

**DATE:** January 20, 2023**FILE:** 5280-06**TO:** Chair and Director  
Regional District Board**FROM:** Russell Dyson  
Chief Administrative OfficerSupported by Russell Dyson  
Chief Administrative Officer**R. Dyson****RE: Corporate Energy and Emissions Plan update****Purpose**

This report provides an update on the Corporate Energy and Emissions Plan and to consider an updated version that reflects Board feedback.

**Recommendation from the Chief Administrative Officer:**

THAT the updated Comox Valley Regional District Corporate Energy and Emissions Plan, and reflecting changes associated with Comox Strathcona Waste Management emissions attached to the staff report dated January 20, 2023, be approved.

**Executive Summary**

- The Corporate Energy and Emissions Plan (CEEP) includes targets for reducing corporate greenhouse gas (GHG) emissions 50 per cent below 2019 levels by 2030, and achieving net zero corporate emissions status by 2050.
- In May 2022 the Board referred the CEEP to the 2023 financial planning process to consider the resources required to operationalize the recommended GHG reduction initiatives and achieve the 2030 target.
- The CEEP was also referred to the Comox Strathcona Waste Management (CSWM) Board and an addendum was prepared to address GHG emissions associated with the operation of CSWM services, especially the fugitive gas from landfills. The CSWM Board has operational control over landfill assets, including maintenance and capital upgrades. As a result of this addendum and referral the CEEP report has been updated (Appendix A) and now includes the addendum and excludes fugitive landfill gas and other CSWM emissions as these are not in the full operational control of CVRD. At their September 2022 meeting the CSWM Board considered this and directed staff to develop a separate GHG reduction strategy to address CSWM's corporate emissions.
- The CEEP identifies a pathway of GHG reduction initiatives that will lead Comox Valley Regional District (CVRD) towards the GHG reduction targets (Appendix B). These are the projects, policies and programs that CVRD must focus its resources on, with particular attention paid to reducing natural gas at recreation facilities and gasoline/diesel from fleet vehicles.
- Crucial work along this pathway has recently been undertaken including:
  - Purchasing six zero emissions vehicles;
  - Investigating energy and energy efficiency opportunities at the recreation facilities;
  - Preparing an Internal Cost of Carbon Policy and climate reserve (see separate staff report on this agenda) and reviewing corporate purchasing policies with a GHG lens;
  - Developing departmental CEEP works plans to operationalize the pathway initiatives.

- These departmental plans have been utilized in the development of individual function budgets and through the course of the upcoming budget presentations staff will highlight the actions included in the 2023-2027 financial plan.
  - Some of the key initiatives proposed in 2023 include:
    - Recommissioning of Sports and Aquatic Centres to optimize facility performance and reduce energy usage;
    - Developing de-carbonization plans for the Sports and Aquatic Centres which will identify the deep energy retrofits to upgrade or replace equipment and building envelopes;
    - Undertaking energy and emissions audits at water and wastewater facilities to identify process optimizations, retrofits and renewable energy opportunities;
    - Continued purchase of zero emissions vehicles and installation of electric charging equipment for the CVRD fleet;
    - Updating corporate purchasing policy to prioritize low-to no-GHG emissions products and services.
- Much of this year's work will lay the foundation for future efforts and identify capital works and other projects which can be included in future budgets, leading to significant GHG reductions (e.g. de-carbonization upgrades at the recreation facilities, constructing renewable energy and heat recovery projects).
- A report will be brought to the Board in the spring to provide an update on the corporate GHG emissions inventory with 2022 data included.

Prepared by:

*M. Zbarsky*

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Michael Zbarsky  
Manager of Transit  
and Facilities

Concurrence:

*A. Mullaly*

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Alana Mullaly  
General Manager of Planning  
and Development Services

Attachments: Appendix A – Updated CVRD Corporate Energy and Emissions Plan  
Appendix B – Corporate Energy and Emissions Plan Pathway



# Corporate Energy & Emissions Plan

Comox Valley Regional District

## Notice to Reader

The following Corporate Energy and Emissions Plan (CEEP) for the CVRD has been updated since the original version was presented to the CVRD Board on May 31, 2022. Based on board direction an addendum was prepared (Appendix A) to address the fugitive landfill GHG emissions from the Comox Valley Waste Management Centre (CVWMC) and the Campbell River Waste Management Centre (CRWMC).

Because solid waste management matters are dealt with through the Comox Strathcona Waste Management (CSWM) Board (the CSWM Board), the CVRD does not have full operational control over the CVWMC and the CRWMC. On this basis, the addendum recommended that the CVRD's CEEP not include the fugitive landfill GHG emissions, and other solid waste related sources under the purview of the CSWM Board, which have now been removed. This CEEP is a reflection of these changes.

The CEEP was also referred to the CSWM Board on September 1, 2022 who subsequently directed their staff to develop a GHG reduction strategy for CSWM's corporate emissions.

## Table of Contents

<b>INTRODUCTION .....</b>	<b>1</b>
CLIMATE CHANGE IS A GLOBAL PRIORITY.....	1
SCOPE OF PLAN .....	2
PLAN DEVELOPMENT .....	3
<b>2019 CORPORATE ENERGY &amp; GHG EMISSIONS .....</b>	<b>5</b>
CURRENT ENERGY & GHG EMISSIONS .....	5
DEPARTMENTAL ENERGY & GHG EMISSIONS .....	7
HISTORICAL TRENDS.....	8
BUSINESS AS USUAL ENERGY & GHG EMISSIONS FORECAST .....	10
CVRD GHG REDUCTION TARGETS .....	11
PROPOSED INITIATIVES.....	14
<b>BUILDINGS &amp; FACILITIES.....</b>	<b>15</b>
OVERVIEW .....	15
INITIATIVES .....	16
IMPACT, EFFORT, AND TIMING OF INITIATIVES.....	19
<b>FLEET.....</b>	<b>21</b>
OVERVIEW .....	21
INITIATIVES .....	21
IMPACT, EFFORT, AND TIMING OF INITIATIVES.....	22
<b>SOLID WASTE .....</b>	<b>25</b>
OVERVIEW .....	25
INITIATIVES .....	25
IMPACT, EFFORT, AND TIMING OF INITIATIVES.....	26
<b>WATER &amp; WASTEWATER.....</b>	<b>26</b>
OVERVIEW .....	26
INITIATIVES .....	26
IMPACT, EFFORT, AND TIMING OF INITIATIVES.....	27
<b>CORPORATE LEADERSHIP .....</b>	<b>29</b>
OVERVIEW .....	28

INITIATIVES .....	28
IMPACT, EFFORT, AND TIMING OF INITIATIVES.....	32
<b>PLAN IMPLEMENTATION .....</b>	<b>35</b>
CEEP PATHWAY.....	354
PLAN MANAGEMENT SYSTEM .....	35
GOVERNANCE & COLLABORATION .....	35
REPORTING & COMMUNICATION.....	36
RESOURCE & BUDGET PLANNING .....	37
COMMUNICATION STRATEGY .....	38
<b>APPENDIX A SOLID WASTE .....</b>	<b>39</b>
OVERVIEW .....	40
RESPONSIBILITY .....	41
INITIATIVES .....	44

## Executive Summary

Taking action on climate change and reducing greenhouse gas (GHG) emissions has long been a priority for the Comox Valley Regional District (the CVRD) since first committing to becoming a carbon neutral organization and developing its first Corporate Energy and Emissions Plan (CEEP) in 2011. Energy consumption and associated GHG emissions arise as a result of the provision of key services by the CVRD, which include the operation of buildings, fleet, equipment, water and wastewater treatment, street lighting and the transportation of solid waste. In 2019, the CVRD's corporate GHG emissions amounted to 1,617 tonnes of carbon dioxide equivalent (tCO<sub>2</sub>e). Should no action be taken by the CVRD, corporate energy and GHG emissions are expected to increase by approximately 14% and 20%, respectively, by 2050 as a result of increased service levels and demands as the region's population grows.

If the current global GHG emissions trajectory continues, scientists estimate that global temperatures could rise by 4 to 6°C this century, resulting in irreversible environmental, social, and climatic changes, and result in economic losses ranging from 5% to 20% of global Gross Domestic Product (GDP) annually. To substantially reduce the risks and effects of climate change, scientists and policy makers have come to a global agreement that society must dramatically reduce GHG emissions and achieve net zero by 2050.<sup>1</sup> This translates to reducing baseline GHG emissions by 50% by 2030, 80% by 2040 and more than 90% by 2050 with the remaining emissions being offset via the purchase of carbon offsets and carbon neutralization projects (e.g., direct air capture, reforestation, etc.). Recognizing the importance and benefits to addressing climate change, the Government of Canada and the Province of BC have both recently committed to achieving net zero emissions by 2050.

By influencing decisions around where people live and work, how people and goods move around, and how communities change over time, regional districts and cities play an important role in the reduction of GHG emissions and the impacts that climate change can have. On this basis, this Plan is establishing corporate GHG emission reduction targets of 50% below 2019 levels by 2030 and net zero by 2050. In order to achieve these targets most CVRD departments will need to have reduced their GHG emissions by at least 50% by 2030. As the Recreation Department is the largest contributor to the CVRD's GHG emissions (~ 65%) and has the greatest GHG reduction opportunities to capitalize on, to meet the 2030 GHG reduction target, this department will need to reduce its GHG emissions by 80%. Achieving these targets will require the CVRD to re-prioritize

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<sup>1</sup> COP26-Presidency-Outcomes-The-Climate-Pact.pdf (ukcop26.org)

and aggressively invest in its infrastructure to reduce energy and GHG emissions, utilizing renewable natural gas (RNG) and using offsets as a last resort option.

The objective of this Plan is to move the CVRD closer to its GHG emission reduction targets by establishing initiatives that build momentum and lay the groundwork for deeper energy and GHG emissions reduction actions to be implemented post-2030. The Plan acts on the CVRDs recent climate crisis declaration and meets the requirements of the BC Climate Action Charter which committed the CVRD to lowering its corporate carbon footprint, achieving annual carbon neutral corporate operations and taking community-wide actions that demonstrate leadership on sustainable development.

The Plan's GHG emission forecasting was based on corporate energy and GHG emissions available for the most representative year, 2019 and trends from 2015-2018 as well as anticipated growth to 2050. The identification of initiatives for incorporation into the Plan was done through a combination of staff engagement, a best-in-class review of other regional districts, and input from internal and external subject matter experts. The Plan covers a 10-year horizon from 2021 to 2030, but also considers the actions needed to achieve the proposed GHG targets.

To achieve the 2030 GHG reduction target, before 2030, the CVRD will need to focus on the following actions:

- Prepare and implement building de-carbonization plans for the CVRD Recreation Facilities.
- For other facilities or infrastructure, seek out energy projects to reduce energy and GHG emissions when there is new construction, renovations, and/or mechanical system and equipment replacements.
- Implement an ongoing building commissioning and monitoring program to maintain energy conservation and GHG emissions reductions.
- Accelerate the conversion to electric and low-carbon fuels using the cost of carbon to support the life cycle replacement cost.
- Establish an internal cost of carbon (ICC) to ensure investments are sufficient to meet the GHG reduction targets.
- Explicitly define and recognize natural assets as an asset class in the CVRD financial accounting systems and establish obligations to operate, maintain, and replace natural assets alongside traditional capital assets.
- Seek opportunities to invest in local nature-based solutions / projects (e.g., reforestation) to be able to recognize the future carbon benefit.

<sup>1</sup> Green House Gas Monitoring Software <https://ghgaccounting.mythinkstep.com/dashboard.html> (CVRD cooperate energy management software).



- Reduce the balance of the CVRD's GHG emissions through the purchase of renewable natural gas (RNG).<sup>2</sup>

Over the longer term, the achievement of the 2050 net zero target will require the aggressive conversion of all fleet, and off-road equipment to either electric or low-carbon fuels; investment in nature-based solutions; and likely, adjusting various business models and service levels.

The proposed initiatives included in the Plan support the completion of the actions listed above and ultimately the 2050 GHG reduction target. The initiatives have been organized into five key categories: Buildings and Facilities, Fleet and Equipment, Solid Waste, Water and Wastewater, and Corporate Leadership and are summarized in Table E-1 below.

TABLE E-1. PLAN INITIATIVES SUMMARY

Category	Initiative	Description
<b>Buildings &amp; Facilities</b>	Implement Green Building Requirements	In addition to designing and building LEED® Gold equivalent buildings, adopt the BC Step Code, establish a minimum requirement of achieving Step 3, and require that new construction or major renovations be net zero ready.
	Implement an Ongoing Commissioning Program	Prepare and implement an ongoing building commissioning and retro commissioning plan.
	Develop & Implement De-Carbonization Plan for CVRD Recreation Facilities	Develop a unifying de-carbonization plan for the two CVRD recreation facilities. The first step will involve a heat recovery study at the facilities.
	Investigate District Energy / Waste Heat Recovery Opportunities	Work with key stakeholders (e.g., School District, Hospital, NIC) to explore the feasibility of district energy / waste heat recovery opportunities that could benefit CVRD operations.
<b>Fleet</b>	Purchase Zero Emissions Fleet Vehicles	Accelerate the conversion of the CVRD's fleet to Zero Emissions Vehicles (ZEV).

<sup>2</sup> Renewable Natural Gas (RNG) is natural gas that is derived from organic waste material sources such as food waste, garden and lawn clippings, animal waste, and paper, cardboard, wood, and solid waste.

Category	Initiative	Description
<b>Solid Waste</b>	Work With Third-Party Waste Hauling Companies to Pilot New Fuel Technologies	Work with waste hauling companies to pilot projects utilizing biofuel and electric-powered medium and heavy-duty truck technologies as they become available. Where pilots are successful, adopt these requirements in waste hauling contracts.
	Encourage the Adoption of Zero Waste Principles	Promote zero waste principles to Hornby Island and Royston residents to reduce waste and the CVRD's collection related GHG emissions.
<b>Water &amp; Wastewater</b>	Install Solar PV Array at the CVRD Water Treatment Plants	Install a solar PV array at the new water treatment plant and the West Courtney reservoir to reduce energy consumption.
	Reduce Infrastructure Energy Consumption When Constructing / Renovating Non-Building Infrastructure	Complete energy efficiency reviews when constructing or renovating non-building infrastructure, examining systems as a whole as well as reviewing individual components for efficiency opportunities. For example, installing more efficient pumps and solar PV on new water and wastewater pump stations.
<b>Corporate Leadership</b>	Set Departmental Targets & Develop Departmental GHG Emission Reduction Plans	Adopt recommended departmental GHG emission reduction targets and develop a 5-year departmental energy and GHG emissions reduction plans for operational activities.
	Update Asset Management Policy and Plans	Update Capital Asset Management Policy and associated Plans to include the objective of investing in assets to mitigate and adapt to climate change, as part of asset management planning.
	Pilot the Use of LCA Tools When Making Capital Purchases	Pilot the use of publicly available or low cost LCA tools to account for energy and GHG emissions in budget and capital planning and asset management.
	Update Purchasing Policy	Update Purchasing Policy to prioritize the procurement of goods and services that clearly reduce / conserve operational energy use and GHG emissions.
	Develop an Internal Cost of Carbon Policy	Establish a policy that requires the use of an ICC starting at \$160/tCO <sub>2</sub> e (expressed as a cost) in asset and infrastructure decisions such as vehicle procurement and building/facility design, acquisition and modification.

Category	Initiative	Description
	Recognize Natural Assets as an Asset Class	Explicitly define and recognize natural assets as an asset class in the CVRD financial accounting systems and establish obligations to operate, maintain, and replace natural assets alongside traditional capital assets,

## Introduction

### Climate Change is a Global Priority

Climate change has emerged as an unprecedented social, economic, and environmental challenge facing our society today. It poses a serious threat to our quality of life, jobs, and our physical and natural assets. Scientists believe that the human-production of greenhouse gas (GHG) emissions since pre-industrial times have already surpassed the Earth’s “carrying capacity” of natural systems and pose significant future risks to human well-being. As such, if we do not reduce our GHG emissions soon, we can expect to be impacted by more floods, wind-storms, heat waves, and wildfires which can drag down our economy, erode our social systems, impact our natural resources, and limit our ability to respond and recover. Unless we reduce our GHG emissions drastically to achieve net zero by 2050 — scientists believe that we will cause irrevocable harm to our planetary systems as well as our communities. Luckily, governments are in a good position to address the climate crisis and take actions to avoid impacts and realize other community benefits.

Taking action on climate change and reducing greenhouse gas (GHG) emissions has long been a priority for the Comox Valley Regional District (the CVRD) since first committing to becoming a carbon neutral organization and developing its first Corporate Energy and Emissions Plan (CEEP) in 2011. Energy consumption and associated GHG emissions arise as a result of the provision of key services by the CVRD, which include the operation of buildings, fleet, equipment, water and wastewater treatment, and outdoor lighting. While the CVRD has reduced its overall GHG emissions and has met prior GHG reduction targets, the CVRD is not on track to meet the scientifically based GHG 2050 reduction targets and is not alone in this regard.

In recognition of this trend, the CVRD is undertaking additional efforts to reduce GHG emissions to achieve aggressive GHG emission reduction targets of 50% below 2019 levels by 2030 and net zero by 2050 to align with the Government of Canada and the Province of BC’s 2050 GHG reduction targets. This Corporate Energy and Emissions Plan (the Plan) serves numerous purposes in that it provides a 5- and 10-year roadmap towards these new GHG targets, it recognizes and acts on the CVRD’s climate crisis Declaration, and it meets the requirements of the BC Climate Action Charter. The BC Climate Action Charter committed the CVRD to lowering its corporate carbon footprint and taking community-wide actions that demonstrate leadership on sustainable development.

The achievement of the 2030 and 2050 targets will require the CVRD to re-examine and redesign how it delivers services, manages its assets, and procures goods and services. The CVRD’s reduction in energy and GHG emissions are expected to materialize by focusing on three key actions: aggressive energy efficiency/energy reductions within buildings and facilities, stronger accountability systems that internalize the cost of climate change, and a progressive shift from fossil-fuel burning equipment to those running on electricity, renewable natural gas, hydrogen, or advanced biofuels.

## Scope of Plan

Calculating corporate municipal GHG emissions can be complicated because of how services are delivered and by who delivers them (e.g., contractors). To be relevant, GHG inventories must reflect the operations of the entity and the way in which it interacts with the community. At the same time, it is important that the GHG inventory conform to international standards for reporting to ensure consistency and comparability with other cities. To this end, the CVRD's energy and GHG boundary has been set following an “operational control” approach where the CVRD should track energy and GHG emissions of an asset when:

- The CVRD owns the asset, and
- The CVRD is responsible for maintenance and capital upgrades.

Emissions over which the CVRD has operational control — i.e., the CVRD owns and is responsible for maintenance and capital upgrades of the asset — are included in this Plan. These are also referred to as Scope 1 and 2 GHG emissions (Figure 1).

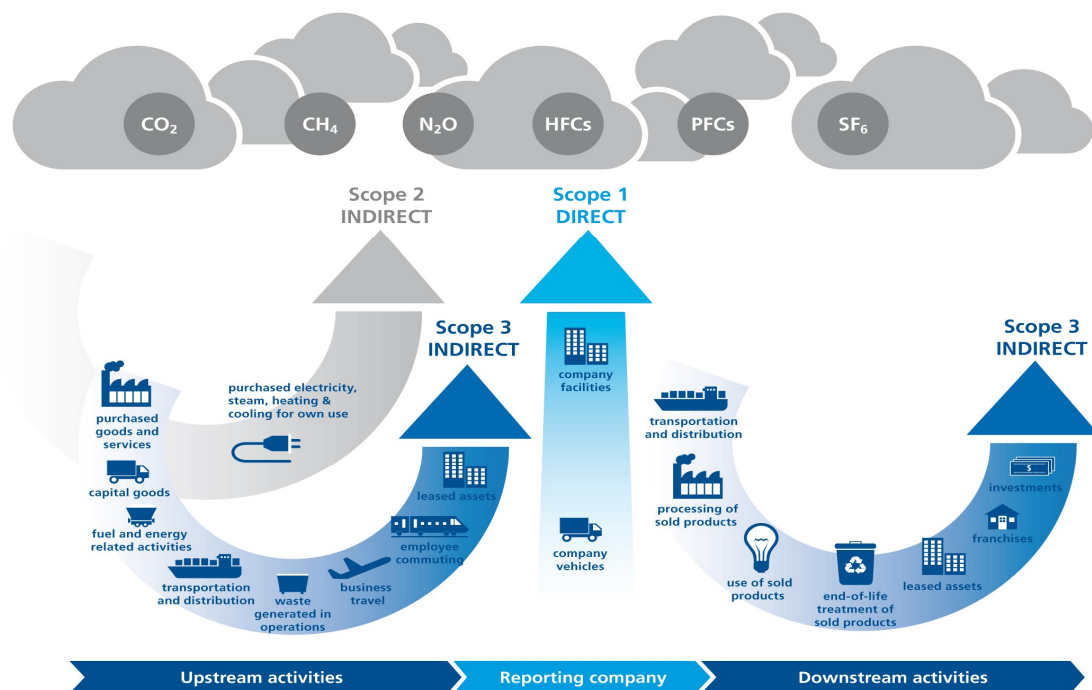


FIGURE 1. OVERVIEW OF GHG EMISSION SOURCES BY CLASSIFICATION<sup>3</sup>

In addition, the Plan does include some Scope 3 GHG emission sources — such as streetlights and solid waste collection (contractors) — it does not include all third-party contractors, construction

<sup>3</sup> <https://ghgprotocol.org/greenhouse-gas-protocol-accounting-reporting-standard-cities>

activities, and embodied GHG emissions. The Plan also excludes emissions related to activities that are under the operational control of the Comox Strathcona Waste Management (CSWM) board which is made up of elected officials from the CVRD and Strathcona Regional District (SRD). This includes fugitive GHG emissions from the Comox Valley Waste Management Centre (CVWMC) and the Campbell River Waste Management Centre (CRWMC). An Addendum to the CEEP has been prepared and appended to this document which contains a series of suggested initiatives for the CSWM Board to consider.

The assets over which the CVRD has direct control, and which were considered in the development of this Plan, are presented in the table below.

TABLE 1. LIST OF EMISSION SOURCES INCLUDED IN THE PLAN BY CATEGORY

	<b>Buildings &amp; Facilities</b>	<b>Fleet &amp; Equipment</b>	<b>Solid Waste</b>	<b>Water &amp; Wastewater</b>	<b>Streetlights</b>
<b>Asset</b>	Administrative Offices, Service Buildings.	Heavy Duty Vehicles	Solid Waste Contractors	Water Treatment Plants	Streetlights
	Recreational Centers, Pools, Arenas & Sports Facilities	Off Road Vehicles		Wastewater Treatment Plants	
	Fire Halls	Light Duty Vehicles		Pumping Stations Distribution & Collection Systems	

GHG emissions were quantified using a third party energy and GHG emissions software system called SOFI.

## Plan Development

The Plan's GHG emission forecasting was based on corporate energy and GHG emissions available for the most representative year, 2019<sup>4</sup>, and trends from 2015 to 2018 as well as anticipated growth to 2050. The identification of initiatives for incorporation into the Plan was done through a combination of staff engagement, a best-in-class review of other regional districts and input from

<sup>4</sup> **GHG Reporting my think step (SPHERA)**

internal and external subject matter experts. The Plan covers a 10-year horizon from 2021 to 2030, but also considers the actions needed to achieve the proposed GHG targets.

## 2019 Corporate Energy & GHG Emissions

With GHG emissions contributing to climate change at the forefront of public awareness and policy development, municipal governments are incorporating strategies to both manage the anticipated impacts and reduce their energy consumption and GHG emissions footprint. Many of these efforts have focused on reducing building energy and fleet fuel consumption as these sources are the largest contributors to an organization's GHG emissions profile.

### Current Energy & GHG Emissions

The CVRD owns and operates administrative facilities, recreation centers, streetlights, water and wastewater systems, and a fleet of vehicles and equipment to provide public services. These service areas make up the CVRD's corporate energy consumption and GHG emissions, and contribute to serving the residents, businesses, and visitors.

In 2019, the CVRD's corporate activities resulted in the release of 1,617 tonnes of carbon dioxide equivalent (tCO<sub>2</sub>e). The consumption of energy and associated GHG emissions were the direct result of the provision of key services by the CVRD, which are organized into the following categories:

- **Buildings & Facilities:** The CVRD's buildings and facilities consume electricity and natural gas to heat, cool, ventilate, and illuminate administrative buildings, fire halls, and recreation centers. The treatment and movement of water and wastewater is accomplished largely by electrically driven pumps and processes. Diesel fuel is used for backup electricity generation.
- **Streetlights:** The CVRD operates streetlights which are powered by electricity.
- **Fleet:** The CVRD's fleet includes light, medium, and heavy-duty vehicles.
- **Contracted Services:** The CVRD engages with third party contractors to perform Royston Garbage and the Hornby Island garbage collection services. The contractors power their waste collection fleet with diesel.

Table 2 presents the breakdown of the 2019 energy and GHG emissions by reporting category.

TABLE 2. 2019 CORPORATE ENERGY AND GHG EMISSIONS BY CATEGORY

Reporting Category	Energy (GJ)		GHG Emissions (tCO <sub>2</sub> e)	
Buildings & Facilities	56,816.9	92.2%	1,334.6	82.5%
Streetlights	552.5	0.9%	4.6	0.3%
Fleet	4,023.4	6.5%	262.7	16.3%
Contracted Services (Solid Waste Collection & Transportation)	216.1	0.4%	14.8	0.9%



Reporting Category	Energy (GJ)		GHG Emissions (tCO <sub>2</sub> e)	
Total	61,609	100.0%	1,617	100.0%

For the 2019 reporting year, approximately 83% of the CVRD's corporate GHG emissions came from buildings and other facilities like recreation centers and arenas; 16% came from fleet related activities; and less than 1% came from contracted solid waste collection services. A breakdown of energy consumption and GHG emissions are presented in Figure 2 and Figure 3 below.

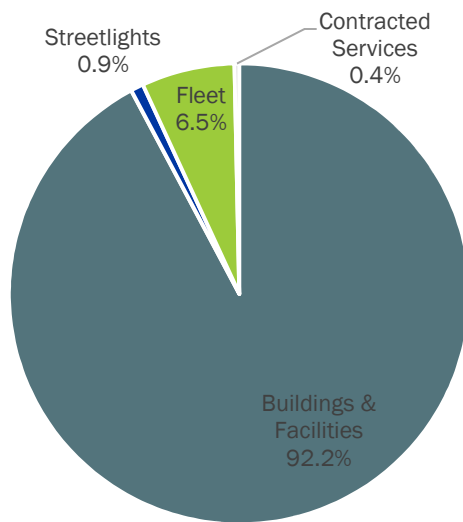


FIGURE 2. ENERGY USE BY CATEGORY

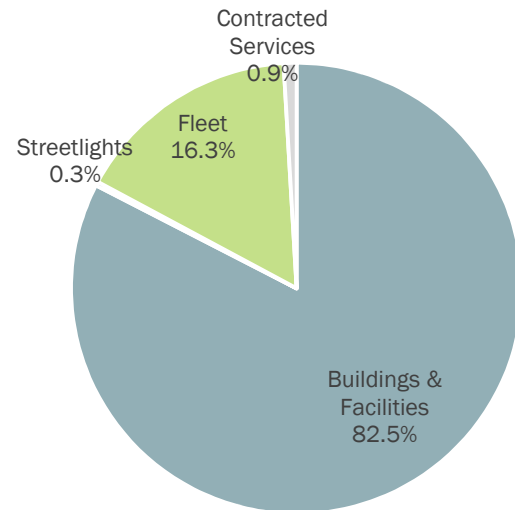


FIGURE 3. GHG EMISSIONS BY CATEGORY

Although electricity consumption accounted for nearly 60% of the CVRD's energy profile, it only accounted for 19% of GHG emissions due to the low emissions intensity of the BC Hydro grid. In contrast, due to the high emissions intensity of diesel, gasoline, propane, and natural gas, these fuel sources accounted for 81% of the CVRD's corporate GHG emissions and 41% of energy consumption. Due to their GHG emissions intensity, reducing or switching to lower carbon intensity fuel sources, like electricity, biofuels, renewable natural gas, or hydrogen, pose one of the better opportunities to reduce the CVRD's total GHG emissions. A breakdown of energy consumption and GHG emissions are presented in Figure 4 and Figure 5 below.

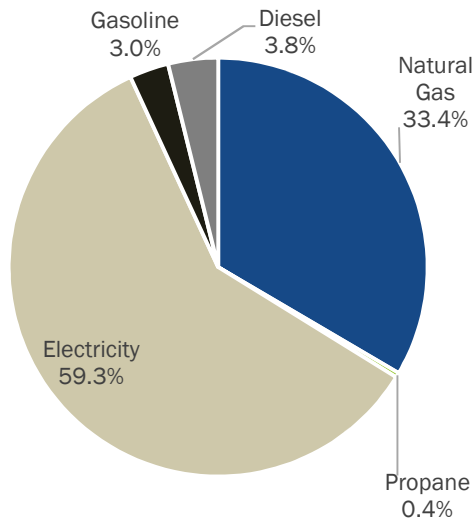


FIGURE 4. ENERGY USE BY FUEL TYPE

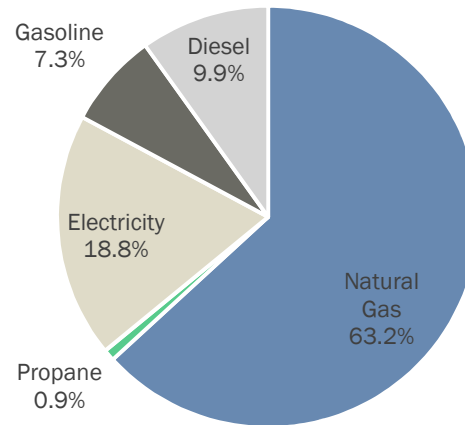


FIGURE 5. GHG EMISSIONS BY FUEL TYPE

### Departmental Energy & GHG Emissions

In terms of department and function, in 2019, the top energy consumers and GHG emitters include Recreation, Administration (which includes bylaw, building, finance, and corporate office ETC.) and Wastewater. These departments account for 95% of corporate emissions. This is presented in Table 3 and Figure 6.

TABLE 3. 2019 ENERGY AND GHG EMISSIONS BY DEPARTMENT / FUNCTION

Reporting Category	Energy (GJ)		GHG Emissions (tCO <sub>2</sub> e)	
Recreation	33,284.6	54%	1,051.3	65.0%
Administration	5,415.7	9%	291.7	18.0%
Wastewater	15,329.7	25%	192.0	11.9%
Water	6,035.3	10%	50.2	3.1%
Solid Waste	216.1	0%	14.8	0.9%
Fire	757.9	1%	11.4	0.7%
Streetlights	552.5	1%	4.6	0.3%
Parks	16.9	0%	0.8	0.1%
<b>Total</b>	<b>61,609</b>	<b>100%</b>	<b>1,617</b>	<b>100%</b>

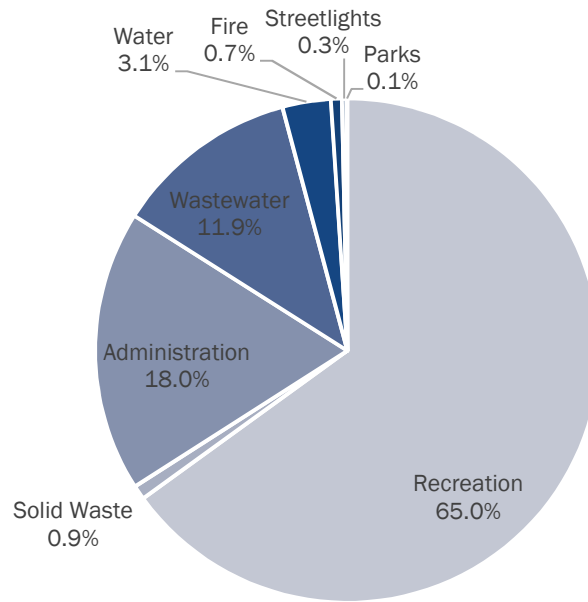


FIGURE 6. DEPARTMENTAL GHG EMISSIONS

### Historical Trends

In the 2011 CEEP, the CVRD set 2009 as its base year. Since 2009, the CVRD's population has increased over 15% while absolute energy and GHG emissions from corporate operations have decreased 20% and 36% respectively. Figure 7 shows that while overall energy consumption has been on a general decline, there have been fluctuation in energy and GHG emissions between years. The fluctuation in energy consumption between years is primarily related to variability in the number of heating degree days (HDD) and cooling degree days (CDD) (e.g., cold winters will drive up natural gas consumption to warm buildings; hot summers will increase cooling loads and electricity consumption), although some energy reduction initiatives have also taken place. This is presented in Figure 8.

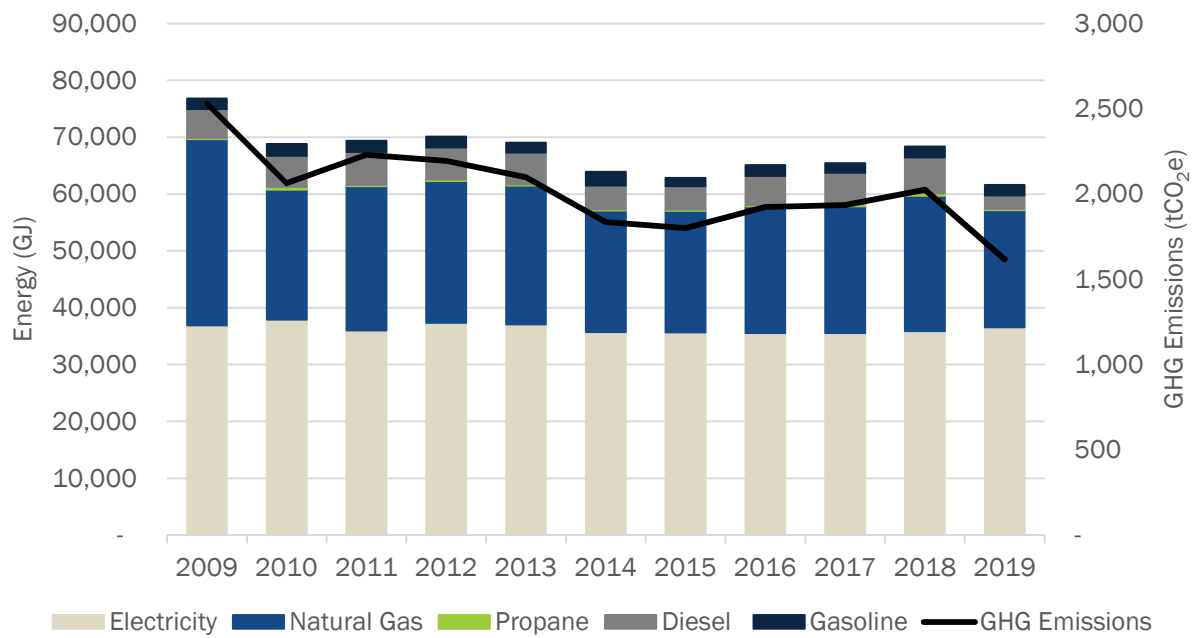


FIGURE 7. 2009 – 2019 GHG EMISSIONS TRENDS BY FUEL TYPE

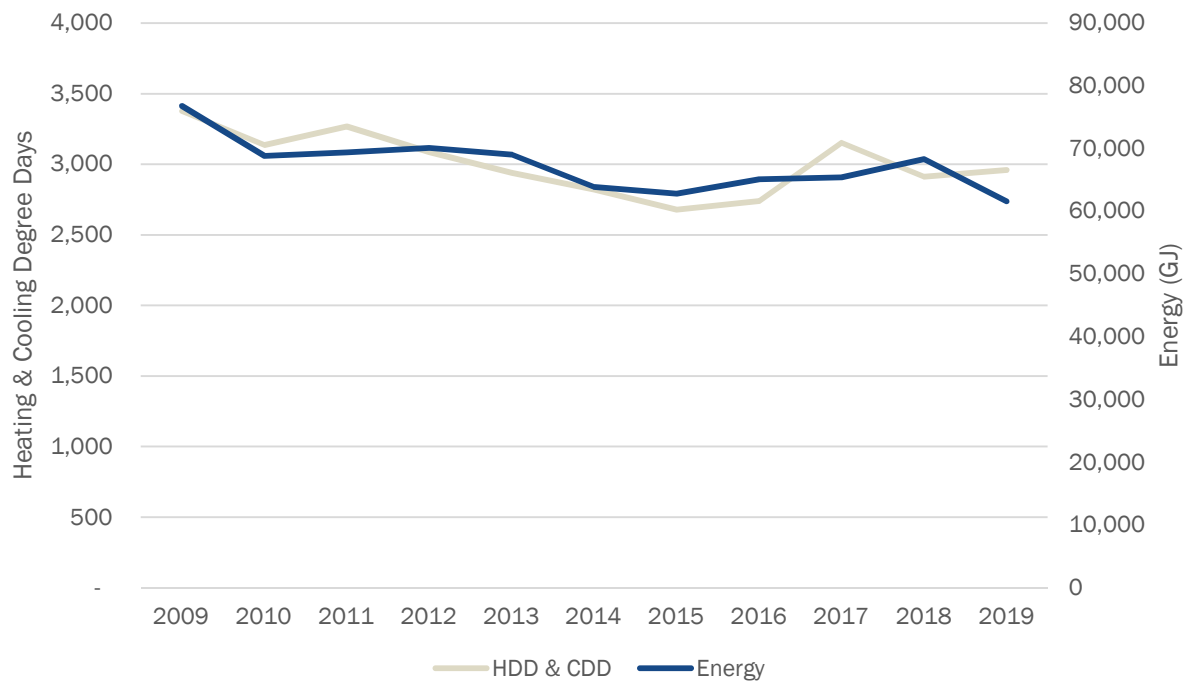


FIGURE 8. HISTORICAL ENERGY, HEATING AND COOLING DAY TRENDS

## Business as Usual Energy & GHG Emissions Forecast

A business as usual (BAU) energy and GHG emissions forecast was developed for the Plan to understand what the CVRD's energy and carbon footprint would look like in 2030 and 2050 as well as examine the potential magnitude of energy and GHG reduction opportunities relative to best practice GHG reduction targets (Figure 9). Assuming the CVRD does not implement any of the energy saving and GHG emissions reduction initiatives recommended in this Plan, the CVRD's corporate energy and emissions are expected to increase by 14% and 20%, respectively, by 2050 as a result of increased energy costs and rising service levels and demands as the community grows. Accordingly, corporate energy costs in 2019 were nearly \$1.2 million and are estimated to reach \$4.4 million by 2050, should no further conservation and demand reduction actions take place.

The BAU forecast assumes that the CVRD can continue servicing the growing community with existing building assets but will require additional fleet vehicles and equipment. The following assumptions are applied in the forecast:

- Real energy consumption data was available from the CVRD from 2009 to 2019. This data was used to derive annual energy estimates for the future.
- The existing corporate building stock is expected to be better utilized to support an increasing population and thus no additional buildings beyond those planned or in the process of being built are included.
- The new water treatment operations center and GLID water treatment system were commissioned and operational in 2021.
- Current Solar Photovoltaic (PV) systems continue to operate as intended through 2050.
- The CVRD vehicle population would turn-over at a similar rate to the average rate for Canada (every 10 years).
- The CVRD opportunistically converts light duty vehicles and trucks to electric.
- Future wastewater pumping and processing, and water storage, treatment, and pumping energy usage will increase proportionally to the population growth rate.
- Federal corporate average fuel economy (CAFE) standards and tailpipe GHG emissions standards for light duty and heavy-duty vehicles (HDV) starting in 2027.
- Electric vehicle sale requirements will be followed as established by the Zero-Emissions Act.<sup>5</sup>
- The electricity GHG emissions intensity in BC does not change from 2020 levels.
- The CVRD population grows, on average, at an annual rate of 1.6% (this based on the 2021 census results).

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<sup>5</sup> <https://www2.gov.bc.ca/gov/content/industry/electricity-alternative-energy/transportation-energies/clean-transportation-policies-programs/zero-emission-vehicles-act>



FIGURE 9. FORECASTED ENERGY & GHG EMISSIONS UNDER A BAU SCENARIO

### CVRD GHG Reduction Targets

To substantially reduce the risks and effects of climate change, and limit global warming to 1.5°C, scientists and policy makers have come to the agreement that global society must dramatically reduce greenhouse gas emissions and achieve net zero by 2050. This translates to reducing base year GHG emissions 50% by 2030, 80% by 2040, more than 90% by 2050 with the remaining emissions being offset or neutralized (e.g., direct air capture, reforestation, etc.) and net negative in the second half of the century. Recognizing the importance and benefits to addressing climate change, the Government of Canada, the Province of BC, and companies representing more than \$23 trillion in market capitalization have now committed to these science-based targets (SBT).<sup>6</sup>

As more and more organizations and governments commit to science-based targets, the global authority on the topic — The Science Based Targets initiative (SBTi) — is in the process of

<sup>6</sup> <https://sciencebasedtargets.org/news/more-than-1000-companies-commit-to-science-based-emissions-reductions-in-line-with-1-5-c-climate-ambition>

establishing specific industry guidance on how these targets need to be established and met. While there is no current industry guidance for local and regional governments yet, the following corporate standards are expected to apply:

- Any net zero claim will need to be based on a long-term SBT with a completion before 2050. These reduction targets are required to be 90% of the base year with the remainder of the GHG emissions (e.g., residual) that cannot be eliminated are to be offset or neutralized.
- Carbon offsets and technological removals projects (e.g., direct air capture) and neutralization projects like reforestation or land conservation projects can be used to reduce emissions but cannot exceed 10% of the required emission reductions.
- The base year must be within 2 years of when the SBT is set.
- Natural GHG emission reductions can be achieved through the procurement of renewable fuels like renewable natural gas (RNG).
- All SBTs must be revisited every 5 years.

Achieving a net-zero claim means that little to no GHG emissions are being emitted from operations; this is different from carbon neutrality where the intent is to allow GHG emissions to be released to the atmosphere and “balance” them out by procuring carbon offsets. This means that no organization can wait until 2050 to achieve its GHG reduction target – actions to reduce operational GHG emissions must begin to be implemented immediately.

Adopting a net-zero target will require a significant change from the CVRD’s current approach from procuring carbon offsets to achieve carbon neutrality as this approach places a greater onus on the organization to implement projects to actually reduce corporate GHG emissions. While the CVRD can continue to procure offsets to adhere to its current carbon neutral commitments, the organization will need to actively work to reduce corporate GHG emissions first, utilize RNG second, and then use carbon offsets and technological removals and / or neutralization projects to achieve the GHG reduction targets. To this end, it is recommended that the CVRD establish carbon offset procurement standards that align with The Oxford Principles for Net Zero Aligned Carbon Offsetting<sup>7</sup> and that consider the following criteria:

- **Additional.** The carbon offsets would not have occurred without the carbon finance.
- **Audited.** The carbon offsets have been validated and verified by third-party assessors using independent, recognized, standard quantification methodologies to ensure GHG emission removals were actually achieved.
- **Not Double Counted.** The carbon offsets are serialized on a carbon registry and ownership can be traced back to the developer.

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<sup>7</sup> <https://www.smithschool.ox.ac.uk/publications/reports/Oxford-Offsetting-Principles-2020.pdf>

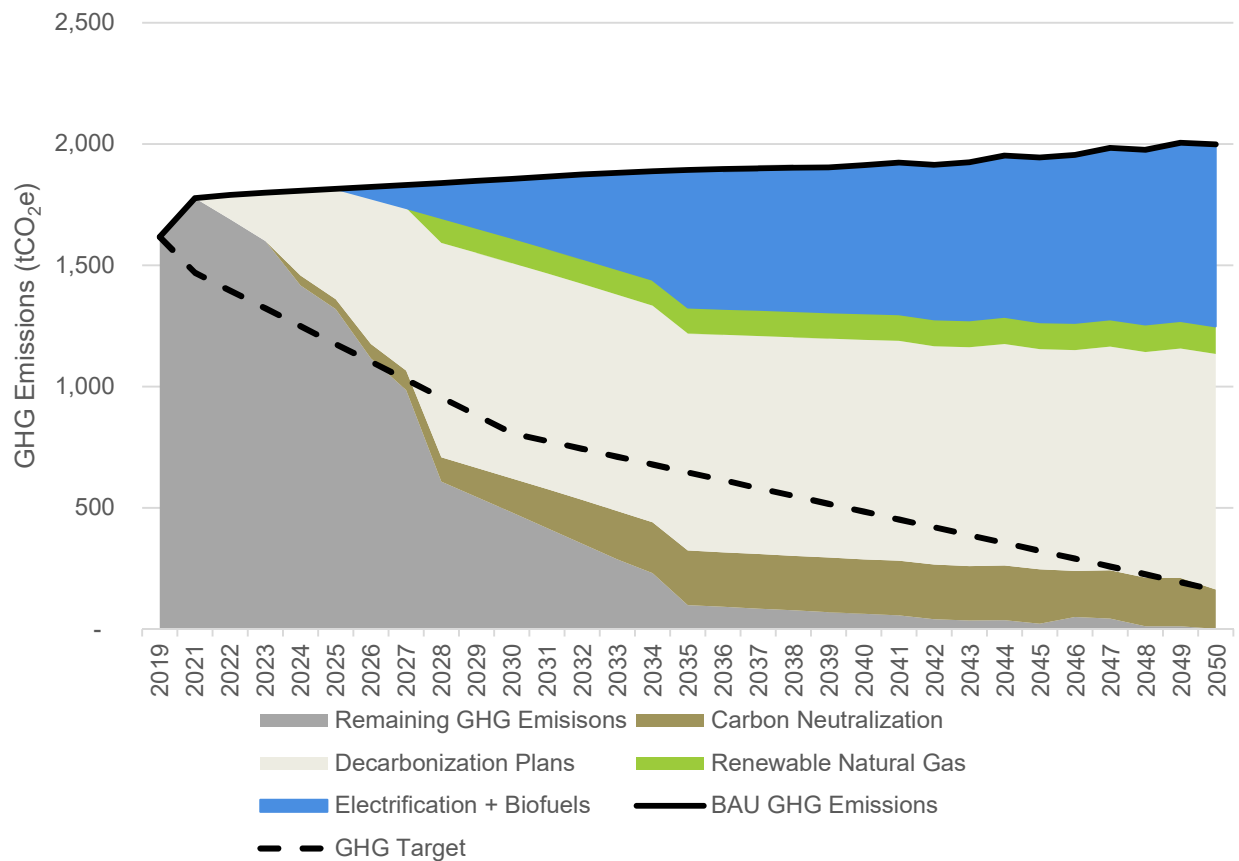
- **Local.** The carbon offsets are Canada-based and local (preference to those based in British Columbia).
- **Socially & Environmentally Positive.** There are no negative environmental or social impacts as a result of the generation of the carbon offsets and the project provides social and community co-benefits, such as those that directly support/engage communities, local/small business, and/or projects with First Nation's ownership.
- **Certified.** The carbon offsets have been generated under a recognized offset standard (e.g., Gold Standard, BC GGIRCA, VCS).

By influencing decisions around where people live and work, how people and goods move around, and how communities change over time, regional districts and cities play an important role in the reduction of GHG emissions and the impacts that climate change can have. On this basis, in this Plan, the CVRD is establishing new SBT GHG emission reduction targets of 50% below 2019 levels by 2030, and net zero by 2050. Using today's technologies, to meet either of these GHG reduction targets, the CVRD would need to:

- Renovate the existing building and facility stock to operate at or close to zero-emissions performance.
- Switch all large and heavy-duty equipment to biodiesel or other low carbon fuels.
- Adjust various business models and service levels to reduce energy and GHG emissions.
- Transition heavy duty fleet and equipment to electric where there are no conflicts with occupation health and safety or other performance requirements, and where technologies have proven to be reliable through pilot studies.
- Explicitly define and recognize natural assets as an asset class in the CVRD financial accounting systems and establish obligations to operate, maintain, and replace natural assets alongside traditional capital assets.
- Seek opportunities to invest in local nature-based solutions / projects (e.g., reforestation) to be able to recognize the future carbon benefit. This includes having natural asset management strategies and financial resources to maintain them.
- Reduce the balance of the CVRD's GHG emissions through the purchase of renewable natural gas (RNG).

Such a pathway is presented in Figure 9 for context.





**FIGURE 10. PATHWAY TO 2030 AND NET-ZERO GHG REDUCTIONS**

To take action towards achieving the GHG reduction targets, the CVRD need to be aggressive in approach to reducing GHG emissions – this will require sufficient funding. Other than the procurement of low-cost carbon offsets, there has been little direct cost to the CVRD for emitting GHG emissions to the atmosphere. However, even accounting for fuel savings and carbon offset, the current price of carbon is just too low to shift the business case away from typical ‘like for like’ replacements towards low- or no-carbon technologies that have a lower or negative return on investment. To encourage the adoption of low- and no-emission technologies and fuels, an internal cost of carbon (ICC) method is included as an initiative in this Plan as part of all capital project assessments.

### Proposed Initiatives

To build momentum and lay the groundwork for deeper energy and GHG reduction actions to be implemented, a series of short- and medium-term initiatives have been identified in this Plan and are listed at the end of each category’s section. The initiatives represent best-practice information collected from similar regional and local governments as well as input from staff and experts.

## Buildings & Facilities

### Overview

The CVRD owns and manages administrative buildings and facilities including fire halls, solid waste facilities, community and recreation centers, and water and wastewater facilities. In 2019, the CVRD's buildings and facility portfolio accounted for 92% of its energy use and 83% of its annual GHG emissions.

To meet the CVRD's 2030 GHG emission reduction target, the CVRD will need to prioritize reducing energy and GHG emissions from its largest GHG emission contributors. The recreation centers, which account for 65% of CVRD's total emissions, are reaching asset renewal milestones which presents the CVRD an opportunity to drastically reduce and lock-in energy and GHG emission reductions over the assets remaining lifecycle (20–30 years). This also presents a challenge in that going beyond like-for-like replacements will have a cost premium and capital investment that must be planned for. These facilities will require de-carbonization plans (Initiative B3) that determine the timing and the identification of what deep energy retrofits need to take place to reduce energy and GHG emissions while maintaining the required level of service to the community. As part of each de-carbonization plan, a decision will need to be made regarding whether to redevelop, revitalize, or remove the asset. Along with considering the needs of the CVRD, health and safety, and its residents, the decision must also consider the current and future energy performance, costs, GHG emissions, and impact to the CVRD's GHG emissions base year and forecast. Taking a more holistic and life cycle view of the asset being reviewed will ensure that the CVRD considers the long-term impacts of each building addition, removal, and replacement option.

As part of maintaining and minimizing the CVRD's operational GHG emissions as part of servicing a growing community, new buildings and heavily retrofitted facilities will need to be 'net zero energy ready' which means they will be highly efficient buildings that can easily accommodate future renewable energy add-ons, such as rooftop solar panels, that will enable them to produce at least as much energy as they consume. Adopting the Province of BC's Step Code (Initiative B1), in addition to constructing buildings to be LEED® Gold equivalent<sup>8</sup>, is a valuable first step towards these important targets to mitigate a significant impact that new construction and existing renovations can have on the CVRD's carbon budget over the next 30 years.

The above actions will require capital investment and an update to the CVRD's Capital Asset Management Plans (CAMP) to address energy conservation, GHG emissions, and the impacts of climate change and to develop long-term de-carbonization plans for other buildings and facilities. Having de-carbonization plans will align or accelerate end-of-life rehabilitation initiatives for

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<sup>8</sup> [https://www.comoxvalleyrd.ca/sites/default/files/docs/Projects-Initiatives/1rs\\_cvsustainabilitystrategy\\_18feb2010.pdf](https://www.comoxvalleyrd.ca/sites/default/files/docs/Projects-Initiatives/1rs_cvsustainabilitystrategy_18feb2010.pdf)

individual building components (e.g., roof, windows, mechanical equipment, etc.) with the expected updates in the CAMPs.

Maintenance and ongoing-commissioning programs — a process of ongoing monitoring, adjustment, and retrofitting with new technologies like building automation systems upgrades and energy sub-metering — will also be key to maintaining energy and GHG reductions. Building condition assessments (BCA) and behavioral change programs are also important initiatives that will complement retrofit and building monitoring programs. One of the most cost-effective GHG emissions avoidance measures is to improve existing building utilization rates therefore minimizing the number of new buildings requiring construction in the future.

## Initiatives

### B1: Implement Green Building Requirements

The CVRD has the opportunity to increase energy efficiency and conservation during the design and construction of new buildings and the profound renovation of existing buildings. In addition to maintaining a requirement to construct LEED® Gold equivalent buildings, it is recommended that the CVRD adopt the BC Step Code, establish a minimum requirement of achieving Step 3 (which is 20% more efficient than the current building code), and require that new construction or major renovations be net zero ready. Typically, buildings achieve net zero operations by implementing ultra-efficient energy management strategies and the utilization of on-site renewable energy generation. It is recommended that this commitment apply to CVRD-owned buildings that meet any of the following criteria:

- New buildings with a gross floor area greater than 5,400 ft<sup>2</sup>.
- Major additions to existing buildings, where the size of the addition is greater than 5,400 ft<sup>2</sup>.
- Major renovations, retrofits, and rehabilitation of existing buildings, where the construction budget is greater than \$500,000.

By adopting this new criteria, the CVRD will be able to gain experience with these requirements and, ideally by 2030, adopt a LEED® Zero certification policy.

### B2: Implement an Ongoing-Commissioning Program

Commissioning verifies that a building has been constructed to its proper specifications. The best time to commission a building is during construction, with special attention being paid to the building envelope. The building envelope influences most aspects of building performance such as energy consumption, occupant comfort, and durability over the life of the entire building (40+ years).

Ongoing commissioning is the continuous commissioning of a building's entire systems over a specified period of time (typically every 2–3 years) to verify continuous peak performance over its useful life. Ongoing-commissioning and re-commissioning are important because they reduce operating costs, reduce the risk of failures, and inform retrofit opportunities and deep energy retrofit

plans. Various pre-and post-implementation commissioning case studies have showed efficiency improvements in the order of 5% to 30% because of improved operations and maintenance. The studies also showed that the resulting simple payback periods are typically less than 2 years<sup>9</sup>. Typical commissioning activities include:

- Adjusting reset and set-back temperatures and temperature settings;
- Staging/sequencing of boilers, chillers, and air handling units;
- Adjusting and repairing dampers and economizers;
- Modifying control strategies for standard hours of operation;
- Eliminating simultaneous heating and cooling;
- Air and water distribution balancing and adjustments; and
- Verifying controls and control sequencing, including enabling and re-enabling automatic controls for set points, weekends, and holidays.

It is recommended that the commissioning of buildings be scheduled on at least a three-year cycle or when the function of a building or facility changes, and that an ongoing-commissioning program be developed, managed, and tracked by the building manager in conjunction with the CVRD's asset management system. To limit the impact of occupant behavior on building performance, it is also recommended that the CVRD use change management techniques to help occupants understand and adapt to the defined parameters (i.e., temperature range, light, air flows, etc.) for conditioned spaces.

### B3: Develop & Implement De-Carbonization Plans for CVRD Recreation Facilities

Making significant progress towards the CVRD's GHG targets will require a unifying de-carbonization plan for high GHG emitting buildings and facilities — i.e., the Comox Valley Aquatic Centre and the Comox Valley Sports Centre. Deep energy retrofits that upgrade or replace equipment and building envelopes (e.g., roof, walls, windows) will help achieve the required large energy and greenhouse gas emission reductions. The objective of deep energy retrofits is to create a building that can be heated and cooled with very little energy. Deep energy retrofits involve at a minimum:

- Replacing the roof, if necessary, but minimally adding insulation
- Replacing doors, windows, louvers, etc.
- Harnessing sunlight for heat and illumination
- Converting natural gas powered heating, ventilation, and air conditioning (HVAC) systems to operate on renewable technologies like solar photovoltaic systems

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<sup>9</sup> Office of Energy Efficiency and Renewable Energy, 2010. *Operations & Maintenance Best Practices: A Guide to Achieving Operational Efficiency*, [https://www.energy.gov/sites/prod/files/2013/10/f3/omguide\\_complete.pdf](https://www.energy.gov/sites/prod/files/2013/10/f3/omguide_complete.pdf) August 3, 2018.

A study conducted by Natural Resources Canada (NRCAN) estimates that deep energy retrofits can achieve upwards of a 60% reduction in energy consumption and a similar reduction in GHG emissions.<sup>10</sup> Building de-carbonization plans will require re-thinking of building operations as well as HVAC systems. A significantly reduced building energy demand means smaller mechanical systems and options for cleaner fuel sources. Electrically driven heat-pumps generate significantly fewer GHG emissions than a natural gas boiler or furnace but may cost more to operate. The assessment and use of solar PV can reduce / eliminate the consumption of grid-based power and could be used to opportunistically support other GHG reductions in the community (e.g., solar PV to power nearby Electric Vehicle (EV) charging station). The final step to de-carbonize CVRD buildings will be to offset any residual GHG emissions through the procurement of RNG and carbon offsets.

De-carbonization plans are likely to accelerate the replacement of building components (e.g., roof, windows, mechanical equipment, etc.) where significant GHG emission reductions can be achieved. The implementation of the de-carbonization plans will require a significant capital investment with the deep energy retrofits expected to have upwards of a 40% premium on existing renovation costs for like-for-like replacements and the fact that these costs have not been planned for. Over the next 2-years, the CVRD must develop long-term de-carbonization plans for the two recreation centers. The first step towards developing de-carbonization plans is completing a heat recovery study that will review the evaluation of the heat loads, heat sinks and sources, and a review of mechanical systems and options to identify equipment renewal phases.

Wherever possible, the CVRD should bundle external funding opportunities to speed up the implementation of project initiatives. For example, the CVRD could utilize federal funding sources to help with the development of the de-carbonization plan / study (i.e., FCM Green Municipal Fund: GHG Reduction Pathway Feasibility Fund)<sup>11</sup> and use Infrastructure Canada funds (e.g., Community, Culture and Recreation Fund) to support the implementation of the de-carbonization plans.

#### B4: Investigate District Energy / Waste Heat Recovery Opportunities

The low density of existing development in the CVRD, and the high cost of retrofitting existing buildings for district energy and/or waste heat recovery may indicate that the best district energy opportunities are likely to arise when there is new construction or a large infrastructure project in the region. To ensure that the CVRD is able to benefit from future district energy and waste heat recovery opportunities during major renovations or redevelopment, the CVRD should consider undertaking a feasibility study in an effort to:

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<sup>10</sup> [www.nrcan.gc.ca/energy/efficiency/buildings/20707](http://www.nrcan.gc.ca/energy/efficiency/buildings/20707).

<sup>11</sup> [Study: GHG reduction pathway feasibility | Federation of Canadian Municipalities \(fcm.ca\)](#)

- Understand where potential opportunities exist and identify specific zones.
- Identify potential energy supply and/or heat sources.
- Investigate partnerships, financing, and governance models to advance potential district energy and heat recovery systems. The Canada Infrastructure Bank often provides funding for district energy systems if proper conditions are met.
- Understand which CVRD facilities / buildings would be best suited to benefit from these opportunities.

A key requirement for a promising location would be the proximity of major energy / heat users and sources. Through a previous study, a potential opportunity was identified for a district energy / heat recovery system shared between North Island College, Queneesh School, the Hospital, and the Aquatic Center. It is recommended that the CVRD engage with key stakeholders to explore the feasibility of such a system. There may be a funding opportunity through the QUEST Canada Net-Zero Communities Accelerator Program. The program is seeking small to mid-sized communities interested in accelerating projects and plans to save energy and emissions.

### Impact, Effort, and Timing of Initiatives

The following table outlines the potential carbon reduction, effort and cost, and the estimated completion year associated with the building and facilities initiatives.

TABLE 4. IMPACT, EFFORT, AND TIMING OF BUILDINGS & FACILITIES INITIATIVES

	<b>Initiative</b>	<b>Carbon Potential: 2021-2050</b>	<b>Effort / Cost</b>	<b>Estimated Completion Year</b>
<b>B1</b>	Implement Green Building Requirements	C	Staff Time	2022
<b>B2</b>	Implement an Ongoing-Commissioning Program	CC	Staff Time	2023
<b>B3</b>	Develop & Implement De-Carbonization Plan for CVRD Recreation Facilities	CCC	\$ - Study / Plan (may be externally funded) \$\$\$\$ - Implementation	2023– Study / Plan 2030– Completion
<b>B4</b>	Investigate District Energy / Waste Heat Recovery Opportunities	CC–CCC	Staff Time \$ - Study / Plan (may be externally funded)	2023

### LEGEND

Initiative	Carbon Potential: 2021-2050	Effort / Cost	Estimated Completion Year
<b>GHG Emissions:</b>			
C: Lays the foundation for other efforts, though by itself may not reduce GHG emissions measurably			<b>Financial Resources:</b>
CC: Reduces total annual carbon emissions by 0 to 50 tCO <sub>2</sub> e			\$: \$0–\$25,000
CCC: Reduces total annual carbon emissions by 50 to 500 tCO <sub>2</sub> e			\$\$: \$25,000–\$100,000
CCCC: Reduces total annual carbon emissions by more than 500 tCO <sub>2</sub> e			\$\$\$: Over \$100,000
			\$\$\$\$: Over \$1,000,000

## Fleet

### Overview

The CVRD owns and operates a variety of vehicles to perform daily operations. These include road insured vehicles such as light duty trucks, a fleet of fire trucks, and off-road equipment which utilize either gasoline or diesel fuel. Fleet fuel consumption is influenced by the size of the vehicle fleet, the vehicle operators, and the efficiency of the individual vehicles. In 2019, fleet and equipment accounted for 7% of the CVRD's energy consumption and 16% of corporate GHG emissions.

Fleet and equipment GHG emissions are projected to decline post 2030 as a result of the expected changes to the Federal corporate average fuel economy (CAFE) standards and tailpipe GHG emissions standards for light duty and heavy-duty vehicles (HDV) starting in 2027. Currently, there are very limited options in reducing GHG emissions from heavy duty vehicles (HDV). As the market matures and more options for low- or no-carbon HDVs become available for purchase, it is recommended that the CVRD consider pilot testing hybrid or fully electric heavy equipment prior to purchasing.

### Initiatives

Fleet and equipment GHG emissions are the direct result of a wide and varied range of services delivered to the community. As no single measure can eliminate fleet and equipment GHG emissions, a suite of strategies is required.

#### F1: Purchase Zero Emissions Fleet Vehicles

According to Bloomberg New Energy Finance, by 2040, globally nearly 55% of vehicle sales will be electric and are projected to achieve cost parity to their equivalent gasoline powered vehicle by the 2050 (Figure 10). This is likely to be accelerated as a result of BC's CleanBC Plan<sup>12</sup> which requires that all light duty vehicle sales be electric by 2040.

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<sup>12</sup> <https://cleanbc.gov.bc.ca/>



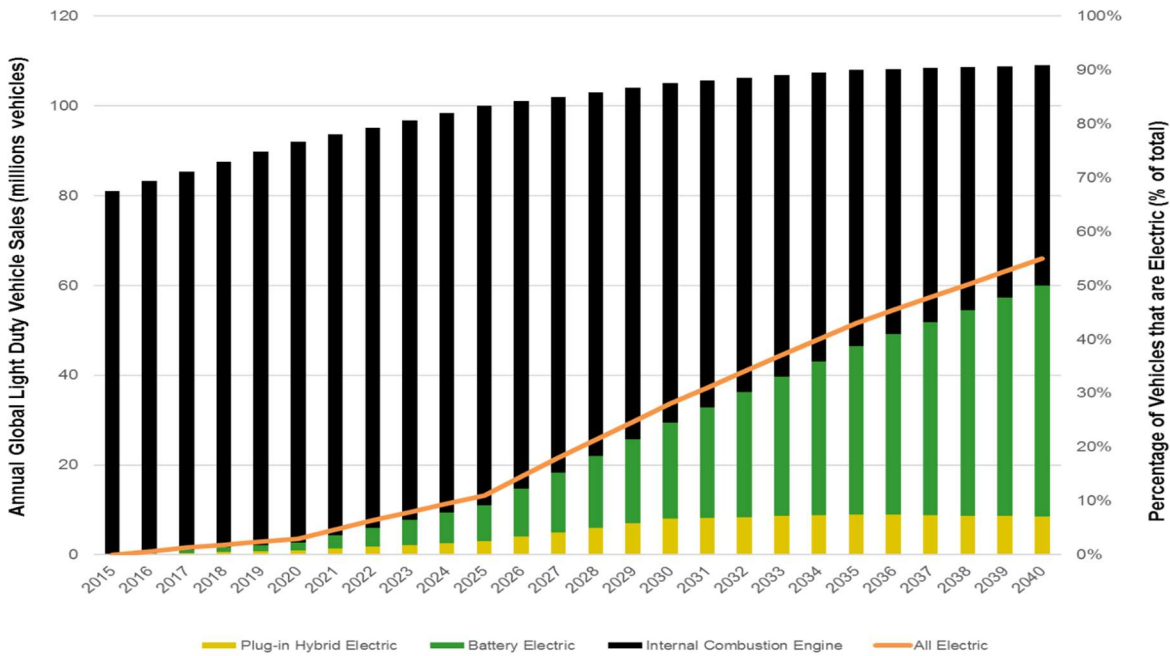


FIGURE 11. FORECASTED ELECTRIC VEHICLE GLOBAL SALES<sup>13</sup>

Currently the CVRD fleet has four electric vehicles (EV) in the fleet — all light duty passenger cars. Due to operational requirements of CVRD services, the majority of CVRD fleet vehicles are pickup trucks and sport utility vehicles (SUV). The variety and types of electric vehicles available for sale are also expected to expand significantly from the current offering of light-duty vehicles to pick-up trucks and SUVs over the next five years.

### Impact, Effort, and Timing of Initiatives

The following table outlines the potential carbon reduction, effort and cost, and the estimated completion year associated with the fleet & equipment initiatives.

TABLE 5. IMPACT, EFFORT, AND TIMING OF FLEET & EQUIPMENT INITIATIVES

<sup>13</sup> <https://about.bnef.com/electric-vehicle-outlook/>

Initiative		Carbon Potential: 2021-2050	Effort / Cost	Estimated Completion Year
<b>F1</b>	Purchase Zero Emissions Fleet Vehicles	CC-CCC	Staff Time \$ - Additional Cost Per Vehicle	2030

**LEGEND****GHG Emissions:**

C: Lays the foundation for other efforts, though by itself may not reduce GHG emissions measurably

CC: Reduces total annual carbon emissions by 0 to 50 tCO<sub>2e</sub>

CCC: Reduces total annual carbon emissions by 50 to 500 tCO<sub>2e</sub>

CCCC: Reduces total annual carbon emissions by more than 500 tCO<sub>2e</sub>

**Financial Resources:**

\$: \$0–\$25,000

\$\$: \$25,000–\$100,000

\$\$\$: Over \$100,000

\$\$\$\$: Over \$1,000,000



## Solid Waste

### Overview

The CVRD engages with third party contractors to perform Royston and Hornby Island garbage collection services. For the 2019 reporting year, the provision of these collection and transportation services accounted for less than 1% of total energy and GHG emissions.

### Initiatives

Keeping waste out of the landfill, and thus reducing collection services, requires a focus on diverting waste to other uses as well as minimizing the amount of waste generated in the first place (e.g., zero waste).

#### SW1: Work With Third-Party Waste Hauling Companies to Pilot New Fuel Technologies

While only a small portion of GHG emissions comes from waste collection and transportation, there is an opportunity for the CVRD to partner with solid waste collection service providers to investigate pilot projects utilizing electric vehicle and other heavy truck hybrid technologies as they become available. Joint pilot projects would enable the CVRD to track performance and establish performance targets. These performance targets would then be carried through into contractual requirements, along with associated penalties for non-compliance. To track and monitor contracted services, it is recommended that the CVRD include energy and GHG emissions reporting requirements in all new and renewed contracts.

#### SW2: Encourage the Adoption of Zero Waste Principles

Reducing the amount of waste created is a critical first step to reduce the burden on local landfills and reducing GHG emissions throughout a product's lifecycle from extraction to disposal. By reducing and eliminating waste, GHG emissions can be avoided not only in the landfill, but through a product's life cycle. This initiative recommends the promotion of zero waste principles to Hornby Island and Royston residents to reduce waste and the CVRD's collection related GHG emissions (Figure 0-1):

**FIGURE 0-1: ZERO WASTE HIERARCHY**



### Impact, Effort, and Timing of Initiatives

The following table outlines the potential carbon reduction, effort and cost, and the estimated completion year associated with the solid waste initiatives.

TABLE 6. IMPACT, EFFORT, AND TIMING OF SOLID WASTE INITIATIVES

Initiative		Carbon Potential: 2021-2050	Effort / Cost	Estimated Completion Year
<b>SW1</b>	Work with Third-party waste hauling companies to pilot new fuel technologies	CC	Staff Time \$\$	2025
<b>SW2</b>	Encourage the Adoption of Zero Waste Principles	C	Staff Time	Ongoing

### LEGEND

#### GHG Emissions:

C: Lays the foundation for other efforts, though by itself may not reduce GHG emissions measurably

CC: Reduces total annual carbon emissions by 0 to 50 tCO<sub>2</sub>e

#### Financial Resources:

\$: \$0–\$25,000

\$\$: \$25,000–\$100,000

\$\$\$: Over \$100,000

CCC: Reduces total annual carbon emissions by 50 to 500 tCO<sub>2</sub>e  
 CCCC: Reduces total annual carbon emissions by more than 500 tCO<sub>2</sub>e

\$\$\$\$: Over \$1,000,000

## Water & Wastewater

### Overview

The CVRD is the wholesale supplier of water and wastewater services to the Comox Valley community, and is responsible for bulk supply, treatment, and storage of drinking water and conveyance and treatment of wastewater. This infrastructure equipment operates 24 hours a day, seven days a week, and accounted for 35% of the CVRD's total energy use and 15% of GHG emissions.

### Initiatives

The water and wastewater initiatives presented herein leverage existing programs already underway and which should continue if not expand, including the water conservation, sanitary sewer inflow and infiltration reduction, and process energy programs (e.g., opportunistically installing variable frequency drives (VFD) on motors).

#### W1: Install Solar PV Arrays at the CVRD Water Treatment Plants

With the high consumption of electricity used in water and wastewater treatment processes, there exists an opportunity to install large solar photovoltaic arrays at the new water treatment plant and the West Courtney reservoir to reduce operational energy costs and GHG emissions. Financial viability may be improved by accessing external funding sources (i.e., FCM).

#### W2: Reduce Infrastructure Energy Consumption When Constructing / Renovating Non-Building Infrastructure

The CVRD should complete energy efficiency and renewable energy reviews — such as solar PV, wind, solar water/air heating, passive heating and cooling technologies, ground source heat pumps, and biomass — when constructing or renovating non-building infrastructure, examining systems as a whole, as well as when reviewing individual components for efficiency opportunities. Some typical water and wastewater energy and GHG reduction opportunities include:

- **Energy Conservation:**
  - Light emitting diode (LED) lighting retrofits
  - Installation of pump variable frequency drives to optimize pump usage to match flows
  - Improvement/addition of heating, ventilation, and air conditioning controls
  - Utilization of battery storage to reduce costly peak-time energy usage
- **Process Optimization:**

- Optimization of wastewater aeration blowers
- Full-scale implementation of real-time pump efficiency monitoring to optimize pump usage strategies
- Installation of energy sub-meters, monitoring of high energy use processes, and implementation of targeted optimization works
- **Renewable Energy:**
  - Implementation of wastewater process heat recovery systems
  - PV solar installations
  - Micro-hydro turbine installations for water and wastewater systems
- **Fuel Switching:**
  - Switching from diesel powered backup generators to natural gas generators

Many of these opportunities should be considered when infrastructure is constructed or upgraded — e.g., , installing more efficient pumps and solar PV on new water and wastewater pumpstations, replacing diesel powered backup generators with natural gas powered generators to reduce energy consumption and reduce the risks associated with diesel spills, air contaminants, etc.

### Impact, Effort, and Timing of Initiatives

The following table outlines the potential carbon reduction, effort and cost, and the estimated completion year associated with the water and wastewater initiatives.

**TABLE 7. IMPACT, EFFORT, AND TIMING OF WATER AND WASTEWATER INITIATIVES**

	<b>Initiative</b>	<b>Carbon Potential: 2021-2050</b>	<b>Effort / Cost</b>	<b>Estimated Completion Year</b>
<b>W1</b>	Install Solar PV Array at the CVRD Water Treatment Plants	CC	\$\$\$	2025
<b>W2</b>	Reduce Infrastructure Energy Consumption When Constructing / Renovating Non-Building Infrastructure	CC	Staff Time \$ - Study	2023

#### LEGEND

##### GHG Emissions:

C: Lays the foundation for other efforts, though by itself may not reduce GHG emissions measurably

CC: Reduces total annual carbon emissions by 0 to 50 tCO<sub>2</sub>e

CCC: Reduces total annual carbon emissions by 50 to 500 tCO<sub>2</sub>e

CCCC: Reduces total annual carbon emissions by more than 500 tCO<sub>2</sub>e

##### Financial Resources:

\$: \$0–\$25,000

\$\$: \$25,000–\$100,000

\$\$\$: Over \$100,000

\$\$\$\$: Over \$1,000,000

## Corporate Leadership

### Overview

As the center of GHG emissions production (cities produce 70% of all global CO<sub>2</sub> emissions<sup>14</sup>), the CVRD has an opportunity to act now to avoid the most dangerous impacts of radical climate change this century. By setting aggressive GHG emissions reductions, the CVRD takes an important leadership step in curbing GHG emissions by strategically managing its own assets and processes while also reducing community GHG emissions by nearly 2,000 tonnes. Achieving the 2030 and 2050 GHG reduction targets requires both conservation first actions like the building de-carbonization plans, but also a change in how the CVRD internalizes and prioritizes climate related actions.

### Initiatives

The following proposed initiatives align with the proposed commitments and set the foundations for other initiatives identified in the Plan.

#### C1: Set Departmental Targets & Develop Departmental GHG Emission Reduction Plans

To achieve the GHG emission reduction targets, the responsibility of this Plan needs to extend to all departments within the CVRD. While the Planning and Development Services Department commits to help coordinate the monitoring and reporting on the progress of Plan, it is recommended that CVRD departments adopt the recommended departmental GHG emission reduction targets and develop a 5-year energy and GHG emissions reduction plan for their operational activities. This would enable each department, function, or unit to directly engage in the Plan by tracking the energy use and GHG emissions resulting from day-to-day operations, decision-making, and capital purchases.

The recommended departmental GHG target years are presented in Table 13 below – these targets roll up to the proposed corporate GHG reduction targets. Note that these recommended GHG targets include the use of RNG and carbon offsets gradually reducing to 10% by the year 2050) to achieve the GHG reduction targets.

TABLE 8. RECOMMENDED DEPARTMENTAL GHG TARGETS

Department	2025	2030	2035	2040	2045	2050
Administration	30%	50%	65%	75%	85%	90%
Fire	30%	50%	65%	75%	85%	90%

<sup>14</sup> <https://unfccc.int/news/urban-climate-action-is-crucial-to-bend-the-emissions-curve#:~:text=Cities%20consume%20over%20two%2Dthirds,Asia%20and%20Sub%2DSaharan%20Africa.>



Department	2025	2030	2035	2040	2045	2050
Water	30%	50%	75%	80%	85%	90%
Recreation	30%	55%	75%	80%	85%	90%
Wastewater	30%	45%	75%	80%	85%	90%

### C2: Update Asset Management Policy and Plans

Given the nature of the proposed initiatives in this Plan, it is recommended that the CVRD update its Asset Management Policy and Capital Asset Management Plans (CAMP) to include the objective of investing in and upgrading assets to mitigate and adapt to climate change, as part of asset management planning. For example, having de-carbonization plans will align or accelerate end-of-life rehabilitation initiatives for individual building components (e.g., roof, windows, mechanical equipment, etc.) with the expected updates in the CAMPs.

### C3: Pilot the Use of LCA Tools When Making Capital Purchases

Like most local and regional governments, the CVRD is often juggling and prioritizing competing financial priorities, which can result in a procurement culture where the lowest bid is often seen as the most viable and best value for taxpayers. The result, however, is a system that defaults to 'like-for-like' replacements, penalizes higher cost energy and GHG emission reduction technologies and best-practices, and does not account for the GHG footprint of the products or services being provided. For example, NRCAN estimates that 20% of Canada's GHG emissions are embodied in the construction sector — which are not accounted for in most municipal GHG accounting systems.<sup>15</sup> To make this shift, the CVRD will need to factor in life cycle GHG emission costs, and more importantly avoided costs, into budget and capital planning, strategic planning, purchasing policies, preventative maintenance plans, environmental management plans, and asset management. The simplest form of integration is using publicly available or low cost life cycle assessment (LCA) tools (e.g., RETScreen) as part of pilot projects to account for energy and GHG emissions in budget and capital planning and asset management.

Success means that these measures are incorporated into the initial stages of operational and capital project planning, and that options for energy efficiency and conservation are considered, evaluated, and quantified in terms of life cycle, which includes cost, maintenance, and energy and GHG reductions.

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<sup>15</sup> [https://sencanada.ca/content/sen/committee/421/ENEV/reports/ENEV\\_Buildings\\_FINAL\\_e.pdf](https://sencanada.ca/content/sen/committee/421/ENEV/reports/ENEV_Buildings_FINAL_e.pdf)

#### C4: Update Purchasing Policy

The CVRD has supported the purchase of environmentally friendly products and services in principle and as set out in its Purchasing Policy. However, the policy does not directly prioritize low- to no-GHG emission products and services. It is recommended that in support of this Plan the CVRD update its Purchasing Policy to prioritize the procurement of goods and services that have a low to no-carbon footprint.

#### C5: Develop an Internal Cost of Carbon Policy

Although the social and environmental benefits of reducing energy and GHG emissions are well established, their recognition or importance in decision making processes are often under-represented. Applying an internal cost of carbon (ICC) allows organizations to better account for these benefits and is a key component to moving an organization towards its energy and GHG reduction targets. To support many of the proposed initiatives in this Plan, it is recommended that the CVRD establish an ICC which would be used to calculate the value (expressed as a cost) of GHG emissions associated with decision-making in respect to all CVRD assets and infrastructure. It is recommended that the policy require that CVRD departments internalize the cost of corporate GHG emissions in their respective budgets and pay into an internal carbon reserve fund that can be used to support climate mitigation and adaptation projects at both the corporate and community level. Several local governments have implemented similar programs (e.g., District of Saanich, City of Victoria, Metro Vancouver, City of Vancouver, city of New Westminster, City of Dawson Creek).

While it is simple enough to commit to an ICC policy, establishing the actual cost of carbon is difficult. As there is no true global benchmark, the price of carbon typically can range anywhere between CAN \$1–\$50 per tCO<sub>2e</sub> if the cost is associated with a voluntary or regulatory GHG program, or between CAN \$200–\$400 per tCO<sub>2e</sub> if the cost is based on a more comprehensive assessment of the cost of carbon and its associated damages. While a high ICC of \$400 per tCO<sub>2e</sub> is the preferable route, starting with an ICC that is significantly higher than current provincial policy without adequate education and change management is likely to stall the implementation of the policy.

It is therefore recommended that the CVRD align its policy with other climate leaders in BC — i.e., the City of Victoria, City of Vancouver, and Metro Vancouver — who's current ICC are \$160/tCO<sub>2e</sub> and are set to escalate at 6% per year. To put this ICC into context, the CVRD can purchase fossil natural gas from FortisBC for ~\$3 per gigajoule (GJ), while renewable natural gas costs \$9 per GJ. Factoring in an ICC would shift the natural gas cost to \$10 per GJ and support the business case for the purchase of RNG.

#### C6: Recognize Natural Assets as an Asset Class

The CVRD commits to reducing base year GHG emissions 50% by 2030 and more than 90% by 2050 with the remaining emissions being offset or neutralized (e.g., direct air capture,

reforestation, etc.). The neutralization of GHG emissions can be done by investing in local nature-based solutions / projects — such as land conservation projects (e.g., parks), the rehabilitation of riparian ecosystems and wetlands, the construction and maintenance of wetland-based stormwater systems — all of which can act as green infrastructure and replace grey infrastructure and provide GHG sequestration benefits. To be able to recognize the benefits from these systems, and to properly account and manage them in such a manner to maximize the co-benefits, it is recommended that the CVRD explicitly define and recognize natural assets as an asset class in the CVRD financial accounting systems. This will also require the establishment of obligations to operate, maintain, and replace natural assets alongside traditional capital assets.

There are now several examples of local governments exploring and undertaking such initiatives (e.g., Town of Gibson's, City of Surrey, City of Prince George, City of West Kelowna, etc.).<sup>16</sup>

### Impact, Effort, and Timing of Initiatives

The following table outlines the potential carbon reduction, effort and cost, and the estimated completion year associated with the corporate leadership initiatives.

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<sup>16</sup> <https://mnai.ca/>

TABLE 9. IMPACT, EFFORT, AND TIMING OF CORPORATE INITIATIVES

Initiative		Carbon Potential: 2021-2050	Effort / Cost	Estimated Completion Year
<b>C1</b>	Set Departmental Targets & Develop Departmental GHG Emission Reduction Plans	C	Staff Time	2022
<b>C2</b>	Update Asset Management Policy and Plans	C	Staff Time \$\$	2025
<b>C3</b>	Pilot the Use of LCA Tools When Making Capital Purchases	C	Staff Time \$	As opportunities present themselves.
<b>C4</b>	Update Purchasing Policy	C	Staff Time	2022
<b>C5</b>	Develop an Internal Cost of Carbon Policy	CCC	Staff Time	2022
<b>C6</b>	Recognize Natural Assets as an Asset Class	C	Staff Time \$\$	2024

**LEGEND****GHG Emissions:**

C: Lays the foundation for other efforts, though by itself may not reduce GHG emissions measurably

CC: Reduces total annual carbon emissions by 0 to 50 tCO<sub>2</sub>e

CCC: Reduces total annual carbon emissions by 50 to 500 tCO<sub>2</sub>e

CCCC: Reduces total annual carbon emissions by more than 500 tCO<sub>2</sub>e

**Financial Resources:**

\$: \$0–\$25,000

\$\$: \$25,000–\$100,000

\$\$\$ : Over \$100,000

\$\$\$\$: Over \$1,000,000



## Plan Implementation

### CEEP Pathway

The analysis in this Plan indicates that there is a pathway for the CVRD to make significant progress towards the proposed 2030 and 2050 GHG emissions reduction targets. This Plan identifies 20 initiatives which were selected based on their energy and GHG reduction potential. Table 12 presents all 20 initiatives grouped by the timing of their implementation over the next 10 years (2021-2030) and identifies a responsible party. This grouping of the initiatives illustrates the pathway to achieving the 2030 GHG emissions reduction target.

TABLE 10. CEEP PATHWAY

Initiative	Complete By End of			Work Ongoing Between 2022–2030	Carbon Potential: 2021-2050	Effort / Cost	Responsibility
	2022 / 2023	2025	2030				
<b>B1:</b> Implement Green Building Requirements <sup>1</sup>					C	Staff Time	Corporate
<b>B2:</b> Implement an Ongoing-Commissioning Program <sup>1</sup>					CC	Staff Time	Facility Managers
<b>B3:</b> Develop De-Carbonization Plan for CVRD Recreation Facilities <sup>1 2</sup>					C	\$ (Study / Plan) (may be externally funded)	Recreation
<b>B4:</b> Investigate District Energy / Waste Heat Recovery Opportunities <sup>1 2</sup>					CC-CCC	Staff Time \$ (Study / Plan) (may be externally funded)	Corporate
<b>C1:</b> Set Departmental Targets & Develop Departmental GHG Emission Reduction Plans <sup>1</sup>					C	\$\$\$	Corporate
<b>C4:</b> Update Purchasing Policy					C	Staff Time	Finance
<b>C5:</b> Develop an Internal Cost of Carbon Policy <sup>1</sup>					CCC	Staff Time	Finance
<b>B3:</b> Implement De-Carbonization Plan for CVRD Recreation Facilities <sup>1 2</sup>					CCC	\$\$\$\$ (Implementation)	Recreation
<b>C2:</b> Update Asset Management Policy and Plans					C	Staff Time    \$\$	Finance
<b>SW1:</b> Work With Third-Party Waste Hauling Companies to Pilot New Fuel Technologies					CC	Staff Time    \$\$	All Facilities
<b>W1:</b> Install Solar PV Arrays at the CVRD Water Treatment Plants					CC	\$\$\$	Water
<b>C6:</b> Recognize Natural Assets as an Asset Class					C	Staff Time    \$\$	Engineering
<b>F1:</b> Purchase Zero Emissions Fleet Vehicles <sup>1 2</sup>					CC-CCC	Staff Time    \$ (Additional Cost Per Vehicle)	Fleet
<b>C3:</b> Pilot the Use of LCA Tools When Making Capital Purchases					C	Staff Time    \$	Finance
<b>SW2:</b> Encourage the Adoption of Zero Waste Principles					C	Staff Time	Solid Waste
<b>W2:</b> Reduce Infrastructure Energy Consumption When Constructing / Renovating Non-Building Infrastructure					CC	Staff Time    \$ (Study)	Facility Managers

<sup>1</sup> Initiative is proposed to be implemented within the 2022 and 2023 reporting years

<sup>2</sup> Project has begun

LEGEND

GHG Emissions:

- C: Lays the foundation for other efforts, though by itself may not reduce GHG emissions measurably
- CC: Reduces total annual carbon emissions by 0 to 50 tCO<sub>2</sub>e
- CCC: Reduces total annual carbon emissions by 50 to 500 tCO<sub>2</sub>e
- CCCC: Reduces total annual carbon emissions by more than 500 tCO<sub>2</sub>e

Financial Resources:

- \$: \$0–\$25,000
- \$\$: \$25,000–\$100,000
- \$\$\$: Over \$100,000
- \$\$\$\$: Over \$1,000,000

## Plan Management System

A management system is a tool to facilitate the continuous improvement of a plan. For this Plan, it ensures that there will be ongoing monitoring, management, and refinement over time, and a documented delineation of the processes, roles, and responsibilities to ensure its initiatives are actioned and progressed towards the 2030 and 2050 GHG emissions reduction targets.

It is recommended that the Plan should be updated every five years. The following management system framework focuses primarily on the five and ten-year planning horizon. Changes to federal and provincial legislation and regulations, as well as technological advances that will impact the adoption and implementation of longer-term initiatives are anticipated over the next decade. The following are the framework's core elements:

- Governance and Collaboration
- Evaluating Future Initiatives
- Monitoring & Reporting
- Communication Strategy

## Governance & Collaboration

The Plan will be championed by the Executive Management Team. The structure of the Executive Management Team enables for a more direct integration of energy and GHG emissions management in the CVRD's systems while creating the necessary culture of change within the organization. Success of the Plan relies on ongoing collaboration and participation across departments and divisions. Staff from all departments are required to use the Plan as a guide for decision-making as it contains initiatives that will help bring the CVRD closer toward its 2030 and 2050 GHG reduction targets.

The Executive Management Team meets twice a year with the following objectives:

- To track and report on the progress of the Plan initiatives.
- To increase corporate awareness around energy consumption and GHG emissions.
- To integrate best practices into daily operations, where feasible, to reduce energy consumption and GHG emissions.



## Reporting & Communication

### Annual Data Collection & Reporting

Utility energy consumption data (from Fortis and BC Hydro) is provided on a monthly or bimonthly basis and is automatically uploaded into SOFI — a third-party GHG accounting tool utilized by CVRD. Fleet and equipment fuel data and contracted emissions data is collected from several sources summarized in terms of total fuel volumes and sent to the SOFI administrator for manual entry. At present, the SOFI model does not track fuel use by equipment or fleet type. Using the fuel volume data provided by the CVRD and BC based emission factors, SOFI estimates the CVRD's overall energy and GHG emissions.

In the first quarter of the following year, SOFI is used to provide a summary report of energy and GHG emissions.

### Monitoring & Reporting

A monitoring framework provides the CVRD with a task list of items to track that will help re-assess the effectiveness of Plan initiatives, GHG emissions, and other activities contained within the Plan over time. Monitoring includes two components. The first is the monitoring of the Plan initiatives — what is being done, who is doing it, is the activity funded, etc. The second component is the compilation of the energy and GHG emissions inventory to monitor the success of the Plan initiatives. Tracking, measuring, and sharing progress towards the initiatives identified in the Plan is essential to maintaining momentum for change. The success of the Plan will be measured by the results achieved relative to prior reporting years.

On an annual basis, the CVRD will prepare an Energy and GHG Emissions Report, which at a minimum, will include:

- Current energy and GHG emissions profile in aggregate and broken down by asset
- Change in energy and GHG emissions from the prior year and the baseline
- Follow up actions from the prior year's report
- A description of the work that has been completed
- Extent to which GHG emission reduction have been met
- Identification of any issues or challenges faced in advancing each initiative
- An indication of progress toward achieving each initiative, using the following scale:
  - Not Started – The initiative has not been implemented.
  - On Track – The initiative has been implemented. For various initiatives, progress will be measured through quantitative and qualitative indicators.
  - Outstanding – An issue, barrier and/or challenge is prohibiting the initiative from being implemented.
  - Delayed – The initiative has been delayed or placed on hold.
  - Completed – The initiative has been completed.

- List of new initiatives to address issues, barriers and challenges
- Timing and assigned responsibilities of the initiatives

The initiatives in this Plan should be evaluated in consultation with the various CVRD departments on an annual basis, as part of the departmental strategic operations planning process. This will be an opportunity to review and prioritize potential strategies based on resources and emerging technological opportunities.

## Resource & Budget Planning

The CVRD's 2019 energy expenditures including electricity, natural gas, diesel, gasoline, and propane was \$1.5 million. It is anticipated over the next 10 years that the average cost of energy will increase by 1–2% per year (excluding the effects of climate change and supply chain shocks), from which a large portion can be mitigated through the savings achieved by initiatives recommended in the Plan. If no further action to reduce energy and GHG emissions is taken, the CVRD's energy and carbon costs will be significant and expected to more than double by 2050. The rising cost of energy and carbon are justification to act now on implementing initiatives to conserve energy and reduce GHG emissions.

### Staff Resources

A number of strategies are intended to embed sustainable energy management and GHG reduction programs into departments, systems, and policies which requires time, staff, and the training of staff. While the Planning and Development Services Department will help coordinate the monitoring and reporting on the progress of Plan, it is recommended that all CVRD departments develop their own 5-year energy and GHG emissions reduction plan and associated budget. Key to supporting the implementation of the initiatives in this Plan and the department plans is the training of staff on energy and GHG management practices and concepts to build competencies. The CVRD should seek to include energy training concepts for relevant staff, where appropriate.

### Financial Resources

Wherever possible, the CVRD should take advantage of external funds to speed up the implementation of project initiatives. For example, the CVRD could submit an application to Infrastructure Canada for federal funding under the Community, Culture and Recreation Fund to support the energy projects at the identified recreation centers under the basis that the retrofits would reduce GHG emissions, but also support using the community centers as 'cooling centers' during heatwaves. The FCM Green Initiative Funds often has grants available to support sustainability and climate action planning efforts and offset low-interest loans to support capital projects that reduce energy and GHG emissions.

As these funding programs are subject to political changes, the CVRD should proactively plan and incorporate capital and operating costs of the proposed initiatives into future budgets. This will enable the CVRD to take advantage of external funding opportunities when they are available, but not have to rely on these external sources to move forward on initiatives.

It should be noted that regardless of external funding availability, the proposed initiatives are contingent on future Board approval, and future staff and budget (capital and operating) availability. As part of implementing the initiatives in this Plan, the following risks would need to be considered and addressed:

- Increasing capital and operating costs, as well as lower than expected saving and revenues.
- Regulatory barriers and compliance issues that impede the implementation of the initiatives.
- Competing Board and departmental priorities including current operational mandates of impacted services and how mandates have to change to achieve the energy and GHG reductions.

### Communication Strategy

The overall goal of the communication strategy is to outline tools and techniques to assist the CVRD with ongoing internal communication about the Plan, including implementation and progress towards targets. The communication strategy is focused on internal communication for CVRD staff and the Board and is not designed to be public. The key objectives of the communication strategy are to:

- Communicate the presence and importance of the Plan.
- Share progress towards the 2030 and 2050 GHG reduction targets.
- Motivate multiple audiences about what they can do to reduce corporate energy use and GHG emissions.
- Communicate coming changes in business practices to support the implementation of the Plan.

### Tactics

The communications strategy could include the following strategic tactics (Table 14).

TABLE 11. SUGGESTED COMMUNICATION TACTICS

Tactic	Description/Rationale
Host bi-yearly meetings with department leaders	<p>The intent of these meetings is to:</p> <ul style="list-style-type: none"> <li>• Share best practices between departments</li> <li>• Provide status/progress updates on Energy conservation and GHG emission reduction strategies across all departments</li> <li>• Prioritize work</li> <li>• Share funding opportunities</li> <li>• Collaborate on shared initiatives that flow into annual work plans and budgets</li> </ul>
Develop an annual corporate Energy and GHG Emissions Progress Report	<p>Utilize the SOFI platform to gather information from all departments, and report annually on energy and GHG emissions.</p> <p>Ensure the development of a one-page, graphic summary document which can be used to communicate results with a wide range of audiences.</p>

Tactic	Description/Rationale
Implement targeted energy skills training	Implement specialized training opportunities as per the Plan initiatives.
Implement general energy skills training for all staff	<p>Develop (or adopt) a stand-alone webinar that would be suitable for all CVRD staff. The webinar could cover:</p> <ul style="list-style-type: none"> <li>• The presence of the Plan</li> <li>• The role of all staff members in contributing to energy conservation and GHG emission reductions</li> <li>• Easy tips and reminders for every day corporate energy conservation and GHG emission reductions</li> </ul>
Work to integrate key messaging into existing communications	Work alongside the communications department to share tips and reminders about energy conservation and GHG emission reductions with all staff.
Ensure open lines of communication	<p>Ensure that staff across the corporation have knowledge of, and access to a Plan-based information-sharing portal. This portal might be used to:</p> <ul style="list-style-type: none"> <li>• Share innovative ideas</li> <li>• Identify areas of concern</li> <li>• Provide feedback or solutions</li> </ul>
Embed results in performance plans	Consider the inclusion of energy and GHG emission reduction targets in select employee's performance reviews. This would serve to recognize specific staff for their success in helping to achieve the GHG reduction targets.



# Corporate Energy & Emissions Plan (Solid Waste Addendum)

Comox Valley Regional District

## Fugitive Landfill Gas (LFG) Methane Emissions

### Overview

Methane gas is recognized as one of the most potent contributors to climate change – it has 80 times the warming potential of carbon dioxide (CO<sub>2</sub>) over the first 20 years of its life in the atmosphere. It is estimated that 25% of today's global warming is driven by methane from human actions,<sup>17</sup> which means that by significantly reducing and eliminating the release of this greenhouse gas (GHG), it could be one of the fastest opportunities to slow climate change and short-/medium-term warming patterns. Methane occurs both naturally – through the decomposition of organic matter - and from human induced actions like coal mining, oil and gas extraction, production and transportation, agricultural activities, stationary and mobile combustion, wastewater treatment, some industrial processes and through the decomposition of organic waste in landfills.

Landfills create an oxygen-deprived (anaerobic) environment in which organic waste decomposes and creates landfill gas (LFG). LFG is not pure methane, it is a mix of 45-55% methane, 45-55% carbon dioxide, and 1% non-methane organic compounds.<sup>18</sup> Without any infrastructure or controls in place, LFG seeps to the edges of the landfill and is released into the atmosphere. Reducing LFG emissions typically involves two approaches: elimination through emissions capture; and prevention, by diverting decomposable materials away from the landfill.

As it relates to the CVRD, the Comox Strathcona Waste Management (CSWM) service owns and manages two regulated landfill sites under the *Landfill Gas Management Regulation* (B.C. Reg. 391/2008), in Campbell River and Cumberland. Solid waste from the CVRD municipalities and electoral areas are sent to the Comox Valley Waste Management Centre (CVWMC) in Cumberland for disposal. For the 2019 reporting year, these two regulated facilities were estimated to have generated 3,764 tonnes of methane gas, or 94,101 tCO<sub>2</sub>e from the decomposition of waste disposed. This is calculated using a first order decay model and the approximate volume and composition of the garbage over three decades; the emissions generated estimates are not required under the *Landfill Gas Management Regulation* to be field verified.

To reduce the methane emissions, LFG collection wells are installed under vacuum pressure, and are used to extract the LFG and send it to a flare for destruction, or to be used beneficially, for example to create electricity or renewable natural gas (RNG). It should be noted that no LFG capture system

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<sup>17</sup> <https://www.edf.org/climate/methane-crucial-opportunity-climate-fight#:~:text=Methane%20has%20more%20than%2080,by%20methane%20from%20human%20actions.>

<sup>18</sup> <https://www.epa.gov/lmop/frequent-questions-about-landfill-gas#whatcomponents>

is 100% effective and some LFG's will still escape; these escaping gases are referred to as a fugitive emissions.

Flaring is the most common approach to reduce the global warming potential of LFG by converting methane to carbon dioxide through the process of combustion. At the CVWMC an active LFG capture system and flare are operational (since 2016), which reduced the fugitive emissions from this facility by 30,726 tCO<sub>2</sub>e in 2019. An LFG capture system is being constructed at the Campbell River Waste Management Centre (CRWMC) as part of the closure of that landfill and will be operational by 2023 significantly reducing future emissions from the site. Figure 1. shows the total amount of LFG emissions estimated to be released to the atmosphere for each of the facilities, and the reduction in LFG emissions that was achieved by capturing and destroying the LFG via flare at the CVWMC (referred to as avoided GHG emissions).

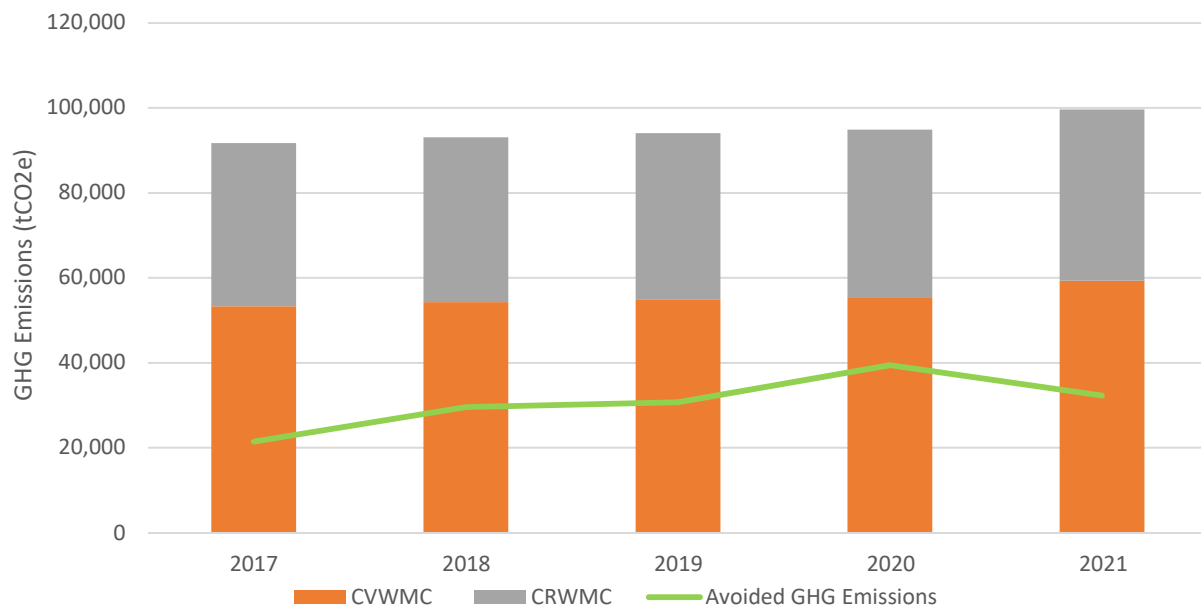


FIGURE 1. SUMMARY OF LANDFILL GHG EMISSIONS

The CVWMC was estimated to have a 63.1% capture efficiency in 2021 for the areas of active gas collection. As stated in Section 3.1 of the Landfill Gas Management Facilities Design Guidelines, “*It is expected that LFG management systems must be designed to maintain 75% collection efficiency.*”. The design of the LFG management system at the CVWMC includes the continued construction and commissioning of LFG infrastructure in conjunction with filling in order to target the 75% collection efficiency. In 2019 and 2020 the CSWM installed additional horizontal collection trenches in the Engineered Landfill, expanded the LFG header pipe in 2021, and began accepting LFG from Cell 1 in January 2022. This new connection will increase the collection efficiency in future years at the CVWMC.

In addition to improving the collection efficiency of the CVWMC and installing LFG capture and flaring at the CRWMC, an additional GHG reduction initiative would be to utilize the LFG as an energy source (electricity or refined to RNG). This can reduce landfill GHG emissions in the community by displacing other fossil fuels (e.g., using RNG to displace conventional natural gas or transportation fuels such as diesel). Contract negotiations are underway at the CVWMC, and feasibility studies are being pursued for the CRWMC to implement beneficial use of the LFG at the CSWM facilities.

On the prevention of LFG emission front, the CSWM group is being proactive and are in the process of constructing an organics compost facility that when operational, will handle organic waste from single family dwellings in Courtenay, Comox, Cumberland and Campbell River. The composting of food and yard waste using a forced aeration composting process would result in fewer emissions compared to landfilling the same material volumes with active landfill gas capture.

## Responsibility

The CVRD's CEEP energy and GHG boundary was established following an "operational control" approach where the CVRD tracks energy and GHG emissions of an asset when two conditions are met:

- the CVRD owns the asset; and
- the CVRD is responsible for maintenance and capital upgrades.

Solid waste management matters are dealt with through the CSWM Board of Directors (the CSWM Board), which includes elected officials from the CVRD and the Strathcona Regional District (SRD) member municipalities and rural areas. Based on this lens, due to the unique management situation of the solid waste disposal facilities through the CSWM Board, the CVRD does not have full operational control. It is therefore recommended that the CVRD corporate energy and emissions plan not include the GHG emissions associated with landfill gas, nor the other solid waste management activities under the purview of the CSWM Board. The CSWM service has initiated a renewal of their Solid Waste Management Plan, which could provide an excellent process and regulatory tool to devise strategies and targets for the reduction of GHG impacts from landfills, organics processing, waste collection and diversion initiatives.

The following GHG reduction initiatives are being suggested for the CSWM Board to consider.

## Suggested Initiatives For Consideration

### [LFG1: Investigate Renewable Energy Sources for Stationary Assets](#)

There may be an opportunity to implement alternative energy systems — such as solar PV systems — at the composting facility to reduce operational energy costs and GHG emissions. Financial viability may be improved by accessing external funding sources (i.e., FCM).



### LFG2: Explore the Feasibility of Refining LFG Generation Estimates

The CSWM is following the Landfill Gas Management Regulation and using a provincial desktop model to estimate the amount of LFG generated. This generic model has been found to overestimate methane generation rates in landfills within BC that have undertaken more site-specific modelling and supported surface emission monitoring. As surface emission monitoring techniques progress, the CSWM could consider exploring direct measurement methods or site-specific modelling to refine the LFG generation estimate.

### LFG3: Explore More Efficient Waste Hauling Systems At Waste Depots

There may be an opportunity to reduce the number of solid waste transfer station trips through the use of waste compaction and bigger trailer systems. Converting this into action would involve examining existing vehicles, size and number of waste loads, fuel use and GHG emissions, and how factors like waste compaction techniques can positively and negatively impact fuel consumption, operation and maintenance costs, and GHG emissions. This information can then be used to establish a baseline for fuel costs and GHG emissions and to model process changes to identify fuel and GHG reduction opportunities.

### LFG4: Incorporate Landfill GHG Reduction Targets and Actions Into the CSWM Solid Waste Management Plan Renewal

As part of the Solid Waste Management Plan renewal, consideration could be given to detailing current GHG emissions from operations, contractor operations and landfills, and setting goals for GHG reduction initiatives within the solid waste service. Funding for significant capital spending required to reduce GHGs could be identified and approved through the SWMP process. Examples include aggressive installation of landfill closure and LFG collection infrastructure, funding LFG beneficial use projects, alternative fuel equipment purchasing, and investment in compaction or capital to reduce transport emissions.

Initiative	Complete By End of			Work Ongoing Between 2022–2030	Carbon Potential: 2021-2050	Effort / Cost
	2022 / 2023	2025	2030			
<b>B1:</b> Implement Green Building Requirements <sup>1</sup>					C	Staff Time
<b>B2:</b> Implement an Ongoing-Commissioning Program <sup>1</sup>					CC	Staff Time
<b>B3:</b> Develop De-Carbonization Plan for CVRD Recreation Facilities <sup>1 2</sup>					C	\$ (Study / Plan) (may be externally funded)
<b>B4:</b> Investigate District Energy / Waste Heat Recovery Opportunities <sup>1 2</sup>					CC-CCC	Staff Time \$ (Study / Plan) (may be externally funded)
<b>C1:</b> Set Departmental Targets & Develop Departmental GHG Emission Reduction Plans <sup>1</sup>					C	\$\$\$
<b>C4:</b> Update Purchasing Policy					C	Staff Time
<b>C5:</b> Develop an Internal Cost of Carbon Policy <sup>1</sup>					CCC	Staff Time
<b>B3:</b> Implement De-Carbonization Plan for CVRD Recreation Facilities <sup>1 2</sup>					CCC	\$\$\$\$ (Implementation)
<b>C2:</b> Update Asset Management Policy and Plans					C	Staff Time    \$\$
<b>SW1:</b> Work With Third-Party Waste Hauling Companies to Pilot New Fuel Technologies					CC	Staff Time    \$\$
<b>W1:</b> Install Solar PV Arrays at the CVRD Water Treatment Plants					CC	\$\$\$
<b>C6:</b> Recognize Natural Assets as an Asset Class					C	Staff Time    \$\$
<b>F1:</b> Purchase Zero Emissions Fleet Vehicles <sup>1 2</sup>					CC-CCC	Staff Time    \$ (Additional Cost Per Vehicle)
<b>C3:</b> Pilot the Use of LCA Tools When Making Capital Purchases					C	Staff Time    \$
<b>SW2:</b> Encourage the Adoption of Zero Waste Principles					C	Staff Time
<b>W2:</b> Reduce Infrastructure Energy Consumption When Constructing / Renovating Non-Building Infrastructure					CC	Staff Time    \$ (Study)

<sup>1</sup> Initiative is proposed to be implemented within the 2022 and 2023 reporting years

<sup>2</sup> Project has begun

#### LEGEND

##### GHG Emissions:

C: Lays the foundation for other efforts, though by itself may not reduce GHG emissions measurably  
 CC: Reduces total annual carbon emissions by 0 to 50 tCO<sub>2e</sub>  
 CCC: Reduces total annual carbon emissions by 50 to 500 tCO<sub>2e</sub>  
 CCCC: Reduces total annual carbon emissions by more than 500 tCO<sub>2e</sub>

##### Financial Resources:

\$: \$0–\$25,000  
 \$\$: \$25,000–\$100,000  
 \$\$\$: Over \$100,000  
 \$\$\$\$: Over \$1,000,000