City of Penticton Corporate Energy and Emissions Plan

Corporate Energy & Emissions Plan

May 2022

CITY OF PENTICTON

Community Energy Association

TABLE OF CONTENTS

List of Figures

List of Tables

Acknowledgements

The Corporate Energy and Emissions Plan was developed by the City of Penticton in collaboration with the Community Energy Association.

The City of Penticton would like to acknowledge the contributions of several people that were involved in the development of this plan:

- David Kassian – Community Sustainability Coordinator
- Staff from the following departments at the City of Penticton
    - Community Services – Anthony Haddad
    - Infrastructure – Kristen Dixon, Tyler Figgitt
    - Development Services – Blake Laven
    - Electric Utility – Shawn Filice
    - Public Works – Len Robson
    - Finance – Angela Campbell

Executive Summary

Introduction

A key part of a local government's role in dealing with climate action is to reduce emissions caused by its own assets. This helps it to meet its requirements as a signatory of the BC Climate Action Charter. The City of Penticton has signed the Climate Action Charter, committing the City to work towards being carbon-neutral in its own operations. This Corporate Energy and Emissions Plan (CEEP) will provide Council and staff with the background information to develop strategic priorities for the next five years. It will be implemented concurrently with the Asset & Amenity Management Project (AAMP) which is intending some major construction projects over the next 2-5 years.

The City should also declare a Climate Emergency, as recommended by the Community Sustainability Advisory Committee, concurrently with the adoption of the CEEP to demonstrate its commitment to take action on climate change. When implemented, the actions in the CEEP will lower GHGs from the corporate fleet and buildings. The City can show its commitment to the Climate Emergency declaration by financing projects through respective department budgets and by utilizing the climate action reserve to further fund projects that lower emissions, improve community resilience, and benefit the environment. Having Council acknowledge the Climate Emergency at the same time as the plan brings validity to both the declaration and the Plan – providing affirmation that the City will engage in actions that lower local GHG emissions on both a community and corporate scale at the same time as the declaration is made.

Reducing corporate GHG emissions has the following co-benefits:

- Reducing municipal energy costs, i.e. providing better value for money to taxpayers
- Providing a more comfortable working environment for staff
- Leading by example with its own assets, helping stimulate further GHG emission reductions in the community
- Community economic development by leveraging infrastructure dollars
- Helping to improve resilience to climate change

The City of Penticton is currently at Milestone 4 of FCM-ICLEI's Partners for Climate Protection (PCP) program. The City can use this Corporate Plan to help it refresh Milestones 1-3, upon adoption of the report and GHG reduction targets by Council.

Note that the corporate inventory in this Executive Summary and the body of this report is defined according to the Climate Action Revenue Incentive Program (CARIP), and not according to PCP. The PCP inventory is included in Appendix C.

City of Penticton's Progress So Far

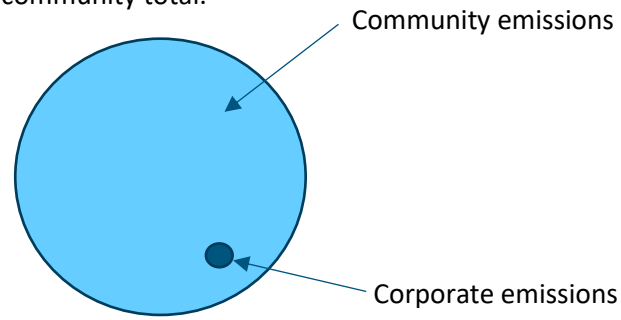
As detailed in the City's annual CARIP reporting, many energy efficiency and GHG reduction measures have already been implemented. Note that this list is not exhaustive:

- **Buildings / lighting** – Replaced ice chiller at Memorial Arena, four new HVAC units installed at Trade & Convention Centre, new cooling units installed at Leir House and City Hall
- **Energy generation** – Feasibility studies completed for smart grid system at City facilities and solar PV in City buildings, continuation of Voltage Conversion Program to increase distribution voltage and increase overall energy efficiency
- **Transportation** – Two hybrid vehicles purchased for building operations, ongoing replacement of aging vehicles with new fuel-efficient ones. Replaced a propane ice resurfacer with electric in Jan 2022, with another on order. Most recently approving the addition of four e-bikes in to the fleet.
- **Solid waste reduction** – Hired Community Sustainability Coordinator to focus on solid waste and improving overall garbage, recycle and yard waste best practices, developed Solid Waste Collection RFP that favoured innovative technologies and low emission vehicles
- **Water / wastewater** – New asset plan for wastewater treatment plant, high performance aeration blower and air floatation pump, replaced half of air diffusers, integrated master plan
- **Institutionalisation** – Hired Community Sustainability Coordinator to hasten progress on climate action.

City of Penticton's Current Emissions and Energy Expenditure

Corporate vs. Community Inventories

In 2019 the City of Penticton's community GHG emissions were 248,039 tCO_2e. Corporate GHG emissions in that year were about 0.8% of the community total.



Community

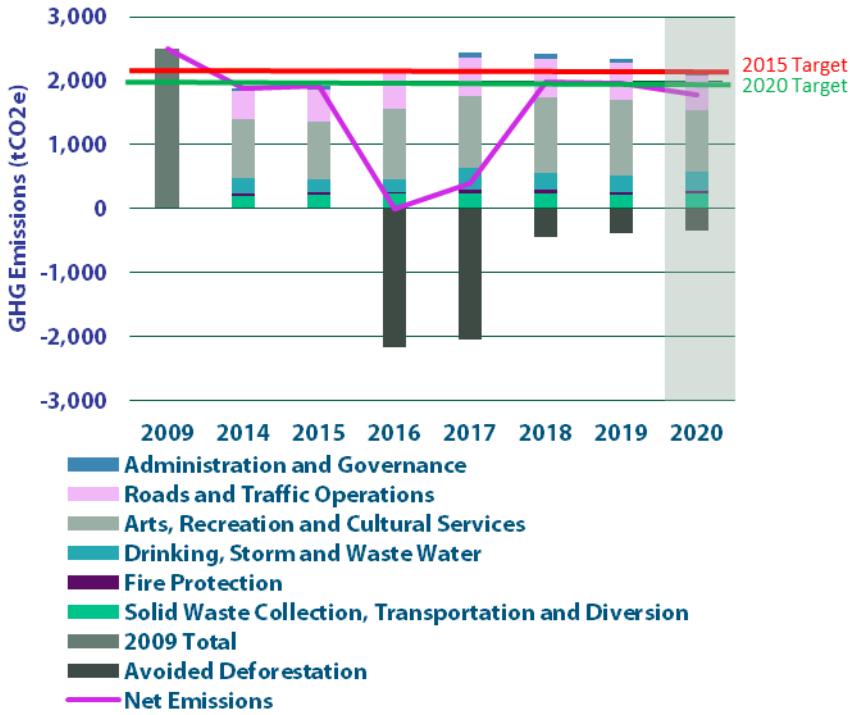
- Community-wide energy use
- Use local government levers of infrastructure, policy/regulation and outreach/engagement to impact community energy and emissions
- Transportation, buildings and waste are the areas of focus

Corporate

- Municipal facilities and operations
- Detailed energy information
- More emphasis on immediate actions
- Corporate actions can anchor community-wide projects

The City of Penticton's corporate emissions for 2014 through to 2019 were compiled according to CARIP classifications, and compared against the 2009 baseline, as illustrated in Figure E. 1. Note that 2020 data was also available, however due to the COVID-19 pandemic, may not be indicative of normal corporate operations. Therefore, it is only being used as a comparison against other years. Arts, Recreation, and Cultural Services contribute the most GHG emissions, increasing from 913 tCO_2e in 2014, to 1,170 tCO_2e in 2019, before dropping to 965 tCO_2e in 2020, which equates to 45-48% of all emissions before offsets. A noticeable increase in emissions in 2016 was due to the partial failure of an electric chiller at the Recreation Centre's pools, which required backup from two natural gas boilers (the chiller should be replaced in 2024 allowing energy use to fully return to normal). Further increases in 2017, 2018, and 2019 were due to relatively cold winters, as was reflected from increased natural gas consumption throughout the Okanagan.[1] The next largest classification was Roads and Traffic Operations, which increased from 446 tCO_2e to 579 tCO_2e in 2019, before dropping to 529 tCO_2e in 2020, which equates to 24-26% of all emissions before offsets. Avoided deforestation from the Three Blind Mice Project has been used to offset emissions from 2016 onwards, with most of the reductions in 2016 and 2017, and residual reductions continuing through 2020, and to 2035.

Figure E. 1 - Emissions by CARIP Classification, 2009 & 2014 – 2020



Total corporate emissions were available in 2009 from the previous Corporate Climate Action Plan, and from 2014-2020 from internal ledgers. Total corporate emissions have reduced from 2,499 tonnes of CO_2e in 2009 to 1,952 tonnes of CO_2e in 2019, and 1,786 tonnes of CO_2e in 2020. The City has therefore reduced its corporate emissions by 21% between 2009 and 2019, and 29% between 2009 and 2020, thus meeting its 15% target by 2015, and 20% by 2020.

[1] Province of BC. Provincial Greenhouse Gas Inventory. (2021) https://www2.gov.bc.ca/gov/content/environment/climate-change/data/provincial-inventory

CARIP classifications were compared based on their relative energy consumption, emissions, and energy costs in 2019, shown in Figure E. 2. Note that avoided deforestation has not been included in Figure E. 2 and Figure E. 3. Arts, Recreation, and Cultural Services contribute the largest proportion of all three categories at 49%, 50%, and 41%, respectively. The next largest source of emissions is from Roads and Traffic Operations at 25%, while also contributing 15% of energy costs and 12% of energy consumption. Drinking, Storm, and Waste Water also contribute large proportions of energy consumption at 30% and energy costs at 34%, while only attributing for 11% of emissions. The relatively low contribution from emissions is due to high electricity demand for infrastructure; natural gas consumption was limited to buildings in this classification.

Another way to look at energy consumption, GHG emissions, and expenditures, is by fuel type, shown in Figure E. 3. GHG emissions from natural gas account for 59% of total emissions, followed by diesel and gasoline at 25% and 14%, respectively. Whilst electricity only accounts for 2% of GHG emissions, it accounts for 81% of the City's energy expenditure. Actions that reduce electricity consumption in buildings provide an opportunity for substantial cost savings. In total, the City spent approximately $2.9 million on energy in 2019. Energy costs have risen steadily for all fuels from 2014 to 2019, with electricity increasing by $716,000 (43%) due predominantly to the unit price of electricity rising 38%. Gasoline was next at $61,000 (74%). Electricity costs dropped by $70,000 from 2019 to 2020, while costs for other sources remained relatively consistent.

Figure E. 2 – Energy, Emissions, and Energy Costs in 2019 by CARIP Classification

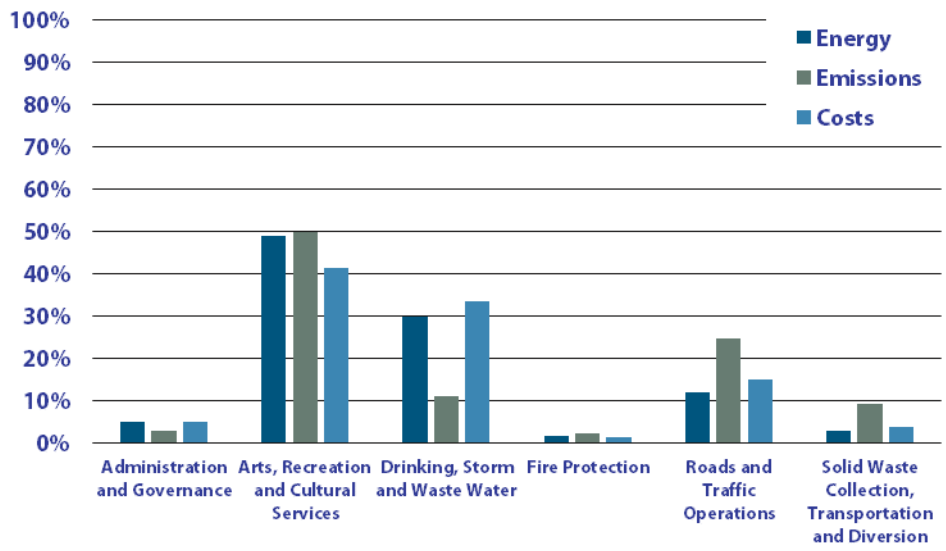
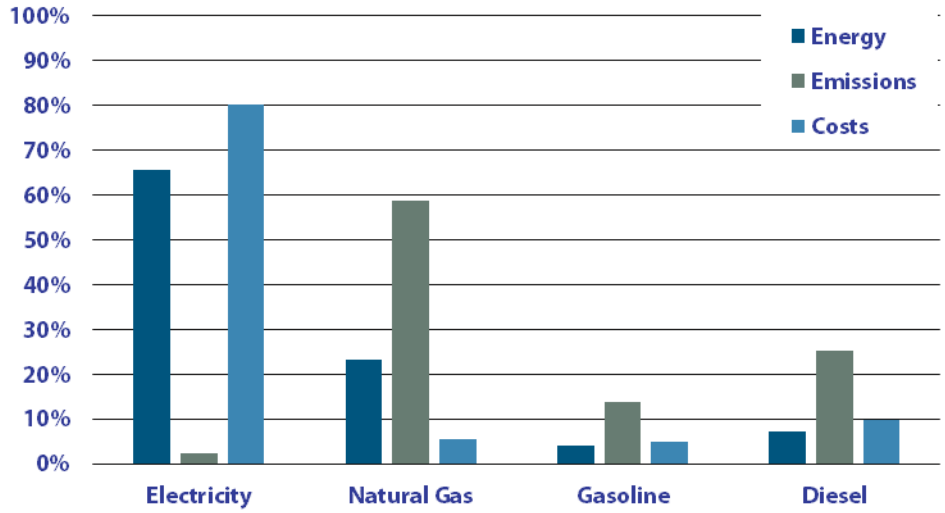


Figure E. 3 – Energy, Emissions, and Energy Costs in 2019 by Fuel



City of Penticton Corporate Targets

To refresh Corporate Milestone 2 under the PCP program, the City must set a corporate emissions reduction target that is adopted by Council. This Plan recommends two sets of targets: for net emissions, short-term targets of 30% below 2009 levels by 2025 and 45% by 2030; and another set of targets that excludes local community sequestration projects or offsets, set at 25% by 2025, 40% by 2030, and zero by 2050.

Though the City does not currently have one, it may benefit from setting a target for energy consumption as well. Based on the expected energy savings from the actions within this Plan, we recommend an energy reduction of 15% below 2009 levels by 2030.

What We Can Do: Recommended Climate Actions

Based on staff consultation and best practices, actions were identified for implementation over the next 5 years. These actions fall under the following five categories:

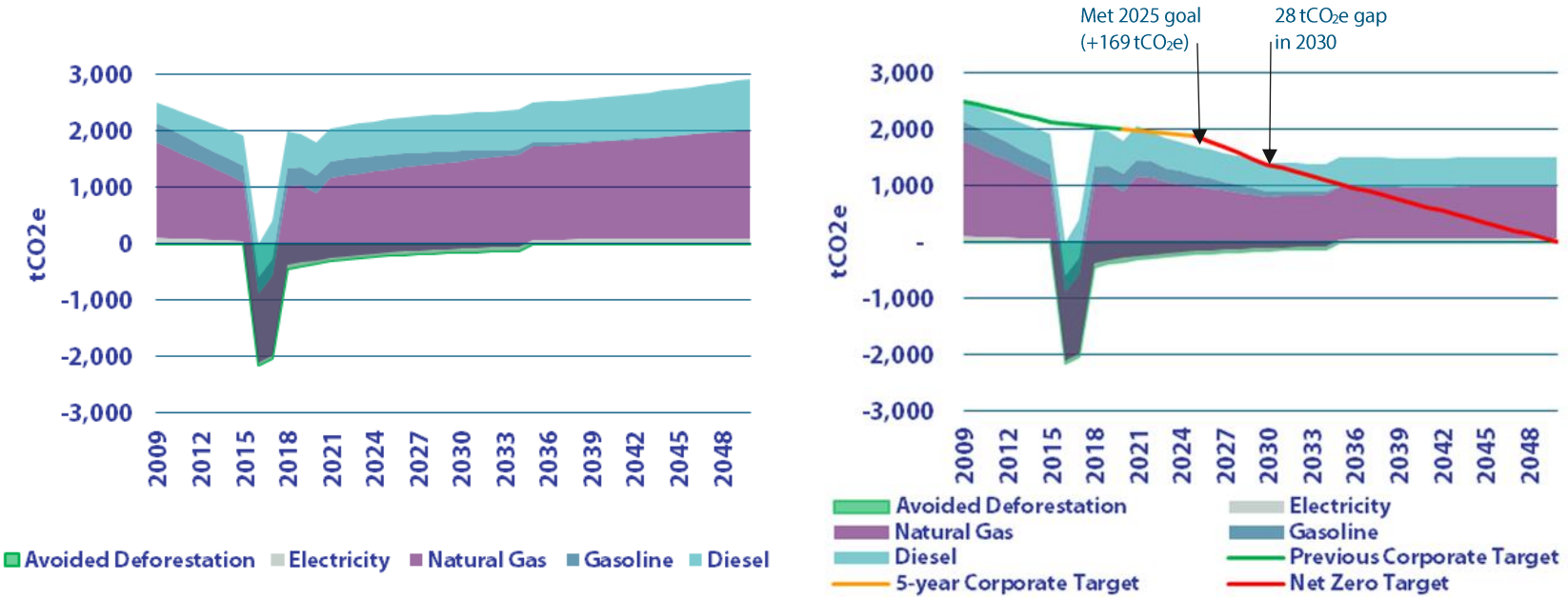
1. ***New Buildings & Infrastructure***: Improve energy performance and lower GHGs in ***new*** City buildings & infrastructure
2. ***Existing Buildings & Infrastructure***: Improve energy performance and lower GHGs in ***existing*** City buildings & infrastructure
3. ***Renewable Energy***: Increase the use of renewable energy
4. ***Transportation*****:** Improve energy efficiency and reduce GHG emissions in the City's fleet
5. ***Enabling Actions and Corporate Leadership***: Institutionalize the plan and demonstrate leadership on waste and water

A detailed list of actions for implementation in the next 5 years is featured in this plan. The timeframe for implementation, department or position responsible for implementation, and possible partners or funding sources for each action are also noted.

Based on business as usual projections shown in Figure E. 4, GHG emissions are forecast to increase by 3% in 2025 and by 5% in 2030 relative to 2019 levels. Business as usual assumes no additional actions by the City but takes into account growing population (and hence assets), policies of higher levels of government, and other factors such as a changing climate. Implementing the actions identified in this plan will reduce total GHG emissions by 32% by 2025 (meeting the above referenced target) and 44% by 2030, relative to 2009).

The business as usual emissions trajectory can be seen on the chart on the left below in Figure E. 4, whereas the chart on the right shows the emissions trajectory if the actions contained in this Plan are implemented. To meet the 2025 and 2030 net emissions targets, Penticton would need to reduce emissions by an additional 90 tCO_2e/year for the next 4 years for 2025, and 8 years for 2030. The red line on the right chart shows the City's short-term and long-term GHG emissions reduction targets combined. Inventory years are 2015 to 2020 and the data from 2021 onwards are projections. Note that projections are based on **2019 data,** as 2020 data was affected from the pandemic. As noted above, the increase in emissions during inventory years is predominantly due to 2017 and 2018 being cold years, resulting in increased natural gas consumption. Also note that propane is not included in the graphs since consumption was relatively negligible, and would be difficult if not impossible to identify graphically.

Figure E. 4 - Business-as-Usual and Modelled Emissions from Proposed Climate Actions



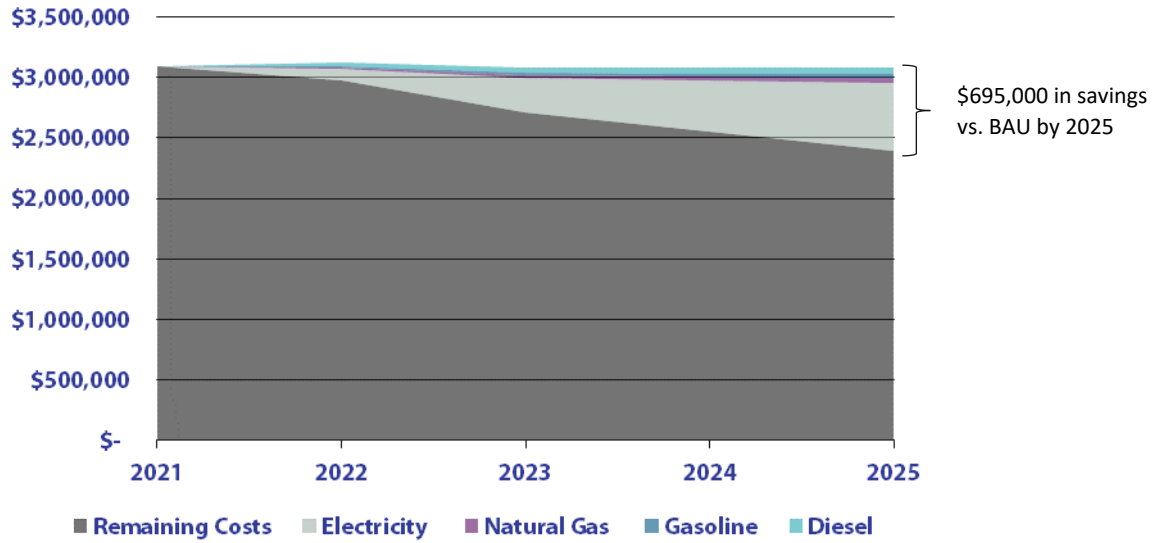
The planned actions are expected to achieve a net reduction of emissions of 32% by 2025, and 44% by 2030 (below 2009 levels). More work will need to be done beyond this to achieve the long-term goal of net zero by 2050, primarily on decarbonisation of building heating and fleet electrification. The CleanBC Roadmap to 2030 does indicate that all heating equipment purchased as of 2030 will need to be a minimum efficiency of 100% (e.g. heat pumps, electric baseboard), and that all new buildings built as of 2030 will be zero carbon. Though the Roadmap and its components have not yet been brought into legislation, and have not been included in GHG modelling as a result, it does indicate Provincial direction towards decarbonisation of buildings.

The top three actions that will achieve the largest reductions in GHG emissions over the next four years are:

- **2.2 – Implement building energy retrofits recommended by building energy audits** (125 tonnes annually)
- **2.4 – Implement measures from operational review of infrastructure** (76 tonnes annually)
- **4.3 – Invest in EVs and EV Charging Stations** (where available and practical) (76 tonnes annually)

In addition to GHG emissions savings, this Plan will result in energy cost savings as a natural bi-product. Figure E. 5 below shows that by 2025, the City could save nearly $695,000 per year on energy expenditures.

Figure E. 5 – Energy Costs and Plan Savings by Fuel to 2025



Successful implementation of this Plan depends upon increasing staff capacity from the current 30% of a full-time position to a dedicated full-time position, and capital investments. Internal and external funding sources are identified in this plan and include allocation from existing budgets, CARIP grant replacement, FCM's Green Municipal Fund, and the CleanBC Communities Fund.

It is advisable to renew this plan in five years as most actions should be completed by then; however, if the need arises, the plan can be renewed in less than five years. The inventory itself should ideally be updated every year to 2030 to track reductions and adapt actions as necessary and available based on results, direction from others orders of government, and advances in technologies. These updates should also include monitoring of key performance indicators such as annual emission reductions towards the 2030 target, the number of fleet vehicles converted to zero-emission alternatives, and number of corporate buildings retrofitted. This will allow the City to continue making progress towards its long-term target and set a new short-term target.

Introduction

Our Role in Climate Action, & Benefits

Climate action consists of both reducing emissions, or *mitigation*, and preparing for the impacts of a changing climate, or *adaptation*. A key part of a local government's role in dealing with climate action is to reduce GHG emissions caused by its own corporate assets, and this is what this plan covers. This helps it to meet its requirements as a signatory of the BC Climate Action Charter (CAC).

> The BC Climate Action Charter is a voluntary agreement between the Province of BC, the Union of BC Municipalities (UBCM), and each local government signatory. The Charter was launched at the 2007 UBCM Convention. By signing it, local governments acknowledge that they and the Provincial government have an important role in addressing climate change. Local governments make commitments including to measure and report on their corporate emissions, and progress towards becoming carbon neutral in their own operations. The City of Penticton is a signatory to this Charter, along with almost every local government in BC.

Reducing corporate GHG emissions has the following co-benefits:

- Reducing municipal energy costs, i.e. providing better value for money to taxpayers
- Providing a more comfortable working environment for staff
- Leading by example with its own assets, helping stimulate further GHG emission reductions in the community
- Community economic development by leveraging infrastructure dollars
- Helping to improve resilience to climate change

The economic development co-benefit could support Penticton's efforts to recover economically from the COVID-19 pandemic. In addition, Federal and Provincial infrastructure funding could be leveraged, and thus improve on the business cases identified in this project.

FCM-ICLEI Partners for Climate Protection Program

The City of Penticton is a member of the FCM-ICLEI Partners for Climate Protection (PCP) program, and currently sits at Milestone 4 for both Corporate and Community climate action. PCP is *mitigation specific*. See Appendix C for a description of the PCP program.

Two Types of Inventory

There are two principal ways for a corporate inventory to be defined, following the CAC/CARIP methodology, and following the PCP methodology. These are described in more detail in the following text box. In this report, Penticton's corporate inventory is defined according to

CAC/CARIP[2], and in Appendix C defined according to PCP. Note that although CARIP funding ended in 2021, most BC communities have used the CAC/CARIP inventory methodology. For continuity, it was decided to continue using the CAC/CARIP methodology for this report.

Corporate Reporting for Climate Action Charter vs. Partners for Climate Protection

BC Climate Action Charter (CAC) Reporting is the reporting conducted by local governments in BC each year to receive the now defunct Climate Action Revenue Incentive Program (CARIP) grant. It includes fuels used through the local governments' traditional services including:

- Administration and Governance
- Drinking, Storm and Waste Water
- Solid Waste Collection, Transportation and Diversion
- Roads and Traffic Operations
- Arts, Recreation and Cultural Services
- Fire Protection

Note that emissions from non-traditional services such as policing (i.e. RCMP Buildings and Fleet) and solid waste management (i.e. the landfill) are not included in BC CAC reporting. Fuel from contracted services and from staff-owned vehicles on mileage for corporate work are however included in fuel inventories. Any buildings that are leased out by the City or paid by the operator would not be included in CAC inventories (e.g. restaurants in parkades or senior's centres) as these do not fall under traditional services.

FCM's Partners for Climate Protection (PCP) reporting is conducted by local governments if they wish to achieve PCP corporate milestone 1. It includes anything that is under "operational control" of the local government. The inventory data needs to be organized into the following five "activity sectors":

- Buildings (electricity, natural gas data) – *includes buildings leased by the City; such as RCMP*
- Street Lights (electricity)
- Water and Sewer (electricity, natural gas, propane) – *including treatment plants*
- Vehicle Fleet (gasoline and diesel) – *includes contractors providing traditional services (contracts over $25,000); includes staff-owned vehicles used for corporate work*
- Solid Waste

Inventories for PCP must include energy consumed by everything a local government owns (e.g. buildings, fleet) and/or operates including leased buildings and contracted services so long as the City has "full authority to introduce and implement operating policies at the operation". Unlike CAC reporting, PCP reporting includes solid waste from corporate operations, and the City-owned RCMP building.

[2] Although CARIP has been discontinued, most BC communities continue to follow this inventory methodology, therefore it was decided to keep using this inventory methodology for consistency.

Penticton – Progress So Far

The City of Penticton has completed CARIP reports since 2009. Highlighted actions are described below in Table 1. A full list of actions can be found in Appendix B. The City has reduced its corporate GHG emissions from 2,499 tCO2e in 2009 to 1,952 tCO_2e in 2019 and 1,786 tCO_2e in 2020, for reductions of 6% and 15%, respectively. This reduction is largely attributable to energy efficiency upgrades to the South Okanagan Events Centre, Trade & Convention Centre, and the Community Recreation Centre.

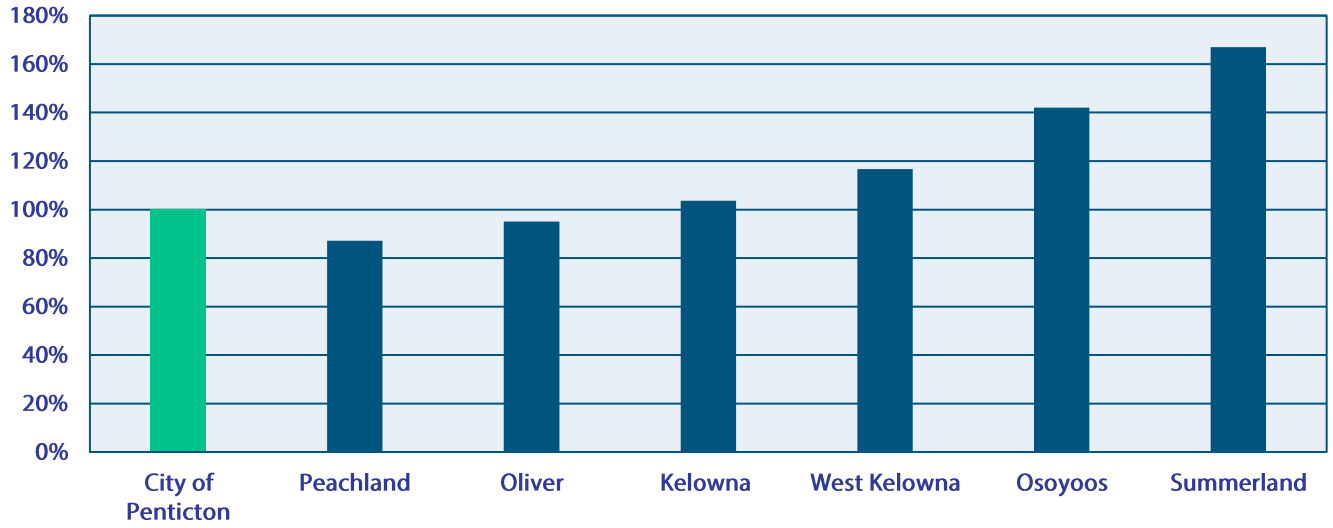
Table 1 – Highlighted Corporate Climate Actions

Buildings / lighting	2019 • New rooftop unit at Library, air handling unit at Museum • New ammonia system at Memorial Arena to replace ice chiller 2018 • Four new HVAC units at Trade & Convention Centre 2017 • Two new cooling units installed at Leir House and City Hall 2016 • LED lighting installed at Curling Rink and McLaren Arena • New infrared tube heater system in garage at City Yards 2015 • LED bulb replacement program for City buildings and arenas, and street lights
Energy generation	2020 • Penticton Generation Study Report, evaluating 15 electricity generation, smart grid, and policy alternatives 2018 • Continued implementation of Voltage Conversion Program to increase energy efficiency • Conducted feasibility study on installing a smart grid system to control/operate some City facilities

Transportation	2022 • Four level 2 EV charging stations installed at 307 Ellis, and two level 2 EV charging stations installed at City Hall, March 2022 • Replaced a propane ice resurfacer with electric in Jan 2022, with another on order 2019 • New electric vehicle charging stations installed in public parking lot 2018 • Two hybrid vehicles purchased for building department 2017 • Route planning through GPS to maximize travel efficiency of fleet
Solid waste reduction	2018 • Biosolids processing review conducted to identify alternatives and upgrades to composting program
Water / wastewater	2019 • Wastewater Water Treatment Asset Plan updated, Master Plan initiated • New variable frequency blower, air diffusers, and pump installed at Advanced Wastewater Treatment Plant 2018 • Installed second high speed turbo blower to decrease energy use 2016 • New blower at wastewater treatment plant (WWTP)
Institutionalisation	2019 • Parks and Recreation Master Plan and Parks Asset Management System beginning to be implemented 2017 • Community Sustainability Coordinator hired to centralize solid waste reduction and climate reporting 2016 • Asset Management Study completed – the Asset & Amenity Management Project (AAMP) – which is intending some major construction projects over the next 2-5 years. 2015-2018 • Penticton has been carbon neutral from 2015-2018 through continual emission reductions and purchase of carbon offsets for remaining emissions. Implementation of the Three Blind Mice avoided forestry conversion project has been a key component of the City's corporate emission reductions to date

Figure 1 compares the GHG emissions per capita for the City's corporate operations (excluding offsets or local carbon reduction projects) with other Cities and Municipalities in the same geographic area of BC, as a percentage of the City's emissions. Data is used from CARIP reports prepared by the individual Cities and Municipalities, which only contain data on traditional services and use a consistent methodology to ensure a like-for-like comparison. The City of Penticton is 3rd out of 7 communities evaluated, with Peachland and Oliver having lower emissions per capita, and Osoyoos, Kelowna, West Kelowna, and Summerland having greater emissions per capita.

Figure 1 – A Comparison of Corporate GHG Emissions Per Capita, 2019

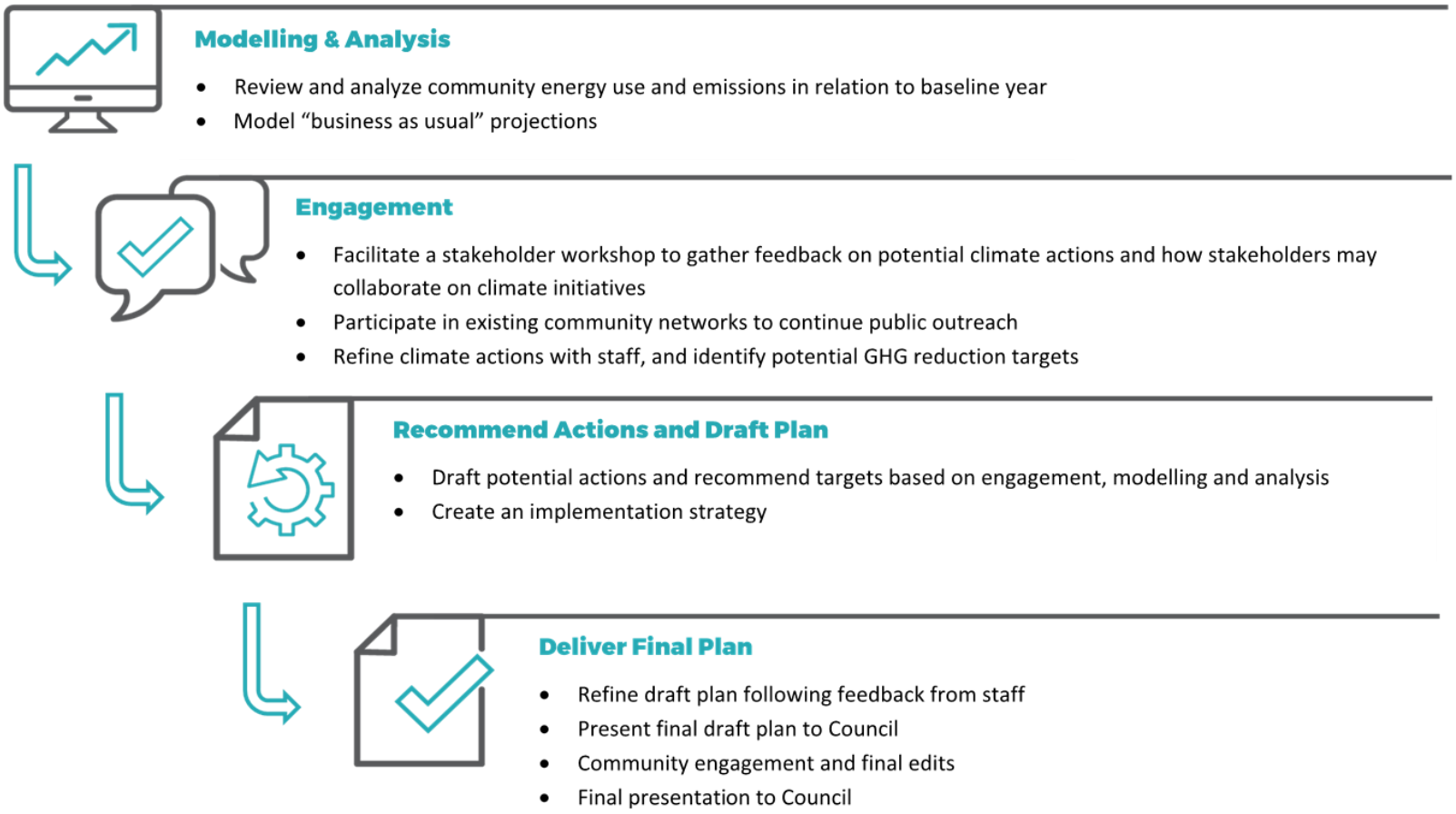


Population (2021)	36,885	5,789	5,094	144,576	36,078	5,556	12,042
GHG Emissions (tCO_2e)	1,952	267	256	7,931	2,229	418	1,065

Corporate Energy & Emissions Plan Development

In 2020, the City of Penticton, in collaboration with CEA, began the process of creating a Corporate Energy and Emissions Plan. The planning process consisted of four main steps, as illustrated in Figure 2.

Figure 2 – Development of the Corporate Energy and Emissions Plan



Energy & Emissions – Where We Are Now

Overview

An inventory is a compiled list of all the energy consumed, the money spent on energy, and the associated greenhouse gas emissions created by the local government in their operations. The inventory may identify the best opportunities for cost and emissions reductions.

This inventory describes the GHG emissions, energy consumption, and annual energy expenditures of all corporate assets based on the CARIP inventory definition. Assumptions made are described in Appendix F. See the info box below for a description of common units to express energy usage and GHG emissions, and what they mean practically.

What is a GJ?

A gigajoule (one billion joules) is a measure of energy. One GJ is about the same energy as:

- Natural gas for 3-4 days of household use
- 25-30 litres of diesel or gasoline
- Two 20 lb propane tanks
- The electricity used by a typical house in 9 days

What is a tonne (tCO_2e) of GHG?

A tonne of greenhouse gases (GHG's) is the amount created when we consume:

- 385 litres of gasoline (about 5 fill-ups)
- $200 of natural gas (a month of winter heating)
- Enough electricity for 8.5 average BC Hydro homes for a year (93,700 kWh)

Historically, the City of Penticton had used SMARTTool, a web based GHG emissions inventory and reporting tool developed and maintained by Shared Services BC, providing a standardized approach to calculating and reporting corporate greenhouse gas emissions. In 2020, SMARTTool was retired and replaced with the Clean Government Reporting Tool (CGRT). Through SMARTTool/CGRT, Penticton tracked corporate energy consumption and GHG emissions, and reported annually for the Provincial CARIP grant. CEA has used the information provided through CGRT to compile the graphs and charts shown in this report.

Breakdown and Trends

Overall, the City of Penticton's energy inventory for the 2019 year was as follows:

- GHG Emissions: 1,952 tonnes CO_2e (tCO_2e)
- Energy consumption: 119,000 GJ
- Energy expenditures: $2.9 million

Figure 3 shows the City of Penticton's GHG emissions by CARIP classifications, and also includes avoided deforestation through the Three Blind Mice Project. The largest area of emissions is Arts, Recreation and Cultural Services at 1,170 tCO_2e in 2019 (965 tCO_2e in 2020). Significant

increases were identified in 2016, 2017, and 2018. The increase in 2016 was due to the partial failure of an electric chiller at the Recreation Centre's pool, requiring natural gas backup from two natural gas boilers (the chiller should be replaced in 2024 allowing energy use to fully return to normal). Increases in 2017 and 2018 were due to colder winters in both years.

The second largest category is Roads and Traffic Operations at 579 tCO_2e in 2019 (529 tCO_2e in 2020). Drinking, Storm, and Wastewater followed next at 260 tCO_2e in 2019 (294 tCO_2e in 2020), followed by Solid Waste Collection, Transportation, and Diversion at 218 tCO_2e in 2019 (231 tCO_2e in 2020). Overall, the City of Penticton has seen a total reduction in GHG emissions of 6% between 2009 and 2019. Avoided deforestation reduced net emissions by 389 tCO_2e from 2,341 to 1,952 tCO_2e. Also note that avoided deforestation offsets began to be applied as of 2016, at 3,696 tCO_2e. Since the totality avoided deforestation offsets was greater than 2016 emissions, the remaining 1,532 tCO_2e from 2016 was then added to the residual offset for 2017. Ongoing residual offsets continue to 2035.

Figure 3 – Emissions by CARIP Classification, 2009 & 2014 - 2020

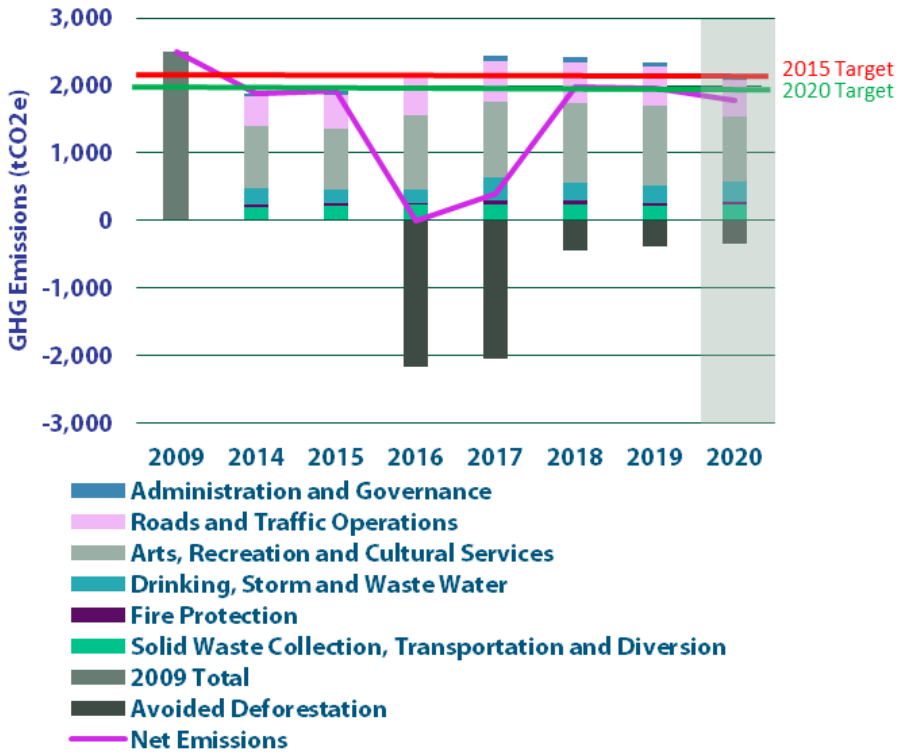


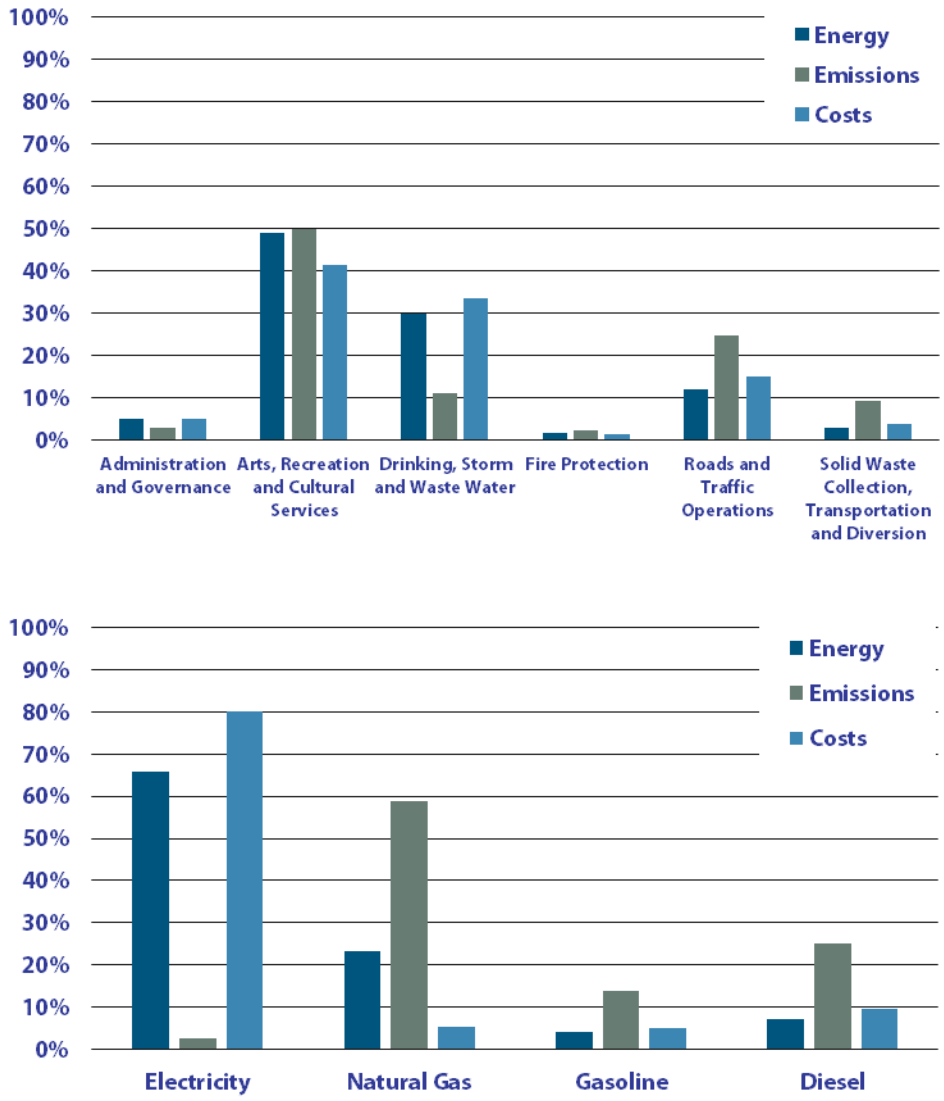
Figure 4 shows the percentage of energy consumption, GHG emissions, and energy expenditure that is attributed to each CARIP classification, and each fuel source in 2019. Note that avoided deforestation has been excluded to keep the calculations simple. In addition to being the largest emitter, Arts, Recreation, and Cultural Services consumed the most energy (49%), at the highest cost (42%). The relative emissions from Roads and Traffic Operations vs. their energy consumption and costs was due to the high emission factor of gasoline and diesel. Conversely for Drinking, Storm, and Wastewater, electricity was the primary energy source; it has a very low emission factor but high cost, hence why its emissions were low relative to energy consumption and costs.

GHG emissions in 2019 were predominantly from natural gas, comprising a total of 59% of total emissions (1,377 tCO_2e) yet accounted for only 5% of energy costs. Electricity, on the other hand, contributed only 2% of emissions, but accounted for 66% of energy consumption (78,200 GJ), and 81% of costs, at over $2.37 million. This is owing to the low emission factor for electricity, but its relatively high cost.

Diesel and gasoline counted for 28% and 14% respectively of total GHG emissions, which combined means that vehicles are responsible for over a third of the City's GHG emissions.

Figure 5 shows the top five operational assets in terms of energy consumption, GHG emissions and energy costs. The Community Recreation Centre used nearly 20,000 GJ of energy in 2019, followed closely by the South Okanagan Events Centre and the Advanced Waste Water Treatment Plant (AWWTP). Fleet vehicles combined was 4th in energy consumption, but contributed the highest proportion of emissions, at just over 900 tCO_2e, nearly double that of the next highest source, the Community Recreation Centre, at 500

Figure 4 – Energy, Emissions, and Cost by CARIP Classification & Source, in 2019

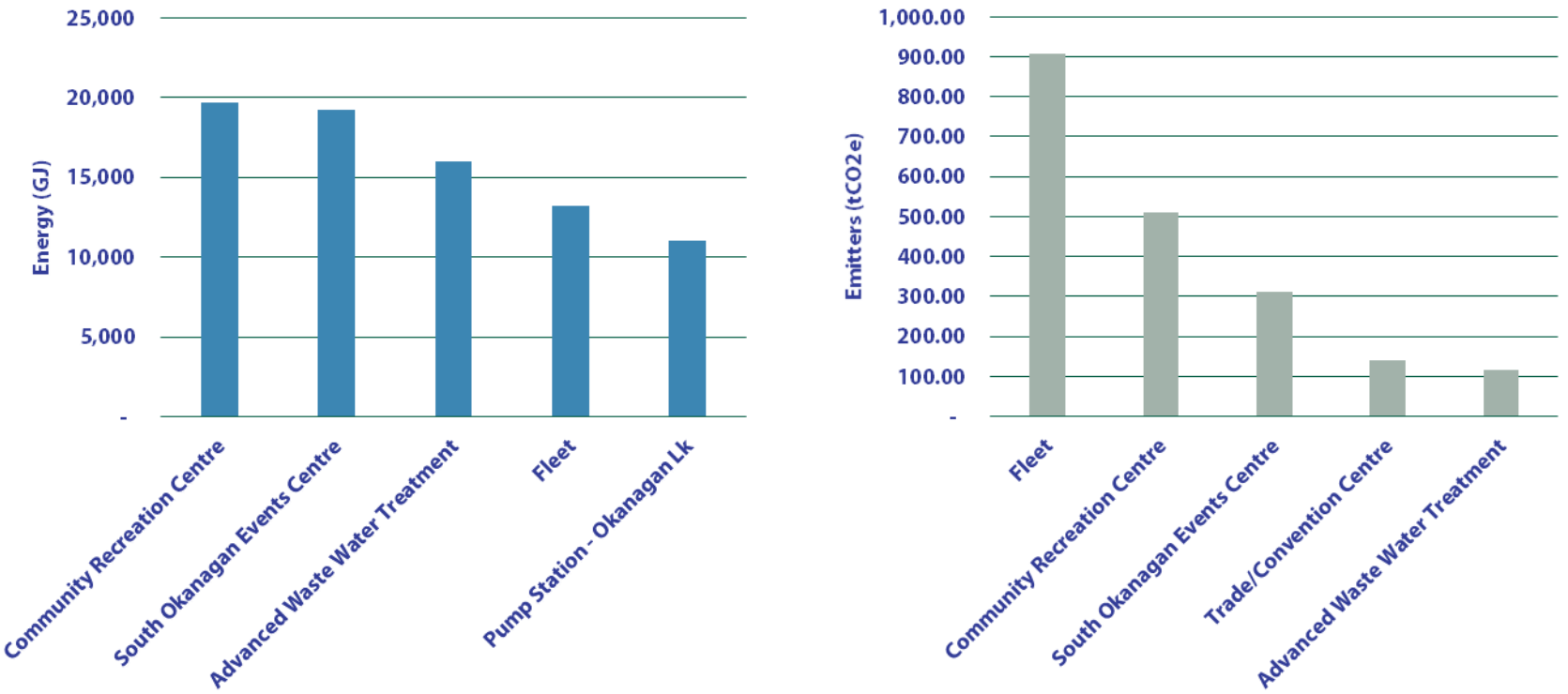


tCO_2e. Conversely, the buildings with the highest energy cost in 2019 were the Events Centre and the AWWTP at approximately $430,000. Both buildings spent over $400,000 in electricity, with small contributions from natural gas.

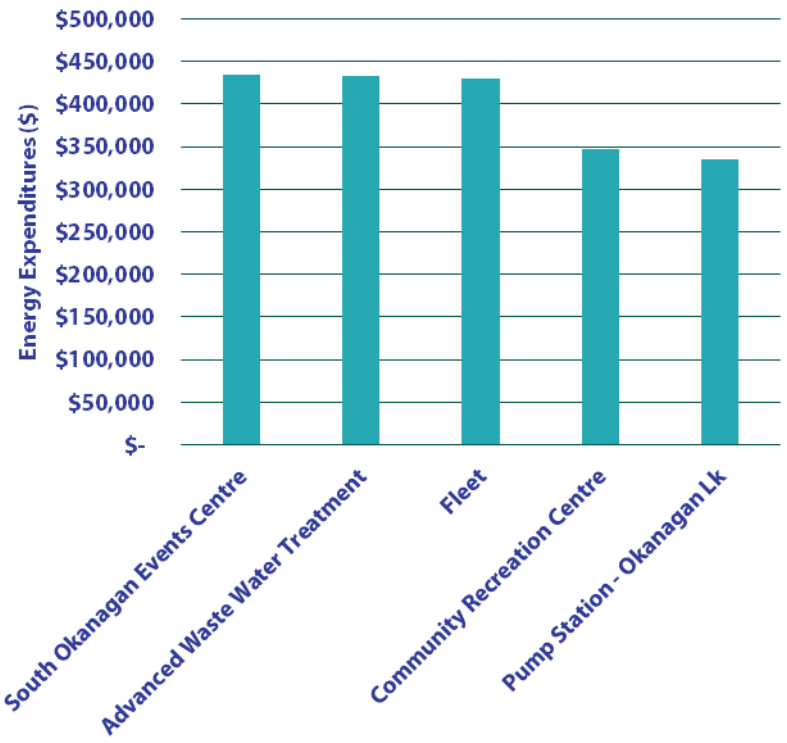
Based on these findings, the 4 priority operational assets to focus on to prioritize electrification, reduce emissions, costs, and consumption are:

- Fleet vehicles
- Community Recreation Centre
- South Okanagan Events Centre
- Advanced Waste Water Treatment Plant

Figure 5 – Top 5 Operational Assets for Energy, Emissions and Cost, 2019



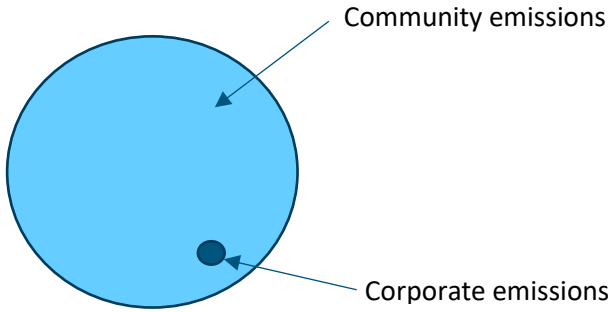
Continuation of Figure 5, Top 5 Operational Assets for Cost, 2019



As mentioned previously, the emissions inventory shown above and its comparison to corporate GHG targets includes the carbon reductions from avoided deforestation through the Three Blind Mice Project. Although this approach is permissible for the purposes of carbon accounting and laudable over the short and medium-terms, the City should not rely on carbon reduction projects and offsets over the long-term to reduce emissions; rather the City should focus on deep energy retrofits and fleet decarbonisation of the assets under its control. To that end, a secondary inventory without offsets and carbon reduction projects has been created to illustrate City emissions in relation to its 2015 and 2020 GHG targets. This is shown in Appendix D.

Corporate vs. Community Inventories

In 2019 the City of Penticton's community GHG emissions were 248,039 tCO_2e. Corporate GHG emissions in that year were about 0.9% of the community total.



Community

- Community-wide energy use
- Use local government levers of infrastructure, policy/regulation and outreach/engagement to impact community energy and emissions
- Transportation, buildings and waste are the areas of focus

Corporate

- Municipal facilities and operations
- Detailed energy information
- More emphasis on immediate actions
- Corporate actions can anchor community-wide projects

Business as Usual Projections

Business as Usual (BAU) projections for the City's CARIP inventory are shown in this section. For projections for the PCP inventory, see Appendix C. Again, due to the pandemic, 2020 data is likely not a representative year from which to base projections on. Therefore, projections were based on 2019 data.

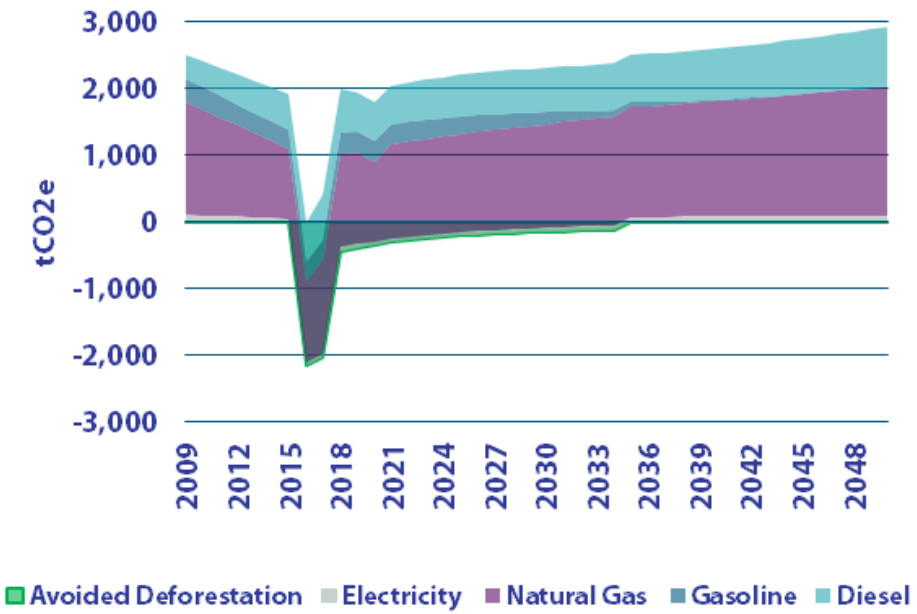
What does Business as Usual mean?

Business as Usual, or BAU, is a way of describing what is estimated to happen if the City does not try to reduce emissions going forward. A number of factors are taken into account, similarly to a Community Energy and Emissions Plan. Population growth and the subsequent growth in corporate assets is a very important consideration. As the number of people increase in a community, more corporate assets are needed to serve them. Other things that are taken into account include:

- Changing climate patterns, as warmer winters and hotter summers change the way that energy is consumed in corporate buildings.
- Impacts of policies already adopted by higher levels of government, such as:
    - Renewable and low carbon fuel standards
    - Vehicle emissions standards
    - That progressive policies on electric vehicles will have an impact on the City's purchases for gasoline vehicles, in particular the Zero Emissions Vehicles mandate.
    - The greening of the BC Building Code (progressive steps towards net zero energy ready buildings by 2032)

If the City of Penticton implements no special efficiency or conservation activities, and assuming that future changes are proportional with population increase at 1.45% per year, then the City's emissions are forecast to increase by an additional 13% in 2025 and by 18% in 2030 relative to 2019 levels as shown in Figure 6 under a BAU scenario. For the BAU scenario projection without local offset project carbon reductions, see Appendix D.

Figure 6 – Business-as-Usual Emissions Forecast to 2050, by Energy Source



It is difficult to predict these future increases, but it is clear that an increasing population will provide upward pressure, while the policies from higher levels of government will provide downward pressure on GHG emissions. It would therefore be prudent for the City to also conduct its own measures (i.e. implement the actions detailed in this Plan) to manage its energy consumption and GHG emissions.

No BAU chart for energy expenditures has been created because of the considerable uncertainty around predicting future energy prices.

Corporate GHG Reduction Target

The City had existing corporate GHG reduction targets of 15% by 2015, and 20% by 2020, below 2009 levels. The City has met its reduction target up to 2020, due in part to the inclusion of avoided deforestation offsets from the Three Blind Mice project. There is however, no current target beyond 2020 for Penticton's corporate emissions.

Through this report, it is recommended that the City adopt a long-term target that is in line with the Intergovernmental Panel on Climate Change (IPCC)'s targets to limit climate change to 1.5°C above 2010 levels, which requires net-zero emissions by 2050. Since a full set of inventory data is not available for 2010, it is recommended that Penticton use 2009 as a baseline year for this target (any difference in emissions will be small).

Based on modelling results from the implementation of actions outlined in the next section, it is recommended that the City adopt a short-term net emissions target including local reduction projects and offsets such as the Three Blind Mice Project. The short-term net emissions target should be a 30% reduction by 2025 and 45% by 2030, below 2009 levels.

Ideally however, the City should not depend on offsets in the long-term to account for increasing corporate emissions. Therefore, it is recommended that the City also adopt an internal emissions target that does not include offsets or other projects that sequester carbon. To that end, based on the modelling results the City should adopt a 25% reduction in GHG emissions by 2025, 40% reduction by 2030, and zero by 2050.

Though the City does not currently have one, it may benefit from setting a target for energy consumption as well. Based on the expected energy savings from the actions within this Plan, we recommend an energy reduction of 15% below 2009 levels by 2030.

Climate Emergency Declaration

By adopting the CEEP the City acknowledges that now is a critical time to reduce greenhouse gas emissions in order to limit global temperature increases to the limit of 1.5ºC as recommended by the IPCC. Declaring a Climate Emergency, as recommended by the Community Sustainability Advisory Committee, concurrently with the adoption of the CEEP will demonstrate the City's commitment to take action on climate change.

When implemented, the actions in the CEEP will lower GHGs from the corporate fleet and buildings. The City can show its commitment to the Climate Emergency declaration by financing projects through respective department budgets and by utilizing the climate action reserve to further fund projects that lower emissions and benefit the environment. Having Council acknowledge the Climate Emergency at the same time as the plan brings validity to both the declaration and the Plan – providing affirmation that the City will engage in actions that lower local GHG emissions on both a community and corporate scale at the same time as the declaration is made.

What We Can Do: Recommended Climate Actions

Based on staff consultation and best practices, actions were identified to be implemented over the next five years, as shown in Table 2. Actions fall under the following five categories.

1. ***New Buildings and Infrastructure:*** Improve energy performance and lower GHG emissions in ***new*** City buildings and infrastructure
2. ***Existing Buildings and Infrastructure****:* Improve energy performance and lower GHG emissions in ***existing*** City buildings and infrastructure
3. ***Renewable Energy****:* Increase the use of renewable energy in municipal operations
4. ***Transportation:*** Improve energy efficiency and reduce GHG emissions in the City's fleet
5. ***Enabling Actions and Corporate Leadership****:* Institutionalise the plan, and demonstrate leadership on waste and water

Look for the "low-hanging fruit" icon. This identifies easy to implement actions that Penticton should focus on in the near term. More details on specific actions can be found in the "Next Steps"

Table 2 – Climate Actions Summary

ACTIONS LIST		Already Done	Ongoing	2022	2023	2024
New Buildings and Infrastructure						
1.1	Commit to building energy efficient and resilient facilities (may include Step Code implementation)		x	x	x	x
1.2	Commit to building energy efficient and resilient infrastructure					(Maybe)
1.3	Optimize siting and orientation of new buildings		x	x	x	x
Existing Buildings and Infrastructure						
2.1	Conduct building energy audits prioritized in AAMP		x	x		
2.2	Implement energy retrofits recommended by building energy audits, & improve resiliency				x	x
2.3	Conduct energy & resilience-focused operational review of infrastructure			x		
2.4	Implement measures from operational review of infrastructure				x	x
2.5	Incorporate energy management into annual building maintenance procedures			x		
2.6	Investigate opportunities to consolidate older buildings			x		
Renewable Energy						

ACTIONS LIST		Already Done	Ongoing	2022	2023	2024
3.1	Make solar ready/Implement Solar PV installations on buildings			x		
3.2	Implement heat recovery retrofits in buildings				x	
3.3	Complete & Identify next steps from Power Generation Study	x	**x**	**x**	**x**	x
Transportation						
4.1	Right-size vehicles for assigned tasks		x			
4.2	Develop a vehicle purchasing policy/Green Fleet Policy			x		
4.3	Invest in EVs and EV Charging Stations (where available and practical)		x	x	x	x
4.4	Assess renewable fuels (e.g. biodiesel, ethanol) for corporate fleet			x		
4.5	Fuel efficient driver training & anti-idling policy			x		
4.6	Energy-focused fleet maintenance (e.g. tire pressure, fuel & air system)		x			
4.7	Encourage employee carpooling and active transportation where possible			x		
4.8	Improve/expand facilities to help staff reduce the emissions associated with commuting to work	x	x	x	x	x
Enabling Actions and Corporate Leadership						
5.1	Have dedicated staff person or department for plan implementation	x				
5.2	Implement recommendations on funding climate action			x	x	x
5.3	Develop KPIs, monitor and track for progress			x	x	x
5.4	Manage waste creation & water consumption			x	x	x
5.5	Examine local carbon offset projects or offset purchases for remaining emissions	x	x	x	x	x
5.6	Incorporate energy and emissions impacts into council reports		x	x	x	x
5.7	Declare Climate Emergency		x	x	x	x
5.8	Create an Emissions Dashboard		x	x	x	x

Further details on actions, including projected implementation timelines, GHG and economic impacts (for the year 2025), are detailed in Appendix B.

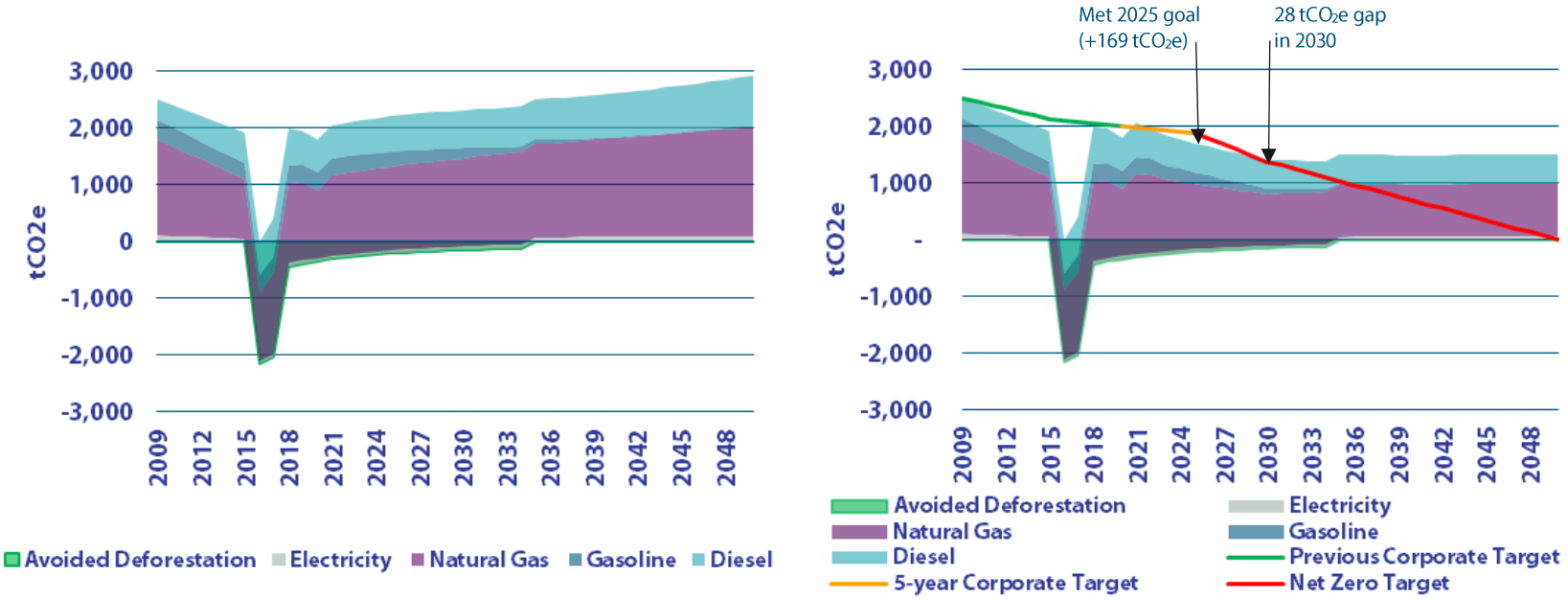
What We Can Achieve

Modelling Climate Actions

Implementation of the actions was modelled to estimate the potential GHG emission reductions and energy expenditure savings. More detail on the modelling is in Appendix F.

As shown in Figure 7, upon implementation, total GHG emissions are expected to decrease by 794 tonnes/year (32%) in 2025, and 1,097 tonnes/year (44%) in 2030, relative to 2009 levels, thus achieving the 2025 short-term suggested corporate target, and essentially meeting the IPCC target in 2030. For projected emissions without contributions from carbon reduction projects, see Appendix D. GHG emissions are then predicted to plateau unless further actions are implemented. It is important that this Corporate Energy and Emissions Plan be updated again in 3-5 years to identify new actions to implement to keep the City on track with its long-term target of net-zero by 2050.

Figure 7 – BAU and Modelled Emissions from Proposed Climate Actions



As depicted in Figure 8, the top three actions that will achieve the largest reductions in GHG emissions in 2025, in order of largest GHG reductions first, are:

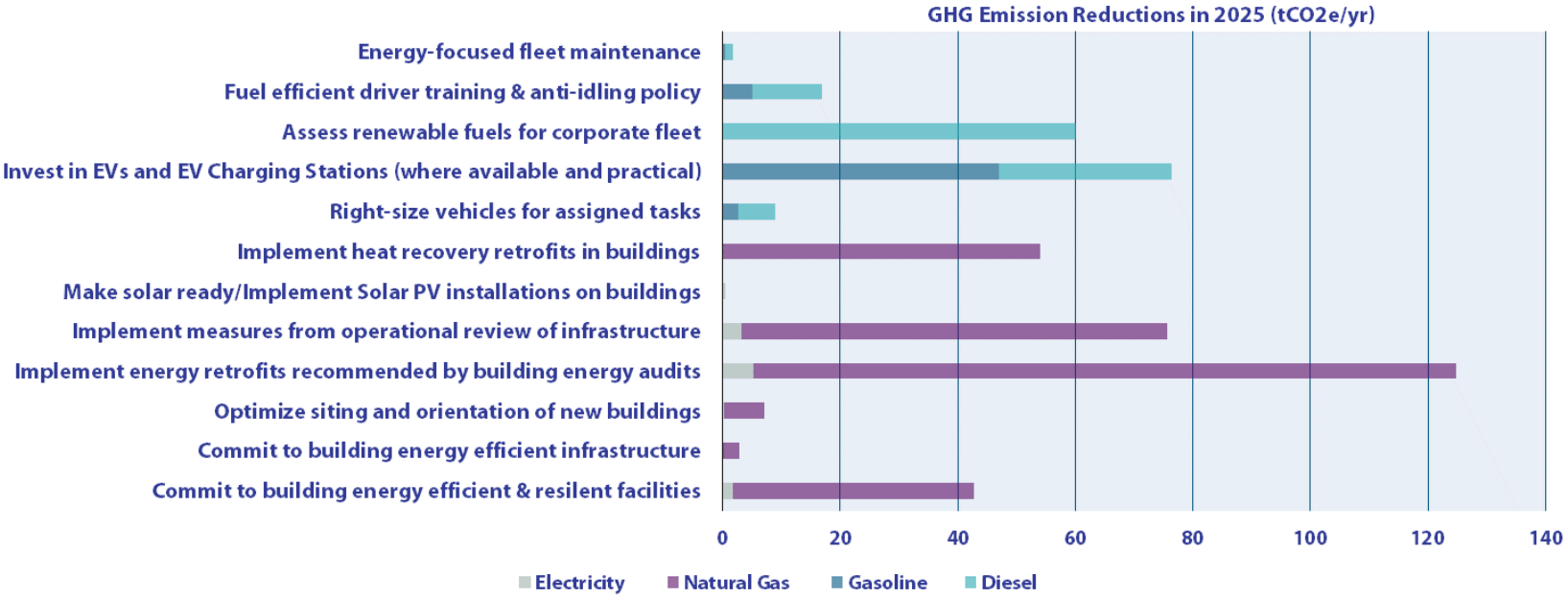
- 2.2 – Implement building energy retrofits recommended by building energy audits (125 tonnes/yr)
- 2.4 – Implement measures from operational review of infrastructure (76 tonnes/yr)
- 4.3 – Invest in EV's and EV charging stations (76 tonnes/yr)

Expected emission reductions for building and infrastructure retrofits are 125 and 76 tonnes/yr in 2025, respectively. Note that energy audits on infrastructure and buildings are expected to be conducted in 2022, which are denoted as actions 2.1 and 2.3, respectively. These actions are pre-requisites to actions 2.2 and 2.4, which are the implementation of retrofits recommended by the audits. Since this report was developed before the audits were completed, smaller but cumulative annualized estimates were made for expected energy and emission reductions, rather than large, discrete reductions for specific retrofit projects. These reductions should be revisited once audits are completed and recommended retrofits are prioritized. Retrofits will also have a resilience co-benefit, as it will improve the ability of buildings to provide a comfortable environment even during extreme temperatures.

Investing in EV's and EV charging stations will reduce the City's consumption of diesel and gasoline and therefore result in reduced GHG emissions from fleet vehicles. There will be an increase in the consumption of electricity as a result of this shift, however, EV's are approximately four times more efficient[3] than traditional internal combustion engine (ICE) vehicles and involve less maintenance costs, therefore significant cost savings will be realised.

[3] Canada Energy Regulator, 2021. *Market Snapshot: Battery electric vehicles are far more fuel efficient than vehicles with internal combustion engines.* https://www.cer-rec.gc.ca/en/data-analysis/energy-markets/market-snapshots/2021/market-snapshot-battery-electric-vehicles-are-far-more-fuel-efficient-than-vehicles-with-internal-combustion-engines.html#:~:text=Altogether%2C%20BEVs%20are%20far%20more,movement%20when%20including%20regenerative%20braking

Figure 8 – Emissions Reduction for each Proposed Action, in 2025



Actions will be implemented over time, and therefore savings will increase over time. There is potential for significant cost savings from reducing electricity purchases, which will come predominantly from energy efficiency measures in new/existing buildings and infrastructure.

Substantial energy cost savings could be realised through the implementation of the actions listed in Figure 9, in particular the implementation of building and infrastructure retrofits arising from the energy audits to be conducted in 2022. Alone, those two actions could yield annual savings of over $440,000/year by 2025. Overall, the plan could save over $695,000/year by 2025, with $560,000/year from electricity. This amounts to an 18% savings in 2025, reducing costs from $3.78 million to $3.09 million, as shown in Figure 10.

Figure 9 – Cost Savings for Each Proposed Action, in 2025

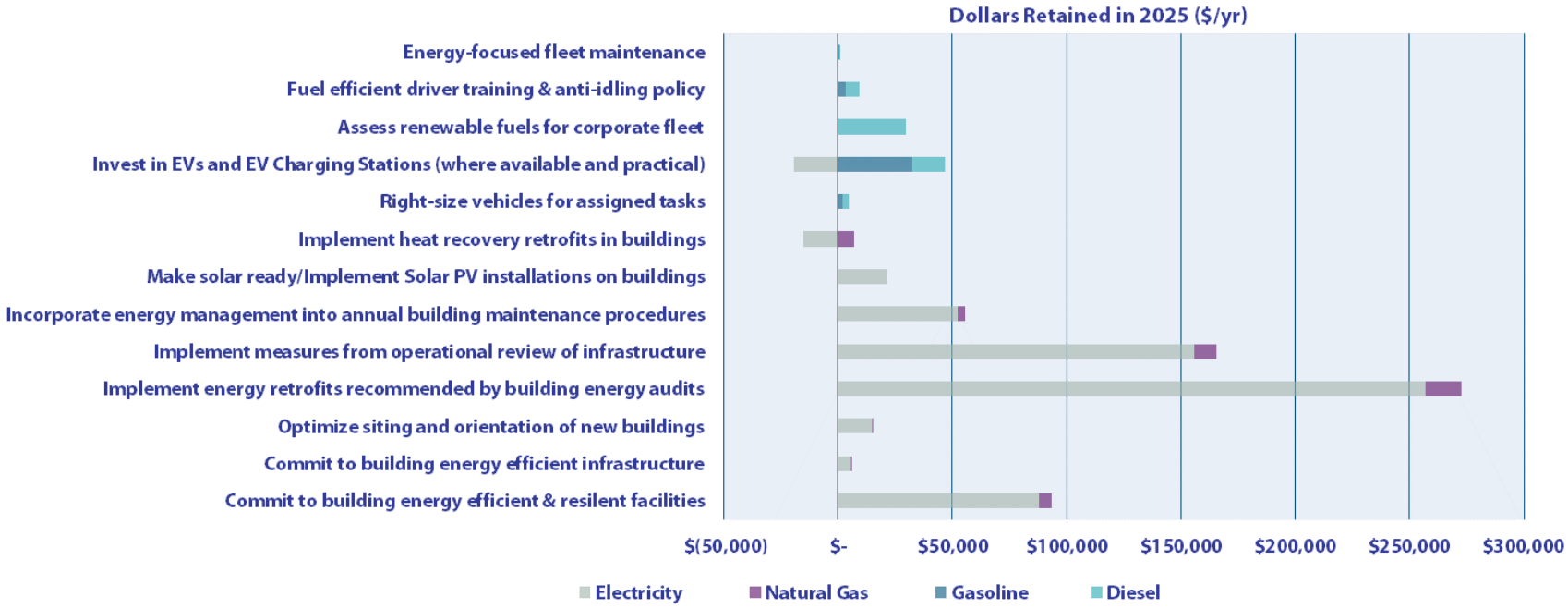
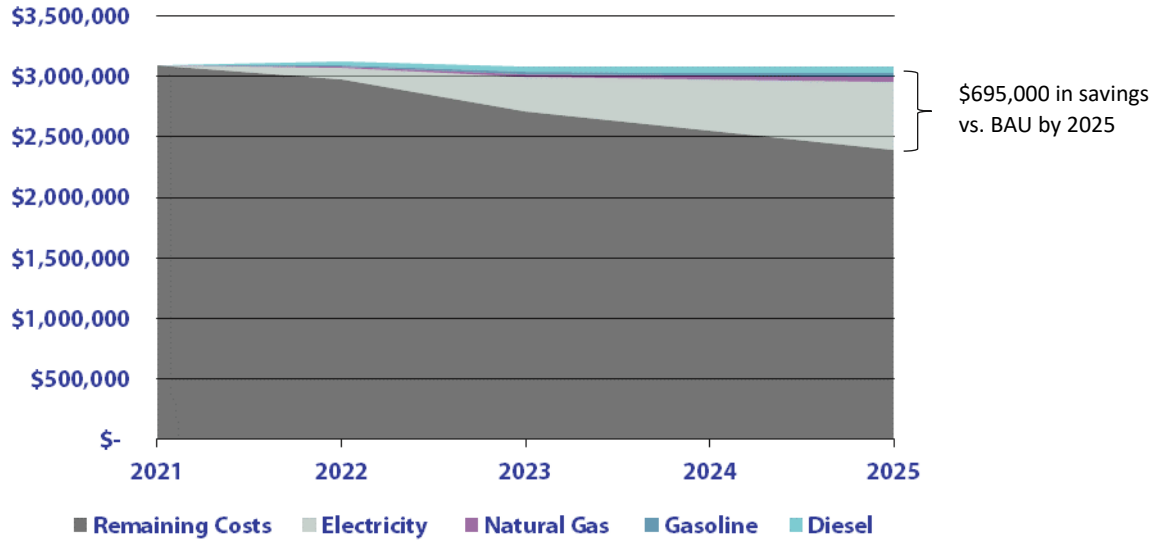
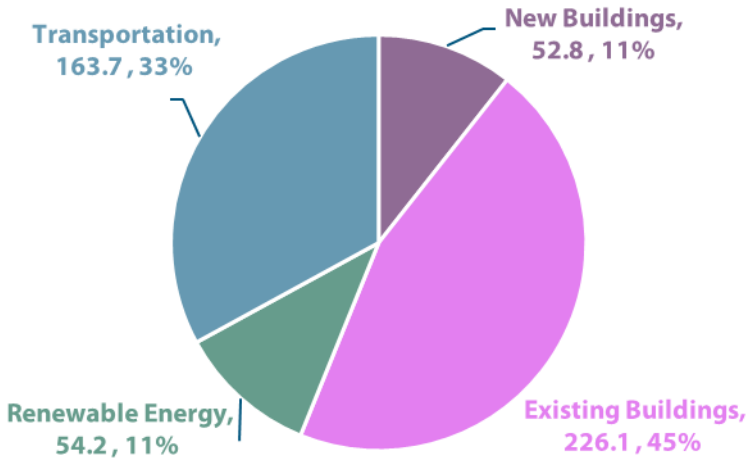


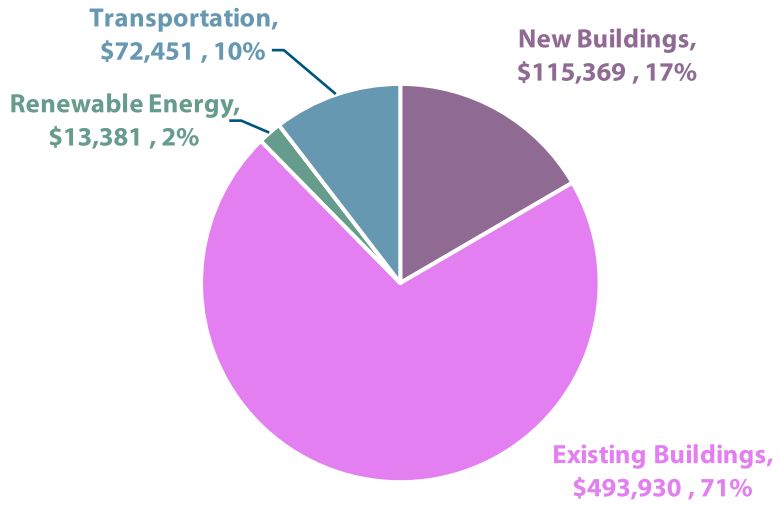
Figure 10 – Energy Costs and Savings from Actions to 2025 by Fuel



Action impacts can be represented in terms of how much each action category will contribute towards the 2025 GHG emissions reduction, as well as associated cost savings. This information is shown in Figure 11. The largest proportion of emission and cost savings will be from existing buildings at 45% and 72%, respectively, while transportation will also contribute 33% and 9% respectively.

Figure 11 – Emissions Reductions* and Cost Savings by Category, in 2025





*Reductions in this graph are in tonnes CO_2e

Next Steps – The Low-Hanging Fruit

Funding Climate Action

Penticton currently has a Climate Action Reserve Fund of approximately $512,000. The fund was financed annually through CARIP grants up until 2021, with the most recent contribution totalling approximately $65,000. The closure of the CARIP grant in 2021 raised questions about how the fund would continue, although since then announcements have been made about a CARIP grant replacement coming in 2022 and would be an excellent way to continue the fund. The Climate Action Reserve Fund has up until now been the sole dedicated source of climate action funding and does not currently have policy guidelines.

To ensure adequate funding for climate action going forwards, as well as to integrate climate action within municipal processes, it is recommended that the City of Penticton require all projects in the City (capital or otherwise) to include an emissions and energy analysis, and that those factors be considered in their prioritization. In addition, the guidelines for the use of the Climate Action Reserve Fund should be created and could include:

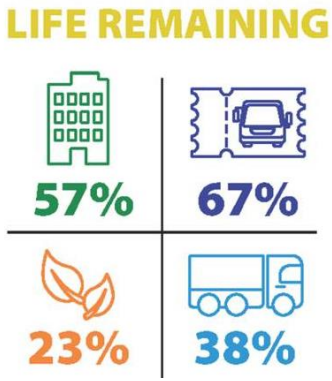
- Topping-up projects or purchases (e.g. increasing the budget of another department to assist with energy savings, such as increasing the Fleet budget to replace a gasoline vehicle with an EV equivalent, instead of replacing with another gas unit)
- Increasing staff resources
- Providing seed money for grants or new projects
- Plans, studies, or other initiatives
- Community engagement or awareness about climate change or GHG reductions
- Purchasing offset credits

City staff could also keep an open mind with respect to finding other sources of funding for augmenting the Climate Action Reserve Fund. Revenues from selling electricity for EV charging through the Low Carbon Fuel Standard are one possible example.

Building & Infrastructure Energy Audits & Retrofits

A recent asset assessment conducted by the City, shown in Figure 12, identified 57% of life remaining for the City's buildings and infrastructure, as well as 67% for transportation systems, 38% for the fleet, and 23% for parks.

Figure 12 – Life Expectancy of Penticton Assets



Penticton is currently in discussion with FortisBC on beginning energy audits on qualified corporate buildings as part of the Commercial Energy Assessment Program, and the Custom Efficiency Program.

The Commercial Energy Assessment Program offers a free walk through energy audit with a high level report (ASHRAE Level 1) identifying energy conservation measures that could take advantage of FortisBC's equipment focused prescriptive rebates, and potential energy efficiency upgrades.

Identified energy efficiency upgrades could then be implemented as part of the Custom Efficiency Program, if the building has the potential to save over 1,000 GJ of natural gas or 50,000 kWh of electricity each year as determined by an energy study proposal. FortisBC will provide 75% of funding to conduct an ASHRAE Level 2 (or equivalent) energy study on the building by an approved engineering consultant, up to $37,500. Note that the cost of the study will depend heavily on the size and type of building, however to that end, the following buildings in Table 3 have been recommended for by FortisBC, with the respective consumption of natural gas and electricity included.

Table 3 – Buildings of Focus for High Impact Energy Retrofits

Building	Nat Gas (GJ)	Electricity (kWh)	Energy Costs ($)
South Okanagan Events Centre	6,051	3,661,483	$434,133
Trade & Convention Centre	2,755	1,009,680	$125,911
Community Rec Centre	10,115	2,657,760	$347,778
McLaren Park Arena	625	693,190	$79,221
Memorial Arena	1,029	1,091,680	$125,017
Works Yard	1,040	430,508	$52,918
Water Filtration Plant	1,311	1,105,200	$128,101

Buildings to focus on first

Buildings that qualify for the Custom Efficiency Program will receive incentives that offset the incremental cost of the new energy efficient project relative to the baseline consumption. The incentives are the lesser of:

- $3/GJ over the measure life of a natural gas efficiency project
- $0.02/kWh over the measure life of an electric efficiency project
- 75% of the invoiced project costs
- a maximum of up to $500,000 for commercial building or agricultural lighting projects, or up to $1 million for industrial facilities

As a hypothetical example of the degree of savings, if natural gas consumption were reduced by 20% and electricity by 5% in the Top 3 buildings identified in blue, this would translate into annual energy cost savings of $23,250 and $43,600 for natural gas and electricity, respectively. There would then be the additional incentives from the Custom Efficiency Program, increasing savings further.

Energy audits are being completed on the three high priority buildings identified in Table 3: South Okanagan Events Centre, Trade & Convention Centre, and Community Rec Centre. The 3rd intake of the Clean Communities Fund (CCF) has been announced, and is being targeted as a suitable funding source for one of these buildings, and the energy audits are important prerequisites to apply for this funding.

This plan will be developed in detail upon completion of the energy audits, as they will provide more certainty on the timeframe and expected costs and returns for recommended retrofits.

Solar-Ready Policy for Buildings

A solar policy is already being drafted for new corporate buildings, which will require that all new corporate buildings have solar installed. The policy will also require solar-readiness for roof retrofits in existing buildings.

Develop a Green Fleet Policy, Including EVs for City Fleet

As the fleet comprises 39% of overall corporate emissions, electrification is important to meet the City's emission reduction targets. As per Figure 12, the City's most recent assessment of asset life indicates that the life remaining for the fleet is at 38%; presenting ample opportunity to develop a green fleet plan, and convert towards electric options.

A Green Fleet Policy formalizes and clarifies fleet replacement policies and practices to reduce GHG emissions acquiring the most appropriate vehicle and equipment (also known as "right-sizing"), minimizing fuel consumption, improving driver satisfaction and equipment life and reducing operating costs. See Appendix K for a sample Green Fleet Policy that the City could implement.

At present, the City has only six Level 2 EV charging stations on City property (four at 307 Ellis and two at City Hall), nor do they have any fully electric vehicles within the fleet. Installation of Level 2 chargers for City staff is relatively inexpensive if unmetered, which are in the $1,000-$2,000 range installed, vs. public chargers which require metering and networking, and are considerably more expensive ($5,000+).

The City is currently awaiting a final decision on its application to the Clean Communities Fund for four direct current fast charging stations on owned properties: One at City Hall, one at the SS Sicamous, one at the South Okanagan Events Centre, and one at Skaha Lake Park West.

As for electrification, electric trucks are starting to reach the market (e.g. Tesla Cybertruck, Rivian R1T in 2021, and the Ford F-150 Lightning, Chevy Silverado EV, Atlis XT in 2022). Though upfront costs are expensive (around $100,000 per vehicle), the Climate Action Reserve Fund could potentially be considered to fund the incremental capital costs. Alternatively, the City could look at new/used passenger EVs.

Of the approximately 180 fleet vehicles owned by the City, 57 are light duty trucks, and 29 are light duty vehicles. Table 4 identifies the number of fleet vehicles in each category that have ZEV alternatives available. A fleet assessment is currently underway with ChargeFWD and is expected to be completed by fall 2022, which will provide more context on vehicles ready for replacement, and potential ZEV alternatives.

Table 4 – ZEV Alternatives for City Fleet

	# in Fleet	# and % with ZEV alternatives	Potential GHG Reduction (tCO_2e/yr)
Light duty vehicles	29	21 (72%)	25
Light duty trucks	57	54 (95%)	122

Below in Table 5 is a list of the top 3 emitters amongst City-owned diesel and gasoline fleet vehicles. Of these six, the 2013 Toro Mower and 2013 Chevrolet Silverado could be candidates for electrification at the time of this report, based on available vehicle models. The 2008 Ford F250 is also a possibility in the near future as technology becomes available, while the other vehicles will be more likely to be available in the longer-term.

Table 5 – Highest Emitting Fleet Vehicles

Reporting_Code	Description	Fuel	Amount (L)	Emissions (tCO_2e)
COP-UNIT-E201	2013 SPARTAN PUMPER TRUCK	Diesel	11,146	29.3
COP-UNIT-0077B	2017 Johnston Sweeper	Diesel	10,093	29.1
COP-UNIT-0070	2013 TORO MOWER	Diesel	9,495	27.4
COP-UNIT-0025A	2015 GMC Concrete Crew	Gasoline	4,037	9.1
COP-UNIT-0029	2013 CHEV SILVERADO	Gasoline	3,961	9.4
COP-UNIT-0135	2008 FORD F250	Gasoline	3,752	8.5

Incorporate Energy and Emissions Impacts into Council Reports

Bringing awareness and transparency of climate action into Council reports will help keep the climate discussion top of mind for Council members and the public. Showcase climate actions at both the community and corporate levels should be identified, with overall energy and emission reductions, along with how those are contributing to the City meeting its emissions (and potentially energy consumption) targets, should be included.

Implementation for Success – Funding the Way

Several key factors are important for the successful implementation of energy and emission reduction plans based on research conducted by CEA, QUEST, and Smart Prosperity.[4] Among others, they include establishing broad support for implementation, building staff and financial capacity for implementation, and institutionalizing the plan in order to withstand political and staff turnover.

The City of Penticton has political and staff support for climate action, however additional staff capacity is necessary, as only 30% of a full-time technical position is currently allocated to climate action, with the remaining 70% allocated to solid waste. The City may need to consider additional staff resources of a higher capacity to appropriately advance the action items in this plan. The City does also does have a Climate Reserve Fund, which is currently being utilized as seed money for the 2020 CleanBC electric vehicle fast charger grant application, to purchase four e-bikes for corporate use, and to pay for the net cost of energy audits for the SOEC, PTCC and Community Recreation Centre.

Funding sources that communities typically use for climate action are shown in Table 6. External funding sources should be pursued where available to accelerate action. The internal funding sources that the City sets aside can be used to leverage external funding to great effect.

Table 6 – Funding Sources BC Governments Typically Use for Climate Action

Internal Funding Sources	External Funding Sources
• Allocation from operating budget (e.g. 0.1% annually) • Climate action revolving fund • Recycling and solid waste user fees • Building permit fees and other service fees charged by Development Services • Electrical utility and water user fees	• Replacement to CARIP grant • Revenue from EV charging, through Low Carbon Fuel Standard • UBCM Gas Tax Agreement Funds • FCM's Green Municipal Fund (supports plans, studies, capital projects and pilot projects for environmental initiatives in a number of focus areas) • Northern Development Initiative Trust • Federal government programs such as the Low Carbon Economy Challenge and Clean Energy Innovation Program • Provincial government programs such as the Clean Energy Vehicle Program and CleanBC Communities Fund

[4] Community Energy Implementation Framework, https://questcanada.org/project/getting-to-implementation-in-canada/?dc=framework

The City already:

- Incorporates climate action into some documents like the OCP
- Has a partially dedicated staff position (30% of a full-time employee) working on climate action, the Community Sustainability Coordinator (remaining 70% dedicated to solid waste)
- Completes annual CARIP reports

In addition to these actions, the City should consider:

- Increasing technical staff resources to implement the actions items in the plan
- Discussing climate action implications in all reports to Council
- Incorporating the recommendations on Funding Climate Action contained in this report, which are:
    - Continuing to fund the Climate Action Reserve Fund with the CARIP replacement, and keeping an open mind to other sources of funding
    - That all projects in the City (capital or otherwise) include an emissions and energy analysis, and that those factors be considered in their prioritization
- Incorporating climate action into job descriptions of other City staff. Climate action is the responsibility of all departments, and there is greater chance of success if responsibility is formally shared
- Monitoring indicators that are easy to track to help ensure that progress is being made
- Reporting on indicators as part of an annual report to Council
- Renewing this plan in five years

With regards to institutionalization, ideas on how this can be done are shown in Table 7.

Table 7 – Ways Local Governments Can Institutionalize a Corporate Energy and Emissions Plan

Incorporate	Embed climate action into other planning documents such as the OCP, bylaws and policies, and departmental/master plans. Climate action could also be incorporated into City staff job descriptions. Include climate action considerations in all reports to Council.
Budget	Embed climate action into the budgeting process.
Monitor	Monitor indicators as outlined in the Monitor and Evaluation section.
Convene	Host regular meetings to discuss implementation with internal and/or external stakeholders.
Report	Report regularly to Council on progress and accomplishments. Annual reporting is recommended. It can be integrated with CARIP-equivalent reporting.
Renew	Prepare for Plan renewal approximately every five years.

Monitoring and Evaluation

Monitoring and evaluating the implementation of the plan is critical for its success. Key Performance Indicators (KPIs) enable communities to measure the outcomes of a plan's implementation. When KPIs are monitored regularly, communities can determine how to best allocate resources to support implementation, and the level of success of different actions.

Suggested indicators are shown in Table 7. Two types of indicators are recommended. Primary indicators measure corporate GHG emissions, energy consumption and energy expenditure, while secondary indicators can quantify the indirect success of various actions.

Examples of KPIs that could be developed now to meet 2030 targets:

- Convert 3 light duty vehicles per year to ZEV (from 2022 to 2030)
- Convert 4 heavy duty vehicles per year to ZEV (from 2026 to 2030)
- Convert 3 off-road vehicles per year to ZEV (from 2026 to 2030)

Note that the number of fleet vehicles converted has been increased to offset emissions from waste hauling, as roughly 25% of fleet emissions are from contracted waste services, and reducing those emissions would require negotiation with the waste hauling contractor regarding their fleet vehicles, or acquiring offsets through local sequestration projects or purchases.

Unlike a Community Energy and Emissions Plan, the primary indicators of corporate energy consumption, emissions, and energy expenditures can be easily and accurately tracked. Whilst these are the determinants of success, secondary indicators can still play a useful role in monitoring progress on climate action. Annual progress reporting should be planned by the City.

Table 8 – Primary and Secondary Indicators for Monitoring and Evaluation

INDICATOR	2021	2022	2023	2024	2025
Primary					
Corporate GHG emissions (tonnes CO2e)					
Corporate energy consumption (GJ)					
Corporate energy expenditure ($)					
Secondary - New Buildings and Infrastructure					
Percentage of new buildings or infrastructure projects conducted to higher energy efficiency projects					
Secondary - Existing Buildings and Infrastructure					
% of corporate assets that have undergone energy assessments in last 24 months					
GJ and GHGs reduced from completion of retrofits on corporate assets in last 24 months					
Secondary - Renewable Energy					
Installed capacity of solar PV on corporate buildings (KW)					
Secondary - Transportation					
Percentage of fleet vehicles that are electric, hybrid, or use other alternative fuels					
Percentage of driving employees that have completed fuel efficient driver training					
Secondary - Enabling Actions and Corporate Leadership					
Water consumption at specific corporate buildings (m^3)					
Total value of incentives received (e.g. grants) for Plan implementation ($)					
Current PCP Milestone (1 to 5)					

Appendix A. Abbreviations

AAMP	Asset & Amenity Management Project
AMBC	Asset Management BC
BAU	Business as Usual
CAC	Climate Action Charter
CARIP	Climate Action Revenue Incentive Program (administered through the Province of BC)
CDD	Cooling Degree Day
CEA	Community Energy Association
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide equivalent
EV	Electric Vehicle
FCM	Federation of Canadian Municipalities
GHG	Greenhouse Gas (there are several different anthropogenic GHGs and they have different relative impacts. When tonnes of GHGs are stated in the document the standard practice of stating this in equivalent of tonnes of carbon dioxide is followed.)
GJ	Gigajoules (one of the standard measures of energy)
GMF	Green Municipal Fund
HDD	Heating Degree Day
HVAC	Heating Ventilation and Air Conditioning
IPCC	Intergovernmental Panel on Climate Change (an intergovernmental body of the United Nations dedicated to providing the world with an objective science-based view of climate change, its possible impacts, risks, and response options)
KPI	Key Performance Indicator
kWh	kilowatt hours (standard measure of energy, typically used with electricity)
LCR	Low Carbon Resilience (a term to describe integrated climate change mitigation & adaptation, created by Simon Fraser University's Adaptation to Climate Change Team)

LED	Light Emitting Diode
MCIP	Municipalities for Climate Innovation Program
MFA	Municipal Finance Authority of BC
MNAI	Municipal Natural Assets Initiative
OCP	Official Community Plan
PCP	FCM-ICLEI's Partners for Climate Protection
PV	Photovoltaics (solar panels that generate electricity)
RCP	Representative Concentration Pathway (four RCPs were adopted by the IPCC as scenarios for the 2014 Fifth Assessment Report, depending on how much GHGs are emitted in future years)

Appendix B. Climate Actions in Detail

Table 9 – Climate Actions in Detail

New Buildings and Infrastructure

Action	Timing	GHG Impacts	Economic Impacts	Adaptation/ Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
1.1 Commit to building energy efficient & resilient facilities (may include Step Code implementation)	**2022**	**43 tCO_2e**	**$94k**	**Low**	**High**	**Medium**	**Province of BC, FortisBC, MFA, GMF, MCIP, REFBC**	**Facilities**

The City will commit to build new buildings that are energy efficient and have low GHG emissions. Appendix J contains "Guiding Principles for Climate Ready Municipal Buildings". The benefits of doing so are;

- Reducing risk by ensuring that the City owns assets that are "future proofed". I.e. that will have low energy costs, low GHG emissions (and hence low carbon tax payments / low offset requirements), and will be resilient to a changing climate (e.g. hotter and smokier summers). It's important for long-term operational savings to the City to be taken in to account when considering higher initial costs.
- Reducing the need for buildings to be retrofitted later.
- Finding opportunities for renewable energy systems.
- Ensuring that the City owns and operates high quality, low maintenance buildings.
- Leading by example in the community on energy efficient building practices, and ensuring that energy efficient best practices are disseminated throughout the community.

Action	Timing	GHG Impacts	Economic Impacts	Adaptation/ Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
1.2 Commit to building energy efficient & resilient infrastructure	**2024 (Maybe)**	**3 tCO_2e**	**$6,2k**	**High**	**Medium**	**Medium**	**CleanBC, MFA, GMF, MCIP**	**Engineering and Public Works**

The City will commit to building the most energy efficient and resilient low emission infrastructure that it reasonably can. There are multiple benefits to doing this:

- Reducing risk by ensuring that the City owns assets that are "future proofed". I.e. that will have low energy costs, low GHG emissions (and hence low carbon tax payments / low offset requirements), and will be resilient to a changing climate (e.g. hotter and smokier summers). It's important for long-term operational savings to the City to be taken in to account when considering higher initial costs.
- Reducing the need for infrastructure to be retrofitted later.
- Finding opportunities for renewable energy systems.
- Ensuring that the City owns and operates high quality, low maintenance infrastructure.
- Leading by example in the community by demonstrating best practices, and ensuring that energy efficient best practices are disseminated throughout the community.

Action	Timing	GHG Impacts	Economic Impacts	Adaptation/ Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
1.3: Optimise siting and orientation of new buildings	**2022**	**7 tCO_2e**	**$16k**	**High**	**Medium**	**Medium**	**n/a**	**Facilities**

The City will commit to optimizing the siting and orientation of new buildings where possible. This includes optimizing orientation to benefit from passive solar gain and siting a building adjacent to a waste heat source if available. This action has the following benefits

- Reducing risk by ensuring that the City owns assets that are "future proofed". I.e. that will have low energy costs, low GHG emissions (and hence low carbon tax payments / low offset requirements), and will be resilient to a changing climate (e.g. hotter and smokier summers).
- Reducing the need for buildings to be retrofitted later.
- Finding opportunities for renewable energy systems.
- Leading by example in the community on building best practices.

Many of these benefits are similar to 1.1 but can in some cases be realised for a lower cost and effort. For example, orientation of a building can ensure passive heat gain at cooler times of the year, while installing passive solar design features that will also reduce the summer heat gain.

Existing Buildings & Infrastructure

Action	Timing	GHG Impacts	Economic Impacts	Adaptation/ Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
2.1: Conduct building energy audits	**2022**	**n/a**	**n/a**	**Medium**	**Low**	**Low**	**Province of BC, FortisBC**	**Facilities**

The City will conduct energy audits of its buildings, beginning with those that consume the most energy. As the audits are completed, the City will then prioritize improvements based on audit results.

The City may choose to prioritize projects based on energy cost savings or GHG emissions savings. The former is most likely to come from reduced electricity consumption whereas the latter is most likely to come from reduced natural gas consumption.

Prioritized buildings should follow the shortlisted buildings identified in the Asset & Amenity Management Plan (AAMP). These include:

- Firehall #1 and #2
- City Hall
- Memorial Arena
- McLaren Arena
- Library/Museum
- Art Gallery
- Leir House
- Cleland Theatre
- Indoor Soccer Sportsplex

Action	Timing	GHG Impacts	Economic Impacts	Adaptation/ Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
2.2: Implement energy retrofits recommended by building energy audits, & improve resiliency	**2023**	**125 tCO_2e**	**$273k**	**Medium**	**High**	**High**	**NRCan, FCM, Province of BC, FortisBC**	**Facilities**

Upon completion of action 2.1, energy retrofits recommended by the energy audit reports should be implemented. A prioritization process will identify which projects to be completed first, based on energy cost savings or GHG emissions savings. Typically, energy retrofits that reduce

electricity consumption will result in energy cost savings and energy retrofits that reduce natural gas consumption will result in GHG emissions savings. A project prioritization matrix can be found in Appendix F.

Opportunities to improve resiliency of existing buildings should also be implemented.

Action	Timing	GHG Impacts	Economic Impacts	Adaptation/ Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
2.3: Conduct energy & resilience-focused operational review of infrastructure	**2022**	**n/a**	**n/a**	**Medium**	**Medium**	**Medium**	**FCM/UBCM Asset Management**	**Engineering and Public Works**
The City will conduct an energy and resiliency-focussed operational review of its infrastructure, which includes drinking, storm and waste water systems, roads, natural assets, and streetlights. It may be possible to identify areas of energy efficiency improvements, which would be planned and implemented after the review.								

Action	Timing	GHG Impacts	Economic Impacts	Adaptation/ Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
2.4: Implement measures from operational review of infrastructure	**2023**	**76 tCO_2e**	**$165k**	**Medium**	**High**	**High**	**FCM, AMBC , MNAI**	**Engineering and Public Works**
The energy and resiliency-focussed operational review of infrastructure will have identified areas of potential energy savings. Most of the operational energy consumption in municipal infrastructure is in the form of electricity for municipal water services and street lighting, though the wastewater system does include some facilities that use natural gas, and are captured here vs. Action 2.2. Due to the relatively high cost of electricity (compared with natural gas), there is the potential for significant energy cost savings, while the reduction in natural gas from wastewater buildings has potential for significant emission reductions.								

Action	Timing	GHG Impacts	Economic Impacts	Adaptation/ Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
2.5: Incorporate energy management into annual	**2022**	**26 CO_2e**	**$56k**	**Medium**	**Low**	**Low**	**n/a**	**Facilities**

building maintenance procedures								

Annual maintenance and safety inspections provide a convenient opportunity to incorporate energy management objectives. Specific actions include:

- Check programming of thermostats and lighting controls
- Check and replace weather stripping on doors and windows as necessary
- Monitor annual energy consumption to identify abnormal energy use
- Assess condition and maintenance dates of HVAC and hot water equipment

Two sample checklists are provided in Appendix H.

Action	Timing	GHG Impacts	Economic Impacts	Adaptation/ Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
2.6: Investigate opportunities to consolidate older buildings	**2022**	**n/a**	**n/a**	**Medium**	**Medium**	**Medium**	**FCM/UBCM Asset Management**	**Facilities, Public Works**

As per the Asset & Amenity Management Plan, the City will investigate opportunities to consolidate buildings and other assets. An example of this is the Proposed 2-Ice Facility which will consolidate operations (e.g. Zamboni, catering, chiller facilities, staff for general duties).

Renewable Energy

Action	Timing	GHG Impacts	Economic Impacts	Adaptation/ Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
3.1: Install solar PV on corporate buildings	**2022**	**0.4 tCO_2e**	**$22k**	**Medium**	**Medium**	**High**	**CleanBC, FortisBC**	**Facilities, Procurement, Electric Utility**

The 2019 Power Generation Study recommended solar PV installations on all new corporate buildings. Additional opportunities can be sought on existing building (e.g. recreation centre). Solar PV is often more cost effective when installed on new buildings or when roof replacement is necessary on an existing building. This action has the following benefits:

- Reducing risk by ensuring that the City owns assets that are "future proofed" (i.e. that will have low energy costs, and will be resilient to a changing climate (e.g. hotter and smokier summers)).
- Reducing the need for buildings to be retrofit later.
- Ensuring that the City owns and operates high quality, low maintenance assets.
- Leading by example in the community on building best practices.

At minimum, when a building is re-roofed, it should be made solar-ready (i.e., wiring conduit added). This is low cost but can significantly reduce the cost of a solar installation later.

Action	Timing	GHG Impacts	Economic Impacts	Adaptation/ Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
3.2: Implement heat recovery retrofits in buildings	**2023**	**54 tCO_2e**	**- ($8k)**	**Medium**	**Medium**	**High**	**Province of BC, FortisBC**	**Facilities**

Building energy audits as described in action 2.1 may identify opportunities to retrofit low-carbon heating systems. Similarly, heat recovery retrofits including low carbon heating systems should be considered for all new corporate buildings. Low-carbon heating systems may include air-source heat pumps and waste heat recovery. Waste heat recovery may be from an ice arena or a wastewater treatment plant. This action could lead to substantial GHG emissions savings, but may have negative financial implications in the case of air-source heat pumps, due to the higher cost of electricity than natural gas.

This action will tie-in with asset management and building maintenance/inspection programs at the City, as retrofit costs and benefits, as well as necessary changes to existing maintenance and inspection programs, will need to be incorporated in asset management decisions.

Action	Timing	GHG Impacts	Economic Impacts	Adaptation/ Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
3.3: Complete & Identify next steps from Power Generation Study	**Done/ Ongoing**	**n/a**	**n/a**	**Medium**	**Medium**	**Medium**	**Province of BC, FCM**	**Facilities, Electric Utility, Procurement**
Renewable energy opportunities include both electricity generation and waste heat recovery. Solar PV was already discussed in action 3.1. Further opportunities are likely to be in the form of waste heat recovery. The City has already had a feasibility study completed for heat recovery from the arena at the recreation centre. Heat recovery from the wastewater treatment centre could also be considered.								

Transportation

Action	Timing	GHG Impacts	Economic Impacts	Adaptation/ Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
4.1: Right-size vehicles for assigned tasks	**2024 (Maybe)**	**9 tCO_2e**	**$4k**	**Low**	**Low**	**Low**	**n/a**	**Public Works**
A municipal fleet contains a wide array of vehicle types and sizes. Vehicle fuel economy (litres/100km) varies widely between vehicle types. An appropriately sized vehicle should be used for each task to reduce fuel consumption. Alternative modes of transportation should also be considered, particularly with the introduction of e-cargo bikes. The City has started a fleet assessment in early 2022 through the CleanBC Go Electric Fleets Program. After the fleet assessment is complete, the City will then create a vehicle use policy, and institutionalise it.								

Action	Timing	GHG Impacts	Economic Impacts	Adaptation/ Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility

4.2: Develop a vehicle purchasing policy/Green Fleet Plan	**2022**	**n/a**	**n/a**	**Low**	**Low**	**Low**	**n/a**	**Public Works, Procurement**

A vehicle purchasing policy should be created and implemented that includes zero-emission vehicles. The policy should ensure that new vehicles are evaluated based on:

- Anticipated usage of vehicles (e.g. engine size, vehicle weight, load capacity, passenger capacity, and routes / operational terrain)
- Life cycle considerations (e.g. life cycle emissions, residual costs / values of vehicle being replaced, capital costs, maintenance costs, fuel costs including fuel being used, resale values)

The objective is to ensure that all vehicles have the lowest GHGs / are the most energy efficient, that still meet minimum service requirements with some contingency. Zero / low carbon vehicles would be considered as part of this.

Action	Timing	GHG Impacts	Economic Impacts	Adaptation/ Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
4.3: Invest in EVs and EV Charging Stations	**2022/ Ongoing**	**76 tCO_2e**	**$20k**	**Low**	**Medium**	**Medium**	**Province of BC, NRCan, Clean BC**	**Public Works, Facilities, Procurement**

When light-duty vehicles are due for replacement, the City will consider purchasing an EV rather than a traditional ICE vehicle. The City will consider the full life-cycle costs including fuel and maintenance when comparing the two vehicle types for purchase. (The GHG impacts for this action assume replacement of ICEs with EVs at end of life.)
The City will consider installing electric vehicle charging stations at City-owned properties, which could also be available for use by the public.
The City will consider partnering with regional EV networks.

Action	Timing	GHG Impacts	Economic Impacts	Adaptation/ Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
4.4: Assess renewable fuels for corporate fleet	**2022**	**60 tCO_2e**	**$27k**	**Low**	**Low**	**Medium**	**Regional fleets (e.g., RDOS, SD67)**	**Public Works**

The City will assess the potential of renewable fuels such as biodiesel and ethanol for its corporate fleet. The City will request a quote for renewable fuels when tendering for fuel contracts annually.

Action	Timing	GHG Impacts	Economic Impacts	Adaptation/ Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
4.5: Fuel efficient driver training & anti-idling policy	**2022**	**17 tCO_2e**	**$8k**	**Low**	**Low**	**Low**	**n/a**	**HR**
The most cost-effective way to reduce fleet emissions is through operator behaviour. The costs to implement an efficient vehicle use program will likely be more than offset by the direct savings on fuel purchases. The City will include fuel efficient and anti-idling driver training as part of yearly training, or staff training plans. It will be included as part of new employee training. Training will be tracked in the employee's personal folder. A Corporate anti-idling policy will be introduced by the City.								

Action	Timing	GHG Impacts	Economic Impacts	Adaptation/ Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
4.6: Energy-focussed fleet maintenance	**2024 (Maybe)**	**2 tCO_2e**	**$1k**	**Low**	**Low**	**Low**	**n/a**	**Public Works**
Routine checks of vehicle systems (e.g. tire pressures, engine tuning), is a very low cost way to improve on emissions and reduce costs. This could be combined with regular safety inspections of vehicles (e.g. brakes). Penticton's vehicle maintenance checklist is provided in Appendix I.								

Action	Timing	GHG Impacts	Economic Impacts	Adaptation/ Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
4.7: Encourage carpooling and active transportation where possible	**2022**	**n/a**	**n/a**	**Low**	**Low**	**Low**	**n/a**	**All**
This action encourages staff to carpool for travel to work and for work-related travel. Furthermore, travel needs can be reduced through attending off-site meetings virtually. Encouraging walking and cycling to work can take place through incentives and competitions. The City already suggests that employees carpool when travelling out of town for conferences and meetings.								

Action	Timing	GHG Impacts	Economic Impacts	Adaptation/ Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
4.8: Improve/expand facilities to help staff reduce the emissions associated with commuting to work	**Done/ Ongoing**	**n/a**	**n/a**	**Low**	**Medium**	**Medium**	**n/a**	**Public Works, Communications**

Providing amenities like covered / secured bicycle racks and showering facilities can help enable staff to leave their vehicles at home and commute to work by foot or bike. EV charging stations and plug-ins can help staff who have electric vehicles, including e-bikes and e-scooters. The City currently provides bike racks.

Emissions from staff commuting are not included within a corporate inventory, but in many cases represent a significant opportunity to demonstrate leadership in reducing overall community emissions. This explains why emissions and economic impacts are given as zero.

Enabling Actions and Corporate Leadership

Action	Timing	GHG Impacts	Economic Impacts	Adaptation/ Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
5.1: Have dedicated staff person or department for plan implementation	**Done**	**n/a**	**n/a**	**Low**	**Low**	**Low**	**n/a**	**Community Sustainability Coordinator**

A Corporate Energy and Emissions Plan details actions that can be taken to reduce energy and emissions. The plan itself does not result in savings - it is the implementation of the actions listed in the plan that does. Limited staff capacity can be a barrier to successful implementation of the plan. Having a dedicated staff person or department to coordinate all responsible parties and provide support is critical for successful plan implementation.

At the City of Penticton, only a 0.3 FTE (full-time equivalent) position is currently dedicated to sustainability, with the remaining 0.7 FTE dedicated to solid waste. Increasing technical staff capacity in a position of higher capacity and influence is necessary to properly facilitate plan implementation.

Action	Timing	GHG Impacts	Economic Impacts	Adaptation/ Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
5.2: Implement recommendations on funding climate action	**2022/ Ongoing**	**n/a**	**n/a**	**Low**	**Low**	**Low**	**n/a**	**Finance, all Departments**

The City should implement the recommendations on Funding Climate Action contained in this report, which are:

- Continuing to fund the Climate Action Reserve Fund with the CARIP replacement, and keeping an open mind to other sources of funding
- That all projects in the City (capital or otherwise) include an emissions and energy analysis, and that those factors be considered in their prioritization
- That guidelines be created for the Climate Action Reserve Fund (outlined in 'Implementation for Success', page 41) to further support climate action implementation

Action	Timing	GHG Impacts	Economic Impacts	Adaptation/ Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
5.3: Develop KPIs, monitor and track for progress	**2022/ Ongoing**	**n/a**	**n/a**	**Low**	**Low**	**Low**	**n/a**	**Community Sustainability Coordinator, Department Directors**
It is important to track energy consumption, energy expenditure and GHG emissions year over year to evaluate overall progress. However, some secondary indicators may also be helpful to monitor progress. A full list of primary and secondary performance indicators are provided in Table 8.								

Action	Timing	GHG Impacts	Economic Impacts	Adaptation/ Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
5.4: Demonstrate leadership on corporate waste and water	**2022/ Ongoing**	**n/a**	**n/a**	**Medium**	**Medium**	**Low**	**n/a**	**All**
Actions should be taken to reduce waste creation and water consumption at the corporate level. Demonstrating leadership at the corporate level may help to guide reductions at the community level. Examples include: • Zero-waste target for corporate operations • Best practices in water efficient landscaping • Policies that discourage printing • Green Event Policy (See Appendix K) Reduction in water consumption and waste creation will have minimal impact on corporate GHGs, but may lead to modest labour and tipping fee savings. Furthermore, GHG's from waste are not included in CARIP reporting.								

Action	Timing	GHG Impacts	Economic Impacts	Adaptation/ Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
5.5: Examine local carbon offset projects or offset purchases for remaining emissions	**Done**	**n/a**	**n/a**	**Low**	**Low**	**High**	**n/a**	**Corporate Services**

To achieve carbon neutrality, local governments must find a way to make up for, or balance, their ongoing corporate emissions. By purchasing offsets, Penticton had been a carbon neutral community from 2015 to 2018. Community carbon offset projects such as Three Blind Mice have also played a significant role in Penticton meeting its corporate GHG targets for 2015 and 2020, and will be an important piece of the carbon puzzle going forward. That said, they should not be relied upon to compensate for increasing emissions; deep retrofits and fleet decarbonisation of City controlled assets need to be the focus to achieve true reduction.

More information about becoming carbon neutral can be found in this report
https://www.toolkit.bc.ca/sites/default/files/BecomingCarbonNeutralGuideV3.pdf

Options currently identified by the Province include the following:

- Energy efficient building retrofits and fuel switching (for private buildings and other buildings outside of traditional corporate emissions)
- Solar thermal retrofits (for private buildings and other buildings outside of traditional corporate emissions)
- Household organic waste composting
- Low-emission vehicles (e.g. for public transportation, police departments and airports)
- Avoided forest conversion (such as Three Blind Mice)

Action	Timing	GHG Impacts	Economic Impacts	Adaptation/ Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
5.6: Incorporate energy and emissions impacts into council reports	**2022**	**n/a**	**n/a**	**Low**	**Low**	**Low**	**n/a**	**Corporate Services**

Identify and highlight showcase climate actions at both the community and corporate levels, include overall energy and emission reductions from actions taken so far, along with how those are contributing to the City meeting its emissions (and potentially energy consumption) targets.

Action	Timing	GHG Impacts	Economic Impacts	Adaptation/ Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
5.7: Declare Climate Emergency	**2022**	**n/a**	**n/a**	**Low**	**Low**	**Low**	**n/a**	**Corporate Services**
Declaring a Climate Emergency, as recommended by the Community Sustainability Advisory Committee, is a critical step towards reducing greenhouse gas emissions in order to limit global temperature increases to the limit of 1.5C as recommended by the IPCC. The City can address the climate emergency by financing projects through respective department budgets and by utilizing the climate action reserve to further fund projects that lower emissions and benefit the environment.								
Action	**Timing**	**GHG Impacts**	**Economic Impacts**	**Adaptation/ Resilience Linkages**	**Effort**	**Cost**	**Possible Partner/ Funder**	**Staff Responsibility**
5.8: Create an Emissions Dashboard	**2022**	**n/a**	**n/a**	**Low**	**Low**	**Low**	**n/a**	**Community Sustainability Coordinator, Corporate Services**
Create an emissions dashboard on the City's community sustainability webpage that displays annual corporate emissions data. Purpose is for residents to easily look up and track annual corporate emissions year over year.								

How are action impact numbers calculated?

Action impact numbers are calculated through a number of assumptions and modelled estimates based on CEA's experience. The impacts of individual actions on energy consumption are calculated for the year 2025. From this, GHG impacts and economic impacts are calculated using GHG intensity values and energy costs.

Actions may have further reaching impacts than the values stated here. Specifically, they demonstrate leadership and therefore may lead to GHG reductions and energy cost savings in the community.

What do the terms and colour coding mean in the actions tables?

In Table 9, the terms refer to the following:

- Effort = staff time
- Costs = municipal costs
- GHG & economic impacts = GHG emission savings & financial savings in the year 2025
- Adaptation / resilience linkages = capacity for increased efficiency and enhanced outcomes through linkages to climate adaptation / resilience. An example of a high resilience linkage is energy independence and an example of a mild linkage is air quality.

And where there are no numbers, there is colour coding to help communicate expected impacts and implications:

- **Green = high adaptation / resilience linkages, low effort, costs estimated to be $0 - $500.**
- **Grey = medium for all attributes. Costs estimated to be in $500-5,000 range.**
- **Red = no adaptation / resilience linkages, high effort, costs estimated to be $5,000 or more.**

Appendix C. PCP Information and Inventory

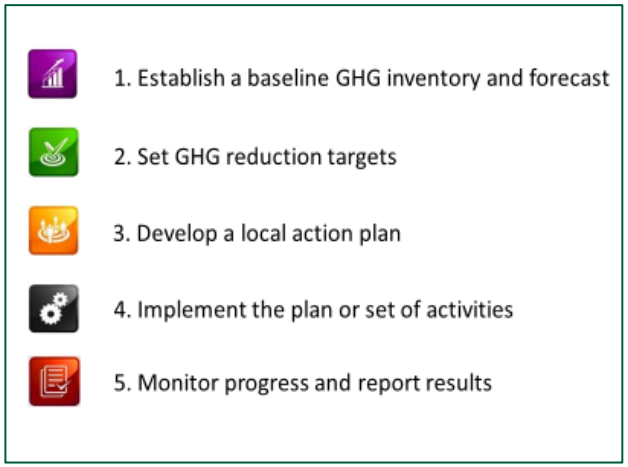
PCP Information

The FCM-ICLEI Partners for Climate Protection (PCP) is a network of Canadian municipal governments that have committed to reducing GHG emissions and to acting on climate change. Since the program's inception in 1994, over 350 municipalities have joined PCP, making a public commitment to reduce GHG emissions. PCP membership covers all provinces and territories and accounts for more than 65 per cent of the Canadian population.

The PCP program is managed and delivered by FCM and ICLEI Canada. They form the PCP Secretariat, which provides administrative and technical support, develops tools and resources, and delivers capacity building activities to support members in reducing local GHG emissions. The Secretariat also provides national recognition for member achievements.

Figure 13 – PCP Program Milestones

Source: PCP



The program empowers municipalities to take action against climate change through a five-milestone process that guides members in creating GHG inventories, setting GHG reduction targets, developing local action plans, implementing actions to reduce emissions, and monitoring and reporting on results.

Under PCP, there are five milestones for mitigation, for both the corporate and community categories. The five milestones are set out in the following figure.

For Milestones 1-3, this report with its appendices will be sufficient, although to achieve Milestone 2 the report will need to be adopted by Council.

For Milestone 4, the City will need to implement actions in this Corporate Plan, and report on this activity in its annual CARIP reports. Then it will need to submit these reports to FCM-ICLEI. **The City of Penticton is currently at this milestone on the corporate path.**

For Milestone 5, the City will need to create a document with updated corporate inventory information (already being collected for CARIP), and that quantifies the impacts of individual actions that have been conducted.

Inventory

The following table breaks down the City's GHG emissions by the PCP categories from 2014 to 2020, along with 2009 emissions as a baseline. The largest area of emissions are buildings, followed by fleet vehicles. This is because many buildings use natural gas as a heating source and fleet vehicles use gasoline or diesel. These three fuel sources are responsible for significant GHG emissions. Streetlights and traffic signals, as well as water and wastewater have much lower emissions because they use electricity as their fuel source which has low GHG emissions, with the latter only having considerable emissions due to the use of natural gas heating in their facilities.

GHG emissions from corporate solid waste were not available, as no surveys for solid waste volumes were conducted/recorded for City facilities. It is important to note that corporate solid waste GHG emissions under PCP are from solid waste produced at corporate buildings only. It does not include landfill GHG emissions nor does it include solid waste collection, transportation and diversion. GHG emissions from solid waste collection and transportation are accounted for in the fleet category. This is an opportunity for the City to record solid waste volumes for their facilities to gain a better understanding of their corporate waste profile.

The GHG emissions from buildings saw significant increases in 2016, and continuing into future years. The original increase in 2016 was due to the partial failure of an electric chiller at the pool, requiring backup from two natural gas boilers. Continued increases in future years was due in part to cold winters. GHG emissions from fleets rose from 723 tCO_2e in 2014 to a high of 1,016 tCO_2e in 2017, before stabilizing at 942 tCO_2e in 2019. Fleets under the PCP classification includes vehicles from all CARIP classifications.

Table 10 – PCP Inventory: Emissions, 2009 & 2014-2020

PCP Emissions by sector (tCO2e)	2009	2014	2015	2016	2017	2018	2019	2020
Buildings		1,055	1,007	1,206	1,279	1,324	1,344	1,124
Corporate Solid Waste		0	0	0	0	0	0	0
Fleet		723	845	913	1,016	1,011	942	924
Streetlights and Traffic Signals		3	3	3	3	3	4	4
Water and Wastewater		220	167	169	293	215	199	209
Total	**2,499**	**2,000**	**2,022**	**2,291**	**2,591**	**2,554**	**2,489**	**2,260**

Figure 14 shows the percentage of energy consumption, GHG emissions, and energy expenditures that can be attributed to each PCP classification, and by fuel source. Buildings comprise the largest proportion for each category, at 56% of energy consumption, 54% of emissions, and 49% of expenditures. Fleet emissions were next at 38%, despite relatively low consumption and expenditures. Despite their low GHG emissions, Water and Wastewater and Streetlights and Traffic Signals account for 32% and 6% of energy cost respectively, due to the high usage of electricity in each sector. This is reflected in the second graph by fuel source, where electricity accounts for 66% of energy consumption and 81% of expenditures.

Figure 15 shows the GHG emissions and energy cost by fuel source in 2019.

Figure 14 – PCP Inventory: Energy, Emissions and Cost by Classification and by Fuel Source, 2019

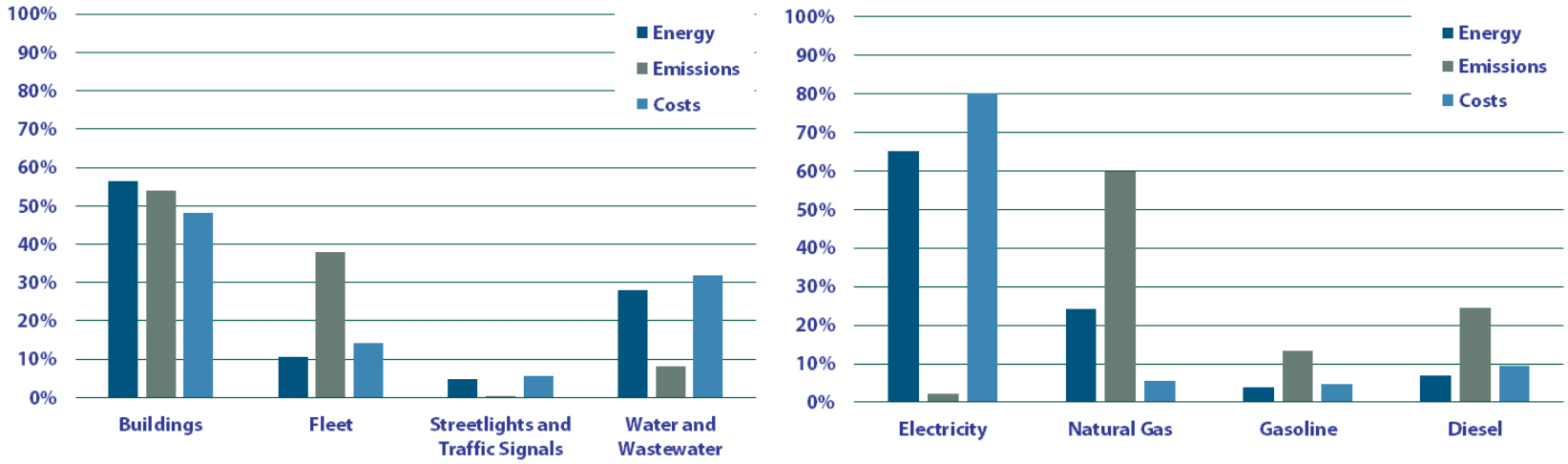
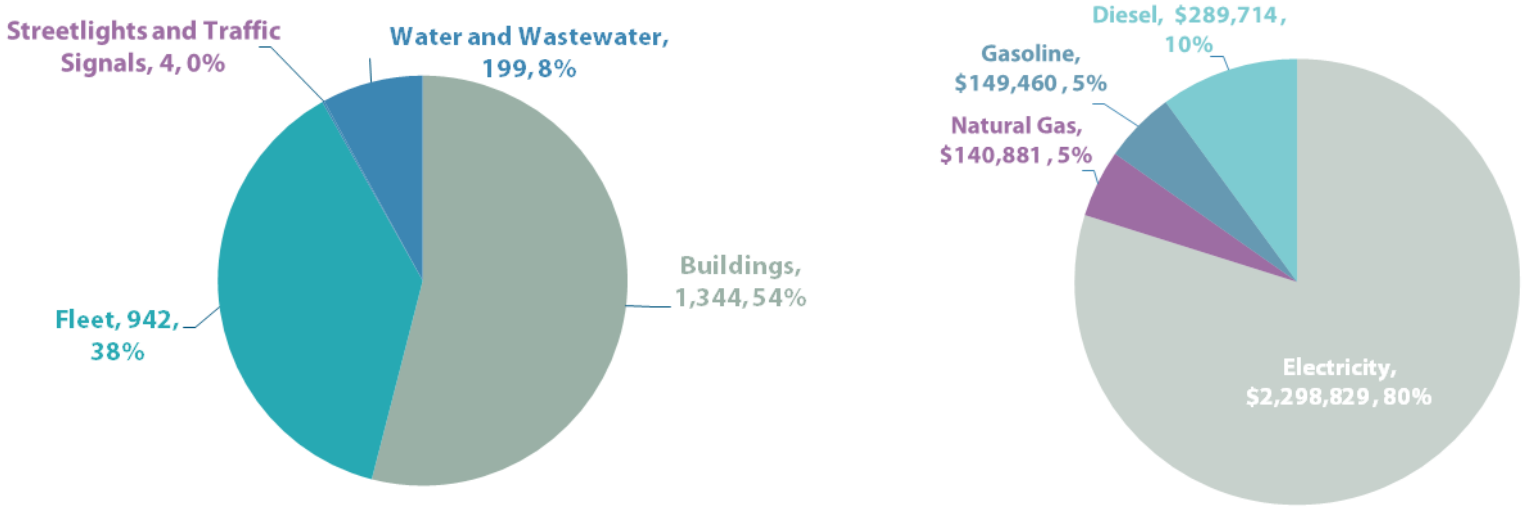


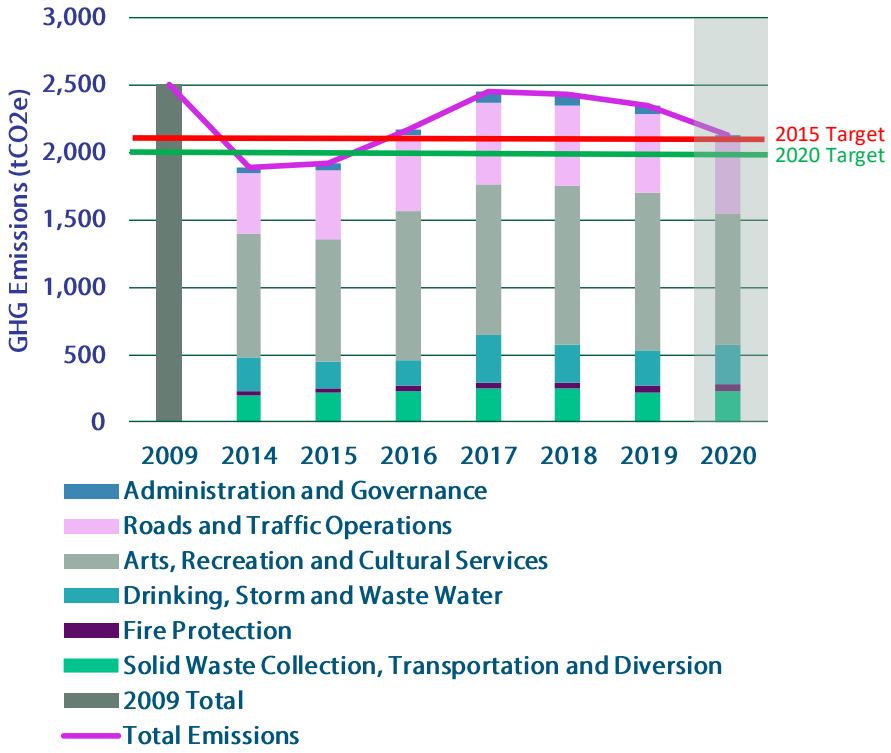
Figure 15 – PCP Inventory: Emissions and Cost by Fuel Source, 2019



Appendix D. GHG Inventory Without Carbon Offsets

This inventory has been created to demonstrate that while carbon reduction projects and offsets are permissible for the purposes of carbon accounting, they should not be relied upon for long-term GHG reductions. Rather, the City should focus on deep energy retrofits and fleet decarbonisation of City controlled assets. Figure 16 illustrates the City of Penticton's corporate GHG emissions without carbon reduction contributions from the Three Blind Mice project.

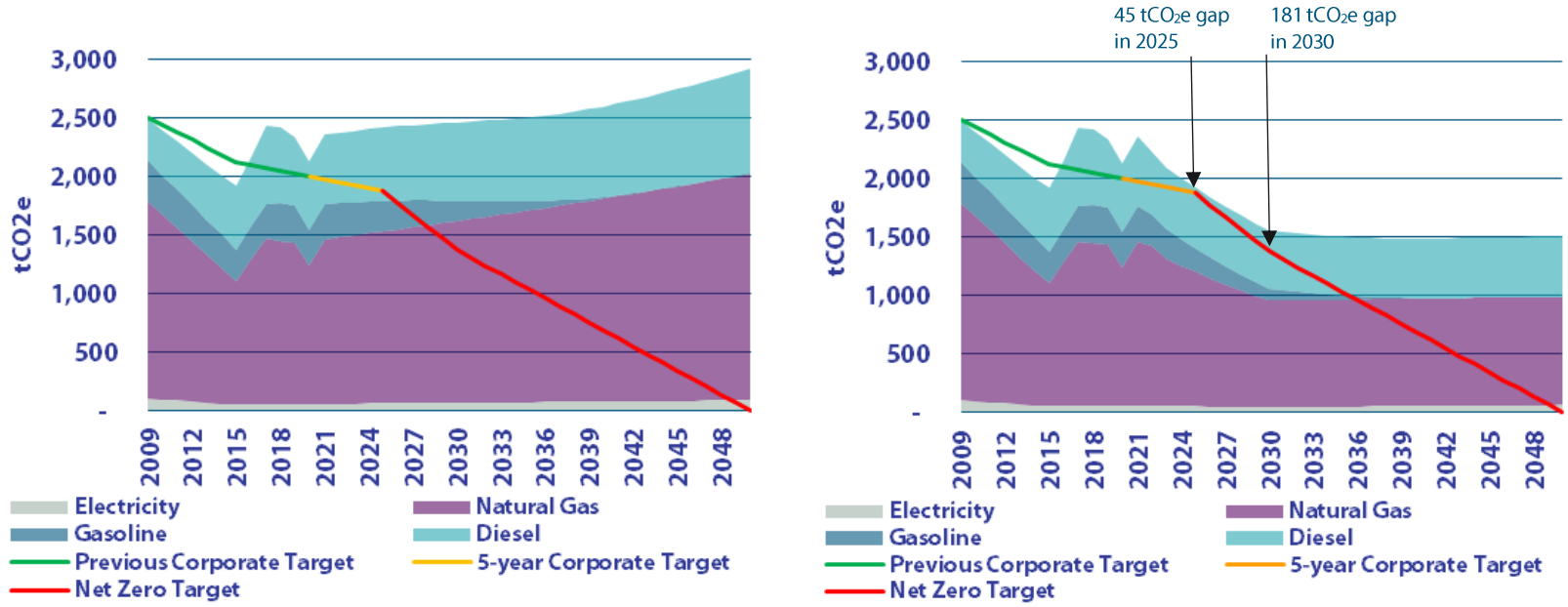
Figure 16 – Corporate GHG Inventory Without Carbon Reduction Contributions



Without carbon reduction contributions, the City's 2019 emissions totalled 2,341 tCO_2e in 2019, a 6% reduction vs. 2009 levels. This compared to a 22% reduction with carbon reduction contributions. Removing the 16% reduction from the Three Blind Mice project significantly changes the narrative on the City's GHG reduction results. In this scenario, the City is well off the target set for 2015 (15% below 2009) and even more so for 2020 (20% below 2009).

With respect to projections, Figure 17 shows that BAU corporate emissions (left) are slated to only decrease 2% and 4% vs. 2009 levels in 2025 and 2030, respectively. With planned actions included (right), emissions are reduced by 23% in 2025, and 40% in 2030, compared to 32% and 44% with carbon reduction contributions.

Figure 17 – BAU and Planned GHG Emissions to 2050 Without Carbon Reduction Contributions



Appendix E. City of Penticton Actions to Date

Table 11 – Climate Actions to Date

Buildings/lighting	2019 • New rooftop unit at Library, air handling unit at Museum • New ammonia system at Memorial Arena to replace ice chiller 2018 • Four new HVAC units at Trade & Convention Centre • Implemented Direct Digital Control (DDC) system 'owners' at key facilities to optimize performance • Natural gas consumption reduction measures in buildings 2017 • Two new cooling units installed at Leir House and City Hall 2016 • Facilities Master Plan Phase II underway • LED lighting installed at Curling Rink and McLaren Arena • Installation of high efficiency furnace for soccer bubble • New infrared tube heater system in garage at City Yards 2015 • City Hall renovation • LED bulb replacement program for City buildings and arenas, and street lights
Energy generation	2018 • Feasibility studies for smart grid system at City facilities, and solar PV in City buildings completed • Continuation of Voltage Conversion Program to increase distribution voltage and increase overall energy efficiency • Home Energy Loan Program to reduce community electricity consumption and minimize required electrical infrastructure upgrades
Transportation	2019 • New electric vehicle charging stations installed in parking lot • Continuous replacement of older vehicles with fuel-efficient vehicles 2018 • Two hybrid vehicles purchased for building department 2017 • Route planning through GPS to maximize travel efficiency of fleet • Promotion of Bike to Week and Carpool Month

Solid waste reduction	2018 • Biosolids processing review conducted to identify alternatives and upgrades to composting program 2017 • RFP released for Solid Waste Collection favouring innovative technologies and low emission vehicles • Hired Community Sustainability Coordinator to focus on solid waste and improving overall garbage, recycle and yard waste best practices • Procurement department investigated limiting single-use plastics
Water / wastewater	2019 • Wastewater Water Treatment Asset Plan updated, Master Plan initiated • New variable frequency blower, air diffusers, and pump installed at Advanced Wastewater Treatment Plant 2018 • Installed second high speed turbo blower to decrease energy use 2016 • New pumping technology for Dissolved Flotation 2015 • New blower at wastewater treatment plant (WWTP) • Electrical sub-metering installed to monitor peaks at WWTP
Institutionalisation	2019 • Parks and Recreation Master Plan and Parks Asset Management System beginning to be implemented 2017 • Community Sustainability Coordinator hired to centralize solid waste reduction and climate reporting 2016 • Asset Management Study completed

Appendix F. Inventory and Modelling Assumptions

This appendix contains details on the corporate energy & emissions inventory and projections for the City of Penticton.

Inventories

Inventories were created using SMARTTool and energy costing data provided by the City. Based on the data compiled, full inventory years for energy consumption and emissions are 2015 – 2020.

Emissions factors for inventory years are shown in Table 12, and are sourced from the Province of BC.

Table 12 – Emissions Factors

GHG/GJ, by Year	2009	2015	2016	2017	2018	2019	2020
Electricity	0.002	0.001	0.001	0.001	0.001	0.001	0.001
Natural gas	0.050	0.050	0.050	0.050	0.050	0.050	0.050
Gasoline	0.068	0.066	0.067	0.067	0.067	0.067	0.065
Diesel	0.073	0.075	0.070	0.070	0.070	0.070	0.069

Assumptions made with respect to the SMARTTool data are described in the 2018 and previous editions of the *BC Methodological Guidance for Quantifying Greenhouse Gas Emissions.*[5]

Projections

CEA's Corporate model was used both to calculate the BAU trajectory, and to estimate the potential GHG reductions that could be achieved. Developed in 2019, the model builds on the SMARTTool data using population and assumptions.

The model uses formulas both to calculate the BAU trajectory, and to estimate the impacts of each action.

The BAU trajectory was calculated by using available inventory data, and then projecting forwards using a population increase of 1.45% per year (the average annual increase between 2011 and 2016).

From 2021 onwards, all of the data is an estimate as a BAU projection. Note that due to the COVID pandemic, 2020 data was not used as the baseline for BAU projections; instead 2019 data was used as it is considered to be more representative of a normal year.

[5] https://www2.gov.bc.ca/gov/content/environment/climate-change/public-sector/carbon-neutral

For the BAU projection modelling, the assumption is that energy consumption and emissions will increase proportionally with increases to population, although the impact of policies from higher levels of government are also incorporated, and other assumptions. Only policies that have already been adopted and that will have quantifiable impacts are incorporated. Assumptions are:

- The Province's incremental steps to net zero energy ready buildings by 2032.
- Tailpipe emissions standards.
- Renewable & low carbon transportation fuel standards.
- How the impacts of a changing climate will affect building energy consumption, as outlined below.

The final assumption had the following methodology:

- Climate change data for the region obtained from ClimateData.ca.
- Projected global emissions to 2030 currently places the world in the range for the IPCC's Fifth Assessment Report's Representative Concentration Pathway (RCP) 6.0 scenario.
- RCP 6.0 scenario not available on ClimateData.ca, therefore RCP 4.5 (high impact scenario) used as a conservative proxy.
- Decreases in commercial / institutional natural gas consumption assumed to be proportional to decreases in HDDs and the proportions of natural gas consumed for space heating for the sector, and that proportion obtained from the Navigant 2017 Conservation Potential Review for FortisBC Gas.
- Decreases in commercial / institutional electricity consumption assumed to be proportional to decreases in HDDs and the proportions of electricity consumed for space heating for the sector. This proportion obtained from the Navigant 2016 Conservation Potential Review for FortisBC Electric.

Annual variability affecting projections

Although CEA's model assumes that projections will be linear, there will be annual variability, primarily due to climatic variations (particularly on building energy consumption). These variations mean that it may often be necessary to collect several years of data before one can see the success or lack of it in implementation of an action, in the primary indicators. An exception to this will be streetlights, which have a remarkably similar consumption in each year, and so the impacts of actions taken should be immediately apparent.

Action impacts

To take into account the impact of implementing a climate action plan, the modelling tool estimates the impacts of actions compared to the BAU trajectory. It calculates the individual and combined impact of actions.

The impacts of individual actions depend on the assumptions made. CEA made educated estimates of the impacts that each action could have.

Details on the impacts of individual actions on GHGs are described in the main body of this report, in Figure 8.

Electricity emissions factor subject to change

Information received from the Province of BC in December 2020 and January 2021 states that the electricity emissions factor used for electricity consumption across BC will change, effective for reporting for the 2021 year. But because of the lag in reporting cycles it will not appear in reports until June 1st 2022, and the Province will not officially change the electricity emission factors in the forthcoming *2019 BC Methodological Guidance for Quantifying Greenhouse Gas Emissions.*

Despite this it is official that there is an intention to change, which will take effect in 2022, and the change will be backdated as well for previous years.

Previously, emissions from electricity use was calculated using a three-year rolling average of emissions from BC utility owned and operated facilities, and did not include emissions associated with importing electricity from outside of BC. Those emissions will now be included. (Note that no credit will be made for clean electricity generated in BC used to displace electricity generated in other jurisdictions.)

Under the old methodology the Province calculated the City of Penticton's electricity emissions factor to be 10.67 tCO_2e/GWh for 2018. Based on the limited information currently available, under the new methodology the Province has calculated the figure for the 2019 year to be 29.9 tCO_2e/GWh. *If* the 2018 and 2019 years are comparable (and it is probable that they are at least approximately comparable), this would be an increase of 2.8 times.

Despite the increase, emissions from electricity would still be far lower than for natural gas on a per unit of energy basis, and electricity used in the City would still have among the lowest GHG emissions in the world (e.g. still about 30 times lower than Australia's, 8 times lower than New York's, or 40% lower than Ontario's).

If the 2018 and 2019 figures are comparable, this change would increase the City's corporate 2019 GHG emissions from electricity from 28 to 78 tCO_2e, and increase its overall 2019 GHG emissions from 962 to 1,012 tCO_2e, or 5%.

This change would slightly impact how actions that reduce electricity or generate renewable electricity are considered as they would reduce more GHG emissions than previously anticipated. This change would also slightly impact the consideration of actions that may increase electricity consumption, e.g. heat pumps.

Appendix G. Sample Project Scoring Matrix

Project #	Date Reviewed

Reviewed By: _____

I. Project Overview	
Project Title	**Analysed By:**
	Name:
	Dept:
Project Lead:	**Supporting Staff (if applicable):**
Name:	**Name(s):**
Dept:	**Dept(s):**

II. Project Metrics		
	Annual Average	**Life of Project**
Emissions Avoided (tCO_2e)		
Financial Savings ($)		
Simple Payback (yrs) after external funds:	**Annual ROI (%) after external funds:**	**Cost per tCO_2e avoided ($):**
Project References / Success Examples:		

Category	Point Value	Poor 0.0	Fair 0.25	Acceptable 0.5	Good 0.75	Excellent 1.0	Total
Potential to Reduce GHG Emissions (50)							
Total GHG Reductions per $ (Community funds only, after external funds)	20						
Annual GHG Reductions	10						
Lifespan of Project	10						
Replicability of Project within community	10						
Ease of Implementation / Business Case (30)							
Ease of implementation (staff time)	10						
Business case (simple payback or ROI)	10						
External funding sources likelihood	10						
Other Considerations (20)							
Impacts to Health and Safety	5						
Project Visibility/Innovation	5						
Benefits to Community	5						
Other Resources Conserved	5						
Total Points Available	**100**	**Total Points This Application**					

Other Key Criteria:

- Staff capacity
  - Project leads and project supports should each determine their capacity to take on projects.
  - Limit projects they take on to their capacity.
  - Select most effective projects first, to maximise effectiveness of staff capacity.

- City funds – budgeting
  - Departments should each determine the ability of their funds to pay for projects.
  - Limit projects based on available funds.
  - Select most effective projects first, to maximise effectiveness of departmental funds.

Appendix H. Sample Building Maintenance Checklists

Sample 1

Building System Optimization – Simple Energy Efficiency Retrofit Measures

Space Heating and Cooling

☒ Building envelope sealing – caulk and draught proof around windows and doors, and other gaps on exterior walls.

Lighting, Appliances and Equipment

☐ Replace any remaining incandescent bulbs with LEDs.

☐ Improve safety and energy efficiency by converting Exit signs to LED. For Exit signs use LED products that maintain their brightness.

☐ Put vending machines on a vending miser – a device with a motion sensor so that it only switches on when people are present.

☐ Plug certain appliances into intelligent power bars with master/slave functions or motion sensors. These can be used for TVs, bench tools, compressors, task lighting, auxiliary heating, printers, coffee makers, microwaves, beverage coolers, or similar devices. (Appliances that need a controlled shutdown sequence, e.g. computers or many ink-jet printers, should not be plugged into such a power bar.)

☐ Unplug or remove unused or rarely used equipment (equipment that is not “on” may still use electricity).

Water – hot and cold

☐ Install aerators on taps in bathrooms and kitchens.

☐ Install low flow shower heads.

☐ Install timers, motion detectors, or flushes to save water with urinals.

☐ Install insulation on hot water pipes where accessible.

☐ Insulate domestic hot water tanks installed before 2005 (if they are not due for replacement).

☐ Turn down domestic hot water tank to lowest acceptable setting, e.g. 55°C (131 F).

Occupant engagement

☐ Dedicate a staff member on energy efficiency for each building, tasked with ensuring lights and equipment are off at the end of each day, and thermostats are correctly set.

Put up signs to:

☐ Remind people to switch off lights.

☐ Remind people to switch off equipment when not in use, including computers, monitors, printers, and photocopiers.

☐ Where there are programmable thermostats, explain how to use these without permanently overriding the settings (install lockable boxes around them if necessary).

☐ Encourage people to close window blinds when leaving a room.

☐ Encourage employees to participate in residential energy efficiency programs. If energy efficiency practices are adopted at home, they are more likely to be adopted in the work place.

Sample 2

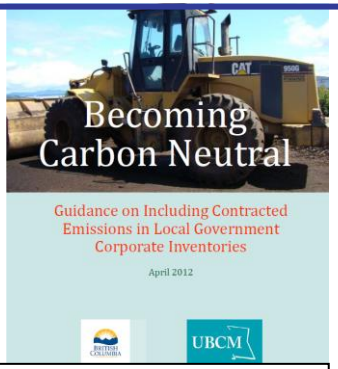
MONITORING	
Each billing period	Ensure the energy consumption for bills of each facility is monitored by the local government as each bill arrives (recording of energy consumption needs to be conducted for the Climate Action Revenue Incentive Program public reporting anyway). Monitor the consumption for any obvious changes, comparing it especially with billing periods with similar weather, e.g. the same billing period in previous years. Large changes in consumption should be investigated as well as the appearance of any special charges, e.g. demand charges or power factor charges.
SPACE HEATING / COOLING	
Monthly	Check settings of Building Automation Systems / thermostats.
Monthly	Inspect, clean, and change HVAC air filters once a month (or according to equipment specifications).
Twice a year	Ensure building temperatures are adequate for building occupants.
Annually	Check weather stripping and caulking around doors and windows. Fix any problems.
Annually	Check HVAC equipment for any obvious signs of problems, e.g. vents/blowers not operating correctly.
Annually	Clean evaporator and condenser air conditioning coils – dirty coils can increase energy costs and reduce equipment life
Annually	Check air conditioner refrigerant levels – too much or too little refrigerant can increase energy costs and reduce equipment life.
LIGHTING, APPLIANCES, EQUIPMENT	
Twice a year	Ensure lights are still working. Ensure no incandescent lightbulbs are installed.
Twice a year	Ensure light sensors are working correctly, e.g. motion sensors for interior lights, and photosensors for exterior lights.
Twice a year	Ensure intelligent power bars and vending misers, where they are being used, are working correctly.
WATER – HOT & COLD	
Annually	Ensure low flow devices working correctly, e.g. timers for urinals.
Annually	Check hot water temperature. If water is too hot or cold, adjust the tank's settings.

OCCUPANT ENGAGEMENT	
Monthly	Check-in with dedicated staff member on energy efficiency for that building.
Twice a year	Ensure signs to encourage energy efficient behaviour (like switching off lights) are still in place.
Twice a year	Ensure posters and leaflets encouraging occupant participation in residential energy efficiency programs are still in the facility, and current. (If energy efficient practices are adopted at home, they are more likely to be adopted by occupants in the work place.)
VEHICLES	
Each winter	Ensure engine block heaters are on a suitable schedule. Experiment to find the optimum schedule for employee comfort and energy efficiency. E.g. on/off for 20 minutes, every 20 minutes, during the coldest months of the year.
SKILLS	
Annually, or every 2 years	Consider going on an energy efficiency course or sending a member of staff on one. Training and workshops may be available through FortisBC, or through professional associations.
SERVICE CONTRACTS	
At contract renewal	Ensure service contracts (where applicable) support energy efficient operations. Energy efficiency can be written in to contract terms during renewal.

Appendix I. Penticton Vehicle Inspection Report

Placeholder for Penticton Pre & Post Inspection Report (will be included as .pdf in final report)

Appendix J. Service Contract Language



Source: *Becoming Carbon Neutral: Guidance on Including Contracted Emissions in Local Government Corporate Inventories, April 2012* found at www.toolkit.bc.ca
A sample contracted Emissions Template is available online at http://www.toolkit.bc.ca/carbon-neutral-government
Sample Contract Language:

Vehicle and Fuel Data

Requirement for Fuel Consumption Data Provision

Commencing on [start date] the [name of local government] will require [name of contractor] to communicate the quantity of fuel used to operate vehicles, equipment and machinery as part of the delivery of the services described in this contract on a [frequency of reporting] basis. Fuel consumption associated with the provision of these services must be provided to the [name of local government] within thirty (30) days of the following dates: [dates on which fuel consumption data will be required by the local government].

Data provided should include the following information:

- Number of vehicles, by vehicle class, used to deliver the contracted service (heavy duty, light duty, off road);
- Type of fuel consumed by each vehicle class (e.g. diesel/gasoline/natural gas/ethanol blend/biodiesel blend); and
- Litres of fossil fuels consumed in relation to the service delivered under the contract in each vehicle class, up to the dates specified above.

Fuel Consumption Data

Requirement for Fuel Consumption Data Provision

Commencing on [start date] the [name of local government] will require [name of contractor] to communicate the quantity of fuel used to operate vehicles, equipment and machinery as part of the delivery of the services described in this contract on a [frequency of reporting] basis. Fuel consumption associated with the provision of these services must be provided to the [name of local government] within thirty (30)

Appendix K. Sample Policies

Green Fleet Policy Template

Adopted {insert date}

POLICY NUMBER:

CHAPTER:

SECTION: CORPORATE SERVICES / GREENHOUSE GAS EMISSIONS REDUCTION

SUBJECT: LOCAL GOVERNMENT GREEN FLEET POLICY

RESOLUTION:

EFFECTIVE DATE: **REVISION DATE:**

1. RESOLUTION

THAT the Green Fleet Policy for the replacement and maintenance vehicles utilized by the Local Government be adopted.

2. OBJECTIVE

To formalize and clarify fleet replacement policies and practices and to support climate action policies to reduce GHG emissions and related pollutants by acquiring the most appropriate vehicle and equipment, minimizing fuel consumption, improving driver satisfaction and equipment life and reducing operating costs.

3. INTRODUCTION

- The Local Government shall utilize a green vehicle purchasing strategy in the replacement of vehicles.
- The Local Government utilizes a fleet of vehicles to support both general operations and service delivery.

- The Local Government will ensure that vehicles under its control are acquired, assigned, utilized, replaced and maintained in the most efficient and effective manner possible.

4. DEFINITIONS

Local Government vehicle - means any licensed motor vehicle owned, rented, borrowed, or leased by the Local Government and used primarily to transport people or property over roads, highways or Local Government property. Rental vehicles are considered Local Government vehicles when rented by a duly authorized employee and while used for official Local Government business.

Operator - means any authorized Local Government employee, or other individual approved by the Chief Administrative Officer (CAO), who is in control of a Local Government vehicle and who possesses a valid driver's license for the type of vehicle operated.

Fleet manager - means the individual designated by the CAO to manage the Local Government vehicles.

Specialty use vehicle - means Local Government fleet vehicles especially equipped for specific function or purpose.

5. RESPONSIBILITY FOR IMPLEMENTATION

There will be one fleet manager, appointed by the CAO, who will be responsible for overall fleet management. He/she will work with department managers to meet their department's fleet vehicle needs within approved financial plans.

6. GREEN FLEET VEHICLE POLICY

a) As per the Local Government's goal to achieve carbon neutrality in part by reducing corporate greenhouse gas emissions from fleet vehicles, the Local Government is committed to:

- Reducing GHG emissions;
- Reducing emissions of other pollutants;
- Reducing vehicle idling;
- Reducing single occupancy trips;
- Purchasing more efficient vehicles and fuels;
- Right-sizing vehicles;
- Considering life cycle costs of fleet vehicle operations when purchasing vehicles;
- Maximizing vehicle efficiency.

b) Vehicle Attributes: Local Government vehicles shall have the following minimum attributes:

- Be right-sized for its intended purpose(s).
- The ability to securely haul materials and equipment required for intended purpose.
- Air conditioning and all wheel drive/four wheel drive features, are optional and only where appropriate.
- Colour = _____
- Acceptable fuel mileage for the anticipated use. The use of electric vehicles, plug-in hybrids, hybrids, vehicles that use other zero / low GHG fuels, and fuel efficient vehicles, with the intent of reducing the Local Government's carbon footprint, are required wherever operational requirements allow.
- Acceptable crash/safety ratings.

c) Right-Sizing Purchasing: Local Government vehicles should be purchased according to the average or usual anticipated use of the vehicle. Occasional vehicle needs that exceed the capacity of the vehicle purchased should be met through vehicle sharing or renting. Bikes / e-bikes, cargo bikes / e-cargo bikes can be considered. The following use requirements should be considered when purchasing a vehicle:

- Engine size;
- Vehicle weight;
- Average carrying capacity;
- Average passenger capacity;
- Average terrain.

d) Life Cycle Cost: Life cycle costs should be considered for all vehicle purchases. Life cycle costs should include: capital costs, maintenance costs, fuel costs and resale costs.

e) Fuel Choice: The lowest GHG emission fuel possible should be purchased for all vehicles in the fleet. Consideration of fuels should include:

- Purchasing vehicles that run on zero / low GHG fuels, e.g. electricity, hydrogen, biodiesel, bioethanol, natural gas. The focus should be on electric, plug-in hybrid, and hydrogen vehicles.
- Purchasing low emission fuel for fleet vehicles that cannot be electric or plug-in electric (i.e. renewable natural gas, gasoline with a high percentage of bioethanol and diesel with a high percentage of biodiesel);
- Purchasing vehicles with an acceptable fuel consumption mileage for the anticipated use. The use of electric vehicles, hybrids and fuel efficient vehicles, with the intent of reducing the Local Government's carbon footprint, is required wherever operational requirements allow.

f) Operating: Fleet vehicles shall be operated with the following considerations:

- Idling shall be reduced among all fleet vehicles and the following guidelines shall be followed by all fleet vehicle operators:
    a. Reduce warm-up idling (no more than 30 seconds as long as windows are clear);
    b. Vehicles are to be turned off when stopped for more than 10 seconds except in the following circumstances: in traffic; in the course of performing a specific duty that requires the vehicle be left running; if the outside temperature is below -10°C; or if doing so would compromise human safety or the mechanical integrity of the vehicle.
  - Vehicle sharing shall be encouraged. Single occupancy vehicle trips will be minimized. Vehicles should be shared between departments to ensure maximum efficiency for vehicle use.
  - Driver education and driving procedures to increase the efficiency of vehicle operations, including anti-idling, should be included in driver training programs for Local Government staff.

g) Vehicle Maintenance and Monitoring: Fleet vehicles shall be operated with the following considerations:
  - All Local Government vehicles shall be kept in good mechanical condition and shall be inspected at required intervals.
  - Maintenance on fleet vehicles should continue to ensure that preventative maintenance continues to maximize the efficiency of all vehicle operations.
  - All vehicles shall be monitored to track fuel consumption, fuel costs, mileage and maintenance costs.

h) Vehicle Replacement and Acquisition:
  - In general Local Government vehicles will be considered for replacement when they have at least 5 years of service and 150,000 kilometres. Vehicles may be retained beyond this point if they are in good working order and are meeting the needs of the Local Government. Alternatively, vehicles that have excessive maintenance, carbon emissions, other air pollutant emissions, or operating costs may be replaced sooner.
  - All vehicle replacements are to be identified in the approved Financial Plan.
  - All Local Government vehicles shall be purchased in accordance with the Local Government purchasing policy.
  - All vehicles shall be acquired in a manner consistent with budgetary intent.

i) Consider joining programs to assist with reducing fleet GHG emissions, e.g:
  a. NRCan's Green Freight Assessment Program
  b. West Coast Electric Fleets:

Green Purchasing Policy Template

Adopted {insert date}

POLICY NUMBER:

CHAPTER: FINANCE

SECTION: EXPENDITURES

SUBJECT: GREEN PURCHASING POLICY

RESOLUTION:

EFFECTIVE DATE: **REVISION DATE:**

1. RESOLUTION

THAT the Green Purchasing Policy to require energy considerations of product selection, life cycle costing in operational decision making and encourage green procurement be adopted.

2. OBJECTIVE

To support Local Government corporate initiatives with respect to sustainability and environmental stewardship, including the Local Government's corporate GHG reduction targets.

3. INTRODUCTION

The Green Purchasing Policy requires that energy considerations and life cycle costing inform product selection and purchasing decisions and encourages green procurement. Products are chosen based on best overall value, not just the lowest price.

4. POLICY

a) The Local Government will buy in the open market and will seek the best value and service for its purchasing dollars. The placement of orders and awarding of contracts will be based on best value to the Local Government.

b) Purchasing decisions are to be based on the life cycle cost of the acquisition rather than just the initial purchase price. Life cycle costs include operation, repair, staff, and disposition costs as well as the invoice price.

c) In order to minimize the Local Government's environmental impact and carbon footprint, staff will review their requirements to ensure that specifications are amended to provide for use of goods and services with lower environmental impact and specifically to follow the steps to sustainable purchasing, life cycle costing and energy efficient equipment purchasing.

5. STEPS TO SUSTAINABLE PURCHASING

In considering future purchases, the Local Government will follow the steps to sustainable purchasing in product selection and decision-making:

a) Rethink purchase – is it necessary?

b) Rent, lease or buy it second hand.

c) Choose a durable or longer-life product and compare cost to disposable product.

d) Choose products or services designed to address specific environmental or social concerns.

e) Choose suppliers committed to sustainability.

f) Calculate the total cost (i.e., storage, maintenance, need to buy additional equipment, energy use, waste disposal, administration).

g) Reduce the transportation impacts.

6. LIFE CYCLE COSTING PURCHASING

In considering future purchases, the Local Government will undertake life-cycle costing in determining the full cost of a product or service. Steps in life cycle costing include:

a) Compare the costs of different products and different purchasing choices.

b) List and compare the accessory activities and costs associated with owning a particular product, such as: storage, maintenance, accessory equipment, operating costs, energy and water use, environmental hazards, waste disposal, training and administration.

c) Purchase based on total costs. Total cost = acquisition + use + disposal and post-disposal costs.

7. ENERGY EFFICIENT EQUIPMENT PURCHASING

The Local Government shall purchase energy efficient equipment, supplies and appliances whenever possible. This requires that product specifications be compliant with ENERGY STAR® guidelines and recommendations and/or Natural Resources Canada guidelines and recommendations.

Energy efficient equipment includes but is not limited to: appliances, HVAC equipment, electric motors, office equipment, lighting and signage, transformers, consumer electronics, vending machines, etc.

The Local Government purchase of energy efficient equipment has the following potential benefits:

- Reduced energy costs and electricity demand;
- Reduced impact on the environment;
- Reduced life cycle cost;
- Extended life and reduced operation and maintenance costs; and
- Manufacturer, government or utility company purchase incentives.

Green Event Policy Template

Adopted {insert date}

POLICY NUMBER:

CHAPTER:

SECTION:

SUBJECT: LOCAL GOVERNMENT GREEN EVENT POLICY

RESOLUTION:

EFFECTIVE DATE: **REVISION DATE:**

1. RESOLUTION

THAT the Green Event Policy to reduce the environmental impact of events hosted by the Local Government be adopted.

2. OBJECTIVE

To support climate action policies to reduce GHG emissions, waste, and other environmental impacts by reducing the impacts of Local Government hosted events.

3. INTRODUCTION

The Green Event Policy requires that GHG and environmental considerations inform how events are conducted, not just the lowest price.

4. POLICY

a) The following are discouraged and encouraged:

Discouraged	Encouraged
Disposable items, including plates, cutlery, cups, single-use water bottles	Reusable dinnerware, and water jugs of local tap water with glasses
Disposable give-away items / prizes	Service-based prizes
Bleached paper napkins	Paper napkins with recycled content
Single-use condiment packets	Reusable containers/squeeze bottles
Garbage-only receptacles	Labeled garbage, recycling, compost receptacles
Food and drink with non-recyclable packaging	Minimal packaging or recyclable packaging
Disposable shipping boxes	Reusable shipping containers
Cellophane wrap and polystyrene	Reusable serving trays/platters
Disposed extra food	Composted or donated
Imported produce	Seasonal, regional produce (where available)
Non-edible garnishes	No garnishes or edible garnishes

Guidelines are meant as guidelines only and all applicable food, health and safety regulations must be met.

Guiding Principles for Climate Ready Municipal Buildings

Adopted {insert date}

POLICY NUMBER:

CHAPTER:

SECTION: GREENHOUSE GAS EMISSIONS REDUCTION / CLIMATE CHANGE ADAPTATION

SUBJECT: GUIDING PRINCIPLES FOR CLIMATE READY MUNICIPAL BUILDINGS

RESOLUTION:

EFFECTIVE DATE: **REVISION DATE:**

1. RESOLUTION

THAT the Policy on Guiding Principles for Climate Ready Municipal Buildings, to evaluate GHG emission reduction and climate adaptation potential in Municipal buildings, be adopted.

2. OBJECTIVE

To ensure that all new Local Government buildings are built to have as low GHG emissions as possible, and are built to be resilient to forthcoming climatic changes. Also to ensure that all existing Local Government buildings have their GHG emissions reduced on an ongoing basis, and are able to be resilient to forthcoming climatic changes.

3. INTRODUCTION

The Local Government is committed to corporate and community energy and GHG reductions, and to being resilient to climatic changes. Therefore it will establish a procedure to build and operate all Local Government buildings with the lowest GHGs possible, and ensure that they will be able to continue to operate effectively when considering predictions of coming climatic changes that will likely take place over their lifespan.

4. POLICY

New Civic Buildings:

a) Aim to construct carbon neutral corporate buildings, e.g. by following Canada Green Building Council's Zero Carbon Building Standard.
b) Incorporate high performance attributes into new civic buildings so that they meet the highest level of the BC Energy Step Code for its building type. If the building type is not included in the Energy Step Code, choose the appropriate alternative energy standard:
    - Meeting or exceeding ASHRAE 90.1-2016 (for all other building types)
    - National Energy Code for Buildings (NECB) 2016
    - LEEDv4 or v4.1 Energy Performance requirements
c) Aim to build with materials with low embodied carbon emissions, e.g. favouring sustainably sourced wood, or low GHG concrete over conventional concrete.
d) Consider forthcoming climatic changes that are likely to occur over the lifespan of the asset in its design and construction.

Existing Civic Buildings:

e) Follow sustainable operation and maintenance best practices guidelines for new and existing buildings, which emphasize conservation, optimized building performance, and continued improvement in energy use, water efficiency, and indoor environmental quality.
f) Maximize energy and operational efficiency through the selective re-commissioning of civic facilities on an on-going basis. Re-commissioning is a form of quality assurance testing that is carried out to ensure that building physical plant systems operate as effectively as possible given occupancy patterns and building function.
g) Strive for GHG emission reductions at all existing civic facilities on an ongoing basis through conducting energy assessments and implementing the recommended measures.
h) Strive for continual decreases in corporate building greenhouse gas emissions through the above measures to help meet municipal GHG reduction targets.
i) Strive to ensure that buildings are equipped to be resilient and effective over the course of forthcoming climatic changes that are likely to occur over their remaining lifespan.

Climate Ready Infrastructure

Adopted {insert date}

POLICY NUMBER:

CHAPTER:

SECTION: GREENHOUSE GAS EMISSIONS REDUCTION / CLIMATE CHANGE ADAPTATION

SUBJECT: ENERGY RECOVERY OPPORTUNITIES POLICY

RESOLUTION:

EFFECTIVE DATE: **REVISION DATE:**

1. RESOLUTION

THAT the Climate Ready Infrastructure Policy to evaluate GHG emission reduction and climate adaptation potential in the planning of Local Government infrastructure assets be adopted.

2. OBJECTIVE

To operate and manage Local Government infrastructure assets, including natural ones, in a manner that conserves energy, reduces greenhouse gas emissions, and is resilient to climatic changes.

3. INTRODUCTION

The Local Government is committed to corporate and community energy and GHG reductions, and to being resilient to climatic changes. Therefore it will establish a procedure to build and operate all Local Government infrastructure assets with the lowest GHGs possible, consider natural assets, and ensure that infrastructure will be able to continue to operate effectively when considering predictions of coming climatic changes that will likely take place over the lifespan of those assets.

4. POLICY

On an ongoing basis, the Local Government shall evaluate opportunities to ensure that infrastructure assets have the lowest GHGs possible, and are resilient to climatic changes. The Local Government will also evaluate natural assets as part of its infrastructure assets, with the benefits these bring.

5. PROCEDURE

a) The Local Government shall conduct energy studies for its existing grey infrastructure assets, and implement recommendations to reduce GHG emissions by as much as possible;

b) Develop a natural asset inventory and expand the evaluation of nature-based solutions for infrastructure projects, including consideration of co-benefits such as carbon sequestration and wildlife;

c) Build new grey infrastructure assets so that they have zero (or as low as possible) GHG emissions, and have as low operational energy costs as possible;

d) Incorporate life-cycle costing into both the infrastructure capital and operational decision-making process;

e) Consider embodied / life-cycle carbon emissions as part of all new infrastructure decisions.