
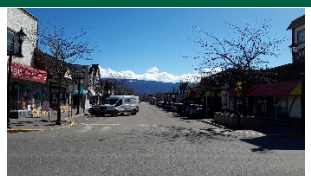

District of Summerland

Corporate Energy and Emissions Management Plan

March 2021

DISTRICT OF SUMMERLAND

Community Energy Association

Acknowledgements

The Corporate Energy and Emissions Management Plan was developed by the District of Summerland in collaboration with the Community Energy Association. Financial support was provided by FCM's Municipalities for Climate Innovation Program (MCIP), and FortisBC.

The District of Summerland would like to acknowledge the contributions of several people and organizations that were involved in the development of this plan:

- Members of the Summerland Corporate Climate Action Team.
- Staff from numerous departments at the District of Summerland.
- Researchers from the Integrated Climate Action for BC Communities Initiative (ICABCCI) through Simon Fraser University's ACT - Adaptation to Climate Change Team.

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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
CEEMP	Corporate Energy and Emissions Management Plan
CEERP	Community Energy and Emissions Reduction Plan
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide equivalent
CEEPA	Corporate Energy and Emissions Plan and Assessments: the 2010 plan created by the District
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)
HDD	Heating Degree Day
HVAC	Heating Ventilation and Air Conditioning
ICABCCI	Integrated Climate Action for BC Communities Initiative (part of Simon Fraser University's Adaptation to Climate Change Team)
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 step change to climate action that breaks down the silos between adaptation, mitigation and co-benefits, and mainstreams their consideration across municipal decision-making
LED	Light Emitting Diode
MCIP	Municipalities for Climate Innovation Program
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)
SAEC	Sustainability / Alternative Energy Coordinator (a staff position at the District)
UBCM	Union of BC Municipalities
WWTP	Wastewater Treatment Plant

Executive Summary

Introduction

This Corporate Energy and Emissions Management Plan (CEEMP) is one piece of an in-progress low carbon resilience (LCR) strategy for the District. The fulsome LCR strategy will include additional work on adaptation, such as a risk and vulnerability assessment, and also includes the District's Community Energy and Emissions Reduction Plan (CEERP).

Part of a community's role in dealing with climate action is to reduce emissions caused by its own buildings and fleet. This helps it to meet its requirements as a signatory of the BC Climate Action Charter.

Reducing corporate GHG emissions offers many co-benefits, including:

- Increasing energy conservation and efficiency, reducing municipal energy costs, i.e., providing better value for money to taxpayers
- Providing improved thermal regulation and quality of lighting, resulting in a more comfortable working environment for staff and visitors
- Minimizing air pollution and improving air quality by transitioning to low or zero carbon fleets and infrastructure

The District joined the FCM-ICLEI Partners for Climate Protection (PCP) program in 2017, and intends to use the CEEMP and CEERP to help it progress through the program milestones. For Milestones 1-3, this report with its appendices will be sufficient.

Despite this, the inventory in this Executive Summary and the body of this report the corporate inventory is defined as it is according to the Province's methodology in line with the Climate Action Revenue Incentive Program (CARIP), and not as a corporate inventory is defined according to PCP.

Summerland leading the way

Although Summerland's first Corporate Energy and Emissions Plan and Assessments, released in 2010, did not identify specific GHG reduction targets, it did specify many actions with an overall goal of reducing emissions by as much as possible. Together, with the allocation of CARIP funds for GHG emissions reduction initiatives, the hiring of a full-time staff resource, and the establishment of the Corporate Climate Action Team, a significant number of actions were able to be implemented:

- **Buildings / lighting** – LED streetlight conversions, numerous retrofits including HVAC upgrades
- **Energy generation** – solar photovoltaic systems on Arts & Cultural Centre and Municipal Hall, solar hot water on Aquatic Centre, heat recovery/exchange plant between new RCMP building and Arena
- **Transportation** – replacing older vehicles with more fuel-efficient models, addition of electric battery-back-ups, encouraging carpooling
- **Solid waste reduction** – encouraging recycling, and requiring that solid waste pickup contractor use emissions reduction measures in operations
- **Water / wastewater** – updates to the District's water conservation plan
- **Institutionalisation** – Green Revolving Fund established and 1st Canadian government body to join Billion Dollar Green Challenge, Corporate Climate Action Team established

Summerland's current emissions

Summerland's corporate emissions for 2012-2018 (available inventory years), using the CARIP inventory method and split by CARIP categories, are as follows:

CARIP Emissions by classification (tCO2e)							
	2012	2013	2014	2015	2016	2017	2018
Administration and Governance	67	63	65	52	63	85	80
Arts, Recreation and Cultural Services	382	375	345	331	343	346	324
Drinking, Storm and Waste Water	196	220	162	168	154	178	189
Fire Protection	39	38	34	33	35	44	38
Roads and Traffic Operations	242	265	208	248	253	295	261
Solid Waste Collection, Transportation and Diversion	119	119	121	121	122	100	82
Total	**1,045**	**1,080**	**936**	**953**	**970**	**1,047**	**975**

The largest area of emissions is Arts, Recreation and Cultural Services. The second largest is Roads and Traffic Operations.

There has been no substantial overall variation from 2012 to 2018, although energy expenditures have increased 20% from $1,000,000 in 2012 to $1,200,000 in 2018. This is despite the fact that overall energy consumption stayed approximately flat – 2018 was 1% more than 2012.

Summerland's corporate GHG reduction target

To achieve Corporate Milestone 2 under the PCP program, the District of Summerland has set a corporate emissions reduction target in this plan. The new corporate targets, compared to the new community targets in the CEERP, are:

	New community target from CEERP, reduction from 2007 levels	New corporate target in CEEMP, reduction from 2012 levels
2025	18%	25%
2030 *	*30%*	*35%*
2050	80%	80%

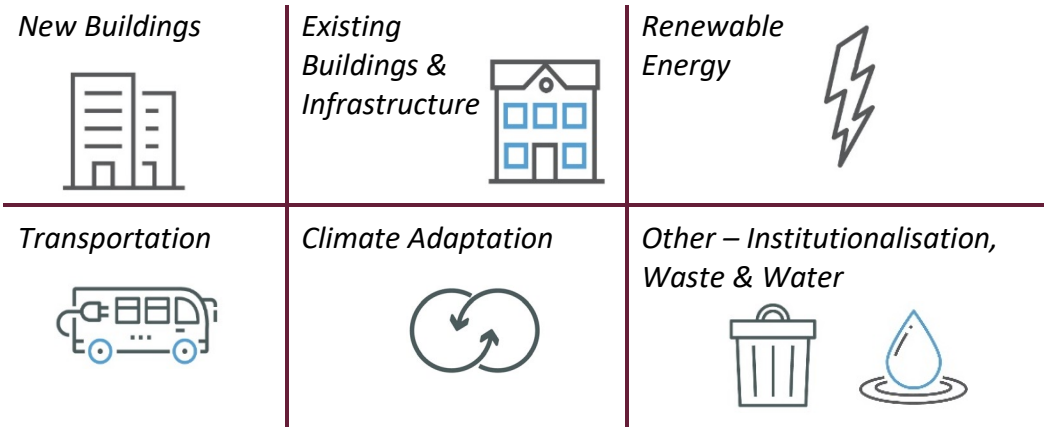
It is not possible to select 2007 as the baseline year for the corporate GHG target as well, because there is no corporate data from that year. 2012 is the most recent accurate corporate year.

* 2030 targets for the CEERP and CEEMP are milestone targets. They have not been adopted by Council, but will help to ensure that the District is on the right track.

What we can do: recommended climate actions

Based on staff consultation, best practices, and energy audits and a green fleet report completed for the District, actions were identified to implement over the next five years and beyond within the following six categories:

1. ***New Buildings:*** Optimizing energy performance and lowering GHG emissions in new District buildings while addressing risks and building in resilience measures.
2. ***Existing Buildings & Infrastructure***: Retrofit existing District buildings and infrastructure to increase energy efficiency, reduce GHG emissions, and be resilient to the impacts of climate change. Prioritize retrofits of District buildings that can double as cooling and clean air shelters.
3. ***Transportation*****:** Improving fuel efficiency and reducing emissions of GHG's and other pollutants from the District's fleet, and shifting how District employees commute to work.
4. ***Renewable Energy***: Increasing the use of renewable energy that can be generated by the District.
5. ***Adaptation***: Ensuring that the District is prepared for coming climatic changes.
6. ***Other – Institutionalisation, Waste & Water***: Institutionalising the Corporate Plan, tackling Corporate waste creation, and water consumption.



The full, detailed list of actions is outlined in the body of this plan. The specific timeframe for implementation, department or position responsible for implementation, and possible partners or funding sources for each action are also noted. Available resources and capacity of staff to implement were considered throughout the process and the actions selected are intended to save the District time and money. The intention of the CEEMP is to rethink business as usual, rather than creating new work projects.

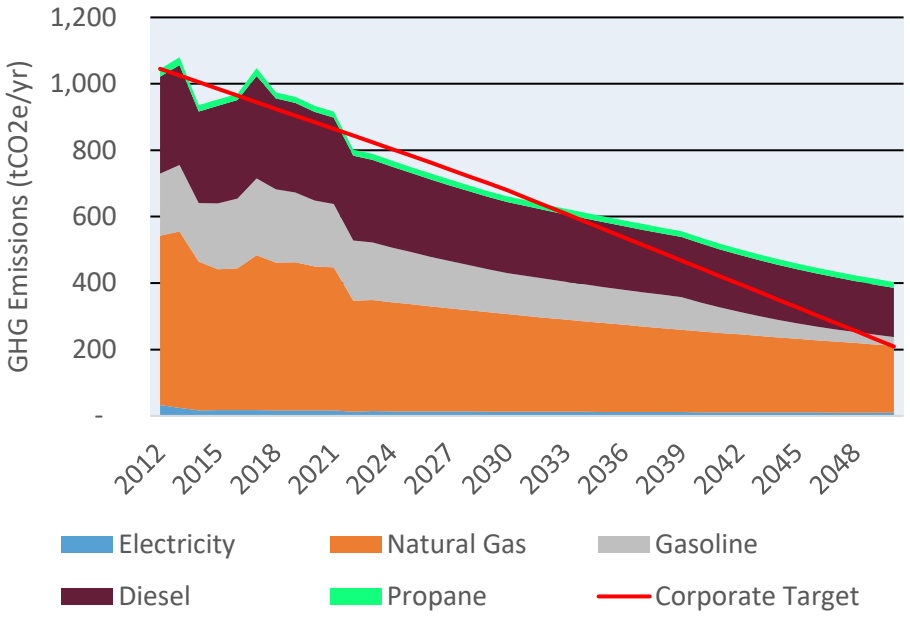
What our actions can achieve, and reduction targets

As shown in the following figure, by implementing the CEEMP, total emissions are expected to decline by the following percentages below 2012 emissions:

- 29% by 2025
- 37% by 3030
- 60% by 2050

As such, it should be possible to achieve the corporate target for 2025 through the actions outlined in this plan. For 2030 and 2050, additional planning work and actions will be necessary.

Figure - District of Summerland's modelled GHG emissions from proposed climate actions by fuel



The top two actions that will achieve the largest reductions in GHG emissions over the next six years, by a considerable margin, are:

- EBI1: Complete energy improvements identified by building energy audits
- T1: Implement consolidated fleet actions

In addition to reducing emissions, the planned climate actions will lower energy expenditures compared to BAU levels. The Plan is expected to save $230,000 a year in corporate energy-related costs by 2025 (including O&M), just over 50% of which will be from electricity savings.

In five years, it is advisable to renew this plan as most actions should be completed by then. This will allow the District to continue making progress towards its 2030 and 2050 corporate 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 Corporate Energy and Emissions Management Plan is one piece of an in-progress low carbon resilience (LCR) strategy for the District. A more integrated climate action plan, or LCR plan, will include additional work on adaptation, such as a risk and vulnerability assessment, and the District's Community Energy and Emissions Reduction Plan (CEERP). This plan is focused on corporate emissions, and ideally, over time will be linked with this other data in order to build out an LCR plan. As such, key intersections with adaptation have been highlighted throughout the report.

Part of the District's role in dealing with climate action is to assess risk to infrastructure, populations, and ecosystems and to ensure that core services are maintained under diverse scenarios over time. As a signatory to the BC Climate Action Charter (CAC), it also the responsibility of the District to reduce emissions caused by its own buildings and fleet, transitioning to zero carbon operations over time.

Solar photovoltaics (PV) being installed on Municipal Hall. Source: District of Summerland

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. Summerland is a signatory to this Charter, along with almost every local government in BC.

This Corporate Energy and Emissions Management Plan includes actions from buildings energy assessments delivered by Building Energy Solutions and a report outlining strategies to reduce emissions in vehicles by Richmond Sustainability Initiatives. These were funded by Federation of Canadian Municipalities' (FCM) Municipalities for Climate Innovation Program (MCIP) and provide critical data for assessing the District's emissions profiles and forecasts over time.

Reducing corporate GHG emissions has the following co-benefits:

- Increasing energy conservation and efficiency, reducing municipal energy costs, i.e., providing better value for money to taxpayers
- Providing improved thermal regulation and quality of lighting, resulting in a more comfortable working environment for staff and visitors

- Minimize air pollution and improve air quality by transitioning to low or zero carbon fleets and infrastructure
- Leading by example to consider key risks and emissions reduction opportunities in assets, stimulates community businesses and residents to do the same, leading to further GHG emission reductions and enhanced climate adaptation in the community
- Contributing towards community economic development by leveraging infrastructure dollars and other funds

Figure 1 – Co-benefits to climate action initiatives with a Low Carbon Resilience approach

Source: Integrated Climate Action for BC Communities Initiative, Adaptation to Climate Change Team, Simon Fraser University (2019)

The co-benefits of climate action also demonstrate the potential to leverage and streamline resources in ways that help the community recover economically from COVID and other economic shocks. In addition, Federal

and Provincial infrastructure funding can be leveraged, and thus improve on the business cases identified in this project.

In 2010 the District of Summerland created a Corporate Plan, called *Moving Towards Carbon Neutrality in Summerland / Corporate Energy and Emissions Plan and Assessments*. Versions 1 and 2 of this plan were created in 2010, and version 3 in 2011. This Corporate Energy and Emissions Management Plan replaces this earlier plan.

FCM-ICLEI Partners for Climate Protection Program

The District joined the FCM-ICLEI Partners for Climate Protection (PCP) program in 2017, and intends to use the CEEMP and CEERP to help it progress through the program milestones. PCP is *mitigation specific*.

What is the FCM-ICLEI Partners for Climate Protection (PCP)?

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

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

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

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

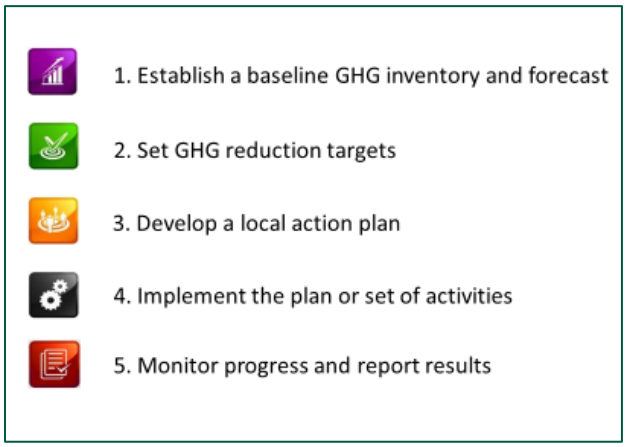


Figure 2 – PCP program milestones

Source: PCP

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 District will need to implement actions in this Corporate Plan, and report on this activity in its annual CARIP reports. Then it will need to submit these reports to FCM-ICLEI.

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

Two Types of Inventory

There are two principal ways for a corporate inventory to be defined, following the CAC/CARIP methodology, and following the PCP methodology. These are described in more detail in the following text box.

In this report, we will define Summerland's corporate inventory according to CAC/CARIP, and in Appendix C: PCP Inventory and BAU define it according to PCP. This is in part because as the District owns its local landfill, it needs to be included in the PCP inventory, even though it accepts waste from the entire community. The scale of the emissions from the landfill means that it dwarfs the emissions from other aspects of the corporate inventory, making it difficult to identify trends in emissions that the District has much more direct control over and which are able to be tracked with much greater precision.

District of Summerland fleet vehicles. Source: District of Summerland

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

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

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

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

FCM's Partners for Climate Protection (PCP) reporting is conducted by local governments if they wish to 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 District; 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 (contracts over $25,000); includes staff-owned vehicles used for District work*
- Solid Waste – *includes all the emissions from the landfill because this is owned by the District*

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 District has "full authority to introduce and implement operating policies at the operation". Unlike CAC reporting, PCP reporting includes solid waste, and the District-owned RCMP building.

Note: Transit fleet is excluded from both because neither is it a traditional service nor is it under the "operational control" of the District.

Summerland – A Leading Community

Although Summerland's first Corporate Energy and Emissions Plan and Assessments, released in 2010, did not identify specific GHG targets, it did specify many actions with an overall goal of reducing emissions by as much as possible. Together, with the annual CARIP reporting, the allocation of CARIP funds for GHG emissions reduction initiatives, and more recently, the hiring of a full-time staff resource and the establishment of the Corporate Climate Action Team, a significant number of actions were able to be implemented. These are described in Table 1.

Table 1 – Summary of existing corporate climate actions

Buildings/lighting	In 2019, buildings audits carried out on all buildings, as part of this Corporate Plan update. Previously: • Conversion of streetlights to LED (all but decorative streetlights) – *see text box* • Works & Infrastructure office roof repairs to increase efficiency • Christmas light upgrades to LED • LED lights and REALice system in arena • LED lights at Fire Dept. training facility, 6 truck bays and light tower of rescue truck • LED light conversion at curling rink • Fluorescent lights at Municipal Hall upgraded to increase energy efficiency • HVAC schedule at Municipal Hall adjusted to optimize comfort/energy efficiency • Heat reflective film added to some windows at Municipal Hall to lower HVAC demands • Replacement of HVAC systems at Municipal Hall • Installed energy efficient lighting, ballasts, motion sensor switches at Works & Infrastructure office • Added occupancy sensors for arena's exhaust fans • Added fan coils for dressing room and arena building to eliminate 2 gas furnaces operating 24/7 • New pool covers purchased to reduce heat loss and energy use

Energy generation	Solar photovoltaic (PV) systems installed: • Fall 2018 – Arts & Cultural Centre. 50 panel. 17.25 kW • Spring 2020 – Municipal Hall. 17 panel. 5.4 kW Other: • New heat pump installed at curling rink • Heat recovery from ice plant for new RCMP building  *5.4 kW solar PV array installed on Municipal Hall* *Source: District of Summerland*
Transportation	In 2019, fleet report completed, as part of this Corporate Plan update. Previously: • Promoted carpooling and active transportation to staff • Replaced some older vehicles with more fuel-efficient models • Improved remote access for work stations for remote support functionality (lowers transportation emissions from on-site repairs) • Established fleet renewal reserve fund • Council commitment for developing Fleet Management Policy for long-term funding for efficient fleet replacement • Installation/connection of RealIce system for Zamboni • Electric Zamboni purchased
Solid waste reduction	• Paper and bottle recycling added to recreation facilities • Renewed contract for waste pickup, ensuring vendor uses emissions reduction measures in operations
Water / wastewater infrastructure	• Wastewater Treatment Plant (WWTP) upgrades. Including boiler replacement/upgrade to higher efficiency • Commissioned HVAC system at WWTP to lower energy requirements • Installation of motion sensors at WWTP to lower light use • Optimization of WWTP to reduce chemical use and equipment operation

Institutionalisation	The District of Summerland established the Climate Action Reserve Fund and accompanying *Climate Action – Funding The Reduction Of Greenhouse Gases & Corporate Carbon Neutrality* policy to voluntarily allocate 0.001% of the District's annual operating budget and all monies received through the CARIP to the Climate Action operating budget. Unspent operating funds are then transferred annually into the Climate Action Reserve Account. This reserve fund is used for programs and strategies for greenhouse gas reductions and is targeted at corporate emissions. The reserve fund is used at as an alternative to purchasing external carbon offsets. The District's Green Revolving Fund was established in 2018 after the District joined the Billion Dollar Green Challenge (1st Canadian Government Body to join) in 2017. The Corporate Climate Action Team was established in 2017.

Summerland's LED streetlight conversion

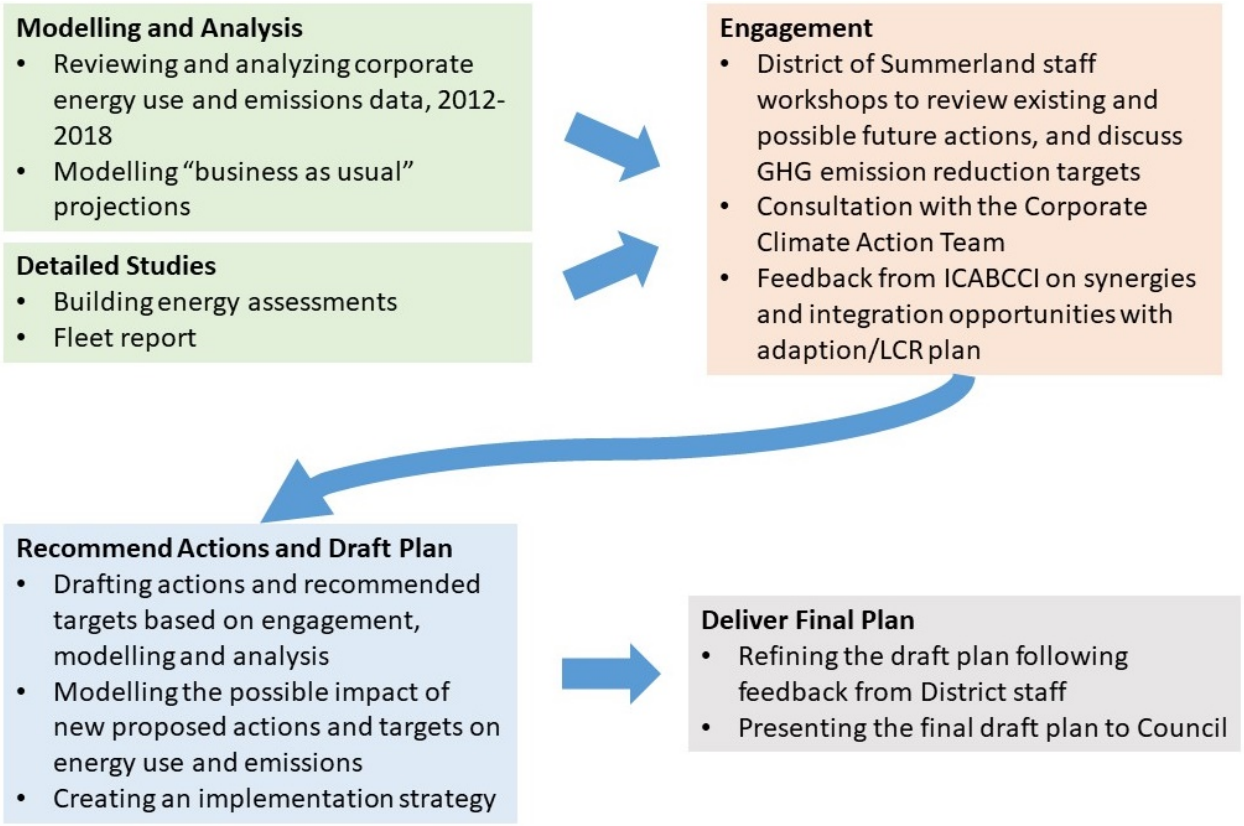
One of the biggest changes in Summerland's energy consumption has been the LED streetlight conversion. By completing a change out of the cobra head style lights, total streetlight consumption reduced from 1,155,776 kWh per year to 408,361 kWh, a reduction of about 65%, or of $57,000 a year. The decorative and floodlight fixtures present an opportunity for further savings. Because this conversion occurred in late 2018, it does not yet appear in the corporate inventory data within this plan.

Corporate Energy & Emissions Management Plan Development

In 2019, the District of Summerland, in collaboration with CEA, began the process of creating an updated Corporate Energy and Emissions Management Plan. The planning process consisted of four main steps, as illustrated in Figure 2.

In the workshops, staff reviewed the buildings actions using a scoring matrix, which is in Appendix E: Project Scoring Matrix.

Figure 3 - Development of the Summerland Corporate Energy and Emissions Management Plan



Available resources and capacity of staff to implement were considered throughout the process and the actions selected are intended to save the District time and money, even though some may require up-front time and capital dollars. The intention of the CEEMP is to rethink business as usual, rather than creating new work projects. To that point, all of the CEEMP actions are related to Council priorities (i.e., Infrastructure Investment; Active Lifestyle; Good Governance), as well as the District's forthcoming energy strategy, the Asset Management strategy, and corporate risk mitigation efforts.

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 helps identify the best opportunities for cost and emissions reductions.

This inventory describes the GHG emissions, energy consumption, and annual energy expenditures of all corporate assets based on the CARIP inventory definition. Further details on the inventory are in Appendix B: Further Details on CARIP Inventory, and assumptions are described in Appendix D: Inventory and Modelling Assumptions.

The following table breaks down the District's CARIP GHG emissions by the CARIP categories. The largest area of emissions is Arts, Recreation and Cultural Services. The second largest is Roads and Traffic Operations.

Table 2 – Breakdown of the District's CARIP GHG emissions, by CARIP categories

CARIP Emissions by classification (tCO2e)							
	2012	2013	2014	2015	2016	2017	2018
Administration and Governance	67	63	65	52	63	85	80
Arts, Recreation and Cultural Services	382	375	345	331	343	346	324
Drinking, Storm and Waste Water	196	220	162	168	154	178	189
Fire Protection	39	38	34	33	35	44	38
Roads and Traffic Operations	242	265	208	248	253	295	261
Solid Waste Collection, Transportation and Diversion	119	119	121	121	122	100	82
Total	**1,045**	**1,080**	**936**	**953**	**970**	**1,047**	**975**

There has been no substantial overall variation from 2012 to 2018, although some categories have increased (Administration and Governance, Roads and Traffic Operations), some categories have decreased (Arts and Recreation, Solid Waste Collection), and some are about the same (Drinking Storm and Waste Water, Fire Protection).

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

Compared to the last full community inventory year of 2016 of just under 60,000 tCO_2e, corporate GHG emissions in that year were about 1.6% of the community total.*

Breakdown and Trends

The charts in this section show the summarized data for 2012 to 2018, for internal operations.

What is a GJ?

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

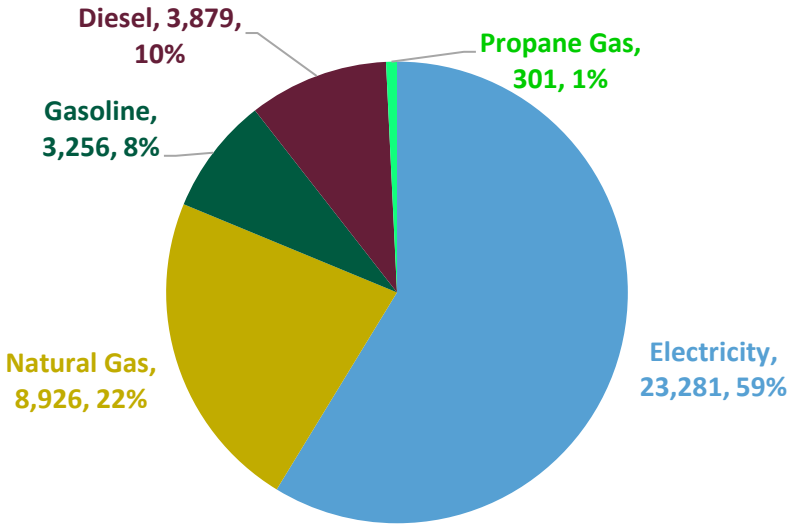
- Natural gas for 3-4 days of household use
- 25-30 litres of diesel or gasoline
- Two 20 lb propane tanks
- The electricity used by a typical house in 9 days

What is a tonne (tCO_2e) of GHG?

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

- 385 litres of gasoline (about 10 fill-ups)
- $200 of natural gas (a month of winter heating)
- Enough electricity for 8.5 average BC Hydro homes for a year (93,700 kWh)

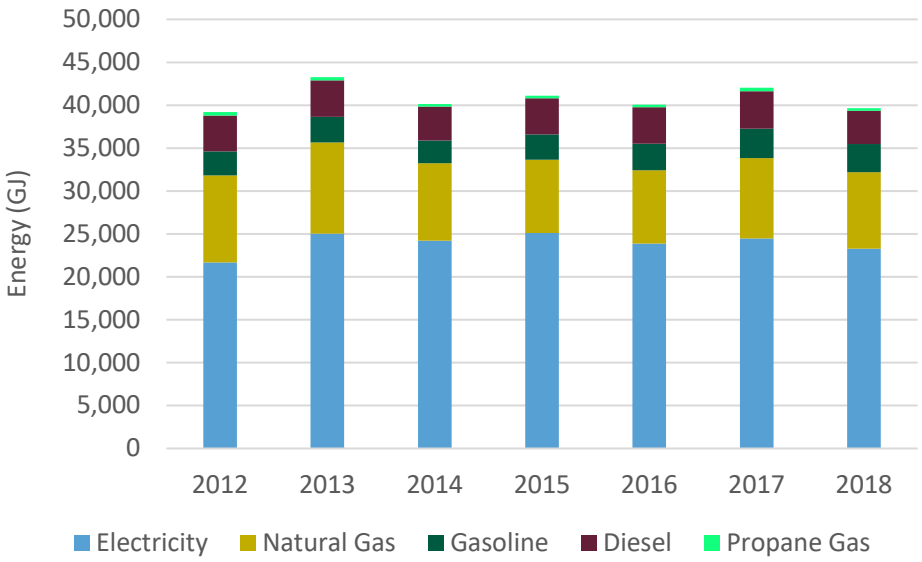
Figure 4 – District of Summerland energy consumption in GJ, by fuel in 2018



In 2018 over half of the energy consumed by the District was electricity, and over a fifth was natural gas. Diesel and gasoline made up most of the remainder, with just a small fraction of propane.

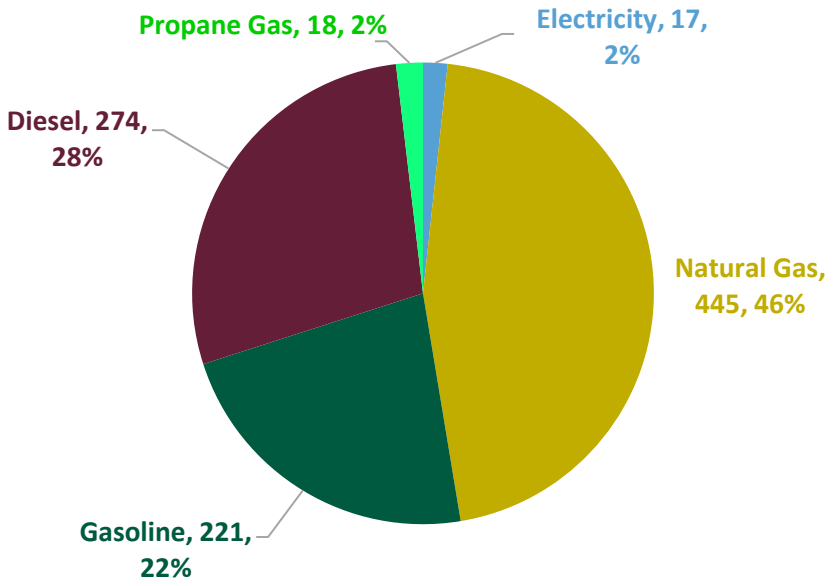
* Based on the PCP corporate inventory methodology, which includes the landfill because that is owned by the District, corporate GHG emissions were 4,131 tCO_2e, or 5%.

Figure 5 - District of Summerland energy consumption in GJ, by fuel, 2012-2018



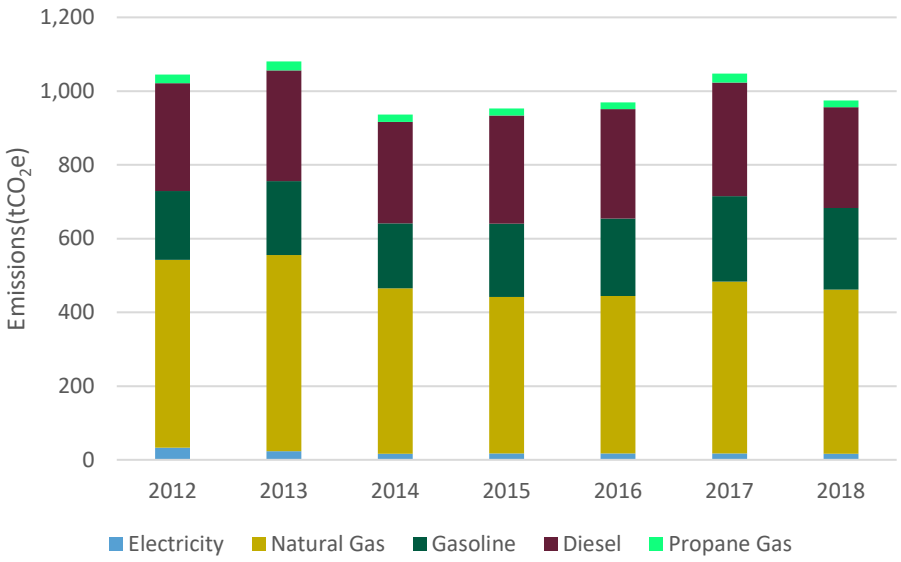
Fuel consumption in District operations has been very consistent from 2012-2018. Note that in 2019 and 2020 the results of the major streetlight retrofit should become apparent as a reduction in electricity consumption. The installation of the solar PV systems and other efficiency activities will also have an impact.

Figure 6 - District of Summerland GHG emissions in tCO_2e, by fuel, in 2018



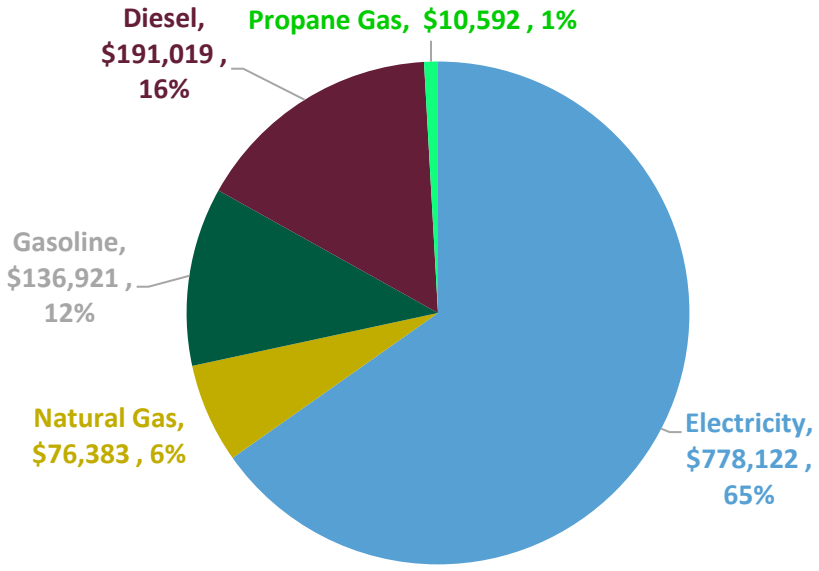
Gasoline & diesel are together responsible for about 50% of the District's 2018 corporate GHG footprint, and natural gas is responsible for 46%. In order to reduce GHG emissions, actions that tackle the consumption of these fuels should have priority.

Figure 7 - District of Summerland GHG emissions in tCO_2e, by fuel, 2012-2018



GHG emissions have been relatively consistent at around 1,000 tCO_2e since 2012. There has been a reduction in natural gas emissions as a result of a reduction in consumption (about 13% over this period), as well as a reduction in diesel emissions (6%). But these have been partially offset by an increase in gasoline emissions (18%). This increase provides an opportunity for improvement, particularly given the aging fleet's existing need of reinvestment and renewal.

Figure 8 - District of Summerland energy expenditures, by fuel, in 2018

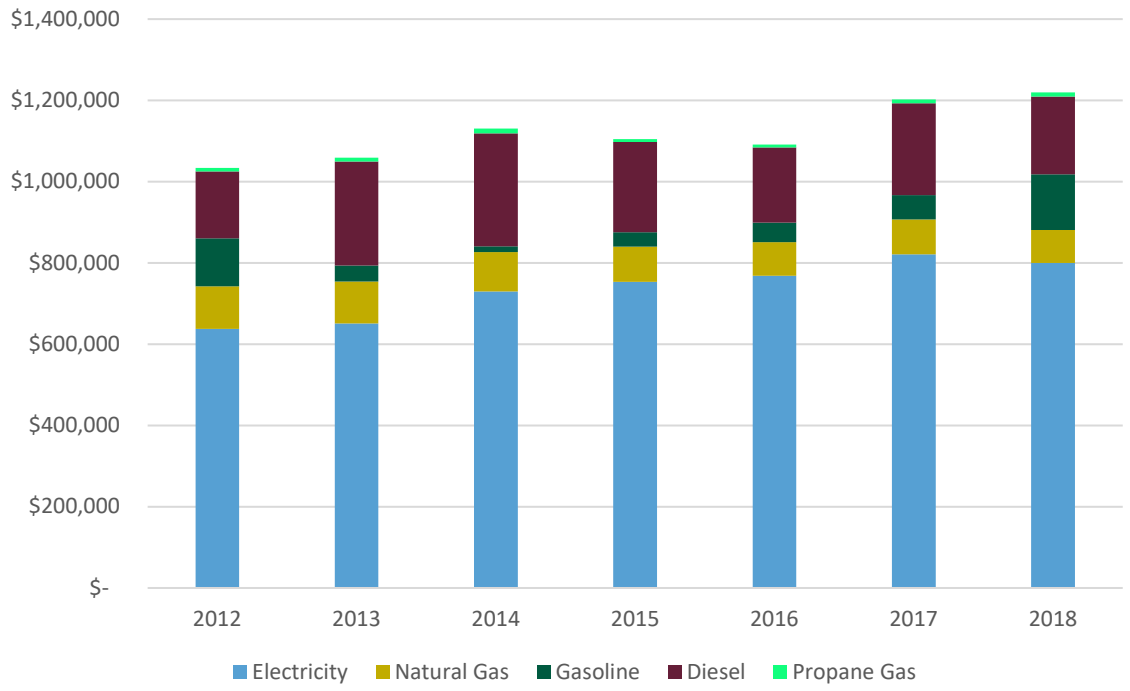


Although electricity forms a small part of the carbon footprint because it has a low GHG intensity, it accounted for the largest part of the District's energy expenditures in 2018 because it has a high cost per unit of energy.

Thus, work to reduce electricity usage is also very important as it will reduce operating costs, even though it will have a low impact on the corporate GHG footprint.

The primary mobility fuels of diesel and gasoline are the next largest part of the energy expenditures at 28%. Natural gas is relatively low at 6%.

Figure 9 - District of Summerland energy expenditures, by fuel, 2012-2018



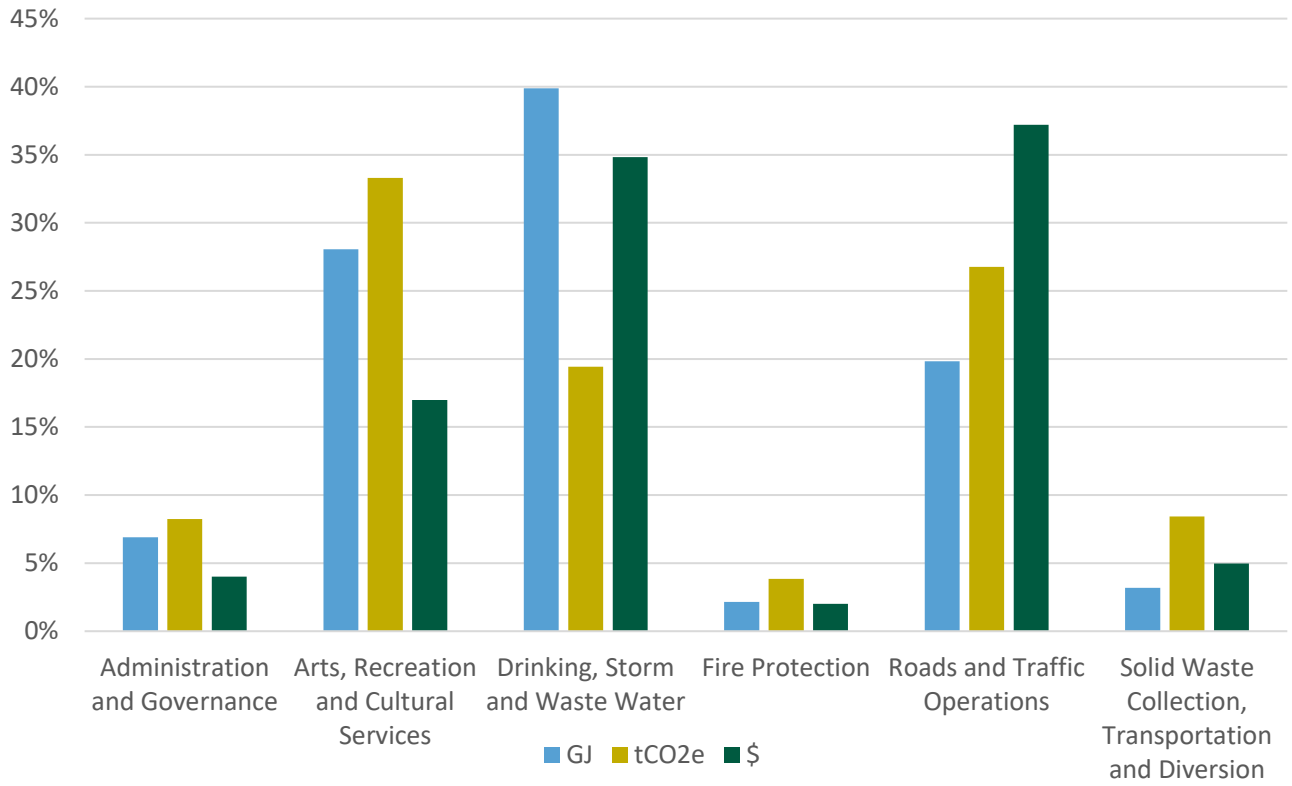
Energy costs for the District have risen about 20% from 2012 to 2018, with some fluctuations. The biggest cause for the increase by far is electricity. All forms of energy increased in expenditures from 2012-2018, with the exception of natural gas that has decreased.

Comparing Figure 5 and Figure 9, it is clear that while energy consumption has fluctuated, energy prices have steadily risen. Overall energy consumption in 2018 is about 1% more than in 2012, yet energy expenditures are about 20% more. The primary reason is that the cost per unit of energy for all forms of energy (except for natural gas) have increased. The secondary reason is that consumption of electricity has risen relative to other forms of energy (particularly at the expense of natural gas).

Rising energy costs present a risk to the District of Summerland, and need to be managed. High electricity costs in particular further emphasize the need to tackle electricity consumption through efficiency measures and the generation of local renewable electricity, despite the low GHG emission reductions.

District of Summerland fleet vehicles. Source: District of Summerland

Figure 10 - District of Summerland energy consumption, emissions, and energy expenditures by CARIP classification, in 2018



The preceding chart shows what percentage of energy consumption, GHG emissions, and energy expenditures can be attributed to each CARIP classification. Arts & recreation has the highest GHG emissions, but drinking, storm and wastewater has the highest energy expenditures. High sources of GHG emissions and energy expenditures can be readily identified.

Business As Usual Projections

Business As Usual (BAU) projections for the District's CARIP inventory are shown in this section. For projections for the PCP inventory, see Appendix C: PCP Inventory and BAU.

What does Business as Usual mean?

Business as Usual, or BAU, is a way of describing what is estimated to happen if the District does not try to reduce emissions going forward. A number of factors are taken into account, the same as with the CEERP. 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 District purchases for gasoline vehicles, in particular the Zero Emissions Vehicles mandate (same assumption as the CEERP)
    - The greening of the BC Building Code (Step Code - progressive steps towards net zero energy ready buildings by 2032)

If the District of Summerland conducts no special efficiency or conservation activities, and assuming that future changes are proportional with population increase at 0.59% per year, then the District's energy consumption and emissions are forecast to change as shown in the following charts under a Business As Usual (BAU) scenario. Energy consumption is forecast to increase by 15% from 2018 levels by 2050, and GHG emissions are forecast to decrease by 9%.

Figure 11 – District of Summerland BAU energy consumption forecast to 2050

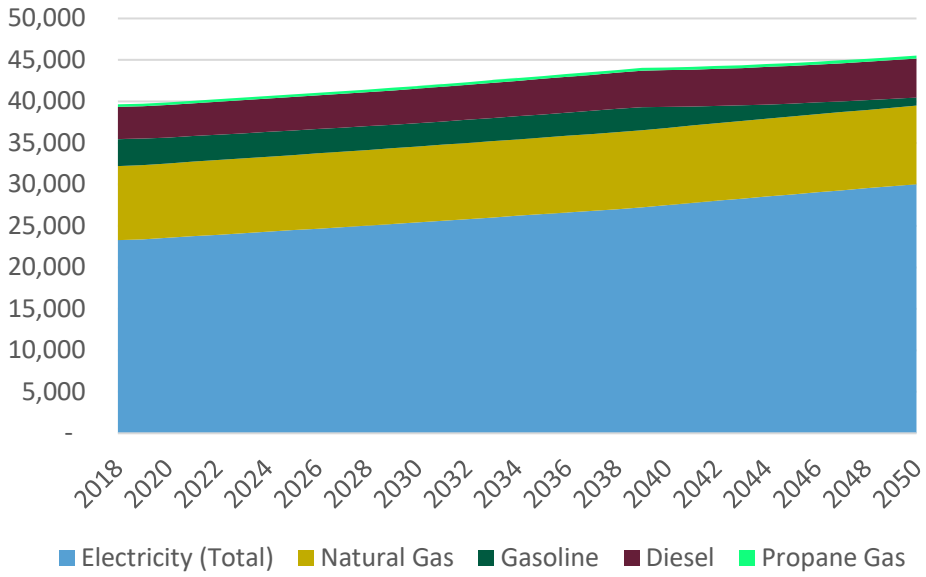
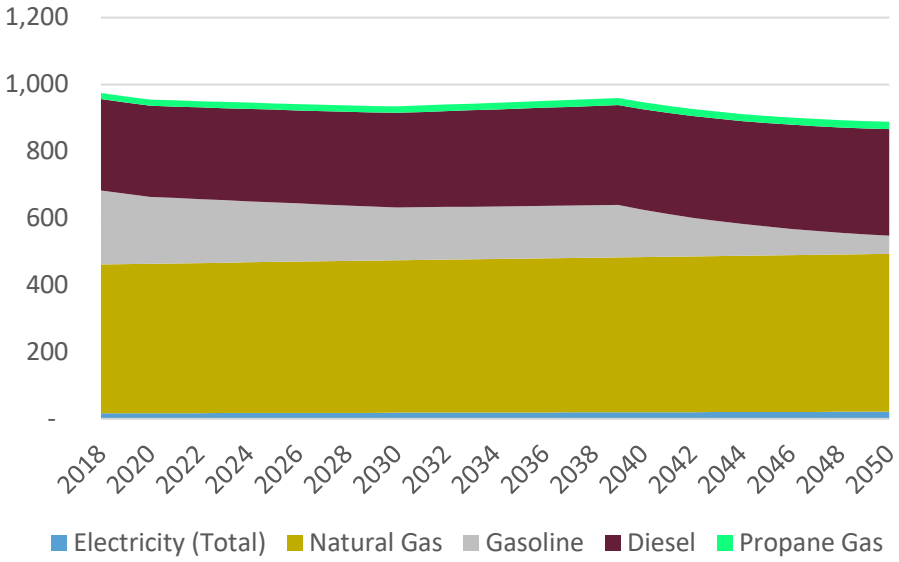


Figure 12 – District of Summerland BAU GHG emissions forecast to 2050



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 and some other factors will provide downward pressure. It would be prudent for the District to also conduct its own measures to manage its energy consumption and GHG emissions.

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

Summerland Corporate GHG Reduction Target

To achieve Corporate Milestone 2 under the PCP program, the District of Summerland has set a corporate emissions reduction target as part of this process.

In its 2015 OCP, the District does not specify a corporate GHG reduction target, but it has a community GHG reduction target of 33% below 2007 levels by 2020, and 80% by 2050. In the new CEERP, the community GHG reduction target was updated. The new corporate target was arrived at in consultation with the Corporate Climate Action Team, and it is based on the results of the building energy assessments and green fleet report. See Table 3 for both new targets.

Table 3 – New community and corporate GHG reduction targets

	New community target from CEERP, from 2007 levels	New corporate target in CEEMP, from 2012 levels
2025	18%	25%
2030 *	*30%*	*35%*
2050	80%	80%

It is not possible to select 2007 as the baseline year for the corporate GHG target as well, because there is no corporate data from that year. The most recent corporate data is from 2009 and 2010, in *Moving Towards Carbon Neutrality in Summerland / Corporate Energy and Emissions Plan and Assessments*. However this data is not being used for the baseline year in order to ensure a consistent corporate inventory methodology.†

Provincial & Federal Corporate GHG Emission Reduction Targets & Progress

The Provincial Government has been carbon neutral since 2010 through the purchase of offsets. From 2010-2018 it has reduced its corporate GHG emissions by 8.5%.

The Federal Government has set targets of a 40% reduction by 2025, and at least 90% by 2050 while also being carbon neutral with offsets. The Government also aspires towards an additional 10% reduction every 5 years from 2025. From 2005-2020 it has reduced its corporate GHG emissions by 34.6%.

* 2030 targets for the CEERP and CEEMP are milestone targets. They have not been adopted by Council, but will help to ensure that the District is on the right track.

† Note that in the 2010 Corporate report 2009 GHGs are 1,223 t CO_2e and 2010 GHGs are 1,125 t CO_2e.

What We Can Do: Recommended Climate Actions

Based on staff consultation and best practices, the following actions were identified to implement over the next five years and beyond.

Staff consultation took place in two sessions, in November 2019 and January 2020. The first session took an overview of the detailed buildings actions with a GHG scoring matrix (see Appendix E: Project Scoring Matrix), and teams of staff rated the actions. Then the SAEC took the scoring and compiled it and used that data to identify the priority buildings actions (see Appendix A: Capital Budget Work Plan for Consolidated Existing Buildings and Fleet Actions).

17.25 kW solar PV array being installed on Arts & Cultural Centre

Source: District of Summerland

These actions fall under the following six categories:

1. ***New Buildings:*** Optimizing energy performance and lowering GHG emissions in new District buildings while addressing risks and building in resilience measures.
    - Opportunities exist to build climate resilient and low GHG new buildings.
2. ***Existing Buildings and Infrastructure***: Retrofit existing District buildings and infrastructure to increase energy efficiency, reduce GHG emissions, and be resilient to the impacts of climate change. Prioritize retrofits of District buildings that can double as cooling and clean air shelters.
    - Opportunities exist to ensure that retrofits occur with consideration of future climate impacts including extreme heat, precipitation events, droughts, and air quality impacts from wildfire smoke.
3. ***Transportation*****:** Improving fuel efficiency and reducing emissions of GHG's and other pollutants from the District's fleet, and shifting how District employees commute to work.
    - Opportunities exist for the District to demonstrate best practice in Low Carbon Resilience, save money, and reduce pollution.
4. ***Renewable Energy***: Increasing the use of renewable energy that can be generated by the District.
    - An opportunity exists to consider the District's use of renewable energy as an energy security action, particularly under potential impacts of extreme weather on the macro-grid.
5. ***Adaptation***: Ensuring that the District is prepared for coming climatic changes.
    - Opportunities exist to help ensure that local government services can continue to be reliably provided during the coming changes to climate that are expected, and are able t provide additional services for community members such as cooling centres.
6. ***Other – Institutionalisation, Waste & Water***: Institutionalising the Corporate Plan, tackling Corporate waste creation and consumption, and water consumption.
    - An opportunity exists to link to water and waste management that builds the District's resilience under projected climate change.

The intersections between these actions support the overall goal for taking strong action on climate action as outlined in Summerland's OCP. However, only one action in the current OCP is specifically focused on corporate climate action (see text box).

In Table 5, all GHG and economic impacts are calculated for the year 2025. As time progresses, GHG and economic impacts for actions will increase, particularly for actions whose impacts will be cumulative, such as new buildings or electric vehicles.

Corporate Climate Change Action in OCP:

13.4.2.5 All newly constructed, municipally owned and operated buildings, shall be at least 25 percent more energy efficient than those built to Provincial building codes.

How are action impact numbers calculated?

Action impact numbers are calculated through a number of assumptions. For existing buildings, they are calculated using the buildings study and assuming that the majority of actions are implemented by 2025. For other actions educated estimates are made based on CEA's experience.

For impacts of individual actions, 2025 was selected as a specific year to calculate the impacts for. Economic impacts for actions are calculated in the same way that GHG savings are, by making estimates for energy saved, and then converting into reduced energy expenditures. Note that actions can have further reaching benefits than is included here, specifically they can be used to demonstrate leadership and hence help to implement the CEERP and realise the benefits described in that plan.

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

In Table 5, the terms refer to the following:

- Effort = staff time
- Costs = municipal costs
- GHG & economic impacts = community GHG & economic impacts
- Adaptation / resilience linkages = capacity for increased energy efficiency and enhanced co-benefit outcomes through linkages to climate adaptation / resilience. An example of a high resilience linkage is energy independence. Mild linkages to adaptation and resilience co-benefits (e.g. air quality) are orange

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.**
- **Yellow = 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.**

Table 4 – Climate actions – overview

	District GHG Savings in 2025, tCO_2e	Ongoing	0-2 yr.	3-4 yr.	5+ yr.
NB1 Commit to building energy efficient and resilient facilities and buildings	12.2			Y	
NB2 Optimise siting and orientation of new buildings	2.4			Y	
NB3 Include renewable energy in new construction & major renovations	2.8			Y	
EBI1 Complete building energy improvements identified by energy audits	107.1		Y	Y	Y
EBI2 Incorporate energy management into annual building maintenance procedures	4.4		Y		
EBI3 Conduct an LCR focused review of infrastructure, including energy assessments and climate risks	16.7		Y		
RE1 Investigate feasibility of hydroelectric project in drinking water supply	-		Y		
RE2 Investigate feasibility of anaerobic digestion at WWTP	-			Y	
T1 Implement consolidated fleet actions	51.1		Y	Y	Y
T2 Reduce emissions associated with staff commuting to work	-	Y			
A1 Assess District readiness for climate impacts	-		Y		
O1 Improve emissions reporting process	2.3			Y	
O2 Manage District water consumption	0.1			Y	
O3 Manage District waste creation	-			Y	
O4 Develop a natural asset inventory and expand the evaluation of nature-based solutions for infrastructure projects	-		Y	Y	

The District's Thirsk Reservoir Dam

Source: District of Summerland

The Emerging Area of Embodied Emissions

Accounting for embodied emissions is an increasing area of interest for communities. Generally, communities have previously been primarily interested in emissions from operations, and this follows guidance from the Province. But emissions are also created through the construction of new assets - the energy consumed in the acquisition of raw materials, their processing, manufacturing, transportation to site, and construction are called embodied emissions. Concrete and cement have particularly high embodied emissions. By including consideration of these lifecycle emissions, decisions that the District takes, e.g., favouring natural assets over engineered infrastructure, can help to reduce the impacts of District infrastructure beyond its own emissions inventory.

Table 5 – High priority climate actions

New Buildings

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
NB1: Commit to building energy efficient and resilient facilities and buildings	3-4 years	**12.2 tCO_2e**	**$26k**	**High**	**Medium**	**Medium**	Province of BC, FortisBC	Works & Infrastruture, and Development Services

The District will commit to building the most energy efficient new facilities and buildings with as low GHGs as it reasonably can, with consideration for relevant green design standards. For example, the District can commit to achieving certain metrics under the BC Energy Step Code, including GHG intensities. There are multiple benefits to doing this:

- Reducing risk by ensuring that the District assets are "future proofed" i.e., that will have low energy costs, low GHG emissions (and hence low carbon tax payments / low offset requirements), and be resilient to a changing climate (e.g., hotter and smokier summers).
- Reducing the need for buildings to be retrofitted later.
- Ensuring that the District owns and operates high quality, healthy and comfortable, low maintenance assets.
- Leading by example in the community on energy efficient building practices and disseminating that knowledge throughout the community.

Outcome: Development of specific standards for District-owned buildings as it relates to energy use, emissions, and resiliency features. This action should still be implemented on an ad-hoc basis while the standard is developed.

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
NB2: Optimise siting and orientation of new buildings	3-4 years	**2.4 tCO_2e**	**$5.2k**	**High**	**Low**	**Medium**	n/a	Works & Infrastructure, and Development Services

This action has the same co-benefits as NB1, 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. The District has already done this by linking the RCMP building so that it recovers waste heat from the arena. Proper siting for new buildings can also mitigate damage from future climate impacts such as flooding, as well as avoid emissions associated with repairing potential damages. The District will commit to doing this wherever reasonably possible.

Outcome: Development of specific standards for District-owned buildings as it relates to siting and orientation. This action should still be implemented on an ad-hoc basis while the standard is developed.

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
NB3: Include renewable energy in new construction & major renovations	3-4 years	**2.8 tCO_2e**	**$6.2k**	**High**	**Medium**	**Medium**	Province of BC, FortisBC	Works & Infrastructure, and Development Services

This action has the same co-benefits as NB1, and renewable energy features can often be installed more cost-effectively with new construction versus a retrofit on an existing building. New buildings can be designed to operate with ground-source heat pumps to ensure that they have very low GHG emissions, and with solar PV and/or hot water to help shield them from future energy price increases. The District will commit to doing this wherever reasonably possible in new District buildings and facilities, or those undergoing major renovations.

Outcome: Development of specific standards for District-owned buildings as it relates to inclusion of renewable energy systems. This action should still be implemented on an ad-hoc basis while the standard is developed.

Existing Buildings & Infrastructure

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
EBI1: Complete building energy improvements identified by energy audits	0-6 yr.	**107.1 tCO_2e**	**$136k**	**High**	**High**	**High**	Province of BC, FortisBC, FCM	SAEC, Works & Infrastructure

As part of this Corporate Energy & Emissions Management Plan project, comprehensive energy audits of all District buildings have been completed by Building Energy Solutions, with numerous energy efficiency opportunities identified. As part of this project, these have been reviewed by District staff and prioritised using a scoring matrix (see Appendix E: Project Scoring Matrix). This prioritised list of projects will be implemented over the next 6 years, should funds allow. In estimating impacts, it is assumed that all of the building actions in the capital budget work plan (Appendix A: Capital Budget Work Plan for Consolidated Existing Buildings and Fleet Actions) will be implemented.

Outcome: The prioritized list of building actions outlined in Appendix A will be fully implemented.

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
EBI2: Incorporate energy management into annual building maintenance procedures	0-2 yr.	**4.4 tCO_2e**	**$9.4k**	**Medium**	**Low**	**Low**	FortisBC	Works & Infrastructure, Corporate Services

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
- Assess condition and maintenance dates of HVAC and hot water equipment
- Assess building heat and air quality vulnerabilities from extreme heat and wildfire smoke
- Look for existing or potential risks for water damage

Outcome: An energy management checklist will be incorporated into annual building maintenance procedures.

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
EBI3: Conduct an LCR focused review of infrastructure, including energy assessments and climate risks	0-2 yr.	**16.7 tCO_2e**	**$37k**	**High**	**High**	**Medium**	Province of BC, FortisBC, FCM	SAEC

The District has conducted energy audits of its buildings. As these improvements are completed, the District can look at another major area of energy consumption and expenditures, such as the processes used in water and wastewater infrastructure, RCMP/Arena chiller loop, and landfill operations. It may be possible to identify major areas of energy and resiliency improvements, which would be planned and implemented after the review.

Reviewing the lifecycle of existing and new infrastructure under a range of projected climate change scenarios will provide substantial improvements in the resilience over the lifespan of the assets. For example, the District should update the Rainfall Intensity Duration Frequency (IDF) Curves used in infrastructure planning to ensure that future precipitation patterns are planned for when developing stormwater infrastructure.

While the assessments can begin sooner, GHG and economic impacts are limited because implementing the actions identified by this action will only start at the 5+ year mark. Over time (beyond 2025), this action should have much greater potential to reduce emissions and energy expenditures.

Outcome: Studies that look at the District's additional infrastructure and processes for LCR opportunities.

Renewable Energy

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
RE1: Investigate feasibility of hydroelectric project in drinking water supply	0-2 yr.	n/a	n/a	Medium	Medium	Medium	Province of BC, FortisBC, FCM	SAEC, Works & Infrastructure

The drinking water supply system may have the potential for the installation of a hydroelectric system to generate electricity. A number of other communities have these systems in their drinking water supply systems, e.g. Lake Country, Nakusp, Kimberley, and West Vancouver.

This action has no GHG or economic savings at present, as the first phase is to investigate the feasibility of this type of system in Summerland.

Outcome: A completed feasibility study of a hydroelectric project in Summerland's drinking water supply.

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
RE2: Investigate feasibility of anaerobic digestion at WWTP	3-4 yr.	n/a	n/a	Medium	Medium	Medium	Province of BC, FortisBC, FCM	SAEC, Works & Infrastructure

The WWTP may have the potential for the development of an anaerobic digester to produce biogas, which could then be used to either be sold into the FortisBC gas pipeline, or to be utilized to provide electricity and/or heat to be used at the plant. A number of other communities have anaerobic digester systems at their WWTPs, e.g. Prince George.

This action has no GHG or economic savings at present, as the first phase is to investigate the feasibility of this type of system in Summerland.

Outcome: A completed feasibility study of an anaerobic digester at Summerland's WWTP.

Transportation

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
T1: Implement consolidated fleet actions	0-5 yr.	**51.1 tCO_2e**	**$21k**	**Medium**	**High**	**High**	n/a	SAEC, Works & Infrastructure, Manager of Procurement

As part of this Corporate Energy & Emissions Management Plan project, a green fleet report completed by Richmond Sustainability Initiatives, with numerous opportunities identified. As part of this project, these have been reviewed by District staff and prioritised using a scoring matrix (see Appendix E: Project Scoring Matrix). The prioritized list of actions is outlined in detail in Appendix A.

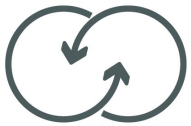
Outcome: The prioritized list of fleet actions outlined in Appendix A will be fully implemented.

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
T2: Reduce emissions associated with staff commuting to work	On-going	not in District's inventory but estimated at **4.6 tCO_2e**	not District energy $ but estimated at **$2.2k**	**Medium**	**Medium**	**Medium**	Province, FCM	Works & Infrastructure, Recreation

Emissions from staff commuting are not included within a corporate inventory, but in many cases represent a significant opportunity to show leadership in reducing overall community emissions, and can influence the wider community to do the same.

Examples of specific actions to be taken include: providing staff with the resources to work from home and conduct virtual meetings; providing amenities like bicycle racks and showering facilities; assisting with carpooling efforts; make EV charging stations and plug-ins available for EVs, e-bikes, and e-scooters; offer programs through recreation to encourage cycling or walking (such as promoting Go By Bike Week).

Outcome: Staff use of low or zero carbon methods of commuting increases (including remote work where feasible).



Climate Adaptation

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
A1: Assess District readiness for climate impacts	0-2 yr.	**n/a**	**n/a – see below**	**High**	**Medium**	**Medium**	FCM, Province of BC	Emergency Management Team, SAEC

The District should ensure that it is ready to respond to climate-related hazards such as flooding, wildfires, and extreme heat. The District can, for example, develop a Heat Alert Response System, examine opportunities to utilize District-owned buildings for cooling centres during extreme heat events, and ensure that it is prepared to respond to flooding events and drought.

Although this action will not directly save energy expenditures, it will lead to avoided costs for the District and the community.

Outcome: An assessment of the District's capacity to respond to the risks from climate change, and the development of plans to address them as well as provide services to the community in response to the risks.

Other – Institutionalisation, Waste & Water

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
O1: Improve emissions reporting process	3-4 yr.	**2.3 tCO_2e**	**$0.4k**	**Low**	**Medium**	**Medium**	n/a	SAEC

The District already provides an annual emissions management report, reviews District utility accounts to identify areas of concern, compares current energy use to records from previous years, and completes documentation of energy reduction initiatives completed each year. Despite this, there are some areas which could be potentially be improved upon.

Sub-meters could be installed in key buildings / situations, to assist with measurement and verification of the impacts of energy saving measures. Weather normalisation could also be incorporated into the emissions reporting.

Outcome: A more robust emissions reporting process with stronger ability to track KPIs and trends.

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
O2: Manage District water consumption	3-4 yr.	**0.1 tCO_2e**	**$2.9k**	**High**	**Medium**	**Low**	n/a	SAEC

While some actions under EBI1 address water reduction, the District does not currently actively manage its consumption of water. There is an opportunity to lead by example, which in turn would help with community-wide actions identified in the CEERP e.g., the District could adopt best practices in water efficient landscaping and educate the community on doing the same.

Reduction in water consumption impacts corporate GHGs and energy expenditures, however, these will be minor relative to the impacts of the entire community if the behaviour change can be replicated.

Outcome: The establishment and implementation of new processes / policies related to District water usage.

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
O3: Manage District waste creation	3-4 yr.	See note below	See note below	**Low**	**Medium**	**Low**	n/a	SAEC

The District does not currently actively manage its creation of waste. There is an opportunity to lead by example in managing waste by first reusing, then reducing, and finally by recycling. This would in turn also help with community-wide actions identified in the CEERP. For example, the District could establish a zero-waste target for itself and educate the community on doing the same, and adopt policies to encourage the reduction in printing and therefore reduce paper and ink consumption.

A reduction in GHGs is not captured by this item, because emissions within CARIP reporting do not include Corporate waste.

Outcome: The establishment and implementation of new processes / policies on District waste creation.

Action	Timing	GHG Impacts	Economic Impacts	Adaptation / Resilience Linkages	Effort	Cost	Possible Partner/ Funder	Staff Responsibility
O4: Develop a natural asset inventory and expand the evaluation of nature-based solutions for infrastructure projects	0-4 yr.	See note below	See note below	**High**	**Medium**	**Medium**	Province of BC, FCM, Municipal Natural Assets Initiative, CEA	SAEC

The District's asset management approach and policy includes a call to make advances in integrating natural assets into asset management. The District's project prioritization framework includes optional fields related to natural assets as an option, but this could be greatly expanded and further integrated into infrastructure planning and renewal.

The valuation and preservation of natural assets has the potential to realise great cost savings / taxpayer benefits, reductions in embodied carbon emissions, ongoing carbon sequestration, ecological benefits such as habitat preservation, and adaptation / resilience benefits such as reduction in flooding and landslide risks. Natural assets could be restored and strengthened to ensure that they are more likely to adapt to the effects of a warming client and help buffer the impacts. Examples include watershed protection by maintaining natural habitat in the watershed, managing flooding risk by preserving wetlands, and urban forests that provide shade, moderate the air temperature, and improve air quality.

The GHG impacts and economic impacts are too difficult to estimate until an inventory is conducted. Avoided emissions and avoided costs are expected to be substantial.

Outcome: A natural asset inventory is completed, and the feasibility of nature-based solutions for infrastructure projects continues is expanded within the District's project prioritization framework.

Electrical Division vehicle. Source: District of Summerland

What We Can Achieve

Modelling Climate Actions

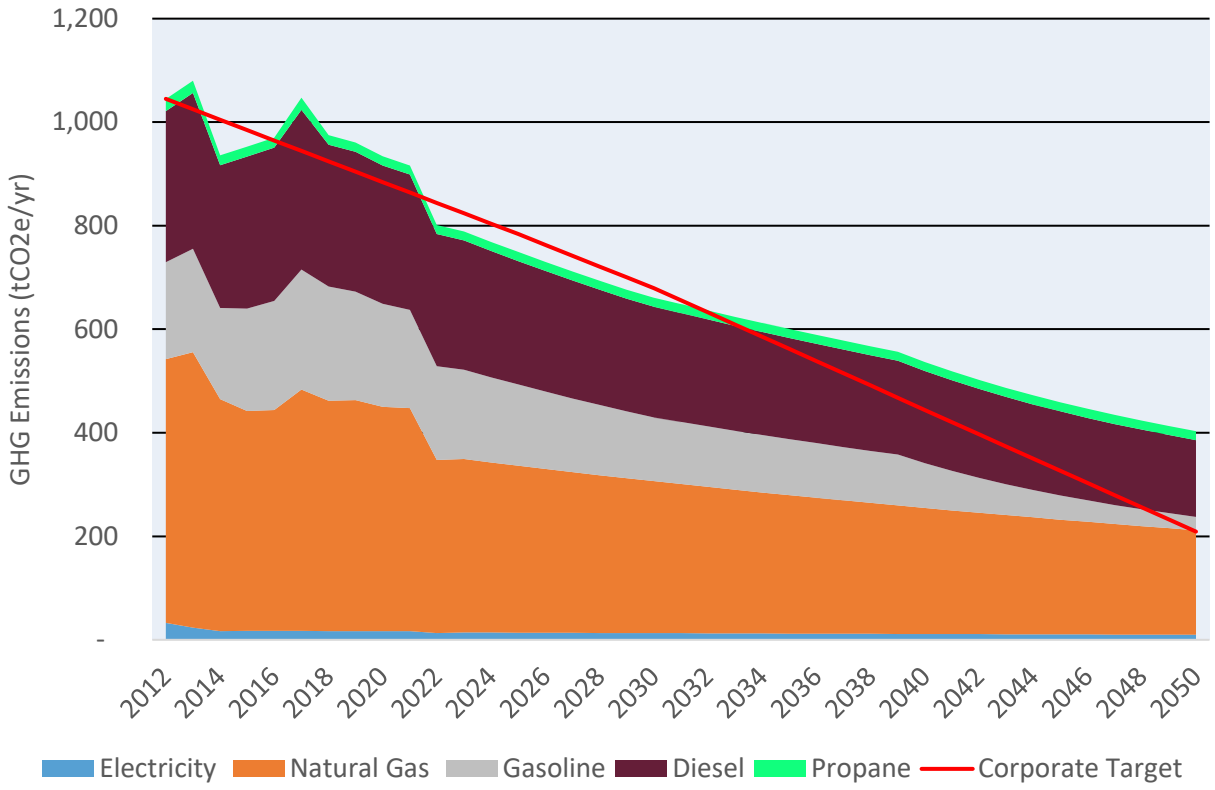
The priority climate actions were modelled to estimate the potential GHG emission reductions by fuel and by implementing the various prioritized actions. More detail on the modelling is in Appendix D: Inventory and Modelling Assumptions.

As shown in Figure 13, total emissions are expected to decline by the following percentages below 2012 emissions:

- 29% by 2025
- 37% by 2030
- 60% by 2050

As such, it should be possible to achieve the corporate target for 2025. For 2030 and 2050, additional planning work and actions will be necessary. Again, it is important to consider the overall projected risks and vulnerabilities in the community in order to advance some of these actions in a way that reduces emissions and builds the District's overall resilience over time.

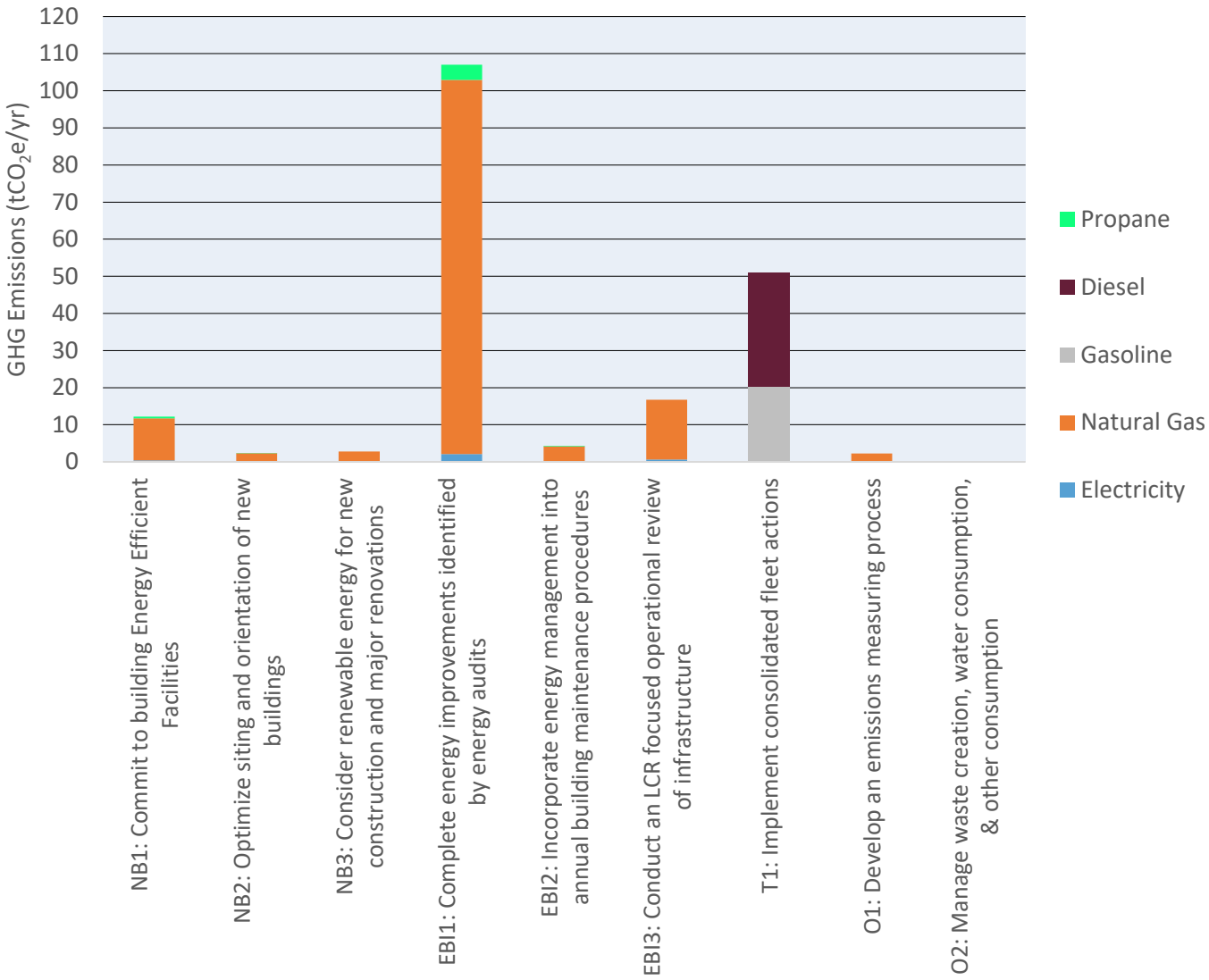
Figure 13 – District of Summerland's modelled GHG emissions from proposed climate actions by fuel



As depicted in Figure 14, the top two actions that will achieve the largest reductions in GHG emissions over the next six years, by a considerable margin, are:

- EBI1: Complete energy improvements identified by energy audits
- T1: Implement consolidated fleet actions

Figure 14 – GHG emissions savings by action, in 2025



Action impacts can also be represented in terms of how much each action category will contribute towards the 2025 emissions target. This information is shown in Figure 15.

EBI1, the single most impactful action in the CEEMP, is the action that has been most comprehensively costed. It is expected to save $136,000 per year (at current energy prices) when implemented. To implement it, from 2021 to 2026 the District should budget about $1.2 million, approximately $790,000 of which is incremental (costs above what would need to be incurred anyway for replacing assets). For more information, see Appendix A: Capital Budget Work Plan for Consolidated Existing Buildings and Fleet Actions. This gives a payback of 5.8 years on this action. The District's Climate Action Reserve Fund can support paying these incremental costs. If external funding is obtained, as it has been in the past, the capital costs and payback will reduce.

Figure 15 – GHG emissions reductions from each action category in 2025

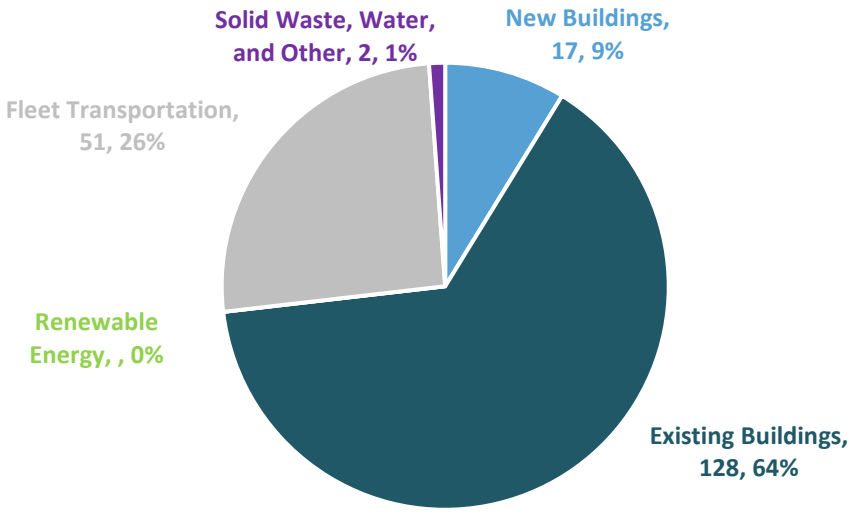
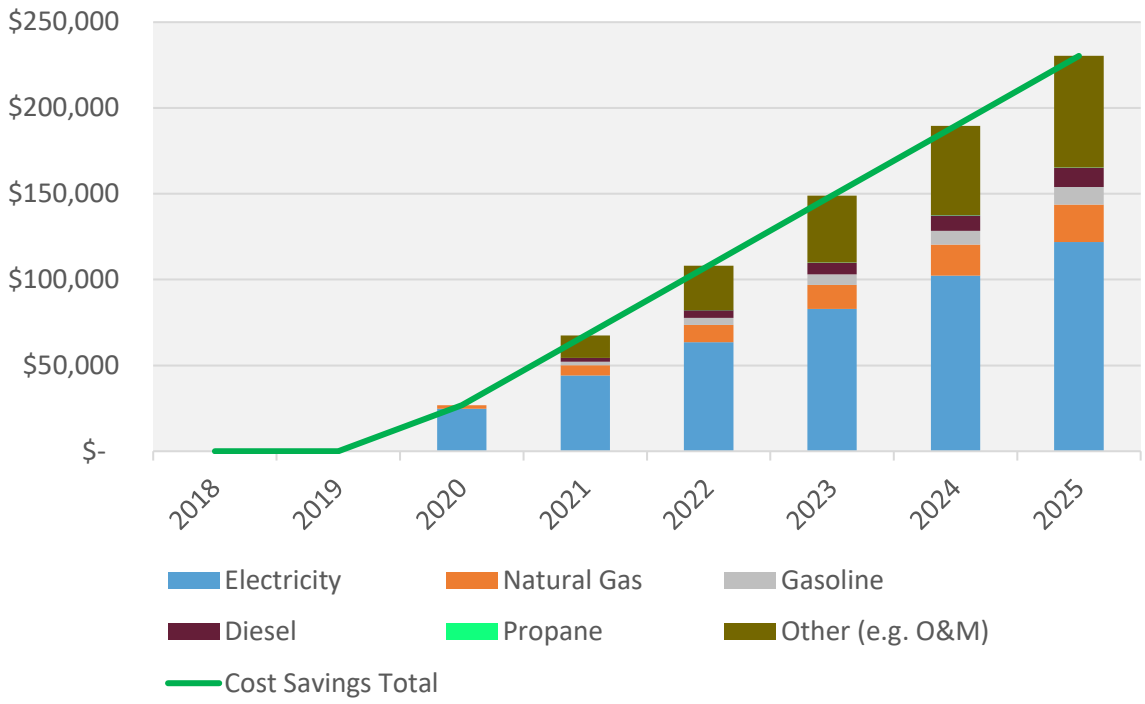


Figure 16 – Plan cost savings



In addition to reducing emissions, the planned climate actions will lower energy expenditures compared to BAU levels, as illustrated in Figure 16. The Plan is expected to save $230,000 a year in corporate energy-related costs (including O&M savings) by 2025, just over 50% of which will be from electricity savings.

Implementation for Success

As also highlighted in the CEERP, there are 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.[*] Among others, they include establishing broad support for implementation, building staff and financial capacity for implementation, and institutionalizing the plan in order to withstand political and staff turnover.

The District of Summerland is fortunate to already have political, staff, and community / stakeholder support for climate action. It also has a dedicated staff position, the SAEC, to implement actions, a policy on funding GHG emissions reductions, and the District has already begun to institutionalize climate action. However, the District would benefit from further integrating climate action across the corporation and community.

Funding sources that communities typically use for climate action are shown in Table 6. The District has taken great strides to fund climate action by setting aside 0.001% of the annual operating budget in addition to its annual Climate Action Revenue Incentive Program (CARIP) rebate, and also has a green revolving fund for corporate projects; however, external funding sources should be pursued where available to accelerate action. The internal funding sources that the District has set aside can be used to leverage external funding to great effect.

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

Internal Funding Sources	External Funding Sources
1. CARIP rebate allocated for climate action 2. Allocation from operating budget (Summerland allocates 0.001% annually) 3. Climate/carbon fund (Summerland has a climate action reserve and a green revolving fund for corporate actions) 4. General revenue (e.g. property taxes) 5. Recycling and solid waste user fees 6. Building permit fees and other service fees charged by Development Services 7. Electrical utility and water user fees	1. UBCM Gas Tax Agreement Funds 2. FCM's Green Municipal Fund supports plans, studies, capital projects and pilot projects for environmental initiatives in a number of focus areas 3. Southern Interior Development Trust grants for community economic and educational initiatives in nine economic sectors 4. Federal government programs such as the Low Carbon Economy Challenge and Clean Energy Innovation Program 5. Provincial government programs such as the Clean Energy Vehicle Program and CleanBC Communities Fund

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

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

The District already:

- Incorporates climate action into some documents like the OCP and Asset Management Strategy.
- Convenes a Corporate Climate Action Team.
- Has a dedicated staff position working on climate action, the SAEC, who will be the owner of this plan.
- Dedicates funds to climate action annually as part of the operating budget and maintains a reserve fund for climate action projects.
- Reports annually on climate action to Council as part of the CARIP reporting.
- Has joined PCP, and progressed through some milestones.
- Renews its plan, as this is a renewal of the older plan.

In addition to these actions, the District should consider:

- Discussing climate action implications in all reports to Council.
- Incorporating climate action into job descriptions of other District staff. Climate action is the responsibility of all departments, and there is greater chance of success if responsibility is formally shared.
- Monitoring indicators that are easy to track to help ensure that progress is being made.
- Reporting on indicators as part of an annual report to Council.
- Progressing through more PCP milestones.
- Renewing this plan again in five years.

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

Incorporate	Embed climate action into other planning documents such as the OCP, bylaws and policies, and departmental/master plans. Climate action could also be incorporated into District staff job descriptions. Some communities report on climate action or sustainability implications in reports to Council.
Budget	Embed climate action into the budgeting process.
Monitor	Establish and monitor KPIs.
Convene	Host regular meetings to discuss implementation with internal and/or external stakeholders.
Report	Report regularly to Council on progress and accomplishments. Annual reporting is recommended. It can be integrated with CARIP reporting.
Renew	Prepare for plan renewal approximately every five years.

Monitoring and Evaluation

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

Suggested indicators are shown in Table 8. Two types of indicators are recommended. Primary indicators measure corporate energy consumption and GHG emissions, while secondary indicators can quantify the indirect success of various actions.

Unlike the community plan, the primary indicators of energy consumption, emissions, and energy expenditures can be relatively easily and accurately tracked. These are the determinants of success. But the secondary indicators can still play a useful role as their increase helps with the primary indicators.

The following table provides a description of these indicators, the measures of success, and data sources for each indicator. Annual progress reporting should be planned by the SAEC.

Table 8 – Examples of Ways Summerland Can Monitor and Evaluate Corporate Climate Action Progress

	Indicators	Measures of Success	Data Sources
Overall	1. Corporate GHG emissions and energy consumption	Reducing corporate GHG emissions and energy consumed (GJ)	CGRT
Financial	2. $ value of incentives received for implementing the CEEMP	Steady level of incentive use, as available from outside sources, e.g. for plans, studies, assessments, capital purchases, etc.	Finance
Buildings & Infrastructure	3. # of new buildings or facilities with energy efficiency features or renewable energy systems	Majority of new buildings or facilities include energy efficiency features or renewable energy systems	Works & Infrastructure
	4. # of energy efficiency upgrades conducted on corporate buildings each year	Steady progress in implementing energy efficiency upgrades	Works & Infrastructure
Renewable Energy	5. # total installed capacity of renewable energy systems	Total capacity of renewable energy systems across District-owned buildings and infrastructure is increasing	Electrical Utility
Fleet	6. # and % of vehicles in fleet that are electric, hybrid, or use other alternative fuels	Increase in number and %	Works & Infrastructure
Waste	7. Tonnes and % of corporate solid waste diverted from landfill	Reduction in corporate waste to landfill	Works & Infrastructure
Water	8. Water consumption	Decline in corporate water use, particularly reducing the “summer bump” which is due to vegetation	Usage data on water meters

	Indicators	Measures of Success	Data Sources
Education	9. Capacity and knowledge of District staff	# of staff who have attended training / educational events on energy sustainability / climate change	Department heads

Appendix A: Capital Budget Work Plan for Consolidated Existing Buildings and Fleet Actions

This appendix contains a 6-year capital budget work plan for the two biggest GHG reducing actions in the CEEMP:

- EBI1: Complete energy improvements identified by energy audits
- T1: Implement consolidated fleet actions

Building / Category	ECM # / Action #	Description	GHG Emission Savings (Tonnes e-CO2/yr)	Total Savings -Energy, O&M, CO2 ($/yr)	Total Estimated Actual Cost (capital, install, design, Incentives) ($)	Total Incremental Estimated Cost (capital, install, design, incentives) ($)	Notes
2021							
Buildings							
Aquatic Centre Arena Arts Centre Day Care Electrical Warehouse Fire Hall Municipal Hall Museum RCMP Works & Infrastructure WTP WWTP	L1-5 L1-8 L1-7 L1-5 L1-7 L1-4 L1-8 L1-8 L1-7 L1-11 L1-5 L1-9	Lighting	0.1	$50,393	$218,499	$218,499	• Budgeted for design and planning to begin in 2021 (carry-over from 2020), with installation in early 2022 • Some replacements have already started as part of building maintenance efforts
Municipal Hall	M5-10	Re-Commission Programmable Thermostats (all)	8.2	$1,931	$1,500	$1,500	• To be completed as part of HVAC system upgrade 2021 • Repeat following major HVAC redesign/upgrade (after space planning complete)
Museum	M4	Install Programmable Thermostats to Control Heating and Cooling Systems and Implement Schedule to Reflect Actual Occupancy	1.2	$203	$600	$600	• Included in 2021 rooftop unit project (Museum M6)
Museum	M6	Replace Existing Gas Fired Roof Top Units with Hybrid High Efficiency Air Source Heat Pump Make Up Air Units Complete with Gas Fired Back-Up	8.2	$1,377	$82,500	$10,500	• Budgeted for in 2021 (carry-over from 2020)
Works & Infrastructure	M4	Interlock the Unit Heaters with the External Roller Shutter Door complete with Notification Alarm (Flush Truck Bay, Mechanics Bay)	4.6	$964	$4,400	$4,400	• To be completed as part of HVAC system upgrade 2021
WWTP	M6	Install Variable Frequency Drives to Glycol Pumps serving Air Handling Units (Process Building)	3.5	$1,281	$11,100	$11,100	• Budgeted for in 2021 (carry-over from 2020)
Fleet							
Management	GF3	Dedicate additional resources to overseeing and managing the fleet system					• Currently fleet management is shared amongst staff, and sits amidst several competing priorities • Grants may be available to support in short-term; longer-term investment is needed to achieve meaningful results
Management	GF4	Right-size fleet vehicles for the tasks they are intended to perform					• Vehicle performance and staff duties must match • Reconsider current system of handing-down vehicles • Combine with GF5, GF6, GF14

Building / Category	ECM # / Action #	Description	GHG Emission Savings (Tonnes e-CO2/yr)	Total Savings -Energy, O&M, CO2 ($/yr)	Total Estimated Actual Cost (capital, install, design, Incentives) ($)	Total Incremental Estimated Cost (capital, install, design, incentives) ($)	Notes
Management	GF5	Identify units that are underutilized & explore actions to dispose of, more fully utilize and/or find alternate means of getting the job done					• Smart car is under used and has safety concerns • No spare vehicle at Works Yard identified as a challenge • Combine with GF4, GF6, GF14
Management	GF6	Complete a unit-by-unit assessment of the fleet to determine a 5-year capital plan for vehicle replacement					• Savings in operations but may be capital expense increase • Consider leasing as a short-term option to assist with renewal • Combine with GF4, GF5, GF14
Procurement	GF14	Consider and prioritize battery-electric and other zero-emission vehicles and equipment where available and practical					• Infrastructure needs to be closely assessed before purchase • Initial purchase cost may be high. High operational cost savings. • Current fleet consists primarily of pickup trucks. EV trucks not likely readily available for small municipalities for several years. • Combine with GF4, GF5, GF6
2022							
Buildings							
Aquatic Centre	M2	Install Thermal Insulation to Exposed Domestic Hot Water Pipework	1.3	$218	$688	$688	• Combine with boiler upgrade (Aquatic Centre M10) • Asbestos may be an issue
Aquatic Centre	M9	Install Timer Controls to Sauna	0.0	$1,133	$1,500	$1,500	• Quick payback on electrical cost savings (<1.5 years)
Aquatic Centre	M10	Install a New Cascading High Efficiency Condensing Boiler System for Normal Heating and DHW Load	18.5	$3,509	$103,636	$13,636	• Priority as current boiler has reached end of life; has problems with high O&M costs and risk of failure • New unit could be removed, kept and used in future facility • Bring together with other projects (Aquatic Centre M2)
Arena Arts Centre Day Care Electrical Warehouse Fire Hall Municipal Hall Museum RCMP Works & Infrastructure WTP WWTP	M3 M3 M3 M2 M2 M2 M2 M4 M2 M1 M3	Repair/Replace Door Seals	7.7	$1,469	$7,050	$7,050	• See actions for individual buildings in individual ASHRAE reports
Municipal Hall	M13	Replace Standard Efficiency Furnaces (F-1 & F-2) in the Basement with New High Efficiency Condensing Furnaces	0.3	$655	$32,900	$4,300	• Nearing/past end of life
WWTP	M4	Retro-commissioning & Perform Boiler Control Optimisation	4.8	$1,333	$5,500	$5,500	• In-house project • Consider a night time set back also
Fleet							
Management	GF2	Implement use of an automated fleet management software system					• Support amongst staff • Provides time and financial savings; may be an annual licensing fee • Vendor must provide complete set up, as internal capacity limited
Practices	GF12	Re-evaluate Electric Vehicle Charging Stations needs for fleet and staff vehicles					• As more EVs come into fleet, infrastructure needs will change • Two Level 2 charging stations to be installed at Works Yard in 2021 • Level 2 stations available at Municipal Hall (open to public)

Building / Category	ECM # / Action #	Description	GHG Emission Savings (Tonnes e-CO2/yr)	Total Savings -Energy, O&M, CO2 ($/yr)	Total Estimated Actual Cost (capital, install, design, Incentives) ($)	Total Incremental Estimated Cost (capital, install, design, incentives) ($)	Notes
Procurement	GF15	Consider the use of renewable fuels including higher blends of biodiesel and ethanol where available					• Using E5 currently; up to E85 available • Implementation may be long-term process to first upgrade fleet & ensure fuel is available for all vehicles at all times • Presently, biofuels have small premium cost • May help address safety concerns with current fueling station also • Combine with GF16
Procurement	GF16	Consider fuel supply contracts that lock in a fixed price for a given period					• May be ability to leverage municipal buying groups and/or work with regional partner fleets • Combine with GF15
2023							
Buildings							
Arena	M2	Install Thermal Insulation to Exposed Domestic Hot Water Pipework (Entire Facility)	0.4	$70	$450	$450	• Combine with Arena M10
Arena	M10	Replace Existing Standard Efficiency Gas Fired Air Handling Unit with a High Efficiency Condensing Air Handling Unit (Curling Club)	1.6	$763	$39,300	$6,300	• Combine with Arena M2
Electrical Warehouse	M3	Interlock the Unit Heaters with the External Roller Shutter Door complete with Notification Alarm	1.5	$513	$5,200	$5,200	• Explore completing same task in carpenter's shop and flush truck bay at same time
WTP	M4	Re-commission DDC System and Air Balancing to ensure proper air flow to each room; update sequence of operations to include OAT reset schedule and optimum start/stop; and incorporate additional equipment schedules for individual equipment and zones.	0.0	$1,336	$4,500	$4,500	• Good payback on electrical cost savings (<3.5 years)
WWTP	M5	Install Smart Learning Thermostats to Control Electric Baseboard Heating and Implement New Schedule to Reflect Actual Occupancy (Administration Building)	0.0	$352	$1,050	$1,050	• Combine with WWTP M7
WWTP	M7	Replace Existing Gas-Fired Make-up Air Unit with High Efficiency Condensing Gas-Fired Make-up Air Unit (Administration Building)	0.5	$634	$49,000	$1,400	• Past end of life • Combine with WWTP M5
Fleet							
Finance	GF1	Review the depreciation & charge-out rates and system used to re-invest in the fleet					• Currently not saving enough and not enough going into reserve • Some vehicle kms not tracked, and done inconsistently in others • Should be reviewed regularly (3-5 years)
Renewal	GF17	Review and update vehicle retention cycles					• Sets stage for ongoing practice • Combine with GF6
Safety	GF20	Obtain and review driver reviews / abstracts with annual insurance renewal					
Training	GF24	Provide fleet management training for fleet management staff and mechanics					
Training	GF25	Develop a driver's handbook for all District employees who use fleet vehicles					• Include practices, procedures, and vehicle related policies

Building / Category	ECM # / Action #	Description	GHG Emission Savings (Tonnes e-CO2/yr)	Total Savings -Energy, O&M, CO2 ($/yr)	Total Estimated Actual Cost (capital, install, design, Incentives) ($)	Total Incremental Estimated Cost (capital, install, design, incentives) ($)	Notes
2024							
Buildings							
Fire Hall	M3	Vending Machine Energy Miser Retrofit	0.0	$81	$155	$155	
Aquatic Centre Municipal Hall Works & Infrastructure	M7 M3 M3	PlugMiser Retrofit to Computer Monitors	0.0	$1,514	$4,819	$4,819	
Arts Centre	M5	PlugMiser Retrofit to Electric Appliances	0.0	$52	$250	$250	• Work with tenant to implement
Day Care	M2	Install Thermal Insulation to Exposed Domestic Hot Water Pipework	0.1	$11	$60	$60	• Consider doing in-house • Combine with Day Care M5
Day Care	M4	Install Smart Learning Thermostats to Control Heating and Cooling Systems and Implement New Schedule to Reflect Actual Occupancy	1.1	$221	$600	$600	• Work with tenant to implement
Day Care	M5	Replace Existing Gas Fired Water Heater with Heat Pump Water Heater	0.7	$882	$14,020	$2,575	• Location, condensation and ducting to be considered
Day Care	M6	Replace Existing Forced Air Furnace Unit with High Efficiency Air Source Low Ambient Heat Pump Unit	10.0	$2,281	$24,900	$15,400	
Fire Hall	M6	Install New High Efficiency Condensing Unit Heaters	2.0	$741	$13,038	$3,838	
WTP	M2	Install roller door interlocks with HVAC equipment on lower floor	0.0	$433	$2,600	$2,600	
Fleet							
Procurement	GF13	Review and update vehicle standardization practices					• Started in 2020 with new procurement policy • Detailed vehicle specifications being applied to purchases (e.g., idling reduction technology, battery backups, LED lights) should be documented and reviewed regularly
Training	GF22	Invest in commercial driver training for all employees expected to drive the District's vehicles as part of their job description					• Introduce incentives for fuel efficient driving behaviour (i.e., idle free, slower speeds)
Training	GF23	Increase education and enforcement of the existing corporate anti-idling policy					• Consider enforcement and oversight

Building / Category	ECM # / Action #	Description	GHG Emission Savings (Tonnes e-CO2/yr)	Total Savings -Energy, O&M, CO2 ($/yr)	Total Estimated Actual Cost (capital, install, design, Incentives) ($)	Total Incremental Estimated Cost (capital, install, design, incentives) ($)	Notes
2025							
Buildings							
Aquatic Centre Arena (entire facility) Arts Centre Day Care Electrical Warehouse Fire Hall Municipal Hall Museum Works & Infrastructure WWTP (administration building)	M1 M1 M1 M1 M1 M1 M1 M1 M1 M1	Install Aerators on Existing Plumbing Fixtures	4.8	$1,041	$3,234	$3,234	
Arena Day Care Electrical Warehouse Fire Hall Municipal Hall (additional system) Museum RCMP WTP WWTP	M11 M7 M6 M8 M14 M5 M11 M5 M11	Installation of Solar Photovoltaic system	0.0	$37,543	$269,506	$244,494	
Arena	M6	Install Occupancy-Based Control to Changing Room HVAC System	0.0	$543	$4,400	$4,400	• Consider coordinating timing with Arena M7
Arena Arts Centre Fire Hall Municipal Hall Works & Infrastructure	M7 M6 M5 M4 M6	Installation of Wireless Controls System complete with remote access and fault detection	17.6	$10,123	$98,500	$98,500	
Fire Hall	M4	Install a Demand Control Ventilation System (Occupancy Control) to Roof Top Unit	1.7	$666	$6,900	$6,900	
RCMP	M6	Install a Variable Speed Drive to Heating Supply Pumps	2.0	$886	$10,500	$10,500	• Combine with RCMP M1
Works & Infrastructure	M7	Install New High Efficiency Condensing Unit Heaters (UH-1, UH-2, UH-3)	0.9	$759	$19,775	$4,025	• Nearing end of life.
Works & Infrastructure	M8	Install New High Efficiency Radiant Heaters	0.8	$639	$10,100	$2,550	• Nearing end of life.

Building / Category	ECM # / Action #	Description	GHG Emission Savings (Tonnes e-CO2/yr)	Total Savings -Energy, O&M, CO2 ($/yr)	Total Estimated Actual Cost (capital, install, design, Incentives) ($)	Total Incremental Estimated Cost (capital, install, design, incentives) ($)	Notes
Fleet							
Metrics	GF7	Implement fleet performance-related goals and targets					• Process for administering and measuring needs to be determined • Currently do not have baseline data to begin tracking
Metrics	GF8	Consider employee awards related to fleet performance-related goals and targets					
Metrics	GF9	Communicate the fleet's successes internally as well as publicly					• Could use newsletter
Practices	GF26	Encourage carpooling where possible					• No guidelines at present • Include practice in handbook
2026							
Buildings							
Arena RCMP	M4 M5	DHWR Pump Thermostat Retrofit	0.0	$311	$2,000	$2,000	• For Arena, consider coordinating timing with Arena M8 • For RCMP, combine with RCMP M6
Arena	M5	Low E Ceiling retrofit in the Curling Club	0.1	$2,402	$38,000	$38,000	
Arena	M8	Programmable Thermostat Retrofit (Bleacher Heater)	0.8	$132	$750	$750	
Arts Centre RCMP WWTP (Administration & Process Building)	M2 M3 M2	Install Thermal Insulation to Exposed Hot Water Pipework	0.7	$126	$720	$720	• For Arts Centre, consider doing in-house
RCMP	M2	Reschedule Existing Electrical Resistance Heaters to Reflect Actual Occupancy in the Space	0.0	$244	$850	$850	• Review after retro-commission
RCMP	M7	Review and Re-set Room Temperature and Airflow Setpoint Schedules to Provide Setbacks and Reduced Over Pressurization Between Cells and Administration Areas	0.4	$1,985	$5,500	$5,500	• Review after retro-commission
RCMP	M8	Review and Adjust Equipment Sequence of Operations. Pump P-7 operates 24/7, However, the Heat Pump which it Serves has Never Operated Since the Building was Constructed. This Pump Also Needs to be Replaced.	0.0	$515	$250	$250	• May need to happen sooner as pump needs replacing • Review after retro-commission
RCMP	M9	Review Scheduling of Exhaust Fan (EF-2). This was Operating Unnecessarily During the Audit.	0.0	$126	$100	$100	• Review after retro-commission
RCMP	M10	Install New High Efficiency Condensing Unit Heaters (Car Bay)	0.2	$534	$12,288	$2,388	• Nearing end of life
Works & Infrastructure	M5	Install a Variable Speed Drive to the Air Compressor	0.0	$710	$5,000	$5,000	
WTP	M3	Install Variable Frequency Drive (VFD) Retrofit to Domestic Cold Water Booster Pumps	0.0	$710	$10,000	$10,000	
WWTP	M8	Replace Existing Electric Block Heater with Heat Pump Block Heater on Back-up Generator (Process Building)	0.0	$1,304	$16,900	$16,900	

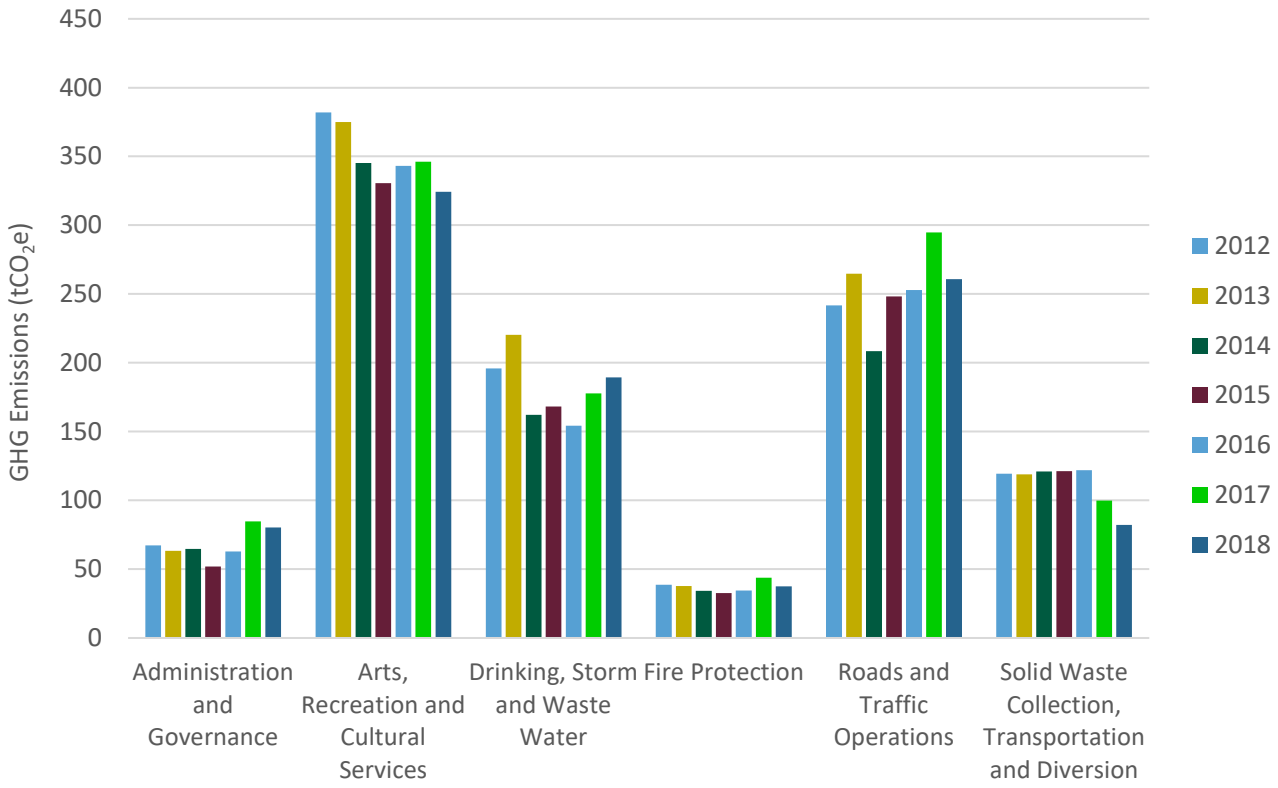
Building / Category	ECM # / Action #	Description	GHG Emission Savings (Tonnes e-CO2/yr)	Total Savings -Energy, O&M, CO2 ($/yr)	Total Estimated Actual Cost (capital, install, design, Incentives) ($)	Total Incremental Estimated Cost (capital, install, design, incentives) ($)	Notes
Fleet							
Metrics	GF27	Add telemetrics to fleet vehicles					• Telemetrics support fuel efficient driving habits (lower speeds, less idling)
Practices	GF28	Utilize used oil burner to heat shop in winter rather than dispose of waste oil					• Cost/benefit analysis of payment for oil vs. heating costs & GHG impact should be completed
Practices	GF10	Ensure wash water and chemicals cannot potentially drain into the ground water					• No direct emission savings, but co-benefits • If this practice leads to contaminated land, financial savings ensue through prevention of potential site clean up
Practices	GF11	Eliminate potentially toxic products used in the fleet garage					• Already started • Cost is comparable and saves in reduced disposal fees
Safety	GF21	Review current preventative maintenance programs and practices to ensure effectiveness and legislative compliance					• Third-party currently completes safety inspections • Associated opportunities, risks, co-benefits should be considered

Appendix B: Further Details on CARIP Inventory

This appendix contains further details on the CARIP inventory for the District of Summerland.

The following figure shows the fluctuations in GHG emissions over the inventory years for each CARIP classification. There are a number of interesting trends, in particular the decrease in emissions from arts & recreation, and solid waste collection etc., and increases from administration & governance and roads & traffic.

Figure 17 – Emissions by CARIP classification, 2012-2018



Summerland's assets fit in to the CARIP categories as follows:

- Administration and Governance
  - Electrical Warehouse
  - Yards Office
  - Fleet vehicles (a portion)
- Arts, Recreation and Cultural Services
  - Aquatic Centre
  - Arena
  - Arts Centre
  - Campsite
  - Kiosks
  - Museum

    - Parks
    - Rodeo Grounds
    - Fleet vehicles (a portion)
- Drinking, Storm and Waste Water
    - Chlorinators
    - Lift stations
    - Pumphouses
    - Waste water Treatment Plant
    - Water Treatment Plant
    - Fleet vehicles (a portion)
- Fire Protection
    - Fire Department Training Grounds
    - Firehall
    - Fleet vehicles (a portion)
- Roads and Traffic Operations
    - Streetlights
    - Fleet vehicles (a portion)
- Solid Waste Collection, Transportation and Diversion
    - Municipal landfill energy consumption
    - Weigh scales
    - Fleet vehicles (a portion)
    - BFI Canada solid waste vehicles – contracted

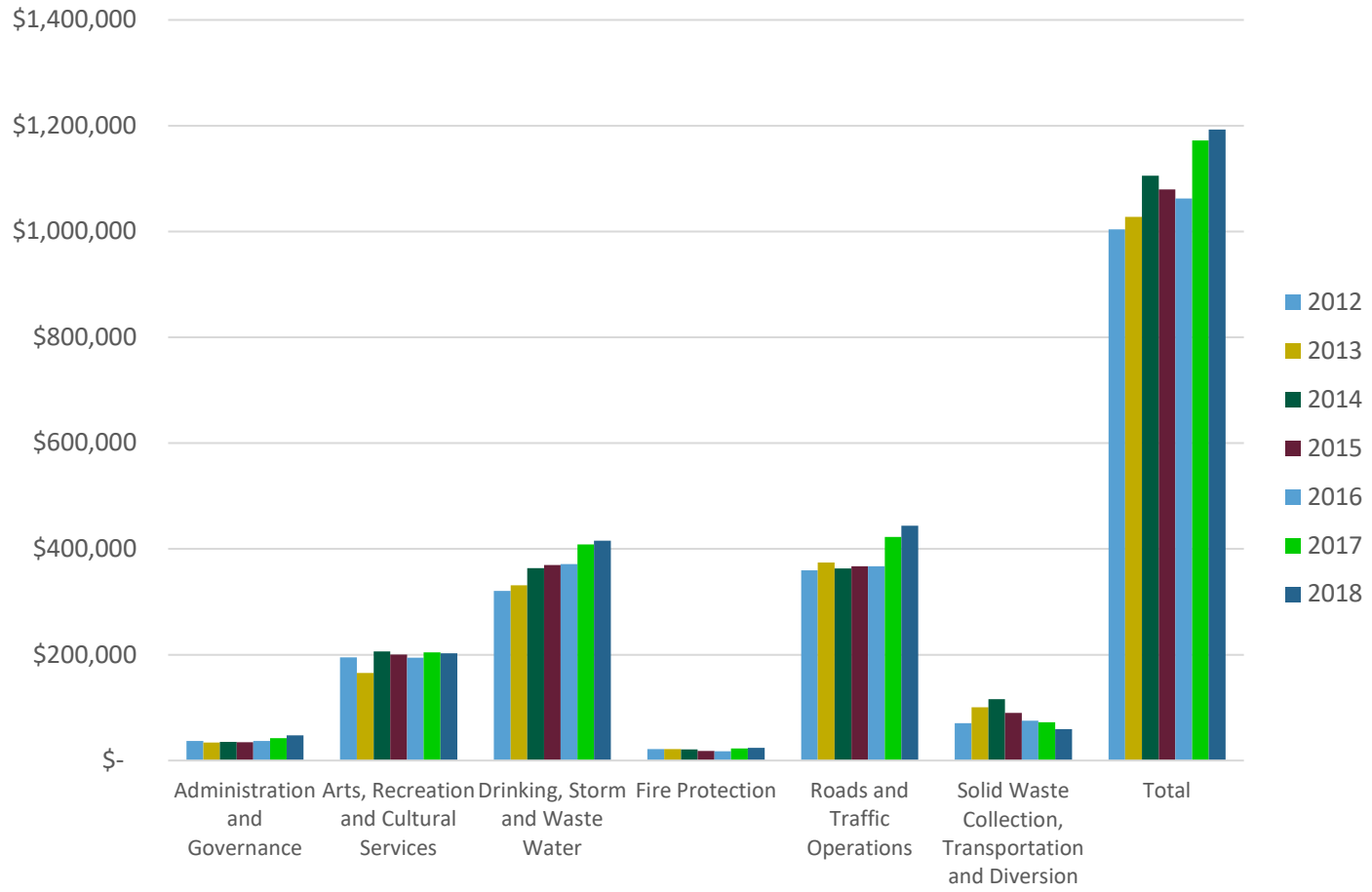
Assets that are not included in CARIP are:

- Little Chicks Daycare
- RCMP
- Landfill solid waste emissions

The following figure shows variations in energy expenditures by CARIP classification. Energy costs are steadily increasing, and have increased by about 20% from 2012-2018. This is primarily due to an increase in electricity expenditures, but also mobility fuels. Natural gas expenditures decreased over this period.

The increase in electricity expenditures is reflected in the CARIP classifications that use the most electricity: roads and traffic operations; and drinking, storm and wastewater.

Figure 18 – Energy expenditures by CARIP classification, 2012-2018

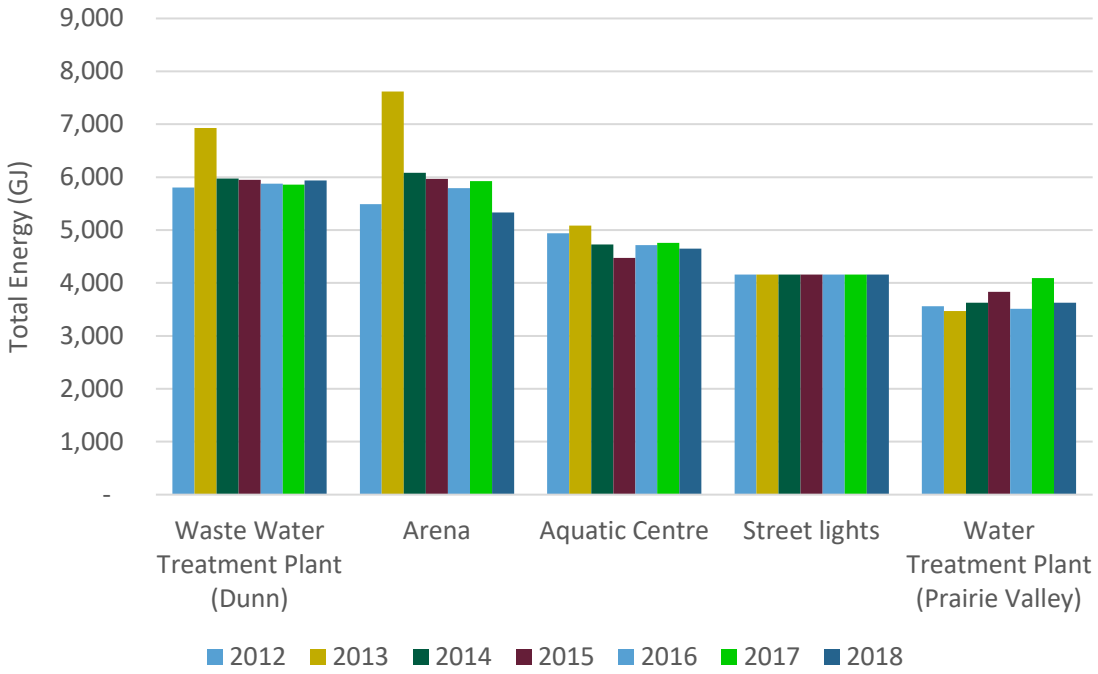


The following figure shows the top five building energy users in the CARIP inventory.

Regarding streetlights, in the next inventory year, they should decrease considerably because of the LED streetlight conversion, to the point that they may no longer be in the top five energy users. However in practice, the streetlights are not metered, and the District has been using estimated electricity use and estimated cost factors. Streetlight monitoring is a known opportunity for improvement in the District's asset management processes. New rate codes reflecting the running cost of LED streetlights have been implemented for 2021, and the inventory is expected to be revised in future years with improved accuracy. The savings from LED streetlights are not accurately reflected with the currently methodology.

Within each building, there is relatively little variation year-to-year, although there was a spike in energy consumption for the WWTP and the arena in 2013.

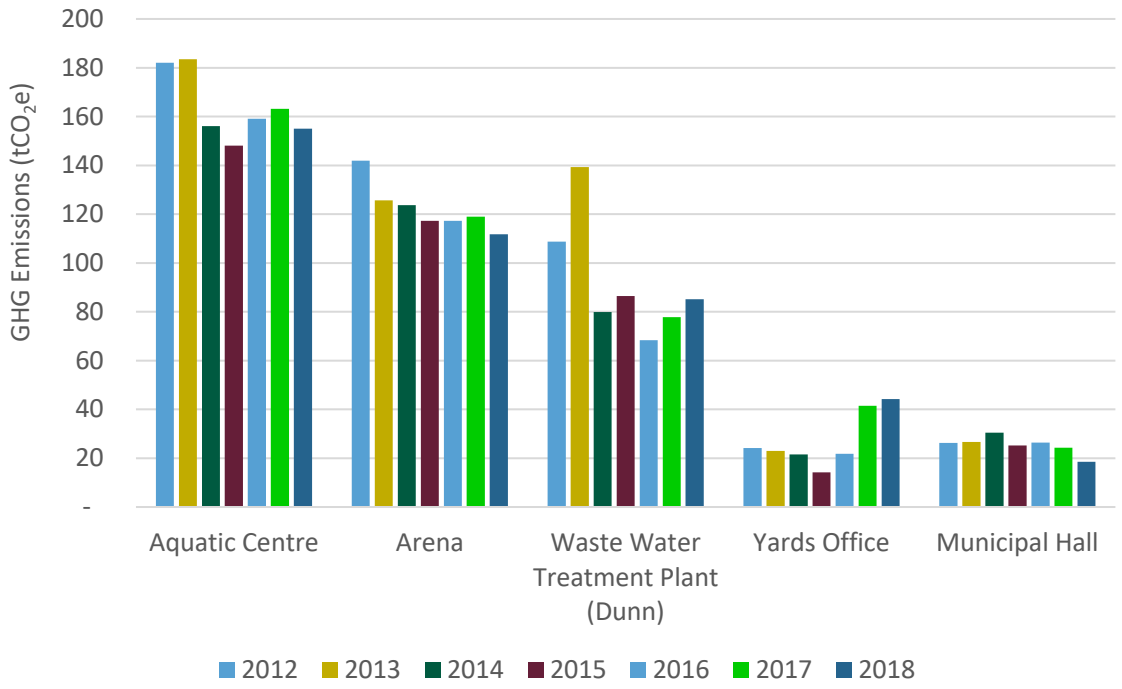
Figure 19 – Top 5 CARIP inventory building energy users



The following figure shows the top five GHG emitters in the CARIP inventory. It clearly shows the order in which buildings should be focussed on to maximise building GHG emission reductions.

Within each building, it is interesting to note that there are some year-to-year trends. The aquatic centre, arena, WWTP and municipal hall have been trending downwards, while the yards office has been strongly trending upwards (approximately doubling).

Figure 20 – Top 5 CARIP inventory building GHG emitters



Appendix C: PCP Inventory and BAU

This appendix contains details on the District's PCP inventory and BAU. It has not been included in the body of the report because the landfill is so large that it dominates the rest of the inventory.

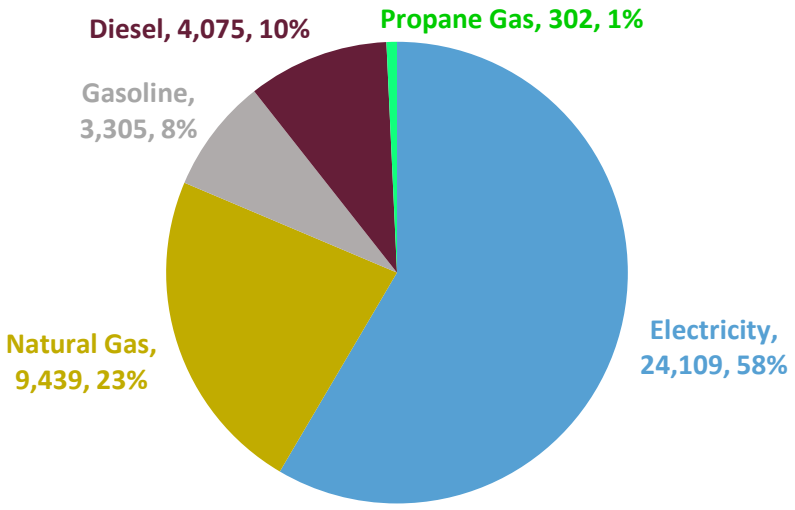
Inventory

The following table breaks down the District's PCP GHG emissions by the PCP categories. The largest area of emissions is solid waste, by far. Then fleet, buildings, and water & wastewater. Streetlights and traffic signals are negligible because of the low GHG emissions of electricity.

Table 9 – Breakdown of the District's PCP GHG emissions, by PCP categories

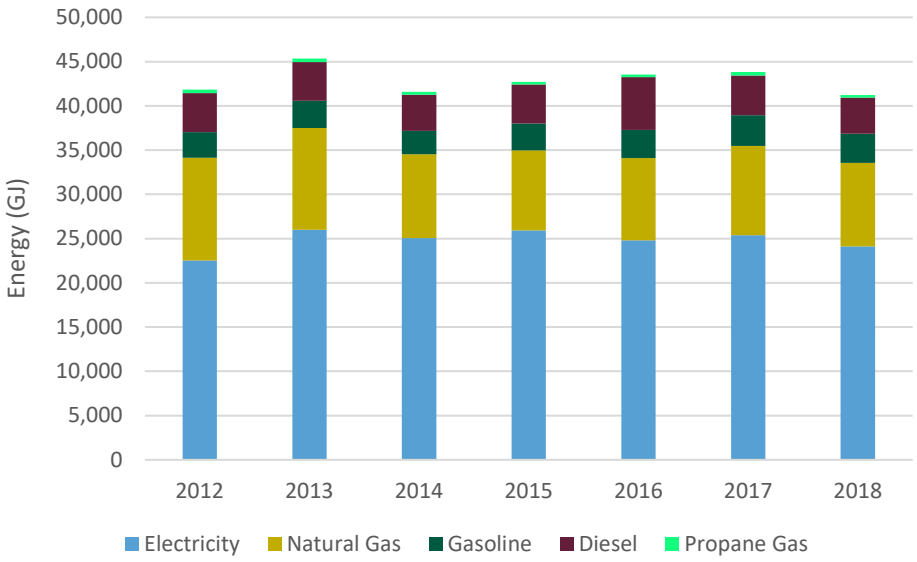
PCP Emissions by sector (tCO2e)							
Buildings	492	450	399	372	404	434	394
Corporate Solid Waste	2,613	2,573	3,218	2,775	2,989	3,654	3,676
Fleet	527	541	482	530	663	575	530
Streetlights and Traffic Signals	3	3	3	3	3	3	3
Water and Wastewater	122	147	86	93	75	85	91
Total	**3,756**	**3,714**	**4,188**	**3,772**	**4,134**	**4,751**	**4,693**

Figure 21 – District of Summerland PCP energy consumption in GJ, by fuel in 2018



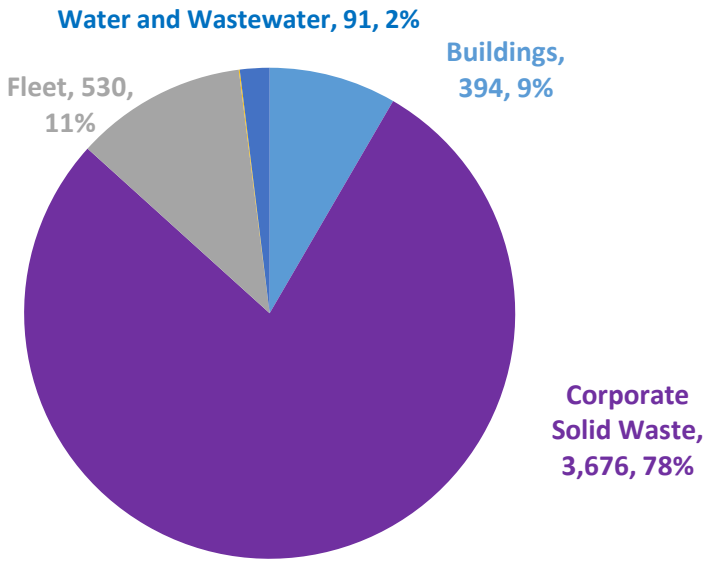
In 2018 over half of the energy consumed by the District was electricity, and over a fifth was natural gas. Diesel and gasoline made up most of the remainder, with just a small fraction of propane. This is very similar to CARIP energy consumption.

Figure 22 - District of Summerland PCP energy consumption in GJ, by fuel, 2012-2018



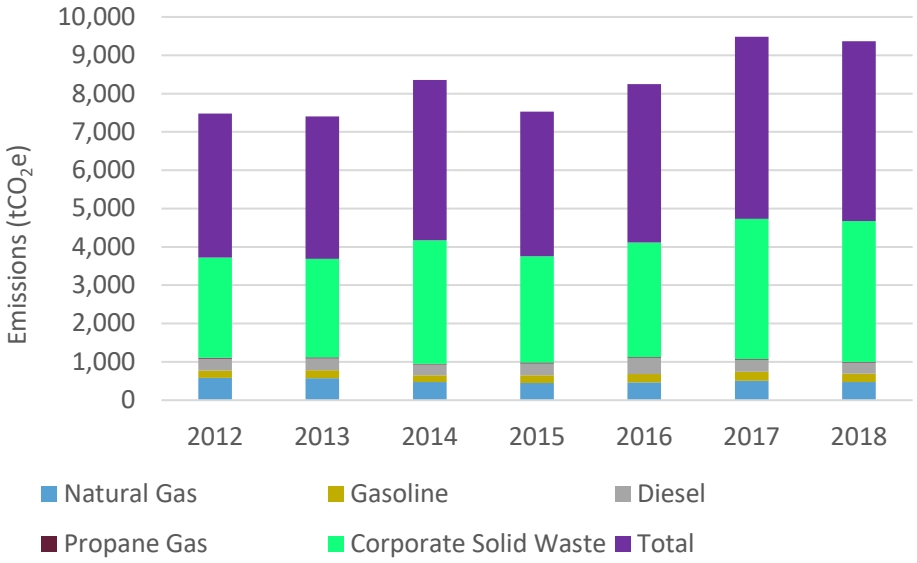
Fuel consumption in District operations has been very consistent from 2012-2018. Note that in 2019 and 2020 the results of the major streetlight retrofit should become apparent as a reduction in electricity consumption. The installation of the solar PV systems and other activities will also have an impact. Again, this is very similar to CARIP.

Figure 23 - District of Summerland PCP GHG emissions in tCO_2e, by fuel and waste, in 2018



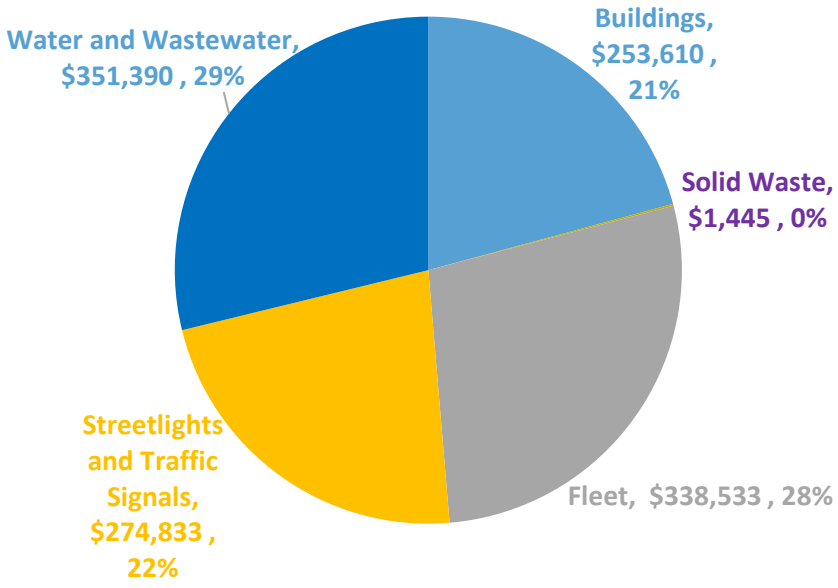
The clear dominance of the emissions from the landfill in the PCP inventory is demonstrated in the previous figure, at 78% of emissions. The fleet is next at 11%, then buildings at 9%, and water and wastewater at 2%. Streetlights and traffic signals are so small that they do not appear in the figure, at 0% of emissions.

Figure 24 - District of Summerland GHG emissions in tCO_2e, by fuel, 2012-2018



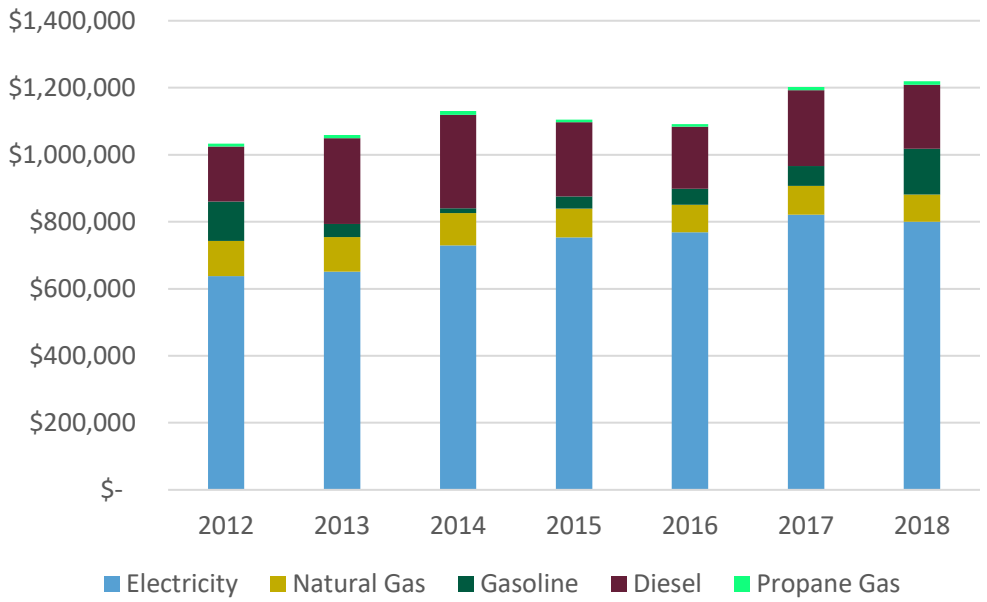
Non-landfill GHG emissions have been relatively consistent at around 1,000 tCO2e since 2012. However emissions from the landfill, calculated using the Waste Commitment method, have been increasing.

Figure 25 - District of Summerland energy expenditures, by PCP classification, in 2018



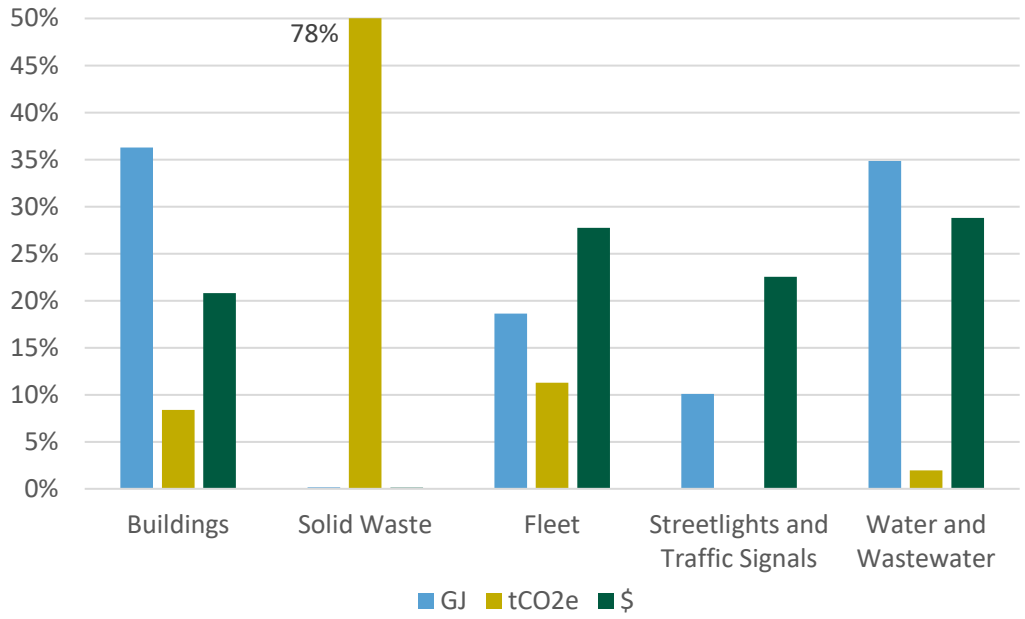
It is clear where most energy expenditures are. But it is interesting to note that Streetlights and Traffic Signals have high expenditure relative to their low GHG emissions, which is due to electricity GHG emissions versus its cost.

Figure 26 - District of Summerland PCP energy expenditures, by fuel, 2016-2018



These are very similar to CARIP energy expenditures, and so the same conclusions can be drawn.

Figure 27 - District of Summerland energy consumption, emissions, and energy expenditures by PCP classification, in 2018



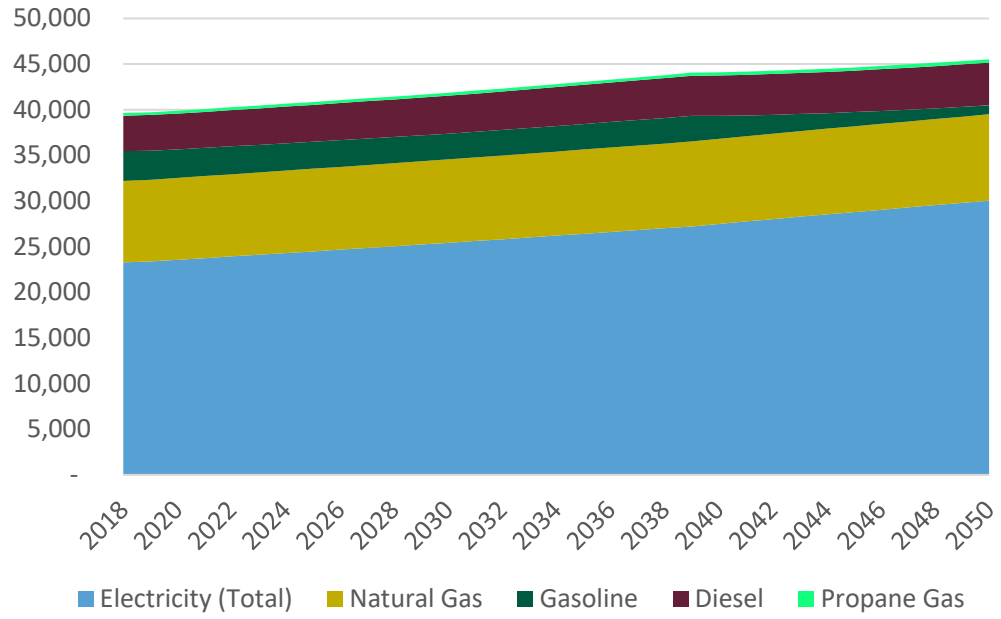
The preceding chart shows what percentage of energy consumption, GHG emissions, and energy expenditures can be attributed to each classification. Solid waste has by far the highest GHG emissions. The other top emitters, and top sources of energy expenditure can be readily identified.

Business As Usual Projections

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

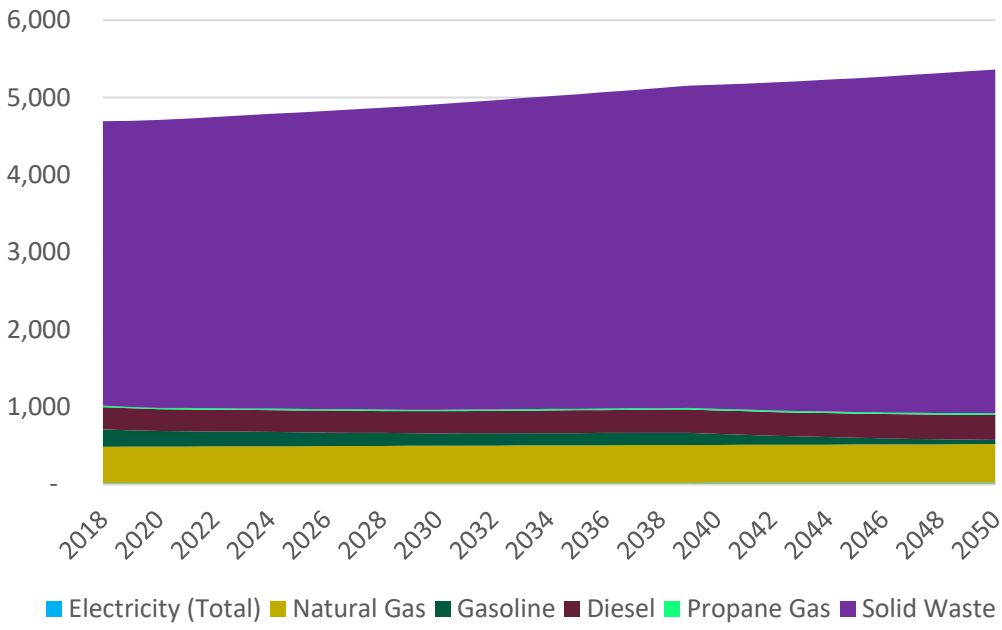
If the District of Summerland conducts no special efficiency or conservation activities, and assuming that future changes are proportional with population increase at 0.59% per year, then the District's energy consumption and emissions are forecast to change as shown in the following charts under a BAU scenario.

Figure 28 – District of Summerland BAU PCP energy consumption forecast to 2050



The energy consumption BAU is very similar to CARIP.

Figure 29 – District of Summerland BAU PCP GHG emissions forecast to 2050



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 and some other factors will provide downward pressure. It would be prudent for the District to also conduct its own measures to manage its energy consumption and GHG emissions.

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

Appendix D: Inventory and Modelling Assumptions

This appendix contains details on the corporate energy & emissions inventory and projections for Summerland.

Inventories

Summerland's inventories were created using SMARTTool and energy costing data provided by the District, while solid waste data was derived from the CEERP where it was calculated using the Province's "Waste Commitment" method. Based on the data compiled, full inventory years for energy consumption, emissions, and energy expenditures are 2012-2018. Note that some gasoline & diesel costing information was missing for 2016 & 2017, and so had to be projected.

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

Table 10 – Emissions factors used for inventory years

GHG/GJ, by Year	2012	2013	2014	2015	2016	2017	2018
Gasoline	0.064	0.064	0.064	0.064	0.064	0.062	0.061
Diesel	0.068	0.068	0.068	0.068	0.068	0.068	0.067
Mobility fuels	0.065	0.065	0.065	0.065	0.065	0.063	0.061
Electricity	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Natural gas	0.050	0.050	0.050	0.050	0.050	0.050	0.050
Wood	0.019	0.019	0.019	0.019	0.019	0.019	0.019
Heating oil	0.068	0.068	0.068	0.068	0.068	0.068	0.068
Propane	0.061	0.061	0.061	0.061	0.061	0.061	0.061

As can be seen, some of the emission factors have changed over time. The emission factors for mobility fuels have decreased as a result of the Renewable and Low Carbon Fuel Requirements Regulation. The emissions factor for electricity has decreased as a result of ongoing efforts to decarbonise the electricity grid.

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

Emissions from solid waste are not included in the CARIP inventory, but they are included in the PCP inventory.

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

Electricity emissions factor subject to change

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

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

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

Under the old methodology the Province calculated Summerland's electricity emissions factor to be 2.587 tCO_2e/GWh for 2018. Based on the limited information currently available, under the new methodology the Province has calculated the figure for the 2019 year to be 29.9 tCO_2e/GWh. *If* the 2018 and 2019 years are comparable (and it is probable that they are at least approximately comparable), this would be an increase of 11.6 times. This far exceeds any fluctuation in Summerland's electricity emissions factor from 2007 to 2018 as calculated under the previous methodology (previously the figure had steadily dropped by 2/3 from 2007 to 2018).

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

If the 2018 and 2019 figures are comparable, this change would increase the District's corporate 2018 GHG emissions from electricity from 17 to 197 tCO_2e, and increase its overall 2018 GHG emissions from 975 to 1,155 tCO_2e, or 18%.

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

Projections

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

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

The BAU trajectory was calculated by using available inventory data, and then projecting forwards using a population increase of 0.59% per year (the average annual increase between the last two census years).

From 2019 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.

The final assumption had the following methodology:

- Climate change data for the region obtained from ClimateData.ca.
- Projected global emissions to 2030 currently places the world in the range for the IPCC's Fifth Assessment Report's Representative Concentration Pathway (RCP) 6.0 scenario.
- RCP 6.0 scenario not available on ClimateData.ca, therefore RCP 4.5 (high impact scenario) used as a 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.

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. The impact of the actions in existing buildings has been determined by the buildings study and the actions from that which were selected by District staff. 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 the sections What We Can Do: Recommended Climate Actions, and What We Can Achieve.

Appendix E: Project Scoring Matrix

This appendix contains the Project Scoring Matrix that was used to prioritise the buildings actions list that was received from the building energy assessors.

DISTRICT OF SUMMERLAND

Summerland Corporate Projects 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 DoS GHG Emissions (50)							

Category	Point Value	Poor 0.0	Fair 0.25	Acceptable 0.5	Good 0.75	Excellent 1.0	Total
Total GHG Reductions per $ (DoS funds only, after external funds)	20						
Annual GHG Reductions	10						
Lifespan of Project	10						
Replicability of Project within DoS	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.**

- **DoS 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.**

Notes: