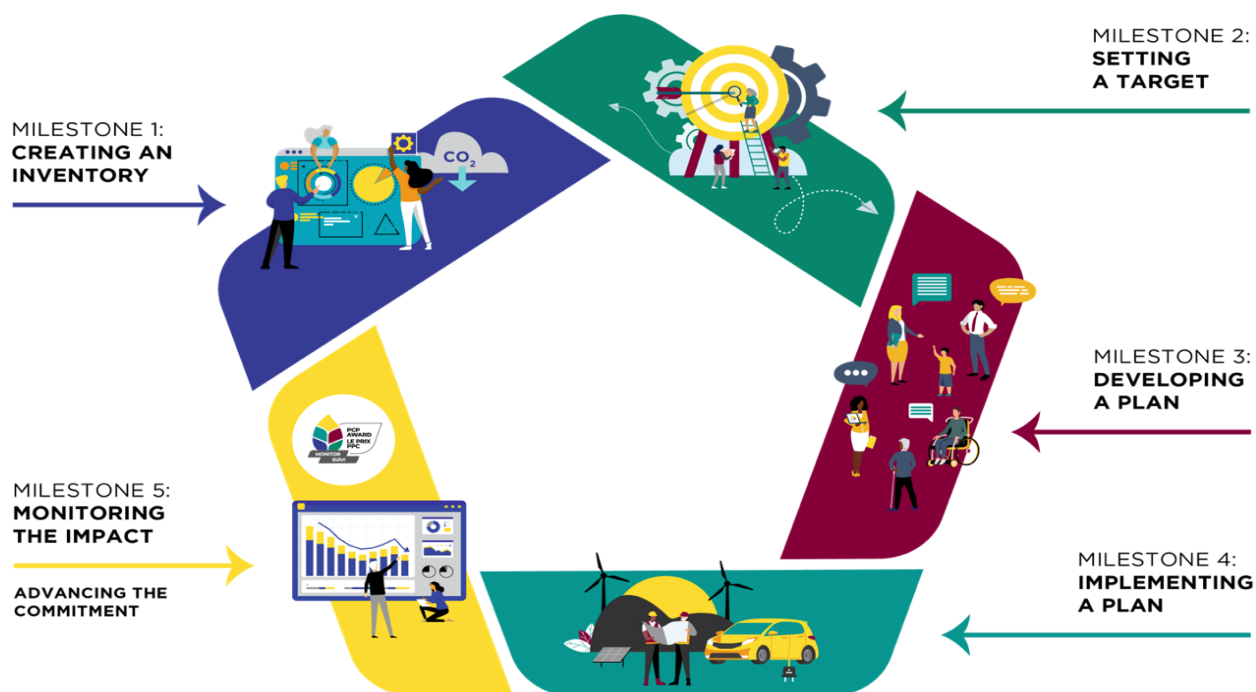


Figure 1: The PCP Five-Milestone Framework

The PCP program offers two streams: Corporate and community. A corporate inventory encompasses all energy use and GHG emissions stemming from municipal operations, including buildings, fleet, outdoor lighting and traffic signals, water and wastewater, and solid waste.

## Baseline Energy and Emissions Profile

To develop the baseline energy and emissions profile, this report followed the PCP Protocol<sup>1</sup>, which applies industry best practices for quantifying emissions at the local level (Greenhouse Gas Protocol<sup>2</sup> and IPCC Guidelines for Greenhouse Gas Inventories<sup>3</sup>) to the context of municipal operations. The baseline energy profile and GHG emissions inventory tracks three principal GHGs that arise from municipal operations: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O). Emissions fall into one of three scopes:

**Scope 1 GHG emissions:** Direct emissions from sources owned or operated by the corporation.

**Scope 2 GHG emissions:** Indirect emissions from sources owned or operated by the corporation.

**Scope 3 GHG emissions:** Emissions from sources neither owned nor operated by the corporation but are related to the corporation activities.

This Inventory's boundary has been determined using an approach known as operational control, which requires local governments to report 100 per cent of GHG emissions from operations over which it has control (scope 1 and scope 2 emissions). Indirect (scope 3) emissions included in this Inventory are sources of emissions associated with Niagara Region's operations but are not under full operational control and decision-making authority (i.e., police vehicle fleets, the contracted community waste collection vehicle fleet and landfill emissions). Energy and GHG emissions totals will include only scope 1 and 2 emissions. Scope 3 emissions will be reported separately. Energy consumed outside the municipal boundary (and the associated emissions generated) as a result of activities taking place within Niagara region are excluded.

The following information will be presented in this report:

- Total energy consumed by Niagara Region in 2018, by sector and by source.
- Total energy dollars spent by Niagara Region, by sector and by source.
- Total emissions generated by Niagara Region, by sector, source, and scope.
- A business-as-usual GHG emissions forecast for 2032, 2041 and 2051.

---

<sup>1</sup> ICLEI Canada. (2014). PCP Protocol: Canadian Supplement to the International Emissions Analysis Protocol.

<sup>2</sup> Greenhouse Gas Protocol. (2015). The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard.

<sup>3</sup> IPCC. (2006). Guidelines for National Greenhouse Gas Inventories.

## Corporate 2018 Energy and Emissions Profile

In 2018, Niagara Region scope 1 and 2 sources used 796,410 GJ of energy, which resulted in \$18,350,788 of energy costs and 22,626 tC02e GHG emissions. Scope 1 and 2 energy consumption, costs, and GHG emissions are disaggregated by sector in Table 1. Table 2 displays the equivalent data for scope 3 emissions.

Table 1: Total scope 1 and 2 municipal energy use, energy costs and GHG emissions in 2018

| Sector                               | Energy Consumption (GJ) | Energy Costs (\$) | GHG Emissions (tC02e) |
|--------------------------------------|-------------------------|-------------------|-----------------------|
| Buildings                            | 376,218                 | \$7,597,162       | 12,668                |
| Fleet                                | 53,004                  | \$1,606,974       | 3,526                 |
| Outdoor Lighting and Traffic Signals | 10,886                  | \$465,679         | 91                    |
| Water & Wastewater                   | 356,301                 | \$8,680,972       | 6,280                 |
| Operational Waste <sup>4</sup>       | N/A                     | N/A               | 62                    |
| Totals*                              | 796,410                 | \$18,350,788      | 22,626                |

\*Values may not sum to total due to rounding

Table 2: Total scope 3 municipal energy use, energy costs, and GHG emissions in 2018

| Sector                               | Energy Consumption (GJ) | Energy Costs (\$) | GHG Emissions (tC02e) |
|--------------------------------------|-------------------------|-------------------|-----------------------|
| Niagara Region Police Vehicle Fleet  | 31,991                  | \$1,015,872**     | 2,074                 |
| Contracted Waste Collection Vehicles | 86,931                  | \$2,500,845       | 5,910                 |
| Landfilled Waste                     | N/A                     | N/A               | 37,492                |
| Totals*                              | 118,922                 | 3,516,717         | 45,477                |

\*Values may not sum to total due to rounding

\*\*Estimated based on total per L fuel cost of the vehicle fleet

Table 3 shows scope 1 and 2 municipal energy consumption, costs, and GHG emissions by fuel type. According to this data, while Electricity is the largest source of fuel-derived energy consumption (46%), Natural Gas is responsible for producing the

<sup>4</sup> Operational waste refers to waste collected from waste bins at municipally owned facilities.

## Niagara Region 2018 Corporate GHG Inventory Summary

largest quantity of GHG emissions amongst fuel types. In fact, Natural Gas accounts for 70% of fuel-derived GHG emissions.

Table 3: Total scope 1 and 2 municipal energy consumption and costs by fuel type in 2018

| Fuel type   | Energy Consumption (GJ) | tCO2e               | Energy Costs (\$) |
|-------------|-------------------------|---------------------|-------------------|
| Electricity | 370,355                 | 3,083               | \$13,992,339      |
| Natural Gas | 309,787                 | 15,775              | \$2,751,475       |
| Gasoline    | 24,854                  | 1,604               | \$797,177         |
| Diesel      | 28,149                  | 1,936               | \$809,797         |
| Biogas      | 63,264                  | 19                  | N/A               |
| Totals*     | 796,410                 | 22,403 <sup>5</sup> | 18,350,788        |

\*Values may not sum to total due to rounding

### Municipal Buildings and Facilities

As displayed in Table 1, municipally owned and operated buildings and facilities are the Region's top energy consumer and greatest producer of GHG emissions, accounting for 47% of municipal energy consumption and 56% of municipal scope 1 and 2 GHG emissions. Moreover, Buildings account for 41% of energy costs, second only to Water and Wastewater. There are 10 asset categories included in the Region's building portfolio; Energy consumption and total GHG emissions from each category are presented in Table 4.

Table 4: Total municipal building energy consumption, costs and GHG emissions by asset in 2018

| Asset Category            | Electricity Consumption (kWh) | Electricity GHG Emissions (tCO2e) | Natural Gas Consumption (m3) | Natural Gas GHG Emissions (tCO2e) | Total Energy Consumption (GJ) | Total GHG Emissions (tCO2e) |
|---------------------------|-------------------------------|-----------------------------------|------------------------------|-----------------------------------|-------------------------------|-----------------------------|
| Niagara HQ                | 2,869,344                     | 86                                | 168,148                      | 319                               | 16,602                        | 405                         |
| Child Care Services       | 272,681                       | 8                                 | 49,802                       | 95                                | 2,839                         | 103                         |
| Long-term Care Facilities | 11,104,930                    | 333                               | 1,721,107                    | 3,269                             | 104,175                       | 3,602                       |
| Health Care               | 350,299                       | 11                                | 54,842                       | 104                               | 3,307                         | 115                         |
| Niagara EMS               | 400,946                       | 12                                | 124,073                      | 236                               | 6,446                         | 248                         |

<sup>5</sup> Excludes emissions from operational waste and flaring.

## Niagara Region 2018 Corporate GHG Inventory Summary

| Asset Category                        | Electricity Consumption (kWh) | Electricity GHG Emissions (tCO2e) | Natural Gas Consumption (m3) | Natural Gas GHG Emissions (tCO2e) | Total Energy Consumption (GJ) | Total GHG Emissions (tCO2e) |
|---------------------------------------|-------------------------------|-----------------------------------|------------------------------|-----------------------------------|-------------------------------|-----------------------------|
| Niagara Regional Housing              | 16,314,940                    | 489                               | 2,882,768                    | 5,475                             | 166,261                       | 5,965                       |
| Niagara Regional Police               | 5,860,042                     | 176                               | 507,651                      | 964                               | 40,032                        | 1,140                       |
| Transportation Patrol Yards           | 1,051,934                     | 32                                | 161,889                      | 307                               | 9,825                         | 339                         |
| Employment Offices and Court Services | 944,137                       | 28                                | 125,480                      | 238                               | 8,079                         | 267                         |
| Waste Management Facilities           | 3,035,775                     | 91                                | 207,056                      | 393                               | 18,652                        | 484                         |
| Totals*                               | 42,205,026                    | 1,266                             | 6,002,816                    | 11,401                            | 376,218                       | 12,668                      |

\*Values may not sum to total due to rounding

### Corporate Vehicle Fleet & Equipment

Niagara Region owns and operates a fleet of 317 vehicles consisting of gasoline and diesel cars, vans, pickups, heavy duty trucks, and snowplows, EMS vehicles, as well as off-road equipment such as loaders, graders, backhoes tractors, and riding mowers. Corporate fleet accounts for 7% of scope 1 and 2 energy consumption, 9% of municipal energy costs, and 16% of scope 1 and 2 GHG emissions. Table 5 displays fleet energy use, costs and GHG emissions by fuel type, and Table 6 presents this data disaggregated by vehicle type.



## Niagara Region 2018 Corporate GHG Inventory Summary

Table 5: Municipal fleet fuel use, energy costs, and GHG emissions in 2018

| Fuel Type | Energy Consumption (L) | Energy Consumption (GJ) | Energy Costs (\$) | GHG Emissions (tCO2e) |
|-----------|------------------------|-------------------------|-------------------|-----------------------|
| Gasoline  | 728,720                | 25,257                  | \$797,177         | 1,604                 |
| Diesel    | 730,015                | 28,237                  | \$809,797         | 1,922                 |
| Totals*   | 1,458,735              | 53,494                  | 1,606,974         | 3,526                 |

\*Values may not sum to total due to rounding

Table 6: Municipal vehicle fleet fuel use and GHG emissions by vehicle type

| Vehicle Type                        | Diesel Fuel Use (L) | Gasoline Fuel Use (L) | Total Fuel Use (GJ) | Diesel GHG Emissions (tCO2e) | Gasoline GHG Emissions (tCO2e) | Total GHG Emissions (tCO2e) |
|-------------------------------------|---------------------|-----------------------|---------------------|------------------------------|--------------------------------|-----------------------------|
| Light Duty (Cars/Vans/Pickups)      | 3,276               | 448,272               | 15,416              | 9                            | 987                            | 996                         |
| Medium Duty (Ford F450/550)         | 29,439              | 77,517                | 3,779               | 78                           | 171                            | 248                         |
| Heavy Duty (Large trucks/snowplows) | 307,030             | 0                     | 11,839              | 805                          | 0                              | 805                         |
| OHEV (Loaders/Graders/Backhoes)     | 30,781              | 0                     | 1,187               | 81                           | 0                              | 81                          |
| OMED (Tractors)                     | 41,895              | 0                     | 1,615               | 111                          | 0                              | 111                         |
| Misc. (Riding Mowers)               | 2,844               | 24                    | 110                 | 7                            | 0                              | 7                           |
| EMS                                 | 314,750             | 202,907               | 19,057              | 831                          | 447                            | 1,278                       |
| Totals*                             | 730,015             | 728,720               | 53,004              | 1,922                        | 1,604                          | 3,526                       |

\*Values may not sum to total due to rounding

### Outdoor Lighting and Traffic Signals

Niagara Region owns, operates and maintains 282 traffic signals, 115 warning beacons and over 1,550 roadway lights. Outdoor lighting consumed 10,886 GJ of energy in 2018 accounting for 1% of energy consumption, at a cost of \$465,679 or 3% of energy costs (Table 1). Electricity usage for outdoor lighting generated 91 tCO2e, contributing less than 1% to scope 1 and 2 GHG emissions.

### Water & Wastewater

The Region operates 10 wastewater treatment plants, 6 water treatment plants, 132 remote wastewater facilities and 84 remote water facilities, as well as non-treatment process related buildings including the central maintenance building and environmental services centre. Water and wastewater collection and distribution facilities are not

## Niagara Region 2018 Corporate GHG Inventory Summary

included here as they fall under member municipality jurisdiction and are not under operational control of Niagara Region.

Water and wastewater accounts for 45% of municipal energy consumption, 28% of scope 1 and 2 GHG emissions, and 47% of energy costs. Table 7 provides an overview of energy use, costs, and GHG emissions in the water and wastewater treatment process. This table does not include non-treatment process related energy use, costs and emissions. Information regarding non-treatment processes is displayed in Table 8.

Furthermore, anaerobic digesters at the wastewater treatment plants produced an additional 19tCO<sub>2</sub>e, and fugitive emissions from flaring accounts for 161 tCO<sub>2</sub>e.

Table 7: Water and wastewater treatment process total energy use, emissions and energy costs in 2018

|            | Electricity Use<br>(kWh) | Natural Gas<br>(kWh) | Total Energy<br>Use | GHG Emissions<br>(tCO <sub>2</sub> e) | Energy Costs<br>(\$) |
|------------|--------------------------|----------------------|---------------------|---------------------------------------|----------------------|
| Water      | 19,379,719               | 669,389              | 94,735              | 1,853                                 | 2,708,759            |
| Wastewater | 37,552,971               | 1,518,708            | 191,839             | 4,011                                 | 5,855,754            |
| Totals*    | 56,932,690               | 2,188,097            | 286,574             | 5,864                                 | 8,564,513            |

\*Values may not sum to total due to rounding

Table 8: Non-treatment process related energy use, costs and emissions

| Building Name                         | Electricity<br>Use<br>(kWh) | Electricity<br>Cost (\$) | Electricity<br>Emissions<br>(tCO <sub>2</sub> e) | Natural<br>Gas Use<br>(m <sup>3</sup> ) | Natural<br>Gas Cost<br>(\$) | Natural Gas<br>Emissions<br>(tCO <sub>2</sub> e) |
|---------------------------------------|-----------------------------|--------------------------|--------------------------------------------------|-----------------------------------------|-----------------------------|--------------------------------------------------|
| Central<br>Maintenance<br>Building    | 252,721                     | \$ 28,244                | 8                                                | 48,165                                  | \$ 12,993                   | 91                                               |
| Environmental<br>Services<br>Building | 357,834                     | \$ 57,996                | 11                                               | 66,209                                  | \$ 17,227                   | 126                                              |
| Totals*                               | 610,555                     | \$ 86,239                | 18                                               | 114,374                                 | \$ 30,220                   | 217                                              |

\*Values may not sum to total due to rounding

### Solid Waste

Due to the operational control of the landfills by Niagara Region, corporate waste emissions are divided into total emissions from active municipally owned and operated landfills, and emissions from operational waste which is waste collected from corporate waste bins at municipally owned facilities. Operational waste is a subset of total landfill emissions and therefore is not added to total landfill emissions. Operational waste

## Niagara Region 2018 Corporate GHG Inventory Summary

includes emissions from green bin collection delivered to composting facilities. Operational waste contributed less than 1% to total landfill emissions.

Niagara Region is also responsible for 12 inactive landfill sites. Inactive landfill sites can continue to produce GHG emissions for years after their closure. For the purposes of GHG baseline inventories, the methane commitment model is used to calculate landfill GHG emissions from the decomposition of biomass into methane (CH<sub>4</sub>). As waste decomposes a portion of emissions are released every year. The methane commitment model calculates the amount of GHG emissions from landfills by using the annual waste disposal amount, regardless of when the emissions actually occurred. In other words, future emissions from waste disposed in a certain year are attributed to that specific inventory year, even though the decomposition of waste and the resulting emissions can take place over many years. Using this method, closed landfills are not included in the Inventory. Total emissions from Niagara Region's two landfills account for 55% of scope 1, 2 and 3 emissions. The Humberstone landfill uses a partial landfill gas collection which significantly reduces emissions.

Table 9: Landfill waste, open burning, and operational waste GHG emissions in 2018

| Asset Category                          | Tonnes of Waste | GHG Emissions (tCO <sub>2</sub> e) |
|-----------------------------------------|-----------------|------------------------------------|
| Humberstone Landfill                    | 54,420          | 14, 693                            |
| Niagara Road 12 Landfill                | 16,888          | 22,799                             |
| Operational Waste* (not added to total) | 62              | 62                                 |
| Totals**                                | 71,308          | 37,492                             |

\*Includes 19 tonnes of compost collected from municipal facilities

\*\*Values may not sum due to rounding

## Business-as-Usual Energy Use GHG Emissions Forecast

The purpose of the Business-as-Usual (BAU) scenario is to understand future energy consumption, energy costs and emissions for the Niagara Region, assuming no action is taken to reduce energy or emissions. Energy consumption, costs and GHG emissions were modelled from 2018 to 2032, 2041, and 2051, in line with population forecasts in the Watson & Associates Economist Ltd. Niagara Region Development Charges Background Study. The BAU forecast is not an absolute picture of future energy use and GHG emissions but instead serves as a tool to guide decision making on energy and emissions mitigation strategies.

Figure 2 shows that energy use is projected to steadily increase throughout the Region between 2018 and 2051. The greatest expected increase is observed in Outdoor Lighting and Traffic Signals, increasing by approximately 46% from 2018 to 2051.

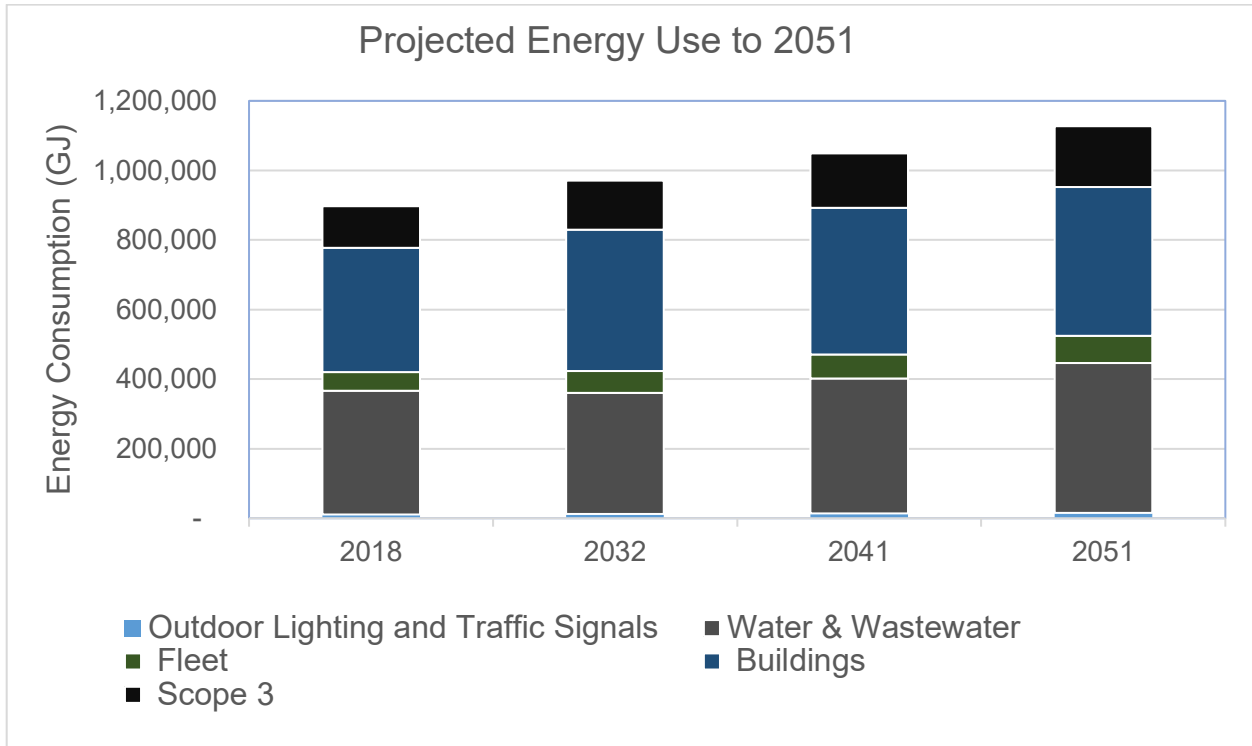


Figure 2: Projected municipal energy use under a business-as-usual scenario by sector to 2051

Figure 3 displays projected GHG emissions from 2018 to 2051. Significant increases are observed in Outdoor Lighting and Traffic Signals (357%), and Water and Wastewater (132%). Total emissions are expected to increase 54% by 2051.

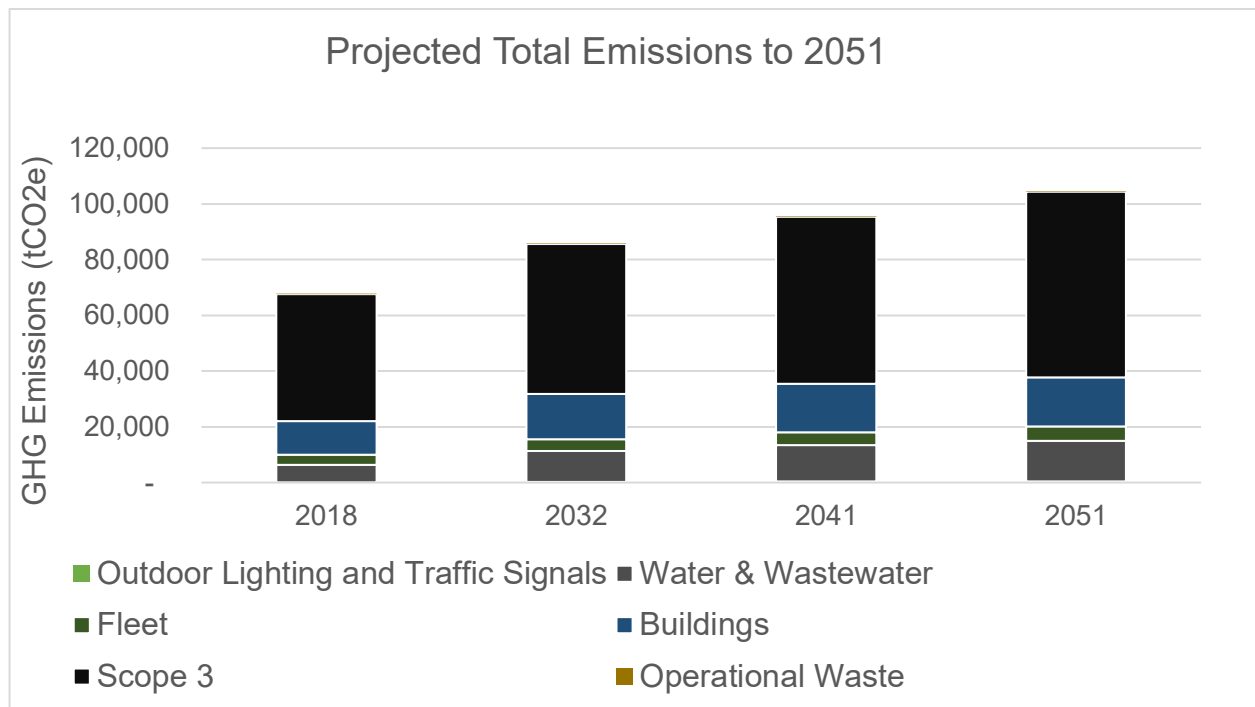


Figure 3: Projected municipal GHG emissions under a business-as-usual scenario by sector to 2051

### Business-as-Usual Cost Projections

Canada Energy Regulator projects future energy prices under two scenarios: a “high cost” future where energy prices increase considerably, and a “low cost” future where energy prices increase by a smaller amount or decrease, depending on the fuel type and sector. Under the low-cost scenario energy costs rise by 37% by 2051, and under the high-cost scenario, energy costs increase by 86% by 2051 (Figure 4).

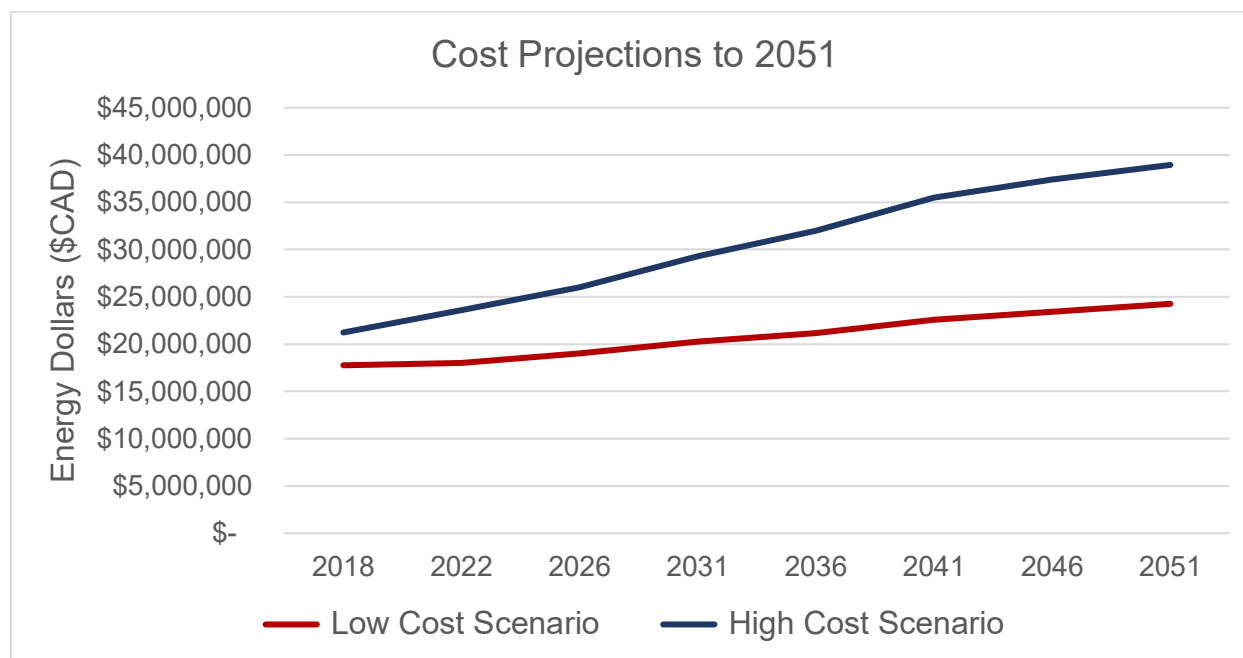


Figure 4: Projection of energy expenditures under a business-as-usual scenario, under a low and high-cost scenario for the Niagara Region

### Monitoring and Reporting

The Corporate Inventory serves as an indispensable tool for Niagara Region to track energy use and GHG emissions. Using the business-as-usual emissions forecast Regional staff can anticipate future emissions trends, which will inform the development of effective strategies to mitigate GHG emissions. Continual monitoring and updates to this Inventory is necessary to ensure that the Region remains on track to meet emissions targets and make meaningful contributions to the fight against climate change.

The Inventory also serves as a powerful communication tool for Niagara Region. By publicly reporting on GHG emissions and the progress made towards corporate emission targets, the Region can engage and inform the public and other stakeholders regarding sustainability efforts. This transparency and accountability not only increase public awareness of the challenges posed by climate change but also foster public trust in municipal leadership.