Corporate Energy and Emissions Plan

Town of Oliver

March 2024

Community Energy Association

Town of Oliver
CANADA'S WINE CAPITAL

Table of Contents

List of Figures

List of Tables

Acknowledgements

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

The Town of Oliver would like to acknowledge the contributions of Town staff that were involved in the development of this plan.

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 meet its requirements as a signatory of the BC Climate Action Charter. The Town of Oliver has signed the Climate Action Charter, committing the Town to work towards being carbon-neutral in its own operations. The Town could also declare a Climate Emergency concurrently with the adoption of this plan to demonstrate its commitment to climate action. This Corporate Energy and Emissions Plan will provide Council and staff with the background information to develop strategic priorities for the next five years.

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 and a healthier indoor environment for visitors
- Leading by example with its own assets, helping stimulate further GHG emission reductions in the community
- Community economic development by leveraging external funding
- Improved climate change resilience

The corporate inventory in this Executive Summary and the body of this report is defined according to the Local Government Climate Action Program (LGCAP). Reporting on Oliver's total corporate emissions, as shown in the adjacent table, will be necessary for obtaining the Local Government Climate Action Program (LGCAP) funding.

The Town of Oliver has not yet joined the FCM-ICLEI Partners for Climate Protection (PCP) program. Should the Town decide to join PCP, it can use this Corporate Plan to help it progress through the program milestones. For Milestones 1-3, this report with its appendices will be sufficient, although to achieve Milestone 2, the report and the GHG reduction targets within will need to be adopted by Council. The PCP inventory is included in Appendix E.

Oliver's 2022 GHG Emissions	
Town Operations	270.8 tCO_2e
Contracted Services	41.2 tCO_2e
Total emissions	312 tCO_2e

Town of Oliver's Progress So Far

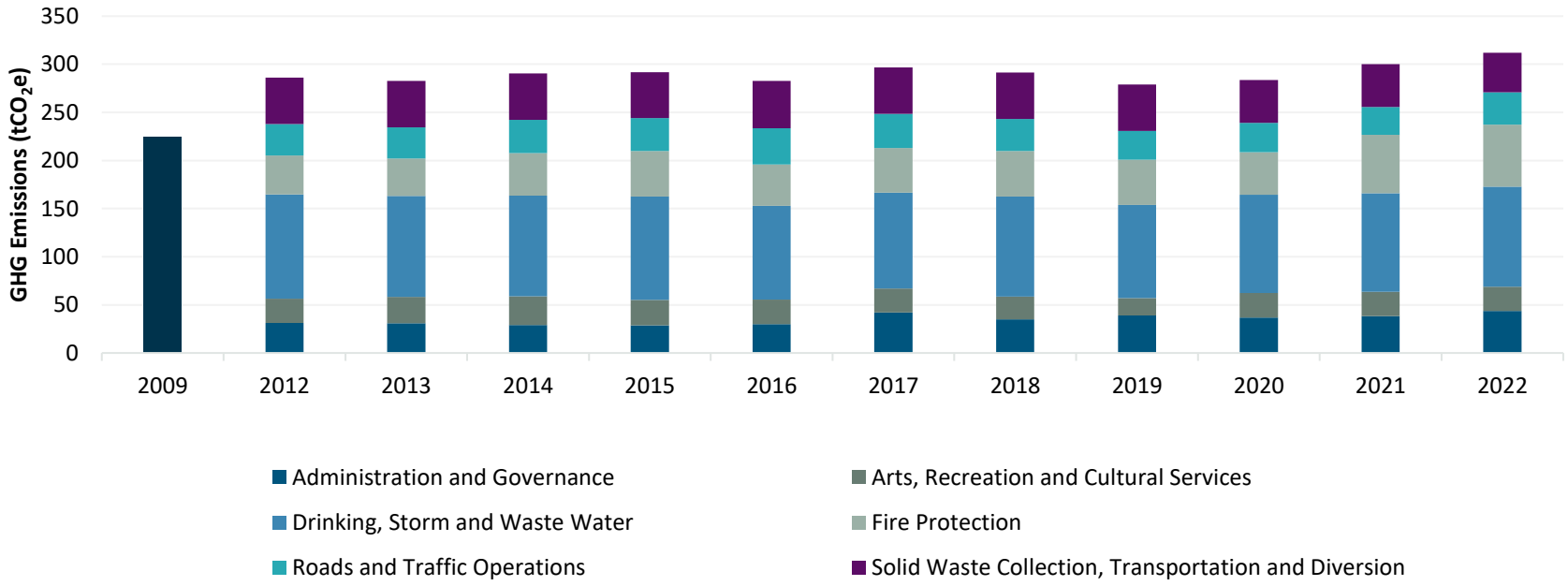
As detailed in the Town's annual CARIP reporting and discussed during the Corporate Workshop, many energy efficiency and GHG reduction measures have already been implemented.

- **Buildings / lighting** – Downtown streetlight replaced with LEDs, insulated the ceiling of the public works truck bay, installed a new energy efficient HVAC system in the Town office, replaced various AC units in Town buildings, and replaced inefficient pump house parts
- **Energy generation** – Installed solar PV on the fire hall roof
- **Transportation** – Continuous fleet replacement with more efficient models
- **Solid waste reduction** – Christmas tree and spring yard waste chipping provided for residents, and improved waste education materials
- **Water / wastewater** – Moved a new park onto the Town's reclaimed waste water irrigation system, added VFD motor installations on water pumps, joined the Okanagan Basin Water Board (OBWB) "Make Water Work" campaign, and replaced wastewater plant blower with frequency drive motor

Town of Oliver's Current Emissions and Energy Expenditure

The Town of Oliver's corporate emissions for 2012 through to 2022 were compiled using the LGCAP inventory method. 2009 emissions are sourced from the 2011 Climate Action plan and may not provide an entirely like comparison.

Emissions by LGCAP Classification, 2009, 2012-2022



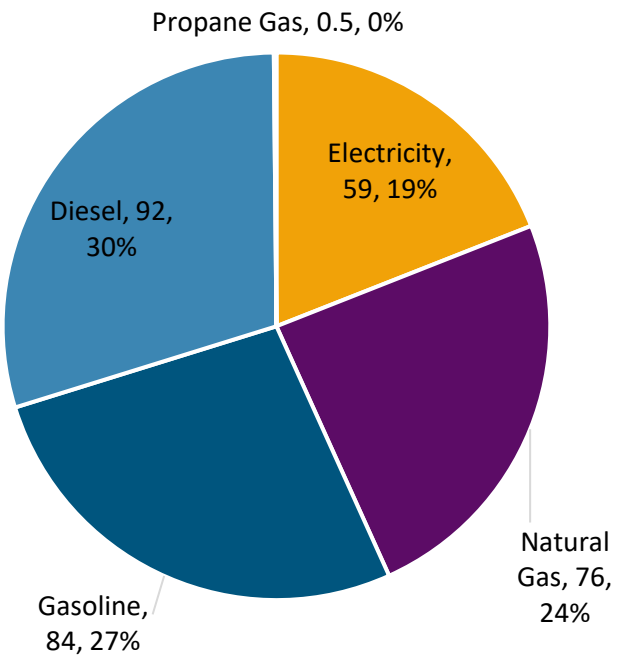
The Town of Oliver's Drinking, Storm, and Wastewater consistently contributes the most to Oliver's GHG emissions, varying between 97-108 tCO_2e per year. The Drinking, Storm, and Wastewater category includes the electricity usage and transportation related to operation and maintenance of water infrastructure. In addition to creating the most emissions,

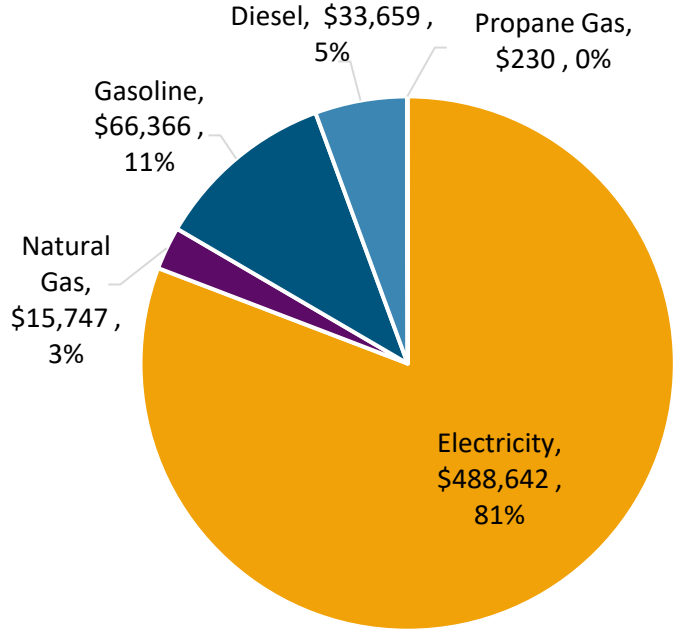
the Drinking, Storm, and Wastewater category is also responsible for 77% of fuel expenditures. Actions towards increasing efficiency in water and wastewater infrastructure provide a large opportunity for cost savings.

Fire Protection and Administration and Governance have had the largest growth since 2012, increasing 59% and 39%, respectively. The increased Fire Protection emissions mostly occurred in 2021 and 2022, which can be explained by Oliver's assistance to B.C. Wildfire. The majority of emissions that grew in the Administration and Governance category are a result of increased natural gas usage in buildings.

Another way to look at GHG emissions and energy expenditures is by fuel type. Diesel accounts for 30% of emissions, followed closely by gasoline with 27%. These two fuels only account for a small portion of expenditures, 16% combined, as electricity is responsible for the majority of costs (81%). The diesel emissions include the transportation emissions from waste collection, which is a contracted service and is responsible for about half of the diesel emissions. However, the fuel cost for this contracted service is not included in the diesel expenditures.

Emissions and Energy Costs by Fuel Source, 2022





Town of Oliver's Corporate GHG Target

To achieve Corporate Milestone 2 under the PCP program, the Town must set a corporate emissions reduction target that is adopted by Council. The Town is proposing a long-term target of net zero by 2050 and a short-term target of 30% reduction by 2030 in relation to the 2022 baseline.

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. Actions fall under the following five categories.

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





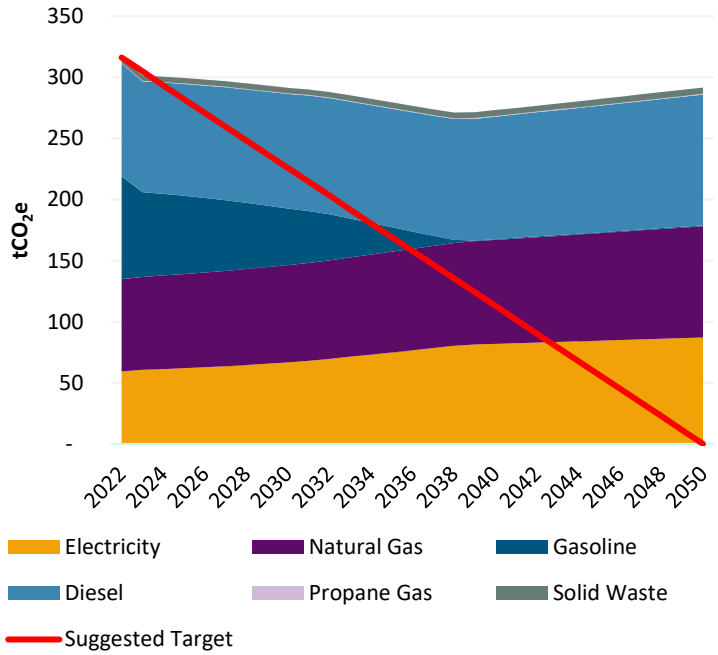
A detailed list of actions for implementation in the next 5 years is featured in this plan. The timeframe for implementation, department or position responsible for implementation, and possible partners or funding sources for each action are also noted.

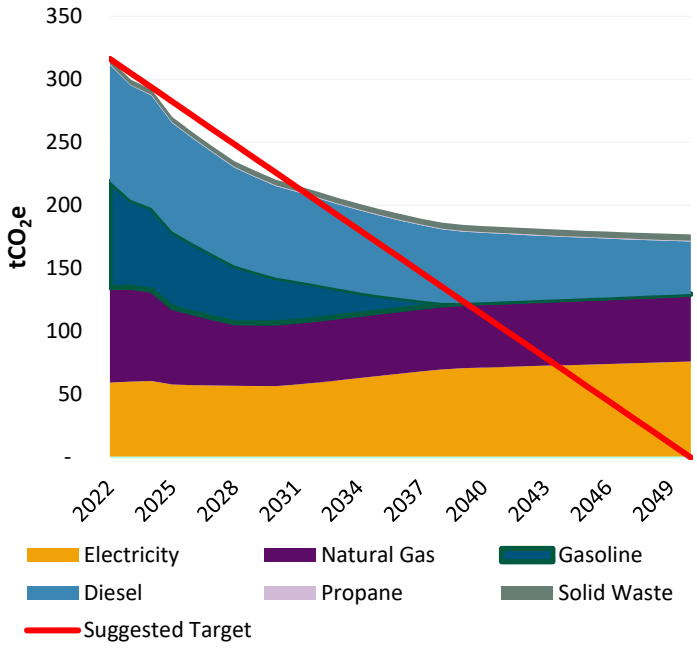
Based on business as usual projections, GHG emissions are forecasted to decrease by 11% in 2030 and 19% in 2040 compared to 2022 levels. However, costs are forecasted to increase by 29% by 2030, as compared to 2022. Business as usual assumes no additional actions by the Town but takes into account growing population (and hence additional assets), policies of higher levels of government, and other factors such as a warming climate.

Implementing the actions identified in this plan, total GHG emissions are expected decrease relative to 2022 by 30% in 2030 and 42% by 2040.

The business as usual emissions trajectory can be seen on the next page in the chart on the left, whereas the chart on the right shows the emissions trajectory if the actions contained in this Plan are implemented. The red lines on the charts show the Town's GHG emissions reduction targets of 30% reduction by 2030, compared to the 2022 baseline, and net zero by 2050. 2022 is an inventory year, whereas 2023 onwards are projections.

Business-as-Usual Emissions and Modelled Emissions from Proposed Climate Actions





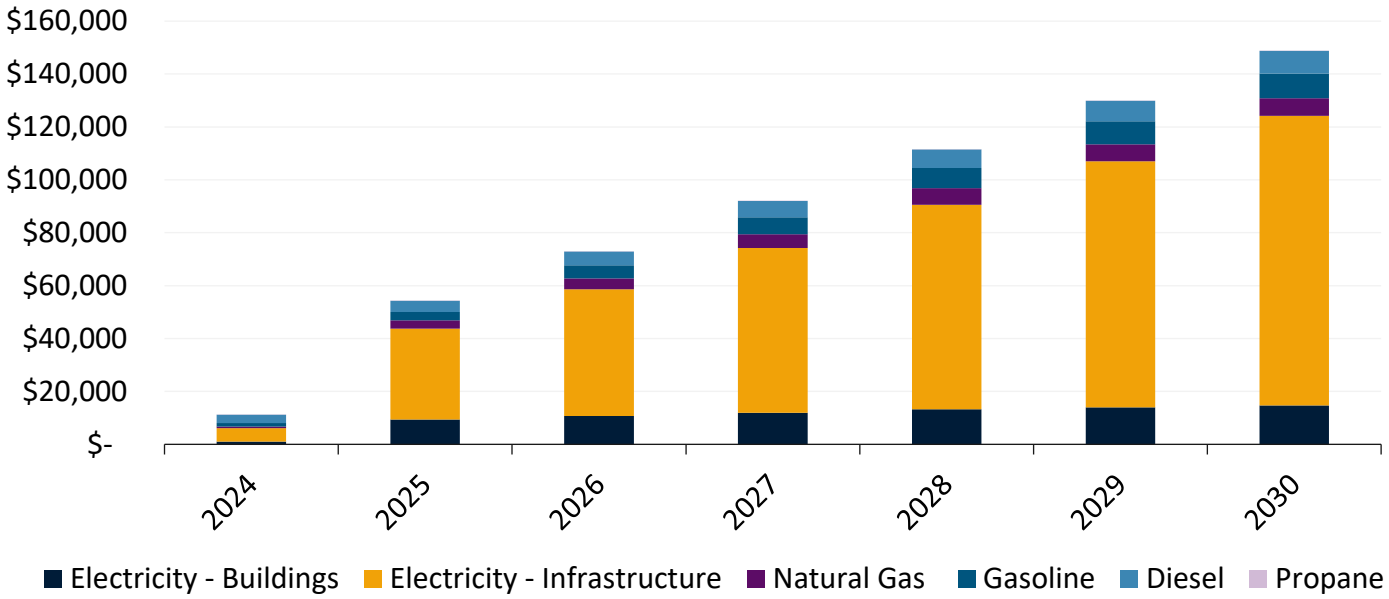
The planned actions are expected to drive the Town's emissions below the target line until 2030, reaching the 2030 goal. More work will need to be done to achieve the long-term goal of net zero by 2050.

The top three actions that will achieve the largest reductions in GHG emissions up to 2030 are:

- Invest in EVs and EV charging stations, 17.8 tCO_2e
- Implement building energy retrofits recommended by building energy audits, 12.4 tCO_2e
- Low carbon heating retrofits for buildings, 10.5 tCO_2e

In addition to GHG emissions savings, this Plan will result in energy cost savings. The chart below shows that by 2030, the Town could save nearly $150,000 per year on energy expenditures.

Plan Cost Savings



Successful implementation of this Plan depends upon staff capacity and capital. Internal and external funding sources are identified in this plan and include the LGCAP funding allocation for climate action, allocation from operating budget, climate action revolving fund, and FCM's Green Municipal Fund.

It is advisable to renew this plan in five years as most actions will be completed by then. This will allow the Town to continue making progress towards its short- and long-term targets.

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*. This plan focuses on mitigation, as a key part of a community's role in dealing with climate action is to reduce emissions caused by its own assets. This also helps it to meet its requirements as a signatory of the BC Climate Action Charter (CAC). The Town could also declare a Climate Emergency concurrently with the adoption of this plan to demonstrate its commitment to climate action.

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 Town of Oliver 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 and a healthier indoor environment for visitors
- Leading by example with its own assets, helping stimulate further GHG emission reductions in the community
- Improved climate change resilience
- Community economic development by leveraging external funding

For the last co-benefit, external funding can be leveraged to improve on the business cases identified in this project.

Two Types of Inventory

In this report, Oliver's corporate inventory is defined according to LGCAP (which has the same requirements as the previous CARIP program), and in Appendix E, defined according to PCP. These two methods of corporate inventories are described in more detail in the following text boxes:

1. Local Government Climate Action Program (LGCAP) vs. Partners for Climate Protection

Local Government Climate Action Program (LGCAP) Reporting is the reporting conducted by local governments in BC each year to receive their Local Government Climate Action Program (LGCAP) funding. It requires local governments to report emissions from their 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 policing (i.e. RCMP Buildings and Fleet) and emissions from solid waste (i.e. the landfill) are not included in LGCAP reporting. Fuel from contracted services and from staff-owned vehicles on mileage for corporate work are however included in fuel inventories.

2. **FCM's Partners for Climate Protection (PCP)** reporting is conducted by local governments if they wish to hit 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 Town; such as RCMP*
    - Street Lights (electricity)
    - Water and Sewer (electricity, natural gas, propane) – *including treatment plants*
    - Vehicle Fleet (gasoline and diesel) – *includes contracted services providing traditional services; 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 Town has "full authority to introduce and implement operating policies at the operation". Unlike LGCAP reporting, PCP reporting includes solid waste.

The Town of Oliver has not yet joined the FCM-ICLEI Partners for Climate Protection (PCP) program.

Town of Oliver – Progress So Far

The Town of Oliver completed CARIP reports from 2015-2019, which reported the actions described below in Table 1.

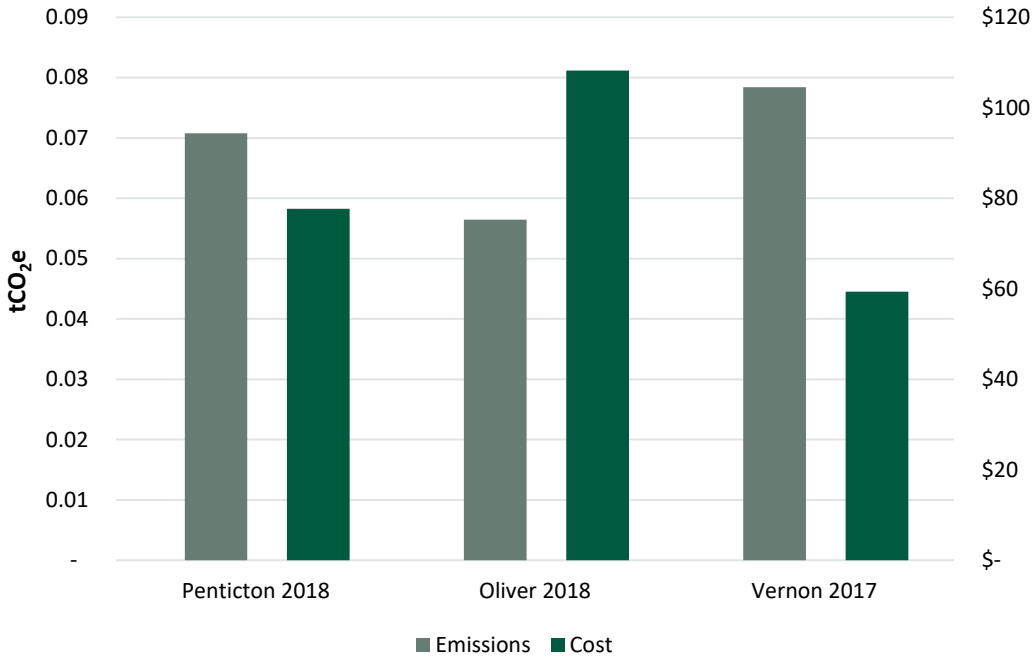
Table 1 – Highlighted Corporate Climate Actions

Buildings/lighting	Downtown streetlight replaced with LEDs, insulated the ceiling of the public works truck bay, installed a new energy efficient HVAC system in the Town office, replaced various AC units in Town buildings, and replaced inefficient pump house parts
Energy generation	Installed a 31.5 kW solar PV system on the roof of the fire hall
Transportation	Continuous fleet replacement with more efficient models
Solid waste reduction	Christmas tree and spring yard waste chipping provided for residents and improved waste education materials
Water / wastewater	Moved a new park onto the Town's reclaimed waste water irrigation system, completed new VFD motor installations on water pumps, joined the Okanagan Basin Water Board (OBWB) "Make Water Work" campaign, and replaced wastewater plant blower with frequency drive motor
Institutionalisation	Environmental sustainability was made a council priority.

Figure 1 – Solar PV System on the Town Fire Hall

Figure 2 compares the per capita GHG emissions and energy expenditures for the Town's corporate operations with other municipalities in the same geographic area of BC. Data is used from previous inventory reports and use a consistent methodology to ensure a like-for-like comparison. Out of the three communities, the Town of Oliver has the highest per capita expenditures[1] ($108/capita) and the lowest per capita emissions (0.06 tCO_2e /capita).

Figure 2 – A Comparison of Per Capita Corporate Emissions and Expenditures



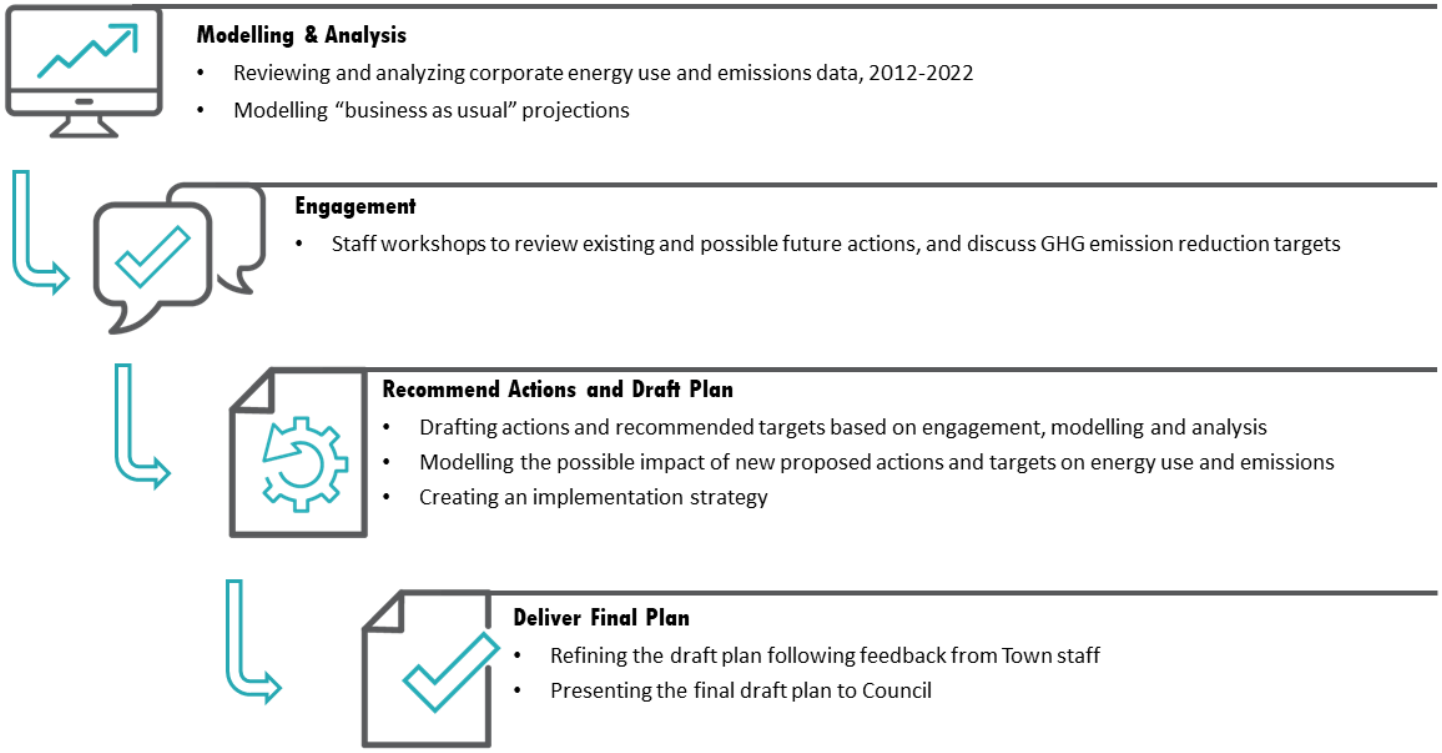
[1] 2019 expenditure data was used for Oliver as complete 2018 cost data was not available.

Corporate Energy & Emissions Plan Development

In 2022, the Town of Oliver, 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 3.

A summary of the staff workshop is in Appendix D.

Figure 3 – 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. This 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. In 2022, the Town of Oliver's emissions were:

- Oliver operations: 270.8 tCO_2e
- Contracted services: 41.2 tCO_2e
- **Total emissions: 312 tCO_2e**

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.

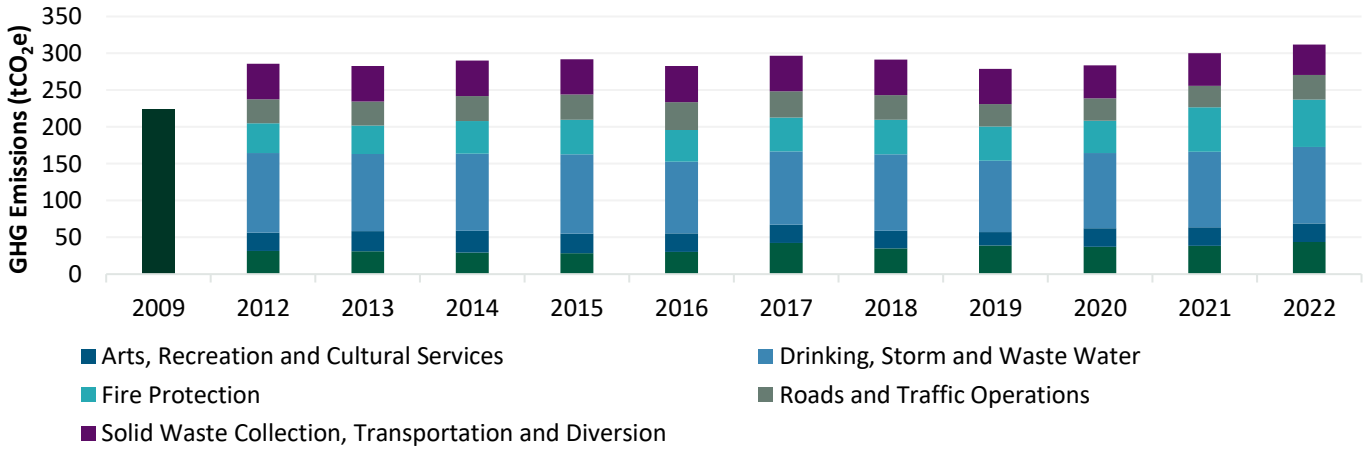
What is a GJ?	***What is a tonne (tCO_2e) of GHG?***
A gigajoule (one billion joules) is a measure of energy. One GJ is about the same energy as: • Natural gas for 3-4 days of household use • 25-30 litres of diesel or gasoline • Two 20 lb propane tanks • The electricity used by a typical house in 9 days	*A tonne of greenhouse gases (GHG's) is the amount created when we consume:* • *385 litres of gasoline (about 10 fill-ups)* • *A month of natural gas winter heating* • *Enough electricity for 8.5 average homes for a year (93,700 kWh)*

Breakdown and Trends

Figure 4 shows the Town of Oliver's GHG emissions by LGCAP category. 2009 data is sourced from the 2011 Climate Action Plan[2] but does not include the breakdown by category and does not included the diesel emissions from contracted waste collection. Since the source of the 2009 data is different from the rest of the years, it may not provide a perfect comparison.

Since 2012, the Town of Oliver's GHG emissions have increased by 9%. The Town of Oliver's Drinking, Storm, and Wastewater consistently contributes the most to Oliver's GHG emissions, varying between 97 and 108 tCO_2e. The Drinking, Storm, and Wastewater category includes the electricity usage and transportation related to operation and maintenance of water infrastructure. Fire Protection and Administration and Governance have had the largest growth since 2012, increasing 59% and 39%, respectively. The increased Fire Protection emissions mostly occurred in 2021 and 2022, which can be explained by Oliver's assistance to B.C. Wildfire. The majority of emissions that grew in the Administration and Governance category are a result of increased natural gas usage in buildings.

Figure 4 – Emissions by LGCAP Classification, 2009, 2012-2022



[2] GHG emission factors were updated to align with current inventory emission factors.

Figure 5 show the Town's energy consumption and expenditures by LGCAP category. The cost data was only available for 2019-2022 and does not include the fuel costs for contracted services. Drinking, Storm, and Waste Water are responsible for a majority of the energy consumption and expenditures, demanding a total of 18,101 GJ and $468,074. This category includes the electricity usage and transportation related to operation and maintenance of water infrastructure. The Drinking, Storm, and Waste Water cost alone breaks down to about $92 per Oliver resident per year, while the total per capita cost among all categories is $119.

Even though overall energy consumption in 2022 had decreased from 2021 by over 1,300 GJ, the total cost increased by nearly $10,000 due to rising energy prices. Energy pries are very difficult to predict, but have generally trended upwards in recent years, and therefore CEA forecasts a continued rise.

Figure 5 – Energy Consumption and Costs by LGCAP Classification

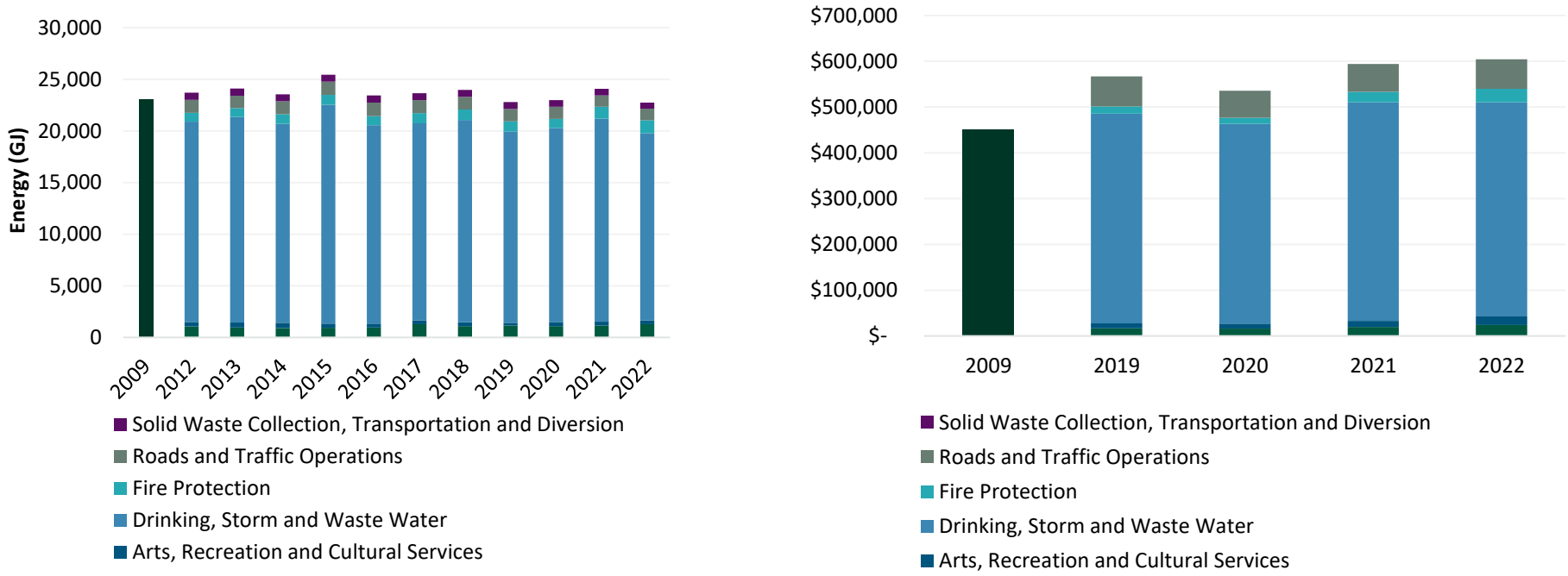
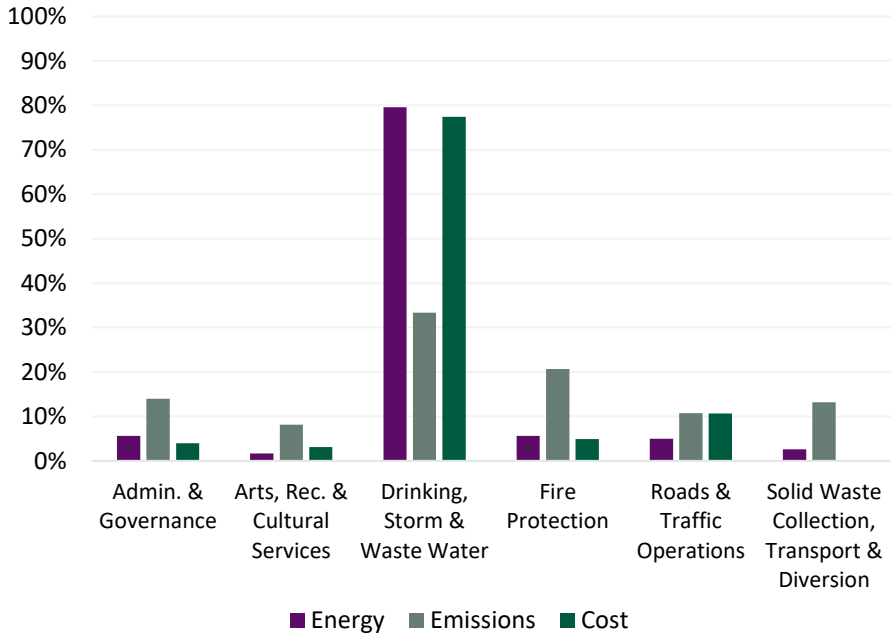


Figure 6 shows the percentage of energy consumption, GHG emissions, and energy expenditure that is attributed to each LGCAP classification and each fuel source. Propane was excluded from the graph on the right as it was responsible for less than 1% in each category. Drinking, Storm, and Waste Water are responsible for 80% of total energy, 33% of total emissions, and 77% of total costs. The next largest sources of emissions are from Fire Protection (21%) and Solid Waste Collection, Transportation, and Diversion (13%), for which transportation is responsible for a significant portion.

Electricity, of which a majority is used for Drinking, Storm, and Waste Water, contributes to 82% of energy demand and 81% of cost. Emissions are distributed fairly evenly between the four fuel sources, with diesel responsible for the highest portion at 29%. Among fuel sources, natural gas has high GHG emissions but low cost. This is in stark contrast to electricity which has very low GHG emissions but high cost. Gasoline and diesel have both high GHG emissions and high cost.

Figure 6 – Energy, Emissions, and Cost by LGCAP Classification & Source, in 2022



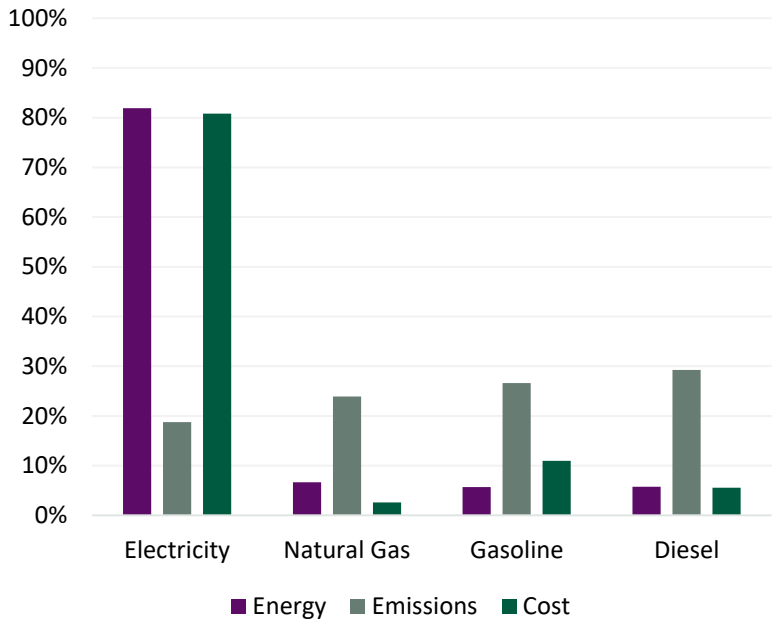


Figure 7 shows the GHG emissions and energy expenditure in 2022 by fuel source. Diesel was responsible for the largest portion of GHG emissions, 92 tCO_2e (30%), followed by gasoline with 84 tCO2 tCO_2e e (27%). However, these two fuel sources only contributed a total of 16% towards total costs. 45% of diesel emissions come from contracted waste collection, but these contracted costs are not included in the expenditures data. Electricity, which contributed to only 19% of emissions, was over 80% of costs ($488,642). This is due to a low emission factor and relatively high costs.

Figure 7 – Emissions (tCO_2e) and Energy Costs by Fuel Source, 2022

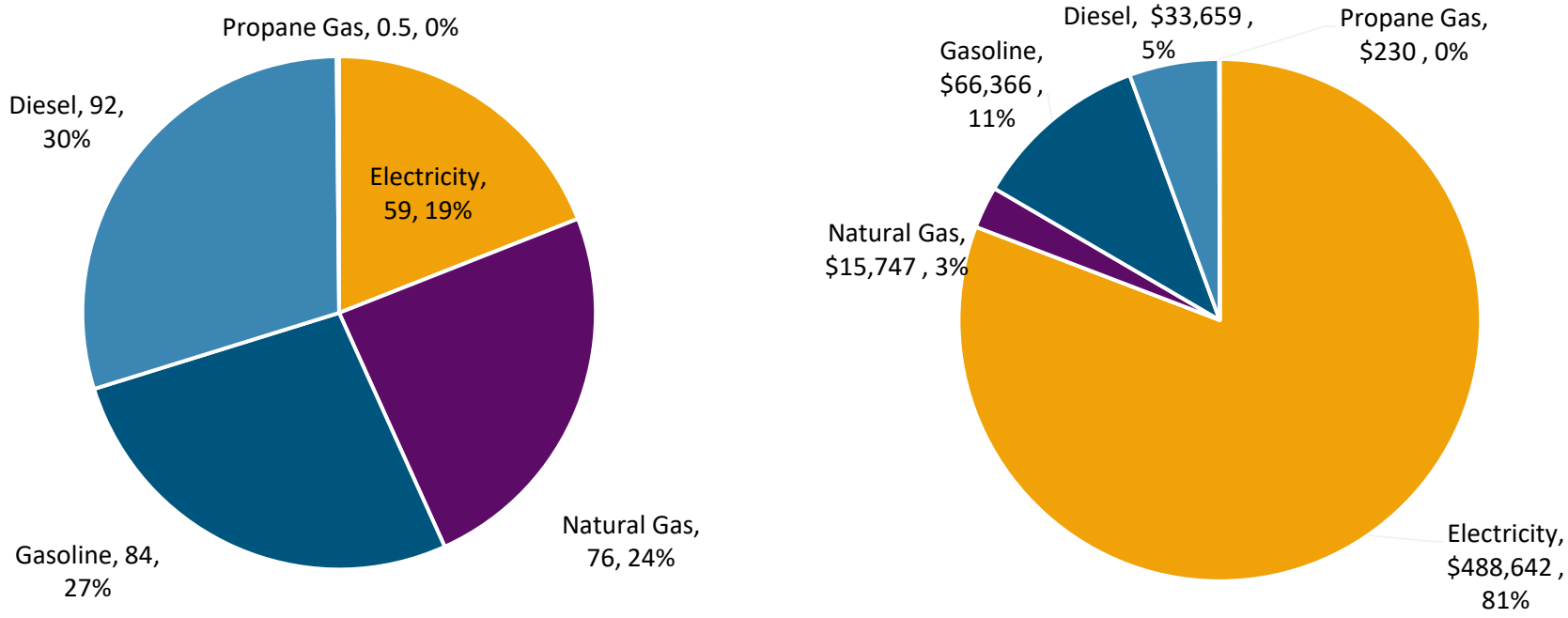
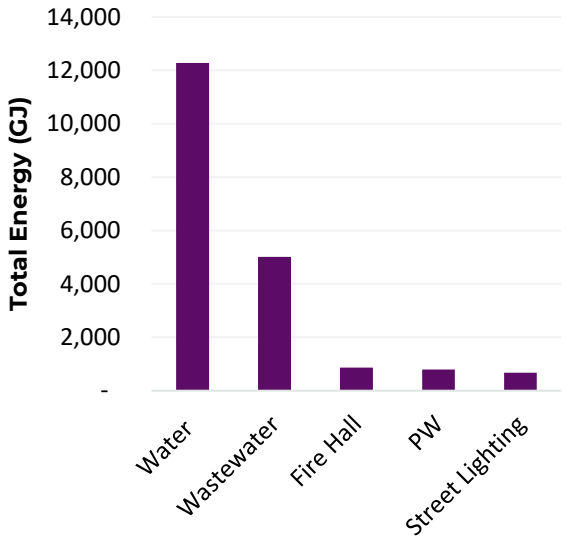
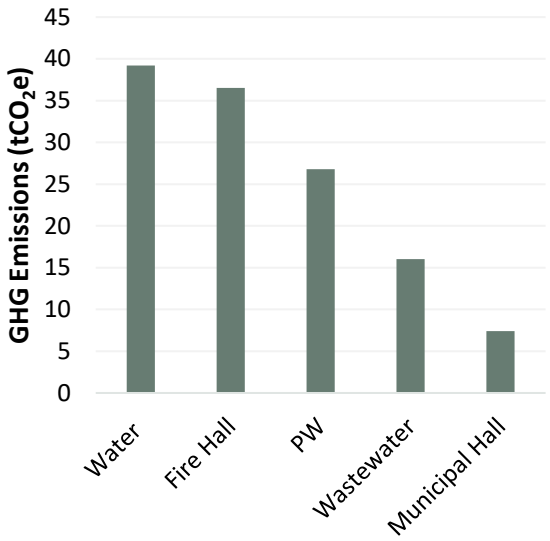


Figure 8 – Top 5 Buildings & Infrastructure for Energy, Emissions and Cost, 2022





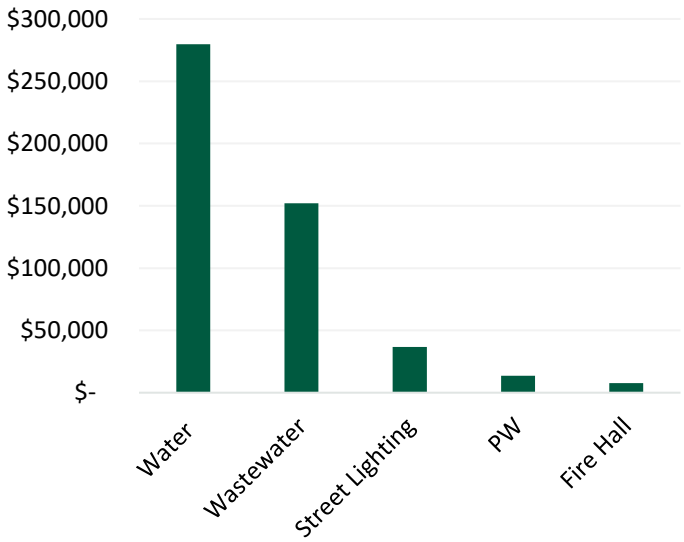


Figure *8* shows the top five buildings and infrastructure in terms of energy consumption, GHG emissions and energy costs. Water infrastructure used over 12,000 GJ which is more than twice the energy used by wastewater (5,016 GJ) and 14 times the energy usage of the Fire Hall (861 GJ). As for emissions, the infrastructure for water emitted the most GHG emissions (39 tCO_2e), followed by the Fire Hall and Public Works (PW) building. Even though the electricity demand for the Fire Hall was reduced greatly from the recently installed solar PV system, there are still significant natural gas emissions. In terms of cost, water and wastewater infrastructure are the highest ($280,000 and $152,000, respectively).

These buildings and infrastructure should be the Town's priority in order to maximise GHG emission and cost reductions.

Figure 9 shows the 10 highest energy and expenditures within the water and wastewater category. The infrastructure at 5971 Sawmill Road has the highest annual energy demand and expenditures (813 MWh, $88,627) and currently does not have a VFD, providing a large energy-saving opportunity. The reason why the costs at Canal Road 2 in proportion to the energy demand are lower than Sawmill Road are explained by the different electricity rates. Sawmill Road is wastewater infrastructure, which has a higher rate than water infrastructure. Toppinglak Fairview RD Aeration Lagoon and 5971 Sawmill RD, PW Influent PW are also wastewater while the rest are water.

Figure 9 – Top 10 Water and Wastewater Energy and Expenditures, 2022

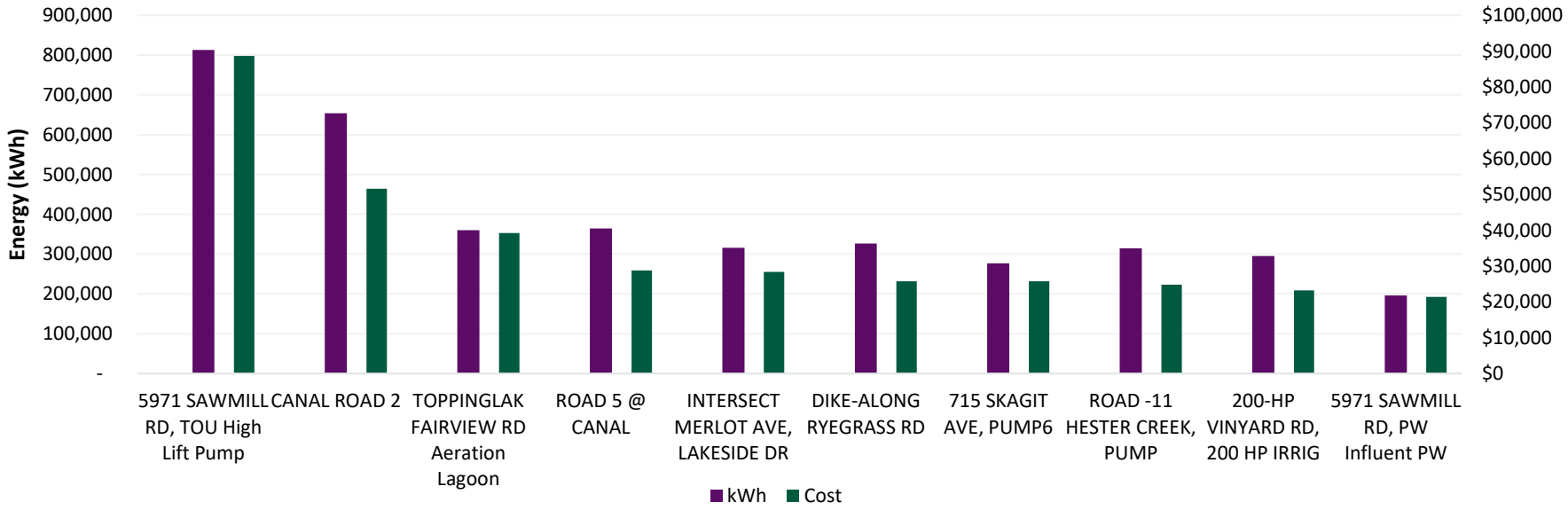


Figure *10* shows the energy breakdown for the water infrastructure. Over 90% of total energy is consumed during the irrigation season (March-October). Figure 11 shows the cost breakdown by energy costs, demand costs, and season. Nearly 90% of costs occur during irrigation season. The Town isn't charged "electricity demand charges" during irrigation season.

Figure 10 – Water Infrastructure Energy by Season (kWh)

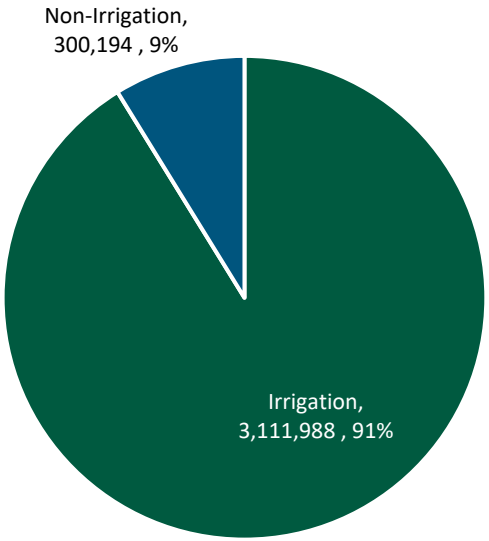
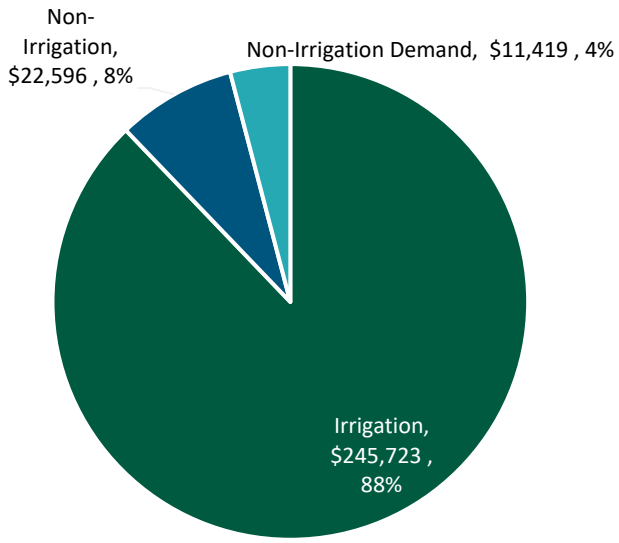


Figure 11 – Water Infrastructure Cost by Energy, Demand, and Season



Appendix C provides information and resources for reducing energy use in water distribution systems.

Corporate vs. Community Inventories

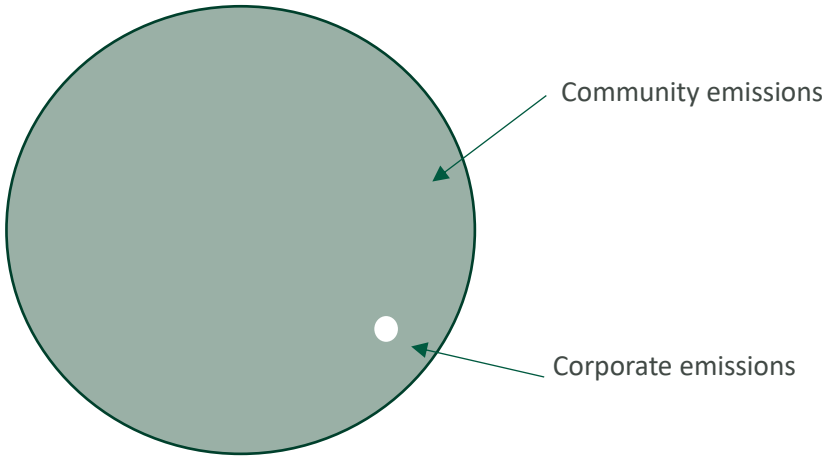
In 2019, the Town of Oliver's community GHG emissions were 43,410 tCO_2e. Corporate GHG emissions in that year were about 0.7% of the community total.

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 be anchor community-wide projects



Business As Usual Projections

Business As Usual (BAU) projections for the Town's inventory are shown in this section.

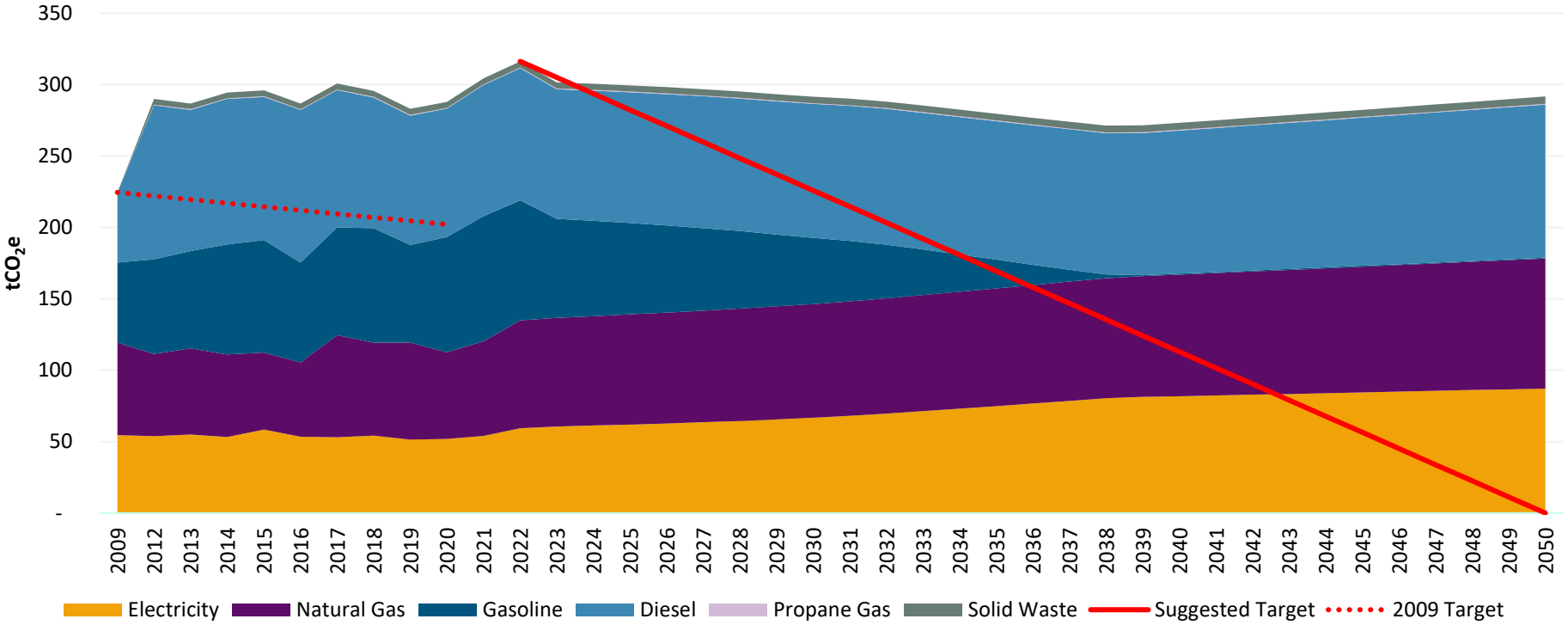
What does Business as Usual mean?

Business as Usual, or BAU, is a way of describing what is estimated to happen if the Town 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 Town'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 Town of Oliver implements no special efficiency or conservation activities, and assuming that future changes are proportional with population increase, then the Town's emissions are forecast to decrease by 11% in 2030 and 19% in 2040 compared to 2022 levels as shown in Figure 12. The graph shows that the Town did not reach its goal of 10% reduction by 2020 compared to 2009 levels. The Town is proposing to adopt a new long-term target that is in line with the Intergovernmental Panel on Climate Change (IPCC)'s target, which requires net-zero emissions by 2050. The Town will also adopt a short-term target of 30% reduction by 2030, compared to the 2022 baseline.

Figure 12 – Business-As-Usual Emissions Forecast to 2050, by Fuel 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 Town to also conduct its own measures (i.e. implement the actions detailed in this Plan) to manage its energy consumption, GHG emissions, and energy expenditures.

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. Actions fall under the following five categories.

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

Table 2 shows the breakdown of actions by category and the beginning year for each action, each to be continued in following years.

Table 2 – Climate Actions Summary

ACTIONS LIST		Already Done	2023	2024	2025	2026	2027
New Buildings and Infrastructure							
1.1	Commit to building energy efficient facilities (including mandatory Step Code implementation)			X			
1.2	Commit to building energy efficient infrastructure (e.g. updating subdivision servicing bylaw)			X			
1.3	Optimize siting and orientation of new buildings			X			

ACTIONS LIST		Already Done	2023	2024	2025	2026	2027
Existing Buildings and Infrastructure							
2.1	Conduct building energy audits			X			
2.2	Implement building energy retrofits recommended by building energy audits					X	
2.3	Conduct energy focused operational review of infrastructure			X			
2.4	Implement measures from operational review of infrastructure				X		
2.5	Incorporate energy management into annual building maintenance procedures			X			
Renewable Energy							
3.1	Implement Solar PV installations on additional buildings				X		
3.2	Low-carbon heating retrofits for buildings				X		
3.3	Conduct corporate renewable energy study (e.g. district energy system recovering heat from rec complex + micro hydro turbines)						X
Transportation							
4.1	Right-size vehicles for assigned tasks			X			
4.2	Develop a vehicle purchasing policy			X			
4.3	Invest in EVs and EV Charging Stations (where available and practical)				X		
4.4	Assess renewable fuels for corporate fleet						X

ACTIONS LIST		Already Done	2023	2024	2025	2026	2027
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 where possible	X					
4.8	Include emission targets in contracted services requirements (waste collection)				X		
Enabling Actions and Corporate Leadership							
5.1	Have dedicated staff person or department for plan implementation			X			
5.2	Hire a staff member focused on climate action (e.g. special projects coordinator)			X			
5.3	Allocate funds for plan implementation (e.g. LGCAP grant, budget allocation, revolving fund)			X			
5.4	Develop KPIs, monitor and track for progress			X			
5.5	Manage waste creation & water consumption			X			
5.6	Join PCP			X			
5.7	Examine local carbon offset projects for remaining emissions (or consider offset purchase)					X	
5.8	Annual reporting on GHGs		X				
5.9	Climate action education and awareness for staff			X			

Further details on actions, including projected implementation timelines, are detailed in Appendix A.

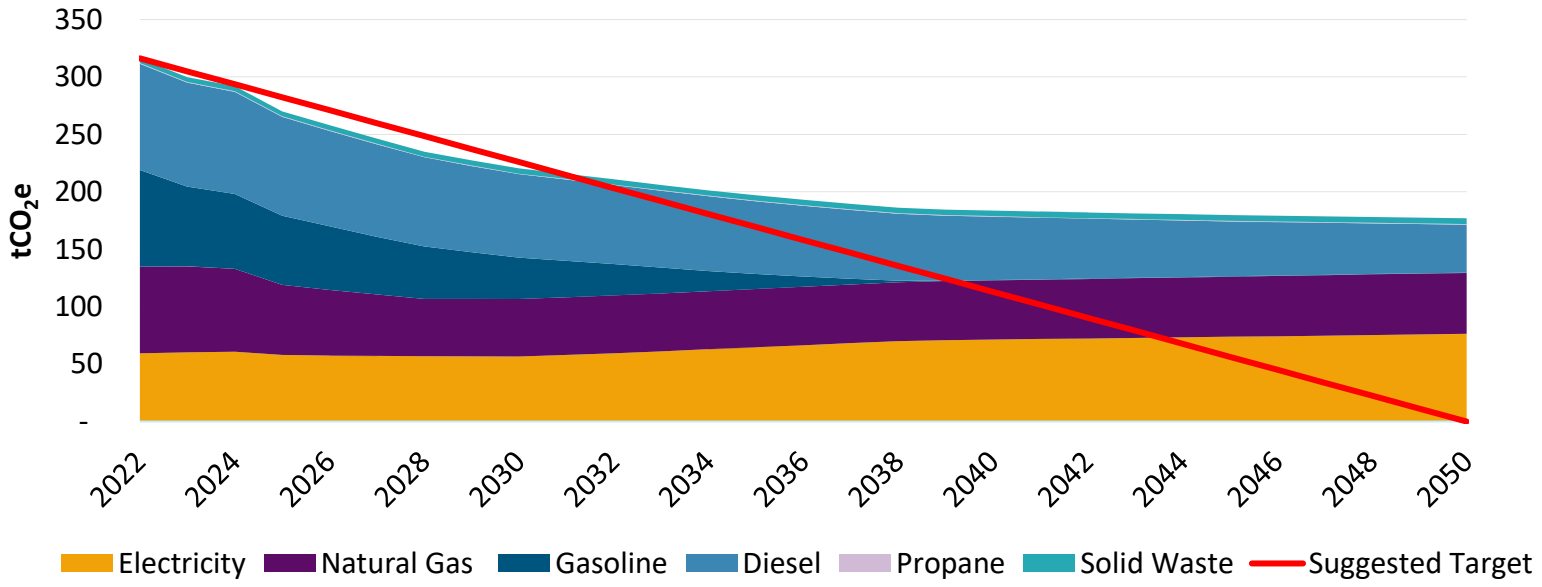
What We Can Achieve

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 13, upon full implementation, total GHG emissions are expected to decrease relative to 2022 by 30% in 2030 and 42% by 2040. GHG emissions are expected to plateau from 2040 unless further actions are implemented. It is important that this Corporate Energy and Emissions Plan be updated again in about 5 years to identify new actions to implement to keep the Town on track with its long-term target of net-zero by 2050.

Figure 13 – Modelled Emissions from Proposed Climate Actions



As depicted in Figure 14, the top three actions that will achieve the largest reductions in GHG emissions over the next 5 years, in order of largest GHG reductions first, are:

- Invest in EV's and EV charging stations
- Implement building energy retrofits recommended by building energy audits
- Low carbon heating retrofits for buildings

Investing in EV's and EV charging stations will reduce the Town'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 four times more efficient than traditional ICE vehicles, therefore significant cost savings will be realised.

Implementing building retrofits will consist of fuel switching to low carbon heating systems, such as heat pumps, and measures to improve energy efficiency, such as air sealing and insulation upgrades. The financial case for switching from natural gas to electricity will continue to improve as the carbon tax continuously increases the price of natural gas.

Figure 14 – Emissions Reduction For each Proposed Action, in 2030

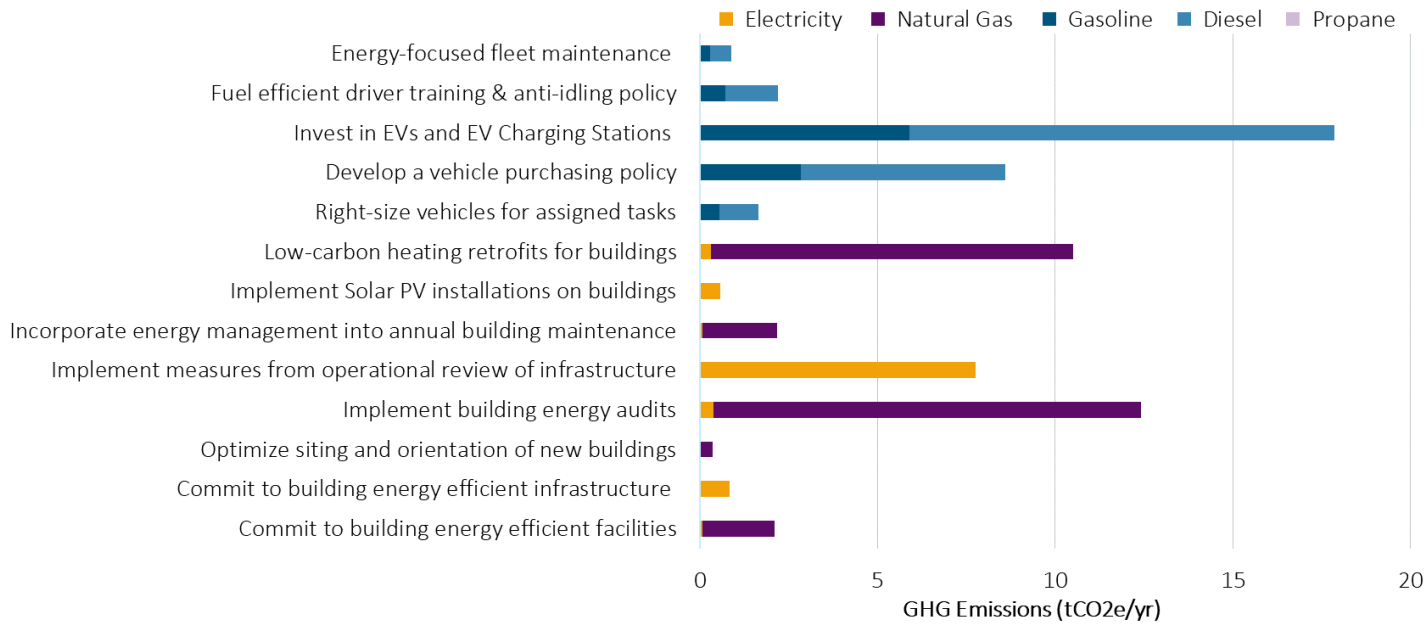


Figure 15 highlights the potential GHG savings resulting from full implementation of the plan. Targeting natural gas use provides the largest opportunity for GHG reduction, followed by diesel and gasoline.

Figure 15 – Plan GHG Savings

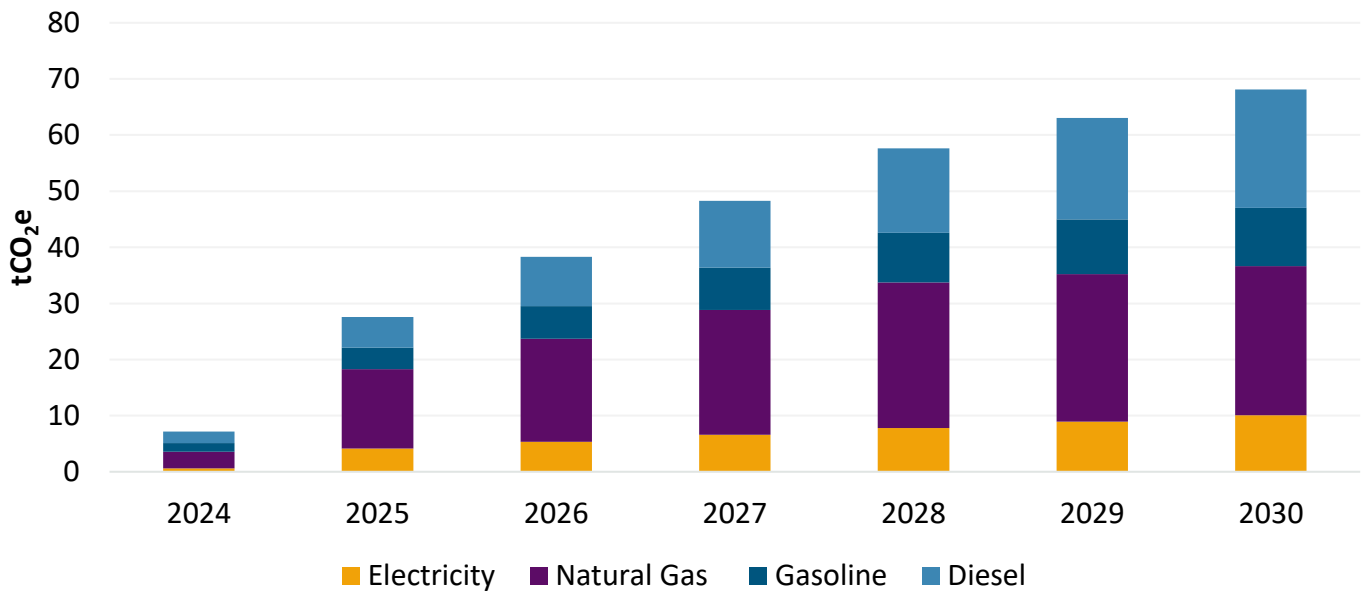
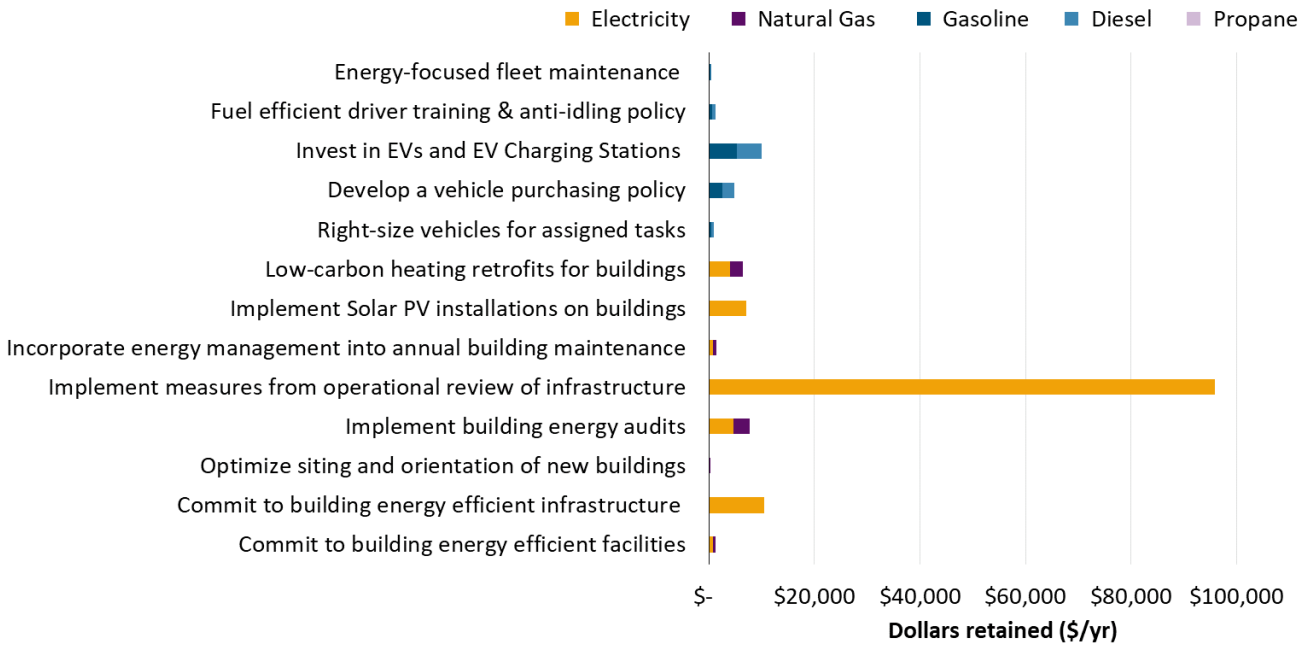


Figure 16 shows the estimated cost savings from each proposed action. Implementing measures from operational review of infrastructure will result in the highest cost savings, which refers to efficiency upgrades to the Town's water and wastewater infrastructure. Investing in EVs and EV charging stations and implementing building energy audits are the next highest cost saving actions, aligning with two of the highest emission reduction actions illustrated above.

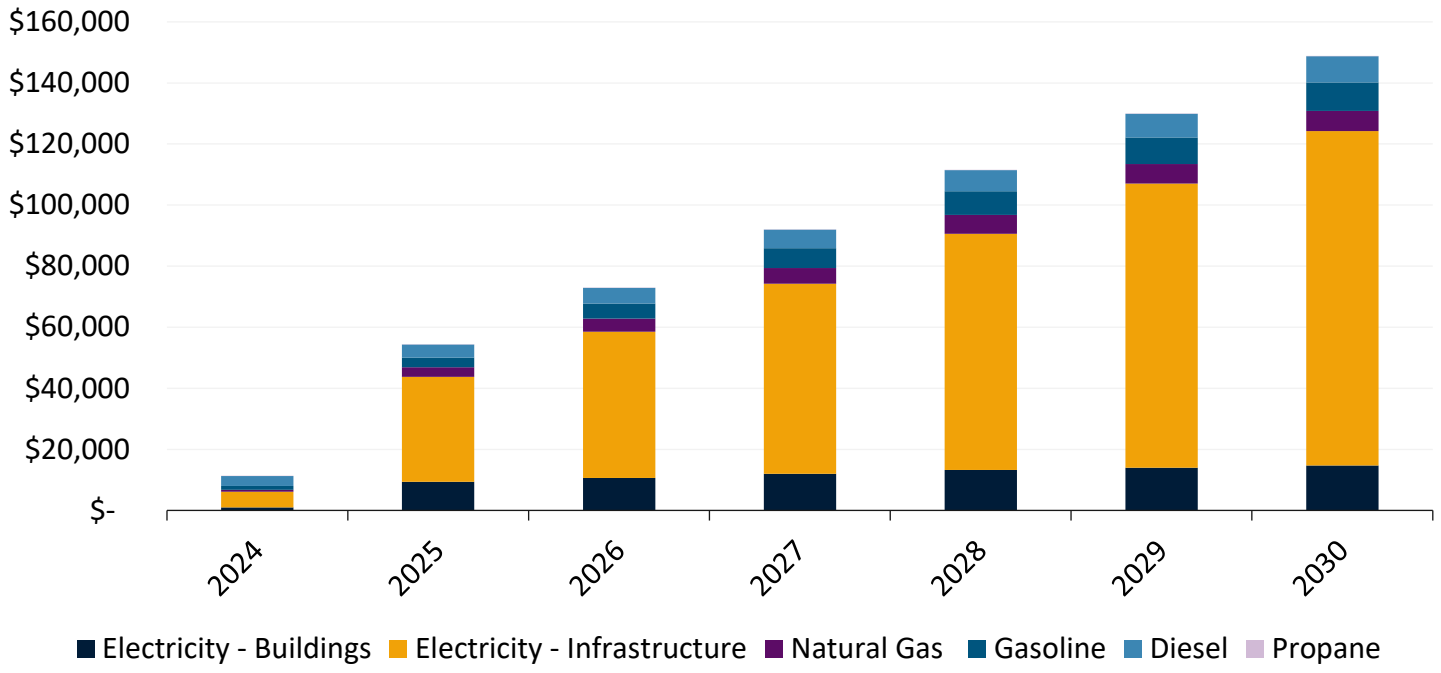
Figure 16 – Cost Reduction For each Proposed Action, in 2030



Substantial energy cost savings could be realised through the implementation of the actions listed, however, this does not reflect the capital cost or payback of each action. More work would be needed to determine this.

Figure 17 shows the financial savings that could be realised upon implementation of the plan. Actions will be implemented over time, as per Table 2, and therefore savings will increase over time. There is potential for substantial cost savings on electricity, a majority coming from energy efficiency upgrades on water and wastewater infrastructure. There is also large potential for cost savings on natural gas, as a result of building retrofits.

Figure 17 – Plan Cost Savings



Overall, the Plan is expected to save 68 tCO_2e and $147,800 annually by 2030 in corporate GHG emissions and energy costs.

Implementation for Success

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.[3] 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. Additionally, CEA can support implementation through the actions outlined in Appendix B.

The Town of Oliver has political and staff support for climate action. The Town does not, however, have a policy on funding GHG emissions reductions, nor does it have a staff position focused on climate action.

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

Internal Funding Sources	External Funding Sources
• LGCAP rebate allocated for climate action • Allocation from operating budget (e.g. 0.1% annually) • Climate action revolving fund • Forgone revenue (e.g. offer scaled discounts on building permits for "greener" buildings) • General revenue (e.g. property taxes) • Recycling and solid waste user fees • Building permit fees and other service fees charged by Development Services • Electrical utility and water user fees	Canada Community-Building Fund (formerly the federal Gas Tax fund) Federal government programs such as the Low Carbon Economy Challenge and Clean Energy Innovation Program FCM, FortisBC, and CleanBC funding as outlined in the following section

[3] Community Energy Implementation Framework, https://questcanada.org/getting-to-implementation-in-canada/

Buildings

Funding	Target	Eligibility	Amount
FCM Study and Capital Project: Retrofit pathway for municipal buildings	A study and capital project to reduce GHG emissions in municipal buildings over time.	Any existing municipal building. Aim to reduce emissions from the municipal building by at least 50% within 10 years and achieve best practice energy targets within 20 years.	Study: Grant for up to 50%[4] of eligible costs. Up to a maximum of $65,000 for a single building, up to $200,000 for multiple buildings. Capital Project: Maximum $10 million. Up to 20% as a grant and the remainder as a loan. Combined loan and grant for up to 80% of eligible project costs.
FCM Study and Capital Project: Construction of new sustainable municipal and community buildings	A study and capital project for a new, low-carbon municipally owned building.	Includes retrofits of municipal buildings and new builds of municipal and community buildings. Municipal buildings should meet best practice energy targets and achieve zero operational GHGs. Community buildings must meet an energy threshold of 25% below National Energy Code of Canada for Buildings 2020 reference building.	Study: Grant for up to 50%[4] of eligible costs. Up to $200,000. Capital Project: Maximum $10 million. Up to 15% as a grant and the remainder as a loan. Combined loan and grant for up to 80% of eligible project costs.
FCM Sustainable Affordable Housing*	Funding to plan, study, pilot, and either retrofit existing affordable housing units or construct energy efficient new builds.	Study: demonstrate and validate the project's environmental, social and economic benefits Pilots: 25% energy reduction or net-zero ready new builds, 30% units below median rent Retrofit: 25% reduction in energy consumption New builds: net-zero ready	Varies by plan, study, pilot, and capital project.
FortisBC Commercial Energy	Energy assessment walkthrough of commercial buildings to	A commercial FortisBC natural gas and/or electricity customer	Free

[4] Regional governments where the average population of the member municipalities is 10,000 or under may qualify for up to 80%

Assessment Program	identify energy conservation measures.	The owner or leaseholder of a medium-sized business or small industrial/manufacturing facility.	
FortisBC Custom Efficiency Program	Funding for energy studies paired with implementation incentives and bonuses for energy-reducing measures.	Be a FortisBC natural gas customer under any rate class except Rate 1 and/or a FortisBC electricity customer. Be an owner or leaseholder of an industrial or commercial building. Select from FortisBC's list of approved consultants to perform an energy study. The project must have the potential to save a minimum of 1,000 GJ of natural gas or 50,000 kWh of electricity annually.	Energy study: Up to $37.5k, 75% of costs Implementation incentives: the lesser of $3 per lifetime GJs reduced, $0.02/ per lifetime kWh reduced, 75% project costs, or $500k. Implementation bonus: up to $12.5k, 25% of the energy study cost when at least one energy conservation measure is implemented
FortisBC Commercial Product Rebates**	Various commercial rebates, includes variable speed drives, lighting, boilers, HVAC, heat pumps, rink de-aerators	Varies	Varies

*The Town should pursue this funding for the potential low-income housing project

**The Town should pursue this funding for future projects and recently installed variable speed drives if they were installed in the past year

Fleets

Funding	Target	Eligibility	Amount
FCM Study and Capital Project: Municipal Fleet Electrification	Study and capital project to transition the municipal fleet to zero-emission vehicles.	The study must include: an assessment of the entire fleet, a fleet transition plan, an optimized scenario (right-sizing), an assessment of the supply of low-carbon (if applicable), and an equity assessment. The project should replace one or more existing vehicles with zero-emission vehicles.	Study: up to 200k, 50% of costs Capital: grant up to 15% of the loan; grant & loan up to $10 million, up to 80% of eligible costs.
FortisBC Workplace Level 2 charging stations	Funding for level 2 chargers.	Connected to a current electricity account with FortisBC. New construction buildings are not eligible Eligible workplaces must have five or more employees who work primarily at the premises where the charging station(s) will be installed and have dedicated parking for employees.	75% of eligible purchase and installation costs, up to $5,000 per station, to a maximum of $25,000
Commercial Vehicle Pilot Program	Funding for on and off-road electric vehicles and supporting infrastructure.	On-road weight class 3 and 4 must deploy a minimum of six ZEVs. Weight class 5 and 6 must deploy a minimum of three ZEVs Weight class 7 and 8 and off-road vehicle types have no minimum vehicle deployment number. Electric charging and hydrogen refueling infrastructure	Up to $10 million, 33% of eligible project costs.
Specialty Use Vehicle Incentive	Rebates on zero-emission motorcycles, low-speed vehicles, on road Medium- and Heavy-Duty vehicles, airport and port specialty vehicles and utility vehicles.	Eligible vehicles: battery electric, hydrogen, or plug-in hybrid (MHDV and specialty vehicles only) Vehicles must be new	Airport and port specialty vehicles: $50,000-150,000 depending on vehicle MHDV: Up to $150,000 or 33% of the purchase price, whichever is lower Ranges from $1700-5000 for other vehicle types

CleanBC Go Electric Fleet Charging Program	Financial assistance to design, procure, and install charging infrastructure, to be used by the fleet.	Open to B.C. registered companies, non-profit organizations and public entities	75% of total costs, up to $2,000, capped at $50,000 per applicant per year.

Water Distribution Systems Funding

Community Works Fund allocates funding to all local governments in BC based on a per capita formula that includes a funding floor. It can be used towards eligible costs of infrastructure that supports drinking water conservation, collection, treatment and distribution systems.

BC Water Metering Pilot Programs were announced with the 2024 BC budget. The budget includes $50 million for water metering pilot programs in 21 communities throughout B.C. that will inform the feasibility of establishing a universal water-metering program with the aim of better conserving water, identifying leaks, and educating users about their actual water use. Watch for future program application intakes.

Additional Funding

FCM Municipal Asset Management Program offers funding, training and resources to help strengthen asset management practices.

UBCM Asset Management Planning Program offers funding for asset management training, planning, and development.

Infrastructure Planning Grant Program offers up to $10k to help local governments develop or improve plans such as asset management, integrated stormwater management, liquid waste management, and water master plans.

The Town already has incorporated climate action into some documents like the OCP. In addition to these actions, the Town should consider:

- Discussing climate action implications in all reports to Council.
- Dedicating funds to climate action annually as part of the operating budget and maintaining a reserve fund for larger climate action projects.
- Incorporating climate action into job descriptions of other Town staff. Climate action is the responsibility of all departments, and there is greater chance of success if responsibility is formally shared.
- Embed climate action into the budgeting process.
- Monitoring indicators that are easy to track to help ensure that progress is being made.
- Host regular meetings to discuss implementation with internal and/or external stakeholders.
- Reporting on indicators as part of an annual report to Council.
- Joining PCP and progressing through the milestones.
- Renewing this plan in five years.

What is a Climate Action Revolving Fund?

Climate action revolving funds invest in energy efficiency projects to reduce energy consumption and hence energy expenditures. Energy cost savings are then reinvested in future projects. They are called “revolving funds” because all or a portion of the savings from previous projects are used to fund new projects, and fund “revolves” in this way. Two local governments in BC have implemented such a fund, Summerland and Vernon. BC Crown Corporations have also implemented these, e.g. Health Authorities. Although conceptually intuitive, they can be difficult to implement in practice.

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 the template in Table 3. 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.

Unlike a Community Energy and Emissions Plan, the primary indicators of 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 Town.

Table 3 – Primary and Secondary Indicators for Monitoring and Evaluation

INDICATOR	2023	2024	2025	2026	2027
Primary					
Corporate GHG emissions (tonnes CO2e)					
Corporate energy consumption (GJ)					
Corporate energy expenditure ($)					
Secondary - New Buildings and Infrastructure					
Number of new buildings or infrastructure projects conducted to higher energy efficiency projects					
Secondary - Existing Buildings and Infrastructure					
Number of energy assessments conducted on corporate buildings					
Number of energy efficiency upgrades installed on corporate buildings					

Secondary - Renewable Energy					
Installed capacity of solar PV on corporate buildings (kW)					
Secondary - Transportation					
Number of fleet vehicles that are electric, hybrid, or use other alternative fuels					
Number of employees that have completed fuel efficient driver training					
Secondary - Enabling Actions and Corporate Leadership					
Water consumption at specific corporate buildings (litres)					
Volume of waste at specific corporate buildings (cubic yards)					
Expenditures by Climate Action Revolving Fund (should one be created) ($)					
Total value of incentives received (e.g. grants) for Plan implementation ($)					
Current PCP Milestone (1 to 5)					

Abbreviations

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
CEERP	Community Energy and Emissions Reduction Plan
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)
LGCAP	Local Government Climate Action Program
LED	Light Emitting Diode
MHDV	Medium and Heavy Duty Vehicles
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 A. Climate Actions in Detail

Table 4 – Climate Actions in Detail

New Buildings and Infrastructure

Action	Timing	GHG Impacts	Economic Impacts	Adaptation/ Resilience Linkages	Incremental Effort	Incremental Cost	Possible Partner/ Funder	Staff Responsibility
1.1 Build energy efficient buildings	**2024**	**2.1 tCO_2e**	**$1.3k**	**High**	**Low**	**Medium**	**n/a**	**All**

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

- Reducing risk by ensuring that the Town 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 retrofit later.
- Ensuring that the Town owns and operates high quality, low maintenance assets.
- 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	Incremental Effort	Incremental Cost	Possible Partner/ Funder	Staff Responsibility
1.2 Build energy efficient infrastructure	**2024**	**0.8 tCO_2e**	**$10.4k**	**High**	**Low**	**Medium**	**n/a**	**Public Works**

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

- Reducing risk by ensuring that the Town 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 infrastructure to be retrofit later.
- Ensuring that the Town owns and operates high quality, low maintenance assets.
- Leading by example in the community by demonstrating best practices.

Action	Timing	GHG Impacts	Economic Impacts	Adaptation/ Resilience Linkages	Incremental Effort	Incremental Cost	Possible Partner/ Funder	Staff Responsibility
1.3: Optimise siting and orientation of new buildings	**2024**	**0.4 tCO_2e**	**$0.2k**	**High**	**Low**	**Low**	**n/a**	**All, Project Manager**

The Town 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 Town 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 retrofit later.
- Ensuring that the Town owns and operates high quality, low maintenance assets.
- 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	Incremental Effort	Incremental Cost	Possible Partner/ Funder	Staff Responsibility
2.1: Conduct building energy audits	**2024**	**n/a**	**n/a**	**High**	**Medium**	**Low**	**FortisBC, FCM**	**Building Maintenance**
The Town will conduct energy audits of its buildings, beginning with those that consume the most energy. As the audits are completed, the Town will then prioritize improvements based on audit results. The Town 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.								

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Incremental Effort	Incremental Cost	Possible Partner/ Funder	Staff Responsibility
2.2: Implement energy retrofits recommended by building energy audits	**2026**	**12.4 tCO_2e**	**$7.6k**	**High**	**High**	**High**	**FortisBC, FCM**	**Building Maintenance**
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 G.								

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Incremental Effort	Incremental Cost	Possible Partner/ Funder	Staff Responsibility
2.3: Conduct energy-focused operational review of infrastructure	**2024**	**n/a**	**n/a**	**High**	**Medium**	**Low**	**FortisBC, FCM/UBCM Asset Management**	**Building Maintenance, Public Works**
The Town will conduct an energy-focussed operational review of its infrastructure, which includes drinking, storm and waste water systems as well as 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	Incremental Effort	Incremental Cost	Possible Partner/ Funder	Staff Responsibility
2.4: Implement measures from operational review of infrastructure	**2025**	**7.8 tCO_2e**	**$96k**	**High**	**High**	**Medium**	**FortisBC, FCM**	**Building Maintenance, Public Works**
The energy-focussed operational review of infrastructure (specifically water) will have identified areas of potential energy savings in the form of electricity. Due to the relatively high cost of electricity (compared with natural gas), there is the potential for significant energy cost savings. Appendix C highlights opportunities for reducing energy use in water distribution systems.								

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Incremental Effort	Incremental Cost	Possible Partner/ Funder	Staff Responsibility
2.5: Incorporate energy management into annual building maintenance procedures	**2024**	**2.2 CO_2e**	**$1.3k**	**Medium**	**Low**	**Low**	**n/a**	**Building Maintenance**

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.

Renewable Energy

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Incremental Effort	Incremental Cost	Possible Partner/ Funder	Staff Responsibility
3.1: Install solar PV on corporate buildings	**2025**	**0.6 tCO_2e**	**$7k**	**High**	**Medium**	**High**	**FCM**	**Departmental Directors**

The Town will consider the potential for solar PV installation on all new corporate buildings and look for potential existing building (e.g. public works). Solar PV is often more cost effective when installed on new buildings or when roof replacement is necessary on an existing building, as is on the public works building. This action has the following benefits:

- Reducing risk by ensuring that the Town 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 retrofit later.
- Ensuring that the Town 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. This is low cost but can significantly reduce the cost of a solar installation later.

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Incremental Effort	Incremental Cost	Possible Partner/ Funder	Staff Responsibility
3.2: Low-carbon heating systems for buildings	**2025**	**10.5 tCO_2e**	**$6.5k**	**High**	**Medium**	**High**	**FortisBC, FCM**	**Building Maintenance, Directors of each departmental building**
Building energy audits as described in action 2.1 may identify opportunities to retrofit low-carbon heating systems. Similarly, 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. 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 Town.								

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Incremental Effort	Incremental Cost	Possible Partner/ Funder	Staff Responsibility
3.3: Conduct corporate renewable energy study	**2027**	**n/a**	**n/a**	**High**	**Medium**	**Medium**	**FCM**	**Corporate services**
Renewable energy opportunities include both electricity generation and waste heat recovery. Solar PV was already discussed in action 3.1.								

Transportation

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Incremental Effort	Incremental Cost	Possible Partner/ Funder	Staff Responsibility
4.1: Right-size vehicles for assigned tasks	**2024**	**1.6 tCO_2e**	**$0.9k**	**Low**	**Low**	**Low**	**n/a**	**All**
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. The Town will create a vehicle use policy and institutionalise it.								

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Incremental Effort	Incremental Cost	Possible Partner/ Funder	Staff Responsibility
4.2: Develop a vehicle purchasing policy	**2024**	**8.6 tCO_2e**	**$4.8k**	**Low**	**Low**	**Low**	**n/a**	**Corporate, Finance**
A vehicle purchasing policy should be created and implemented. 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	Incremental Effort	Incremental Cost	Possible Partner/ Funder	Staff Responsibility
4.3: Invest in EVs and EV Charging Stations	**2025**	**17.8 tCO_2e**	**$10k**	**Low**	**Medium**	**High**	**CEA,FCM, FortisBC, Go Electric Fleets**	**Corporate, Finance**
When light-duty vehicles are due for replacement, the Town will consider purchasing an EV rather than a traditional ICE vehicle. The Town will consider the full life-cycle costs including fuel and maintenance when comparing the two vehicle types for purchase.								

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Incremental Effort	Incremental Cost	Possible Partner/ Funder	Staff Responsibility
4.4: Assess renewable fuels for corporate fleet	**2027**	**n/a**	**n/a**	**Low**	**Medium**	**Medium**	**FCM**	**Public Works, Corporate Services**
The Town will assess the potential of renewable fuels such as biodiesel and ethanol for its corporate fleet. The Town will request a quote for renewable fuels when tendering for fuel contracts annually.								

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Incremental Effort	Incremental Cost	Possible Partner/ Funder	Staff Responsibility
4.5: Fuel efficient driver training & anti-idling policy	**2024**	**2.2 tCO_2e**	**$1.2k**	**Low**	**Low**	**Low**	**n/a**	**Public Works**
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 Town will include this action 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. An anti-idling policy will continue to be implemented by the Town.								

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Incremental Effort	Incremental Cost	Possible Partner/ Funder	Staff Responsibility
4.6: Energy-focussed fleet maintenance	**2024**	**0.9 tCO_2e**	**$0.5k**	**Low**	**Low**	**Low**	**n/a**	**Public Works, Operations**
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). An example vehicle maintenance checklist is provided in Appendix I.								

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Incremental Effort	Incremental Cost	Possible Partner/ Funder	Staff Responsibility
4.7: Encourage carpooling where possible	**Done**	**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. The Town already suggests that employees carpool when travelling out of town for conferences and meetings, which is infrequently.								

Action	Timing	GHG Impacts	Economic Impacts	Adaptation/ Resilience Linkages	Incremental Effort	Incremental Cost	Possible Partner/ Funder	Staff Responsibility
4.8 Include emission targets in contracted services requirements	**2025**	**n/a**	**n/a**	**Low**	**Low**	**n/a**	**n/a**	**Corporate, Directors**
Include emission targets and/or low-carbon fuel requirements for contracted services, such as waste collection. Example contract language is provided in Appendix J.								

Enabling Actions and Corporate Leadership

Action	Timing	GHG Impacts	Economic Impacts	Adaptation/ Resilience Linkages	Incremental Effort	Incremental Cost	Possible Partner/ Funder	Staff Responsibility
5.1: Have dedicated staff person or department for plan implementation	**2024**	**n/a**	**n/a**	**High**	**Medium**	**Medium**	**n/a**	**Land and Environmental Programs Coordinator, Corporate Services**
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 is critical for successful plan implementation.								

Action	Timing	GHG Impacts	Economic Impacts	Adaptation/ Resilience Linkages	Incremental Effort	Incremental Cost	Possible Partner/ Funder	Staff Responsibility
5.2: Hire a staff member focused on climate action (e.g. special projects coordinator)	**2024**	**n/a**	**n/a**	**High**	**Medium**	**High**	**n/a**	**Finance, Human Resources**
A staff member in this position will be responsible for overseeing the implementation of this Plan, as well as other GHG reduction initiatives and special projects.								

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Incremental Effort	Incremental Cost	Possible Partner/ Funder	Staff Responsibility
5.3: Allocate funds for plan implementation	**2024**	**n/a**	**n/a**	**High**	**Low**	**Low**	**n/a**	**Finance, Corporate Services**
There are a variety of mechanisms through which funds could be allocated to corporate climate action. LGCAP funds are one example. A revolving fund can be created whereby cost savings resulting from energy savings from project implementation go back into the climate action fund. Another option is an annual allocation of funds from the budget.								

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Incremental Effort	Incremental Cost	Possible Partner/ Funder	Staff Responsibility
5.4: Develop KPIs, monitor and track for progress	**2024**	**n/a**	**n/a**	**High**	**Low**	**Low**	**n/a**	**Corporate Services**
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 the section.								

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Incremental Effort	Incremental Cost	Possible Partner/ Funder	Staff Responsibility
5.5: Demonstrate leadership on corporate waste and water	**2024**	**n/a**	**n/a**	**High**	**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
- Planning purchases to minimize deliveries

Reduction in water consumption and waste creation will have minimal impact on corporate GHGs and energy expenditures.

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Incremental Effort	Incremental Cost	Possible Partner/ Funder	Staff Responsibility
5.6: Join Partners for Climate Protection (PCP)	**2024**	**n/a**	**n/a**	**Low**	**Low**	**Low**	**CEA, FCM**	**Corporate Services**

PCP is a network of Canadian municipal governments that have committed to reducing GHGs and to acting on climate change. 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. It is free to join.

The Town should join this and start working through the milestones. This plan will be sufficient for corporate milestones 1-3, although for milestone 2 it will need to be adopted by Council.

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Incremental Effort	Incremental Cost	Possible Partner/ Funder	Staff Responsibility
5.7: Examine local carbon offset projects for remaining emissions (or consider offset purchase)	**2026**	**n/a**	**n/a**	**High**	**Medium/High**	**Medium**	**n/a**	**Corporate Services**

To achieve carbon neutrality, local governments must find a way to make up for, or balance, their ongoing corporate emissions. The Green Communities Carbon Neutral Framework provides guidance on how municipalities can become carbon neutral in their corporate operations. Three options exist.

1. Investing in a Green Communities Committee (GCC) supported project allows local governments to invest locally while also ensuring that projects are credible and result in measurable GHG reductions.
2. Investing in alternate GHG reduction projects within the community that are outside the corporate emissions boundary, but do not fall under the definition of option 1.
3. Purchasing offsets from a credible provider is a simple and cost-effective way for local governments to offset their corporate emissions.

More information about becoming carbon neutral can be found in this report

https://toolkit.bc.ca/wp-content/uploads/2022/05/BecomingCarbonNeutralGuideV3.pdf

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Incremental Effort	Incremental Cost	Possible Partner/ Funder	Staff Responsibility
5.8: Annual reporting on GHGs	**2023**	**n/a**	**n/a**	**Low**	**Medium**	**Low**	**n/a**	**Corporate Services**

Track annual emissions from buildings, transportation, waste, and contracted services, as already required for LGCAP.

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Incremental Effort	Incremental Cost	Possible Partner/ Funder	Staff Responsibility
5.9: Climate action education and awareness for staff	**2024**	**n/a**	**n/a**	**Low**	**Medium**	**Low**	**n/a**	**Corporate Services**
Invest in education and professional development for all Town staff on climate change, action mitigation, and climate adaptation.								

How are action impact numbers calculated?

Action impact numbers are calculated through a number of assumptions and educated estimates based on CEA's experience. The impacts of individual actions on energy consumption are calculated for the year 2030. 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 4, the terms refer to the following:

- Effort = staff time
- Costs = municipal costs
- GHG & economic impacts = GHG emission savings & financial savings in the year 2030
- 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.**
- **Blue = 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 B. Corporate Implementation Support

CEA offers a range of implementation supports that can help Oliver complete the actions proposed in this Corporate Energy and Emissions Plan. Current implementation offers include support for transportation, buildings, renewable energy, and staff education.

Table 5 – Corporate Implementation Support

Corporate Energy and Emissions Plan Action(s)	CEA Implementation Support
Transportation	
4.3: Invest in EVs and EV Charging Stations	E-Mobility Education and Awareness Low-Carbon Fleet Assessments EV Charging Implementation Low Carbon Fuel Standard (LCFS) Credits for EV charging
Existing Buildings	
2.1: Conduct building energy audits	Coordination of audits Incentive application process Project prioritization supports
2.2: Implement energy retrofits recommended by building energy audits **3.2: Low-carbon heating systems for buildings**	Coordination of detailed studies and implementation incentives Grant writing services Procurement and RFP support
2.3 Incorporate energy management into annual building maintenance procedures	Implementation of Energy Management Information Systems Strategic Energy Management Plans

Corporate Energy and Emissions Plan Action(s)	CEA Implementation Support
	Policy development
Renewable Energy	
3.1: Install solar PV on corporate buildings	Renewable energy business case studies (e.g. solar) Grant and incentive applications Procurement and RFP support
Enabling Actions and Corporate Leadership	
5.9 Climate action education and awareness for staff	Energy efficiency and low carbon technologies education for facilities and fleet staff Climate action education and awareness for staff Energy savings campaigns

Appendix C. Reducing Energy Use in Water Distribution Systems

Table 6 – Measures, Actions, and Resources to Reduce Energy Use in Water Distribution Systems

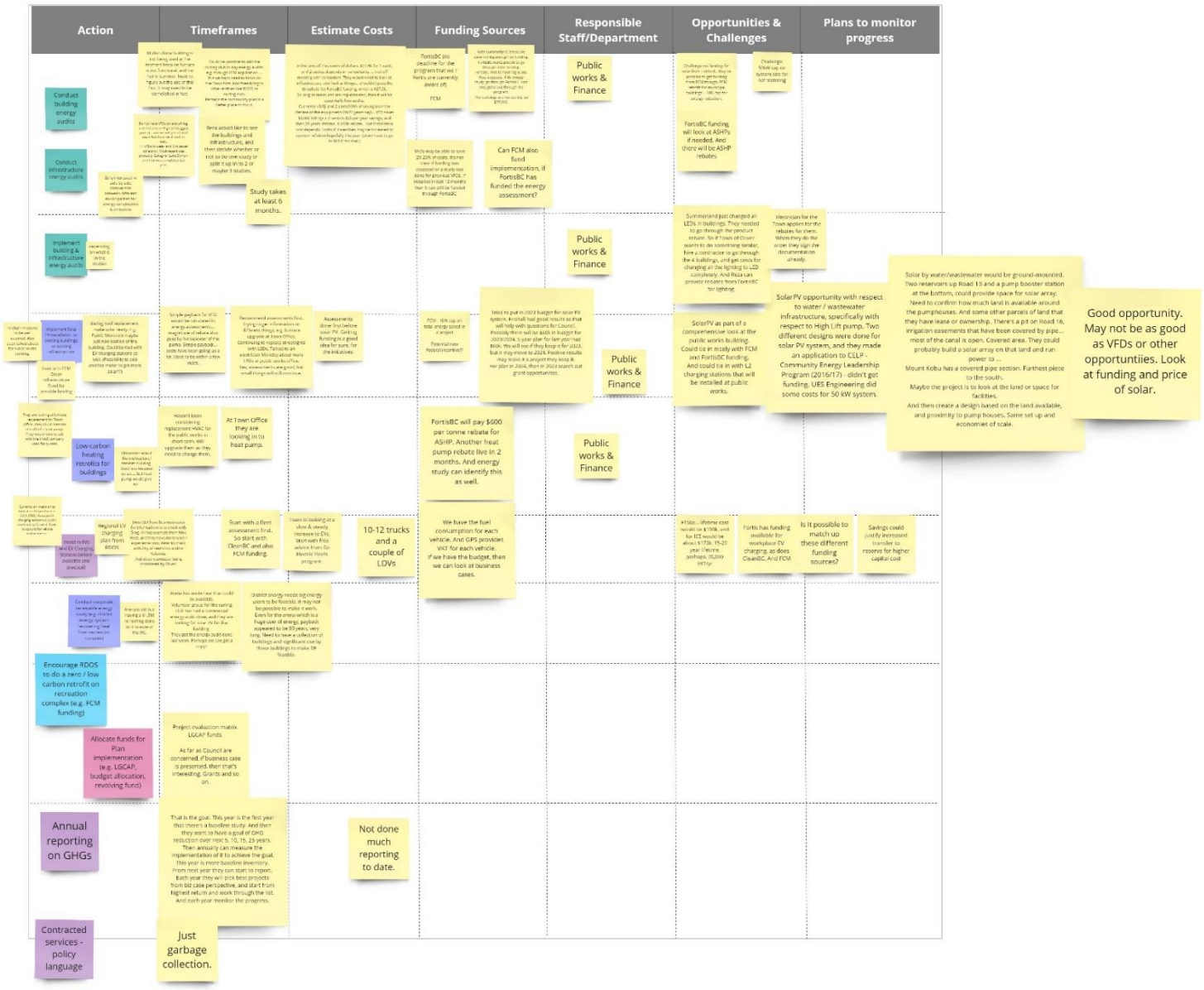
Key Measures	Examples of Actions	Resources
Improve pumping efficiency	Switch to high efficiency motors for pumps with variable speed drives (VSD) (potential ~25% energy savings). Modern VSDs include flow measurement and energy monitoring functions. Schedule pumping at non-peak times of day (for cost savings where there are time of use rates), or at night to also reduce evaporation losses.	Industry article: Energy Savings in Water Systems USEPA: Energy Efficiency for Water Utilities
Minimize leakage	Pressure management: installing pressure valves at water inlets and outlets to better monitor the flow of water and pressures. Active leak detection: using a range of technologies, such as thermal imaging, satellite imaging, drone surveys, acoustic sensors, in-pipe monitoring and smart metering.	Review of leakage detection in water distribution networks
Asset Management	Monitor and replace ageing pipes and infrastructure. Account for future climate impacts, i.e. changes in temperature and precipitation and their impact on water distribution system operation and planning. Consider environmental and economic performance of pipe material and diameter i.e. lower mass and smaller diameter pipes can result in lower life cycle emissions and costs.	Water Distribution Systems Climate Change Risks and Opportunities Case study: design factors in Kelowna FCM Municipal Asset Management Program

Demand side management	Water meters and pricing structures. Public behaviour change campaigns on reducing water use. Incentives and rebates (e.g. water conservation kits, rain barrels). Watering restrictions (i.e. for summer months).	BC Climate Action Toolkit: Water and Wastewater Case study: water meters in Kamloops Water Conservation Guide for BC
Renewable energy	Microhydroelectric power through energy recovery of downhill flows (where water is not pumped up a grade). Installing solar to offset electricity demand, and/or solar powered water pumps with battery banks.	BC Climate Action Toolkit: Renewable and recoverable energy generation

Appendix D. Workshops Summary

This section contains the discussion notes from the staff workshops.

Workshop 2


Action
Timeframes
Estimate Costs
Funding Sources
Responsible Staff/Department
Opportunities & Challenges
Plans to monitor progress
Conduct building energy audits
Conduct infrastructure energy audits
Implement building & infrastructure energy audits
Low-carbon heating retrofits for buildings
Encourage RDOS to do a zero / low carbon retrofit on recreation complex (e.g. FCM funding)
Allocate funds for Plan implementation (e.g. LGCAP, budget allocation, revolving fund)
Annual reporting on GHGs
Contracted services - policy language
Study takes at least 6 months.
Reps would like to see the buildings and infrastructure, and then decide whether or not to do one study or split it up in to 2 or maybe 3 studies.
Public works & Finance
Public works & Finance
Public works & Finance
Can FCM also fund implementation, if FortisBC has funded the energy assessment?
FortisBC will pay $600 per tonne rebate for ASHP. Another heat pump rebate live in 2 months. And energy study can identify this as well.
We have the fuel consumption for each vehicle. And GPS provides VKT for each vehicle. If we have the budget, then we can look at business cases.
10-12 trucks and a couple of LDVs
Start with a fleet assessment first. So start with CleanBC and also FCM funding.
At Town Office they are looking in to heat pump.
FortisBC funding will look at ASHPs if needed. And there will be ASHP rebates
SolarPV opportunity with respect to water / wastewater infrastructure, specifically with respect to High Lift pump. Two different designs were done for solar PV system, and they made an application to CELP - Community Energy Leadership Program (2016/17) - didn't get funding. UES Engineering did some costs for 50 kW system.
Solar by water/wastewater would be ground-mounted. Two reservoirs up Road 13 and a pump booster station at the bottom, could provide space for solar array. Need to confirm how much land is available around the pumphouses. And some other parcels of land that they have lease or ownership. There's a pit on Road 16, irrigation easements that have been covered by pipe... most of the canal is open. Covered area. They could probably build a solar array on that land and run power to ... Mount Kobu has a covered pipe section. Furthest piece to the south. Maybe the project is to look at the land or space for facilities. And then create a design based on the land available, and proximity to pump houses. Same set up and economies of scale.
Good opportunity. May not be as good as VFDs or other opportuntiies. Look at funding and price of solar.
Is it possible to match up these different funding sources?
Not done much reporting to date.
Just garbage collection.

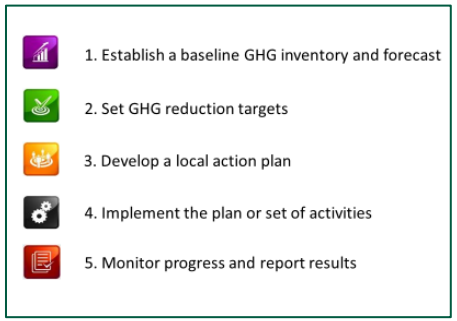
Appendix E. PCP Information and Inventory

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 500 municipalities have joined PCP, making a public commitment to reduce GHG emissions. PCP membership covers all provinces and territories and accounts for more than 70 percent 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 18 – PCP Program Milestones



The program empowers municipalities to take action against climate change through a five-milestone process, as shown in Figure 18.

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 Town will need to implement actions in this Corporate Plan and submit these reports to FCM-ICLEI.

For Milestone 5, the Town will need to create a document with an updated corporate inventory and recorded impacts of individual actions that have been conducted.

Inventory

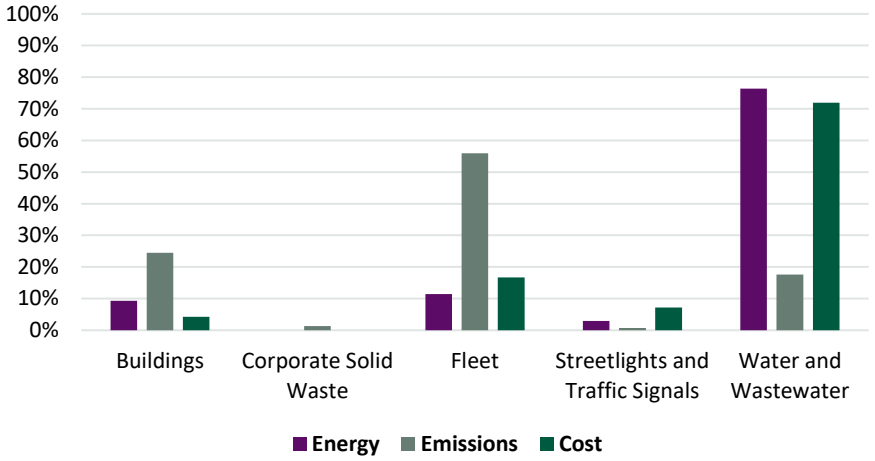
The following table breaks down the Town's GHG emissions by the PCP categories from 2012-2022.

Table 7 – PCP Inventory: Emissions (tCO_2e), 2012-2022

PCP Category	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Buildings	59	62	59	55	53	73	67	69	62	67	77
Corporate Solid Waste	4	4	4	4	4	4	4	4	4	4	4
Fleet	174	167	179	179	177	172	172	159	171	180	177
Streetlights and Traffic Signals	2	2	2	2	2	2	2	2	2	2	2
Water and Wastewater	50	51	50	55	50	49	51	48	48	51	55
Total	**290**	**286**	**294**	**295**	**286**	**300**	**295**	**282**	**287**	**304**	**316**

Figure 19 shows the percentage of energy consumption, GHG emissions, and energy expenditures that can be attributed to each PCP classification and each fuel source. Water and wastewater are responsible for roughly three-quarters of energy consumption and expenditures, which is represented as a majority of the electricity usage. The fleet is the PCP category with the largest emissions, nearly 50%. Corporate solid waste has no energy or cost associated with it since it uses no fuel source, but it does have GHG emissions associated with it due to its decomposition in the landfill.

Figure 19 – PCP Inventory: Energy, Emissions and Cost by Classification and Fuel Source, 2022



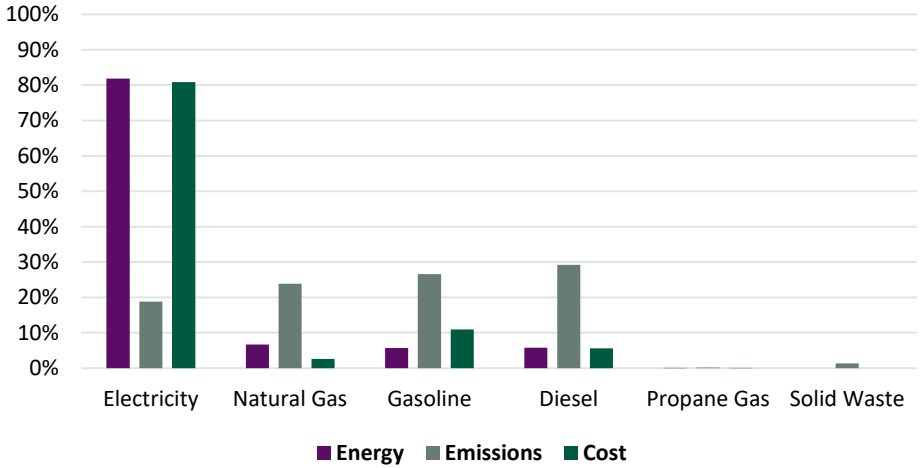
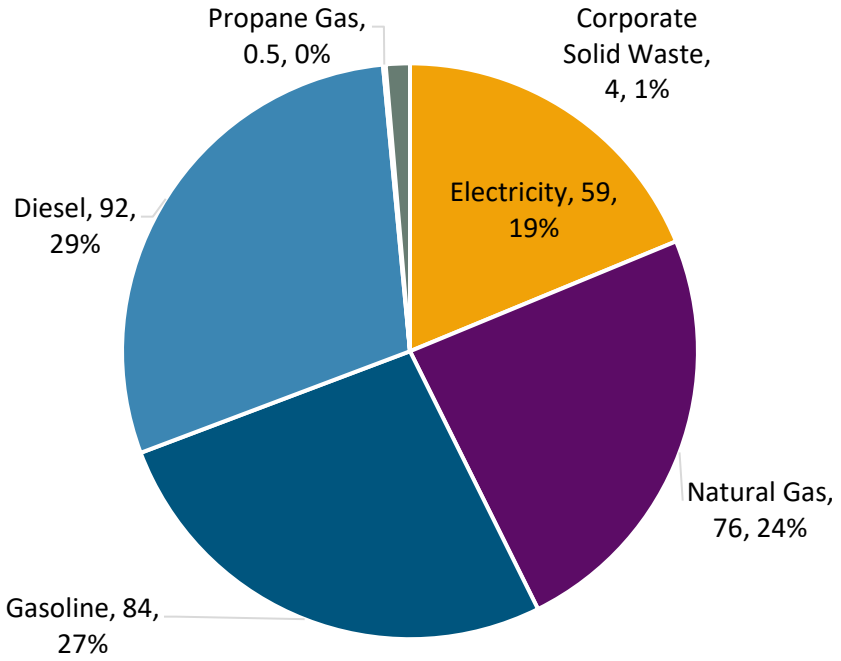
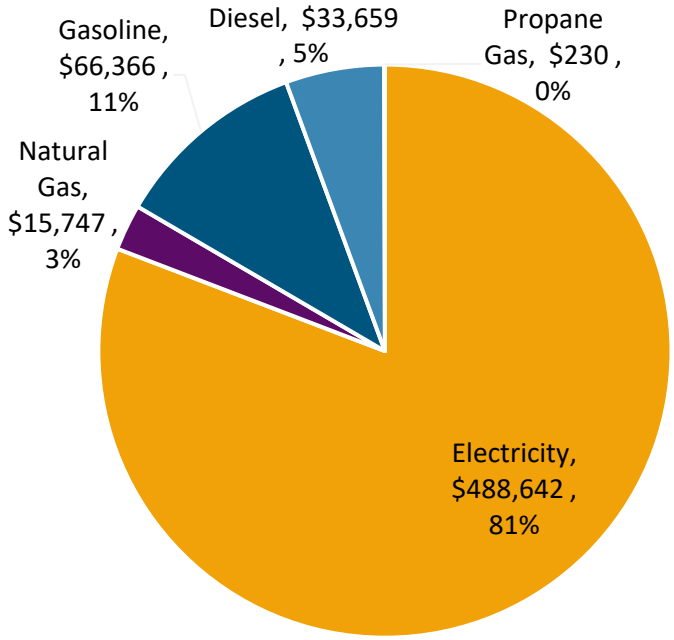


Figure 20 shows the GHG emissions and energy cost by fuel source in 2022.

Figure 20 – PCP Inventory: Emissions (tCO_2e) and Cost by Fuel Source, 2022





Appendix F. Inventory and Modelling Assumptions

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

Inventories

Building and transportation inventories were created using energy and cost data provided by the Town. Based on the data compiled, full inventory years for energy consumption and emissions are 2012-2022, while energy costs are 2019-2022.

- 2017 transportation data for the fleet was unavailable; an average of 2016 and 2018 data was used.
- Public Works staff assisted with sorting Town vehicles into the correct LGCAP category

Waste emissions were determined based on the size of the waste bin at Public Works, assuming an emissions factor of 0.8 tCO_2e / tonne of waste. These emissions are only included in the PCP inventory.

Emissions factors for inventory years are shown in Table 8, are sourced from the Province of BC[5]. The electricity emissions factors were adjusted in 2021 and 2022[6] to include net electricty imports, which was backcast for this inventory to 2009.

Table 8 – Emissions Factors

Fuel	tCO_2e/GJ
Electricity	0.003
Natural gas	0.050
Gasoline	0.067
Diesel	0.070
Propane	0.061

[5] https://www2.gov.bc.ca/assets/gov/environment/climate-change/cng/methodology/2020-pso-methodology.pdf

[6] https://www2.gov.bc.ca/gov/content/environment/climate-change/industry/reporting/quantify/electricity

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 Town inventory 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 0.66% per year (the average annual increase between 2016 and 2021).

From 2023 onwards, all of the data is an estimate as a BAU projection.

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.
    - 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 other actions can have.

Details on the impacts of individual actions on GHGs are described in the main body of this report, in Figure 14.

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.

- Town 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. Sample Vehicle Inspection Report

OAKVILLE

Vehicle Inspection Reports

Truck / Trailer Make		Truck Unit #	Date: mm/dd/year
Truck License Plate #	Trailer License Plate #	Trailer Unit #	Odometer Finish
☐ Pre -trip	Inspection Location: Oakville, Ontario	Time: AM PM	Odometer Start
☐ Post -trip	Inspection Location: Oakville, Ontario	Time: AM PM	Total Km's Driven

Driver(D) use X if item is not satisfactory — **Mechanic (M) use √ + your initials when defect corrected**

Truck	D	M	Truck	D	M	Truck	D	M	Trailer / Towed Vehicle	D	M
Air Brake Adjustments + Connections			Wheels, Rims + Fasteners			Defroster / Heaters, Fans & Controls			Air Brake Adjustment / Brake Components		
Air Compressor			Condition of Tires + Proper Inflation			Steering Wheel			Parking Brake		
Air Lines - Supply + Service			Fire Extinguisher			Air / Electric Horn			Electric / Hydraulic Brakes		
Air Brake Pressure			First Aid kit			Doors, Locks, Handles			Ownership / Valid Insurance		
Parking Brake			Reflective Triangles			Body Damage			Annual Inspection Sticker / Certificate		
Low Air Warning Signals			Stop/Brake & Tail Lights			Cleanliness of Cab			Valid License Plate		
Brake Pedal			Clearance Lights / Reflectors			Mirrors			Lights + Reflectors		
Air Tanks			Turn / Hazard Signals			Load Security			Ramps / Tailgates		
Hydraulic Brakes			Auxiliary Lighting			Mud Flaps			Wheel, Rims, Fasteners		
Electric Brake / Controls			Exhaust Systems			Plow Assemblies			Condition of Tires + Proper Inflation		
Chassis, Frames and Cross Members			Radiator & Fluid Level			Body Damage			Suspension, Springs, Air bags + Controlling Attachments.		
Clutch + Adjustment			Fuel Systems			Valid License Plate			Jack / Landing Gear		
Transmission			Engine			Ownership / CVOR			King Pin / Plate		
Rear End / Axles			Battery(ies)			Valid Insurance			Pintle Hook / Ball Hitch		
Suspension, Springs, Air Bags and Controlling attachments			Oil Pressure & Level			Annual Inspection Sticker / Certificate			Load Security		
Drive Line			Windshield + Windows			Seat Belt			Body Damage		
5th Wheel / Pintle / Ball			Windshield Wipers + Washers			Other Attachments			Other		

Driver's Comments:

Mechanic's Comments:

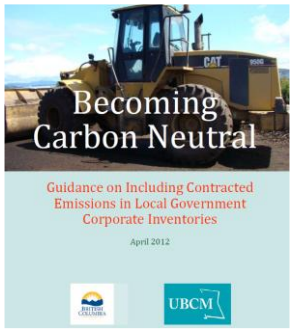
☐ Conditions of above vehicle satisfactory. ☐ Above defects corrected.

☐ Above defects need not be corrected for safe operation of vehicle. Repair Order #:

Driver's Name: (Print and sign) Time: AM PM Date: mm/dd/year

Mechanic's Name: (Print and sign) Time: AM PM Date: mm/dd/year

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) days of the following dates: [dates on which fuel consumption data will be required by the local government].

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. 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^{o}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

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 and strongest requirements of the Zero Carbon 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 90.1-2022 (for all other building types)
    - National Energy Code for Buildings (NECB) 2020
    - 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.