Capital Regional District

625 Fisgard St.,
Victoria, BC V8W 1R7

Notice of Meeting and Meeting Agenda
Environmental Services Committee

Wednesday, September 27, 2023 | **11:30 AM** | **6th Floor Boardroom, 625 Fisgard St. Victoria, BC V8W 1R7**

Special Meeting

B. Desjardins (Chair), S. Tobias (Vice Chair), J. Brownoff, J. Caradonna, G. Holman, D. Kobayashi, D. Murdock, M. Tait, D. Thompson, A. Wickheim, C. Plant (Board Chair, ex-officio)

The Capital Regional District strives to be a place where inclusion is paramount and all people are treated with dignity. We pledge to make our meetings a place where all feel welcome and respected.

1. Territorial Acknowledgement

2. Approval of Agenda

3. Presentations/Delegations

The public are welcome to attend CRD Board meetings in-person.

Delegations will have the option to participate electronically. Please complete the online application at www.crd.bc.ca/address no later than 4:30 pm two days before the meeting and staff will respond with details.

Alternatively, you may email your comments on an agenda item to the CRD Board at crdboard@crd.bc.ca.

3.1. 23-702 Delegation - Lyndsey Smith; Costal Douglas-fir Conservation Partnership: Re: Agenda Item 4.3. Service Planning 2024 - Climate Action Community Need Summary

4. Special Meeting Matters

4.1. 23-645 Service Planning 2024 - Solid Waste & Recycling Community Need Summary

Recommendation: The Environmental Services Committee recommends the Committee of the Whole recommend to the Capital Regional District Board:
That Appendix A, Community Need Summary - Solid Waste & Recycling, be approved as presented and form the basis of the Provisional 2024-2028 Financial Plan.

Attachments: Staff Report: Service Planning 2024 - Solid Waste & Recycling Summary

Appendix A: Community Need Summary - Solid Waste & Recycling

4.2. 23-672 Environmental Resource Management - 2024 Operating and Capital Budget

Recommendation: The Environmental Services Committee recommends the Committee of the Whole recommend to the Capital Regional District Board:
That Appendix A, Operating & Capital Budget - Environmental Resource Management be approved as presented and form the basis of the Provisional 2024-2028 Financial Plan.

Attachments:
- Staff Report: ERM - 2024 Operating and Capital Budget
- Appendix A: 2024 Environmental Resource Management Budget
- Presentation: ERM 2024 Operating & Capital Budget

4.3. 23-658 Service Planning 2024 - Climate Action Community Need Summary

Recommendation: The Environmental Services Committee recommends the Committee of the Whole recommend to the Capital Regional District Board:
That Appendix A, Community Need Summary - Climate Action, be approved as presented and form the basis of the Provisional 2024-2028 Financial Plan.

Attachments:
- Staff Report: Service Planning 2024 - Climate Action Community Need Summary
- Appendix A: Community Need Summary - Climate Action

4.4. 23-676 2022 Regional Greenhouse Gas Inventory

Recommendation: There is no recommendation. This report is for information only.

Attachments:
- Staff Report: Regional Greenhouse Gas Inventory
- Appendix A GHG Emissions Inventory Report - Stantec (September 14, 2023)
- Appendix B: 2007 Base Year & 2022 Reporting Year Energy & GHG Emissions
- Appendix C: CRD CO2e Emissions Per Capita (September 2023)

4.5. 23-663 Vancouver Island and Coastal Communities Climate Leadership Steering Committee - Funding Request

Recommendation: The Environmental Services Committee recommends to the Capital Regional District Board:
That the CRD provide $31,500 to the Community Energy Association to act as a secretariat and support priority initiatives of the Vancouver Island and Coastal Communities Climate Leadership Steering Committee through 2024.

Attachments:
- Staff Report: VICC Climate Leadership Steering Committee - Funding Request
- Appendix A: Funding Request Letter to CRD Chair & Board - July 24, 2023

4.6. 23-656 Vancouver Island and Coastal Communities Committee on Solid Waste and Circular Economy - Terms of Reference and CRD Appointment

Recommendation: The Environmental Services Committee recommends to the CRD Board:
1. That the Vancouver Island and Coastal Communities Committee on Solid Waste and Circular Economy Terms of Reference be endorsed; and
2. That the Environmental Services Committee Chair be appointed as the Vancouver Island and Coastal Communities Committee on Solid Waste and Circular Economy as the Capital Regional District elected representative, with the Environmental Services Committee Vice-Chair as alternate.

Attachments: Staff Report: VICC on Solid Waste & Circular Economy - TOR & Appointment

Appendix A: Draft TOR for VICC Committee on Solid Waste

Appendix B: RFP - Committee Secretariat and Admin Services

5. Adjournment

The next meeting is October 18, 2023.

To ensure quorum, please advise Jessica Dorman (jdorman@crd.bc.ca) if you or your alternate cannot attend.

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ERM 23-34

REPORT TO ENVIRONMENTAL SERVICES COMMITTEE
MEETING OF WEDNESDAY, SEPTEMBER 27, 2023

SUBJECT **Service Planning 2024 – Solid Waste & Recycling Community Need Summary**

ISSUE SUMMARY

To provide strategic context and an overview of services, initiatives and performance data related to the Solid Waste & Recycling Community Need.

BACKGROUND

The Capital Regional District (CRD) Board approved the 2023-2026 Board Priorities on March 8, 2023. Staff then developed the 2023-2026 CRD Corporate Plan, which was approved by the CRD Board on April 12, 2023.

The CRD Corporate Plan presents the work the organization needs to deliver over the four-year term, along with the critical regional, sub-regional and local services, to meet the region's most important needs (i.e., Community Needs) and advance the Board's Vision and Priorities. Board Priorities, Corporate Plan initiatives and core service delivery form the foundation of the five-year financial plan.

The 2024 planning cycle marks the first year of the implementation of the 2023-2026 CRD Corporate Plan. The CRD's annual service plans, known as Community Need Summaries, provide an overview of the operational and strategic context, services levels, initiatives, and performance data for each Community Need. They also provide details of the initiatives, associated staffing, timing and service levels required to advance the work in future years.

The Solid Waste & Recycling Community Need Summary is attached as Appendix A. The desired outcome is to minimize waste disposal and maximize waste diversion.

The CRD reports on the progress of its initiatives and services on a regular basis. The Board receives updates about the Board Strategic Priorities through the Chief Administrative Officer Quarterly Progress Reports. The Board also receives an overview of progress made on delivering the Corporate Plan twice a year at the strategic check-in and provisional budget meetings, which take place in the spring and fall respectively. The next strategic check-in will take place in spring 2024. During the year, standing committees and commissions also fulfill an oversight and advisory role in relation to the work.

ALTERNATIVES

Alternative 1
The Environmental Services Committee recommends the Committee of the Whole recommend to the CRD Board:
That Appendix A, Community Need Summary – Solid Waste & Recycling, be approved as presented and form the basis of the Provisional 2024-2028 Financial Plan.

Alternative 2
The Environmental Services Committee recommends the Committee of the Whole recommend to the CRD Board:
That Appendix A, Community Need Summary – Solid Waste & Recycling, be approved as amended and form the basis of the Final 2024-2028 Financial Plan.

IMPLICATIONS

Governance Implications

In 2024, staff have prioritized programs and initiatives that:

- advance 2023-2026 Board Priorities or Corporate Plan initiatives;
- operationalize capital investments; and/or
- are necessary to maintain a core service level following a regulatory change or where there is a safety risk to customers, communities, or staff.

The Executive Leadership Team (ELT) has reviewed and assessed all initiative business cases and confirmed alignment with the criteria. ELT has determined that the consolidated package of work is appropriate and a proportional response to the CRD Board's and communities' expectations of the organization.

Financial Implications

To exercise constraint and cost containment, the CRD Board directed staff to keep the core inflationary adjustment to 3.5% through the 2024 Service and Financial Planning Guidelines. Staff and management have taken the necessary steps to mitigate the financial impact of proposed initiatives, as well as cost escalation and high inflation rate experienced in 2022 through to 2023.

Financial and staff impacts for initiatives will be summarized and included in the provisional budget, which will be presented at the Committee of the Whole meeting scheduled for October 25, 2023. Starting this year, this will also include a five-year forecast of staffing level changes, which will be reviewed annually.

A separate supplemental service budget report will be submitted to the Environmental Services Committee.

Service Delivery Implications

Appendix A includes information about existing service delivery, operational considerations and performance. Additional information has been provided below about the proposed changes for 2024.

Staff are proposing to advance one new initiative for the Solid Waste & Recycling Community Need that have financial implications for 2024, as shown in Table 1. The initiative advances a Board or Corporate Plan Priority.

Table 1. Solid Waste & Recycling Community Need Initiatives (2024)

Initiative	Implementation year(s)	Staff impacts (2024)	Incremental cost (2024)	Funding source
3a-1.1 Hartland 2100	2024-ongoing	3 New Ongoing	$491,000	Fee-for-service

The information in Table 1 reflects the initiative business case costs, which ELT reviewed as part of its annual assessment of initiatives. The financial impacts reflect full program costs, including cost of staffing.

3a-1.1 Hartland 2100

In 2021, the CRD Board approved a new Solid Waste Management Plan (SWMP) for the region. The plan targets reducing the region's annual disposal rate to 250 kg/per capita or better by 2031. Other goals include extending the life of the landfill to meet the community's needs past 2100, having informed citizens participating effectively in proper waste management practices, and ensuring the solid waste service is financially sustainable. A recent study found that 47% of material directed to Hartland landfill could have been diverted at the source and managed through existing systems in the community.

Initiative 3a-1.1 seeks to create three new regular ongoing positions in the Environmental Resource Management division and secure additional auxiliary hours to better support waste reduction and diversion activities in line with the goals of the SWMP and evaluate the feasibility of increasing Hartland Landfill public access hours.

CONCLUSION

CRD staff are progressing initiatives identified in the 2023-2026 CRD Corporate Plan, including the Board Priorities. The CRD Board and commissions with delegated authorities determine resourcing through the annual review and approval of the provisional financial plan. To support decision-making, staff provide recommendations on funding, timing and service levels through the service and financial planning processes.

RECOMMENDATION

The Environmental Services Committee recommends the Committee of the Whole recommend to the Capital Regional District Board:
That Appendix A, Community Need Summary – Solid Waste & Recycling, be approved as presented and form the basis of the Provisional 2024-2028 Financial Plan.

Submitted by:	Russ Smith, Senior Manager, Environmental Resource Management
Concurrence:	Larisa Hutcheson, P. Eng., General Manager, Parks & Environmental Services
Concurrence:	Ted Robbins, B. Sc., C. Tech., Chief Administrative Officer

ATTACHMENT

Appendix A: Community Need Summary – Solid Waste & Recycling

3 Solid Waste & Recycling

Minimize waste disposal and maximize waste diversion

01 Strategy

STRATEGIES & PLANS

- Solid Waste Management Plan
- Hartland Environmental Programs
- Regional Growth Strategy
- Climate Action Strategy
- Special Task Force on First Nations Relations
- CRD Corporate Plan

CORPORATE PLAN GOALS

3a Maximize solid waste diversion & resource recovery from waste materials
3b Outreach & engagement with communities

02 Contacts

Russ Smith, Senior Manager, Environmental Resource Management (ERM)	@ email	T. 250.360.3080
Tom Watkins, Manager, Solid Waste & Recycling Operations, ERM	@ email	T. 250.360.3197
Liz Ferris, Manager, Policy & Planning	@ email	T. 250.360.3643

03 Operating Context

ACHIEVEMENTS IN 2023

1. Solid Waste Management Plan (SWMP) Approval: following CRD Board endorsement of the Plan in May 2021, the SWMP received approval from the Ministry of Environment & Climate Change Strategy (ENV) in July 2023.
2. Design, Operations and Closure Plan Update: submitted the revised Design, Operations and Closure Plan to ENV for review and approval.
3. New Policies to divert waste from Hartland Landfill: board endorsement of policies to commence in 2024, including: modifying the tipping fee structure to incent diversion, expanding landfill material bans for streams where viable alternatives exist, facilitating the diversion of material and energy recovery of diverted material and enhancing bylaw enforcement to reduce the amount of banned materials and recyclables being sent to the landfill.
4. Plan Monitoring and Performance Measures: in consultation with the CRD's Solid Waste Advisory Committee, staff developed metrics for reporting on the goals of the SWMP.
5. Hartland Landfill Operations: Researched and piloted new technologies to maximize the densification and compaction rate at the active face. Decreased use of raw materials (such as aggregate) for cover by increasing beneficial use of select waste material, consistent with ENV guidelines.

FACTORS THAT WILL AFFECT OUR OPERATIONS IN 2024 AND BEYOND

- Solid Waste Management Plan: The new SWMP was endorsed by the CRD Board in May 2021, and approved by the Ministry of Environment and Climate Change (ENV) in July 2023. The SWMP has a target of reducing waste in the region by more than one third over the next decade. Though ENV approved the SWMP, the Board expressed a desire in its deliberations to achieve waste reduction levels greater than the targets laid out in it.
- Collaboration on Waste Diversion Targets: Despite the newly approved Plan, waste received at Hartland Landfill has increased each year since 2020, and achieving SWMP targets will require significant dedication and effort by the CRD, along with behaviour change by the public, and complementary actions by other jurisdictions and entities, including Province of BC, federal government, municipalities and stewardship agencies such as Recycle BC.
- Material Stream Diversion: New policies to be implemented in 2024, including landfill bans on wood waste, carpet and underlay and asphalt shingles, along with a modernization of the tipping fee structure and increased bylaw enforcement are expected to generate waste reductions in support of meeting the SWMP targets. Implementation of the material diversion policies will involve development of a material diversion transfer site at the Hartland Landfill, transport and processing contracts for newly diverted materials, and increased resourcing requirements to account for additional materials handling, processing and, in future years, increased bylaw enforcement.
- Material Diversion Depots: The Hartland public drop-off area continues to experience increased customer volumes, likely resulting from strong housing market activity. Increased WorkSafe BC requirements when receiving homeowner renovation and demolition materials at the landfill. As

part of the new SWMP, staff will be investigating options to increase access to depots, including expanding Hartland Depot operating hours, and establishing new depots.

- Organics/Kitchen Scraps: Organic waste made up 16.7% of the material received at Hartland Landfill in 2022. The kitchen scraps transfer station is being relocated on-site and will require continued staffing to ensure diversion and processing of the segregated food waste materials. The Environmental Service Committee has directed staff to explore regulating curbside organics collection from municipalities and electoral areas in the Region. Increased organics collection would require evaluation of processing capacity in region and on the Island.
- Resource Recovery/Landfill Gas Utilization: The existing electricity generation plant has reached end-of-life and the CRD has entered into a 25-year agreement to upgrade landfill gas generated at Hartland Landfill to RNG and sell it to FortisBC. A Renewable Natural Gas upgrade facility, to be operated by Waga Energy through its subsidiary Hartland Renewable Resource Group, will come on-line in 2024 and is expected to reduce the capital region's greenhouse gas (GHG) emission by approximately 450,000 tonnes of carbon dioxide equivalent over the next 24 years (equivalent to removing 3,900 cars from the road).
- Landfill Operations: As cell 3 becomes full of waste and Hartland begins landfilling waste in cell 4, commercial traffic will be moved to the North access point from Willis Point Road to accommodate the fill plan.

OPERATIONAL STATISTICS (2022 DATA)

- Received and disposed of 180,004 tonnes of waste, 409 kg/capita, an increase of 9kg/capita over 2021
- Issued 559 tickets and 13 warnings primarily related to banned materials in garbage
- Removed 30,000 m^3 of overburden and 225,000 m^3 of in-situ rock to prepare the new landfilling cell to receive future garbage.
- Achieved a 69% gas collection efficiency based on the ENV model, and a 78% gas collection efficiency based on the UBCi model in 2021.

04 Services

The services listed below rely on the support of several corporate and support divisions to operate effectively on a daily basis. More information about these services is available in the Corporate Services and Government Relations Community Need Summaries.

SERVICE BUDGET REFERENCES[1]

› 1.521 & 1.525 Environmental Resource Management

STAFFING COMPLEMENT

Environmental Resources Management Division: 25.7 FTE (including 3 Managers and 2 Administrative Support)

1. DIVERSION SERVICES

Description

Responsible for solid waste management planning in the capital region, including policy and program development to increase waste reduction or recycling.

What you can expect from us

- Planning & policy development activities include the SWMP and the administration of 49 contracts and agreements and Compost Facilities Bylaw
- Delivery of the recycling programs, including curbside collection from 132,232 households and packaging, printed paper and glass collection from six electoral area depots. Today, the Hartland recycling facility collects more than 80 items from 28 product categories
- Implementation of new diversion policies that will reduce the amount of waste received at Hartland Landfill and increase reuse, recycling, recovery and beneficial use
- Beginning in 2024, delivery of material stream diversion transfer service for wood waste, asphalt shingles, carpet and underlay

2. LANDFILLING SERVICES

Description

Ensure regional landfill capacity with the operation of the CRD's Hartland Landfill. Ongoing capital and operating investments are made at Hartland to ensure compliance with the ENV landfill regulations, including leachate and landfill gas management infrastructure.

[1] Service budget(s) listed may fund other services

What you can expect from us

- Administration of five contracts and agreements
- Residential service at bin area (9am-5pm weekdays, 9am-2pm Saturdays)
- Commercial service at Hartland Landfill active face (7am-5pm weekdays, 9am-2pm Saturdays)

3. RESOURCE RECOVERY SERVICES

Description

Installation and operation of landfill gas collection and utilization infrastructure at Hartland Landfill to ensure landfill gas (methane) destruction, and compliance with provincial environmental regulations. Seek to maximize the environmental and financial benefits of Hartland Landfill gas utilization.

What you can expect from us

- Production of Renewable Natural Gas (RNG) from upgraded landfill gas for sale to FortisBC, reducing GHG emissions by approximately 450,000 tonnes carbon dioxide equivalent over the next 25 years (beginning in 2024).

4. HARTLAND ENVIRONMENTAL PROGRAMS

Description

Monitoring, assessment and technical reporting to support regulatory compliance and contaminant reduction at Hartland Landfill.

What you can expect from us

- Regulatory compliance monitoring of surface water, groundwater, landfill gas and leachate

05 Initiatives

Below are the initiatives listed in the Capital Regional District 2023-2026 Corporate Plan and the related initiative business cases (IBCs), including financial and staffing impacts, proposed for 2024. The financial impacts reflect full program costs, including cost of staffing.

Initiative	Implementation year(s)	Impacts in 2024
3a-1 Develop and implement new and enhanced waste diversion policies	2024	
▸ **NEW IBC** 3a-3.1 Hartland 2100	2024-ongoing	$491K fee-for-service; 3 New Ongoing
3a-2 Investigate regional waste flow management	Planned for 2025	N/A
3a-3 Increase multi-family dwelling and industrial, commercial and institutional sector waste diversion	2023-2026	Impacts included in 3a-1
3a-4 Explore beneficial uses for solid waste residuals	2023-2026	Impacts included in 3a-1
3a-5 Financially sustainable service delivery	2023-2026	Impacts included in 3a-1
3b-1 Ongoing engagement and outreach on all major policies and new diversion programs and plans	2023-2026	Impacts included in 3a-1

06 Performance

GOAL 3A: MAXIMIZE SOLID WASTE DIVERSION & RESOURCE RECOVERY FROM WASTE MATERIALS

Targets & Benchmarks

The landfill and recycling metrics focus on minimizing waste disposal and maximizing waste diversion (Metric 1) while ensuring they are done efficiently (Metric 3) and environmentally sustainably (Metric 2).

Measuring Progress

	Performance Measure(s)	Type	2022 Actual	2023 Forecast	2024 Target
1	**Solid waste disposal target rate of 250 kg/person per year by 2030[1]**	Quantity	410 kg/capita	375 kg/capita	350kg/capita
2	**Capture 75% of landfill gas at Hartland landfill [2]**	Quantity	73%	75%	75%
3	**Waste compaction rate at Hartland Landfill of 850 kg/m³**	Quantity	921 kg/m³	850 kg/m³	900 kg/m³

[1] Annual kilos of solid waste per capita; calculation based on provincial Municipal Solid Waste methodology

[2] Percentage of landfill gas captured at Hartland Landfill; data from CRD staff measurement and calculation

[3] Kilos per cubic metre; data from CRD staff measurement

Discussion

- Metric 1 – per capita disposal rates have been on the rise due to a very active real estate market but rates are expected to decline as market conditions cool.
- Metric 2 – landfill gas capture continues to improve with additional capital investment and enhanced landfill gas collection techniques.
- Metric 3 – recent waste volume increases have resulted in challenges associated with waste compaction effectiveness. Hartland engineering is working with our heavy equipment contractor to improve compaction.

GOAL 3B: OUTREACH & ENGAGEMENT WITH COMMUNITIES

Targets & Benchmarks

- Following the July 2023 provincial approval of the SWMP, establish baseline data for current and new CRD programs with performance measures to be developed in subsequent years

07 Business Model

PARTICIPANTS	Service users (no requisition)
FUNDING SOURCES	Fee-for-service: landfill tipping fees, Extended Producer Responsibility and recycling programs, biogas sale revenue
GOVERNANCE	Environmental Services Committee

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ERM 23-39

REPORT TO ENVIRONMENTAL SERVICES COMMITTEE
MEETING OF WEDNESDAY, SEPTEMBER 27, 2023

SUBJECT **Environmental Resource Management – 2024 Operating and Capital Budget**

ISSUE SUMMARY

To provide an overview of the draft 2024 Environmental Resource Management (ERM) budget, highlighting the changes from the 2023 budget.

BACKGROUND

The Capital Regional District (CRD) established a local service for solid waste disposal in 1973. The ERM division is responsible for municipal solid waste management, including waste reduction, recycling programs and the operation of Hartland Landfill.

ERM in the capital region is based on the 5R pollution prevention hierarchy of Reduce, Reuse, Recycle, Resource Recovery and Residuals Management, with the goal of extending the life of Hartland Landfill by minimizing waste disposal and maximizing diversion opportunities. The CRD's solid waste mandate, using the 5R pollution hierarchy, is delivered to the community through a provincially mandated and recently approved regional Solid Waste Management Plan (SWMP). The SWMP targets reducing per capita waste generation from the current rate of 409 kg/capita to 250 kg/capita by 2030.

All costs associated with the CRD solid waste disposal and diversion programs are funded through tipping and user fee revenues at Hartland Landfill, service delivery agreements for stewarded materials, sale of energy and sale of recyclables. There is no requisition for this service.

The draft 2024 ERM budget has been prepared for consideration by the Environmental Services Committee (see Appendix A).

Year-end revenue and expenditure projections for 2023 have been established, and estimated variances are summarized, as follows:

Budget Item	Variance ($)	Variance (%)
Diversion Services Expenditures	-$147,000	
Landfilling Services Expenditures	-$201,000	
Energy Recovery Services Expenditures	-$110,000	
Total Operating Expenditures	**-$458,000**	**-1.6%**
Revenue: Tipping Fee	$4,400,000	
Revenue: Other	$870,000	
Total Revenue	**$5,270,000**	**18.3%**
Reserve Fund Transfers	$5,728,000	

Operating cost variance (-1.6%): staff expect minor negative operating cost variances, split evenly across the waste diversion, landfilling and energy recovery services.

Revenue variance (18.3%): staff expect a significant positive revenue variance due to increased landfill tonnage from sustained heightened economic activity. The rate of revenue increase has started to slow in the latter half of 2023. The 2023 net budget surplus will be transferred to the ERM reserve funds, to assist in funding the substantial 2024-2028 capital plan requirements.

While the draft 2024 ERM budget was prepared, considering the Board's 2024 service planning and financial expectations, the 2024 budget proposes significant operating and capital budget increases that have been deemed necessary to help the community achieve the goals set out in the new SWMP. The following are key components of the proposed 2024 ERM budget:

Operating Budget

Operating budget expenses have increased by a total $7.5 million over 2023 budget (+25%), as follows:

- Diversion Services – increase of $6.6 million over 2023 budget (+40%)
  - Increased material stream diversion expenses ($2.7 million), as a result of implementation of the new fees proposed by the material stream diversion policy changes recently adopted by the Board
  - Increase Solid Waste Management Plan programing and promotion expenditures ($700,000) to better ensure effective delivery of SWMP programing
  - Increase curbside recycling costs ($2.8 million) for a new five-year collection contract (2024-2028), with GFL Environmental replacing the incumbent collector, Emterra Environmental. Increased curbside collection costs are expected to be offset by corresponding increase in Recycle BC's blue box funding starting in 2025.
  - Increase 2024 Electoral Area recycling depot funding by same percentage as curbside increases noted above ($250,000)
- Landfilling Services – increased by $1.6 million over 2023 budget (+15%)
  - Increase Contract for Service budget (heavy equipment operating contract) to reflect increased costs associated with waste volumes and operational changes at Hartland Landfill ($500,000)
  - 2024 funding for Raincoast Foundation's proposed testing of Tod Creek ($200,000), as directed by the Board and coordinated by the CRD's Environmental Protection staff
  - Increase in Corporate overhead ($0.9 million)
- Energy Recovery Services – decreased by $700,000 over 2023 budget (-31%)
  - Net decrease in energy recovery operating costs in 2024, primarily due to a one-time operating expense, BC Hydro power purchase agreement termination payment, in the 2023 operating budget

Operating budget revenues are budgeted to increase by a total of $8.2 million, as follows:

- Diversion Services (+$2.0 million) – increased waste diversion revenue resulting from material stream diversion policy changes (diversion incentives) in 2024
- Landfilling Services (+$5.7 million) – increased landfilling revenue resulting from material stream diversion policy changes (tipping fees) in 2024
- Energy Recovery Services (+$0.5 million) – net revenue from the Renewable Natural Gas facility, which is anticipated to be commissioned in the fourth quarter of 2024

Capital Budget

The Hartland Landfill five-year capital plan is made up of 40 projects totalling $68 million. These projects can be grouped into five categories:

- **Sustaining Capital:** This group includes projects that are required to support ongoing daily operations. There are 14 projects that cover items such as computer and vehicle replacements, aggregate production, gas and leachate piping purchase and installation. It also includes projects required to maintain regular operations such as landfill gas capture, sedimentation pond repairs, scale upgrades, controlled waste and asbestos area development, and the Hartland North master plan. The estimated cost for this group of projects for 2024 is $2.4 million, with an estimated five-year total cost of $9.5 million.

- **Progressive Closure of the Landfill:** There are four projects over five years totalling $12.8 million ($850,000 for 2024), which include projects such as final closure of external faces, interim closure of various internal faces and aggregate stockpile covers.

- **Cell 4, 5 and 6 Preparation and North End Commercial Access Improvements:** There are 16 projects over five years totalling $22.45 million ($12.6 million in 2024), which include design and installation of complete liner systems for Cells 4, 5 and 6, relocating the contractor mobile equipment maintenance shop, the Hartland amenity project, relining of the stormwater sedimentation pond, fire safety improvements and traffic safety improvements.

- **Renewable Natural Gas:** There are three projects in 2024 totalling $17.4 million to construct a new landfill gas upgrading facility and flare station, such that all gas captured at the landfill is processed and injected into the Fortis BC natural gas distribution system, while ensuring all environmental requirements are met.

- **Solid Waste Management Plan Diversion and Beneficial Use Targets:** In 2024, there are three projects totalling $5.6 million to construct a new diversion transfer station to accept and process wood, asphalt shingles and carpet such that they are then shipped to various beneficial uses outside the landfill. There are also projects to improve the recycling area, including a new cover-all style building to be used in managing the materials separated for beneficial use.

Capital Funding

There are two primary elements to the capital program funding, debt servicing and reserve funds. Debt servicing costs (principal and interest payments) are associated with long-term capital infrastructure financing. New financing under the $36 million loan authorization was approved in 2022 for the purpose of financing the solid waste facility five-year (2023-2027) capital plan.

Reserve funds are established through annual contributions to allow accumulation of funds for future expenditure. There are currently three reserve funds established for this service (2023 estimated year-end balances):

- **Operating Reserve ($22 million):** This fund is established for mitigating fluctuations in tipping fee revenue and for covering operational expenditures, as required, including debt

servicing. In 2024, the excess operating reserve funds will be used to help fund significant Renewable Natural Gas and Hartland capital projects. The plan is for the reserve balance to be reduced to its $5 million target balance and then maintained.

- **Equipment Replacement Reserve ($2.4 million):** used to fund replacement of computer equipment and for PERS (Priority Equipment Replacement) equipment that lasts less than 15 years. The 2024 equipment replacement reserve fund contributions are set at $200,000.

- **Capital Reserve ($26 million):** used to fund major equipment and infrastructure replacement that has a service life of 5 to 25 years or more, such as landfill facilities, roads and improvements at the Hartland Landfill site, construction of remote transfer stations, composting facilities, watershed management, closure of Phase 2 and post closure maintenance, and all related ancillary works and equipment necessary for landfill and operations. The 2024 capital reserve fund will be used to fund $7.2 million of the 2024 capital plan.

In summary, the future capital funding will be a combination of reserves and debt financing.

ALTERNATIVES

Alternative 1
The Environmental Services Committee recommends the Committee of the Whole recommend to the Capital Regional District Board:
That Appendix A, Operating & Capital Budget – Environmental Resource Management be approved as presented and form the basis of the Provisional 2024-2028 Financial Plan.

Alternative 2
The Environmental Services Committee recommends the Committee of the Whole recommend to the Capital Regional District Board:
That Appendix A, Operating & Capital Budget – Environmental Resource Management be approved as presented and form the basis of the Final 2024-2028 Financial Plan.

IMPLICATIONS

Financial Implications

The 2024 Environmental Resource Management operating budget reflects a number of significant adjustments to both expenditures and revenues in response to key drivers, namely: implementation of the Board's new SWMP, new policy direction to incent material stream diversion, transition to a new curbside recycling contractor one year ahead of recalibrated Recycle BC blue box funding, termination of a BC Hydro power purchase agreement and transition to a new renewable natural gas facility for the beneficial use of landfill gas.

The five-year capital plan to support the operating adjustments noted above, in addition to preparing new cells for waste disposal by early 2025, represents a significantly larger program compared to previous years. This higher level of capital activity is anticipated to scale back to a typical year in 2027.

If the proposed budget is amended, the implications will vary depending on how the amendment impacts specific initiatives, ongoing operations, or the capital work program.

CONCLUSION

The draft 2024 Environmental Resource Management budget has been prepared for consideration by the Environmental Services Committee, with a primary focus on implementing the new Solid Waste Management Plan, with a goal of diverting waste and extending the life of Hartland Landfill. While the budget was prepared considering the Board's 2024 service planning and financial expectations, the 2024 budget proposes significant operating and capital budget increases, with no requisition requirement, that have been deemed necessary to help the community achieve the goals set out in the new Solid Waste Management Plan.

RECOMMENDATION

The Environmental Services Committee recommends the Committee of the Whole recommend to the Capital Regional District Board:
That Appendix A, Operating & Capital Budget – Environmental Resource Management be approved as presented and form the basis of the Provisional 2024-2028 Financial Plan.

Submitted by:	Russ Smith, Environmental Resource Management
Concurrence:	Larisa Hutcheson, P. Eng., General Manager, Parks & Environmental Services
Concurrence:	Nelson Chan, MBA, FCPA, FCMA, Chief Financial Officer
Concurrence:	Ted Robbins, B. Sc., C. Tech., Chief Administrative Officer

ATTACHMENT

Appendix A: Environmental Resource Management – Operating and Capital Budget

APPENDIX A

CAPITAL REGIONAL DISTRICT

2024 BUDGET

Environmental Resource Management

COMMITTEE REVIEW

SEPTEMBER 2023

Service: 1.521 Environmental Resource Management **Committee: Environmental Services**

PARTICIPATION:

All costs recovered through tipping fees.

MAXIMUM LEVY:

No requisition

MAXIMUM CAPITAL DEBT:

Authorized:	LA Bylaw 3518	12,270,000	LA Bylaw 4515	36,000,000
Borrowed:	SI Bylaw 3547	(2,000,000)		
	SI Bylaw 3677	(2,500,000)		
	SI Bylaw 3769	(2,200,000)		
Remaining:	Expired May 14, 2013	$5,570,000		36,000,000

All previous Loan Authorizations have expired. Total debt outstanding at Dec 31, 2023 $546,597
Final debt payments in 2026.

COMMISSION:

OPERATING COSTS - REFUSE DISPOSAL:

To be recovered through user fees

RESERVE FUND:

Solid Waste Refuse Disposal Reserve Fund, Bylaw No. 2164 (Sept. 8, 1993).
Waste Reduction Sustainability Operating Reserve Fund Bylaw No. 3867 (Nov 14, 2012).

Service:	1.521	Environmental Resource Management	Committee: Environmental Services

			Hartland Landfill General Refuse				Recycling (Diversion Revenue)			
Year	Population	General Refuse Rate*	Budget Volume (Tonne)	Actual Volume (Tonne)	Beneficial Use	Landfilled	Recycling Rate*	Budget Volume (Tonne)	Actual Volume (Tonne)	Disposal Rate kg/person
2018	413,406	$110	135,000	148,551 [1]	-2,120	146,431				380
2019	418,511	$110	140,000	146,544 [1]	-1,142	145,402				382
2020	425,503	$110	135,000	155,041 [1]	-5,476	149,565				395
2021	432,062	$110	135,000	167,169 [1]	-1,013	166,156				400
2022	440,456	$110	145,000	185,111 [1]	-5,107	180,004				409
2023		$110	165,000	186,747 [2]						
2024 Budget		$150	160,000				$80-$110	20,300		
2025 Budget		$155	150,000				$80-$110	20,300		
2026 Budget		$160	135,000				$80-$110	20,300		
2027 Budget		$165	130,000				$80-$110	20,300		
2028 Budget		$170	125,000				$80-$110	20,300		

* Tipping fee: rate in $/tonne

[1] Actual Tonnage Volume

[2] Estimated Tonnage Volume

1.521 & 1.525 - ERM	2023 BOARD BUDGET	2023 ESTIMATED ACTUAL	BUDGET REQUEST 2024 CORE BUDGET	2024 ONGOING	2024 ONE-TIME	2024 TOTAL	2025 TOTAL	2026 TOTAL	2027 TOTAL	2028 TOTAL
GENERAL PROGRAM EXPENDITURES:										
Diversion Services	16,136,927	15,989,188	16,965,035	5,753,753	-	22,718,788	23,779,580	25,025,747	25,138,408	25,454,474
Landfilling Services	10,716,470	10,515,234	11,645,185	500,000	200,000	12,345,185	12,567,020	13,548,829	13,010,202	13,308,987
Energy Recovery Services	2,277,455	2,167,231	1,568,723	-	-	1,568,723	1,580,867	1,622,310	1,610,806	1,640,338
TOTAL OPERATING COSTS	29,130,852	28,671,652	30,178,943	6,253,753	200,000	36,632,696	37,927,467	40,196,886	39,759,416	40,403,799
*Percentage Increase over prior year		-1.6%	3.6%	21.5%	0.7%	25.8%	3.5%	6.0%	-1.1%	1.6%
CAPITAL / RESERVE										
Transfer to Equipment Replacement Fund	30,176	30,176	200,000	-	-	200,000	204,000	204,000	204,000	204,000
Transfer to Operating Reserve Fund	15,372	2,415,621	356,635		-	356,635	3,162,797	-	-	-
Transfer to General Capital Reserve Fund	4,000	2,404,249	1,100,370	-	-	1,100,370	1,100,370	4,000	4,000	4,000
Transfer to Landfill Closure Capital Reserve Fund	455,120	455,120	455,120	-	-	455,120	455,120	455,120	455,120	455,120
Transfer to Millstream Remediation Debt	55,467	55,467	6,262	-	-	6,262	3,717	-	-	-
TOTAL CAPITAL / RESERVES	560,135	5,360,633	2,118,387	-	-	2,118,387	4,926,004	663,120	663,120	663,120
Debt Expenditures	314,054	290,127	1,229,666	-	-	1,229,666	2,137,816	2,726,996	2,765,453	2,791,453
TOTAL COSTS	30,005,041	34,322,412	33,526,996	6,253,753	200,000	39,980,749	44,991,287	43,587,002	43,187,989	43,858,372
*Percentage Increase over prior year		14.4%	11.7%	20.8%	0.7%	33.2%	12.5%	-3.1%	-0.9%	1.6%
Allocation Recovery										
OPERATING COSTS LESS INTERNAL RECOVERIES	30,005,041	34,322,412	33,526,996	6,253,753	200,000	39,980,749	44,991,287	43,587,002	43,187,989	43,858,372
FUNDING SOURCES (REVENUE)										
Surplus / (Deficit)										
Balance C/F from Prior to Current year										
Sale of Renewable Natural Gas (net revenue)	-	-	(495,000)	-	-	(495,000)	(6,395,537)	(6,335,817)	(6,285,331)	(6,244,071)
Revenue - Other	(8,307,913)	(9,177,490)	(8,258,750)	(1,996,000)	-	(10,254,750)	(12,854,750)	(12,854,750)	(12,854,100)	(12,854,100)
Transfer from Operating Reserve	(1,000,000)			(2,540,000)	(200,000)	(2,740,000)	-	(305,434)	(107,558)	(1,019,200)
TOTAL REVENUE	(9,307,913)	(9,177,490)	(8,753,750)	(4,536,000)	(200,000)	(13,489,750)	(19,250,287)	(19,496,001)	(19,246,989)	(20,117,371)
TIPPING FEE (based on inflation)	**(20,697,128)**	**(25,144,922)**	**(24,773,247)**	**(1,717,753)**	**-**	**(26,491,000)**	**(25,741,000)**	**(24,091,000)**	**(23,941,000)**	**(23,741,000)**
PROJECTED TONNAGE (General Refuse)	165,000	186,747	160,000			160,000	150,000	135,000	130,000	125,000
*Percentage Increase over prior year		21.5%	19.7%	8.3%	0.0%	28.0%	-2.8%	-6.4%	-0.6%	-0.8%
AUTHORIZED POSITIONS:										
On-going	25.70	25.70	25.70	3.00		28.70	28.70	28.70	28.70	28.70
Term	2.00	2.00	1.00			1.00	1.00			

Change in Budget 2023 to 2024 Service: 1.521 & 1.525 ERM	Total Expenditure	Comments
2023 Budget	**30,005,041**	
Change in Salaries:		
Base salary and benefit change	90,025	Inclusive of estimated collective agreement changes
Step increase/paygrade change	(114,623)	Term position ended
3.0 FTE Environmental Technician	303,524	2024 IBC 3a-1.1: Hartland 2100
Increase in auxiliary wages	339,700	2024 IBC 3a-1.1: Hartland 2100
Other (explain as necessary)	-	
Total Change in Salaries	618,626	
Other Changes:		
Standard Overhead Allocation	992,249	Increase in 2023 operating costs
Human Resources Allocation	28,189	Contribution towards 2024 Human Resources & Corporate Safety initiatives
Building Occupancy	5,416	
Contract for Services	500,000	To reflect the anticipated costs related to heavy equipment services and landfilling of standard refuse and controlled waste
	2,803,753	Additional costs related to curbside collection contract
	2,700,000	Additional costs related to processing of materials contract
	250,000	To Increase Electoral Area recycling depot funding by same ratio as curbside increases
	200,000	To fund for 2024 one-time Raincoast Foundation testing of Tod Creek
	(1,000,000)	Reduction for 2023 one-time costs for BC Hydro Termination
Promotion	521,000	Hartland Communications Campaign, Outreach, and Education project
Labour allocation	136,460	Increase in Environmental Engineering & Environmental Protection Allocation
Trf to Capital Reserve Fund	1,096,730	To fund 2024 Capital Plan requirements
Debt Servicing Expenses	915,612	Additional borrowing of $12.2m is required to fund 2024 Capital Plan requirements
Other Costs	207,673	
Total Other Changes	9,357,082	
2024 Budget	**39,980,749**	

Summary of % Expense Increase

2024 Base salary and benefit change	0.3%
Standard Overhead Allocation	3.3%
Balance of increase	29.6%
% expense increase from 2023:	***33.2%***

% Requisition increase from 2023 (if applicable):	***%***	*Requisition funding is (x)% of service revenue*

Overall 2023 Budget Performance
(expected variance to budget and surplus treatment)

'Overall Solid Waste Tipping Revenue for 2023 is forecasted to be higher than budget by $4.4 million. Tipping fee revenues higher due to an increased quantity of solid waste being received. Recycling revenue for scrap metal (price fluctuates with the global commodity markets) is also higher than budgeted. Landfill Operations/Diversion Services/Energy Recovery services expenses are forecasted to be lower than budget for 2023 by $450k. The estimated surplus will be split between the Capital Reserve Fund ($2.4m) and the Operating Reserve Fund ($2.4m).

CAPITAL REGIONAL DISTRICT

FIVE YEAR CAPITAL EXPENDITURE PLAN SUMMARY - 2024 to 2028

Service No. 1.521 Environmental Resource Management	Carry Forward from 2023	2024	2025	2026	2027	2028	TOTAL
EXPENDITURE							
Buildings	$0	$350,000	$0	$0	$0	$0	$350,000
Equipment	$0	$603,000	$355,000	$385,000	$385,000	$385,000	$2,113,000
Land	$0	$0	$0	$0	$0	$0	$0
Engineered Structures	$5,975,000	$37,856,000	$14,975,000	$9,600,000	$1,600,000	$1,250,000	$65,281,000
Vehicles	$0	$0	$0	$0	$0	$0	$0
	$5,975,000	**$38,809,000**	**$15,330,000**	**$9,985,000**	**$1,985,000**	**$1,635,000**	**$67,744,000**
SOURCE OF FUNDS							
Capital Funds on Hand	$100,000	$950,000	$225,000	$200,000	$0	$0	$1,375,000
Debenture Debt (New Debt Only)	$2,000,000	$14,213,000	$7,650,000	$2,000,000	$350,000	$0	$24,213,000
Equipment Replacement Fund	$0	$1,103,000	$355,000	$385,000	$385,000	$385,000	$2,613,000
Grants (Federal, Provincial)	$0	$0	$0	$0	$0	$0	$0
Donations / Third Party Funding	$0	$0	$0	$0	$0	$0	$0
Reserve Fund	$3,875,000	$22,543,000	$7,100,000	$7,400,000	$1,250,000	$1,250,000	$39,543,000
	$5,975,000	**$38,809,000**	**$15,330,000**	**$9,985,000**	**$1,985,000**	**$1,635,000**	**$67,744,000**

CAPITAL REGIONAL DISTRICT

5 YEAR CAPITAL PLAN

2024 - 2028

Service #: 1.521

Service Name: Environmental Resource Management

				PROJECT BUDGET & SCHEDULE									
Project Number	Capital Expenditure Type	Capital Project Title	Capital Project Description	Total Project Budget	Asset Class	Funding Source	Carryforward	2024	2025	2026	2027	2028	5 - Year Total
16-06	Renewal	Replacing of Small Equipments	Replacing of Small Equipments	$ 1,430,000	E	ERF		$ 240,000	$ 240,000	$ 270,000	$ 270,000	$ 270,000	$ 1,290,000
17-01	Renewal	Gas & Leachate Collection Pipe Extension	Gas & Leachate Collection Pipe Extension	$ 2,550,000	S	Res		$ 500,000	$ 500,000	$ 500,000	$ 550,000	$ 550,000	$ 2,600,000
17-02	Renewal	Aggregate Production for Internal Use	Aggregate Production for Internal Use	$ 13,135,000	S	Res		$ 750,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 2,750,000
17-04	Renewal	Progressive Closure of External Faces	Progressive Closure of External Faces	$ 10,000,000	S	Res		$ -	$ 4,000,000	$ 6,000,000			$ 10,000,000
17-07	Renewal	Computer Equipment	Computer Equipment	$ 71,000	E	ERF		$ 13,000	$ 15,000	$ 15,000	$ 15,000	$ 15,000	$ 73,000
17-09	Renewal	Vehicle Replacements	Vehicle Replacements	$ 500,000	E	ERF		$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 500,000
17-11	Renewal	Food Waste Transfer Station Relocation Planning & Construction	Food Waste Transfer Station Relocation Planning	$ 700,000	S	ERF		$ 250,000	$ -	$ -	$ -		$ 250,000
17-12	Renewal	Hartland Environmental Performance Model	Hartland Environmental Performance Model	$ 225,000	S	Cap		$ -	$ 225,000	$ -	$ -		$ 225,000
17-14	New	Landfill Gas Utilization	Landfill Gas Utilization	$ 7,213,000	S	Debt		$ 7,213,000					$ 7,213,000
17-14	New	Landfill Gas Utilization	Landfill Gas Utilization	$ 23,718,000	S	Res		$ 9,468,000	$ -				$ 9,468,000
18-01	New	Interim Covers	Interim Covers - West and North Slopes	$ 1,350,000	S	Res			$ 550,000	$ 400,000	$ 200,000	$ 200,000	$ 1,350,000
18-02	Renewal	Paving of Service Roads	Paving of Service Roads	$ 550,000	S	Cap		$ 350,000	$ -	$ 200,000	$ -		$ 550,000
18-03	Renewal	Cell 3 Bottom Lift Gas Wells / Leachate Drain	Cell 3 Bottom Lift Gas Wells / Leachate Drain	$ 250,000	S	Cap		$ 250,000	$ -	$ -	$ -		$ 250,000
18-05	Renewal	Controlled Waste & Asbestos Area Development	Controlled Waste & Asbestos Area Development	$ 100,000	S	Res	$ 50,000	$ 50,000	$ 50,000	$ -	$ -		$ 100,000
22-01	Renewal	Sedimentation Pond Relining	NW Sedimentation Pond Relining & Expansion	$ 1,000,000	S	Res	$ 1,000,000		$ 1,000,000				$ 1,000,000
22-02	New	Cell 4 Liner Installation	Cell 4 Liner Installation	$ 7,200,000	S	Debt	$ 500,000	$ 500,000					$ 500,000
22-03	Decommission	Leachate Line Decommissioning	Leachate Line Decommissioning	$ 100,000	S	Cap	$ 100,000	$ 100,000					$ 100,000
22-06	Renewal	Hartland FIRE Safety Improvements	Installation of new Fire Line	$ 200,000	S	Res	$ 200,000	$ 200,000					$ 200,000
22-07	Study	Recycling Area Upgrades	Recycling Area Upgrades	$ 225,000	S	Res	$ 25,000	$ 225,000					$ 225,000
22-10	New	Storm Water Sedimentation pond Emergency Repairs	Storm Water Sedimentation pond Emergency Repairs	$ 250,000	E	Res		$ 250,000					$ 250,000
23-02	New	Contractor Workshop Relocation	Contractor Workshop Relocation	$ 1,250,000	S	Res	$ 650,000	$ 650,000					$ 650,000
23-03	New	Cell 4, 5 & 6 gas well layout Plan	Cell 4, 5 & 6 gas well Plan	$ 150,000	S	Res	$ 150,000	$ 150,000					$ 150,000
23-04	New	North End Commercial Access Improvements	North End Commercial Access Improvements	$ 700,000	S	Res		$ 250,000					$ 250,000
23-05	New	Existing Manual and Commercial Scale Upgrades	Existing Manual and Commercial Scale Upgrades	$ 250,000	S	ERF		$ 250,000					$ 250,000
24-01	New	Cell 5&6 GRW	Cell 5&6 Gravity Retaining Wall Construction	$ 2,000,000	S	Debt	$ 750,000	$ 750,000	$ 1,250,000				$ 2,000,000
24-02	Study	Hartland North Master Plan	Hartland North Master Plan	$ 150,000	S	Res			$ 150,000				$ 150,000
24-03	New	Hartland Amenity Project	Intersection Upgrade	$ 4,000,000	S	Res	$ 1,800,000	$ 3,800,000					$ 3,800,000
24-04	New	Biosolids Beneficial Reuse /RDF Building	Biosolids Beneficial Reuse /RDF Building	$ 350,000	B	Res		$ 350,000					$ 350,000
24-05	New	Cell 5 Liner Construction	Cell 5 Liner Construction	$ 7,900,000	S	Debt		$ 3,000,000	$ 2,900,000	$ 2,000,000			$ 7,900,000
24-06	New	Cell 1, 2 & 3 Transition Liner	Cell 1, 2 & 3 Transition Liner	$ 4,000,000	S	Debt		$ 2,000,000	$ 2,000,000				$ 4,000,000
24-07	New	Relocation of N. Toe Road Sedimentation Pond	Relocation of N. Toe Road Sedimentation Pond	$ 500,000	S	Debt			$ 500,000				$ 500,000
24-08	New	North End Fence Replacement	North & East Fence Replacement	$ 250,000	S	ERF		$ 250,000					$ 250,000
24-09	New	Diversion Transfer Station	Diversion Transfer Station	$ 5,000,000	S	Res		$ 5,000,000					$ 5,000,000
24-10	New	RNG Spare Parts Inventory	RNG Spare Parts Inventory	$ 700,000	S	Res		$ 700,000					$ 700,000
24-11	New	Traffic Pattern Changes - Site Signage	Traffic Pattern Changes - Site Signage	$ 250,000	S	Cap		$ 250,000					$ 250,000
25-01	New	NE & NW Aggregate Stockpile cover	NE & NW Aggregate Stockpile cover	$ 1,400,000	S	Debt	$ 750,000	$ 750,000	$ 650,000				$ 1,400,000
25-02	Renewal	North End Wheel Wash	North End Wheel Wash	$ 400,000	S	Res		$ 200,000					$ 200,000
25-03	New	Landfill Gas capture to meet New Federal Regs	Landfill Gas capture to meet New Federal Regs	$ 250,000	S	Res			$ 250,000				$ 250,000
25-04	New	Hartland Operating Certificate Renewal	Hartland Operating Certificate Renewal	$ 100,000	S	Res			$ 100,000				$ 100,000
26-01	New	Cell 4& 5 Bottom Lift Gas Wells / Leachate Drain	Cell 4 Bottom Lift Gas Wells / Leachate Drain	$ 700,000	S	Debt			$ 350,000		$ 350,000		$ 700,000
													$ -
		Sustaining capital											$ -
		Progressive Closure of Landfill											$ -
		Cell 4, 5 & 6 Preparation and North End Relocation											$ -
		RNG	**GRAND TOTAL**	**$ 101,067,000**			**$ 5,975,000**	**$ 38,809,000**	**$ 15,330,000**	**$ 9,985,000**	**$ 1,985,000**	**$ 1,635,000**	**$ 67,744,000**
		SWMP Targets - Diversion / Beneficial Use											$ -
													$ -
													$ -
													$ -

Service: **1.521** **Environmental Resource Management**

Project Number	16-06	**Capital Project Title**	Replacing of Small Equipments	**Capital Project Description**	Replacing of Small Equipments
Project Rationale	Replacement of small equipments that have reached their end of life				

Project Number	17-01	**Capital Project Title**	Gas & Leachate Collection Pipe Extension	**Capital Project Description**	Gas & Leachate Collection Pipe Extension
Project Rationale	To meet BC Ministry of Environment regulations, gas wells and leachate collectors are installed in each lift of refuse and have to be connected to the existing header system to collect methane gas. Well heads, valves, condensation traps, monitoring points, and piping has to be installed to each gas well and leachate collector. The gas is then conveyed to the gas plant, and the leachate is conveyed to the lined storage lagoons and then discharged into the municipal sewer. Cost estimate is derived from historical construction information and includes consulting costs to layout pipe design/headers.				

Project Number	17-02	**Capital Project Title**	Aggregate Production for Internal Use	**Capital Project Description**	Aggregate Production for Internal Use
Project Rationale	Producing aggregate annually from in-situ rock provides the CRD with a number of benefits including: prolonging the landfill life (creating landfilling airspace), providing aggregate for on-site needs, effective interception of shallow groundwater inflows, cost and space savings by not having to import aggregate, and reduced social and environmantal impacts by not having to truck in aggregate. Cost estimate is derived from historical tender data.				

Project Number	17-04	**Capital Project Title**	Progressive Closure of External Faces	**Capital Project Description**	Progressive Closure of External Faces
Project Rationale	As specified under the BC Ministry of Environments Landfill Criteria for Municipal Solid Waste, completed landfill areas and slopes must be closed with a progressive closure system on an annual basis. The closure system consists of a clay or synthetic cover placed over a gravel drainage layer This progressive closure system stays in place until economies of scale makes it cost effective to proceed with installation of a final closure system.				

Service:	1.521	Environmental Resource Management

Project Number	17-07	**Capital Project Title**	Computer Equipment	**Capital Project Description**	Computer Equipment
Project Rationale	Replacement of computer equipment due to end of life cycle				

Project Number	17-09	**Capital Project Title**	Vehicle Replacements	**Capital Project Description**	Vehicle Replacements
Project Rationale	Replacement of vehicle due to end of life cycle				

Project Number	17-11	**Capital Project Title**	Food Waste Transfer Station Relocation Planning & Construction	**Capital Project Description**	Food Waste Transfer Station Relocation Planning
Project Rationale	The CRD has made a commitment to Hartland Residents to move the Kitchen Scraps transfer station away from the South End of the Landfill Property to alleviate resident's nuisance concerns (noise, vector, odour etc). The Kitchen Scrap transfer station will need to move to the North End of the property when commercial traffic moves to Willis Point in 2024. This project meets an immediate and future need to relocate the Kitchen Scrap tranfer station. Phase 1 of the project will be complete in 2023 (moving the new food transfer facility). Phase 2 includes all improvements related to leachate, power, storm water, lighting, access stairs, vector control, fall protection enhancements etc. needed to support operation of the facilty over the next 30+ years. This project covers the planning and construction costs related to relocating the kitchen scrap transfer station.				

Service:	1.521	Environmental Resource Management

Project Number	17-12	**Capital Project Title**	Hartland Environmental Performance Model	**Capital Project Description**	Hartland Environmental Performance Model

Project Rationale The CRD is interested in developing a site-specific computer model that integrates engineering design with environmental performance for the Hartland Landfill. In 2016 the BC MOE made revisions to the BC Landfill Criteria. Many of Hartland's design and operations are already compliant, however a preliminary review identified additional conformance requirements for Hartland under the status quo. The model will enable the CRD to better demonstrate technical justification and environmental conformance over the lifespan of the landfill.

Project Number	17-14	**Capital Project Title**	Landfill Gas Utilization	**Capital Project Description**	Landfill Gas Utilization

Project Rationale The landfill gas is currently utilized as fuel to power a generator system to generate electricity and sold to BC Hydro. The excess landfill gas which is approximately 50% currently generated from the landfill is destructed by burning. ERM and EE have initiated a project to process the landfill gas to a higher quality could be utilized as natural gas. Fortis BC is interested to purchase the processed landfill gas from the CRD. The projected gas revenues from Fortis is significantly higher than the current arrangement with BC Hydro. This project is to carry out the feasibility study, preliminary engineering, and conduct business case and triple-bottom-line analysis, if the project proved to be feasible the detailed design and implementation will be followed.

Project Number	18-01	**Capital Project Title**	Interim Covers	**Capital Project Description**	Interim Covers - West and North Slopes

Project Rationale Following Golder's Leachate Management Plan, once an active landfilling cell is completed, but hasn't reached future filling contours, tarping is required to shed rainwater and divert to the freshwater collection system to prevent it from entering the leachate collection system and overwhelming the leachate storage ponds. Cost estimate is derived from historical in-house cost data.

Project Number	18-02	**Capital Project Title**	Paving of Service Roads	**Capital Project Description**	Paving of Service Roads

Project Rationale To ensure compliance with BC Ministry of Environment Operating Certificate for the Hartland Landfill, continuous improvement is made to ensure nuisance dust generated at the site is minimized from operations. Repairs and new pavements are added in high traffic areas to minimize dust generation and reduce dependance on costly short term dust mitigation measures (ie. water trucks, application of lignosulfonate etc) and to improve road conditions throughout the lanfill property. Estimate is derived from historical costs.

Service:	1.521	Environmental Resource Management

Project Number	Capital Project Title	Capital Project Description
18-03	Cell 3 Bottom Lift Gas Wells / Leachate Drain	Cell 3 Bottom Lift Gas Wells / Leachate Drain

Project Rationale To meet BC Ministry of Environment regulations, gas wells and leachate collectors are installed in each lift of refuse and have to be connected to the existing collection systems to collect methane gas. Well heads, valves, condensation traps, monitoring points, and piping has to be installed to each gas well and leachate collector. The gas is then conveyed to the gas plant, and the leachate is conveyed to the lined storage lagoons and then discharged into the municipal sewer. Estimate is derived from historical costs.

Project Number	Capital Project Title	Capital Project Description
18-05	Controlled Waste & Asbestos Area Development	Controlled Waste & Asbestos Area Development

Project Rationale Controlled waste and asbestos areas within the landfill footprint are required to be developed in conjunction with active cells. BC Ministry of Environment regulatory requirements must be met on a continual basis. Asbestos is a high risk material that requires proper planning and special burrial to ensure safe disposal.

Project Number	Capital Project Title	Capital Project Description
22-01	Sedimentation Pond Relining	NW Sedimentation Pond Relining & Expansion

Project Rationale To prevent leakage and fines from migrating off site into the north freshwater drainage area, the sedimentation pond must be relined. In addition the sedimentation pond must be enlarged to meet MOE requirements for retaining 24 hrs of preciptiation from a 100 year storm event. Finally, the sedimentation pond requires inlet valving and piping to permit flows to be diverted to the upper lagoon in the event there is an onsite spill that must be contained and diverted from fresh water courses.

Project Number	Capital Project Title	Capital Project Description
22-02	Cell 4 Liner Installation	Cell 4 Liner Installation

Project Rationale A new drainage and liner system will ensure effective removal of leachate from within the new Cell 4 area and prevent any off site migration. The liner will also include an underdrain which will relieve pore pressure and ensure fresh ground water does not contribute to ongoing leachate collection and processing.

Project Number	Capital Project Title	Capital Project Description
22-03	Leachate Line Decommissioning	Leachate Line Decommissioning

Project Rationale The new Centrate Return Line built as part of the CORE Area Wastewater project carries all of the leachate from Hartland along with the planned and phased centrate from the Residuals Treatment Facility. This project has been set up to facilitate a planned and phased decommissioning of the old leachate line now that it is no longer required.

Service: **1.521** **Environmental Resource Management**

Project Number	22-06	**Capital Project Title**	Hartland FIRE Safety Improvements	**Capital Project Description**	Installation of new Fire Line

Project Rationale Hartland has purchased a new fire pump and related components in order to mitigate risk from a major fire at the landfill. As part of the system a new fire line is required to be installed starting from near the lower lagoon and run all the way to the crest of the landfill. Phase 2 (2023) includes a means to roll/unroll 6" layflat hose, 2" firefighting hose and acts as an anchor point for the main fire line. The system will allow operations to setup the hose system near the working face to allow the fire department the best access to leachate resources to fight fires. Includes design, procurement and installation of the system.

Project Number	22-07	**Capital Project Title**	Recycling Area Upgrades	**Capital Project Description**	Recycling Area Upgrades

Project Rationale The project has been set up to conduct a design review of the existing recyling area at Hartland and investigate changes relating to efficent accessibility due to growing public interest in the depot and to include safety considerations such as protection from the sun during hot weather.

Project Number	22-10	**Capital Project Title**	Storm Water Sedimentation pond Emergency Repairs	**Capital Project Description**	Storm Water Sedimentation pond Emergency Repairs

Project Rationale Leachate has been detected getting into the fresh water sedimentation pond. This project has been set up to explore sources of contamination and make remedial works to the pond, incoming pipes and outgoing infrastructure as necessary to ensure containment of any contaminants. This project also includes the installation of any new monitoring wells, including consulting fees to locate , prove/commission and report findings/recommendations.

Project Number	23-02	**Capital Project Title**	Contractor Workshop Relocation	**Capital Project Description**	Contractor Workshop Relocation

Project Rationale The current contractors workshop is located in the future Cell 5 of the landfill and must be relocated so critical landfill infrastructure can be completed for Cell 4, 5 and 6. This project includes removal of the existing structure and reuse (if economical) in a new location adjacent to future cells so the operations contractor can conduct repairs on large landfill operations equipment (Packer, Bull-Dozer, excavators etc).

Project Number	23-03	**Capital Project Title**	Cell 4, 5 & 6 gas well layout Plan	**Capital Project Description**	Cell 4, 5 & 6 gas well Plan

Project Rationale This project allows for design services to provide a conceptual layout of new gas wells in Cells 4, 5 & 6 and the tie-in to gas wells on the North Slope from Cells 2 and 3 as garbage is landfilled against the North Slope.

Project Number	23-04	**Capital Project Title**	North End Commercial Access Improvements	**Capital Project Description**	North End Commercial Access Improvements

Project Rationale This project includes necessary improvements to ensure the North Entrance and Scales are equipped for fully automated commercial access off Willis Point Road when Cell 4 is ready for filling. Improvements include landscaping, scale house improvements, automated gates, staging lanes, card readers/scanners, RFID systems, scale safety rails, bollards, radio intercoms, sidewalks, signage, etc.

Service:	1.521	Environmental Resource Management

Project Number	Capital Project Title	Capital Project Description
23-05	Existing Manual and Commercial Scale Upgrades	Existing Manual and Commercial Scale Upgrades

Project Rationale The South Entrance Commercial scale approach/exit ramps are in poor condition. This project includes sawcutting and removal of old scale ramps and pouring new concrete with Rebar to eliminate further safety hazards to trucks and employees. The South Entrance Manual Scale deck is in poor condition. It requires replacement and/or major repair. This project accounts for all work that needs to be done after detailed assement to ensure life of the existing manual and commercial scales can continue reliably for the next 20 years.

Project Number	Capital Project Title	Capital Project Description
24-01	Cell 5&6 GRW	Cell 5&6 Gravity Retaining Wall Construction

Project Rationale This project will allow for the construction of a new mounded structural earth berm north of cell 1&2 at 5 corners intersection to serve as the new toe of cells 5 & 6. As part of this berm, the project includes installation of a critical sub-grade landfill leachate containment system (grout wall/curtain) and raising the clay containment berm from 130mAsl to 135mASL to ensure leachate capture from future landfill cells 4, 5 & 6. The project also includes relocation of any existing infrastructure (LFG, Leachate, Water, electrical etc) that currently resides in the future footprint of the MSE berm.

Project Number	Capital Project Title	Capital Project Description
24-02	Hartland North Master Plan	Hartland North Master Plan

Project Rationale With the recent completion of the new Residuals Treatment Facilty and associated access and new scales at Hartland North, this design project will ensure that there is adequate future planning and integration with the existing landfill site

Project Number	Capital Project Title	Capital Project Description
24-03	Hartland Amenity Project	Intersection Upgrade

Project Rationale This project considers all road and intersection improvements necessary to move commercial access from Hartland Avenue to Willis Point Rd.

Project Number	Capital Project Title	Capital Project Description
24-04	Biosolids Beneficial Reuse /RDF Building	Biosolids Beneficial Reuse /RDF Building

Project Rationale This project will allow for the replacement of the old biosoids storage barn with a new Sprung Structure for mixing and repurposing of dried biosolids and other refuse derived fuel generated at the Hartland site.

Project Number	Capital Project Title	Capital Project Description
24-05	Cell 5 Liner Construction	Cell 5 Liner Construction

Project Rationale A new drainage and liner system will ensure effective removal of leachate from within the new Cell 5 area and prevent any off site migration. The liner will also include an underdrain which will relieve pore pressure and ensure fresh ground water does not contribute to ongoing leachate collection and processing.

Service: 1.521 **Environmental Resource Management**

Project Number	24-06	**Capital Project Title**	Cell 1, 2 & 3 Transition Liner	**Capital Project Description**	Cell 1, 2 & 3 Transition Liner

Project Rationale A new drainage and liner system will ensure effective removal of leachate above Cells 1 & 2 from garbage placed ontop of it from cells 4, 5 and 6. This liner provides continuity, separation and acts as a transition between old cells of the landfill and cells 4-6. The liner will also include an underdrain which will relieve pore pressure and ensure leachate from Cell 1, 2 & 3 can properly drain to heal basin or the upper lagoon.

Project Number	24-07	**Capital Project Title**	Relocation of N. Toe Road Sedimentation Pond	**Capital Project Description**	Relocation of N. Toe Road Sedimentation Pond

Project Rationale The North Toe Road fresh water sedimentation collection pond sits ontop of Cell 1 garbage. The future Gravity Retaining Wall will be constructed ontop of the pond so it must be relocated.

Project Number	24-08	**Capital Project Title**	North End Fence Replacement	**Capital Project Description**	North & East Fence Replacement

Project Rationale The fence line from the Upper lagoon to the new RTF driveway entrance is madeup of various fencing materials. This project provides proper fencing to ensure a continuous perimeter around Hartland property.

Project Number	24-09	**Capital Project Title**	Diversion Transfer Station	**Capital Project Description**	Diversion Transfer Station

Project Rationale Starting Jan 1, 2024 the landfill will ban carpet, wood and asphalt shingles. These will be mandatory recycleable materials. A new transfer depot to receive, process and ship these diverted streams to end markets is required. This project covers all equipment and capital improvements required to facilitate this service.

Project Number	24-10	**Capital Project Title**	RNG Spare Parts Inventory	**Capital Project Description**	RNG Spare Parts Inventory

Project Rationale Upon Startup of the new LFG RNG facility, a spare parts inventory is required. Parts will be selected by HRRG and paid for by CRD for the 25 year operating agreement. This project covers the initial capital outlay for spare parts.

Project Number	24-11	**Capital Project Title**	Traffic Pattern Changes - Site Signage	**Capital Project Description**	Traffic Pattern Changes - Site Signage

Project Rationale Sitewide signage, delineators, signals, digital entrance signs and barriers required to facilitate new traffic patterns associated with relocation of Commercial traffic from Hartland Ave to Willis Point Rd, opening cell 4, relocation of the kitchen scrap transfer station and a new diversion transfer station.

Project Number	25-01	**Capital Project Title**	NE & NW Aggregate Stockpile cover	**Capital Project Description**	NE & NW Aggregate Stockpile cover

Project Rationale This project allows for the installation of a temporary impermeable membranes to be placed overtop the NE and NW shot-rock storage stock piles to protect the environment from minerals may runoff with precipitation.

Service: **1.521** **Environmental Resource Management**

Project Number	25-02	**Capital Project Title**	North End Wheel Wash	**Capital Project Description**	North End Wheel Wash

Project Rationale This project accounts for a new commercial truck wheel wash system to be installed on the North End to ensure trucks don't track mud onto Willis Point Road.

Project Number	25-03	**Capital Project Title**	Landfill Gas capture to meet New Federal	**Capital Project Description**	Landfill Gas capture to meet New Federal

Project Rationale Environment & Climate Change Canada has released a proposed Landfill Methane Regulation that is expected to come into force in Q1/Q2 of 2024, with the intent of reducing fugitive landfill emissions across the country. The regulation sets thresholds for surface emissions at landfills emitting more than 10,000 tonnes of CO_2e per year (Hartland exceeds this). Based on required monitoring events, any surface methane concentrations that exceed proposed levels require a corrective action plan and mitigation within a specified timeframe. Based on current surface emissions data, it is expected that Hartland will need to implement additional controls, improve gas collection, or repair infrastructure to reduce surface methane concentrations to achieve compliance with these proposed limits.

Project Number	25-04	**Capital Project Title**	Hartland Operating Certificate Renewal	**Capital Project Description**	Hartland Operating Certificate Renewal

Project Rationale Hartland's Operating Certificate (OC) has not been modified since January 27, 2010. CRD has committed to updating its OC in light of recent MOE diuscussion and approval of ERM's SWMP. This project covers staff time and consultant/legal fees to assist the CRD in updating the OC with the MOE.

Project Number	26-01	**Capital Project Title**	Cell 4& 5 Bottom Lift Gas Wells / Leachate Drain	**Capital Project Description**	Cell 4 Bottom Lift Gas Wells / Leachate Drain

Project Rationale To meet BC Ministry of Environment regulations, gas wells and leachate collectors are installed in each lift of refuse and have to be connected to the existing collection systems to collect methane gas. Well heads, valves, condensation traps, monitoring points, and piping has to be installed to each combination gas well and leachate collector. The leachate is then conveyed to the lined storage lagoons and then discharged into the municipal sewer. Estimate is derived from historical costs.

1.521 Enviromental Resource Management
ERF Reserve Fund Schedule
2024 - 2028 Financial Plan

ERF Reserve Fund Schedule

ERF: ERM ERF or PERS Fund for Equipment

Equipment Replacement Fund Fund: 1022 Fund Centre: 101447	Estimate 2023	Budget 2024	2025	2026	2027	2028
Beginning Balance	2,594,261	2,366,326	1,463,326	1,312,326	1,131,326	950,326
Planned Purchase (Based on Capital Plan)	(258,111)	(1,103,000)	(355,000)	(385,000)	(385,000)	(385,000)
Transfer to/from Ops Budget	30,176	200,000	204,000	204,000	204,000	204,000
Disposal of equipment	-	-	-	-	-	-
Interest Income*		-	-	-	-	-
Ending Balance $	**2,366,326**	**1,463,326**	**1,312,326**	**1,131,326**	**950,326**	**769,326**

Assumptions/Background:
ERF Reserve to fund replacement of computer equipment and for PERS (Prority Equipment Replacement) type equipment that lasts less than 15 years

* Interest should be included in determining the estimated ending balance for the current year. Interest in planning years nets against inflation which is not included.

1.521 Enviromental Resource Management
Capital Reserve Fund Schedule - ERM
2024 - 2028 Financial Plan

Capital Reserve Fund Schedule - ERM

Capital Reserve Fund ERM - Landfill Closure Portion, Capital Reserve Portion, and Recycling Depots Portion

Capital Reserve Fund Schedule

Bylaw 2164 established a Solid Waste Refuse Disposal Reserve Fund for the ERM Service (was called Solid Waste Service). There are three portions in the Reserve Fund: Landfill Closure, restricted funds to cover the liability of closing Phase 2 - 4 and post-closure maintenance. Capital Reserve is working capital and not restricted.

Landfill Closure Portion	**Estimate**	**Budget**				
Fund: 1020 Fund Centre: 101363	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**
Beginning Balance	12,695,022	13,613,753	14,068,873	10,523,993	4,979,113	5,434,232
Planned Capital Expenditure (Based on Capital Plan)	-	-	(4,000,000)	(6,000,000)	-	-
Transfer to/from Ops Budget	455,120	455,120	455,120	455,120	455,120	455,120
Interest Income*	463,611	-	-	-	-	-
Ending Balance $	**13,613,753**	**14,068,873**	**10,523,993**	**4,979,113**	**5,434,232**	**5,889,352**

Assumptions/Background:

Liability reserve to fund closure of Phase 2-4 and post closure maintenance.

* Interest should be included in determining the estimated ending balance for the current year. Interest in planning years nets against inflation which is not included.

Capital Reserve Fund Schedule

Capital Reserve Portion Fund: 1020 Fund Centre: 101364	Estimate 2023	Budget 2024	2025	2026	2027	2028
Beginning Balance	10,658,469	12,116,098	6,037,468	4,383,838	3,683,838	2,433,838
Planned Capital Expenditure (Based on Capital Plan)	(2,350,000)	(7,175,000)	(2,750,000)	(700,000)	(1,250,000)	(625,000)
Transfer from Air Space Reserve Funds	1,000,000					
Transfer to/from Ops Budget	2,400,249	1,096,370	1,096,370	-	-	-
Interest Income*	407,379	-	-	-	-	-
Ending Balance $	**12,116,098**	**6,037,468**	**4,383,838**	**3,683,838**	**2,433,838**	**1,808,838**

Assumptions/Background:

* Interest should be included in determining the estimated ending balance for the current year. Interest in planning years nets against inflation which is not included.

Capital Reserve Fund Schedule

Recycling Depots/Compost Center Reserve Portion Fund: 1020 Fund Centre: 102102	Estimate 2023	Budget 2024	 2025	 2026	 2027	 2028
Beginning Balance	16,920	17,185	21,185	25,185	29,185	33,185
Planned Capital Expenditure	(3,734)	-	-	-	-	-
Transfer to/from Ops Budget	4,000	4,000	4,000	4,000	4,000	4,000
Ending Balance $	**17,185**	**21,185**	**25,185**	**29,185**	**33,185**	**37,185**

Assumptions/Background:

Reimburse operating budget for capital expenditures spent by Compost Center.

1.521 Enviromental Resource Management
Operating Reserve Summary
2024 - 2028 Financial Plan

Profile

Enviromental Resource Management

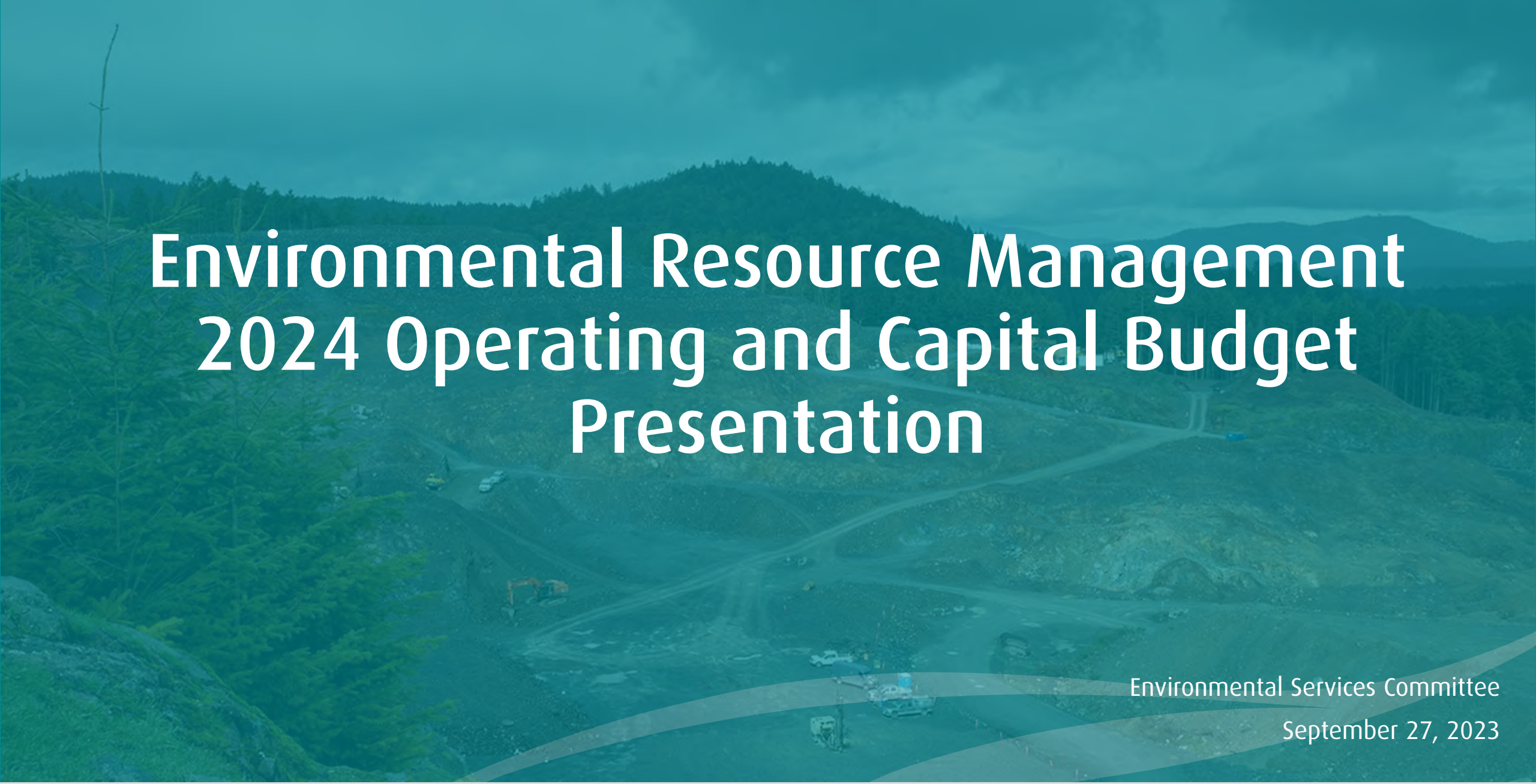
Bylaw 3867 - established Operating Reserve for the ERM Service to be used by the service for: mitigating fluctuations in tipping fee revenue and for covering operational expenditures as required, including debt servicing.

Operating Reserve Schedule

Operating Reserve Schedule	Estimate	Budget				
Fund: 1500 Fund Center 105509	2023	2024	2025	2026	2027	2028
Beginning Balance	26,910,018	22,048,051	4,296,686	7,109,483	6,104,049	5,996,491
Planned Purchase - RNG project	(2,000,000)	(9,468,000)		-	-	-
Planned Capital Expenditure (Based on Capital Plan)	(6,250,000)	(5,900,000)	(350,000)	(700,000)		(625,000)
Transfer to/from Ops Budget	2,415,621	(2,383,365)	3,162,797	(305,434)	(107,558)	(1,019,200)
Interest Income*	972,411			-	-	-
Total projected year end balance	**22,048,051**	**4,296,686**	**7,109,483**	**6,104,049**	**5,996,491**	**4,352,291**

Assumptions/Background:
Reserve for rate stabilization

* Interest should be included in determining the estimated ending balance for the current year. Interest in planning years nets against inflation which is not included.



Environmental Resource Management 2024 Operating and Capital Budget Presentation

Environmental Services Committee

September 27, 2023

ERM Service Areas

Waste Diversion

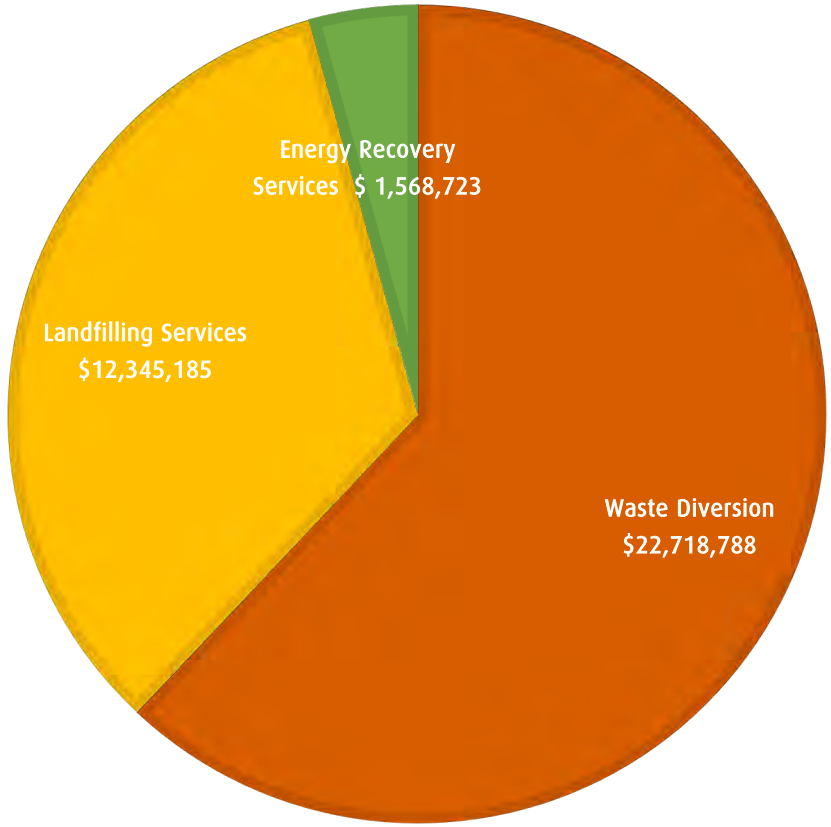
Landfilling

Energy Recovery

2024 Operating Budget Expenses

+$7.5 million (25%)

- Waste Diversion (+$6.6 million)
- Landfilling (+$1.6 million)
- Energy Recovery (-$0.7 million)



2024 Operating Budget Expenses

Waste Diversion (+$6.6 million)

- Material Stream Diversion expenses ($2.7 million)
- Solid Waste Management Plan – increase in programming ($700,000)
- New Curbside Blue Box 2024 contract ($2.4 million)
- Electoral Area recycling depot top-up ($250,000)
- Raincoast Foundation – Tod Creek sampling ($200,000)

2024 Operating Budget Expenses

Landfilling (+$1.6 million)

- Heavy equipment contract - volume / op costs ($500,000)
- Corporate overhead ($1 million)

Energy Recovery Services (-$700,000)

- Removal of one-time BC Hydro termination payment in 2023 budget (-$700,000)

2024 Operating Budget Revenues

+$8.2 million

- Waste Diversion (+$2 million)
- Landfilling (+$5.7 million)
- Energy Recovery (+$0.5 million)

2024 Operating Budget Revenues

Waste Diversion (+$2.0 million)

- Revenue from Material Stream Diversion policy changes – diversion incentive rates ($2.0 million)

Landfilling (+$5.7 million)

- Revenue from Material Stream Diversion policy changes – garbage tipping fee increases ($5.7 million)

Energy Recovery (+$500,000)

- Net revenue from new Renewable Natural Gas facility, Q4 commissioning / start-up

2024 – Capital Budget
$38.8million

Ongoing capital ($3.25 million)

- Aggregate production, progressive closure, scale upgrades, vehicles…

Renewable Natural Gas ($17.4 million)

- Completion of RNG capital project

Preparing Cells 4, 5, 6 ($12.6 million)

- Design / install new liner, fire safety improvements, traffic improvements…

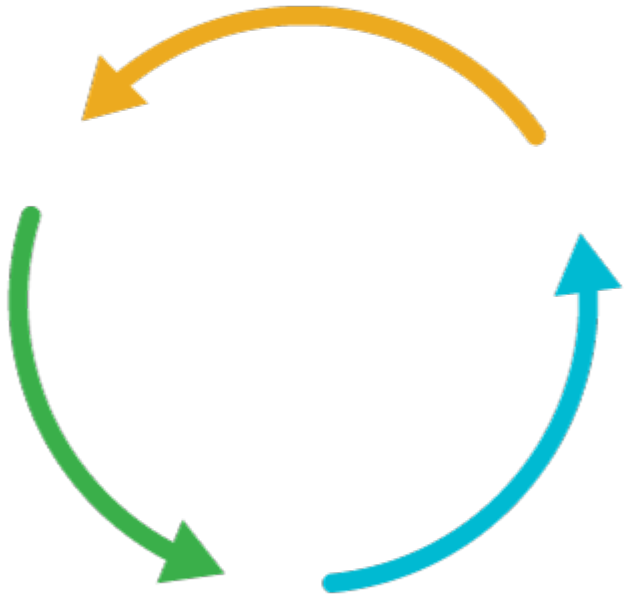
Material Stream Diversion ($5.6 million)

- On-site diversion transfer station to facilitate material stream diversion policy changes

Capital Funding
2023-2027: $68 million

Funding new 5-year capital plan using a combination of reserve funds and new debt

2024 Operating & Capital Budget



2024 ERM BUDGET SUMMARY

- Operating expenses +$7.5 million
- Operating revenues +$8.2 million
- 2024 Capital Budget ($39 million)
- 2024 Capital Funding with ERM Reserves and Debt
- No requisition required to fund ERM budget
- 3.0 new FTEs (2024)
  - Material Stream Diversion Attendant
  - Material Stream Diversion Coordinator
  - Residential Waste Reduction Coordinator

Thank you

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Capital Regional District

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Making a difference...together

ECA 23-36

REPORT TO ENVIRONMENTAL SERVICES COMMITTEE
MEETING OF WEDNESDAY, SEPTEMBER 27, 2023

SUBJECT **Service Planning 2024 – Climate Action Community Need Summary**

ISSUE SUMMARY

To provide strategic context and an overview of services, initiatives and performance data related to the Climate Action Community Need.

BACKGROUND

The Capital Regional District (CRD) Board approved the 2023-2026 Board Priorities on March 8, 2023. Staff then developed the 2023-2026 CRD Corporate Plan, which was approved by the CRD Board on April 12, 2023.

The CRD Corporate Plan presents the work the organization needs to deliver over the four-year term, along with the critical regional, sub-regional and local services, to meet the region's most important needs (i.e., Community Needs) and advance the Board's Vision and Priorities. Board Priorities, Corporate Plan initiatives and core service delivery form the foundation of the five-year financial plan.

The 2024 planning cycle marks the first year of the implementation of the 2023-2026 CRD Corporate Plan. The CRD's annual service plans, known as Community Need Summaries, provide an overview of the operational and strategic context, services levels, initiatives and performance data for each Community Need. They also provide details of the initiatives, associated staffing, timing and service levels required to advance the work in future years.

The Climate Action Community Need Summary is attached as Appendix A. The desired outcome is progress on adaptation, reduced greenhouse gas emissions and triple-bottom-line solutions that consider social, environmental and economic impacts.

The CRD reports on the progress of its initiatives and services on a regular basis. The Board receives updates about the Board Strategic Priorities through the Chief Administrative Officer Quarterly Progress Reports. The Board also receives an overview of progress made on delivering the Corporate Plan twice a year at the strategic check-in and provisional budget meetings, which take place in the spring and fall respectively. The next strategic check-in will take place in spring 2024. During the year, standing committees and commissions also fulfill an oversight and advisory role in relation to the work.

ALTERNATIVES

Alternative 1
The Environmental Services Committee recommends the Committee of the Whole recommend to the Capital Regional District Board:
That Appendix A, Community Need Summary – Climate Action, be approved as presented and form the basis of the Provisional 2024-2028 Financial Plan.

Alternative 2
The Environmental Services Committee recommends the Committee of the Whole recommend to the Capital Regional District Board:
That Appendix A, Community Need Summary – Climate Action, be approved as amended and form the basis of the Final 2024-2028 Financial Plan.

IMPLICATIONS

Governance Implications

In 2024, staff have prioritized programs and initiatives that:

- advance 2023-2026 Board Priorities or Corporate Plan initiatives
- operationalize capital investments; and/or
- are necessary to maintain a core service level following a regulatory change or where there is a safety risk to customers, communities, or staff.

The Executive Leadership Team (ELT) has reviewed and assessed all initiative business cases and confirmed alignment with the criteria. ELT has determined that the consolidated package of work is appropriate and a proportional response to the CRD Board's and communities' expectations of the organization.

Financial Implications

To exercise constraint and cost containment, the CRD Board directed staff to keep the core inflationary adjustment to 3.5% through the 2024 Service and Financial Planning Guidelines. Staff and management have taken the necessary steps to mitigate the financial impact of proposed initiatives, as well as cost escalation and high inflation rate experienced in 2022 through to 2023.

Financial and staff impacts for initiatives will be summarized and included in the provisional budget, which will be presented at the Committee of the Whole meeting scheduled for October 25, 2023. Starting this year, this will also include a five-year forecast of staffing level changes, which will be reviewed annually.

Service Delivery Implications

Appendix A includes information about existing service delivery, operational considerations and performance. Additional information has been provided below about the proposed changes for 2024/2025.

1. Proposed changes for 2024

Staff are proposing to advance three new initiatives for the Climate Action Community Need that have financial implications for 2024, as shown in Table 1. The key drivers for the initiatives are:

1. advancing a Board or Corporate Plan Priority; and
2. operationalization of capital investments.

Table 1. Climate Action Community Need Initiatives (2024)

Initiative	Implementation year(s)	Staff impacts (2024)	Incremental cost (2024)	Funding source
6a-4.1 Biodiversity Service	2024-ongoing	Existing position moved	-	Core budget
6b-3.1 Fuel Purchase System	2024	-	$17,000	Other
6b-3.3 Fleet Overhead Recovery	2024	-	$128,000	Other

The information in Table 1 reflects the initiative business case costs, which ELT reviewed as part of its annual assessment of initiatives. The financial impacts reflect full program costs, including cost of staffing.

6a-4.1 Biodiversity Service

The CRD Board directed staff to "explore options for a regional approach to biodiversity and the protection of ecological assets." Increased environmental stewardship through action on biodiversity and protection of ecological assets can improve watershed and harbour health, build climate resilience and create more sustainable and livable communities.

Ecosystems that have a high degree of biodiversity with a wide variety of species are more resilient than those that have less biodiversity. The more diverse an ecosystem, the more it can withstand stressors like climate change, invasive species, disease, or other disturbances. Conserving and restoring natural spaces, both on land and in the water, is essential for limiting carbon emissions and adapting to an already changing climate.

As a start, initiative 6a-4.1 seeks to allocate an existing staff position (0.5 full-time equivalent) and budget in the Environmental Protection Division to create a new Biodiversity & Environmental Stewardship Service (Sooke to Saanich Peninsula) to coordinate invasive species management, biodiversity and ecological assets.

6b-3.1 Fuel Purchase System

The CRD currently utilizes the services of seven vendors to facilitate fuel purchasing for its fleet assets. This approach evolved over time as services grew but is no longer efficient.

Initiative 6b-3.1 seeks a core budget increase to identify and implement a software tool to improve the CRD's fuel purchasing process. Doing so will enable the Customer & Technical Services Division to streamline cost allocation, lower the administrative burden and acquire data to facilitate better fiscal and climate action monitoring and reporting.

6b-3.3 Fleet Overhead Recovery

Since it was created in 2007, the Corporate Fleet function has grown its internal customer base from two water services with 100 fleet assets to 33 services across the region with a fleet size of 420 assets. The fleet supported has also grown more complex, as a wider variety of vehicles and mobile equipment was added. The replacement value of all current fleet assets is $55 million.

While the scope of services provided has grown steadily, the way that the function recovers costs for services rendered has not been updated. Currently, overhead costs are only recovered from the Integrated Water Services fleet users, which only account for 45% of all customers. The shortfall has been made up using Integrated Water Services revenue.

Initiative 6b-3.3 seeks to expand the cost recovery model to all internal customers to ensure appropriate fiscal accountability and support the ongoing fleet management and electrification.

2. Planned changes in 2025

There are two initiatives planned for 2025, shown in Table 2. The CRD Board will consider approval next year.

Table 2. Forecast of Future Initiatives: Climate Action Community Need

Initiative	Implementation year(s)	Staff impacts (2025)	Incremental cost (2025)	Funding source
6b-2.1 Corporate Fleet Mechanic	2025-ongoing	1 New Ongoing	$120,000	Fee-for-service
6b-3.1 Fleet Data Telematics	2025	-	-	

The information in Table 2 also reflects the business case costs.

6b-2.1 Corporate Fleet Mechanic

The number of vehicles and equipment that the CRD's Corporate Fleet function (Customer & Technical Services Division) supports has grown from 100 to over 400 over the last 10 years, in alignment with the growth of operations. The addition of specialist vehicles (e.g., fire and rescue vehicles) and growing geographic area supported means the level of complexity and effort involved in maintaining the fleet has grown considerably.

Separately, the CRD is implementing a strategy to electrify 75% of its light duty fleet by 2028 and 90% by 2030. Guiding and supporting this implementation is drawing considerable effort from the function. While the function has so far been able to respond to times of high demand by drawing on contracts for services, the cost of doing so has increased by 40% in recent years for lower levels of service.

Initiative 6b-2.1 will propose the creation of one new regular ongoing Fleet Mechanic position with the Customer & Technical Services Division to address these pressures in a cost-efficient manner and improve the level of support for fleet users.

6b-3.2 Fleet Data Telematics

Initiative 6b-3.2 will propose to identify and implement fleet telematics to strengthen utilization management, reporting, fiscal accountability and climate action.

CONCLUSION

CRD staff are progressing initiatives identified in the 2023-2026 CRD Corporate Plan, including the Board Priorities. The CRD Board and commissions with delegated authorities determine resourcing through the annual review and approval of the provisional financial plan. To support decision-making, staff provide recommendations on funding, timing and service levels through the service and financial planning processes.

RECOMMENDATION

The Environmental Services Committee recommends the Committee of the Whole recommend to the Capital Regional District Board:
That Appendix A, Community Need Summary – Climate Action, be approved as presented and form the basis of the Provisional 2024-2028 Financial Plan.

Submitted by:	Nikki Elliott, MPA, Manager, Climate Action Programs
Concurrence:	Glenn Harris, Ph.D., R.P.Bio., Senior Manager, Environmental Protection
Concurrence:	Jan van Niekerk, Senior Manager, Customer & Technical Services
Concurrence:	Larisa Hutcheson, P. Eng., General Manager, Parks & Environmental Services
Concurrence:	Alicia Fraser, P. Eng., General Manager, Integrated Water Services
Concurrence:	Ted Robbins, B. Sc., C. Tech., Chief Administrative Officer

ATTACHMENT

Appendix A: Community Need Summary – Climate Action

6 Climate Action

Progress on adaptation, reduced greenhouse gas emissions and triple-bottom line solutions that consider social, environmental and economic impacts

01 Strategy

STRATEGIES & PLANS

- Climate Action Strategy
- Regional Growth Strategy
- Regional Water Supply Strategic Plan
- Regional Parks Strategic Plan 2022-2032
- Special Task Force on First Nations Relations
- Statement of Reconciliation
- Solid Waste Management Plan

CORPORATE PLAN GOALS

6a Sustainable & resilient land use, planning and preparedness
6b Low carbon mobility
6c Low carbon & resilient buildings & infrastructure
6d Community-based greenhouse gas emissions

02 Contacts

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03 Operating Context

ACHIEVEMENTS IN 2023

1. Publication of 2022 Climate Action Progress Report.
2. Continued execution of the Home Energy Navigator Program and Regional Electric Vehicle Infrastructure program.
3. Continuted implementation of corporate Green Fleet Policy, and new execution of corporate Green Building Policy and Carbon Price Policy.

FACTORS THAT WILL AFFECT OUR OPERATIONS IN 2024 AND BEYOND

- Climate is changing, which will result in various regional impacts to human health, water supply and demand, rainwater and coastal storm management, transportation networks, ecosystems and species, buildings, infrastructure and energy systems, tourism and recreation, and food and agriculture
- Climate action is a shared responsibility and the regional government has a limited role focused on data collection and research, education and outreach, policy facilitation, regional program delivery, and managing emissions and adaptation within its own service delivery.
- The Board declared a Climate Emergency in February 2019 and approved a renewed Climate Action Strategy in late 2021. This aligns corporate and regional actions with senior levels of government and local government coordination to meet climate action targets through 2025.
- CRD Climate Action service levels were increased in 2022 through 2025 to focus on key areas (electric vehicle infrastracture, residential retrofit program), along with corporate energy management. It is anticipated that service levels will need to continue at similar or increased levels, 2025 onwards.
- There was a 7.7% reduction in the overall regional greenhouse gas emissions (GHG) reductions between 2007 and 2022 (equivalent to 26% reduction per capita), and 1% increase between 2020 and 2022 partly due to COVID-19 recovery. Population growth and concurrent economic growth will continue to add emissions as the region transitions to a reduced dependence on fossil fuels.
- There was a 6% decrease in corporate GHG emissions between 2007 and 2022. With increases in service levels and associated infrastructure, the CRD will need to sustain efforts and investment in GHG reduction initiatives to achieve future targets. Various policies and processes are being adopted to embed a climate lens in corporate decision making which target low carbon building systems and capital expenditures to ensure a sustained effort.

OPERATIONAL STATISTICS OF CLIMATE ACTION SERVICE

- Over 2022 – 2023, accessed or applied to external funding for 19 distinct corporate or regional climate projects/programs:
    - 6 complete (approximate $450k grant value)
    - 10 in progress (approximate $1.1m value, including $142k redistributed to municipal partners)

    - 3 in application process (approximate $7.7m value, including $5.7m to be redistributed to municipal/community partners)
- Annually administered four climate action Inter-municipal Working Group meetings and four Inter-Municipal Task Force meetings, produced monthly local government climate action e-newsletters and actively participated in five distinct provincial local government peer networks.

04 Services

The services listed below rely on the support of several corporate and support divisions to operate effectively on a daily basis. More information about these services is available in the Corporate Services and Government Relations Community Need Summaries.

SERVICE BUDGET REFERENCES[1]

- 1.309 Climate Action & Adaptation
- 1.012 Other Legislative & General - Climate

1. COMMUNITY CLIMATE ACTION

Description

To support and align regional climate action efforts with local governments related to strategies, policies and programs, and liaising and coordinating information and efforts with senior levels of government.

What you can expect from us

- Provide support to local governments in developing and implementing climate action plans and policies and execute regional programs.
- Catalyze action through partnerships with public and private sectors, non-governmental organizations and community organizations and increase public awareness of climate change issues.
- Liaise with senior levels of government on climate change-related programs, policies and legislation that impact the capital region.
- Provide scientific information, data and indicators related to local and regional GHG emissions and projected climate impacts.
- Support the CRD in fulfilling its corporate climate objectives and support execution of climate-related Board priorities.

Staffing Complement

Climate Action Program: **5 FTE (including 1 term and 1 manager)**

2. CORPORATE CLIMATE ACTION

Description

CRD services will embed climate action within their own service delivery, with support from Climate Action program staff. The program will support the organization with its corporate climate goals/commitments, develop and monitor corporate policies related to climate action, undertake annual reporting, support corporate building and fleet emission reduction and climate preparedness initiatives.

[1] Service budget(s) listed may fund other services

What you can expect from us

- Develop and monitor corporate climate action activities, policies and strategies.
- Facilitate internal coordination, knowledge sharing, capacity building and project identification and execution.
- Pursue grants and support services in implementing corporate projects.
- Complete annual reporting.

Staffing Complement

Climate Action Program: **1 FTE**

05 Initiatives

Below are the initiatives listed in the Capital Regional District 2023-2026 Corporate Plan and the related initiative business cases (IBCs), including financial and staffing impacts, proposed for 2024. The financial impacts reflect full program costs, including cost of staffing.

Initiative	Implementation year(s)	Impacts in 2024	
6a-1 Promote community capacity building on climate action	Ongoing		
6a-2 Update the climate projections for the capital region to support decision making and to help community partners understand how their work may be affected by our changing climate	2023-2024		
6a-3 Generate analysis to understand vulnerability and exposure to extreme heat now and into the future	2023-2024		
6a-4 Explore options for a regional approach to biodiversity and the protection of ecological assets	2024-2026		
▸ **NEW IBC** 6a-4.1 Biodiversity Service	2024-ongoing	-	Existing position moved
6b-1 Implement the Capital Region Electric Vehicle Infrastructure Roadmap to support shift to low-carbon transportation options	Ongoing		
6b-2 Advance the electrification of the CRD vehicle fleet	2023-2030		
▸ **FUTURE IBC** 6b-2.1 Corporate Fleet Mechanic	Planned for 2025	$120K fee-for-service	1 New Ongoing
6b-3 Enhance on-board and CRD fleet management technology to support utilization management, reporting, fiscal accountability and climate action	2024		
▸ **NEW IBC** 6b-3.1 Fuel Purchase System	2024	$17K other	-
▸ **FUTURE IBC** 6b-3.1 Fleet Data Telematics	Planned for 2025	-	-
▸ **NEW IBC** 6b-3.3 Fleet Overhead Recovery	2024	$128K other	-

Initiative	Implementation year(s)	Impacts in 2024
6c-1 Collaborative policies, programs and data collection initiatives to achieve energy efficient and low carbon buildings across the region	Ongoing	
6c-2 Implement the CRD Corporate Green Building Policy and CRD Corporate Carbon Price Policy	Ongoing	
6c-3 Expand the Home Energy Navigator program	Ongoing	
6d-1 Update the regional greenhouse gas inventories biannually to monitor progress on emissions reduction targets	2023 & 2025	

06 Performance

GOAL 6A: SUSTAINABLE & RESILIENT LAND USE, PLANNING AND PREPAREDNESS

Targets & Benchmarks

Tracking regional resiliency is challenging due to data availability and the various roles and responsibilities of governments and agencies within the region. Additionally, the regulatory framework will be changing with the modernization of the provincial *Emergency Programs Act*.

Staff will work with partners to consider opportunities for developing regional targets, benchmarks and related monitoring programs in the future.

Measuring Progress

Ref	Performance Measure(s)	Type	2022 Actual	2023 Forecast	2024 Target	Desired trend
	N/A	-	-	-	-	-

Discussion

N/A

GOAL 6B: LOW CARBON MOBILITY

Targets & Benchmarks

- Transportation mode shift targets: the Regional Transportation Plan established a mode share target of 42% for active transportation and transit combined for the region by 2038, based on 15% walking, 15% cycling and 12% transit. The Victoria Regional Transit Commission increased the transit mode share target to 15% in 2020, increasing the regional target to 45%.
- New public electric vehicle (EV) charging infrastructure target: 770 public Level 2 EV charger ports and 132 Direct Current Fast Charging (DCFC) ports by 2030
- Regional EV registrations: provided for context, no explicit target in place.

Measuring Progress

Ref	Performance Measure(s)	Type	2022 Actual	2023 Forecast	2024 Target	Desired trend
1	**Total trips made by walking, cycling and transit in the Growth Management Planning Area[1]**	Quantity	26.6%	TBC	N/A	↗
2	**New public EV charging infrastructure installed across the region: Level 2 ports/ DCFC ports[2]**	Quantity	296 / 35	400 / 37	500 /45	↗
3	**Regional EV registrations[3]**	Quantity	2.5%	3%	7%	↗

1 Indicator details are available in the Regional Growth Strategy indicator report; data is collected every five years through the CRD Origin and Destination Household Survey, last update completed in 2017

2 Data from the Electric Charging and Alternative Fuelling Stations Locator (canada.ca)

3 EVs as a percentage of all vehicles registered with ICBC in the capital region; data collected and provided by ICBC.

Discussion

- Metric 1: Targets included in Regional Transporation Plan.
- Metric 2: Target from Capital Region EV Infrastracture Roadmap (2021). Forecast assumes implementation of the CRD EV Infrastracture Regional network, Saanich and Victoria EV network.

GOAL 6C: LOW CARBON & RESILIENT BUILDINGS & INFRASTRUCTURE

Targets & Benchmarks

- Natural gas consumption: provided for context, no explicit target in place.
- Natural gas connections: provided for context, no explicit target in place.
- Fossil fuel heated homes sold in the region: provided for context, no explicit target in place.
- Home Energy Navigator participation: provided for context, no explicit target in place.
- Home Energy Navigator supported retrofits: the business case for the Navigator program targeted 1,000 per year of operation.

Measuring Progress

Ref	Performance Measure(s)	Type	2022 Actual	2023 Forecast	2024 Target	Desired trend
1	**Regional natural gas reported consumption**[1]	Quantity	7.4 PJ	7.8 PJ	7.4 PJ	↘
2	**Regional Fortis BC gas connections**[2]	Quantity	60,260	61,000	60,000	↘
3	**Fossil fuel heated homes sold in the capital region**[3]	Quantity	31.1%	30.5%	30%	↘
4	**Home Energy Navigator participation**[4]	Quantity	164	600	1,500	↗
5	**Home Energy Navigator low carbon retrofits**[5]	Quantity	0	400	1,000	↗

1 Total natural gas consumed annually in the capital region; data collected and provided by the Province of BC.

2 All gas connections active in the capital region in any given year; data collected and provided by the Province of BC.

3 Oil, propane and natural gas heated homes in the capital region; data provided by the Victoria Real Estate Board.

4 Annual total Home Energy Navigators participants; data collected and provided by City Green Solutions and CRD Climate Action Program.

5 Annual retrofit projects supported by the Home Energy Navigator; data collected and provided by City Green Solutions and CRD Climate Action Program.

Discussion

- Metric 5: the CRD launched the regional Home Energy Navigator Program in November 2022. Participation includes anyone who accessed the program for support during the term.
- Metric 6: Low carbon retrofits/conversion is a lagging indicator.

GOAL 6D: COMMUNITY-BASED GREENHOUSE GAS EMISSIONS

Targets & Benchmarks

The metrics included provide community and corporate Greenhouse Gas (GHG) reduction results.

- The CRD Board set a target to decrease community GHG emissions by 33% from 2007 levels by 2020, and 61% by 2038.
- The CRD has a target to decrease corporate GHG emissions by 45% from 2007 levels by 2030, and net-zero by 2050.

Measuring Progress

Ref	Performance Measure(s)	Type	2022 Actual	2023 Forecast	2024 Target	Desired trend
1	**Community GHG emissions**	Quantity	1.85m	N/A	N/A	↘
2	**Corporate GHG emissions**	Quantity	2,845	2,720	2,500	↘

[1] *Tonnes of CO2 emissions generated by community activities; data from Regional GHG Inventory Study (Stantec, 2023)*

[2] *Tonnes of CO2 emissions generated by CRD operations; data from CRD 2022 Climate Action Progess Report*

Discussion

- Metric 1: Includes emissions sources such as stationary energy, transportation, waste, industrial process and product use, agriculture, forestry and other land use. Inventories completed every two years.
- Metric 2: Does not include waste processing emissions from Hartland Landfill nor Capital Region Housing Corporation. The 2023 drop in emissions is expected thanks to the Green Fleet policy which enabled the purchase of EVs when they have demonstrated a lower total cost of ownership.

07 Business Model

PARTICIPANTS	All municipalities and electoral areas
FUNDING SOURCES	Requisitions and grants
GOVERNANCE	Environmental Services Committee

Making a difference...together

ECA 23-38

REPORT TO ENVIRONMENTAL SERVICES COMMITTEE
MEETING OF WEDNESDAY, SEPTEMBER 27, 2023

SUBJECT **2022 Regional Greenhouse Gas Inventory**

ISSUE SUMMARY

To provide the results of the 2022 Capital Regional District (CRD) regional and local government community greenhouse gas (GHG) emission inventories.

BACKGROUND

The CRD's 2018 Regional Growth Strategy (RGS) targets a reduction in community GHG emissions of 61% by 2038. In October 2021, the CRD Board approved the CRD Climate Action Strategy, which included a commitment to deliver a biennial regional GHG inventory. Utilizing the internationally recognized Global Protocol for Cities (GPC) BASIC + framework, the CRD retained Stantec Consulting Ltd. to update the CRD regional and local government emission inventories for the 2022 calendar year (see Appendices A and B).

Results

The 2022 CRD inventory indicates that the capital region emitted approximately 1.86 million tonnes of CO_2e. Carbon pollution in 2022 was 7% below the 2007 baseline and increased approximately 1%, compared to the 2020 inventory. This trend varies between the region's municipalities and electoral area inventories (Appendix B). On a per capita basis, emissions have decreased by 25% since 2007, which again, varies by community across the region (see Appendix C).

In 2022, on-road regional transportation related emissions accounted for approximately 42% of all carbon pollution. In conjunction with the increase in electric vehicles in the region, the region's on-road transportation-related carbon pollution was down approximately 12% from 2007 but increased approximately 11% over 2020. This is partly due to the COVID-19 pandemic recovery.

Natural gas use in buildings, which accounted for the majority of building carbon pollution in the region, continued to increase in 2022 at almost 10% above 2020 levels. Despite the substantial increase in natural gas use in 2022, the 2022 CRD inventory observed a reduction from buildings in the region of approximately 7% below 2007, as a result of heating oil use reductions and the continued greening of the BC electricity grid. Trends for propane and wood carbon pollution continued to be estimated using provincial estimates for the baseline year and annual adjustments using linear regression methods.

Waste-related carbon pollution was observed to be approximately 61.4% below 2007 levels, thanks to ongoing work at the Hartland Landfill to capture landfill gas and the new commissioning of the McLoughlin Wastewater Treatment Plant in December 2020.

This inventory represents the best available information and includes four notable updates, including:

- best available emission factor for electricity for each inventory year
- a new method for tracking heating oil use to better reflect building owners retrofitting in favor of other fuel types (including electricity and natural gas)

- modelled on-road transportation data (due to lack of vehicle-kilometre travelled [VKT] data) was adjusted using the travel pattern results from 2022 CRD Origin Destination Household Travel Survey
- changes to the estimates in the national inventory affecting emissions assumed to be coming from Other Stationary Combustion, such as those associated with agriculture and fishing, required previous inventories to be updated

As with the 2020 CRD inventory, due to limitations in how to quantify GHG emissions from sequestration and land use change, these values have been excluded from the calculation of total emissions for the 2022 CRD inventory. Values for these items are disclosed for information only in the CRD and regional local government community GHG emissions inventory reports.

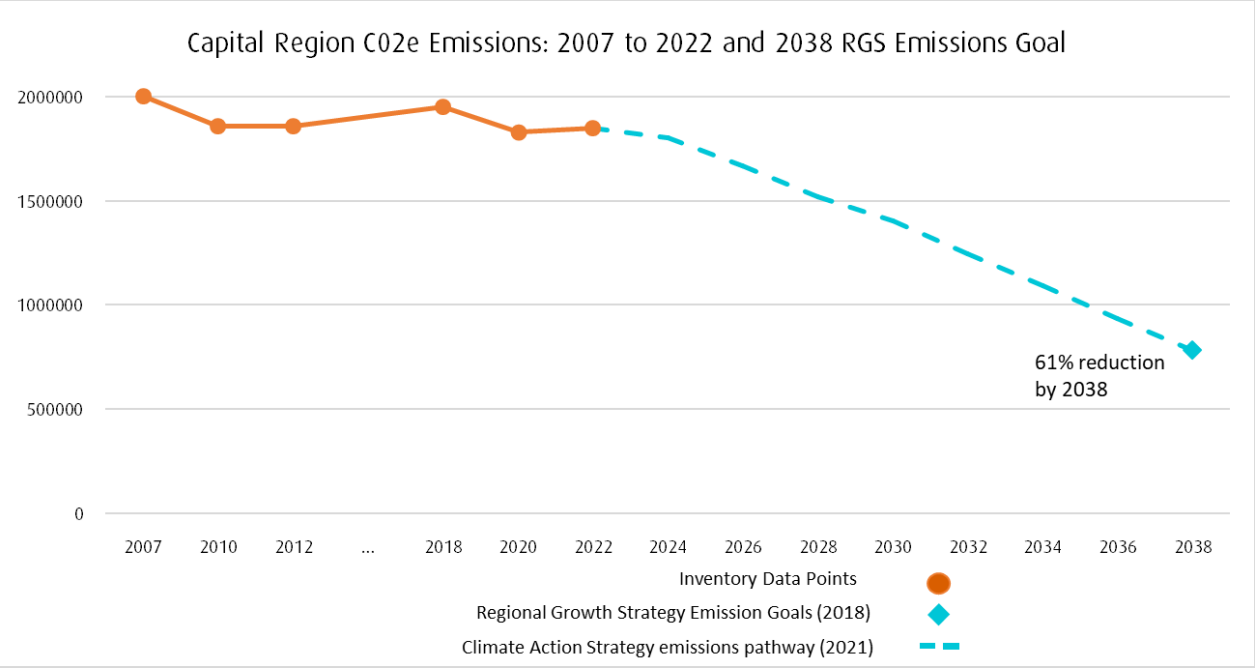

Figure 1: Capital Region Greenhouse Gas Global Protocol for Cities Basic + Emissions and 2038 Regional Growth Strategy (RGS) Goal

Summary and Next Steps

Carbon pollution in the region remains persistent and significant work remains for the region to meet its 2038 target. Together, building and transportation-related carbon pollution continue to be the largest sources of the region's carbon pollution in 2022 (approximately 75%). To achieve regional emissions targets, the natural gas use trend must reverse, and the transition to zero-emission transportation must accelerate while protecting and conserving ecosystem health and improving our region's resilience.

Staff will review results and methodology details of these inventories with staff and elected officials on the CRD Climate Action Inter-Municipal Working Group (IMWG) and Task Force and continue to work on collaborative climate action initiatives. Of note, the province has indicated that they may release revised Community Energy and Emissions Inventories (CEEIs) for local governments later this year. The last CEEIs were released in 2012. It is anticipated that methodologies used may differ from that of the CRD, and therefore may have different results. Once released, staff will review the methodology and share differences with the Climate Action IMWG.

CONCLUSION

The CRD completes regional and local government greenhouse gas emission inventories every two years. Results for the regional inventory for the 2022 calendar year indicate an approximate 7% decrease in regional emissions from 2007 to 2022, and a 1% increase from 2020. This trend varies between the municipalities and electoral areas within the capital region. The analyses also indicate that carbon pollution in the region remains persistent and significant work remains for the region to meet its 2038 emissions target. The CRD, through the regional climate action service, will continue to work with local governments to advance collaborative climate action initiatives.

RECOMMENDATION

There is no recommendation. This report is for information only.

Submitted by:	Nikki Elliott, BES, MPA, Manager, Climate Action Programs
Concurrence:	Larisa Hutcheson, P. Eng., General Manager, Parks & Environmental Services
Concurrence:	Ted Robbins, B. Sc., C. Tech., Chief Administrative Officer

ATTACHMENTS

Appendix A: Capital Regional District 2022 GPC BASIC+ Community Greenhouse Gas Emissions Inventory Report – Stantec Consulting Ltd. – September 14, 2023
Appendix B: Capital Regional District – Municipalities and Electoral Areas – 2007 Base Year and 2022 Reporting Year Energy & Greenhouse Gas Emissions Inventory – Stantec Consulting Ltd. – September 14, 2023
Appendix C: Capital Region CO_2e Emissions Per Capita – September 2023

APPENDIX A

Capital Regional District 2022 GPC BASIC+ Community Greenhouse Gas (GHG) Emissions Inventory Report

Prepared for:
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Project #: 160925214

September 14, 2023

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Executive Summary

There is increasing evidence that global climate change resulting from emissions of carbon dioxide (CO_2) and other greenhouse gases (GHGs) is having a significant impact on the ecology of the planet. Delayed actions to respond to the effects of climate change are expected to have serious negative impacts on global economic growth and development.

Beyond the costs associated with delayed climate action, there are cost savings to be realized through efforts to improve energy efficiency, conserve energy, and reduce GHG emissions intensity. To make informed decisions on reducing energy use and GHG emissions at the community scale, community managers must have a good understanding of these sources, the activities that drive them, and their relative contribution to the total. This requires the completion of an energy and GHG emissions inventory. To allow for credible and meaningful reporting locally and internationally, the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (the GPC Protocol) was developed. The GPC Protocol has been adopted by the Global Covenant of Mayors—an agreement led by community networks to undertake a transparent and supportive approach to measure GHG emissions community-wide. The Global Covenant of Mayors and the Federation of Canadian Municipalities promotes the use of the GPC Protocol as a standardized way for municipalities to collect and report their actions on climate change.

This project set out to compile a detailed GHG inventory for the capital region of British Columbia (the CRD) for the 2022 reporting year using the GPC Protocol. The CRD Region has historically relied on the Provincial 2007, 2010 and 2012 Community Energy and Emissions Inventories (CEEI) to baseline and track community GHG emissions. However, there have been some limitations to the CEEI which has resulted in the CRD preparing a GPC BASIC+ inventory. Following the requirements of the GPC Protocol, the GHG inventories considered emissions from all reporting Sectors, including Stationary Energy, Transportation, Waste, Industrial Process and Product Use (IPPU), and Agriculture, Forestry and Other Land Use (AFOLU). The purpose of this document is to describe the quantification methodologies used to calculate GHG emissions for the 2022 reporting year, and to present the CRD's 2022 community GHG emissions.

In 2022, the CRD's Regional BASIC+ GHG emissions totaled 1,858,325 tonnes of carbon dioxide equivalent (tCO_2e). On an absolute basis, this is an 7% decline from the 2007 base year GHG emissions and a decline of 25% on a per capita basis. Due to limitations in how to quantify GHG emissions resulting from land use change (e.g., residential development) and sequestration, these GHG emissions have been excluded from the CRD's GHG emissions inventory, but have been disclosed, until a more robust measurement methodology can be developed.

A summary of the 2022 GHG emissions is presented in Table E-1.

Table E-1 BASIC+ 2007 Base Year And 2022 Reporting Year GHG Emissions

Sector	Sub-Sector	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)
Stationary Energy	Residential Buildings	422,256	275,044
	Commercial & Institutional Buildings	270,524	344,011
	Manufacturing Industries & Construction	0	0
	Energy Industries	418	6,497
	Agriculture, Forestry & Fishing activities	89,497	101,034
	Fugitive Emissions	1,003	1,510
Transportation	In-Boundary On-road Transportation	864,570	765,180
	Trans-Boundary On-road Transportation	13,256	6,949
	Waterborne Navigation	48,218	55,107
	Aviation	26,097	15,746
	Off-road Transportation	60,629	87,673
Waste	Solid Waste	110,955	39,699
	Biological Treatment of Waste	73	5,602
	Wastewater Treatment & Discharge	18,998	4,975
IPPU	IPPU	70,418	135,461
AFOLU	Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**	-33,172	-401,842
	Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**	24,093	89,610
	Livestock	6,867	12,431
	Non-CO_2 Land Emission Sources	849	1,406
Total GHG Emissions		**2,004,628**	**1,858,325**
Change in GHG Emissions from Base Year			**-7.3%**
Total Per Capita GHG Emissions		**5.6**	**4.2**
Change GHG Emissions per Capita from Base Year			**-25.1%**

Data in the table above is depicted in Figure E-1.

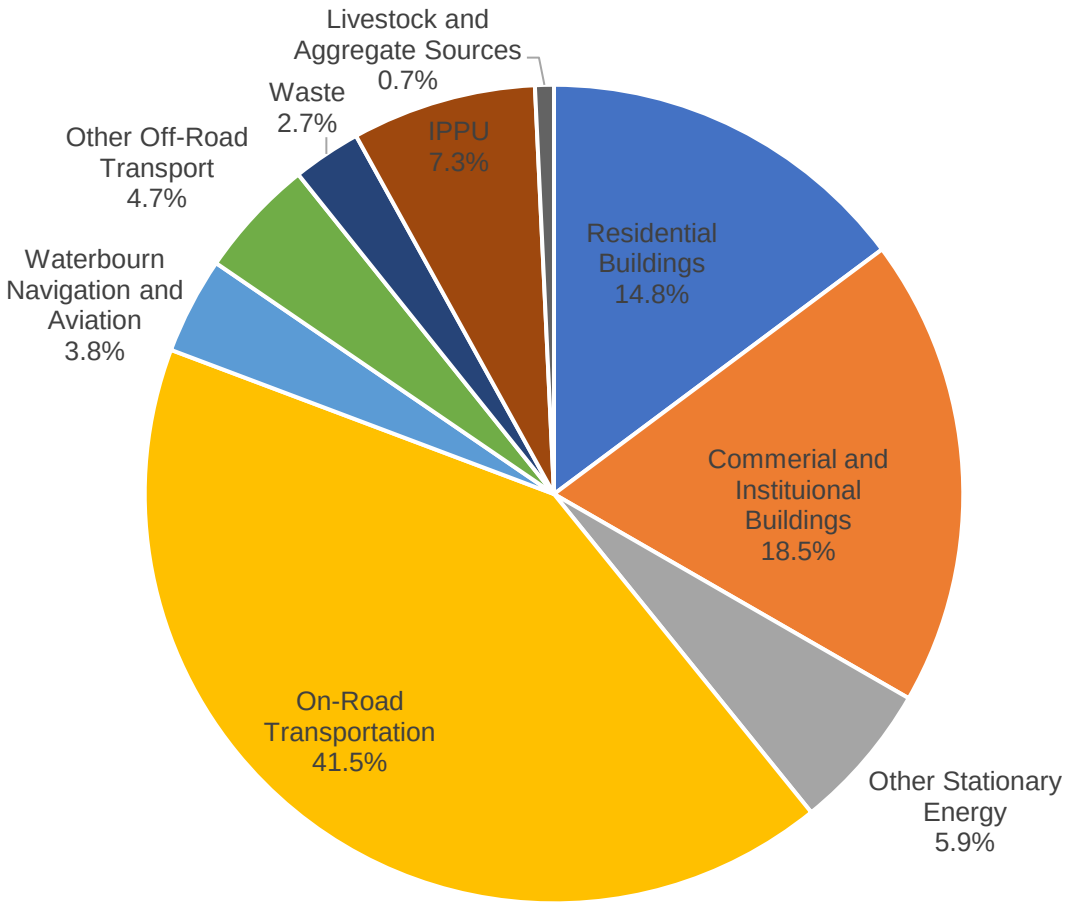

Figure E-1 CRD's 2022 BASIC+ GHG Emissions Profile

Abbreviations

ACERT	Airport Carbon Emissions Reporting Tool
ACI	Annual Crop Inventory
AFOLU	Agriculture, Forestry, and Other Land Use
BC	British Columbia
C40	C40 Cities Climate Leadership Group
CH_4	Methane
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
CEEI	Community Energy and Emissions Inventories
CRD	Capital Regional District
VIA	Victoria International Airport
eMWh	megawatt hours equivalents
FCM	Federation of Canadian Municipalities
GDP	gross domestic product
GHG	greenhouse gas
GJ	Gigajoules
GPC	Global Protocol for Community-Scale Greenhouse Gas Emission Inventories
GVHA	Greater Victoria Harbour Authority
GWP	global warming potentials
HFC	Hydrofluorocarbons
ICAO	International Civil Aviation Organization
ICBC	Insurance Corporation of BC

ICLEI	International Council for Local Environmental Initiatives
IE	included elsewhere
IPCC	Intergovernmental Panel on Climate Change
IPPU	Industrial Process and Product Use
ISO	International Organization for Standardization
kg	Kilograms
kW	Kilowatt
kWh	kilowatt hours
L	Litres
MWh	megawatt hours
N_2O	nitrous oxides
NE	not estimated
NIR	National Inventory Report
NPRI	National Pollutant Release Inventory
NO	not occurring
PCP	Partnership for Climate Protection
PFC	Perfluorocarbons
SC	Other Scope 3
SF_6	sulfur hexafluoride
VIA	Victoria International Airport
WIP	waste-in-place
WRI	World Resources Institute

Glossary

Air pollution	The presence of toxic chemicals or materials in the air, at levels that pose a human health risk.
Base Year	This is the reference or starting year to which targets and GHG emissions projections are based.
BASIC	An inventory reporting level that includes all Scope 1 sources except from energy generation, imported waste, IPPU, and AFOLU, as well as all Scope 2 sources (GPC, 2014).
BASIC+	An inventory reporting level that covers all GPC BASIC sources, plus Scope 1 AFOLU and IPPU, and Scope 3 in the Stationary Energy and Transportation Sectors (GPC, 2014).
Biogenic emissions	Emissions produced by living organisms or biological processes, but not fossilized or from fossil sources (GPC, 2014).
Carbon dioxide equivalent (CO_2e)	The amount of carbon dioxide (CO_2) emissions that would cause the same integrated radiative forcing, over a given time horizon, as an emitted amount of a greenhouse gas (GHG) or a mixture of GHGs. The CO_2e emission is obtained by multiplying the emission of a GHG by its Global Warming Potential (GWP) for the given time horizon. For a mix of GHGs, it is obtained by summing the CO_2e emissions of each gas (IPCC 2014).
Climate change	Climate change refers to a change in the state of the climate that can be identified by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forces such as modulations of the solar cycles, volcanic eruptions, and persistent anthropogenic changes in the composition of the atmosphere or in land use (IPCC, 2014).
Emission	The release of GHGs into the atmosphere (GPC, 2014).
Emission factor(s)	A factor that converts activity data into GHG emissions data (GPC, 2014).
Flaring	The burning of natural gas that cannot be used.
Fossil fuels	A hydrocarbon deposit derived from the accumulated remains of ancient plants and animals which is used as an energy source.
Fugitive emission	Emissions that are released during extraction, transformation, and transportation of primary fossil fuels. These GHG emissions are not combusted for energy.
Geographic boundary	A geographic boundary that identifies the spatial dimensions of the inventory's assessment boundary. This geographic boundary defines the physical perimeter separating in-boundary emissions from out-of-boundary and transboundary emissions (GPC, 2014).
Gigajoule (GJ)	A gigajoule (GJ), one billion joules, is a measure of energy. One GJ is about the same energy as: • Natural gas for 3-4 days of household use • The electricity used by a typical house in 10 days

Global warming	A gradual increase in the Earth's temperature which is attributed to the greenhouse effect caused by the release of greenhouse gas (GHG) emissions into the atmosphere.
Global warming potential (GWP)	An index measuring the radiative forcing following an emission of a unit mass of a given substance, accumulated over a chosen time horizon, relative to that of the reference substance, carbon dioxide (CO_2). The GWP thus represents the combined effect of the differing times these substances remain in the atmosphere and their effectiveness in causing radiative forcing. The Kyoto Protocol is based on global warming potentials over a 100-year period (IPCC 2014).
Greenhouse gas (GHG)	GHGs are the seven gases covered by the UNFCCC: carbon dioxide (CO_2); methane (CH_4); nitrous oxide (N_2O); hydrofluorocarbons (HFCs); perfluorocarbons (PFCs); sulphur hexafluoride (SF_6); and nitrogen trifluoride (NF_3) (GPC, 2014).
GHG intensity	The annual rate to which GHG emissions are released in the atmosphere, relative to a specific intensity.
Gross domestic product (GDP)	An economic measure of all goods and services produced in an economy.
In-boundary	Occurring within the established geographic boundary (GPC, 2014).
Reporting year	The year for which emissions are reported (GPC, 2014).
Scope 1	Emissions that physically occur within a community.
Scope 2	Emissions that occur from the use of electricity, steam, and/or heating/cooling supplied by grids which may or may not cross Community boundaries.
Scope 3	Emissions that occur outside a community but are driven by activities taking place within a community's boundaries.
Tonne of CO_2e	A tonne of greenhouse gases (GHGs) is the amount created when we consume: • 385 litres of gasoline (about 10 fill-ups) • Enough electricity for three homes for a year (38,000 kWh)
Transboundary GHG emissions	Emissions from sources that cross the geographic boundary (GPC, 2014).

1.0 INTRODUCTION

1.1 CLIMATE CHANGE AND GREENHOUSE GAS EMISSIONS

Since the industrial revolution, human activities such as burning fossil fuels, deforestation, agricultural practices, and other land use changes have resulted in the release of unnaturally large volumes of greenhouse gas (GHG) emissions into the Earth's atmosphere causing global climate systems to change. In its sixth assessment report, the Intergovernmental Panel on Climate Change (IPCC) concluded that "the scale of recent changes across the climate system as a whole and the present state of many aspects of the climate system are unprecedented over many centuries to many thousands of years."[1] 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 (GHG) emissions 50–60% 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 be net negative in the second half of the century. Recognizing the importance and benefits to addressing climate change, many governments – including the Government of Canada and Province of British Columba, and the CRD as well as publicly traded organizations representing more than $23 trillion in market capitalization have now committed to these GHG reduction targets.[2]

1.2 COMMUNITIES AND GREENHOUSE GAS EMISSIONS

Communities are centers of communication, commerce, and culture. They are, however, also a significant and growing source of energy consumption and GHG emissions. On a global scale, communities are major players in GHG emissions. They are responsible for more than 70% of global energy-related carbon dioxide emissions and thus represent the single greatest opportunity for tackling climate change.

For a community to act on mitigating climate change and monitor its progress, it is crucial to have good quality GHG emissions data to build a GHG inventory. Such an inventory enables cities to understand the breakdown of their emissions and plan for effective climate action. The Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC Protocol) seeks to support exactly that, by giving cities the standards and tools that are needed to measure the emissions, build more effective emissions reduction strategies, set measurable and more ambitious emission reduction goals, and to track their progress more accurately and comprehensively.

Until recently there has been no internationally recognized way to measure community-level emissions. Inventory methods that community managers have used to date around the globe vary significantly. This inconsistency has made comparisons between cities and over the years difficult. The GPC Protocol offers

[1] https://www.ipcc.ch/assessment-report/ar6/
[2] sciencebasedtargets.org/news/more-than-1000-companies-commit-to-science-based-emissions-reductions-in-line-with-1-5-c-climate-ambition

an internationally accepted, credible emissions accounting and reporting practice that will help communities to develop comparable GHG inventories.

1.3 VARIANCE FROM COMMUNITY ENERGY AND EMISSIONS INVENTORIES (CEEI)

The CRD has historically relied on the Provincial 2007, 2010 and 2012 Community Energy and Emissions Inventories (CEEI) to baseline and track community GHG emissions. However, there have been some limitations to the CEEI in that it is an in-boundary inventory, the most recent version published is for 2012, and the CEEI Protocol does not fully meet the requirements of the GPC Protocol BASIC or BASIC+ reporting requirements which is the required reporting standard for local governments that have committed to the Global Covenant of Mayors—an agreement led by community networks to undertake a transparent and supportive approach to measure GHG emissions community-wide. A high-level summary of the differences between the CEEI and GPC Protocol inventories are presented in Table 1.

Table 1 Summary of GHG Inventory Scope Differences

Reporting Sector	2007-2019 CEEIs	GPC BASIC	GPC BASIC+
Residential Buildings	✓	✓	✓
Commercial And Institutional Buildings And Facilities	✓	✓	✓
Manufacturing Industries And Construction	✓	✓	✓
Energy Industries		✓	✓
Energy Generation Supplied To The Grid		✓	✓
Agriculture, Forestry And Fishing Activities		✓	✓
Non-Specified Sources		✓	✓
Fugitive Emissions From Mining, Processing, Storage, And Transportation Of Coal		✓	✓
Fugitive Emissions From Oil And Natural Gas Systems		✓	✓
On-Road Transportation		✓	✓
Railways		✓	✓
Waterborne Navigation		✓	✓
Aviation		✓	✓
Off-Road Transportation		✓	✓
Solid Waste	✓	✓	✓
Biological Waste	✓	✓	✓
Incinerated And Burned Waste		✓	✓

Reporting Sector	2007-2019 CEEIs	GPC BASIC	GPC BASIC+
Wastewater		✓	✓
Emissions From Industrial Processes			✓
Emissions From Product Use			✓
Emissions From Livestock	✓		✓
Emissions From Land			✓
Emissions From Aggregate Sources And Non-CO_2 Emission Sources On Land	✓		✓

1.4 PURPOSE OF THIS REPORT

The purpose of this document is to describe the quantification methodologies used by the CRD to calculate its BASIC+ GHG emissions for the 2007 base and 2022 reporting years. The focus of this report is on the 2022 reporting year. The CRD has elected to prepare a BASIC+ GHG emissions inventory to align with global best practices in community GHG emissions and to provide its members with the more comprehensive GHG emissions inventory database.

This document also supports the preparation of future community GHG emissions inventories, by:

- Defining GHG emissions data sources to be used for future inventory work
- Establishing quantification methods and assumptions.
- Evaluating the quality of the data sources and emission factors.
- Supporting consistent quantification of the inventory results over time.

2.0 GLOBAL PROTOCOL FOR COMMUNITY (GPC) SCALE EMISSION INVENTORIES PROTOCOL

2.1 OVERVIEW

The GPC Protocol is the result of a collaborative effort between the GHG Protocol at the World Resources Institute (WRI), C40 Cities Climate Leadership Group (C40), and ICLEI—Local Governments for Sustainability (ICLEI). The GPC Protocol is recognized as one of the first set of standardized global rules for cities to measure and publicly report community wide GHG emissions. It sets out requirements and provides guidance for calculating and reporting community wide GHG emissions, consistent with the 2006 IPCC guidelines on how to estimate GHG emissions (IPCC, 2006). Specifically, the GPC Protocol seeks to:

- Help cities develop a comprehensive and robust GHG inventory to support climate action planning.
- Help cities establish a base year GHG emissions inventory, set GHG reduction targets, and track performance.
- Ensure consistent and transparent measurement and reporting of GHG emissions between cities, following internationally recognized GHG accounting and reporting principles.
- Enable community-wide GHG inventories to be aggregated at subnational and national levels.
- Demonstrate the important role that cities play in tackling climate change and facilitate insight through benchmarking—and aggregation—of comparable GHG data.

2.2 GPC PROTOCOL STRUCTURE

The GPC Protocol sets several assessment boundaries which identify the restrictions for gases, emission sources, geographic area, and time span covered by a GHG inventory:

- The GHG inventory is required to include all seven Kyoto Protocol GHGs occurring within the geographic boundary of a community. These include:
  - Carbon dioxide (CO_2)
  - Methane (CH_4)
  - Nitrous oxide (N_2O)
  - Hydrofluorocarbons (HFCs)
  - Perfluorocarbons (PFCs)
  - Sulfur hexafluoride (SF_6)
  - Nitrogen trifluoride (NF_3)
- The GHG emissions from community-wide activities must be organized and reporting under the following five Sectors, based on the selected reporting level:
  - Stationary Energy
  - Transportation
  - Waste
  - Industrial Processes and Product Use (IPPU)

- Agriculture, Forestry, and Other Land Use (AFOLU)

The GPC Protocol also requires that a community define an inventory boundary, identifying the geographic area, time span, gases, and emission sources.

Under the GPC Protocol, a community has the option of reporting GHG emissions under three different levels:

- Territorial - A City only reports on GHG emissions occurring within the city boundaries
- City-Induced – A City accounts for all GHG emissions as a result of activities that occur within Under the City-Induced framework, there are two levels of reporting available to cities - BASIC and BASIC+
  - **BASIC—**This level covers stationary energy and transportation GHG emissions that physically occur within a city (Scope 1) and those that occur from the use of electricity, steam, and/or heating/cooling supplied by grids which may or may not cross city boundaries (Scope 2). The BASIC level also includes waste GHG emissions that may occur outside of a city but are driven by activities taking place within a city's boundaries (Scope 3). The BASIC level aligns with the current GHG reporting requirements of most voluntary reporting programs for local governments.
  - **BASIC+—**This level covers the same scopes as BASIC and includes more in-depth and data dependent methodologies. Specifically, it expands the reporting scope to include Scope 1 emissions from Industrial Process and Product Use (IPPU), Agriculture, Forestry, and Other Land-Use (AFOLU), and Scope 3 GHG emissions from transboundary transportation. The sources covered in BASIC+ also align with sources required for national reporting in IPCC guidelines.

Activities taking place within a community can generate GHG emissions that occur inside a Community boundary as well as outside a Community boundary. To distinguish between these, the GPC Protocol groups emissions into three categories based on where they occur: Scope 1, Scope 2, or Scope 3 emissions. The GPC Protocol distinguishes between emissions that physically occur within a Community (Scope 1), from those that occur outside a Community but are driven by activities taking place within a Community's boundaries (Scope 3), from those that occur from the use of electricity, steam, and/or heating/cooling supplied by grids which may or may not cross community boundaries (Scope 2). Scope 1 emissions may also be termed "territorial" emissions, because they are produced solely within the territory defined by the geographic boundary (see Figure 1).

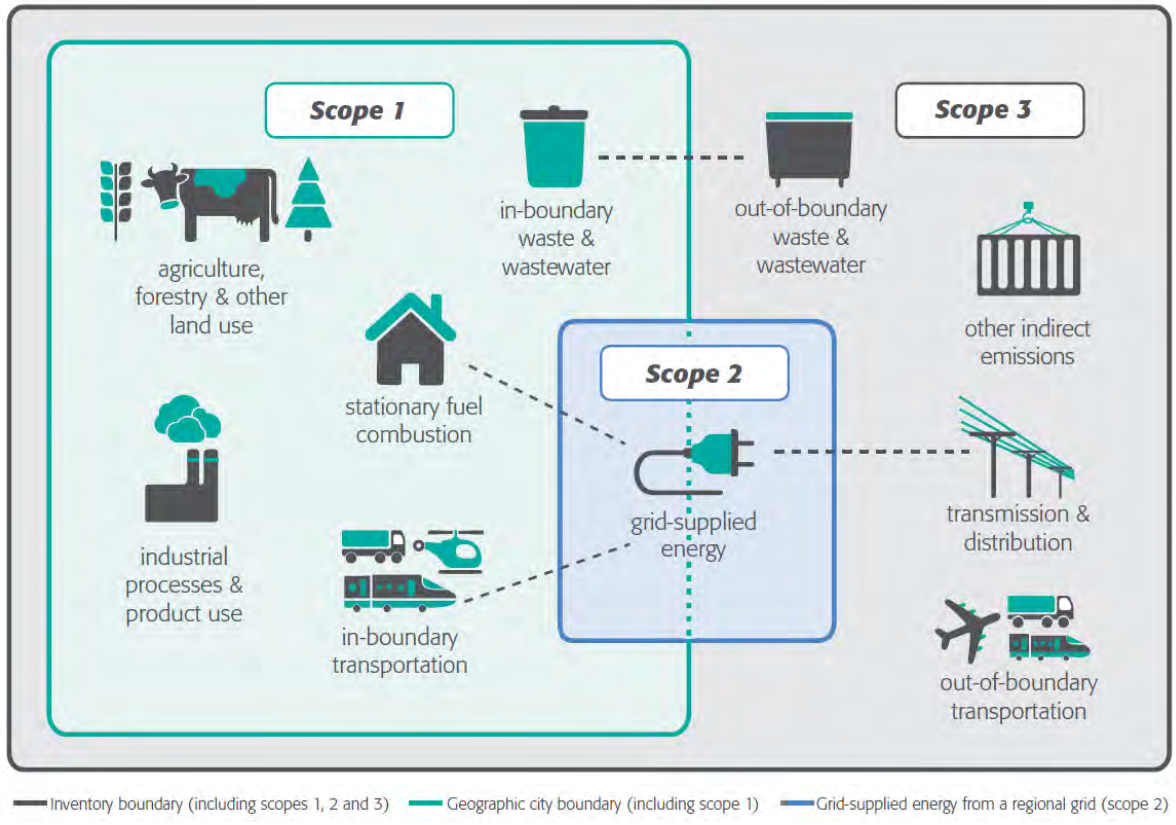

Figure 1 Sources and Boundaries of a Community's GHG Emissions (GPC 2014)

2.3 GHG EMISSION CATEGORIES

As noted previously, the GPC Protocol requires that different emission sources to be categorized into six main reporting Sectors. These high-level categories are described in more detail in Section 2.3.1 to Section 2.3.6. More information on how GHG emissions are captured within the GPC Protocol is available on the Greenhouse Gas Protocol website.

2.3.1 Stationary Energy

Stationery energy sources are typically one of the largest contributors to a community's GHG emissions. In general, these emissions come from fuel combustion and fugitive emissions. They include the emissions from energy to heat and cool residential, commercial, and industrial buildings, as well as the activities that occur within these residences and facilities, such as off-road transportation emissions from construction equipment. Emissions associated with distribution losses from grid-supplied

electricity/steam/heating/cooling are also included, as are some fugitive emissions from sources such as coal piles, and natural gas distribution systems.

The Stationary Energy Sector includes the following Sub-Sectors:

- Residential buildings
- Commercial and institutional buildings and facilities
- Manufacturing industries and construction
- Energy industries
- Energy generation supplied to the grid*
- Agriculture, forestry, and fishing activities
- Non-specific sources
- Fugitive emissions from mining, processing, storage, and transportation of coal
- Fugitive emissions from oil and natural gas systems

*Emissions related with electricity generation activities occurring within a community's boundaries are to be reported; however, the GHG emissions from these sources are not included in the total GHG inventory to prevent double counting (GPC 2014).

Under the GPC Protocol, cities are to report off-road GHG emissions under the Off-road Transportation Sub-Sector if and only if the GHG emissions are occurring at transportation facilities (e.g., airports, harbors, bus terminals, train stations, etc.). Other off-road transportation GHG emissions that occur on industrial premises, construction sites, agriculture farms, forests, aquaculture farms, and military premises, etc., are to be reported under the most relevant Stationary Energy Sub-Sector (GPC, 2014). For example, GHG emissions from commercial building off-road construction equipment would be included in the Commercial And Institutional Buildings And Facilities Sub-Sector, whereas GHG emissions from residential lawn mowers would be reported under the Residential Buildings Sub-Sector.

2.3.2 Transportation

The GHGs released to the atmosphere to be reported in the Transportation Sector are those from combustion of fuels in journeys by on-road, railway, waterborne navigation, aviation, and off-road. GHG emissions are produced directly by the combustion of fuel, and indirectly using grid-supplied electricity. Unlike the Stationary Energy Sector, transit is mobile and can pose challenges in both accurately calculating GHG emissions and allocating them to a specific Sub-Sector. This is particularly true when it comes to transboundary transportation, which includes GHG emissions from trips that either start or finish within a community's boundaries (e.g., departing flight emissions from an airport outside a Community boundaries) (GPC, 2014). Transboundary GHG emissions are only required for GPC BASIC+ GHG reporting.

The Transportation Sector includes the following Sub-Sectors:

- On-road
- Railways

- Waterborne
- Aviation
- Off-road

As noted previously, cities are to report off-road GHG emissions under the Off-road Transportation Sub-Sector if and only if the GHG emissions are occurring at transportation facilities (e.g., airports, harbors, bus terminals, train stations, etc.). For example, off-road railway maintenance support equipment GHG emissions are reported under the Off-Road Transportation Sub-Sector.

2.3.3 Waste

Cities produce GHG emissions that arise from activities related to the disposal and management of solid waste. Waste does not directly consume energy, but releases GHG emissions because of decomposition, burning, incineration, and other management methods.

The Waste Sector includes the following Sub-Sectors:

- Solid waste disposal
- Incineration and open burning
- Biological treatment of waste
- Wastewater treatment and discharge

Under the GPC Protocol, the Waste Sector includes all GHG emissions that result from the treatment or decomposition of waste regardless of the source of the waste (e.g., another community's waste in a Community's landfill). However, the GHG emissions that are associated with waste from outside a Community's boundary that is treated or decomposes within a Community boundary are deemed to be "reporting only" emissions and do not contribute to the GHG inventory (GPC 2014).

Any GHG emissions that result from the combustion of waste or waste related gases to generate energy, such as a methane capture and energy generation system at a landfill, are reported under Stationary Energy Generation Supplied To The Grid Sub-Sector (GPC, 2014). Any waste related GHG emissions that are combusted but not related to energy generation are reported in the appropriate Waste Sub-Sector. Lastly, any waste GHG emissions that are released to the atmosphere are also captured in the appropriate Waste Sub-Sector.

2.3.4 Industrial Processes and Product Use (IPPU)

Emissions from this Sector are only required for BASIC+ GHG reporting under the GPC Protocol. This Sector encompasses GHG emissions produced from industrial processes that chemically or physically transform materials and using products by industry and end-consumers (e.g., refrigerants, foams, aerosol cans) (GPC, 2014).

The IPPU Sector includes the following Sub-Sectors:

- Industrial processes
- Product use

Any GHG emissions associated with energy use for industrial processes are not reported in the IPPU Sector; rather, they are reported under the appropriate Stationary Energy Sub-Sector.

2.3.5 Agriculture, Forestry, and Other Land Use (AFOLU)

Emissions from the AFOLU Sector are only required for BASIC+ GHG reporting. AFOLU GHG emissions are those that are captured or released because of land-management activities. These activities can range from the preservation of forested lands to the development of crop land. Specifically, this Sector includes GHG emissions from land-use change, manure management, livestock, and the direct and indirect release of nitrous oxides (N_2O) from soil management, rice cultivation, biomass burning, urea application, fertilizer, and manure application (GPC, 2014).

The AFOLU Sector is organized into the following Sub-Sectors:

- Livestock
- Land
- Aggregate sources and non-CO_2 emission sources on land

2.3.6 Other Scope 3 Emissions

Cities, by their size and connectivity, inevitably give rise to GHG emissions beyond their boundaries. The GPC Protocol already includes the following Scope 3 emissions in other Sectors:

- On-road, waterborne, and aviation transboundary transportation
- Transmission and distribution losses associated with grid-supplied energy
- Solid waste disposal
- Biological treatment of solid waste
- Wastewater treatment and discharge

Cities may voluntarily report on other Scope 3 emissions as they are estimated. In the case of the CRD, no other Scope 3 GHG emissions, other than those listed above, have been estimated.

2.4 ACCOUNTING AND REPORTING PRINCIPLES

All GHG inventories following the GPC Protocol are required to meet GHG accounting principles. Specifically, these inventories should be relevant, consistent from year to year, accurate and transparent about methodologies, assumptions, and data sources. The transparency of inventories is fundamental to the success of replication and assessment of the inventory by interested parties.

The GHG inventories must also properly account for key energy and GHG emission sinks, sources, and reservoirs (SSR) that are occurring within municipal boundaries. The SSRs are a convenient way to identify and categorize all the GHG emissions to determine if they should be included or excluded from a GHG inventory. A “Source” is something that releases GHG emissions to the atmosphere, such as a diesel generator. A “Sink” is a process or item that removes GHG from the atmosphere, such as photosynthesis and tree growth. Finally, a “Reservoir” is a process or item with the capability to store or accumulate a GHG removed from the atmosphere by a GHG sink, such as a wetland or a peat bog. By assessing and reporting on the applicable SSRs, users of the GHG inventory can have confidence that the inventory is complete and representative of the types and quantities of the GHGs being released within community limits.

2.5 BASE AND REPORTING YEAR RECALCULATIONS

As communities grow and expand, significant changes to the GHG emissions profile can alter materially thus making it difficult to meaningfully assess GHG emission trends and changes over time. The GPC Protocol has requirements on how to treat changes in a community’s GHG profile—this is presented in Table 2.

Table 2 GPC Protocol Recalculation Thresholds

Threshold	Example Change	Recalculation Needed	No Recalculation Needed
Changes in the assessment boundary	A local government is annexed in or removed from the administrative boundary	✓	
	Change in protocol reporting method (e.g., from BASIC to BASIC+, addition of GHGs reported, etc.)	✓	
	Shut down of a power plant		✓
	Building a new cement factory		✓
Changes in calculation methodology or improvements in data accuracy	Change in calculation methodology for landfilled municipal solid waste (MSW) that results in a material change in GHG emissions to that sector (i.e., +/-10%).	✓	
	Adoption of more accurate local emission factors, instead of a national average emission factors that results in a material change in GHG emissions (i.e., +/-10%).	✓	
	Change in electricity emission factor due to energy efficiency improvement and growth of renewable energy utilization.		✓
Discovery of significant errors	Discovery of mistake in unit conversion in formula used.	✓	

2.6 DATA QUALITY

Data collection and the assessment of its quality is an integral component of compiling any GHG inventory. Like the IPCC, the GPC Protocol requires users to establish first whether a source exists, and then assess the data availability and quality. To support GHG reporting, the following notation keys are used.

- If the GHG sink, source or reservoir does not exist, a “NO” is used to indicate it is “not occurring”.
- If the GHG sink, source or reservoir does occur, and data is available, then the emissions are estimated. However, if the data is also included in another emissions source category or cannot be disaggregated, the notation key “IE” would be used to indicate “included elsewhere” to avoid double counting.
- When GHG emissions are occurring in the CRD, but data is not available, then the notation key “NE” would be used to indicate “not estimated”.

For GHG data that does exist, in accordance with the GPC Protocol, an assessment of quality is also made on emission factors and GHG estimation methodologies deployed. The GPC Protocol data quality assessment notation keys are summarized in Table 3.

Table 3 GPC Protocol Data Quality Assessment Notation Keys

Data Quality	Activity Data	Emission Factor
High (H)	Detailed activity data. Data accuracy is high.	Site-specific emission factors
Medium (M)	Modeled activity data using robust assumptions. Data accuracy is moderate.	More general emission factors
Low (L)	Highly modeled or uncertain activity data. Data accuracy is low / very poor.	Default emission factors

3.0 GHG ASSESSMENT BOUNDARIES

This section sets out the reporting boundaries of the CRD's GHG inventory.

3.1 SPATIAL BOUNDARIES

This GHG inventory is defined geographically by the capital region of British Columbia jurisdictional boundaries. As shown in Figure 2, this region consists of 13 municipalities and 3 electoral areas. For the purposes of this report, only the CRD GHG emissions are presented. A breakdown of GHG emissions by each CRD municipality and electoral area has been presented in a separate report.

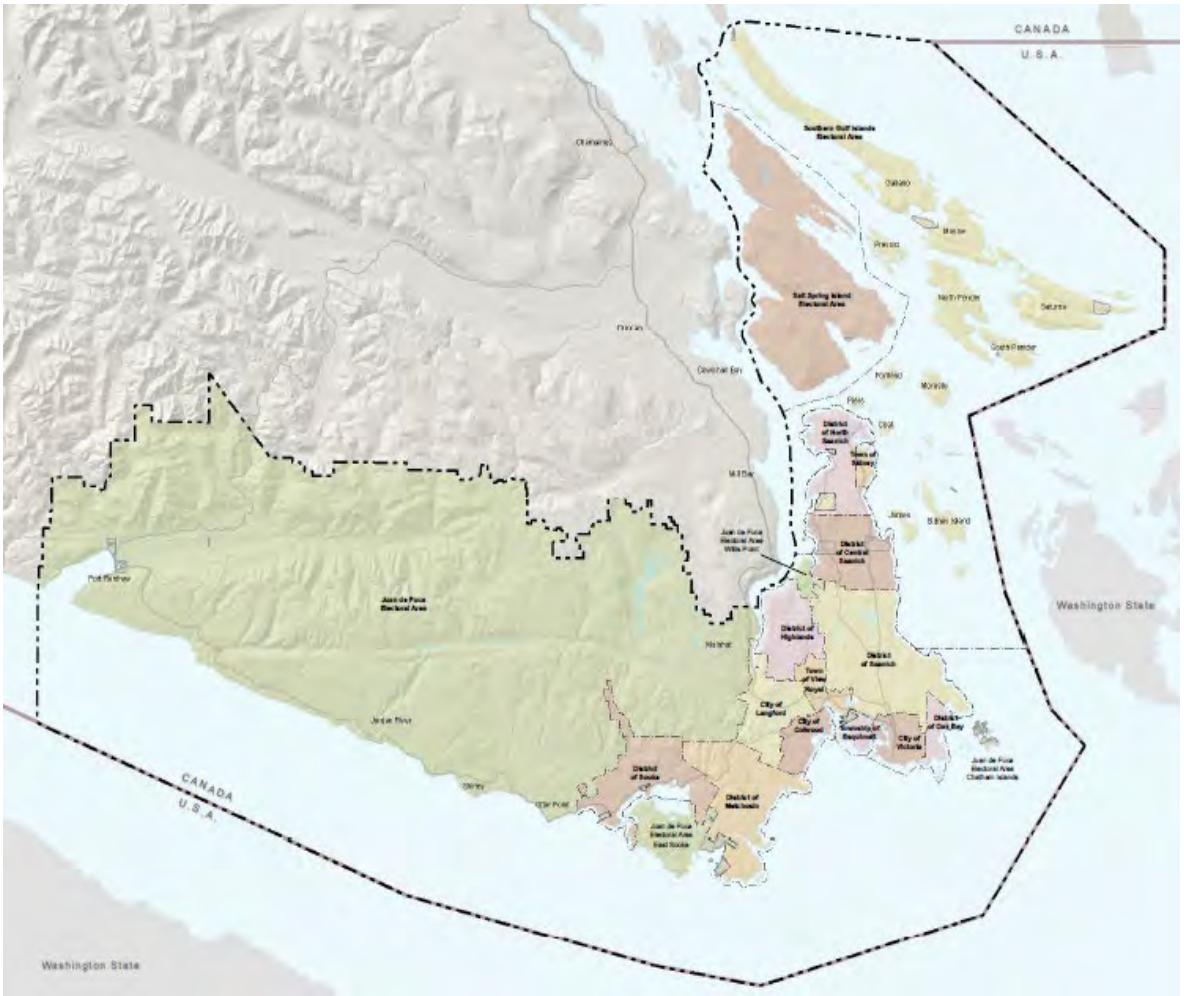

Figure 2 Region GHG Boundary

Table 4 Inventory Information

Inventory Boundary	Community / District Information
Name of Community / District	Capital Regional District
Municipality / Electoral Area	• District of Central Saanich • City of Colwood • Township of Esquimalt • District of Highlands • Juan de Fuca Electoral Area • City of Langford • District of Metchosin • District of North Saanich • District of Oak Bay • District of Saanich • Salt Spring Island Electoral Area • Town of Sidney • District of Sooke • City of Victoria • Town of View Royal • Southern Gulf Islands Electoral Area
Country	Canada
Inventory Year	2022
Geographic Boundary	See Figure 2
Land Area (km^2)	2,310.18
Resident population	432,931
GDP (US$)	Unknown at time of reporting
Composition of Economy	Government
Climate	Temperate, warm summer

3.2 TEMPORAL BOUNDARIES

3.2.1 2007 Base Year

Federal and provincial initiatives and legislation have been implemented to support local governments in acting to advance energy efficiency, promote energy conservation, and reduce GHG emissions. The CRD and its local governments have already been working to address sustainability and climate change through several initiatives for many years. The CRD's Regional Growth Strategy set an absolute regional GHG reduction target of 61% by 2038 (below 2007 levels).

To maintain consistency with the current reporting year, and as required by the GPC Protocol, the CRD has updated its 2007 GHG base year GHG emissions profile to be consistent with the GPC Protocol BASIC+ reporting level. Between the current reporting year and the 2007 base year, there were no boundary changes (e.g., annexes) and thus no additional modifications were made. All methods and assumptions, adjusted for the 2007 reporting year, are the same.

Due to limitations in how to quantify GHG emissions resulting from land use change (e.g., residential development) and sequestration, these GHG emissions have been excluded from the CRD's 2007 and 2022 GHG emissions inventories, but have been disclosed, until a more robust measurement methodology can be developed.

Table 5 summaries the original 2007 and the updated 2007 base year GHG emissions reported as tonnes of carbon dioxide equivalent (tCO_2e). The base year has been updated (in 2023) to reflect the adoption of the IPCC's 5th assessment report GWPs.

Table 5 Original And Updated BASIC+ Base Year

Aspect	Quantification Protocol	2007 GHG Base Year (tCO_2e)
Original Base Year	CEEI Protocol	1,563,000
Updated Base Year	GPC Protocol BASIC+	2,004,628

3.2.2 GHG Reduction Target

Recognizing the role that the CRD plays in achieving a significant and immediate reduction in global GHG emissions, the CRD has set a regional GHG reduction target of 61% (from 2007 levels) by 2038. With the CRD's 2007 base year GHG emissions being 2,004,628 tCO_2e, a 61% reduction would require a reduction of approximately 1,222,823 tCO_2e. On a per capita basis, this amounts to reducing emissions from approximately 4.3 tCO_2e per person in 2022 to 2.4 tCO_2e per person by 2038.

In February 2019, the CRD declared a climate emergency and committed to regional carbon neutrality.

3.2.3 2022 GHG Boundary

This inventory covers all GHG emissions for the 2022 reporting year. Where 2022 data was not available, the most recent year's data have been used, and the timescale noted accordingly. These are as follows:

- **Global Warming Potentials (GWP)**. The BC government has communicated that is adopting GWPs from the fifth IPCC report. On this basis, the CRD is applying GWPs from the fifth IPCC report.
- **Stationary Energy: Residential, Commercial and Institutional Buildings**. Propane, and wood GHG emissions were estimated using linear regression methods. The data used in the estimates included historical propane and wood energy data published in the 2007-2019 CEEIs, and heating degree days (HDD) published by Environment and Climate Change Canada.

- **Stationary Energy: Residential, Commercial and Institutional Buildings**. The CRD used real-estate sales data between 2019 and 2022 to estimate the number of heating oil tanks and average household consumption for the 2020 reporting year. The 2020 heating oil numbers were adjusted using a change in heating degree days between 2020 and 2022. This approach was used to estimate heating oil consumption for all local governments, except the City of Victoria and District of Saanich. For the District of Saanich and the City of Victoria, heating oil GHG emissions were estimated based on the number of known tanks, average heated floor areas and fuel volume intensity.
- **Stationary Energy: Fugitives**. Fortis BC provided total fugitive emissions for the 2020 reporting year at the CRD level. Since no historical numbers were provided, the 2020 value was used to estimate the 2022 emissions.
- **Stationary Energy: Other Off-Road.** The ECCC 2023 NIR prepared for the Province of BC for the 2021 reporting year was used to estimate GHG emissions for:
    - Off-road agriculture and forestry GHG emissions
    - Off-road commercial and institutional GHG emissions
    - Off-road manufacturing, mining and construction GHG emissions
    - Off-road residential GHG emissions

  These GHG emissions were assigned to the CRD on a per capita basis.
- **Transportation: On-Road**. The on-road transportation emissions are based on the total estimated fuel sales in the CRD, and the number of registered vehicles. Insurance Corporation of BC (ICBC) compiles data on an April 1 to March 31 basis, and thus the current on-road GHG emission estimate is based on the number of registrations from April 1, 2022 – March 31, 2023.
- **Transportation: Aviation.** 2022 aviation GHG emissions were estimated using 2015 aircraft flight profiles (the last available data), and the total number of aircraft movements reported in 2022.
- **Transportation: Waterborne Recreational Watercraft.** GHG emissions from recreational watercraft and US/Canada ferries were estimated based on a publicly available year 2000 study for the Victoria, Vancouver, and Washington harbors.
- **Transportation: Cruise Ships.** The Greater Victoria Harbour Authority (GVHA) reported on cruise ship emissions for the 2018 reporting year but did not provide an estimate for 2022. As a result, the 2018 GHG emissions estimate and number of cruise ship visits to Ogden Point was used to create a proxy to estimate 2022 cruise ship emissions.
- **Waste: Solid Waste.** To quantify GHG emissions from the Hartland Landfill, the CRD utilized the waste-in-place (WIP) method which is accepted under the GPC Protocol. The WIP assigns landfill emissions based on total waste deposited during that year. It counts GHGs emitted that year, regardless of when the waste was disposed. Except for the City of Victoria, who claims 31% of the CRD's landfill GHG emission, the remaining landfill GHG emissions were allocated to each local government on a per capita basis. Using this allocation method, the CRD members may over, or underestimate associated solid waste GHG emissions as the current year landfill GHG emissions are based upon cumulative waste over time, and each member may have contributed more waste in past years than the current year (and vice versa).
- **AFOLU: Aggregate Sources And Non-CO_2 Emission Sources On Land.** These emissions are based on the 2023 NIR as prepared by ECCC and the total area of farmland BC in 2021 as reported by Statistics Canada. These GHG emissions were assigned to each local government on a per hectare (ha) of cropland basis.

- **AFOLU: Land-Use.** The land cover change analysis requires a consistent land-use category attribution and spatial data. For parts of the CRD, spatial data was available for the 2007, 2011 and 2019 reporting years. Differences between these data sets in terms of resolution and their timing of collection increase the uncertainty as to the accuracy of the land-use classifications. For example, the 2007 and 2011 land use data was collected at different times of the year and may not accurately reflect tree cover. Furthermore, no land use spatial data was collected the Juan de Fuca, Salt Spring Island and Gulf Islands and thus Annual Crop Inventory (ACI) settlement data collected by Agriculture Canada was used to inform the analysis. The challenge in utilizing this data is that it is provided in a 30m resolution. Furthermore, since annual data is not available, the change between land cover data years (2007-2011, 2011-2019) for all areas was averaged and may not represent actual changes in each year. Since no data was available for 2022, the 2019 estimates were applied.
  Due to limitations in how to quantify GHG emissions resulting from land use change (e.g., residential development), these GHG emissions have been excluded from the CRD's GHG emissions inventory, but have been disclosed, until a more robust measurement methodology can be developed.

3.3 GHG EMISSION SOURCES AND SCOPES

Table 6 summarizes the CRD's GHG emissions by source and GHG emission scope.

Table 6 Summary of Emissions Scope and GPC Protocol Reporting Sector

GHG Emissions Scope	GPC Protocol Reporting Sector
Scope 1	The GHG emissions occurring from sources located within the CRD's limits: • Stationary fuel combustion: – Residential buildings – Agriculture, forestry, and fishing activities – Commercial and institutional buildings, and facilities – Energy industries – Fugitive emissions from oil and natural gas systems • Transportation: – On-road: In Boundary – Waterborne Navigation – Off-road • Waste: – Solid waste disposal – Biological treatment of solid waste – Wastewater treatment and discharge • Industrial processes and product use (IPPU): – Product use • Agriculture, Forestry, and Other Land Use (AFOLU): – Land-use: emissions sequestered – Livestock – Aggregate sources and non-CO_2 emission sources on land

GHG Emissions Scope	GPC Protocol Reporting Sector
Scope 2	The GHG emissions occurring from using grid-supplied electricity, heating and/or cooling within the CRD's boundary: • Stationary fuel combustion: – Residential buildings – Commercial and institutional buildings and facilities • Transportation: – On-road
Scope 3	Other GHG emissions occurring outside of the CRD's limits as a result of the CRD's activities: • Stationary Energy: – Transmission, Distribution, and Line Losses • Transportation: – Aviation – On-Road: Transboundary – Waterborne Navigation

3.4 GHG REPORTING

Where relevant, the GPC Protocol recommends using methodologies that align with the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. The GHG inventory is required to include all seven Kyoto Protocol GHGs occurring within the geographic boundary of a community. These include:

- Carbon Dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulfur hexafluoride (SF_6)
- Nitrogen trifluoride (NF_3)

Each GHG listed above has a different global warming potential (GWP) due to its ability to absorb and re-emit infrared radiation. This chemical property is recognized by the GWP set out by the IPCC Fifth Assessment Report. A larger GWP value means the substance has a greater affinity to absorb and re-emit infrared radiation. The GWP of these GHGs are CO_2 = 1.0, CH_4 = 28, N_2O = 265 (IPCC, 2014).

Total GHG emissions are normally reported as CO_2e, whereby emissions of each of the GHGs are multiplied by their GWP and are reported as tonnes of CO_2e.

The GHG inventory results following the GPC Protocol reporting table format is presented in Section 5.0. The GPC Protocol reporting format is presented in Table 7 below which also indicates the reporting level (BASIC / BASIC+) for each source.

Table 7 GPC Protocol Summary Table

GPC Protocol Reference Number	Reporting Level	Emissions Scope	GHG Emissions Source
I	**Stationary Energy Sources**		
I.1	**Residential Buildings**		
I.1.1	BASIC	1	Emissions from in-boundary fuel combustion
I.1.2	BASIC	2	Emissions from consumption of grid-supplied energy
I.1.3	BASIC+	3	Transmission and distribution losses from grid-supplied energy
I.2	**Commercial and Institutional Buildings/Facilities**		
I.2.1	BASIC	1	Emissions from in-boundary fuel combustion
I.2.2	BASIC	2	Emissions from consumption of grid-supplied energy
I.2.3	BASIC+	3	Transmission and distribution losses from grid-supplied energy
I.3	**Manufacturing Industry and Construction**		
I.3.1	BASIC	1	Emissions from in-boundary fuel combustion
I.3.2	BASIC	2	Emissions from consumption of grid-supplied energy
I.3.3	BASIC+	3	Transmission and distribution losses from grid-supplied energy
I.4	**Energy Industries**		
I.4.1	BASIC	1	Emissions from in-boundary production of energy used in auxiliary operations
I.4.3	BASIC+	3	Transmission and distribution losses from grid-supplied energy
I.5	**Agriculture, Forestry, and Fishing Activities**		
I.5.1	BASIC	1	Emissions from in-boundary fuel combustion
I.5.2	BASIC	2	Emissions from consumption of grid-supplied energy
I.5.3	BASIC+	3	Transmission and distribution losses from grid-supplied energy
I.7	**Fugitive Emissions from Mining, Processing, Storage, And Transportation of Coal**		
I.7.1	BASIC	1	In-boundary fugitive emissions
I.8	**Fugitive Emissions from Oil and Natural Gas Systems**		
I.8.1	BASIC	1	In-boundary fugitive emissions
II	**Transportation**		
II.1	**On-road Transportation**		
II.1.1	BASIC	1	Emissions from in-boundary transport
II.1.2	BASIC	2	Emissions from consumption of grid-supplied energy
II.1.3	BASIC+	3	Emissions from transboundary journeys
II.2	**Railways**		
II.2.1	BASIC	1	Emissions from in-boundary transport
II.2.2	BASIC	2	Emissions from consumption of grid-supplied energy

Table 7 GPC Protocol Summary Table

GPC Protocol Reference Number	Reporting Level	Emissions Scope	GHG Emissions Source
II.2.3	BASIC+	3	Emissions from transboundary journeys
II.3	**Waterborne Navigation**		
II.3.1	BASIC	1	Emissions from in-boundary transport
II.3.2	BASIC	2	Emissions from consumption of grid-supplied energy
II.3.3	BASIC	3	Emissions from transboundary journeys
II.4	**Aviation**		
II.4.1	BASIC	1	Emissions from in-boundary transport
II.4.2	BASIC	2	Emissions from consumption of grid-supplied energy
II.4.3	BASIC+	3	Emissions from transboundary journeys
II.5	**Off-road**		
II.5.1	BASIC	1	Emissions from in-boundary transport
II.5.2	BASIC	2	Emissions from consumption of grid-supplied energy
III	**Waste**		
III.1	**Solid Waste Disposal**		
III.1.1	BASIC	1	Emissions from waste generated and treated within the Community
III.1.2	BASIC	3	Emissions from waste generated within but treated outside of the Community
III.2	**Biological Treatment of Waste**		
III.2.1	BASIC	1	Emissions from waste generated and treated within the Community
III.2.2	BASIC	3	Emissions from waste generated within but treated outside of the Community
III.3	**Incineration and Open Burning**		
III.3.1	BASIC	1	Emissions from waste generated and treated within the Community
III.3.2	BASIC	3	Emissions from waste generated within but treated outside of the Community
III.4	**Wastewater Treatment and Discharge**		
III.4.1	BASIC	1	Emissions from wastewater generated and treated within the Community
III.4.2	BASIC	3	Emissions from wastewater generated within but treated outside of the Community
IV	**Industrial Processes and Product Use (IPPU)**		
IV.1	BASIC+	1	In-boundary emissions from industrial processes

Table 7 GPC Protocol Summary Table

GPC Protocol Reference Number	Reporting Level	Emissions Scope	GHG Emissions Source
IV.2	BASIC+	1	In-boundary emissions from product use
V	**Agriculture, Forestry, and Other Land Use (AFOLU)**		
V.1	BASIC+	1	In-boundary emissions from livestock
V.1	BASIC+	1	In-boundary emissions from land
V.1	BASIC+	1	In-boundary emissions from other agriculture
VI	**Other Scope 3 Emissions**		
VI.1	BASIC / BASIC+	3	Other indirect emissions

4.0 GHG METHODOLOGIES BY SOURCE CATEGORY

The following sections describe the reporting source category, assumptions, activity data applied, and quantification methodology. The results of the analysis are presented in Section 5.0.

4.1 STATIONARY ENERGY

4.1.1 Overview

Stationery energy sources are one of the largest contributors to the CRD's GHG emissions. For the District, the Stationary Energy Sector encompasses the following GHG emissions scopes and Sub-Sectors:

- Scope 1 Emissions:
  - Residential buildings
  - Agriculture, forestry, and fishing activities
  - Commercial and institutional buildings, and facilities
  - Energy industries
  - Fugitive emissions from oil and natural gas systems
- Scope 2 Emissions:
  - Emissions from the consumption of grid-supplied electricity, steam, heating, and cooling.
- Scope 3 Emissions:
  - Transmission and distribution losses of electricity, steam, heating, and cooling.

There are GHG emissions from construction of buildings and infrastructure as the capital region grows and changes. However, these GHG emissions have not been quantified due to a lack of available data. Environment and Climate Change Canada does estimate BC GHG emissions for manufacturing industries, mining and construction, but these GHG emission sources are not disaggregated and cannot reasonably be applied to the CRD (there is no mining and limited manufacturing activities). As a result, the notation "Not Estimated (NE)" is reported.

4.1.2 Activity Data

BC Hydro and Fortis BC provided the Province of BC electricity and natural gas consumption data in MWh and GJ, respectively. Based on the utility provider descriptions of the data, each is categorized as follows:

- Residential Buildings based on the BC Hydro and Fortis BC descriptor: "Residential"
- Commercial and Institutional Buildings/Facilities based on BC Hydro and Fortis BC descriptor: "Commercial"

The Province developed 2007-2019 residential, propane and wood GHG energy use estimates from the number and type of dwellings and the average dwelling consumption by authority and region from the BC

Hydro Conservation Potential Review. In conjunction with heading degree days data, this provincial data was used to estimate the 2022 reporting year propane and wood GHG emissions for all CRD members.

The CRD provided 2020 heating oil values for all member municipalities except for the District of Saanich and the City of Victoria who provided their own fuel oil estimates for residential and commercial buildings.

Fortis BC provided the fugitive emission estimate for the 2020 reporting year.

The CRD provided landfill gas energy generation data from the Hartland landfill.

Applicable, off-road GHG emissions included in the Stationary Energy Sector are based on the 2023 NIR as prepared by Environment and Climate Change Canada. These emissions are pro-rated to the CRD on a per capita basis.

4.1.3 Assumptions and Disclosures

The following assumptions were made in the calculation of the 2022 GHG emissions:

- The 2022 natural gas and electricity energy data was provided to the CRD in draft form and may be subject to change.
- BC Hydro estimates that the combined energy losses- transmission and distribution- to be approximately 6.28%. This value was used to calculate the Scope 3 emissions for each Stationary Energy Sub-Sector. It is assumed that this is accurate.
- Fugitive emissions from the natural gas distribution network within the CRD is based on the Fortis fugitive emission factor for the 2020 reporting year. This factor was used to estimate 2022 fugitive emissions for residential natural gas use in the CRD and assumes a direct change with the number of reported natural gas connections (as reported by Fortis BC). This value is assumed to be stable and has been applied to the 2022 reporting year.
- Propane and wood GHG emissions were estimated using linear regression methods. The data used in the estimate included historical propane and wood energy data published in the 2007-2019 CEEIs by the Province of BC, and heating degree days (HDD) as published by Environment and Climate Change Canada.
- The CRD fuel oil estimates are based on the percentage of homes sold (relative to the total number of homes in each municipality) with heating oil systems between 2019 and 2022. Using this 4-year average, and BC assessment data, the CRD estimated the size and number of homes with heating oil for each member municipality for the 2020 reporting year. The guiding assumption is that oil systems are not increasing overtime; they are stable or decreasing in number. However, the 2020 heating oil consumption volume was adjusted for the number of heating degree days in 2022.

4.1.4 Data Quality Assessment

Table 8 presents the activity data quality assessment for the stationary energy sources.

Table 8 Stationary Energy Data Source Quality Assessment

Data	Quality Assessment Rating
Residential, Commercial and Industrial Electricity	Medium for Source Category; Low for Distribution between CRD Members
Residential, Commercial and Industrial Natural Gas	Medium for Source Category; Low for Distribution between CRD Members
Agriculture, Forestry & Fishing Activity GHG Emissions	Low
Manufacturing Industries & Construction GHG Emissions	Low
Fugitive Emissions	Medium
Transmission, Distribution & Line Losses	Medium
Off-Road Transportation Emissions	Low
Landfill Gas Volumes Utilized / Flared	High

4.1.5 Calculation Methodology

The Province of BC developed residential propane and wood GHG energy use estimates using heating degree days (HDD) the number and type of dwellings and the average dwelling consumption by authority and region contained in the BC Hydro Conservation Potential Review. To estimate the 2022 propane and wood energy use, historical 2019 values and the number of heating degree days (HDD) were linearly regressed to estimate future propane and wood energy use using reporting year HDD values. These values were prorated to each local government.

Except for Saanich and Victoria who provided their own fuel oil consumption estimates, the CRD provided 2020 fuel oil estimates for all member municipalities based on the percentage of homes sold (relative to the total number of homes in each municipality) with heating oil systems between 2019 and 2022. Similar to wood and propane fuel consumption, heating oil consumption was estimated using 2020 data and HDDs.

To calculate GHG emissions from electricity, natural gas, heating oil, propane, and wood, the total net annual energy values (where applicable, less transmission, distribution, and line losses of 6.28%) were multiplied by applicable emissions factors. These values were then multiplied by the pollutant's GWP to give total CO_2e emissions in tonnes.

These quantification methods are captured as follows:

$$\textbf{Energy}_{\text{Stationary Energy – Electricity}} = \textit{Electricity} * (1 - \textit{Line Loss (\%)})$$

$$\textbf{Energy}_{\text{Stationary Energy – Transmission, Distribution, and line Losses}} = \textit{Electricity} * \textit{Line Loss (\%)}$$

$$Emissions_{Stationary\ Energy\ -\ Electricity} = Fuel\ (MWh) * EF_{tCO2e}$$

$$Emissions_{Stationary\ Energy\ -\ Natural\ Gas} = (Fuel\ (GJ) * EF_{CO2}) + (Fuel\ (GJ) * EF_{CH4} * GWP_{CH4}) + (Fuel\ (GJ) * EF_{N2O} * GWP_{N2O})$$

$$Emissions_{Stationary\ Energy\ -\ Propane} = (Fuel\ (GJ) * EF_{CO2}) + (Fuel\ (GJ) * EF_{CH4} * GWP_{CH4}) + (Fuel\ (GJ) * EF_{N2O} * GWP_{N2O})$$

$$Emissions_{Stationary\ Energy\ -\ Wood} = (Fuel\ (GJ) * EF_{CO2}) + (Fuel\ (GJ) * EF_{CH4} * GWP_{CH4}) + (Fuel\ (GJ) * EF_{N2O} * GWP_{N2O})$$

$$Emissions_{Stationary\ Energy\ -\ Heating\ Oil} = (Fuel\ (GJ) * EF_{CO2}) + (Fuel\ (GJ) * EF_{CH4} * GWP_{CH4}) + (Fuel\ (GJ) * EF_{N2O} * GWP_{N2O})$$

The emission factors used in the 2022 reporting year are from the 2023 NIR, unless identified otherwise. These are summarized in Table 9.

Table 9 Stationary Energy GHG Emission Factors

Emission Factor	Units	tCO_2e	Quality Assessment Rating
Electricity (BC Hydro)	tCO_2e / MWh	0.00970000	Medium
Natural Gas	tonne CO_2e / m^3	0.0019763	Medium
Propane	tonne CO_2e / L	0.0015443	Medium
Heating Oil	tonne CO_2e / GJ	0.0683516	Medium
Wood	tonne CO2e / kg	0.0004624	Medium

4.1.6 Biogas & Flaring GHG Emissions

The Hartland Landfill captures fugitive landfill gas, combusts it for energy generation and export to the BC electrical grid, and flares the landfill gas captured but not used. The landfill gas that is combusted for electricity generation and exported to the electrical grid, under the GPC Protocol, it is deemed a reporting only GHG emissions source and is not included in the GHG inventory. This is to avoid double counting GHG emissions with other cities and energy consumers.

To quantify these GHG emissions, the high heat value (HHV) of landfill fugitive is used – this methodology is as follows.

$$Emissions_{Landfill\ Fugitive\ Gas} = Landfill\ Fugitive\ Gas\ Volume_{m3} * Landfill\ Fugitive\ Gas\ HHV\ (0.0187)_{GJ/m3} * EF_{tCO2e}$$

The biogas combustion emission factor is presented in Table 10.

Table 10 Landfill Fugitive Gas Combustion GHG Emission Factor

Emission Factor	Units	Emission Factor	Quality Assessment Rating
Landfill Fugitive Gas	tCO_2e/GJ Landfill Fugitive Gas	0.054898	Medium

The landfill gas that is flared is reported under the Solid Waste category. Both methodologies assume a combustion efficiency of 99.7%. To quantify GHG emissions related to landfill fugitive gas combustion, the following methodology is deployed.

$$Emissions_{Fugitive\ Landfill\ Gas} = LFG\ Volume_{m3} * LFG\ Methane\ Content_{Percent} * Density\ of\ methane\ at\ 25^{o}C\ and\ 1.0\ Atmosphere * Combustion\ Efficiency * GWP_{CH4}$$

4.2 TRANSPORTATION

4.2.1 Overview

Transportation covers all GHG emissions from combustion of fuels in journeys by on-road, railways, waterborne navigation, aviation, and off-road. GHG emissions are produced directly by the combustion of fuel, and indirectly using grid-supplied electricity. For the CRD, the Transportation Sector encompasses the following GHG emissions scopes and Sub-Sectors:

- Scope 1 Emissions:
  - On-road: In Boundary
  - Waterborne
  - Aviation
  - Off-road
- Scope 2 Emissions:
  - Emissions from the consumption of grid-supplied electricity.
- Scope 3 Emissions:
  - On-road: Transboundary
  - Waterborne
  - Aviation
  - Off-road

4.2.2 Activity Data

The Province of BC provided 2022 ICBC vehicle registration data to the CRD.

BC Transit provided total diesel and gasoline fuel use. This data was used to estimate GHG emissions from busses serving the CRD.

The 2022 CRD Origin Destination Travel Survey was used to estimate on-road in-boundary and transboundary split for registered vehicles and busses. The CRD Origin Destination Travel Survey is based on travel patterns observed in the Capital Regional District (CRD) level.

The City of Victoria and District of Saanich provided an estimate of vehicle kilometer travelled (VKT) data for light duty and heavy vehicles. This data is based on survey's completed in prior years.

Transport Canada provided total domestic and international itinerant movements, by type of operation, airports with NAV CANADA flight service stations for the Victoria International Airport and the Victoria Harbour. The Victoria International Airport provided 2015 GHG emissions estimates; this was used to estimate the 2022 emissions data.

Marine watercraft GHG emissions were estimated using published BC Ferries 2022 GHG emissions estimates. GHG emissions from the Coho Ferry, the Victoria Clipper Ferry, personal and commercial watercraft, were estimated based on a Study entitled "Marine Vessel Air Emissions in BC and Washington State Outside of the GVRD and FVRD for the Year 2000". The Transport Canada Vessel Registration System provided the total number of registered waterborne vehicles for the reporting year. The Greater Victoria Harbor Authority provided 2018 GHG emissions estimates per cruise ship and the number of 2022 cruise ships docked in Victoria Harbor.

Other off-road transportation emissions are based on the 2023 NIR as prepared by Environment and Climate Change Canada.

4.2.3 Assumptions and Disclosures

The following assumptions were made in the calculation of the Transportation Sector GHG emissions:

- The on-road transportation emissions are based on the total estimated fuel sales in the CRD, and the number of registered vehicles. Insurance Corporation of BC (ICBC) compiles data on an April 1 to March 31 basis, and thus the current on-road GHG emission estimate is based on the number of registrations from April 1, 2022 – March 31, 2023.
- Vehicle fuel consumption rates and Vehicle Kilometer Travelled (VKT) were taken from the activity data summary for British Columbia on-road transportation from the 2023 National Inventory Report (1990-2021) as prepared by Environment and Climate Change Canada. Based on the clear diesel and clear gasoline consumption values reported by the Province of BC for the Victoria region, the VKT and fuel efficiency values are reasonable and result in a similar estimate of fuel consumption for the Region.
- Gasoline and diesel GHG emissions from BC Transit busses are pro-rated to the CRD based on the proportion of population in each municipality within the CRD. A more accurate estimation method would be to prorate fuel use based on total bus service kilometers in the CRD. However, this data is not available, and thus the method applied provides the best estimate at the time of reporting.
- It is assumed that the 2015 aircraft flight profiles at the Victoria International Airport are representative of the 2022 reporting year.

- Victoria harbour aviation GHG emissions were estimated using Victoria harbor aircraft movement statistics, estimated taxi times, and estimated fuel use for the DHC-6 Twin Otter type of plane.
- All aviation GHG emissions are prorated based on the total Victoria population relative to the CRD population.
- As there is currently no publicly available energy or GHG related information on the operation of the Coho and the Victoria Clipper Ferries, it was assumed that the GHG emissions for these ferries calculated in the Study entitled “Marine Vessel Air Emissions in BC and Washington State Outside of the Greater Victoria Regional District (GVRD) and FVRD for the Year 2000”.
- Cruise ship emissions were based on the Greater Victoria Harbor Authority’s 2018 GHG emissions estimates per cruise ship and the number of 2022 cruise ships reported to dock in Victoria Harbor.
- BC Ferries did not disclose its total reported fuel use for 2022 but did publish 2022 GHG emissions by Scope. Fuel consumption was back calculated using emissions factors.
- The Transport Canada Vessel Registration System provided the total number of registered waterborne vehicles for the reporting year; however, it does not provide any detail on the type, size, use, and owner of the watercraft. It was therefore assumed that the watercraft would have been similar to those in the referenced study.
- All marine GHG emissions are prorated to each member municipality relative to the CRD population.
- No railway GHG emissions are occurring in the CRD.
- The off-road transportation emissions are based on the 2023 NIR as prepared by Environment and Climate Change Canada. This is deemed to be the best available data.

4.2.4 Data Quality Assessment

Table 11 presents the activity data quality assessment for the transportation data sources.

Table 11 Transportation Data Quality Assessment

Data	Quality Assessment Rating
Split Between In-Boundary and Transboundary Traffic	Medium-High
Vehicle Registry Data	High
Vehicle Kilometers Travelled (VKT) Data	Medium-Low
Aviation GHG Data	Medium-Low
Waterborne GHG Data	Low
Other Off-Road Transportation GHG Data	Low

4.2.5 Calculation Methodology

4.2.5.1 On-Road

The GPC Protocol identifies several methods for determining on-road emissions. The vehicle kilometers travelled (VKT) methodology and fuel sales methods were utilized to estimate the GHG emissions from on-road transportation (Scope 1) and transboundary transportation (Scope 3). The VKT uses the number

and type of vehicles registered in a geopolitical boundary, the estimated fuel consumption rate of individual vehicles, and an estimate of the annual vehicle kilometres traveled (VKT) by various vehicle classes. ICBC provided the number of registered vehicles in the CRD by style and by fuel type for 2022. To estimate the split between on-road in-boundary and transboundary traffic, data from the 2022 CRD Origin Destination Survey was applied. The results of the survey as it applies to the CRD is presented in Table 12.

Table 12 CRD On-Road In-Boundary/Transboundary Split

Aspect	By Vehicle
Estimated proportion of on-road in-boundary travel	99.3%
Estimated proportion of on-road transboundary travel	0.7%

To quantify the 2022 reporting year on-road and transboundary GHG emissions, the following steps were taken:

1. Sort the ICBC vehicle registration data by postal code.
2. Review each vehicle model and fuel type and assign it to one of 4 classes (for each fuel type): LDV, LDT, HDV, ORVE
3. Assign estimated NRCan vehicle fuel consumption rates and estimated VKT to each vehicle class (Table 13).
4. Estimate total fuel use by vehicle classification.
5. Summate and allocate estimated fuel use, by vehicle class using the applicable in-boundary and transboundary split.
6. Pro-rate the gasoline and diesel fuel use from busses.
7. Summate and allocate estimated bus fuel use using the applicable in-boundary and transboundary split.
8. Compare fuel estimated fuel volumes to the regional fuel sales volumes reported by the CRD. Adjust the VKTs as needed to make sure that the fuel estimate is at least above the fuel sales volumes reported in the region.

Table 13 Estimated VKT And Fuel Efficiencies by Vehicle Class For Reporting Year

Vehicle Classification	Estimated VKT / Year	Estimated Fuel Efficiency (L/100 km)
Diesel-HDV	27,791	45.6
Diesel-LDT	24,516	11.8
Diesel-LDV	23,597	9.2
Diesel-ORVE	Not Estimated	45.6
Electric-HDV	9,651	30.0
Electric-LDT	10,290	20.0
Electric-LDV	11,328	20.0
Electric-ORVE	Not Estimated	30.0
Gasoline-HDV	9,759	54.1

Vehicle Classification	Estimated VKT / Year	Estimated Fuel Efficiency (L/100 km)
Gasoline-Hybrid-HDV	8,732	37.9
Gasoline-Hybrid-LDT	9,462	10.0
Gasoline-Hybrid-LDV	8,333	7.0
Gasoline-Hybrid-ORVE	Not Estimated	37.9
Gasoline-LDT	8,545	12.2
Gasoline-LDV	9,270	9.0
Gasoline-ORVE	Not Estimated	54.1
Hydrogen-Hybrid-LDV	10,883	Not Estimated
Hydrogen-LDV	11,717	Not Estimated
Hydrogen-LDT	12,840	Not Estimated
Motorcycle - Electric	1,973	17.0
Motorcycle - Non catalyst	1,973	9.9
Natural Gas-HDV	27,791	22.9
Natural Gas-LDT	24,516	8.3
Natural Gas-LDV	23,597	5.4
Natural Gas-ORVE	Not Estimated	22.9
Propane-HDV	27,791	22.9
Propane-Hybrid-LDV	16,386	13.1
Propane-LDT	24,516	12.6
Propane-LDV	23,597	8.2
Propane-ORVE	Not Estimated	22.9

Table 14 Total Registered Vehicles & Estimated Fuel Use For Reporting Year

Vehicle Classification	Total Estimated Registered Vehicles	Total Estimated Fuel Use	Units
Diesel-HDV	2,203	29,822,878	Liters (L)
Diesel-LDT	10,109	23,720,905	Liters (L)
Diesel-LDV	1,540	2,605,908	Liters (L)
Diesel-ORVE	2,437	-	Liters (L)
Electric-HDV	35	101,332	kWh
Electric-LDT	2,923	5,131,320	kWh
Electric-LDV	5,585	11,992,543	kWh
Electric-ORVE	71	-	kWh
Gasoline-HDV	3,308	18,414,669	Liters (L)
Gasoline-Hybrid-HDV	5	15,903	Liters (L)
Gasoline-Hybrid-LDT	5,547	6,222,292	Liters (L)

Vehicle Classification	Total Estimated Registered Vehicles	Total Estimated Fuel Use	Units
Gasoline-Hybrid-LDV	4,892	2,713,645	Liters (L)
Gasoline-Hybrid-ORVE	3	-	Liters (L)
Gasoline-LDT	154,048	170,158,970	Liters (L)
Gasoline-LDV	98,045	73,956,005	Liters (L)
Gasoline-ORVE	2,671	2,909,461	Liters (L)
Hydrogen-Hybrid-LDV	-	-	Liters (L)
Hydrogen-LDV	24	-	Liters (L)
Hydrogen-LDT	2	-	Liters (L)
Motorcycle - Electric	-	-	kWh
Motorcycle - Non catalyst	6,437	1,395,105	Liters (L)
Natural Gas-HDV	19	127,517	Kilogram (kg)
Natural Gas-LDT	38	60,955	Kilogram (kg)
Natural Gas-LDV	4	4,141	Kilogram (kg)
Natural Gas-ORVE	7	-	Kilogram (kg)
Propane-HDV	38	234,115	Liters (L)
Propane-Hybrid-LDV	2	4,284	Liters (L)
Propane-LDT	160	383,154	Liters (L)
Propane-LDV	8	13,302	Liters (L)
Propane-ORVE	84	-	Liters (L)
Total	**300,245**	**N/A**	**N/A**

Once the fuels were allocated amongst the vehicle classes and sectors, the GHG emissions were calculated accordingly. The GHG quantification method is captured, for all fuel types, is as follows:

$$\textit{Emissions}_{\textit{On-road}} = \textit{In-Boundary Split \%} * ((\textit{Vol. Fuel} * EF_{CO2}) + (\textit{Vol. Fuel} * EF_{CH4} * GWP_{CH4}) + (\textit{Vol. Fuel} * EF_{N2O} * GWP_{N2O}))$$

$$\textit{Emissions}_{\textit{Transboundary}} = \textit{Transboundary Split \%} * ((\textit{Vol. Fuel} * EF_{CO2}) + (\textit{Vol. Fuel} * EF_{CH4} * GWP_{CH4}) + (\textit{Vol. Fuel} * EF_{N2O} * GWP_{N2O}))$$

The emission factors used in the reporting year GHG inventory are from the 2023 NIR unless otherwise indicated. These are summarized in Table 15.

Table 15 Vehicle GHG Emission Factors

Vehicle Class	Units	tCO_2e	Quality Assessment Rating
Gasoline-LDV	tonne CO_2e / L	0.00234581	Medium-Low
Gasoline-LDT	tonne CO_2e / L	0.0022579	Medium-Low
Gasoline-HDV	tonne CO_2e / L	0.0022851	Medium-Low
Gasoline-ORVE	tonne CO_2e / L	0.0022033	Medium-Low
Gasoline-Hybrid-LDV	tonne CO_2e / L	0.0023293	Medium-Low
Gasoline-Hybrid-LDT	tonne CO_2e / L	0.0022579	Medium-Low
Gasoline-Hybrid-HDV	tonne CO_2e / L	0.0022851	Medium-Low
Gasoline-Hybrid-ORVE	tonne CO_2e / L	0.0022579	Medium-Low
Electric-LDV (BC Hydro)	tonne CO_2e / kWh	0.0000097	Medium-Low
Electric-LDT (BC Hydro)	tonne CO_2e / kWh	0.0000097	Medium-Low
Electric-HDV (BC Hydro)	tonne CO_2e / kWh	0.0000097	Medium-Low
Electric-ORVE	tonne CO_2e / kWh	0.0000097	Medium-Low
Diesel-LDV	tonne CO_2e / L	0.0025786	Medium-Low
Diesel-LDT	tonne CO_2e / L	0.0025790	Medium-Low
Diesel-HDV	tonne CO_2e / L	0.0025629	Medium-Low
Diesel-ORVE	tonne CO_2e / L	0.0027757	Medium-Low
Hydrogen-Hybrid-LDV	tonne CO_2e / L	-	Medium-Low
Hydrogen-LDV	tonne CO_2e / L	-	Medium-Low
Hydrogen-LDT	tonne CO_2e / L	-	Medium-Low
Natural Gas-LDV	tonne CO_2e / kg	0.0002337	Medium-Low
Natural Gas-LDT	tonne CO_2e / kg	0.0002337	Medium-Low
Natural Gas-HDV	tonne CO_2e / kg	0.0002337	Medium-Low
Natural Gas-ORVE	tonne CO_2e / kg	0.0002337	Medium-Low
Propane-LDV	tonne CO_2e / L	0.0014495	Medium-Low
Propane-LDT	tonne CO_2e / L	0.0014495	Medium-Low
Propane-HDV	tonne CO_2e / L	0.0014495	Medium-Low
Propane-ORVE	tonne CO_2e / L	0.0014495	Medium-Low
Propane-Hybrid-LDV	tonne CO_2e / L	0.0014495	Medium-Low
Motorcycle - Non catalyst	tonne CO_2e / L	0.0022420	Medium-Low
Motorcycle - Electric	tonne CO_2e / L	0.0000097	Medium-Low

4.2.5.2 Aviation: Victoria International Airport

The Victoria International Airport (VIA) estimated its 2015 airplane GHG emissions following the ACI ACERT standard. This includes GHG emissions from aircraft and GHG emissions from auxiliary power units (APU). APUs provides electricity to the aircraft prior to the engine start up. Within the ACERT model, it is assumed all aircraft have APUs and the duration of the APU operation (of five minutes per aircraft) was generically applied to every landing take-off (LTO) cycles. It should also be noted that the EIA has quantified aircraft GHG emissions from planes up to 3,000 ft. to avoid double counting with other airports and cities. This is consistent with the ACERT standard.

The CRD's 2022 aviation emissions estimate is based on the 2015 aircraft flight profiles, which included the estimated landing and takeoff (LTO) and auxiliary power unit (APU) fuel use, and an estimated percentage allocation of total flights to the following aviation class groupings (Table 16). The total reported flight movements for the reporting year (99,988) and the aircraft flight profile data was used to estimate aviation GHG emissions for the reporting year at the VIA.

Table 16 Aircraft Type, Estimated Percentage of Total Reported Movements, And Estimated Fuel Use

Aviation Class	Aircraft Type	Estimated Percentage of Annual Movements	Estimated LTO Fuel Use by Aircraft Type (kg)	Estimated APU Fuel Use by Aircraft Type (kg/min)
Jet	Large: 2-aisle, long-haul	0.01%	1,853	4.00
	Medium: 2-aisle, medium-haul	0.01%	1,321	4.00
	Small: 1-aisle, small/medium haul	7.95%	565	1.78
	Regional: 1-aisle, short-haul	0.01%	315	1.78
	Business: 2-eng business jets	0.01%	41	1.78
Turboprop	Turboprop (all engines)	22.29%	46	1.78
Piston	Piston (all engines)	66.30%	41	0.00
Helicopter	Helicopter small (1 engine/turbine)	1.72%	13	0.00
	Helicopter large (2 engine/turbine)	1.72%	8	0.00

Calculating fuel use for each aviation class applied the following equation:

$$\textbf{Fuel Use}_{\text{Per Aviation Class}} = \textit{Number of Aircraft Movements} * (\textit{LTO Fuel Use} + (\textit{APU Fuel Use} * 15\ \textit{minutes}))$$

The GHG quantification method, that was applied to each aviation class, is as follows:

$$\textbf{Emissions}_{\text{Per Aviation Class}} = (\textit{Vol. Fuel} * \textit{Aviation Class } EF_{CO2}) + (\textit{Vol. Fuel} * \textit{Aviation Class } EF_{CH4} * GWP_{CH4}) + (\textit{Vol. Fuel} * \textit{Aviation Class } EF_{N2O} * GWP_{N2O}))$$

The ACERT GHG calculator used by the VIA utilized emission factors from the 2023 NIR. Actual airplane emission factors are from the International Civil Aviation Organization (ICAO) GHG database. These are summarized in Table 17.

These GHG emissions were reported in the Scope 3 category as directed by the GPC Protocol.

Table 17 Aviation GHG Emission Factors

Airplane Type	Units	tCO_2e	Quality Assessment Rating
Jet	tCO_2e/kg fuel	0.0032254	Medium-Low
Turbo Propeller	tCO_2e/kg fuel	0.0032254	Medium-Low
Piston	tCO_2e/kg fuel	0.0034154	Medium-Low
Helicopter	tCO_2e/kg fuel	0.0032254	Medium-Low

4.2.5.3 Aviation: Victoria Harbour

Victoria harbor aviation emissions were estimated using 2022 NAV Canada airplane movement statistics, estimated taxi times, and estimated fuel use for the DHC-6 Twin Otter type of plane (Table 18).

Table 18 Aircraft Type, Estimated Percentage of Total Reported Movements, And Estimated Fuel Use

Aviation Class	Aircraft Type	Estimated Percentage of Annual Movements	Estimated LTO Fuel Use by Aircraft Type (kg)	Estimated APU Fuel Use by Aircraft Type (kg/min)
Turboprop	DHC-6 Twin Otter	100%	56	0.00

Calculating aviation fuel use in the Victoria harbor for applied the following equation:

$$\textbf{Fuel Use}_{\text{Per Aviation Class}} = \textit{Number of Aircraft Movements} * (\textit{LTO Fuel Use} + (\textit{APU Fuel Use} * 15\ \textit{minutes}))$$

The GHG quantification method is as follows:

$$\textbf{Emissions}_{\text{Per Aviation Class}} = \textit{CRD Population} * ((\textit{Vol. Fuel} * \textit{Aviation Class } EF_{CO2}) + (\textit{Vol. Fuel} * \textit{Aviation Class } EF_{CH4} * GWP_{CH4}) + (\textit{Vol. Fuel} * \textit{Aviation Class } EF_{N2O} * GWP_{N2O}))$$

The airplane emission factors are from the International Civil Aviation Organization (ICAO) GHG database. These are summarized in Table 19.

Table 19 Marine Aviation GHG Emission Factors

Units	tCO_2e	Quality Assessment Rating
Turbo Propeller	0.0032163	Medium-Low

As there is no publicly available origin traveler data for harbor flights, the aviation GHG emissions were prorated based on the local government populations relative to the CRD population. These were reported in the Scope 3 category.

4.2.5.4 Waterborne Transportation

4.2.5.4.1 BC Ferries

Marine waterborne transportation emissions encompass GHG emissions from the use of the BC Ferries. BC Ferries reported their 2022 GHG emissions which were pro-rated based on total service populations. The GHG emissions reported by BC Ferries are based on provincially derived GHG emissions factors (Table 20).

Table 20 BC Ferries GHG Emission Factors

Aspect	Units	tCO_2e	Quality Assessment Rating
Ferry: Diesel	tonne CO_2e / L	0.0028777	Medium
Ferry: Natural Gas	tonne CO_2e / L	0.0014140	Medium

As BC Ferries operate outside of the CRD's boundary, the GHG emissions were allocated to Scope 3 based on the proportion of the CRD population relative to the total Vancouver Island and Mainland / Southwest populations.

4.2.5.4.2 Other Watercraft

The GHG emissions from the Coho Ferry, the Victoria Clipper Ferry, and personal and commercial watercraft were estimated based on a publicly available year 2000 study for the Victoria, Vancouver, and Washington harbors and the Transport Canada Vessel Registration System. As there is currently no publicly available energy or GHG related information on the operation of the Coho and the Victoria Clipper Ferries, it was assumed that the GHG emissions for these ferries calculated in the Study entitled "Marine Vessel Air Emissions in BC and Washington State Outside of the GVRD and FVRD for the Year 2000" is still valid for 2022. The GHG emissions for these ferries are summarized in Table 21.

Table 21 Coho and the Victoria Clipper Ferries Estimated GHG Emissions

Aspect	Units	CO_2	CH_4	N_2O	tCO_2e
Coho Ferries	tonnes	1,160.00	0.10	0.40	1,281.70
Victoria Clipper	tonnes	1,895.00	0.10	0.80	2,135.90

Cruise ship GHG emissions were estimated by the Greater Victoria Harbour Authority.[3] The Greater Victoria Harbour Authority (GVHA) reported on cruise ship emissions for the 2018 reporting year but did not derive an estimate for 2022. As a result, the 2018 GHG emissions estimate and number of cruise ship visits to Ogden Point in 2022 was used to create a proxy to estimate 2022 cruise ship emissions. The GVHA reported 329 visits in 2022.

The GHG quantification method to estimate 2022 GHG emissions from the Odgen Point cruise ship terminal was as follows:

$$Emissions_{Waterborne} = (GVHA\ Reported\ Emissions_{2018} / Cruise\ Ship\ Visits_{2018}) * Cruise\ Ship\ Visits_{2022}$$

The Transport Canada Vessel Registration System provided the total number of registered waterborne vehicles which was 2,254 vessels all registered boats in the CRD; however, the registration system does not provide any detail on the type, size, use, and owner of the watercraft. It was therefore assumed that the watercraft would have been similar to those in the referenced study. To estimate the personal / watercraft GHG emissions, the breakdown of vessels and total fuel use by category were used to estimate what the current population and fuel use might be in the reporting year. To do this, the following steps were taken.

1. Calculate the percentage of the population and per unit fuel use of the year 2000 population (Table 22).
1. Take the total number of registered vessels, and the percentage breakdown of the year 2000 population, and apply the per unit fuel use factor to determine the total gasoline and diesel fuel use (Table 23).
2. Using 2023 NIR emission factors estimate the GHG emissions from other watercraft.

Table 22 Year 2000 Other Watercraft Population Breakdown And Estimated Fuel Use

Type of Watercraft from Year 2000 Study	Year 2000 Study Vancouver Island Population	Percentage of Population	Fuel Use (m^3/Year)	Fuel Use Per Unit (m^3/Year)
Inboard: 4 stroke - gasoline	1,689	0.19%	175	0.10

[3] https://gvha.ca/wp-content/uploads/2019/10/EmissionsInventory-2019.pdf

Type of Watercraft from Year 2000 Study	Year 2000 Study Vancouver Island Population	Percentage of Population	Fuel Use (m^3/Year)	Fuel Use Per Unit (m^3/Year)
Inboard: Diesel	199	0.02%	62	0.31
Outboard: 2 stroke - gasoline	23,494	2.66%	1,632	0.07
Outboard: 4 stroke - gasoline	622	0.07%	7	0.01
Stemdrive: 2 stroke - gasoline	68	0.01%	8	0.12
Stemdrive: 4 stroke - gasoline	6,576	0.74%	535	0.08
Stemdrive: Diesel	784	0.09%	216	0.28
Personal Watercraft: 2 stroke - gasoline	848,492	96.00%	342	0.00
Sailboat Auxiliary Inboard: 4 stroke - gasoline	428	0.05%	1	0.00
Sailboat Auxiliary Inboard: Diesel	1,088	0.12%	6	0.01
Sailboat Auxiliary Outboard: 2 stroke - gasoline	396	0.04%	1	0.00
Sailboat Auxiliary Outboard: Diesel	1	0.00%	0	0.01

Table 23 Reporting Year Other Watercraft Population Breakdown and Estimated Fuel Use

Type of Watercraft	Estimated Breakdown of Currently Registered Vessels	Estimated Fuel Use (L/year)
Inboard: 4 stroke - gasoline	4	438.6
Inboard: Diesel	0	155.4
Outboard: 2 stroke - gasoline	59	4,090.0
Outboard: 4 stroke - gasoline	2	17.5
Stemdrive: 2 stroke - gasoline	0	20.0
Stemdrive: 4 stroke - gasoline	16	1,340.8
Stemdrive: Diesel	2	541.3
Personal Watercraft: 2 stroke - gasoline	2,126	857.1
Sailboat Auxiliary Inboard: 4 stroke - gasoline	1	1.3
Sailboat Auxiliary Inboard: Diesel	3	15.0
Sailboat Auxiliary Outboard: 2 stroke - gasoline	1	1.3
Sailboat Auxiliary Outboard: Diesel	0	0.0

To calculate the GHG emissions, for the other watercraft, provincially derived GHG emissions factors were used (Table 24).

Table 24 Watercraft GHG Emission Factors

Aspect	Units	tCO_2e	Quality Assessment Rating
Marine Gasoline	tonne CO_2e / L	0.0022539	Medium-Low
Marine Diesel	tonne CO_2e / L	0.0026083	Medium-Low

The GHG quantification method, that was applied to the BC Ferries and other watercraft was as follows:

$$\textbf{Emissions}_{\textbf{Waterborne}} = (\text{CRD Population / Vancouver Island; Mainland; Southwest Population}) * ((\text{Vol. Fuel} * EF_{CO2}) + (\text{Vol. Fuel} * EF_{CH4} * GWP_{CH4}) + (\text{Vol. Fuel} * EF_{N2O} * GWP_{N2O}))$$

4.2.5.5 Off-Road

Currently, there is limited data available to estimate off-road GHG emissions. As such, a GHG emissions per capita estimate for each off-road category was developed using Provincial emissions data from the 2023 NIR, and BC's population from Statistics Canada. To develop each off-road factor, the total BC GHG emissions for each reporting category was divided by the BC population for the NIR reporting year (2021). Each derived per-capita value was applied to the current reporting year CRD population (2022) to estimate off-road GHG emissions.

The NIR currently reports the following off-road emissions:

- Total BC off-road agriculture and forestry GHG emissions
- Total BC off-road commercial and institutional GHG emissions
- Total BC off-road residential GHG emissions
- Total BC other off-road GHG emissions

Total BC off-road manufacturing, mining, and construction GHG emissions were not included on the basis that manufacturing and mining GHG emission could not be split out.

Other than other off-road GHG emissions, which is reported in the Off-Road Transportation Sub-Sector, the remaining off-road GHG emissions are reported in the Stationary Energy Sector as required by the GPC Protocol.

The GHG quantification method is presented below:

$$\textbf{Emissions}_{\textbf{Off-Road}} = (\text{NIR Off-Road GHG Emissions}_{BC} / \text{BC Population}_{BC}) * \text{Current Reporting Year Population}_{CRD}$$

4.3 WASTE

Cities produce GHG emissions because of the disposal and management of solid waste, incineration and open burning of waste, the biological treatment of waste, and through wastewater treatment and discharge. Waste does not directly consume energy, but releases GHG emissions because of decomposition, burning, incineration, and other management methods.

For the CRD, the Waste Sector encompasses the following GHG emissions scopes and Sub-Sectors:

- Scope 3: Emissions:
  - Solid waste disposal
  - Biological treatment of waste
  - Wastewater treatment and discharge

4.3.1 Data Quality Assessment

Table 25 presents the activity data quality assessment for the waste data sources.

Table 25 Waste Data Quality Assessment

Data	Quality Assessment Rating
Wastewater volume data	High
Wastewater BOD and TKN data	High
Composting waste data	Low

4.3.2 Activity Data

The CRD provided landfill gas volumes, energy and GHG related data for the Hartland landfill (fugitives and flaring), total CRD wastewater volumes, average biological oxygen demand (BOD) and Total Kjeldal Nitrogen (TKN) annual average values (mg/L) from the wastewater for all relevant outfalls. The wastewater volumes are based on total budgeted sewer costs.

Some GHG emissions from incineration and open burning are likely to be occurring in the CRD but cannot readily be estimated. This the notation key for “Not Estimated” has been used to indicate this.

4.3.3 Assumptions and Disclosures

The following assumptions were made in the calculation of the 2022 GHG emissions:

- To quantify GHG emissions from the Hartland Landfill, the CRD utilized the waste-in-place method which is accepted under the GPC Protocol. The Waste-in-place (WIP) assigns landfill emissions based on total waste deposited during that year. It counts GHGs emitted that year, regardless of when the waste was disposed. GHG emissions from the Hartland Landfill for the reporting year are allocated based upon the percentage of Community waste, relative to total waste received at to the

Hartland Landfill. It is assumed that the GHG emissions data provided is reasonably accurate and the method deployed correct.

- It is assumed that the landfill gas has a constant higher heating value (HHV) of 0.01865 (GJ/m^3).
- Composting GHG emissions are estimated based on the total tonnage estimated by the CRD. It is assumed that all compost is treated aerobically.
- Wastewater is not currently treated. As such, IPCC wastewater methane (CH_4) producing capacity and CH_4 correction default factors were used. These factors used are for untreated wastewater being deposited into deep or moving waters. It is likely that ocean sequesters more CH_4 than is estimated.
- It is likely that GHG emissions from incineration and open burning are occurring on an infrequent and controlled (property by property) basis, but without available data the GHG emissions cannot be reasonably quantified.

4.3.4 Calculation Methodology

4.3.4.1 Solid Waste

The Hartland Landfill has a landfill gas (LFG) collection and destruction system at the Hartland Landfill to which the LFG is either combusted in a flare, or in an engine to generate electricity which is exported to the grid. The GHG emissions associated with energy generation are reported as a reporting only GHG emission under Stationary Energy: Energy Industries Reporting Only and are not included in the total GHG emissions estimate. The GHG emissions associated with flaring of the landfill gas are reported under Stationary Energy: Energy Industries Scope 1.

The GHG quantification method for Stationary Energy: Energy Industries is as follows:

$$\textbf{Emissions}_{\text{Stationary Energy: Energy Industries}} = (LFG\ Consumed_{m3} * HHV_{LFG} * EF_{RNG\ CH4} * GWP_{CH4}) + (LFG\ Consumed_{m3} * HHV_{LFG} * EF_{RNG\ N2O} * GWP_{N2O})$$

The fugitive landfill GHG emissions estimates were generated by the CRD using the waste-in-place (WIP) method which is accepted under the GPC Protocol. The WIP assigns landfill emissions based on emissions during that year. It counts GHGs emitted that year, regardless of when the waste was disposed.

4.3.4.2 Biological Treatment of Solid Waste

The CRD provided 2022 composting data which is assumed to be treated aerobically at the Hartland Landfill. The composting emission factor used in the estimation of GHG emissions was derived from the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Volume 5, Chapter 4: Biological Treatment of Solid Waste) (Table 26).

Table 26 Composting Emission Factor

Emission Factor	Units	tCO_2e	Quality Rating Assessment

Composting: Anerobic	tCO_2e / kg waste	0.00019150	Low
Composting: Aerobic	tCO_2e / kg waste	0.00002800	Low

To quantify GHG emissions from the biological treatment of solid waste, the following GHG quantification methods was deployed:

$$Emissions_{Anaerobic\ Waste} = Compost\ Waste_{Total} * EF_{CH4} * GWP_{CH4}$$

4.3.4.3 Wastewater Treatment And Discharge

Wastewater is currently treated on Vancouver Island prior to being sent to ocean-based outfalls. The CRD provided the 2022 wastewater volumes (m^3), the average biological oxygen demand (BOD) and the average Total Kjeldal Nitrogen (TKN) in wastewater. IPCC default wastewater methane (CH_4) producing capacity (0.6 kg CH_4/kg BOD) and methane correction factor (MCF) (0.1 – unit less) were used to estimate CH_4 from the wastewater. To estimate N_2O from the wastewater, the Total Kjeldal Nitrogen (TKN) annual average in conjunction with the total wastewater volumes to calculate the total TKN in the wastewater. The IPCC default conversion value of 0.01 kg N_2O-N/kg sewage-N was used to estimate N_2O from the wastewater. These factors used are for treated wastewater being deposited into deep or moving waters. It is likely that ocean sequesters more CH_4 than what has been estimated.

To quantify GHG emissions from the wastewater treatment, the following GHG quantification method is deployed:

$$Emissions_{Wastewater\ CH4} = ((Wastewater_{m3} * (BOD_{ml/L} / 1000) * (0.06_{kg\ CH4/kg\ BOD} * 0.01)) / 1000) * GWP_{CH4}$$

$$Emissions_{Wastewater\ N2O} = ((Wastewater_{m3} * (TKN_{ml/L} / 1000) * 0.01_{kg\ N2O\text{-}N/kg\ sewage\text{-}N}) / 1000) * GWP_{N2O}$$

4.4 INDUSTRIAL PROCESSES AND PRODUCT USE (IPPU)

4.4.1 Overview

Emissions from the IPPU Sector are only required for BASIC+ GHG reporting under the GPC Protocol. This Sector encompasses GHG emissions produced from industrial processes that chemically or physically transform materials and using products by industry and end-consumers (e.g., refrigerants, foams, and aerosol cans) (GPC, 2014).

For the CRD, the IPPU encompasses the following GHG emissions scopes and Sub-Sectors:

- Scope 1 Emissions:
  - Product use

No GHG emissions from Industrial Processes are known to be occurring and thus the notation key for "Not Occurring" has been used to indicate this.

4.4.2 Activity Data

As there is limited data available on Product Use GHG emissions, the GHG Emissions estimate was derived on a per capita basis using the 2023 NIR GHG data for the Province of BC and BC population data for the reporting year.

4.4.3 Data Quality Assessment

Table 27 presents the activity data quality assessment for the IPPU data sources.

Table 27 IPPU Data Quality Assessment

Data	Quality Assessment Rating
Industrial process emissions data	Low
Industrial product use emissions data	Low

4.4.4 Assumptions and Disclosures

The following assumptions were made in the calculation of the 2022 GHG emissions:

- The product use emissions are based on the 2023 NIR product use GHG emissions as prepared by Environment and Climate Change Canada.
- The NIR uses the Tier 1 methodology to estimate these emissions and thus uncertainty around their accuracy remains quite high.

4.4.5 Calculation Methodology

4.4.5.1 Product Use Emissions

For the 2022 reporting year, only the emissions estimated were production and consumption of halocarbons, SF_6 and NF_3 were estimated for the Province. To estimate product use GHG emissions for the CRD, a per capita estimate was developed using the Provincial emissions data from the 2023 NIR, and BC's NIR reporting year population from Statistics Canada. This value was applied to the 2022 reporting year CRD population to estimate the total product use emissions.

The GHG quantification method is presented below:

$$Emissions_{Product\ Use} = (NIR\ Product\ Use\ GHG\ Emissions_{BC} / NIR\ Population_{BC}) * Current\ Reporting\ Year\ Population$$

4.5 AGRICULTURE, FORESTRY, AND OTHER LAND USE (AFOLU)

4.5.1 Overview

The AFOLU Sector includes emissions from livestock, land-use, and all other agricultural activities occurring within a community's boundaries. For the CRD, the AFOLU encompasses the following GHG emissions scopes and Sub-Sectors:

- Scope 1 Emissions:
  - Land (*reported, but not included in the GHG totals*)
  - Livestock
  - Aggregate Sources And Non-CO_2 Emissions Sources On Land

4.5.2 Activity Data

The CRD provided remotely sensed imagery to estimate land-cover change. This data included:

- Habitat Acquisition Trust (HAT) Land Cover Mapping (2007 and 2011)
- Annual Crop Inventory (ACI), Agriculture Canada
- Satellite Imagery interpretation (2011 and 2019), CRD
- Vegetation Resources Inventory (VRI), British Columbia Government.
- Earth Observation for Sustainable Development of Forests (EOSD) Land Cover Classification, Service Natural Resources Canada

Livestock and aggregate sources and non-CO_2 emissions sources on land were estimated using GHG emissions data from the 2023 NIR, and land-use data from the 2021 Statistics Canada Census of Agriculture, to create a GHG emissions per hectare value.

4.5.3 Data Quality Assessment

Table 28 presents the activity data quality assessment for the AFOLU data sources.

Table 28 AFOLU Data Quality Assessment

Data	Quality Assessment
Land-use data	Medium
Urea application GHG data	Low
Direct, indirect, and manure nitrous oxide (N_2O) GHG data	Low
Livestock data	Medium

4.5.4 Assumptions and Disclosures

The following assumptions were made in the calculation of the 2022 GHG emissions:

- It is conservatively assumed that all cropland is used for livestock and agricultural purposes.
- Infrequent and small source open burning may be occurring, but there is no data to estimate this emissions source.
- The land cover change analysis requires a consistent land-use category attribution and spatial data. For parts of the CRD, spatial data was available for the 2007, 2011 and 2019 reporting years. Differences between these data sets in terms of resolution and their timing of collection increase the uncertainty as to the accuracy of the land-use classifications. For example, the 2007 and 2011 land use data was collected at different times of the year and may not accurately reflect tree cover. Furthermore, no land use spatial data was collected for the Juan de Fuca, Salt Spring Island or Gulf Islands and thus Annual Crop Inventory (ACI) settlement data collected by Agriculture Canada was used to inform the analysis. The challenge in utilizing this data is that it is provided in a 30m resolution. Furthermore, since annual data is not available, the change between land cover data years (2007-2011, 2011-2019) for all areas was averaged and may not represent actual changes in each year. Lastly, due to limitations in how to quantify GHG emissions resulting from land use change (e.g., residential development), these GHG emissions have been excluded from the CRD's GHG emissions inventory, but have been disclosed, until a more robust measurement methodology can be developed. Since no data was available for 2022, the 2019 estimates were applied.

4.5.5 Calculation Methodology

4.5.5.1 Land Use

Remotely sensed imagery was used to estimate land-cover changes during the 2007-2019 reporting periods. Using the remotely sensed imagery an annual average land-use change between land classes (e.g. cropland forestland, etc.) was determined and applied to BC-based emission factors to estimate GHG emissions resulting from changes between land-uses for the reporting year.

The following table identifies the data sources used for the reporting years for each of the study area's geographies.

Table 29 Spatial Data Sources Representing Land Cover For The CRD Study Area

		CRD Study Area Geography		
		CRD Core	**Gulf Islands**	**Juan de Fuca Region**
Reporting Year	**2007**	2005 HAT Land Cover Mapping	2001 EOSD Land Cover Classification	2011 HAT Land Cover Mapping[2]
	2011	2011 HAT Land Cover Mapping	2001 EOSD Land Cover Classification + 2011 ACI 'Settlement'	2011 HAT Land Cover Mapping[2] + 2011 ACI 'Settlement'
	2022	2019 HAT Land Cover Mapping + 'Settlement' satellite image interpretation[1]	2001 EOSD Land Cover Classification + 2019 ACI 'Settlement'	2011 HAT Land Cover Mapping[2] + 2019 ACI 'Settlement'

Notes:

[1] Settlements land cover category is a combination of i) municipality provided building footprint as acquired mostly from digitizing roofline from satellite and orthoimagery, ii) new roads (ParcelMap BC parcel with parcel start dates > 2011 and parcel class = 'road') and iii) and theoretical building footprints (average building footprint areas as buffered centroids of new ParcelMap BC parcel with start dates > 2011 with a residential parcel class)

[2] The 2011 land cover classification was interpreted mostly from 2005 imagery in the Juan de Fuca region making it more suitable for the 2007 reporting year.

The spatial data sources representing land cover in this analysis include more categories than the 6 IPCC land-use categories. To align with the IPCC land classification definitions (as required by the GPC Protocol), the following data categories were re-assigned to the most appropriate IPCC land class.

Table 30 IPCC Land Use Classification Cross-References

IPCC Land Cover	EOSD Land Cover	HAT Land Cover	Annual Crop Inventory
Cropland	Annual Cropland, Perennial Cropland And Pasture	Agricultural Fields	-
Forest	Broadleaf Dense, Broadleaf Open, Coniferous Dense, Coniferous Open, Coniferous Sparse	Tree	-
Grassland	Grassland, Herb, Shrub Low	Grass, Herb	-
Settlement	Developed	Pavement/Building	Developed
Wetland	Wetland - Herb, Wetland - Shrub, Wetland - Treed	Riparian Tree, Riparian Herb, Pond	-
Other	Water, Exposed Land	Shadow, Ocean, Lake, River, Sand/Gravel Shoreline, Bedrock Shoreline, Exposed Soil, Exposed Bedrock	-

The analysis resulted an estimate of an annual average change in hectares' value for each land class. Once the land use change values were determined for the reporting year, BC-based and IPCC emission factors were applied to estimate reported and disclosed (not-reported) GHG emissions from land use (Table 31).

Table 31 Land-Use Change Emission Factors

Land-Use Classification	Emission Factor	Units	Quality Assessment Rating
Forestland	224.1	tCO_2e / ha	Low
Shrubland/Scrubland	112.0	tCO_2e / ha	Low
Grasslands	205.7	tCO_2e / ha	Low

Land-Use Classification	Emission Factor	Units	Quality Assessment Rating
Wetlands	471.5	tCO_2e / ha	Low
Cropland	239.8	tCO_2e / ha	Low
Settlements	0	tCO_2e / ha	Low
Other	0	tCO_2e / ha	Low
Forestland	1.8	tCO_2e / ha / year	Low
Shrubland/Scrubland	0.1	tCO_2e / ha / year	Low
Grasslands	2.6	tCO_2e / ha / year	Low
Wetlands	3.3	tCO_2e / ha / year	Low
Croplands	0.4	tCO_2e / ha / year	Low
Settlements	0	tCO_2e / ha / year	Low
Other	0	tCO_2e / ha / year	Low

The GHG quantification methods for land use change is presented below:

$$\textbf{Emissions}_{\textbf{Lands Not Converted}} = Land\ Type_{ha} * EF_{Sequester}$$

$$\textbf{Emissions}_{\textbf{Lands Converted}} = Land\ Type_{ha} * (EF_{Release} / (Current\ Land\ Reporting_{Year} - Last\ Land\ Reporting_{Year} + 1))$$

4.5.5.2 Emissions from Aggregate Sources and Non-CO_2 Emission Sources on Land

Emissions from Aggregate Sources and Non-CO_2 Emission Sources on Land includes direct N_2O emissions from agricultural soil management and indirect N_2O emissions from applied nitrogen. To estimate these GHG emissions, the total area of farmland for BC was used in conjunction with 2023 NIR data to develop a tCO_2e / ha value estimate for:

- Livestock
- Aggregate Sources And Non-CO_2 Emissions Sources On Land

To calculate GHG emissions from urea application, the calculated total crop land in hectares for the reporting year was applied against an IPCC GHG emissions factor of 0.20 tCO_2e / ha. This emission factor is also applied in the 2023 NIR.

The GHG quantification method is presented below:

$$\textbf{Emissions}_{\textbf{Direct \& Indirect N2O}} = ((BC_{\ Direct\ N2O\ Emissions} + BC_{\ Indirect\ N2O\ Emissions} + BC_{\ Indirect\ N2O\ Manure\ Management\ Emissions}) / BC_{\ Land\ In\ Crops\ ha})) * CRD\ Cropland_{ha}$$

$$\textbf{Emissions}_{\textbf{Urea Application}} = CRD\ Cropland_{ha} * 0.66\ tCO_2e / ha$$

5.0 2022 GHG REPORTING YEAR RESULTS

5.1 SUMMARY

Total BASIC, and BASIC+ emissions for the CRD for the 2022 reporting year are presented in the Figure 3 below.

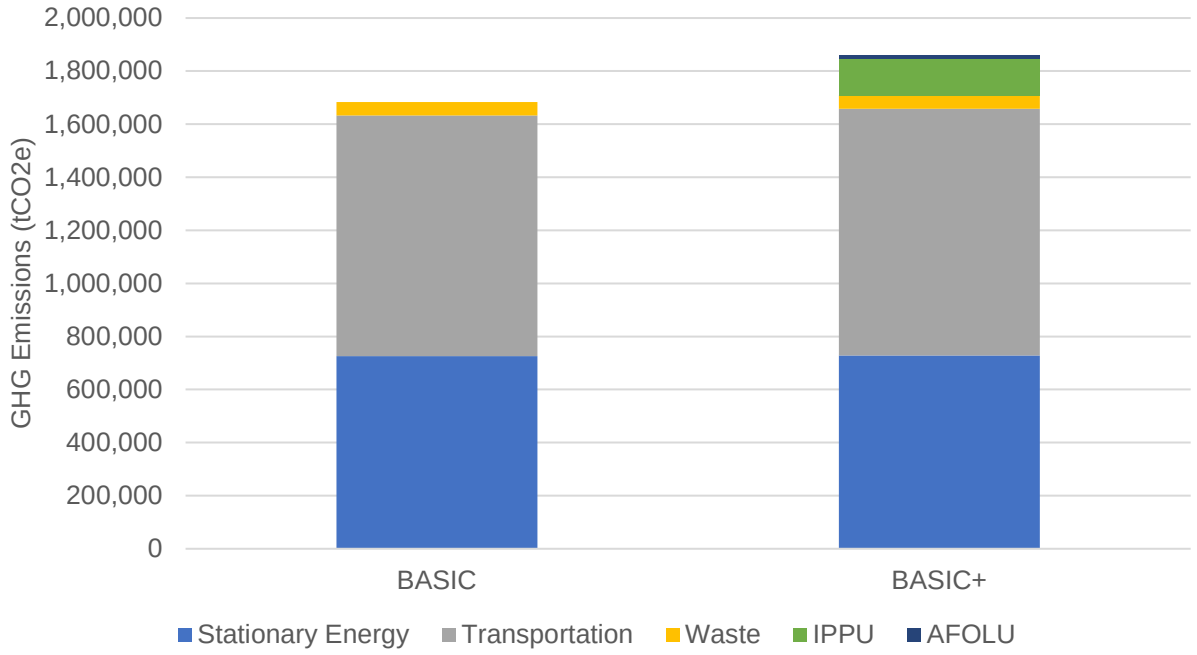

Figure 3 2022 GHG Emissions Summary by GPC Reporting Level

Emission by reporting level are presented in the Table 32 below which shows a difference in emissions under the GPC Protocol's BASIC, and BASIC+ reporting levels. This is due to the inclusion of additional sources in BASIC+ which are very significant for almost any growing community. These additional emissions include transboundary emissions, industrial and product use emissions, and emissions from land-use change. Under the GPC Protocol, emissions included within each higher reporting level are cumulative from lower levels.

Table 32 Breakdown of the CRD's 2022 GHG Emissions in GPC Reporting Format

GHG Emissions Source (by Sector)		Total GHGs (metric tonnes CO_2e)					
		Scope 1	Scope 2	Scope 3	BASIC	BASIC+	BASIC+ S3
Stationary Energy	Energy use (all emissions except I.4.4)	686,323	39,149	2,623	725,472	728,096	728,096
	Energy generation supplied to the grid (I.4.4)	8,217					
Transportation	(all II emissions)	907,764	198	22,694	907,962	930,656	930,656
Waste	Waste generated in the Community (III.X.1 and III.X.2)	50,275		0	50,275	50,275	50,275
	Waste generated outside community (III.X.3)	NO					
IPPU	(all IV emissions)	135,461				135,461	135,461
AFOLU	(all V emissions)	13,837				13,837	13,837
Other Scope 3 (S3)	(all VI emissions)			NE			NE
TOTAL		**1,793,660**	**39,347**	**25,317**	**1,683,710**	**1,858,325**	**1,858,325**

NOTES:
Notation Keys: IE = Included Elsewhere; NE = Not Estimated; NO = Not Occurring.
Cells in green are required for BASIC reporting
Cells in green and blue are required for BASIC+ reporting
Cells in purple are for disclosure purposes only but are not included in the summary totals as required by the GPC Protocol.
Cells in orange are not required for BASIC or BASIC+ reporting

Table 33 presents the breakdown of the CRD's BASIC+ GHG emissions by Sector and Sub-Sector.

Table 33 Breakdown of the CRD's 2022 BASIC+ GHG Emissions in the GPC Protocol Reporting Format

GPC ref No.	GHG Emissions Source (by Sector and Sub-Sector)	Total GHGs (metric tonnes CO_2e)			
		Scope 1	Scope 2	Scope 3	Total
I	**Stationary Energy**				
I.1	Residential buildings	248,785	24,609	1,649	275,044
I.2	Commercial and institutional buildings and facilities	328,496	14,540	974	344,011
I.3	Manufacturing industries and construction	NE	NE	NE	NE
I.4.1/2/3	Energy industries	6,497	NO	NO	6,497
I.4.4	Energy generation supplied to the grid	8,217			
I.5	Agriculture, forestry, and fishing activities	101,034	IE	IE	101,034
I.6	Non-specified sources	IE	IE	IE	IE
I.7	Fugitive emissions from mining, processing, storage, and transportation of coal	NO			NO
I.8	Fugitive emissions from oil and natural gas systems	1,510			1,510
Sub-Total	(community induced framework only)	**686,323**	**39,149**	**2,623**	**728,096**
II	**Transportation**				
II.1	On-road transportation	764,983	198	6,947	772,129
II.2	Railways	NO	NO	NO	NO
II.3	Waterborne navigation	55,107	IE	IE	55,107
II.4	Aviation	IE	IE	15,746	15,746
II.5	Off-road transportation	87,673	IE	IE	87,673
Sub-total	(community induced framework only)	**907,764**	**198**	**22,694**	**930,656**
III	**Waste**				
III.1.1/2	Solid waste generated in the Community	39,699		NO	39,699
III.2.1/2	Biological waste generated in the Community	5,602		NO	5,602
III.3.1/2	Incinerated and burned waste generated in the Community	NO		NO	NO
III.4.1/2	Wastewater generated in the Community	4,975		IE	4,975
III.1.3	Solid waste generated outside the Community	NO			
III.2.3	Biological waste generated outside the Community	NO			
III.3.3	Incinerated and burned waste generated outside community	NO			
III.4.3	Wastewater generated outside the Community	NO			
Sub-total	(community induced framework only)	**50,275**		**0**	**50,275**
IV	**Industrial Processes and Product Uses**				

Table 33 Breakdown of the CRD's 2022 BASIC+ GHG Emissions in the GPC Protocol Reporting Format

GPC ref No.	GHG Emissions Source (by Sector and Sub-Sector)	Total GHGs (metric tonnes CO_2e)			
		Scope 1	Scope 2	Scope 3	Total
IV.1	Emissions from industrial processes occurring in the Community boundary	NE			NE
IV.2	Emissions from product use occurring within the Community boundary	135,461			135,461
Sub-Total	(community induced framework only)	**135,461**			**135,461**
V	**Agriculture, Forestry, and Other Land Use**				
V.1	Emissions from livestock	12,431			12,431
V.2	Emissions from land	-312,232			-312,232
V.3	Emissions from aggregate sources and non-CO_2 emission sources on land	1,406			1,406
Sub-Total	(community induced framework only)	**13,837**			**13,837**
VI	**Other Scope 3**				
VI.1	Other Scope 3			NE	NE
Total	(community induced framework only)	**1,793,660**	**39,347**	**25,317**	**1,858,325**

NOTES:
Cells in green are required for BASIC reporting
Cells in green and blue are required for BASIC+ reporting
Cells in purple are for disclosure purposes only but are not included in the summary totals as required by the GPC Protocol.
Cells in orange are not required for BASIC or BASIC+ reporting

5.2 TOTAL GHG EMISSIONS

Under the BASIC+ method, the CRD's GHG emissions totaled 1,858,325 tCO_2e. On a per capita basis, this works out to 4.3 tCO_2e per person.

Table 34 Total Energy and GHG Emissions Per Person by Sector

Sector	Sub-Sector	Energy (GJ)	GHG Emissions (tCO_2e)	GJ Per Capita	tCO_2e Per Capita
Stationary Energy	Residential Buildings	13,310,014	275,044	30	0.6
	Commercial & Institutional Buildings	10,788,422	344,011	25	0.8
	Manufacturing Industries & Construction	-	-	-	-
	Energy Industries	-	6,497	-	0.0
	Agriculture, Forestry & Fishing Activities	1,407,950	101,034	3	0.2
	Fugitive Emissions	-	1,510	-	0.0
Transportation	In-Boundary On-road Transportation	11,641,173	765,180	26	1.7
	Trans-Boundary On-road Transportation	105,722	6,949	0	0.0
	Waterborne Navigation	709,978	55,107	2	0.1
	Aviation	211,848	15,746	0	0.0
	Off-road Transportation	1,221,764	87,673	3	0.2
Waste	Solid Waste		39,699		0.1
	Biological Treatment of Waste		5,602		0.0
	Wastewater Treatment & Discharge		4,975		0.0
IPPU	Product Use		135,461		0.3
AFOLU	Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**		(401,842)		(0.9)
	Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**		89,610		0.2
	Livestock		12,431		0.0
	Non-CO2 Land Emission Sources		1,406		0.0
Total		**39,396,871**	**1,858,325**	**89.5**	**4.2**

Total GHG emissions for 2022 are 1,858,325 tCO_2e and have decreased 8% from the 2007 base year. Scope 1 and 2 Emissions are 97% and 2% of the total GHG inventory. Scope 1 emissions are the GHG emissions that result from the combustion of fuel in sources within the CRD's boundaries, primarily from

Stationary Energy and Transportation. Scope 1 GHG emissions also include IPPU and some AFOLU GHG emissions. Scope 2 emissions result from the use of electricity supplied to the CRD which includes emissions associated with the generation of electricity and other forms of energy (e.g., heat and steam). Scope 2 emissions are low compared to other geographies, due to the predominance of hydroelectric generation technologies in the BC. Scope 3 emissions are emissions from electricity line losses, transboundary traffic, and emissions associated with the CRD that are occurring outside of the CRD's boundaries. For 2022, Scope 3 GHG emissions make up 1% of the GHG inventory. This breakdown by emission scope is depicted in Figure 4.

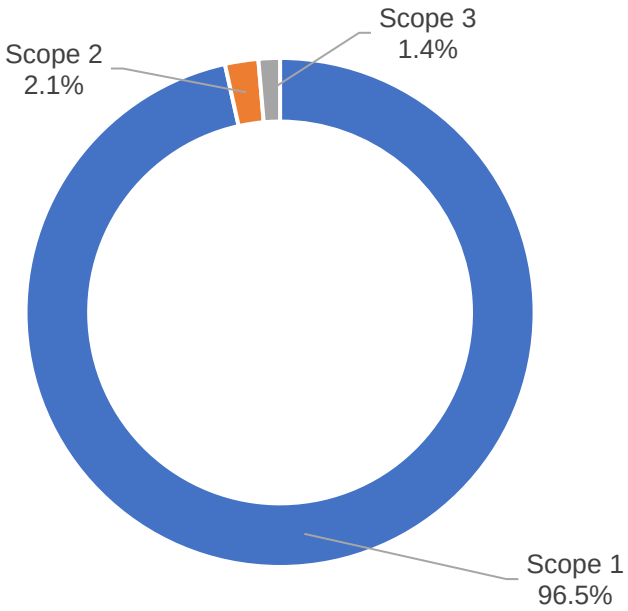

Figure 4 CRD BASIC+ GHG Emissions by Emissions Scope

A breakdown of GHG emissions by reporting scope for the 2007 base and reporting year are presented in Table 35 below.

Table 35 Change in GHG Emissions from Base Year

Emissions Scope	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change
Scope 1	1,841,365	1,793,660	-2.6%
Scope 2	116,129	39,347	-66.1%
Scope 3	47,134	25,317	-46.3%
Total	**2,004,628**	**1,858,325**	**-7.3%**

5.3 SECTORAL GHG EMISSIONS ANALYSIS

5.3.1 Stationary Energy

Stationary energy sources are one of the largest contributors to the CRD's GHG emissions. In 2022, it contributed 39% of the community's GHG emissions. In general, stationary energy emissions include the energy to heat and cool residential, commercial, and industrial buildings, as well as the activities that occur within these residences and facilities. Fugitive methane emissions from natural gas pipelines and other distribution facilities, and related off-road GHG emissions, are also reported in this Sector. The table below shows the breakdown of energy use in the stationary energy reporting category.

Table 36 summarizes the energy and GHG emissions for the 2022 reporting year.

Table 36 2022 Energy and GHG Emissions by Stationary Energy Sector

Sector	Electricity (tCO_2e)	Natural Gas (tCO_2e)	Heating Oil (tCO_2e)	Propane (tCO_2e)	Wood (tCO_2e)	Other Sources (tCO_2e)	**Total GHG Emissions (tCO_2e)**	**Total Energy (GJ)**
Residential Buildings	26,258	141,472	42,240	25,703	28,855	10,516	**275,044**	**13,310,014**
Commercial & Institutional Buildings	15,514	235,444	9,775			83,278	**344,011**	**10,788,422**
Energy Industries						6,497	**6,497**	
Agriculture, Forestry & Fishing activities						101,034	**101,034**	**1,407,950**
Fugitive Emissions						1,510	**1,510**	
Total GHG Emissions (tCO_2e)	**41,773**	**376,916**	**52,014**	**25,703**	**28,855**	**202,835**	**728,096**	
Total Energy (GJ)	**13,076,561**	**7,409,355**	**760,983**	**421,254**	**1,123,230**	**2,715,004**		**25,506,387**

It can be seen in Figure 5 that heating oil and natural gas use contributed to almost 60% of the CRD's total Stationary Energy GHG emissions.

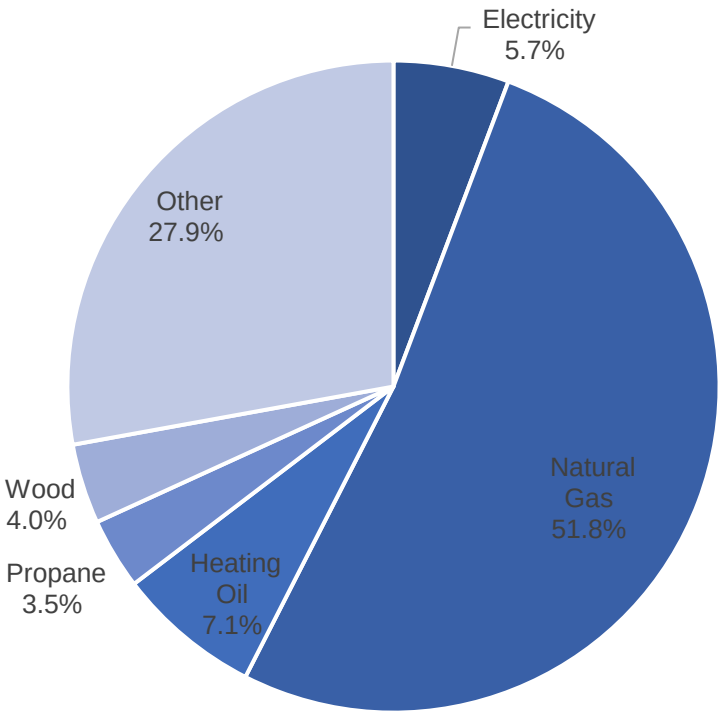

Figure 5 Stationary Energy GHG Emissions Contribution to the GHG Inventory

Figure 6 shows that more than 90% of the stationary GHG emissions arise from the operation of buildings. Historically, residential buildings contributed more to the CRD's GHG emissions inventory, but this is now declining with the focus on reducing heating oil and energy efficiency building retrofits.

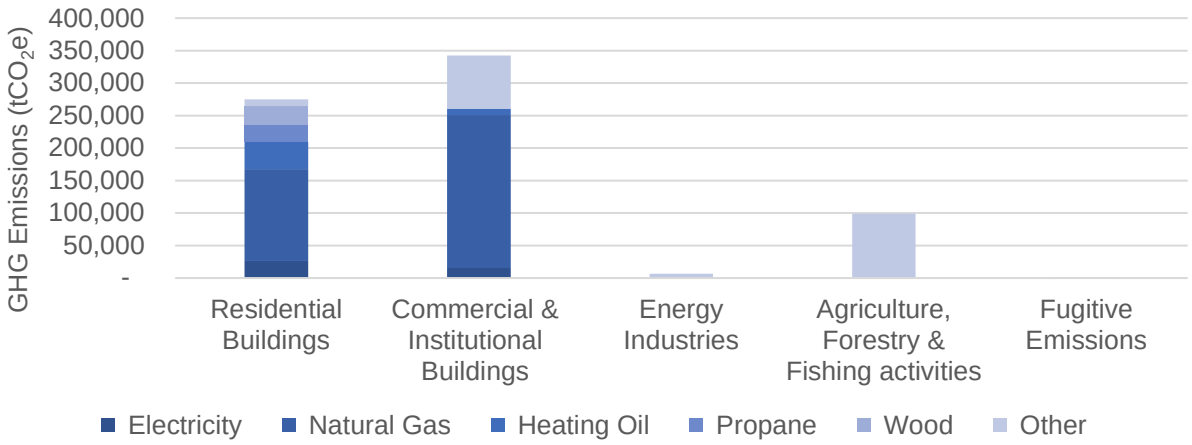

Figure 6 Total Stationary Energy Use By Sub-Sector

Stationary energy GHG emissions have decreased by nearly 8% since the base year (Table 37). This is mainly the result of the changing electricity emission factor which increased by 12% in 2022 (as compared to 2007) as well as a decline in the use of heating oil.

Table 37 Stationary Energy—Energy and GHG Emissions Trends

Sector	Change in GJ: 2007 & 2022	Change in tCO_2e: 2007 & 2022
Residential Buildings	-5.7%	-34.9%
Commercial & Institutional Buildings	19.6%	27.2%
Energy Industries	N/A	1454.3%
Agriculture, Forestry & Fishing activities	16.0%	12.9%
Fugitives	N/A	50.6%
Total	**4.7%**	**-7.1%**

5.3.2 Transportation

Transportation covers all emissions from combustion of fuels in journeys by road, rail, water, and air, including inter-community and international travel. For the 2022 reporting year, transportation GHG emissions accounted for 50% of the CRD GHG inventory with the bulk of transportation GHG emissions resulting from the on-road transportation sub-sector (84%). The transportation GHG emissions are produced directly by the combustion of fuel or indirectly because of the use of grid-supplied electricity. Unlike stationary emission sectors, transit is mobile and can pose challenges in both accurately calculating emissions and allocating them to the cities linked to the transit activity. The following sections summarize energy and GHG emissions by on-road transportation, which is then followed by off-road transportation (marine, aviation, and other).

Table 38 summarizes the on-road energy and GHG emissions for the 2022 reporting year.

Table 38 2022 On-Road Transportation Energy And GHG Emissions by Fuel Type

Fuel Type	Number of Registered Vehicles	Total Fuel Use	Fuel Use Units	Energy (GJ)	GHG Emissions (tCO_2e)
Electricity	8,614	17,225,195	kWh	62,010	198
Gasoline	274,956	275,786,050	Liters (L)	9,558,744	626,637
Diesel	16,289	56,149,691	Liters (L)	2,171,870	144,329
Propane	292	634,856	Liters (L)	16,208	920
Hydrogen	26	-	Liters (L)	-	-
Natural Gas	68	192,612	Kilograms (kg)	10	45
Total	**300,245**	**N/A**	**N/A**	**11,746,895**	**772,129**

Overall, GHG emissions from on-road transportation have decreased by 12% compared to the 2007 base year. The majority of these GHG emissions (84%) are from passenger vehicles, light trucks, and SUVs (Figure 7).

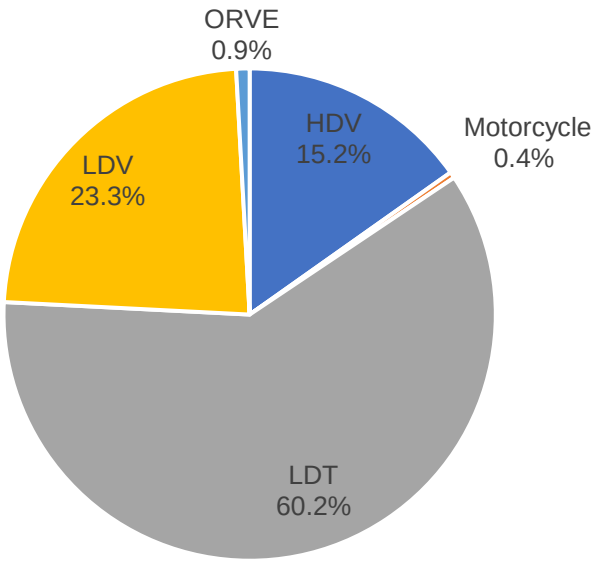

Figure 7 Breakdown of On-Road GHG Emissions by Vehicle Type

Table 39 summarizes the aviation, waterborne, and off-road transportation energy and emissions by fuel type. These GHG emissions contribute to 17% of the total transportation GHG emissions and 9% to the total inventory (Figure 8).

Table 39 2022 Aviation, Waterborne, and Off-Road Transportation Energy and Emissions by Fuel Type

Fuel Type	Total	Units	Energy (GJ)	GHG Emissions (tCO_2e)
Marine Gasoline	7,610	Liters (L)	264	17
Marine Diesel	17,090,167	Liters (L)	661,048	51,990
Marine Natural Gas	1,252,662	Liters (L)	48,666	3,099
Aviation Jet Fuel	6,105,118	Liters (L)	211,848	15,746
Other Off-Road Transportation Diesel	31,586,453	Liters (L)	1,221,764	87,673
Total	**N/A**	**N/A**	**2,143,589**	**158,527**

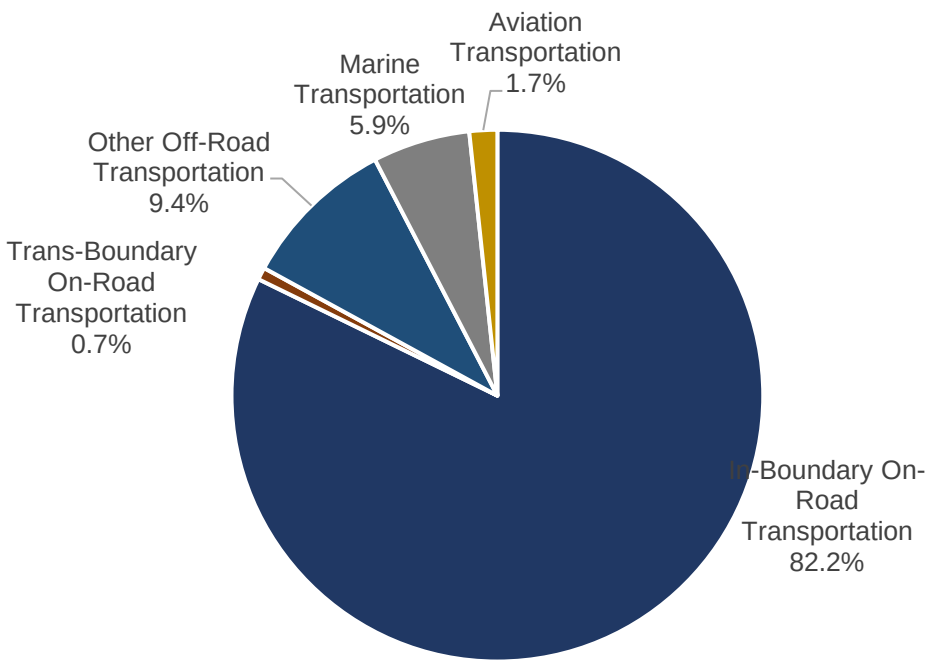

Figure 8 Summary of Transportation GHG Emissions by Sub-Sector

5.3.3 Waste

Communities produce solid waste, compost, and wastewater. Waste does not directly consume energy, but when deposited into landfills, or left exposed to the atmosphere, it decomposes and releases methane (CH_4) gas which is a potent GHG. The GHG emissions from the solid waste, composting, and wastewater facilities for the reporting year is summarized in the following table. For the 2022 reporting

year, waste emissions contributed 3% to the GHG inventory. A breakdown of the Waste Sub-Sector GHG emissions is presented in Table 40.

Table 40 Summary of Waste Sub-Sector GHG Emissions

Sector	2022 GHG Emissions (tCO_2e)	GHG Emissions Per Capita (tCO_2e / Capita)	Change from Base Year (2007)
Wastewater Treatment And Discharge	4,975	0.01	-73.8%
Biological Treatment of Solid Waste	5,601	0.01	7556%
Solid Waste	39,699	0.09	-64.3%
Total	**50,274**	**0.12**	**-61.4%**

For the 2022 reporting year, in scope GHG emissions from waste have decreased by 61% compared to the 2007 base year. Fluctuations in waste will occur over the reporting periods as waste is driven by both the population, as well as economic prosperity in the region. The Solid Waste Sub-Sector contributes more than 79% of total waste GHG emissions (Figure 9). To reduce the amount of waste landfilled, and thus GHG emissions, the CRD and its members are making a significant effort to reduce waste going to landfills through organics diversion and recycling.

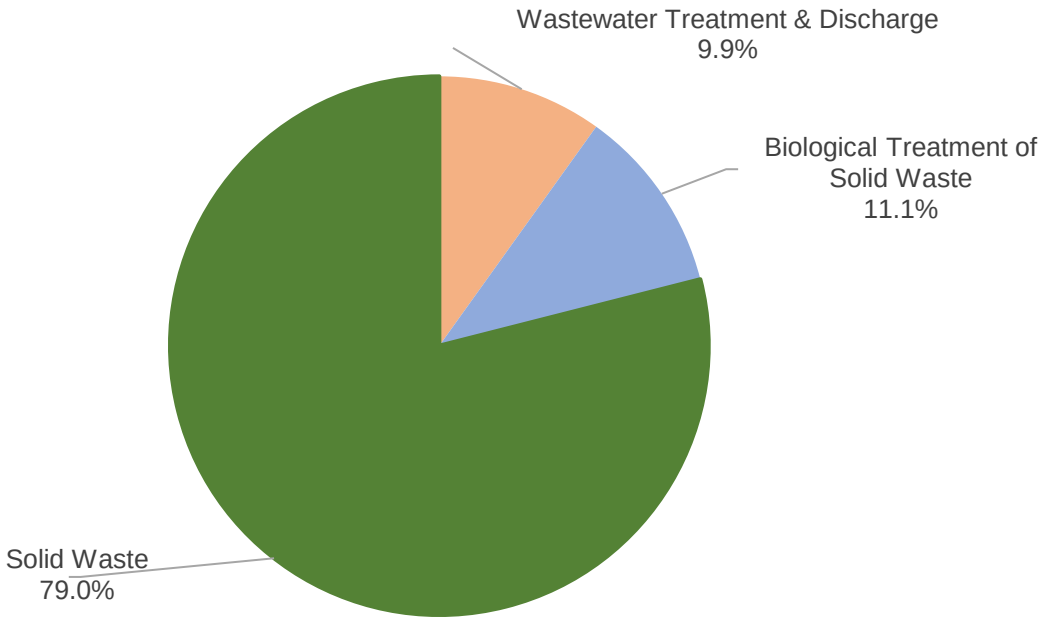

Figure 9 2022 GHG Emissions from Waste (tCO_2e)

5.3.4 Industrial Processes and Product Use (IPPU)

Reporting on IPPU GHG emissions are required for BASIC+ reporting only. Industrial GHG emissions are produced from a wide variety of non-energy related industrial activities which are typically releases from industrial processes that chemically or physically transform materials. During these processes, many different GHGs can be produced. It is not clear if there are industrial GHG emissions occurring within the CRD's boundaries and thus a "Not Estimated" notation is used in the GPC tables.

Also included in the IPPU Sector is Product Use GHG emissions. Certain products used by industry and end-consumers, such as refrigerants, foams or aerosol cans, also contain GHGs which can be released during use and disposal and thus, as with best-practice, must be accounted for. For the reporting year, only the emissions estimated were production and consumption of halocarbons, SF_6 and NF_3 were estimated for the CRD on the basis that other GHG emissions sources identified in the NIR are not likely to be occurring in the CRD. The sources of these GHG emissions are typically fridges, heat pumps, and air conditioners. To estimate Product Use GHG emissions for the CRD, a per capita estimate was developed using the Provincial emissions data from the 2023 NIR, and BC's NIR reporting year population from Statistics Canada. This value was applied to the 2022 reporting year population to estimate the total Product Use emissions for the CRD.

Between the 2007 and 2022 reporting years, IPPU GHG emissions have increased 92%. The reason for the increase is attributed to Environment and Climate Change Canada having better data available to make the estimate, than the actual GHG emissions increasing such an amount.

Table 41 Product Use GHG Emissions for the 2007 and 2022 Reporting Years

Sub-Sector	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change
Product Use Emissions	70,418	135,461	92.4%

5.3.5 Agriculture, Forestry, and Other Land Use

The AFOLU Sector includes GHG emissions from livestock, land use, and all other agricultural activities occurring within the CRD's boundaries.

The following information is provided for disclosure purposes only. Using remotely sensed imagery, land cover data was used to estimate land use changes between the reporting years. In 2022, the CRD's greenspace is estimated to have sequestered and stored 401,842 tCO_2e (Table 42), released 89,610 tCO_2e for a net effect of 312,232 tCO_2e. Upon review, the result was deemed to contradict expectations relative known trends of development in the region. Therefore, it was excluded from the total inventory calculations.

Table 42 Summary of Land-Use Change in 2022

Land Type	Total Hectares (Ha)	GHG Emissions Sequestered (tCO_2e)	GHG Emissions Released (tCO_2e)
Forest Land	171,008.8	(312,121.9)	-
Cropland	6,347.2	(2,714.9)	-
Grassland	15,864.1	(43,300.6)	-
Wetlands	12,511.1	(43,704.2)	-
Settlements	11,821.8	-	46,066.8
Other Land	13,439.6	-	43,542.9
Total	**230,992.6**	**(401,841.6)**	**89,609.7**

5.3.5.1 Livestock and Other Agriculture

In addition to land use change, GHG emissions from the AFOLU Sector are produced through a variety of non-land use pathways, including livestock (enteric fermentation and manure management), and aggregate sources and non-CO_2 emission sources on land (e.g., fertilizer application). Under this Sector, the CRD is reporting on GHG emissions from the following sources, and Sub-Sectors:

- Scope 1 GHG Emissions:
  - Livestock:
    - Methane (CH_4) Emissions from Enteric Fermentation
    - Methane (CH_4) Emissions from Manure Management
    - Direct Nitrous Oxide (N_2O) GHG Emissions
  - Aggregate Sources and Non-CO_2 Emissions Sources on Land
    - Direct Nitrous Oxide (N_2O) Emissions from Agricultural Soil Management
    - Indirect Nitrous Oxide (N_2O) Emissions from Applied Nitrogen

Table 43 summarizes these other land-use GHG emissions for the 2022 reporting year. Compared to the 2007 base year, these GHG emissions have increased 79%.

Table 43 Total AFOLU GHG Emissions for 2022

AFOLU Sub-Sector	GHG Emissions (tCO_2e)
Livestock	12,431
Aggregate Sources And Non-CO_2 Emissions Sources On Land	1,406
Total	**13,837**

6.0 QUALITY ASSURANCE AND QUALITY CONTROL

Quality Assurance and Quality Control (QA/QC) procedures are applied to add confidence that all measurements and calculations have been made correctly and to reduce uncertainty in data. Examples include:

- Checking the validity of all data before it is processed, including emission factors
- Performing recalculations to reduce the possibility of mathematical errors
- Recording and explaining any adjustments made to the raw data
- Documenting quantification methods, assumptions, emission factors and data quality

With respect to the GHG inventory, the data was subject to various quality assurance and quality control checks throughout the collection, analysis, and reporting phases. Specifically, the following procedures were followed:

- Upon receipt of data from the CRD, the data was checked for completeness (e.g., all months of data are present), relevancy (e.g., the correct calendar year is presented), and reasonableness (e.g., comparing similar transportation data sets). Incorrect or incomplete datasets were queried directly with the data provider.
- Where estimates were used (e.g., fuel oil consumption), all possible data sources were considered for their accuracy and relevance to the community before a final method and data source was selected.
- All manual data transfers were double-checked for data transfer accuracy.
- The inventory was compared to other third party inventories (e.g. CEEI) to assess for reasonableness of the estimates.
- The inventory underwent internal CRD reviews to confirm assumptions, data and reasonableness of the estimates.

7.0 RECOMMENDATIONS

To remain accurate and reflective of the current community conditions, the CRD should revise and improve its GHG emissions inventory either annually or in line with capital planning cycles (i.e., every 3-4 years), to which there are the following aspects should be focused on:

- Improving activity data collection and management, including Sector and Sub-Sector allocations.
- Performing recalculations, where applicable, and tracking GHG emissions over time.
- Reviewing methodologies and data to assess for opportunities to improve the estimates.
- Assessing changes to boundaries, methodologies, assumptions or data that may be material and require a base year restatement.

The next section provides a summary of specific GHG inventory improvement recommendations.

7.1 INVENTORY ASSUMPTIONS, ASSESSMENT, AND RECOMMENDATIONS

In the preparation of the 2022 GHG emissions inventory, there are several assumptions were made in the analysis that will have some influence on accuracy of the CRD's estimate of GHG emissions. Most emission sources have been calculated with a high level of confidence, due to the presence of utility records, and direct energy and emissions data being provided by stakeholders. Data sources and assumptions with medium to high uncertainty are presented in Table 44 which summarizes the main assumptions, possible impacts on the data, and recommended improvement. It is recommended that the CRD prioritize improvements for that are likely to have a material (>5%) influence on the GHG inventory estimate.

Table 44 Summary of GHG Inventory Assumptions, Estimated Impacts, and Recommended Improvements

Sector	Assumption	Possible Impact on The GHG Inventory	Recommended Improvements
Stationary Energy	The energy utility providers provide energy in lump sum amounts for: residential, commercial, and industrial. As such, other sectors, like agricultural buildings, could not be split out. A related accuracy issue is the assignment of mixed-use buildings without separate metering.	No impact on the GHG inventory. The change would only happen between emission sub-sectors.	Work with the utility provider to get a more detailed breakdown of energy use by sub-sector.

Table 44 Summary of GHG Inventory Assumptions, Estimated Impacts, and Recommended Improvements

Sector	Assumption	Possible Impact on The GHG Inventory	Recommended Improvements
Stationary Energy	Propane and wood GHG emissions were estimated based on a 2005 study, 2007-2019 CEEIs and HDD data. it is assumed that the consumption patterns have remained consistent since the 2005 study.	Immaterial impact on the GHG inventory (<5%)	Consider completing a residential energy labelling program. With such a program, an energy and fuel profile for buildings could be developed so that a reasonable estimate of other fuel use be determined. Work with the Province on developing a methodology to estimate wood fuel use.
Stationary Energy	The CRD estimated heating oil consumption for the member municipalities (except for Saanich and Victoria) using real-estate sales data and an estimated consumption factor.	Immaterial impact on the GHG inventory (<5%)	Consider completing a residential energy labelling program. With such a program, an energy and fuel profile for buildings could be developed so that a reasonable estimate of other fuel use be determined.
Stationary Energy	FortisBC provided a total estimate of fugitive emissions for the CRD region for 2022; however, this did not include upstream fugitive emissions as suggested as best practice by the GPC Protocol.	Immaterial impact on the GHG inventory (<1%)	Work with FortisBC to refine this estimate.
Transportation	Taxable fuel volumes only represent about 67% of taxable fuel sales (a value that fluctuates yearly). Without more detailed information, a fuel allocation amount could not be allocated to the CRD. As such, the CRD had to rely on vehicle registration data from ICBC and estimated vehicle kilometers travelled (VKT).	Possibly material (>10%) impact to the GHG inventory. Using the estimated VKT data, it is likely that the CRD is over-estimating the GHG emissions from transportation (fuel consumption volumes would include other-off-road consumption). This is the most conservative approach available to the CRD at this point.	If the CRD can get complete fuel sales data for the Region, a more robust estimate of fuel use and GHG emissions, using vehicle registration data, can be determined.

Table 44 Summary of GHG Inventory Assumptions, Estimated Impacts, and Recommended Improvements

Sector	Assumption	Possible Impact on The GHG Inventory	Recommended Improvements
Transportation	The CRD is relying on ECCC data and models applied at a Provincial level to estimate off-road fuel consumption (e.g., construction, etc.). These emissions are assigned on a per capita basis. It is likely that this approach is over-estimating and possibly double counting GHG emissions.	Possibly material (>10%) impact to the GHG inventory.	Work with member municipalities to estimate infrastructure and building construction GHG emissions for different project types. Use this information with building and infrastructure construction data to estimate these GHG emissions.
Transportation	The Victoria International Airport does not report on GHG emissions from tenants or aircraft. Keeping in line with the GPC Protocol, only the aircraft GHG emissions were estimated using NAV Canada airplane movement statistics, estimated taxi times, and estimated fuel use. The fuel use only accounts for departing and arriving planes up to 3,000ft to avoid double counting with other cities.	Immaterial impact on the GHG inventory (<5%)	The Victoria International Airport will not be collecting or reporting on GHG emissions from tenants or aircraft. This is the best available data at this point.
Transportation	The GHG emissions from recreational watercraft and US/Can ferries were estimated based on a publicly available year 2000 study for the Victoria, Vancouver, and Washington harbors.	Immaterial impact on the GHG inventory (<5%)	Work with the Victoria Harbor Master as they begin to deploy a database tracking the types and number of boats entering the Victoria harbor.
Transportation	The GHG emissions from marine aviation are estimated based on Victoria Harbor NAV Canada air traffic movements and an estimate of fuel consumption for a typical plane.	Immaterial impact on the GHG inventory (<5%)	Work with Harbour Air and other marine aircraft companies to provide fuel consumption volumes.
Transportation	The GHG inventory does not include refrigerant losses from vehicles. Derive a	Immaterial impact on the GHG inventory (<5%)	Develop a method to estimate these GHG emissions.

Table 44 Summary of GHG Inventory Assumptions, Estimated Impacts, and Recommended Improvements

Sector	Assumption	Possible Impact on The GHG Inventory	Recommended Improvements
	method to estimate these GHG emissions.		
Waste	There is tracking to the origin of solid waste but is based on reported origin which may or may not be accurate. For example, some haulers will identify that they are hauling waste from Victoria when in fact the waste is originating from Saanich.	There is no impact to the GHG Inventory for the CRD but will have impacts to the CRD member inventories.	Work with waste haulers to devise a better system to track waste origination.
Waste	The inventory does not estimate the fugitive emissions from septic tanks.	Immaterial impact on the GHG inventory (<1%)	Work with member municipalities to inventory the number of homes on septic systems so that an estimate can be derived.
Waste	The inventory does estimate open burning GHG emissions.	Immaterial impact on the GHG inventory (<1%)	Work with member municipalities to estimate the likely occurrence of open burning in their jurisdictions so that an estimate can be derived.
IPPU	Product use emissions were estimated on a per capita basis using the 2023 NIR estimates. The product use emissions were estimated by the NIR using an IPCC Tier 1 approach and thus will have high uncertainty. There are many emission sources in this category, but the largest one is likely from building air conditioner and heat pump units.	Immaterial impact on the GHG inventory (<5%)	Explore the use of using LIDAR to estimate the number of air conditioners on buildings, and other means to collection information on how many residential buildings have heat pumps and air conditioners. Use this information to estimate refrigerant losses.
AFOLU	GHG estimates for land use change are based on a period of years (2011-2019) and thus were averaged for each period. As there was no current data, land use change for the reporting year was estimated using the	Immaterial impact on the GHG inventory (<5%)	Work with the planning department to track land-use change annually so that a more refined estimate can be made.

Table 44 Summary of GHG Inventory Assumptions, Estimated Impacts, and Recommended Improvements

Sector	Assumption	Possible Impact on The GHG Inventory	Recommended Improvements
	average value between the data years.		
AFOLU	The land-use sequestration and storage GHG emission factors are taken from the literature, for BC ecozones, and may not reflect the productivity, or lack thereof, of land uses in the CRD. The land-change emission factors for changes between land types were derived by the Province. These are average values by ecozone and are based on a 20-year horizon. Since land-use change in the CRD is typically related to development, it was assumed that the loss of emissions is immediate which may overestimate GHG emission losses. In both emission factor applications, the use of non-site emission factors may result in an over or underestimate of GHG emissions.	Possibly a material impact on the GHG inventory (>10%)	Work with the Province and the post-secondary institutions to derive refined sequestration emission factors.

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CAPITAL REGIONAL DISTRICT 2022 GPC BASIC+ COMMUNITY GREENHOUSE GAS (GHG) EMISSIONS INVENTORY REPORT

September 14, 2023

Stantec

APPENDIX B

Capital Region District – Municipalities and Electoral Areas
2007 Base Year and 2022 Reporting Year Energy & GHG Emissions Inventory

Prepared for:

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Date: September 14, 2023

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SUMMARY

Climate change has emerged as the next unprecedented social, economic, and environmental challenge facing society today. It poses a serious threat to quality of life, jobs, and 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.

Recognizing the role that Capital Regional District (CRD) plays in achieving a significant and immediate reduction in global GHG emissions, the CRD set a regional GHG reduction target of 61% (from 2007 levels) by 2038. In February 2019, the CRD declared a climate emergency and committed to regional carbon neutrality. Local governments across the region have also set similar ambitious GHG reduction targets and commitments.

To meet these climate commitments, the CRD seeks a better understanding of the energy and GHG emissions at the regional level, as well as at the local government level which includes 13 municipalities and 3 electoral areas. The following document presents a summary of energy and GHG emissions at both the CRD and local government level for the 2007 and 2022 reporting years. This document compliments a 2022 inventory report which describes the methodologies and data sources applied to derive the estimate of GHG emissions for the CRD and local governments. A summary of the 2007 and 2022 GHG emissions and energy by local government is presented in **Table 1** and **Table 2**, respectively.

Table 1. Summary of GHG Emissions By CRD Local Government

Local Government	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
District of Central Saanich	100,771	111,246	10.4%
City of Colwood	84,132	84,570	0.5%
Township of Esquimalt	96,206	74,246	-22.8%
District of Highlands	11,901	15,019	26.2%
Juan de Fuca Electoral Area	63,610	32,598	-48.8%
City of Langford	137,319	202,749	47.6%
District of Metchosin	28,165	26,425	-6.2%
District of North Saanich	65,819	63,971	-2.8%
District of Oak Bay	90,308	74,984	-17.0%
District of Saanich	593,359	507,791	-14.4%
Salt Spring Island Electoral Area	50,023	50,992	1.9%
Town of Sidney	64,104	55,426	-13.5%
District of Sooke	52,539	64,405	22.6%
City of Victoria	483,269	407,082	-15.8%
Town of View Royal	51,087	51,486	0.8%
Southern Gulf Islands Electoral Area	32,015	35,335	10.4%

Table 2. Summary of Energy Use By CRD Local Government

Local Government	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)
District of Central Saanich	1,899,678	2,167,736	14.1%
City of Colwood	1,564,731	1,682,007	7.5%
Township of Esquimalt	1,790,634	1,597,949	-10.8%
District of Highlands	224,145	300,539	34.1%
Juan de Fuca Electoral Area	1,293,256	937,656	-27.5%
City of Langford	2,642,187	4,139,276	56.7%
District of Metchosin	525,440	535,995	2.0%
District of North Saanich	1,345,969	1,436,531	6.7%
District of Oak Bay	1,671,340	1,520,022	-9.1%
District of Saanich	11,256,692	10,288,081	-8.6%
Salt Spring Island Electoral Area	1,079,295	1,181,612	9.5%
Town of Sidney	1,258,133	1,195,902	-4.9%
District of Sooke	983,346	1,302,000	32.4%
City of Victoria	9,876,133	9,193,993	-6.9%
Town of View Royal	982,469	1,069,552	8.9%
Southern Gulf Islands Electoral Area	766,699	848,020	10.6%

1 INTRODUCTION

1.1 GHG Emissions & Climate Change

There is overwhelming evidence that global climate change resulting from emissions of carbon dioxide and other greenhouse gases (GHGs) is having a significant impact on the ecology of the planet. In addition, climate change is expected to have serious negative impacts on global economic growth and development. In 2005, the UK government commissioned an independent economic review called the Stern Review, which states that the *"costs of stabilizing the climate are significant but manageable; delay would be dangerous and much more costly"*.

Beyond the costs associated with delayed action, there are cost savings to be realized through efforts to conserve energy and to use it more efficiently, and economic opportunities available to communities that develop local energy supply and infrastructure. Actions to encourage energy efficiency and conservation and to promote implementation of renewable energy will assist local governments in developing energy resilient communities, in addition to mitigating climate change. Local governments are at the forefront of global action on climate change, setting both ambitious commitments and targets while going about the difficult task of reducing emissions. Per the latest report from the C40 Cities Climate Leadership Group, ICLEI Local Governments for Sustainability, UN Habitat, and others, most GHG reduction commitments are set for 2030 or 2050 and range from a 10% to 100% reduction (**Figure 1**).

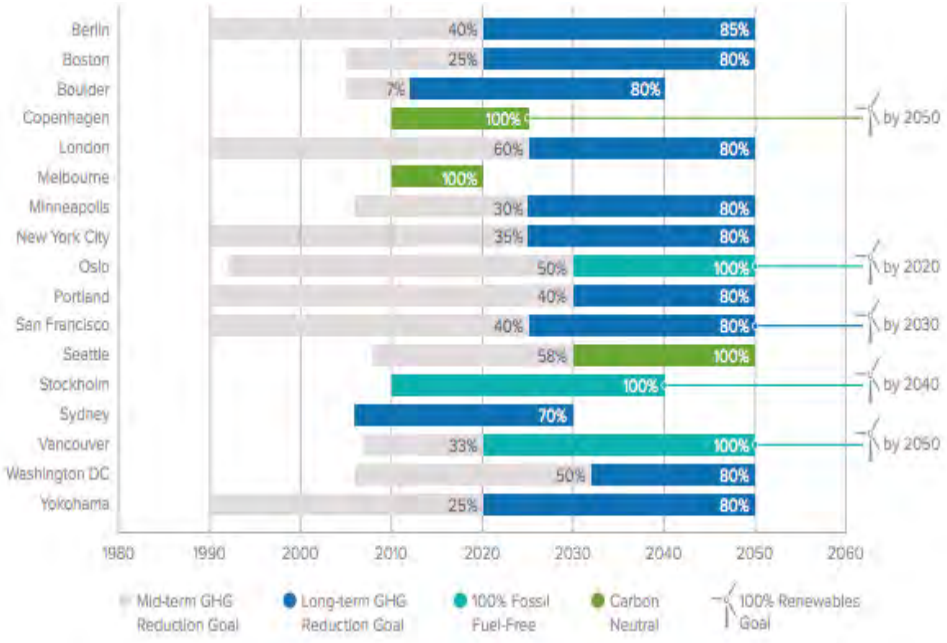


Figure 1. Summary of Long-Term Global GHG Emission Reduction Targets[1]

[1] http://www.c40.org/

1.2 GPC Protocol

To make informed decisions on reducing energy use and GHG emissions at the regional and local government scale, community managers must have a good understanding of these sources, the activities that drive them, and their relative contribution to the total. This requires the completion of an energy and GHG emissions inventory. To allow for credible and meaningful reporting locally and internationally, the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (the GPC Protocol) was developed as a partnership between ICLEI-Local Governments for Sustainability, The World Resources Institute (WRI) and C40 Cities Climate Leadership Group (C40), with additional collaboration by the World Bank, United Nations Environment Program (UNEP) and UN-Habitat. The GPC Protocol has now become recognized as the standardized way for local governments to collect and report their actions on climate change. Over 9,000 cities have committed to using the GPC Protocol.

The Protocol has two established levels of reporting: BASIC and BASIC+ which are defined as the following:

- The BASIC level covers scope 1 and scope 2 emissions from stationary energy and in-boundary transportation, as well as scope 1 and scope 3 emissions from waste.
- The BASIC+ level covers the same scopes as BASIC and includes more in-depth and data dependent methodologies. Specifically, it expands the reporting scope to include emissions from industrial process and product use (IPPU), agriculture, forestry and other land-use (AFOLU), and transboundary transportation.

1.3 Variance from Community Energy and Emissions Inventories (CEEI)

The CRD has historically relied on annual Provincial Community Energy and Emissions Inventories (CEEI) to track community GHG emissions. However, there have been some limitations to the CEEI in that it is an in-boundary inventory and the most recent version containing transportation data was published in 2010. Because the most recent (2019) CEEI's do not contain on-road transportation data, the CEEI Protocol does not fully meet the requirements of the GPC Protocol BASIC or BASIC+ reporting requirements which is the required reporting standard for local governments that have committed to the Global Covenant of Mayors (GCoM)—an agreement led by city networks to undertake a transparent and supportive approach to measure GHG emissions community-wide. The minimum GCoM reporting requirement requires quantifying and reporting on building stationary energy, on-road transportation, and waste GHG emissions. A high-level summary of the differences between the CEEI and GPC Protocol inventories are presented in **Table 3**.

Table 3. Summary of GHG Inventory Scope Differences

Reporting Sector	2007-2019 CEEI's	GPC BASIC	GPC BASIC+
Residential Buildings	✓	✓	✓
Commercial And Institutional Buildings And Facilities	✓	✓	✓
Manufacturing Industries And Construction	✓	✓	✓
Energy Industries		✓	✓
Energy Generation Supplied To The Grid		✓	✓

Reporting Sector	2007-2019 CEEI's	GPC BASIC	GPC BASIC+
Agriculture, Forestry And Fishing Activities		✓	✓
Non-Specified Sources		✓	✓
Fugitive Emissions From Mining, Processing, Storage, And Transportation Of Coal		✓	✓
Fugitive Emissions From Oil And Natural Gas Systems		✓	✓
On-Road Transportation		✓	✓
Railways		✓	✓
Waterborne Navigation		✓	✓
Aviation		✓	✓
Off-Road Transportation		✓	✓
Solid Waste	✓	✓	✓
Biological Waste	✓	✓	✓
Incinerated And Burned Waste		✓	✓
Wastewater		✓	✓
Emissions From Industrial Processes			✓
Emissions From Product Use			✓
Emissions From Livestock	✓		✓
Emissions From Land			✓
Emissions From Aggregate Sources And Non-CO_2 Emission Sources On Land	✓		✓

1.4 Purpose of Document

The purpose of this document is to provide the 2007 and 2022 GPC BASIC+ energy and GHG emissions inventories at the regional and local government level. This document compliments a 2022 inventory report which describes the methodologies and data sources applied to derive the estimate of GHG emissions for the CRD region and local governments.

2 INVENTORY SCOPE

2.1 GPC BASIC+ Inventory Scope

In accordance with the GPC Protocol, the 2007 and 2022 BASIC+ GHG inventories presented herein accounts for GHG emissions from the following Reporting Sectors:

- **Stationary Energy** – These are GHG emissions from fuel combustion, fugitive emissions, and some off-road transportation sources (e.g., construction equipment, residential mowers, etc.). They include the emissions from energy to heat and cool residential, commercial, institutional, and light/heavy industrial buildings, as well as the activities that occur within these residences and facilities.
- **Transportation** – These are GHG emissions from the combustion of fuels as a result of vehicular on-road, off-road, including marine, aviation, and other off-road, and trans-boundary journeys.
- **Waste** – These are GHG emissions from the disposal and management of solid waste, the biological treatment of waste, and wastewater treatment and discharge. Waste does not directly consume energy, but releases GHG emissions because of decomposition, burning, and other management methods.
- **Industrial Process and Product Use (IPPU)** – These are GHG emissions from products such as refrigerants, foams or aerosol cans can release potent GHG emissions, known as product use GHG emissions. There are no known industrial process emissions in the CRD.
- **Agriculture, Forestry and Other Land-Use (AFOLU)** – These are GHG emissions that are captured or released as a result of land-management activities. These activities can range from the preservation of forested lands to the development of crop land. This Sector includes GHG emissions from land-use change, manure management, livestock, and the direct and indirect release of nitrous oxides (N_2O) from soil management, urea application, fertilizer and manure application.

  Due to limitations in how to quantify GHG emissions resulting from land use change (e.g., residential development), these GHG emissions have been excluded from the GHG emissions inventories presented herein but have been disclosed.

2.2 GHG Emissions Boundary

The GHG inventories are defined geographically by the capital region of British Columbia, which includes 13 municipalities and 3 electoral areas, as shown in Figure 2.

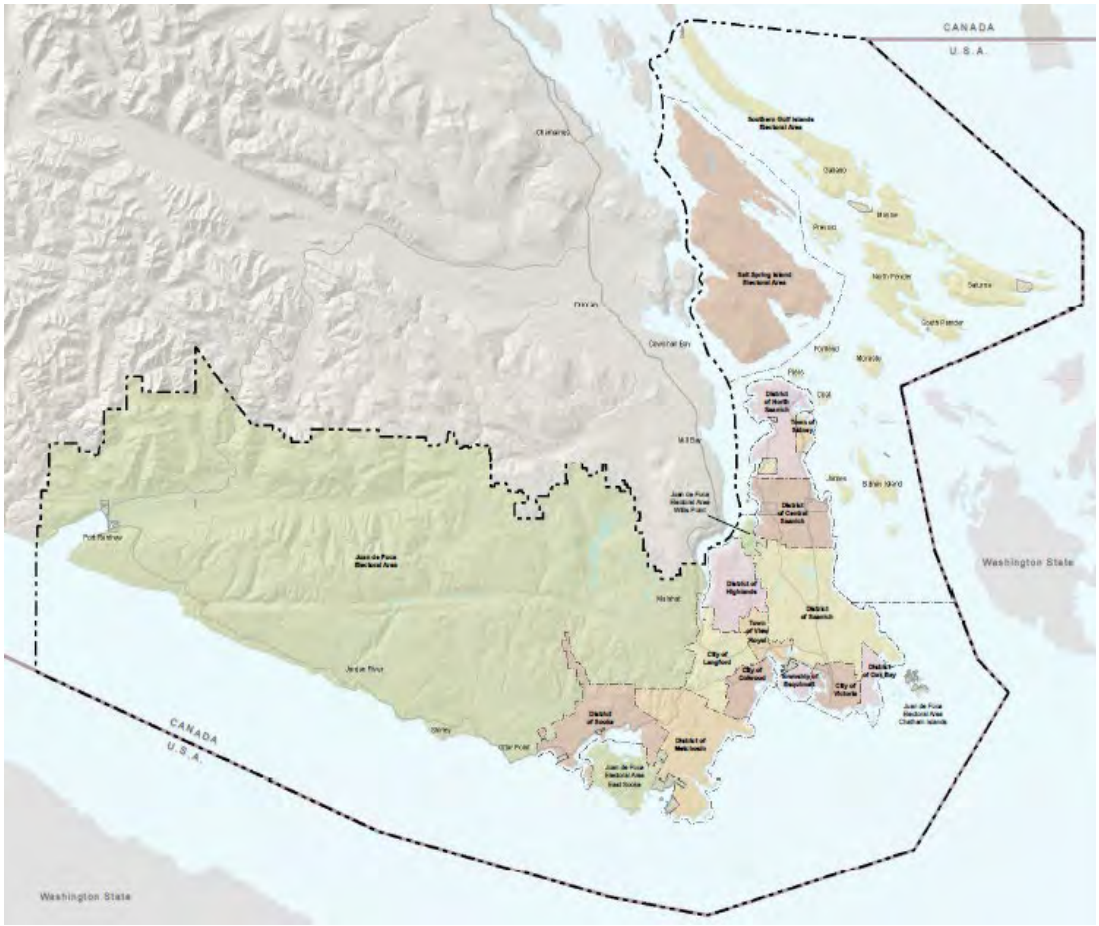


Figure 2 Regional GHG Boundary

2.3 Assumptions & Disclosures

The following inventories covers all GHG emissions for the 2007 and 2022 reporting years. Where data was not available, the most recent year's data have been used, and the timescale noted accordingly. These disclosures are as follows:

- **Global Warming Potentials (GWP)**. The BC government has communicated that is adopting GWPs from the fifth IPCC report. On this basis, the CRD is applying GWPs from the fifth IPCC report.
- **Stationary Energy: Residential, Commercial and Institutional Buildings**. Propane, and wood GHG emissions were estimated using linear regression methods. The data used in the estimates included historical propane and wood energy data published in the 2007-2019 CEEIs, and heating degree days (HDD) published by Environment and Climate Change Canada.

- **Stationary Energy: Residential, Commercial and Institutional Buildings**. The CRD used real-estate sales data between 2019 and 2022 to estimate the number of heating oil tanks and average household consumption for the 2020 reporting year. The 2020 heating oil numbers were adjusted using a change in heating degree days between 2020 and 2022. This approach was used to estimate heating oil consumption for all local governments, except the City of Victoria and District of Saanich. For the District of Saanich and the City of Victoria, heating oil GHG emissions were estimated based on the number of known tanks, average heated floor areas and fuel volume intensity.
- **Stationary Energy: Fugitives**. Fortis BC provided total fugitive emissions for the 2020 reporting year at the CRD level. Since no historical numbers were provided, the 2020 value was used to estimate the 2022 emissions.
- **Stationary Energy: Other Off-Road.** The ECCC 2023 NIR prepared for the Province of BC for the 2021 reporting year was used to estimate GHG emissions for:
    - Off-road agriculture and forestry GHG emissions
    - Off-road commercial and institutional GHG emissions
    - Off-road manufacturing, mining and construction GHG emissions
    - Off-road residential GHG emissions

  These GHG emissions were assigned to the CRD on a per capita basis.
- **Transportation: On-Road**. The on-road transportation emissions are based on the total estimated fuel sales in the CRD, and the number of registered vehicles. Insurance Corporation of BC (ICBC) compiles data on an April 1 to March 31 basis, and thus the current on-road GHG emission estimate is based on the number of registrations from April 1, 2022 – March 31, 2023.
- **Transportation: Aviation.** 2022 aviation GHG emissions were estimated using 2015 aircraft flight profiles (the last available data), and the total number of aircraft movements reported in 2022.
- **Transportation: Waterborne Recreational Watercraft.** GHG emissions from recreational watercraft and US/Canada ferries were estimated based on a publicly available year 2000 study for the Victoria, Vancouver, and Washington harbors.
- **Transportation: Cruise Ships.** The Greater Victoria Harbour Authority (GVHA) reported on cruise ship emissions for the 2018 reporting year but did not provide an estimate for 2022. As a result, the 2018 GHG emissions estimate and number of cruise ship visits to Ogden Point was used to create a proxy to estimate 2022 cruise ship emissions.
- **Waste: Solid Waste.** To quantify GHG emissions from the Hartland Landfill, the CRD utilized the waste-in-place (WIP) method which is accepted under the GPC Protocol. The WIP assigns landfill emissions based on total waste deposited during that year. It counts GHGs emitted that year, regardless of when the waste was disposed. Except for the City of Victoria, who claims 31% of the CRD's landfill GHG emission, the remaining landfill GHG emissions were allocated to each local government on a per capita basis. Using this allocation method, the CRD members may over, or underestimate associated solid waste GHG emissions as the current year landfill GHG emissions are based upon cumulative waste over time, and each member may have contributed more waste in past years than the current year (and vice versa).
- **AFOLU: Aggregate Sources And Non-CO_2 Emission Sources On Land.** These emissions are based on the 2023 NIR as prepared by ECCC and the total area of

farmland BC in 2021 as reported by Statistics Canada. These GHG emissions were assigned to each local government on a per hectare (ha) of cropland basis.

- **AFOLU: Land-Use.** The land cover change analysis requires a consistent land-use category attribution and spatial data. For parts of the CRD, spatial data was available for the 2007, 2011 and 2019 reporting years. Differences between these data sets in terms of resolution and their timing of collection increase the uncertainty as to the accuracy of the land-use classifications. For example, the 2007 and 2011 land use data was collected at different times of the year and may not accurately reflect tree cover. Furthermore, no land use spatial data was collected the Juan de Fuca, Salt Spring Island and Gulf Islands and thus Annual Crop Inventory (ACI) settlement data collected by Agriculture Canada was used to inform the analysis. The challenge in utilizing this data is that it is provided in a 30m resolution. Furthermore, since annual data is not available, the change between land cover data years (2007-2011, 2011-2019) for all areas was averaged and may not represent actual changes in each year. Since no data was available for 2022, the 2019 estimates were applied.

  Due to limitations in how to quantify GHG emissions resulting from land use change (e.g., residential development), these GHG emissions have been excluded from the CRD's GHG emissions inventory, but have been disclosed, until a more robust measurement methodology can be developed.

Details surrounding all GHG emissions sources quantification methods, assumptions, and assessment of uncertainties are contained in a complimentary GHG emissions methodology document and are not presented herein.

3 CAPITAL REGIONAL DISTRICT ENERGY & GHG EMISSIONS

3.1 Base Year (2007) Energy & GHG Emissions

In 2007, the CRD's Regional GHG BASIC+ emissions totaled 2,004,628 tCO_2e. Buildings are the CRD's second largest GHG emissions source at 35%, with 38% of those GHG emissions coming from natural gas for heating and cooling, 20% from heating oil for heating, 16% from electricity use, 7% from wood and propane use for heating and the remainder from other-related off-road activities like residential lawn mowing. On-road transportation GHG emission sources contributed 45% to the GHG inventory, almost all of which came from passenger vehicles, light trucks, and SUVs (83%). Off-road transportation, which includes marine, aviation, and other off-road emission sources contributed 7% to the overall GHG inventory. Solid waste, organic waste treatment methods, and wastewater treatment and discharge accounted for 7% of the total community GHG emissions. IPPU emissions accounted for 4% of total GHG emissions while AFOLU GHG emissions resulted for less than 1% of community GHG emissions.

A summary of the GHG emissions by sector and energy use by source is presented in the Table 4.

Table 4. Base Year (2007) CRD Regional GHG Energy & GHG Emissions by Source

Source	Type	Consumption	Units	Energy (GJ)	GHG Emissions (tCO_2e)
Stationary Energy					
Residential Buildings	Electricity	2,102,967	MWh	7,570,620	75,076
	Natural Gas	2,639,980	GJ	2,639,980	131,578
	Fuel Oil	83,335	L	2,147,821	146,807
	Propane	10,747	L	424,600	25,823
	Wood	1,144,369	GJ	1,144,369	29,398
	Diesel	4,760,958	L	184,154	13,574
Commercial & Industrial Buildings	Electricity	1,367,919	MWh	4,924,469	48,835
	Natural Gas	3,352,456	GJ	3,352,456	167,089
	Fuel Oil	6,272	L	161,638	11,048
	Diesel	15,274,984	L	590,836	43,552
Energy Industries	LFG Combustion				418
Agriculture, Forestry And Fishing Activities	Diesel	31,389,167	L	1,214,133	89,497
Natural Gas Fugitive Emissions					1,003
Total				**24,355,075**	**783,698**
On-Road Transportation					
Electric Vehicles	Electricity	51,201	MWh	0	0

Source	Type	Consumption	Units	Energy (GJ)	GHG Emissions (tCO_2e)
Hydrogen Vehicles	Hydrogen	0	L	0	0
Passenger Vehicles	Gasoline + Diesel	163,062,222	L	5,673,042	381,743
Light Trucks, Vans, SUVs	Gasoline + Diesel	142,617,615	L	5,003,722	340,885
Heavy Duty Vehicles	Gasoline + Diesel	59,156,416	L	2,230,995	150,270
Propane Vehicles	Propane	1,322,222	L	33,756	2,037
Natural Gas Vehicles	Natural Gas	0	kg	0	0
Motorcycles	Gasoline	1,208,124	L	41,874	2,891
Total On-Road Transportation				**12,983,390**	**877,826**
Off-Road Transportation					
Marine, Aviation and Other Off-Road Vehicles	Marine Gasoline + Marine Diesel + Jet Fuel	48,137,749	L	1,821,683	134,944
Total Off-Road Transportation				**1,821,683**	**134,944**
Waste					
Wastewater					18,998
Composting					73
Solid Waste					110,955
Total Waste					**130,026**
Agriculture Forestry & Other Land Use (AFOLU)					
Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**					-396,487
Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**					151,516
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					7,716
Total AFOLU					**7,716**
Industrial Process & Product Use (IPPU)					
Process Use Emissions					70,418
Total IPPU					**70,418**
TOTAL				**39,160,148**	**2,004,628**
TOTAL Per Capita				**110.1**	**5.6**

Energy consumption and GHG emissions by source are shown in **Figure 3**, **Figure 4** and **Figure 5**. On-road and transboundary transportation (82%) account for most of the energy consumption in the region.

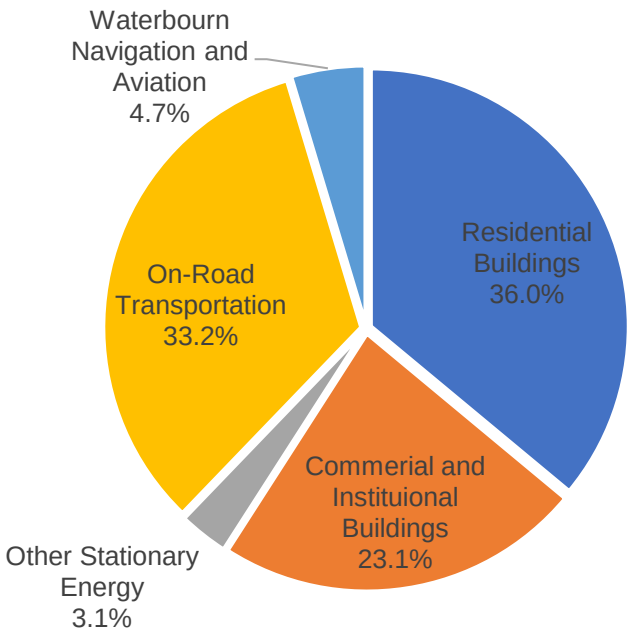


Figure 3. 2007 Regional Energy Consumption By Sector

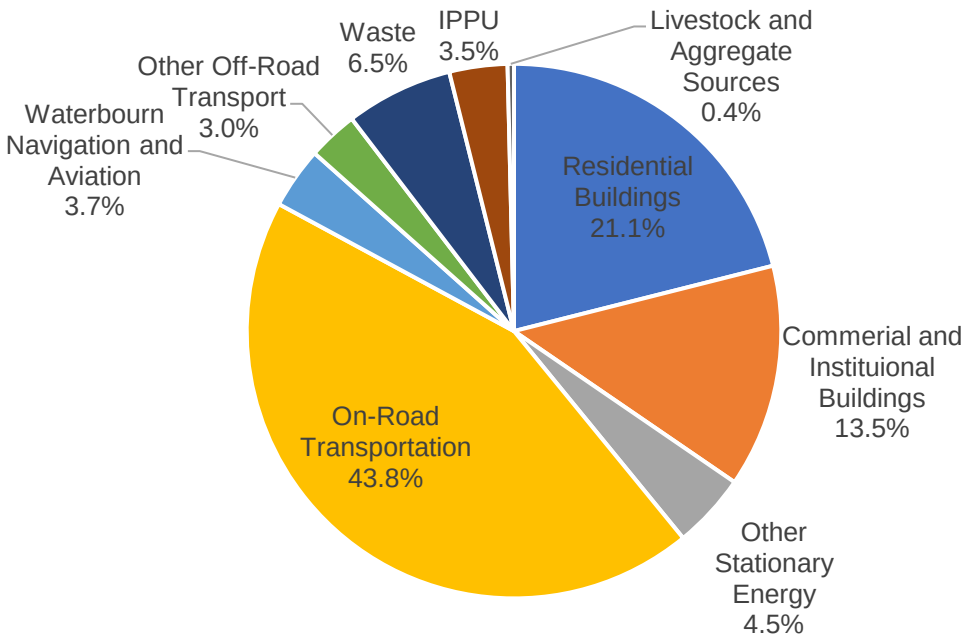


Figure 4. 2007 Regional GHG Emissions By Sector

GHG emissions by fuel type is presented in **Figure 5**.

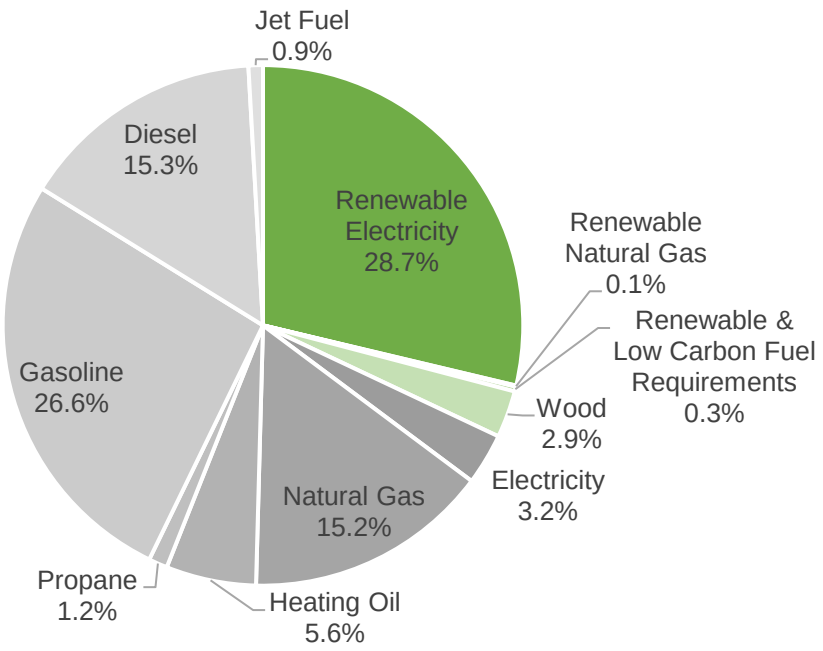


Figure 5. 2007 Regional GHG Emissions By Fuel Type

3.2 CRD GHG Reduction Target

Recognizing the role that the CRD plays in achieving a significant and immediate reduction in global GHG emissions, the CRD has set a regional GHG reduction target of 61% (from 2007 levels) by 2038. With the CRD's 2007 base year GHG emissions being 2,004,628 tCO_2e, a 61% reduction would require a reduction of approximately 1,222,823 tCO_2e. On a per capita basis, this amounts to reducing emissions from approximately 4.3 tCO2e per person in 2022 to 2.4 tCO_2e per person by 2038.

In February 2019, the CRD declared a climate emergency and committed to regional carbon neutrality.

3.3 Reporting Year (2022) Energy & GHG Emissions

In 2022, the CRD's Regional BASIC+ GHG emissions totaled 1,858,325 tCO_2. On an absolute basis, this is an 7% decline from the 2007 base year GHG emissions and a decline of 25% on a per capita basis.

Similar to the 2007 base year, buildings are the second largest GHG emissions source at 34%, with 52% of those GHG emissions coming from natural gas for heating and cooling, 7% from heating oil for heating, 6% from electricity use, 8% from wood and propane use for heating and the remainder from other-related off-road activities like residential lawn mowing. On-road transportation GHG emission sources contributed 50%, almost all of which came from passenger vehicles, light trucks, and SUVs (84%). Off-road transportation, which includes marine, aviation, and other off-road emission sources contributed 9% to the overall GHG inventory. Solid waste, organic waste treatment methods, and wastewater treatment and discharge accounted for 3% of the total community GHG emissions. IPPU emissions accounted for 7% of total GHG emissions while AFOLU GHG emissions contributed to less than 1% of community GHG emissions.

A summary of the 2022 GHG emissions by sector and energy use by source is presented in the following table and figures.

Table 5. Reporting Year (2022) CRD Regional GHG Energy & GHG Emissions by Sector

Source	Type	Consumption	Units	Energy (GJ)	GHG Emissions (tCO_2e)
Stationary Energy					
Residential Buildings	Electricity	2,283,344	MWh	8,219,973	26,258
	Natural Gas	2,781,030	GJ	2,781,030	141,472
	Fuel Oil	23,978	L	617,980	42,240
	Propane	10,662	L	421,254	25,703
	Wood	1,123,230	GJ	1,123,230	28,855
	Diesel	3,788,739	L	146,548	10,516
Commercial & Industrial Buildings	Electricity	1,349,063	MWh	4,856,588	15,514
	Natural Gas	4,628,325	GJ	4,628,325	235,444
	Fuel Oil	5,549	L	143,003	9,775
	Diesel	30,002,730	L	1,160,506	83,278
Energy Industries	LFG Combustion				6,497
Agriculture, Forestry And Fishing Activities	Diesel	36,399,960	L	1,407,950	101,034
Natural Gas Fugitive Emissions					1,510
Total				**25,506,387**	**728,096**
On-Road Transportation					
Electric Vehicles	Electricity	128,302	MWh	62	198
Hydrogen Vehicles	Hydrogen	0	L	0	0
Passenger Vehicles	Gasoline + Diesel	79,275,557	L	2,758,167	179,829
Light Trucks, Vans, SUVs	Gasoline + Diesel	200,102,167	L	7,030,899	464,227
Heavy Duty Vehicles	Gasoline + Diesel	51,162,912	L	1,893,194	123,783
Propane Vehicles	Propane	634,856	L	16,208	920
Natural Gas Vehicles	Natural Gas	192,612	kg	10	45
Motorcycles	Gasoline	1,395,105	L	48,354	3,128
Total On-Road Transportation				**11,746,895**	**772,129**
Off-Road Transportation					
Marine, Aviation and Other Off-Road Vehicles	Marine Gasoline + Marine Diesel + Jet Fuel	56,042,010	L	2,143,589	158,527
Total Off-Road Transportation				**2,143,589**	**158,527**
Waste					
Wastewater					4,975
Composting					5,602

Source	Type	Consumption	Units	Energy (GJ)	GHG Emissions (tCO_2e)
Solid Waste					39,699
Total Waste					**50,275**
Agriculture Forestry & Other Land Use (AFOLU)					
Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**					-401,842
Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**					89,610
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					13,837
Total AFOLU					**13,837**
Industrial Process & Product Use (IPPU)					
Process Use Emissions					135,461
Total IPPU					**135,461**
TOTAL				**39,396,871**	**1,858,325**
TOTAL Per Capita				**89.5**	**4.2**

Energy consumption and GHG emissions by source are shown in **Figure 6**, **Figure 7** and **Figure 8**.

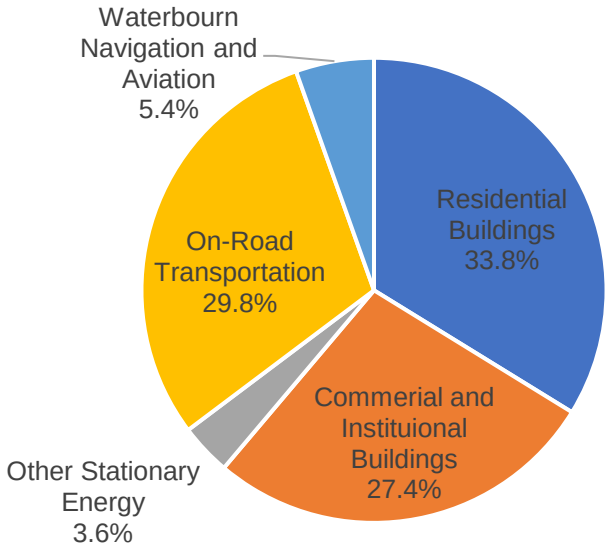


Figure 6. 2022 Regional Energy Consumption By Sector

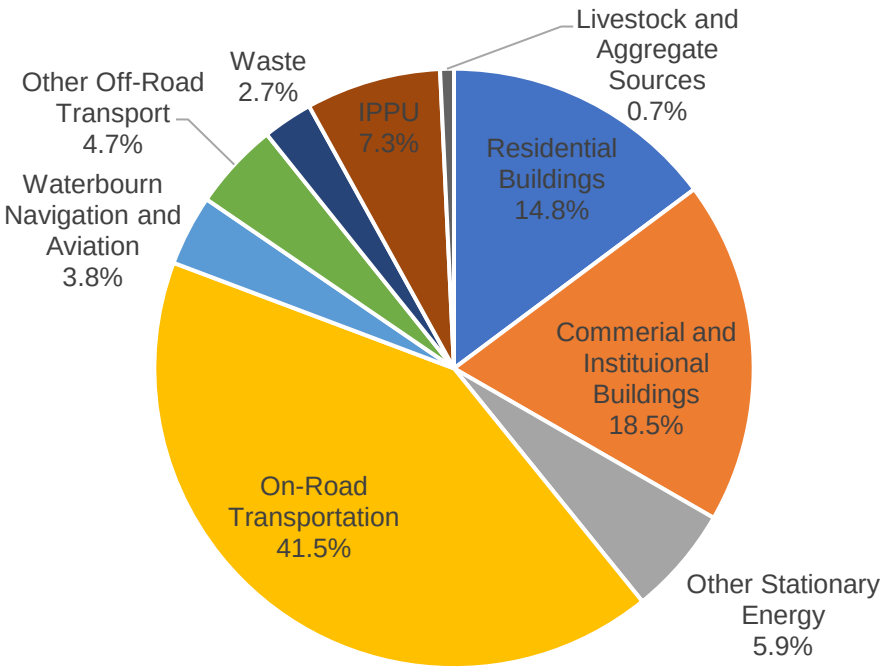


Figure 7. 2022 Regional GHG Emissions By Sector

GHG emissions by fuel type is presented in **Figure 8**.

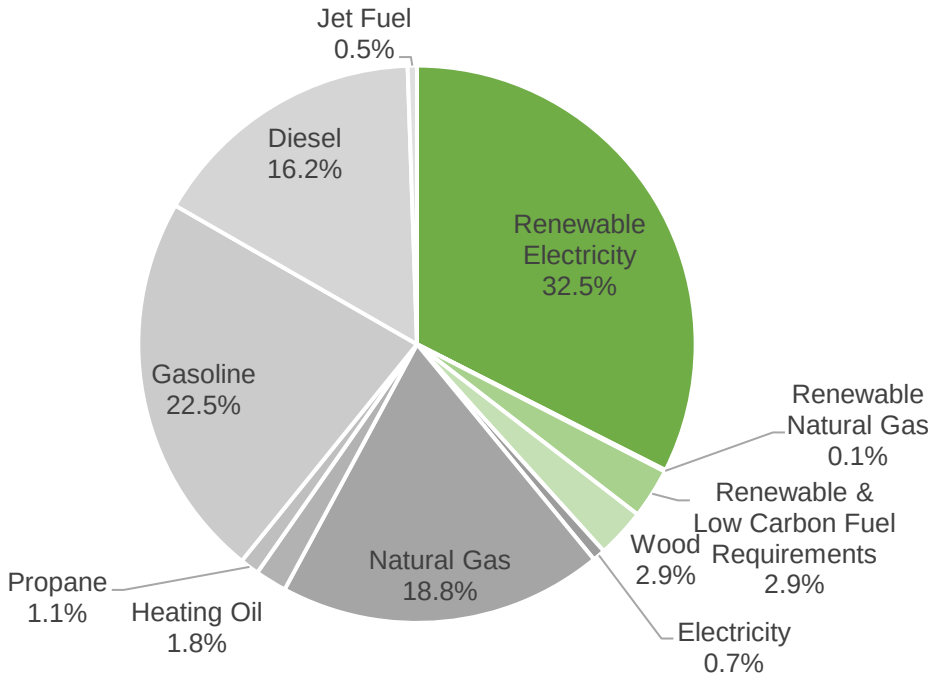


Figure 8. 2022 Regional GHG Emissions By Fuel Type

3.4 Energy & GHG Emissions Trends

Table 6 presents the changes between the 2007 and 2022 reporting years. Compared to the 2007 GHG emissions inventory, the 2022 GHG emissions have declined by 7.3%. Overall, GHG emissions related to buildings and transportation decreased due to lower emission factors (applicable to electricity), commuting behavior changes (people working from home and driving less), improved vehicle fuel efficiency and a shift away from inefficient vehicles towards electric vehicles and other modal shifts.

The table below shows that residential and commercial building energy consumption increased while the related GHG emissions decreased. The change in GHG emissions is related to the greening of the electrical grid and a change in how the province quantifies electricity GHG emissions in BC.[2] Industry GHG emissions have increased since the 2007 base year which is hidden by the overall reduction in Stationary Energy at the regional district scale.

On-road transportation GHG emissions have decreased despite an increase in vehicle registrations between 2007 and 2022. Origin destination data shows that while the COVID restrictions have been lifted, there are less people commuting to work. Increased uptake of electric vehicles and improved light duty vehicle fuel efficiency have also contributed to this decrease. Off-road aviation and waterborne transportation GHG emissions have increased 17% as compared to 2007 due to an increase in population in the CRD and an increase in overall travel and tourism.

There was a decrease in GHG emissions from solid waste and an increase in composting emissions which is directly related to an increase in population and the CRD and member municipalities efforts to divert organic waste away from the landfill. Increased efforts by the CRD to capture and utilize landfill fugitive gas has also reduced solid waste GHG emissions. Wastewater GHG emissions have also declined as a result of the CRD implementing wastewater treatment systems.

Although not accounted for the totals, the land-use change emissions estimates show a release of ecosystem carbon. A refinement in data and methodological processes is required to identify as to what would be root cause.

Industrial process and product use GHG emissions (e.g., solvent use, refrigerant release from air conditioning systems) have increased between 2007 and 2022. The increase is largely driven by the methodology deployed which relied on assigning these GHG emissions on a per capita basis and more so, the direct result of Environment Canada and Climate Change (ECCC) refining their estimation methodology which resulted in a more than doubling of the estimate.

[2] The updated methodology measures "net imports" instead of "gross imports" to more accurately reflect the carbon intensity of electricity consumed in BC. Electricity emission intensity factors for grid-connected entities - Province of British Columbia (gov.bc.ca)

Table 6. Change in CRD GHG Energy & GHG Emissions

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Stationary Energy							
Residential Buildings	Electricity	7,570,620	8,219,973	8.6%	75,076	26,258	-65.0%
	Natural Gas	2,639,980	2,781,030	5.3%	131,578	141,472	7.5%
	Fuel Oil	2,147,821	617,980	-71.2%	146,807	42,240	-71.2%
	Propane	424,600	421,254	-0.8%	25,823	25,703	-0.5%
	Wood	1,144,369	1,123,230	-1.8%	29,398	28,855	-1.8%
	Diesel	184,154	146,548	-20.4%	13,574	10,516	-22.5%
Commercial & Industrial Buildings	Electricity	4,924,469	4,856,588	-1.4%	48,835	15,514	-68.2%
	Natural Gas	3,352,456	4,628,325	38.1%	167,089	235,444	40.9%
	Fuel Oil	161,638	143,003	-11.5%	11,048	9,775	-11.5%
	Diesel	590,836	1,160,506	96.4%	43,552	83,278	91.2%
Energy Industries	LFG Combustion			-	418	6,497	1454.3%
Agriculture, Forestry And Fishing Activities	Diesel	1,214,133	1,407,950	16.0%	89,497	101,034	12.9%
Natural Gas Fugitive Emissions				-	1,003	1,510	50.6%
Total		**24,355,075**	**25,506,387**	**4.7%**	**783,698**	**728,096**	**-7.1%**
On-Road Transportation							
Electric Vehicles	Electricity	-	62	-	-	198	-
Hydrogen Vehicles	Hydrogen	-	-	-	-	-	-
Passenger Vehicles	Gasoline + Diesel	5,673,042	2,758,167	-51.4%	381,743	179,829	-52.9%
Light Trucks, Vans, SUVs	Gasoline + Diesel	5,003,722	7,030,899	40.5%	340,885	464,227	36.2%
Heavy Duty Vehicles	Gasoline + Diesel	2,230,995	1,893,194	-15.1%	150,270	123,783	-17.6%

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Propane Vehicles	Propane	33,756	16,208	-52.0%	2,037	920	-54.8%
Natural Gas Vehicles	Natural Gas	-	10	-	-	45	-
Motorcycles	Gasoline	41,874	48,354	15.5%	2,891	3,128	8.2%
Total On-Road Transportation		**12,983,390**	**11,746,895**	**-9.5%**	**877,826**	**772,129**	**-12.0%**
Off-Road Transportation							
Marine, Aviation and Other Off-Road Vehicles	Gasoline + Diesel + Jet Fuel	1,821,683	2,143,589	17.7%	134,944	158,527	17.5%
Total Off-Road Transportation		**1,821,683**	**2,143,589**	**17.7%**	**134,944**	**158,527**	**17.5%**
Waste							
Wastewater					18,998	4,975	-73.8%
Composting					73	5,602	7557.7%
Solid Waste					110,955	39,699	-64.2%
Total Waste					**130,026**	**50,275**	**-61.3%**
Agriculture Forestry & Other Land Use (AFOLU)							
Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**					-396,487	-401,842	1.4%
Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**					151,516	89,610	-40.9%
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					7,716	13,837	79.3%
Total AFOLU					**7,716**	**13,837**	**79.3%**
Industrial Process & Product Use (IPPU)							
Process Use Emissions					70,418	135,461	92.4%
Total IPPU					**70,418**	**135,461**	**92.4%**
TOTAL		**39,160,148**	**39,396,871**	**0.6%**	**2,004,628**	**1,858,325**	**-7.3%**

Table 7 presents the changes between the 2007 and 2022 years for each CRD local government.

Table 7. Change in Member GHG Energy & GHG Emissions

Member	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
District of Central Saanich	1,899,678	2,167,736	14.1%	100,771	111,246	10.4%
City of Colwood	1,564,731	1,682,007	7.5%	84,132	84,570	0.5%
Township of Esquimalt	1,790,634	1,597,949	-10.8%	96,206	74,246	-22.8%
District of Highlands	224,145	300,539	34.1%	11,901	15,019	26.2%
Juan de Fuca Electoral Area	1,293,256	937,656	-27.5%	63,610	32,598	-48.8%
City of Langford	2,642,187	4,139,276	56.7%	137,319	202,749	47.6%
District of Metchosin	525,440	535,995	2.0%	28,165	26,425	-6.2%
District of North Saanich	1,345,969	1,436,531	6.7%	65,819	63,971	-2.8%
District of Oak Bay	1,671,340	1,520,022	-9.1%	90,308	74,984	-17.0%
District of Saanich	11,256,692	10,288,081	-8.6%	593,359	507,791	-14.4%
Salt Spring Island Electoral Area	1,079,295	1,181,612	9.5%	50,023	50,992	1.9%
Town of Sidney	1,258,133	1,195,902	-4.9%	64,104	55,426	-13.5%
District of Sooke	983,346	1,302,000	32.4%	52,539	64,405	22.6%
City of Victoria	9,876,133	9,193,993	-6.9%	483,269	407,082	-15.8%
Town of View Royal	982,469	1,069,552	8.9%	51,087	51,486	0.8%
Southern Gulf Islands Electoral Area	766,699	848,020	10.6%	32,015	35,335	10.4%

4 DISTRICT OF CENTRAL SAANICH

4.1 2022 Profile

Profile	
Population	19,070
Dwellings	7,933
Registered Vehicles	18,981
Energy (Thousands of GJ)	2,168
GHG Emissions (tCO_2e)	111,246

4.2 Energy & GHG Emissions

Table 8 presents a summary comparison of the District of Central Saanich's 2007 and 2022 energy and GHG emissions.

Table 8. Estimated Energy and GHG Emissions By Reporting Source

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Stationary Energy							
Residential Buildings	Electricity	400,574	362,855	-9.4%	3,972	1,159	-70.8%
	Natural Gas	101,999	145,249	42.4%	5,084	7,389	45.3%
	Fuel Oil	18,644	15,794	-15.3%	1,274	1,080	-15.3%
	Propane	3,220	3,179	-1.3%	196	194	-0.9%
	Wood	7,150	6,905	-3.4%	184	177	-3.4%
	Diesel	8,496	6,352	-25.2%	626	456	-27.2%
Commercial & Industrial Buildings	Electricity	231,056	270,135	16.9%	2,291	863	-62.3%
	Natural Gas	152,986	176,742	15.5%	7,625	8,991	17.9%

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
	Fuel Oil	-	-	-	-	-	-
	Diesel	27,258	50,303	84.5%	2,009	3,610	79.7%
Energy Industries	LFG Combustion			-	-	-	-
Agriculture, Forestry And Fishing Activities	Diesel	83,613	88,306	5.6%	6,163	6,337	2.8%
Natural Gas Fugitive Emissions				-	57	81	44.0%
Total		**1,034,994**	**1,125,820**	**8.8%**	**29,482**	**30,337**	**2.9%**
On-Road Transportation							
Electric Vehicles	Electricity	-	4	-	-	13	-
Hydrogen Vehicles	Hydrogen	-	-	-	-	-	-
Passenger Vehicles	Gasoline + Diesel	278,538	156,998	-43.6%	18,746	10,241	-45.4%
Light Trucks, Vans, SUVs	Gasoline + Diesel	324,185	462,004	42.5%	22,087	30,533	38.2%
Heavy Duty Vehicles	Gasoline + Diesel	179,813	338,365	88.2%	12,135	21,990	81.2%
Propane Vehicles	Propane	2,375	1,006	-57.7%	143	57	-60.2%
Natural Gas Vehicles	Natural Gas	-	-	-	-	-	-
Motorcycles	Gasoline	2,245	2,537	13.0%	155	164	5.9%
Total On-Road Transportation		**787,157**	**960,914**	**22.1%**	**53,267**	**62,997**	**18.3%**
Off-Road Transportation							
Marine, Aviation and Other Off-Road Vehicles	Gasoline + Diesel + Jet Fuel	77,527	81,002	4.5%	5,741	5,985	4.3%
Total Off-Road Transportation		**77,527**	**81,002**	**4.5%**	**5,741**	**5,985**	**4.3%**
Waste							
Wastewater					668	189	-71.6%

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Composting					0	149	-
Solid Waste					5,119	1,522	-70.3%
Total Waste					**5,786**	**1,860**	**-67.9%**
Agriculture Forestry & Other Land Use (AFOLU)							
Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**					-5,014	-4,844	-3.4%
Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**					5,925	154	-97.4%
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					3,246	4,135	27.4%
Total AFOLU					**3,246**	**4,135**	**27.4%**
Industrial Process & Product Use (IPPU)							
Process Use Emissions					3,249	5,932	82.6%
Total IPPU					**3,249**	**5,932**	**82.6%**
TOTAL		**1,899,678**	**2,167,736**	**14.1%**	**100,771**	**111,246**	**10.4%**

5 CITY OF COLWOOD

5.1 2022 Profile

Profile	
Population	21,147
Dwellings	7,672
Registered Vehicles	15,482
Energy (Thousands of GJ)	1,682
GHG Emissions (tCO_2e)	84,570

5.2 Energy & GHG Emissions

Table 9 presents a summary comparison of the City of Colwood's 2007 and 2022 energy and GHG emissions.

Table 9. Estimated Energy and GHG Emissions By Reporting Source

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Stationary Energy							
Residential Buildings	Electricity	304,680	357,600	17.4%	3,021	1,142	-62.2%
	Natural Gas	100,740	181,279	79.9%	5,021	9,222	83.7%
	Fuel Oil	65,936	27,224	-58.7%	4,507	1,861	-58.7%
	Propane	11,388	11,244	-1.3%	693	686	-0.9%
	Wood	25,284	24,416	-3.4%	650	627	-3.4%
	Diesel	8,131	7,044	-13.4%	599	505	-15.7%
Commercial & Industrial Buildings	Electricity	159,630	135,834	-14.9%	1,583	434	-72.6%
	Natural Gas	94,097	105,119	11.7%	4,690	5,347	14.0%

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
	Fuel Oil	-	-	-	-	-	-
	Diesel	26,087	55,782	113.8%	1,923	4,003	108.2%
Energy Industries	LFG Combustion			-	-	-	-
Agriculture, Forestry And Fishing Activities	Diesel	80,021	97,924	22.4%	5,899	7,027	19.1%
Natural Gas Fugitive Emissions				-	61	111	82.9%
Total		**875,994**	**1,003,466**	**14.6%**	**28,646**	**30,966**	**8.1%**
On-Road Transportation							
Electric Vehicles	Electricity	-	3	-	-	10	-
Hydrogen Vehicles	Hydrogen	-	-	-	-	-	-
Passenger Vehicles	Gasoline + Diesel	233,329	146,676	-37.1%	15,699	9,563	-39.1%
Light Trucks, Vans, SUVs	Gasoline + Diesel	265,308	371,902	40.2%	18,074	24,562	35.9%
Heavy Duty Vehicles	Gasoline + Diesel	112,318	67,158	-40.2%	7,572	4,390	-42.0%
Propane Vehicles	Propane	1,441	686	-52.4%	87	39	-55.2%
Natural Gas Vehicles	Natural Gas	-	0	-	-	2	-
Motorcycles	Gasoline	2,145	2,293	6.9%	148	148	0.1%
Total On-Road Transportation		**614,540**	**588,717**	**-4.2%**	**41,580**	**38,713**	**-6.9%**
Off-Road Transportation							
Marine, Aviation and Other Off-Road Vehicles	Gasoline + Diesel + Jet Fuel	74,196	89,824	21.1%	5,494	6,637	20.8%
Total Off-Road Transportation		**74,196**	**89,824**	**21.1%**	**5,494**	**6,637**	**20.8%**
Waste							
Wastewater					397	153	-61.5%

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Composting					0	57	-
Solid Waste					4,899	1,688	-65.5%
Total Waste					**5,296**	**1,897**	**-64.2%**
Agriculture Forestry & Other Land Use (AFOLU)							
Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**					-2,536	-3,254	28.3%
Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**					2,482	2,755	11.0%
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					6	-1	-107.8%
Total AFOLU					**6**	**-1**	**-107.8%**
Industrial Process & Product Use (IPPU)							
Process Use Emissions					3,109	6,357	104.5%
Total IPPU					**3,109**	**6,357**	**104.5%**
TOTAL		**1,564,731**	**1,682,007**	**7.5%**	**84,132**	**84,570**	**0.5%**

6 TOWNSHIP OF ESQUIMALT

6.1 2022 Profile

Profile	
Population	19,536
Dwellings	9,438
Registered Vehicles	11,254
Energy (Thousands of GJ)	1,598
GHG Emissions (tCO_2e)	74,246

6.2 Energy & GHG Emissions

Table 10 presents a summary comparison of the Township of Esquimalt's 2007 and 2022 energy and GHG emissions.

Table 10. Estimated Energy and GHG Emissions By Reporting Source

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Stationary Energy							
Residential Buildings	Electricity	282,544	290,356	2.8%	2,802	928	-66.9%
	Natural Gas	133,315	94,996	-28.7%	6,644	4,832	-27.3%
	Fuel Oil	116,338	22,923	-80.3%	7,952	1,567	-80.3%
	Propane	20,190	19,934	-1.3%	1,228	1,216	-0.9%
	Wood	44,358	42,835	-3.4%	1,140	1,100	-3.4%
	Diesel	9,121	6,507	-28.7%	672	467	-30.5%
Commercial & Industrial Buildings	Electricity	167,991	214,378	27.6%	1,666	685	-58.9%
	Natural Gas	323,843	349,511	7.9%	16,141	17,780	10.2%

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
	Fuel Oil	-	-	-	-	-	-
	Diesel	29,264	51,532	76.1%	2,157	3,698	71.4%
Energy Industries	LFG Combustion			-	-	-	-
Agriculture, Forestry And Fishing Activities	Diesel	-	-	-	-	-	-
Natural Gas Fugitive Emissions				-	44	55	23.7%
Total		**1,126,964**	**1,092,973**	**-3.0%**	**40,446**	**32,328**	**-20.1%**
On-Road Transportation							
Electric Vehicles	Electricity	-	2	-	-	7	-
Hydrogen Vehicles	Hydrogen	-	-	-	-	-	-
Passenger Vehicles	Gasoline + Diesel	263,197	125,075	-52.5%	17,709	8,156	-53.9%
Light Trucks, Vans, SUVs	Gasoline + Diesel	215,762	239,116	10.8%	14,699	15,785	7.4%
Heavy Duty Vehicles	Gasoline + Diesel	97,257	54,443	-44.0%	6,543	3,555	-45.7%
Propane Vehicles	Propane	1,908	1,208	-36.7%	115	69	-40.4%
Natural Gas Vehicles	Natural Gas	-	1	-	-	2	-
Motorcycles	Gasoline	2,312	2,151	-7.0%	160	139	-12.9%
Total On-Road Transportation		**580,437**	**421,996**	**-27.3%**	**39,226**	**27,713**	**-29.4%**
Off-Road Transportation							
Marine, Aviation and Other Off-Road Vehicles	Gasoline + Diesel + Jet Fuel	83,234	82,981	-0.3%	6,163	6,131	-0.5%
Total Off-Road Transportation		**83,234**	**82,981**	**-0.3%**	**6,163**	**6,131**	**-0.5%**
Waste							
Wastewater					1,388	356	-74.4%

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Composting					0	144	-
Solid Waste					5,496	1,559	-71.6%
Total Waste					**6,883**	**2,059**	**-70.1%**
Agriculture Forestry & Other Land Use (AFOLU)							
Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**					-828	-1,178	42.3%
Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**					1,155	1,284	11.2%
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					0	0	-
Total AFOLU					**0**	**0**	**-**
Industrial Process & Product Use (IPPU)							
Process Use Emissions					3,488	6,015	72.5%
Total IPPU					**3,488**	**6,015**	**72.5%**
TOTAL		**1,790,634**	**1,597,949**	**-10.8%**	**96,206**	**74,246**	**-22.8%**

7 DISTRICT OF HIGHLANDS

7.1 2022 Profile

Profile	
Population	2,980
Dwellings	957
Registered Vehicles	3,116
Energy (Thousands of GJ)	301
GHG Emissions (tCO_2e)	15,019

7.2 Energy & GHG Emissions

Table 11 presents a summary comparison of the District of Highland's 2007 and 2022 energy and GHG emissions.

Table 11. Estimated Energy and GHG Emissions By Reporting Source

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Stationary Energy							
Residential Buildings	Electricity	63,637	74,980	17.8%	631	240	-62.0%
	Natural Gas	69	5,263	7478.3%	3	268	7634.9%
	Fuel Oil	9,468	1,106	-88.3%	647	76	-88.3%
	Propane	1,633	1,612	-1.3%	99	98	-0.9%
	Wood	3,637	3,512	-3.4%	93	90	-3.4%
	Diesel	1,150	993	-13.7%	85	71	-16.0%
Commercial & Industrial Buildings	Electricity	6,447	15,188	135.6%	64	49	-24.1%
	Natural Gas	20,440	20,362	-0.4%	1,019	1,036	1.7%

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
	Fuel Oil	-	-	-	-	-	-
	Diesel	3,689	7,861	113.1%	272	564	107.4%
Energy Industries	LFG Combustion			-	-	-	-
Agriculture, Forestry And Fishing Activities	Diesel	11,317	13,799	21.9%	834	990	18.7%
Natural Gas Fugitive Emissions				-	0	3	1559.9%
Total		**121,486**	**144,676**	**19.1%**	**3,748**	**3,484**	**-7.0%**
On-Road Transportation							
Electric Vehicles	Electricity	-	1	-	-	2	-
Hydrogen Vehicles	Hydrogen	-	-	-	-	-	-
Passenger Vehicles	Gasoline + Diesel	25,510	23,909	-6.3%	1,718	1,559	-9.2%
Light Trucks, Vans, SUVs	Gasoline + Diesel	43,712	88,140	101.6%	2,979	5,831	95.7%
Heavy Duty Vehicles	Gasoline + Diesel	21,839	30,503	39.7%	1,472	2,009	36.5%
Propane Vehicles	Propane	779	158	-79.7%	47	9	-80.9%
Natural Gas Vehicles	Natural Gas	-	0	-	-	0	-
Motorcycles	Gasoline	327	495	51.2%	23	32	41.7%
Total On-Road Transportation		**92,166**	**143,205**	**55.4%**	**6,238**	**9,442**	**51.4%**
Off-Road Transportation							
Marine, Aviation and Other Off-Road Vehicles	Gasoline + Diesel + Jet Fuel	10,493	12,658	20.6%	777	935	20.4%
Total Off-Road Transportation		**10,493**	**12,658**	**20.6%**	**777**	**935**	**20.4%**
Waste							
Wastewater					0	0	-

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Composting					0	0	-
Solid Waste					693	238	-65.7%
Total Waste					**693**	**238**	**-65.6%**
Agriculture Forestry & Other Land Use (AFOLU)							
Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**					-7,090	-7,521	6.1%
Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**					1,957	3,157	61.4%
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					6	14	146.3%
Total AFOLU					**6**	**14**	**146.3%**
Industrial Process & Product Use (IPPU)							
Process Use Emissions					440	905	105.9%
Total IPPU					**440**	**905**	**105.9%**
TOTAL		**224,145**	**300,539**	**34.1%**	**11,901**	**15,019**	**26.2%**

8 JUAN DE FUCA ELECTORAL AREA

8.1 2022 Profile

Profile	
Population	6,032
Dwellings	2,281
Registered Vehicles	4,680
Energy (Thousands of GJ)	938
GHG Emissions (tCO_2e)	32,598

8.2 Energy & GHG Emissions

Table 12 presents a summary comparison of Juan de Fuca Electoral Area's 2007 and 2022 energy and GHG emissions.

Table 12. Estimated Energy and GHG Emissions By Reporting Source

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Stationary Energy							
Residential Buildings	Electricity	275,784	315,854	14.5%	2,735	1,009	-63.1%
	Natural Gas	-	-	-	-	-	-
	Fuel Oil	442,152	6,268	-98.6%	30,222	428	-98.6%
	Propane	82,743	81,694	-1.3%	5,032	4,985	-0.9%
	Wood	184,018	177,700	-3.4%	4,727	4,565	-3.4%
	Diesel	2,380	2,009	-15.6%	175	144	-17.8%
Commercial & Industrial Buildings	Electricity	47,620	78,692	65.3%	472	251	-46.8%
	Natural Gas	-	-	-	-	-	-

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
	Fuel Oil	-	-	-	-	-	-
	Diesel	7,636	15,911	108.4%	563	1,142	102.9%
Energy Industries	LFG Combustion			-	-	-	-
Agriculture, Forestry And Fishing Activities	Diesel	23,423	27,932	19.3%	1,727	2,004	16.1%
Natural Gas Fugitive Emissions				-	-	-	-
Total		**1,065,755**	**706,061**	**-33.8%**	**45,653**	**14,529**	**-68.2%**
On-Road Transportation							
Electric Vehicles	Electricity	-	1	-	-	4	-
Hydrogen Vehicles	Hydrogen	-	-	-	-	-	-
Passenger Vehicles	Gasoline + Diesel	7,521	38,446	411.2%	511	2,510	391.1%
Light Trucks, Vans, SUVs	Gasoline + Diesel	119,903	129,711	8.2%	8,172	8,580	5.0%
Heavy Duty Vehicles	Gasoline + Diesel	76,282	36,338	-52.4%	5,177	2,381	-54.0%
Propane Vehicles	Propane	1,830	799	-56.4%	110	45	-58.9%
Natural Gas Vehicles	Natural Gas	-	-	-	-	-	-
Motorcycles	Gasoline	247	678	174.4%	17	44	157.1%
Total On-Road Transportation		**205,783**	**205,973**	**0.1%**	**13,987**	**13,564**	**-3.0%**
Off-Road Transportation							
Marine, Aviation and Other Off-Road Vehicles	Gasoline + Diesel + Jet Fuel	21,718	25,621	18.0%	1,608	1,893	17.7%
Total Off-Road Transportation		**21,718**	**25,621**	**18.0%**	**1,608**	**1,893**	**17.7%**
Waste							
Wastewater					0	0	74.2%

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Composting					0	240	-
Solid Waste					1,434	481	-66.4%
Total Waste					**1,434**	**722**	**-49.6%**
Agriculture Forestry & Other Land Use (AFOLU)							
Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**					-259,223	-255,713	-1.4%
Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**					31,481	706	-97.8%
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					18	16	-7.5%
Total AFOLU					**18**	**16**	**-7.5%**
Industrial Process & Product Use (IPPU)							
Process Use Emissions					910	1,874	105.9%
Total IPPU					**910**	**1,874**	**105.9%**
TOTAL		**1,293,256**	**937,656**	**-27.5%**	**63,610**	**32,598**	**-48.8%**

9 CITY OF LANGFORD

9.1 2022 Profile

Profile	
Population	49,726
Dwellings	18,405
Registered Vehicles	34,972
Energy (Thousands of GJ)	4,139
GHG Emissions (tCO_2e)	202,749

9.2 Energy & GHG Emissions

Table 13 presents a summary comparison of the City of Langford's 2007 and 2022 energy and GHG emissions.

Table 13. Estimated Energy and GHG Emissions By Reporting Source

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Stationary Energy							
Residential Buildings	Electricity	514,977	869,447	68.8%	5,107	2,777	-45.6%
	Natural Gas	122,432	282,797	131.0%	6,102	14,386	135.8%
	Fuel Oil	103,002	40,499	-60.7%	7,040	2,768	-60.7%
	Propane	17,793	17,568	-1.3%	1,082	1,072	-0.9%
	Wood	39,489	38,133	-3.4%	1,014	980	-3.4%
	Diesel	12,882	16,564	28.6%	950	1,189	25.2%
Commercial & Industrial Buildings	Electricity	343,772	418,410	21.7%	3,409	1,337	-60.8%
	Natural Gas	186,387	474,339	154.5%	9,290	24,130	159.7%

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
	Fuel Oil	-	-	-	-	-	-
	Diesel	41,330	131,168	217.4%	3,047	9,413	209.0%
Energy Industries	LFG Combustion			-	-	-	-
Agriculture, Forestry And Fishing Activities	Diesel	126,780	230,263	81.6%	9,345	16,524	76.8%
Natural Gas Fugitive Emissions				-	81	191	137.1%
Total		**1,508,845**	**2,519,187**	**67.0%**	**46,467**	**74,765**	**60.9%**
On-Road Transportation							
Electric Vehicles	Electricity	-	6	-	-	20	-
Hydrogen Vehicles	Hydrogen	-	-	-	-	-	-
Passenger Vehicles	Gasoline + Diesel	364,717	347,442	-4.7%	24,540	22,654	-7.7%
Light Trucks, Vans, SUVs	Gasoline + Diesel	432,627	813,940	88.1%	29,475	53,765	82.4%
Heavy Duty Vehicles	Gasoline + Diesel	211,609	240,223	13.5%	14,287	15,776	10.4%
Propane Vehicles	Propane	3,348	1,888	-43.6%	202	107	-46.9%
Natural Gas Vehicles	Natural Gas	-	7	-	-	32	-
Motorcycles	Gasoline	3,488	5,366	53.8%	241	347	44.1%
Total On-Road Transportation		**1,015,791**	**1,408,873**	**38.7%**	**68,746**	**92,701**	**34.8%**
Off-Road Transportation							
Marine, Aviation and Other Off-Road Vehicles	Gasoline + Diesel + Jet Fuel	117,552	211,216	79.7%	8,705	15,606	79.3%
Total Off-Road Transportation		**117,552**	**211,216**	**79.7%**	**8,705**	**15,606**	**79.3%**
Waste							
Wastewater					621	435	-30.0%

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Composting					0	275	-
Solid Waste					7,761	3,969	-48.9%
Total Waste					**8,382**	**4,678**	**-44.2%**
Agriculture Forestry & Other Land Use (AFOLU)							
Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**					-6,609	-7,138	8.0%
Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**					6,886	8,316	20.8%
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					93	156	67.0%
Total AFOLU					**93**	**156**	**67.0%**
Industrial Process & Product Use (IPPU)							
Process Use Emissions					4,926	14,843	201.3%
Total IPPU					**4,926**	**14,843**	**201.3%**
TOTAL		**2,642,187**	**4,139,276**	**56.7%**	**137,319**	**202,749**	**47.6%**

10 DISTRICT OF METCHOSIN

10.1 2022 Profile

Profile	
Population	5,523
Dwellings	2,083
Registered Vehicles	4,940
Energy (Thousands of GJ)	536
GHG Emissions (tCO_2e)	26,425

10.2 Energy & GHG Emissions

Table 14 presents a summary comparison of the District of Metchosin's 2007 and 2022 energy and GHG emissions.

Table 14. Estimated Energy and GHG Emissions By Reporting Source

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Stationary Energy							
Residential Buildings	Electricity	136,893	128,782	-5.9%	1,358	411	-69.7%
	Natural Gas	8,173	11,258	37.8%	407	573	40.6%
	Fuel Oil	9,003	12,598	39.9%	615	861	39.9%
	Propane	1,553	1,534	-1.3%	94	94	-0.9%
	Wood	3,457	3,338	-3.4%	89	86	-3.4%
	Diesel	2,643	1,840	-30.4%	195	132	-32.2%
Commercial & Industrial Buildings	Electricity	38,037	58,579	54.0%	377	187	-50.4%
	Natural Gas	33,858	23,250	-31.3%	1,688	1,183	-29.9%

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
	Fuel Oil	-	-	-	-	-	-
	Diesel	8,481	14,569	71.8%	625	1,045	67.2%
Energy Industries	LFG Combustion			-	-	-	-
Agriculture, Forestry And Fishing Activities	Diesel	26,016	25,575	-1.7%	1,918	1,835	-4.3%
Natural Gas Fugitive Emissions				-	4	4	14.6%
Total		**268,114**	**281,322**	**4.9%**	**7,370**	**6,412**	**-13.0%**
On-Road Transportation							
Electric Vehicles	Electricity	-	1	-	-	4	-
Hydrogen Vehicles	Hydrogen	-	-	-	-	-	-
Passenger Vehicles	Gasoline + Diesel	80,035	36,147	-54.8%	5,388	2,360	-56.2%
Light Trucks, Vans, SUVs	Gasoline + Diesel	110,966	144,179	29.9%	7,562	9,541	26.2%
Heavy Duty Vehicles	Gasoline + Diesel	40,483	50,060	23.7%	2,728	3,283	20.3%
Propane Vehicles	Propane	1,051	237	-77.5%	63	13	-78.8%
Natural Gas Vehicles	Natural Gas	-	-	-	-	-	-
Motorcycles	Gasoline	668	590	-11.7%	46	38	-17.3%
Total On-Road Transportation		**233,204**	**231,214**	**-0.9%**	**15,787**	**15,239**	**-3.5%**
Off-Road Transportation							
Marine, Aviation and Other Off-Road Vehicles	Gasoline + Diesel + Jet Fuel	24,123	23,459	-2.7%	1,786	1,733	-3.0%
Total Off-Road Transportation		**24,123**	**23,459**	**-2.7%**	**1,786**	**1,733**	**-3.0%**
Waste							
Wastewater					0	0	-

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Composting					0	4	-
Solid Waste					1,593	441	-72.3%
Total Waste					**1,593**	**445**	**-72.0%**
Agriculture Forestry & Other Land Use (AFOLU)							
Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**					-12,139	-13,009	7.2%
Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**					4,011	4,030	0.5%
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					618	880	42.4%
Total AFOLU					**618**	**880**	**42.4%**
Industrial Process & Product Use (IPPU)							
Process Use Emissions					1,011	1,716	69.8%
Total IPPU					**1,011**	**1,716**	**69.8%**
TOTAL		**525,440**	**535,995**	**2.0%**	**28,165**	**26,425**	**-6.2%**

11 DISTRICT OF NORTH SAANICH

11.1 2022 Profile

Profile	
Population	13,052
Dwellings	5,195
Registered Vehicles	11,310
Energy (Thousands of GJ)	1,437
GHG Emissions (tCO_2e)	63,971

11.2 Energy & GHG Emissions

Table 15 presents a summary comparison of the District of North Saanich's 2007 and 2022 energy and GHG emissions.

Table 15. Estimated Energy and GHG Emissions By Reporting Source

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Stationary Energy							
Residential Buildings	Electricity	375,413	364,490	-2.9%	3,723	1,164	-68.7%
	Natural Gas	41,591	91,354	119.6%	2,073	4,647	124.2%
	Fuel Oil	5,953	16,285	173.6%	407	1,113	173.6%
	Propane	1,027	1,014	-1.3%	62	62	-0.9%
	Wood	2,286	2,208	-3.4%	59	57	-3.4%
	Diesel	5,806	4,348	-25.1%	428	312	-27.1%
Commercial & Industrial Buildings	Electricity	156,437	202,840	29.7%	1,551	648	-58.2%
	Natural Gas	99,927	127,891	28.0%	4,980	6,506	30.6%

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
	Fuel Oil	-	-	-	-	-	-
	Diesel	18,627	34,429	84.8%	1,373	2,471	79.9%
Energy Industries	LFG Combustion			-	-	-	-
Agriculture, Forestry And Fishing Activities	Diesel	57,138	60,439	5.8%	4,212	4,337	3.0%
Natural Gas Fugitive Emissions				-	21	41	96.2%
Total		**764,204**	**905,298**	**18.5%**	**18,889**	**21,358**	**13.1%**
On-Road Transportation							
Electric Vehicles	Electricity	-	4	-	-	12	-
Hydrogen Vehicles	Hydrogen	-	-	-	-	-	-
Passenger Vehicles	Gasoline + Diesel	208,096	99,382	-52.2%	14,009	6,486	-53.7%
Light Trucks, Vans, SUVs	Gasoline + Diesel	227,960	295,735	29.7%	15,531	19,553	25.9%
Heavy Duty Vehicles	Gasoline + Diesel	90,034	78,160	-13.2%	6,040	5,121	-15.2%
Propane Vehicles	Propane	1,012	715	-29.4%	61	41	-33.6%
Natural Gas Vehicles	Natural Gas	-	0	-	-	1	-
Motorcycles	Gasoline	1,684	1,798	6.8%	116	116	0.0%
Total On-Road Transportation		**528,786**	**475,793**	**-10.0%**	**35,757**	**31,330**	**-12.4%**
Off-Road Transportation							
Marine, Aviation and Other Off-Road Vehicles	Gasoline + Diesel + Jet Fuel	52,979	55,440	4.6%	3,923	4,096	4.4%
Total Off-Road Transportation		**52,979**	**55,440**	**4.6%**	**3,923**	**4,096**	**4.4%**
Waste							
Wastewater					196	75	-61.9%

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Composting					0	30	-
Solid Waste					3,498	1,042	-70.2%
Total Waste					**3,694**	**1,147**	**-69.0%**
Agriculture Forestry & Other Land Use (AFOLU)							
Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**					-5,055	-5,121	1.3%
Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**					4,758	5,160	8.5%
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					1,335	2,022	51.4%
Total AFOLU					**1,335**	**2,022**	**51.4%**
Industrial Process & Product Use (IPPU)							
Process Use Emissions					2,220	4,017	81.0%
Total IPPU					**2,220**	**4,017**	**81.0%**
TOTAL		**1,345,969**	**1,436,531**	**6.7%**	**65,819**	**63,971**	**-2.8%**

12 DISTRICT OF OAK BAY

12.1 2022 Profile

Profile	
Population	19,592
Dwellings	8,059
Registered Vehicles	12,101
Energy (Thousands of GJ)	1,520
GHG Emissions (tCO_2e)	74,984

12.2 Energy & GHG Emissions

Table 16 presents a summary comparison of the District of Oak Bay's 2007 and 2022 energy and GHG emissions.

Table 16. Estimated Energy and GHG Emissions By Reporting Source

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Stationary Energy							
Residential Buildings	Electricity	370,574	346,497	-6.5%	3,675	1,107	-69.9%
	Natural Gas	276,642	313,923	13.5%	13,788	15,969	15.8%
	Fuel Oil	66,466	41,113	-38.1%	4,543	2,810	-38.1%
	Propane	11,487	11,341	-1.3%	699	692	-0.9%
	Wood	25,469	24,594	-3.4%	654	632	-3.4%
	Diesel	9,649	6,526	-32.4%	711	468	-34.2%
Commercial & Industrial Buildings	Electricity	106,747	78,134	-26.8%	1,059	250	-76.4%
	Natural Gas	83,140	131,482	58.1%	4,144	6,689	61.4%

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
	Fuel Oil	-	-	-	-	-	-
	Diesel	30,957	51,680	66.9%	2,282	3,709	62.5%
Energy Industries	LFG Combustion			-	-	-	-
Agriculture, Forestry And Fishing Activities	Diesel	-	-	-	-	-	-
Natural Gas Fugitive Emissions				-	83	114	37.3%
Total		**981,129**	**1,005,291**	**2.5%**	**31,637**	**32,439**	**2.5%**
On-Road Transportation							
Electric Vehicles	Electricity	-	4	-	-	14	-
Hydrogen Vehicles	Hydrogen	-	-	-	-	-	-
Passenger Vehicles	Gasoline + Diesel	322,115	131,858	-59.1%	21,677	8,597	-60.3%
Light Trucks, Vans, SUVs	Gasoline + Diesel	199,128	253,538	27.3%	13,563	16,737	23.4%
Heavy Duty Vehicles	Gasoline + Diesel	78,292	44,175	-43.6%	5,265	2,870	-45.5%
Propane Vehicles	Propane	857	207	-75.8%	52	12	-77.2%
Natural Gas Vehicles	Natural Gas	-	0	-	-	1	-
Motorcycles	Gasoline	1,771	1,730	-2.3%	122	112	-8.5%
Total On-Road Transportation		**602,163**	**431,512**	**-28.3%**	**40,679**	**28,343**	**-30.3%**
Off-Road Transportation							
Marine, Aviation and Other Off-Road Vehicles	Gasoline + Diesel + Jet Fuel	88,048	83,219	-5.5%	6,520	6,149	-5.7%
Total Off-Road Transportation		**88,048**	**83,219**	**-5.5%**	**6,520**	**6,149**	**-5.7%**
Waste							
Wastewater					1,968	399	-79.7%

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Composting					0	1	-
Solid Waste					5,813	1,564	-73.1%
Total Waste					**7,782**	**1,964**	**-74.8%**
Agriculture Forestry & Other Land Use (AFOLU)							
Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**					-1,461	-1,871	28.0%
Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**					1,731	1,898	9.6%
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					0	0	133.0%
Total AFOLU					**0**	**0**	**133.0%**
Industrial Process & Product Use (IPPU)							
Process Use Emissions					3,690	6,089	65.0%
Total IPPU					**3,690**	**6,089**	**65.0%**
TOTAL		**1,671,340**	**1,520,022**	**-9.1%**	**90,308**	**74,984**	**-17.0%**

13 THE DISTRICT OF SAANICH

13.1 2022 Profile

Profile	
Population	126,234
Dwellings	50,443
Registered Vehicles	82,995
Energy (Thousands of GJ)	10,288
GHG Emissions (tCO_2e)	507,791

13.2 Energy & GHG Emissions

Table 17 presents a summary comparison of the District of Saanich's 2007 and 2022 energy and GHG emissions.

Table 17. Estimated Energy and GHG Emissions By Reporting Source

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Stationary Energy							
Residential Buildings	Electricity	2,358,702	2,261,336	-4.1%	23,391	7,224	-69.1%
	Natural Gas	743,960	917,866	23.4%	37,079	46,692	25.9%
	Fuel Oil	518,953	245,284	-52.7%	35,471	16,766	-52.7%
	Propane	97,519	96,737	-0.8%	5,931	5,902	-0.5%
	Wood	216,161	211,769	-2.0%	5,553	5,440	-2.0%
	Diesel	57,644	42,049	-27.1%	4,249	3,017	-29.0%
Commercial & Industrial Buildings	Electricity	1,176,089	1,043,614	-11.3%	11,663	3,334	-71.4%
	Natural Gas	759,454	894,838	17.8%	37,852	45,521	20.3%

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
	Fuel Oil	38,936	20,302	-47.9%	2,661	1,388	-47.9%
	Diesel	184,944	332,982	80.0%	13,633	23,895	75.3%
Energy Industries	LFG Combustion			-	418	6,497	1454.3%
Agriculture, Forestry And Fishing Activities	Diesel	567,313	584,544	3.0%	41,818	41,947	0.3%
Natural Gas Fugitive Emissions				-	314	462	47.0%
Total		**6,719,676**	**6,651,319**	**-1.0%**	**220,033**	**208,084**	**-5.4%**
On-Road Transportation							
Electric Vehicles	Electricity	-	15	-	-	46	-
Hydrogen Vehicles	Hydrogen	-	-	-	-	-	-
Passenger Vehicles	Gasoline + Diesel	1,877,530	776,827	-58.6%	126,328	50,639	-59.9%
Light Trucks, Vans, SUVs	Gasoline + Diesel	1,549,388	1,973,500	27.4%	105,548	130,220	23.4%
Heavy Duty Vehicles	Gasoline + Diesel	564,100	329,218	-41.6%	37,966	21,579	-43.2%
Propane Vehicles	Propane	8,605	3,199	-62.8%	519	182	-65.0%
Natural Gas Vehicles	Natural Gas	-	1	-	-	3	-
Motorcycles	Gasoline	11,374	17,812	56.6%	785	1,152	46.7%
Total On-Road Transportation		**4,010,996**	**3,100,571**	**-22.7%**	**271,147**	**203,821**	**-24.8%**
Off-Road Transportation							
Marine, Aviation and Other Off-Road Vehicles	Gasoline + Diesel + Jet Fuel	526,020	536,191	1.9%	38,951	39,618	1.7%
Total Off-Road Transportation		**526,020**	**536,191**	**1.9%**	**38,951**	**39,618**	**1.7%**
Waste							
Wastewater					4,989	1,337	-73.2%

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Composting					0	3,468	-
Solid Waste					34,731	10,076	-71.0%
Total Waste					**39,720**	**14,881**	**-62.5%**
Agriculture Forestry & Other Land Use (AFOLU)							
Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**					-15,421	-17,123	11.0%
Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**					22,453	13,619	-39.3%
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					1,465	1,883	28.5%
Total AFOLU					**1,465**	**1,883**	**28.5%**
Industrial Process & Product Use (IPPU)							
Process Use Emissions					22,042	39,504	79.2%
Total IPPU					**22,042**	**39,504**	**79.2%**
TOTAL		**11,256,692**	**10,288,081**	**-8.6%**	**593,359**	**507,791**	**-14.4%**

14 SALT SPRING ELECTORAL AREA

14.1 2022 Profile

Profile	
Population	12,209
Dwellings	5,270
Registered Vehicles	10,174
Energy (Thousands of GJ)	1,182
GHG Emissions (tCO_2e)	50,992

14.2 Energy & GHG Emissions

Table 18 presents a summary comparison of Salt Spring Island Electoral Area's 2007 and 2022 energy and GHG emissions.

Table 18. Estimated Energy and GHG Emissions By Reporting Source

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Stationary Energy							
Residential Buildings	Electricity	360,697	385,852	7.0%	3,577	1,233	-65.5%
	Natural Gas	-	-	-	-	-	-
	Fuel Oil	9,967	7,006	-29.7%	681	479	-29.7%
	Propane	9,006	9,167	1.8%	548	559	2.1%
	Wood	75,133	74,798	-0.4%	1,930	1,921	-0.4%
	Diesel	5,252	4,067	-22.6%	387	292	-24.6%
Commercial & Industrial Buildings	Electricity	91,954	126,373	37.4%	912	404	-55.7%
	Natural Gas	-	-	-	-	-	-

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
	Fuel Oil	-	-	-	-	-	-
	Diesel	16,851	32,205	91.1%	1,242	2,311	86.1%
Energy Industries	LFG Combustion			-	-	-	-
Agriculture, Forestry And Fishing Activities	Diesel	51,691	56,535	9.4%	3,810	4,057	6.5%
Natural Gas Fugitive Emissions				-	-	-	-
Total		**620,552**	**696,003**	**12.2%**	**13,087**	**11,256**	**-14.0%**
On-Road Transportation							
Electric Vehicles	Electricity	-	4	-	-	11	-
Hydrogen Vehicles	Hydrogen	-	-	-	-	-	-
Passenger Vehicles	Gasoline + Diesel	166,502	75,332	-54.8%	11,207	4,915	-56.1%
Light Trucks, Vans, SUVs	Gasoline + Diesel	191,257	271,076	41.7%	13,028	17,912	37.5%
Heavy Duty Vehicles	Gasoline + Diesel	50,460	84,654	67.8%	3,350	5,529	65.0%
Propane Vehicles	Propane	857	1,356	58.3%	52	77	48.9%
Natural Gas Vehicles	Natural Gas	-	-	-	-	-	-
Motorcycles	Gasoline	1,737	1,330	-23.5%	120	86	-28.3%
Total On-Road Transportation		**410,814**	**433,750**	**5.6%**	**27,758**	**28,531**	**2.8%**
Off-Road Transportation							
Marine, Aviation and Other Off-Road Vehicles	Gasoline + Diesel + Jet Fuel	47,929	51,859	8.2%	3,549	3,832	8.0%
Total Off-Road Transportation		**47,929**	**51,859**	**8.2%**	**3,549**	**3,832**	**8.0%**
Waste							
Wastewater					49	9	-81.3%

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Composting					0	0	-
Solid Waste					3,165	975	-69.2%
Total Waste					**3,213**	**984**	**-69.4%**
Agriculture Forestry & Other Land Use (AFOLU)							
Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**					-33,060	-34,295	3.7%
Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**					32,083	12,143	-62.2%
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					407	2,563	529.2%
Total AFOLU					**407**	**2,563**	**529.2%**
Industrial Process & Product Use (IPPU)							
Process Use Emissions					2,008	3,827	90.5%
Total IPPU					**2,008**	**3,827**	**90.5%**
TOTAL		**1,079,295**	**1,181,612**	**9.5%**	**50,023**	**50,992**	**1.9%**

15 TOWN OF SIDNEY

15.1 2022 Profile

Profile	
Population	12,950
Dwellings	6,349
Registered Vehicles	9,582
Energy (Thousands of GJ)	1,196
GHG Emissions (tCO_2e)	55,426

15.2 Energy & GHG Emissions

Table 19 presents a summary comparison of the Town Sidney's 2007 and 2022 energy and GHG emissions.

Table 19. Estimated Energy and GHG Emissions By Reporting Source

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Stationary Energy							
Residential Buildings	Electricity	242,453	247,660	2.1%	2,404	791	-67.1%
	Natural Gas	70,155	96,432	37.5%	3,497	4,906	40.3%
	Fuel Oil	58,189	9,648	-83.4%	3,977	659	-83.4%
	Propane	10,069	9,942	-1.3%	612	607	-0.9%
	Wood	22,263	21,499	-3.4%	572	552	-3.4%
	Diesel	6,040	4,314	-28.6%	445	310	-30.5%
Commercial & Industrial Buildings	Electricity	187,401	165,750	-11.6%	1,858	529	-71.5%
	Natural Gas	80,240	106,080	32.2%	3,999	5,396	34.9%

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
	Fuel Oil	-	-	-	-	-	-
	Diesel	19,378	34,160	76.3%	1,428	2,451	71.6%
Energy Industries	LFG Combustion			-	-	-	-
Agriculture, Forestry And Fishing Activities	Diesel	59,441	59,967	0.9%	4,382	4,303	-1.8%
Natural Gas Fugitive Emissions				-	47	71	48.8%
Total		**755,630**	**755,451**	**0.0%**	**23,223**	**20,576**	**-11.4%**
On-Road Transportation							
Electric Vehicles	Electricity	-	2	-	-	6	-
Hydrogen Vehicles	Hydrogen	-	-	-	-	-	-
Passenger Vehicles	Gasoline + Diesel	199,863	102,924	-48.5%	13,448	6,710	-50.1%
Light Trucks, Vans, SUVs	Gasoline + Diesel	162,604	211,267	29.9%	11,077	13,952	26.0%
Heavy Duty Vehicles	Gasoline + Diesel	82,673	69,148	-16.4%	5,563	4,523	-18.7%
Propane Vehicles	Propane	973	557	-42.8%	59	32	-46.2%
Natural Gas Vehicles	Natural Gas	-	0	-	-	0	-
Motorcycles	Gasoline	1,276	1,547	21.2%	88	100	13.5%
Total On-Road Transportation		**447,389**	**385,444**	**-13.8%**	**30,234**	**25,323**	**-16.2%**
Off-Road Transportation							
Marine, Aviation and Other Off-Road Vehicles	Gasoline + Diesel + Jet Fuel	55,114	55,006	-0.2%	4,081	4,064	-0.4%
Total Off-Road Transportation		**55,114**	**55,006**	**-0.2%**	**4,081**	**4,064**	**-0.4%**
Waste							
Wastewater					612	175	-71.4%

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Composting					0	201	-
Solid Waste					3,639	1,034	-71.6%
Total Waste					**4,251**	**1,410**	**-66.8%**
Agriculture Forestry & Other Land Use (AFOLU)							
Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**					-543	-506	-6.8%
Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**					823	1,251	52.1%
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					4	87	1915.6%
Total AFOLU					**4**	**87**	**1915.6%**
Industrial Process & Product Use (IPPU)							
Process Use Emissions					2,310	3,967	71.7%
Total IPPU					**2,310**	**3,967**	**71.7%**
TOTAL		**1,258,133**	**1,195,902**	**-4.9%**	**64,104**	**55,426**	**-13.5%**

16 DISTRICT OF SOOKE

16.1 2022 Profile

Profile	
Population	16,372
Dwellings	6,379
Registered Vehicles	12,589
Energy (Thousands of GJ)	1,302
GHG Emissions (tCO_2e)	64,405

16.2 Energy & GHG Emissions

Table 20 presents a summary comparison of the District of Sooke's 2007 and 2022 energy and GHG emissions.

Table 20. Estimated Energy and GHG Emissions By Reporting Source

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Stationary Energy							
Residential Buildings	Electricity	257,364	343,855	33.6%	2,552	1,098	-57.0%
	Natural Gas	13,108	70,631	438.8%	653	3,593	450.0%
	Fuel Oil	56,455	9,956	-82.4%	3,859	680	-82.4%
	Propane	9,744	9,620	-1.3%	593	587	-0.9%
	Wood	21,667	20,923	-3.4%	557	537	-3.4%
	Diesel	5,454	5,454	0.0%	402	391	-2.7%
Commercial & Industrial Buildings	Electricity	68,790	87,332	27.0%	682	279	-59.1%
	Natural Gas	16,506	35,468	114.9%	823	1,804	119.3%

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
	Fuel Oil	-	-	-	-	-	-
	Diesel	17,499	43,186	146.8%	1,290	3,099	140.3%
Energy Industries	LFG Combustion			-	-	-	-
Agriculture, Forestry And Fishing Activities	Diesel	53,678	75,813	41.2%	3,957	5,440	37.5%
Natural Gas Fugitive Emissions				-	13	53	314.1%
Total		**520,266**	**702,237**	**35.0%**	**15,380**	**17,564**	**14.2%**
On-Road Transportation							
Electric Vehicles	Electricity	-	3	-	-	9	-
Hydrogen Vehicles	Hydrogen	-	-	-	-	-	-
Passenger Vehicles	Gasoline + Diesel	141,887	113,978	-19.7%	9,552	7,437	-22.1%
Light Trucks, Vans, SUVs	Gasoline + Diesel	187,290	324,163	73.1%	12,761	21,428	67.9%
Heavy Duty Vehicles	Gasoline + Diesel	80,655	89,791	11.3%	5,440	5,874	8.0%
Propane Vehicles	Propane	1,986	286	-85.6%	120	16	-86.4%
Natural Gas Vehicles	Natural Gas	-	0	-	-	1	-
Motorcycles	Gasoline	1,490	2,001	34.3%	103	129	25.8%
Total On-Road Transportation		**413,309**	**530,222**	**28.3%**	**27,976**	**34,895**	**24.7%**
Off-Road Transportation							
Marine, Aviation and Other Off-Road Vehicles	Gasoline + Diesel + Jet Fuel	49,771	69,542	39.7%	3,686	5,138	39.4%
Total Off-Road Transportation		**49,771**	**69,542**	**39.7%**	**3,686**	**5,138**	**39.4%**
Waste							
Wastewater					0	0	-

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Composting					0	41	-
Solid Waste					3,286	1,307	-60.2%
Total Waste					**3,286**	**1,348**	**-59.0%**
Agriculture Forestry & Other Land Use (AFOLU)							
Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**					-9,952	-11,266	13.2%
Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**					6,213	5,442	-12.4%
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					126	517	309.5%
Total AFOLU					**126**	**517**	**309.5%**
Industrial Process & Product Use (IPPU)							
Process Use Emissions					2,086	4,943	137.0%
Total IPPU					**2,086**	**4,943**	**137.0%**
TOTAL		**983,346**	**1,302,000**	**32.4%**	**52,539**	**64,405**	**22.6%**

17 CITY OF VICTORIA

17.1 2022 Profile

Profile	
Population	96,771
Dwellings	53,590
Registered Vehicles	54,547
Energy (Thousands of GJ)	9,194
GHG Emissions (tCO_2e)	407,082

17.2 Energy & GHG Emissions

Table 21 presents a summary comparison of the City of Victoria's 2007 and 2022 energy and GHG emissions.

Table 21. Estimated Energy and GHG Emissions By Reporting Source

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Stationary Energy							
Residential Buildings	Electricity	1,235,156	1,440,845	16.7%	12,249	4,603	-62.4%
	Natural Gas	952,641	477,565	-49.9%	47,480	24,294	-48.8%
	Fuel Oil	617,245	101,625	-83.5%	42,190	6,946	-83.5%
	Propane	118,617	117,666	-0.8%	7,214	7,179	-0.5%
	Wood	259,255	257,078	-0.8%	6,660	6,604	-0.8%
	Diesel	42,018	32,235	-23.3%	3,097	2,313	-25.3%
Commercial & Industrial Buildings	Electricity	1,983,621	1,791,569	-9.7%	19,671	5,723	-70.9%
	Natural Gas	1,377,709	2,026,818	47.1%	68,666	103,105	50.2%

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
	Fuel Oil	122,702	122,702	0.0%	8,387	8,387	0.0%
	Diesel	134,809	255,264	89.4%	9,937	18,318	84.3%
Energy Industries	LFG Combustion			-	-	-	-
Agriculture, Forestry And Fishing Activities	Diesel	-	-	-	-	-	-
Natural Gas Fugitive Emissions				-	240	272	13.0%
Total		**6,843,772**	**6,623,367**	**-3.2%**	**225,791**	**187,744**	**-16.9%**
On-Road Transportation							
Electric Vehicles	Electricity	-	9	-	-	29	-
Hydrogen Vehicles	Hydrogen	-	-	-	-	-	-
Passenger Vehicles	Gasoline + Diesel	1,250,314	462,162	-63.0%	84,131	30,110	-64.2%
Light Trucks, Vans, SUVs	Gasoline + Diesel	774,818	1,120,119	44.6%	52,783	73,864	39.9%
Heavy Duty Vehicles	Gasoline + Diesel	467,779	293,864	-37.2%	31,539	19,210	-39.1%
Propane Vehicles	Propane	5,840	2,667	-54.3%	352	151	-57.0%
Natural Gas Vehicles	Natural Gas	-	0	-	-	2	-
Motorcycles	Gasoline	8,968	5,902	-34.2%	619	382	-38.3%
Total On-Road Transportation		**2,507,720**	**1,884,723**	**-24.8%**	**169,424**	**123,748**	**-27.0%**
Off-Road Transportation							
Marine, Aviation and Other Off-Road Vehicles	Gasoline + Diesel + Jet Fuel	524,642	685,904	30.7%	38,899	50,820	30.6%
Total Off-Road Transportation		**524,642**	**685,904**	**30.7%**	**38,899**	**50,820**	**30.6%**
Waste							
Wastewater					7,699	1,735	-77.5%

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Composting					73	902	1133.5%
Solid Waste					25,316	12,307	-51.4%
Total Waste					**33,088**	**14,944**	**-54.8%**
Agriculture Forestry & Other Land Use (AFOLU)							
Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**					-1,798	-1,939	7.8%
Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**					3,725	3,744	0.5%
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					0	0	-
Total AFOLU					**0**	**0**	**-**
Industrial Process & Product Use (IPPU)							
Process Use Emissions					16,067	29,825	85.6%
Total IPPU					**16,067**	**29,825**	**85.6%**
TOTAL		**9,876,133**	**9,193,993**	**-6.9%**	**483,269**	**407,082**	**-15.8%**

18 TOWN OF VIEW ROYAL

18.1 2022 Profile

Profile	
Population	12,987
Dwellings	5,115
Registered Vehicles	8,417
Energy (Thousands of GJ)	1,070
GHG Emissions (tCO_2e)	51,486

18.2 Energy & GHG Emissions

Table 22 presents a summary comparison of the Town of View Royal's 2007 and 2022 energy and GHG emissions.

Table 22. Estimated Energy and GHG Emissions By Reporting Source

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Stationary Energy							
Residential Buildings	Electricity	185,833	214,630	15.5%	1,843	686	-62.8%
	Natural Gas	75,155	92,417	23.0%	3,746	4,701	25.5%
	Fuel Oil	22,724	4,855	-78.6%	1,553	332	-78.6%
	Propane	3,926	3,876	-1.3%	239	237	-0.9%
	Wood	8,710	8,411	-3.4%	224	216	-3.4%
	Diesel	4,806	4,326	-10.0%	354	310	-12.4%
Commercial & Industrial Buildings	Electricity	113,772	121,413	6.7%	1,128	388	-65.6%
	Natural Gas	123,868	156,425	26.3%	6,174	7,957	28.9%

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
	Fuel Oil	-	-	-	-	-	-
	Diesel	15,419	34,257	122.2%	1,137	2,458	116.3%
Energy Industries	LFG Combustion			-	-	-	-
Agriculture, Forestry And Fishing Activities	Diesel	47,299	60,138	27.1%	3,487	4,315	23.8%
Natural Gas Fugitive Emissions				-	38	52	36.7%
Total		**601,514**	**700,749**	**16.5%**	**19,922**	**21,653**	**8.7%**
On-Road Transportation							
Electric Vehicles	Electricity	-	2	-	-	6	-
Hydrogen Vehicles	Hydrogen	-	-	-	-	-	-
Passenger Vehicles	Gasoline + Diesel	138,335	87,713	-36.6%	9,308	5,719	-38.6%
Light Trucks, Vans, SUVs	Gasoline + Diesel	135,581	188,803	39.3%	9,236	12,468	35.0%
Heavy Duty Vehicles	Gasoline + Diesel	61,064	35,124	-42.5%	4,112	2,290	-44.3%
Propane Vehicles	Propane	895	606	-32.3%	54	34	-36.3%
Natural Gas Vehicles	Natural Gas	-	-	-	-	-	-
Motorcycles	Gasoline	1,223	1,391	13.7%	84	90	6.5%
Total On-Road Transportation		**337,099**	**313,639**	**-7.0%**	**22,795**	**20,608**	**-9.6%**
Off-Road Transportation							
Marine, Aviation and Other Off-Road Vehicles	Gasoline + Diesel + Jet Fuel	43,856	55,164	25.8%	3,248	4,076	25.5%
Total Off-Road Transportation		**43,856**	**55,164**	**25.8%**	**3,248**	**4,076**	**25.5%**
Waste							
Wastewater					386	107	-72.4%

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Composting					0	88	-
Solid Waste					2,896	1,037	-64.2%
Total Waste					**3,282**	**1,232**	**-62.5%**
Agriculture Forestry & Other Land Use (AFOLU)							
Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**					-2,585	-2,740	6.0%
Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**					1,738	1,807	4.0%
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					4	22	502.5%
Total AFOLU					**4**	**22**	**502.5%**
Industrial Process & Product Use (IPPU)							
Process Use Emissions					1,838	3,895	112.0%
Total IPPU					**1,838**	**3,895**	**112.0%**
TOTAL		**982,469**	**1,069,552**	**8.9%**	**51,087**	**51,486**	**0.8%**

19 SOUTHERN GULF ISLANDS ELECTORAL AREA

19.1 2022 Profile

The Southern Gulf Islands Electoral Area consists of: Galiano, Mayne, North Pender, Saturna and South Pender.

Profile	
Population	5,769
Dwellings	2,323
Registered Vehicles	5,105
Energy (Thousands of GJ)	848
GHG Emissions (tCO_2e)	35,335

19.2 Energy & GHG Emissions

Table 23 presents a summary comparison of the Southern Gulf Islands Electoral Area 2007 and 2022 energy and GHG emissions.

Table 23. Estimated Energy and GHG Emissions By Reporting Source

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Stationary Energy							
Residential Buildings	Electricity	205,339	214,933	4.7%	2,036	687	-66.3%
	Natural Gas	-	-	-	-	-	-
	Fuel Oil	27,326	55,796	104.2%	1,868	3,814	104.2%
	Propane	24,684	25,126	1.8%	1,501	1,533	2.1%
	Wood	206,032	205,113	-0.4%	5,293	5,269	-0.4%
	Diesel	2,683	1,922	-28.4%	198	138	-30.3%

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Commercial & Industrial Buildings	Electricity	45,106	48,348	7.2%	447	154	-65.5%
	Natural Gas	-	-	-	-	-	-
	Fuel Oil	-	-	-	-	-	-
	Diesel	8,608	15,218	76.8%	634	1,092	72.1%
Energy Industries	LFG Combustion			-	-	-	-
Agriculture, Forestry And Fishing Activities	Diesel	26,403	26,714	1.2%	1,946	1,917	-1.5%
Natural Gas Fugitive Emissions				-	-	-	-
Total		**546,181**	**593,168**	**8.6%**	**13,924**	**14,604**	**4.9%**
On-Road Transportation							
Electric Vehicles	Electricity	-	1	-	-	4	-
Hydrogen Vehicles	Hydrogen	-	-	-	-	-	-
Passenger Vehicles	Gasoline + Diesel	115,551	33,298	-71.2%	7,772	2,172	-72.0%
Light Trucks, Vans, SUVs	Gasoline + Diesel	63,232	143,707	127.3%	4,308	9,497	120.4%
Heavy Duty Vehicles	Gasoline + Diesel	16,337	51,972	218.1%	1,082	3,403	214.5%
Propane Vehicles	Propane	-	636	-	-	36	-
Natural Gas Vehicles	Natural Gas	-	-	-	-	-	-
Motorcycles	Gasoline	916	733	-20.0%	63	47	-25.0%
Total On-Road Transportation		**196,036**	**230,347**	**17.5%**	**13,225**	**15,159**	**14.6%**
Off-Road Transportation							
Marine, Aviation and Other Off-Road Vehicles	Gasoline + Diesel + Jet Fuel	24,482	24,504	0.1%	1,813	1,811	-0.1%
Total Off-Road Transportation		**24,482**	**24,504**	**0.1%**	**1,813**	**1,811**	**-0.1%**
Waste							

Source	Type	2007 Energy (GJ)	2022 Energy (GJ)	Change (%)	2007 GHG Emissions (tCO_2e)	2022 GHG Emissions (tCO_2e)	Change (%)
Wastewater					24	5	-77.8%
Composting					0	0	-
Solid Waste					1,616	460	-71.5%
Total Waste					**1,641**	**466**	**-71.6%**
Agriculture Forestry & Other Land Use (AFOLU)							
Land-Use: Emissions Sequestered **(Disclosure Only - Not Included In Total)**					-33,172	-34,324	3.5%
Land-Use: Emissions Released **(Disclosure Only - Not Included In Total)**					24,093	24,143	0.2%
Livestock, Aggregate Sources and Non-CO_2 Emission Sources on Land					387	1,542	298.6%
Total AFOLU					**387**	**1,542**	**298.6%**
Industrial Process & Product Use (IPPU)							
Process Use Emissions					1,026	1,753	70.9%
Total IPPU					**1,026**	**1,753**	**70.9%**
TOTAL		**766,699**	**848,020**	**10.6%**	**32,015**	**35,335**	**10.4%**

Capital Region CO_{2e} Emissions Per Capita

September 2023

Capital Region CO_{2e} (tonnes) Emissions Per Capita		
	2007	2022
Capital Region	5.7	4.2
Central Saanich	6.2	5.8
Colwood	5.4	4.0
Esquimalt	5.5	3.8
Highlands	5.9	5.0
Juan De Fuca Electoral Area	14.6	5.4
Langford	5.6	4.1
Metchosin	5.7	4.8
North Saanich	6.0	4.9
Oak Bay	4.9	3.8
Saanich	5.3	4.0
Salt Spring Island Electoral Area	5.0	4.2
Sidney	4.9	4.3
Sooke	5.1	3.9
Victoria	6.0	4.2
View Royal	5.6	4.0
Southern Gulf Islands Electoral Area	6.4	6.1

Making a difference...together

ECA 23-37

REPORT TO ENVIRONMENTAL SERVICES COMMITTEE
MEETING OF WEDNESDAY, SEPTEMBER 27, 2023

SUBJECT **Vancouver Island and Coastal Communities Climate Leadership Steering Committee – Funding Request**

ISSUE SUMMARY

To seek Board direction on a funding request from the Vancouver Island and Coastal Communities Climate Leadership Steering Committee.

BACKGROUND

Vancouver Island and Coastal Communities (VICC) Climate Leadership Steering Committee consists of mainly local government elected officials from across Vancouver Island and surrounding coastal communities. As noted in the VICC Climate Leadership Steering Committee's draft terms of reference dated July 13, 2023 (Appendix A), the mandate of this group is "to support effective and cohesive climate action across the VICC region by acting as an inter-regional network convener, facilitator, and advocate." Director Thompson is the Capital Regional District's (CRD) appointed representative on the VICC Climate Leadership Steering Committee.

On October 12, 2022, the Board approved a $73,150 funding request from the VICC Climate Leadership Steering Committee to support the completion of a Vancouver Island Climate Leadership Plan. The funding was not ultimately provided, as the scope of work did not materialize as proposed, in part due to lack of other regional district funding partners, and changing priorities of the VICC Climate Leadership Steering Committee after the fall 2022 election.

The VICC Climate Leadership Steering Committee co-chairs have sent a renewed one-time funding request to the CRD Board and Chair (Appendix A). Separate requests have been sent to all other regional districts on Vancouver Island. The revised funding amounts are based mainly on population, with the CRD's share totalling $31,500. As noted in Appendix A, the funding would be provided to the Community Energy Association (CEA) to act as a secretariat for the VICC Climate Leadership Steering Committee and to support the execution of the following key deliverables between late 2022 and the end of 2024:

- organize annual summit of elected officials, staff, non-governmental organizations and businesses for information sharing, relationship building, identifying collaboration opportunities, and advocacy prioritization
- maintain quarterly steering committee meetings as a strategic planning body
- liaise with CEA's staff peer network to share best practices and support collaborative initiatives
- develop a digital resource library for sharing best practices, data and new initiatives
- facilitate and administer functional working groups based on shared priorities
- engage in senior government level advocacy based on climate action advocacy priorities identified through the VICC Climate Leadership Steering Committee and Association of Vancouver Island and Coastal Communities
- continued relationship building with Indigenous communities across VICC

Following the initial request, various regional district staff communicated to CEA and the VICC Climate Leadership Steering Committee that most regional districts do not have climate action services and associated regional funding allocations and may not be the appropriate funder for this initiative. As such, VICC Climate Leadership Steering Committee and CEA will reevaluate the funding model upon conclusion of this funding period.

To date, five regional districts have approved the VICC Climate Leadership Steering Committee's funding request (Comox Valley, qathet, Sunshine Coast, Alberni-Clayoquot and newly-approved Mount Waddington).

ALTERNATIVES

Alternative 1
The Environmental Services Committee recommends to the Capital Regional District Board:
That the CRD provide $31,500 to the Community Energy Association to act as a secretariat and support priority initiatives of the Vancouver Island and Coastal Communities Climate Leadership Steering Committee through 2024.

Alternative 2
That this report be referred back to staff for additional information.

IMPLICATIONS

Alignment with Existing Plans & Strategies

The CRD Climate Action Strategy (2021) outlines goals and corporate and regionally-focused actions for the organization to complete through 2025. This request may support the intention of Action 2-6 to "coordinate regional climate action, collaboration and capacity building among local governments and interested First Nations."

Financial Implications

The VICC Climate Leadership Steering Committee is seeking a total of $107,500 from regional districts located on Vancouver Island to support their initiatives through 2024. The CRD's allocated share is $31,500. Funding for this initiative would be provided through existing 2023 program budgets of the regional climate action service.

Staff are also providing in-kind support to a new Vancouver Island and surrounding communities staff-focused peer network noted above. This is also administered by CEA and currently funded by BC Hydro. The CRD's Manager of Climate Action Programs is currently acting as a co-chair.

Intergovernmental Implications

The CRD Climate Action Service has a mandate to support regional collaboration on climate action. To do so, staff work directly with municipal and electoral area staff and elected officials on collaborative policy initiatives, data and research collection, regional programs, information sharing and capacity building, and support Board advocacy efforts. Staff also participate in numerous provincial-scale local government focused peer networks to support this work.

The intention of the VICC Climate Leadership Steering Committee is, in part, to develop an elected official network at a broader geographical scale, and to support communities and regions advance climate priorities that currently do not have similar capacity to the capital region.

CONCLUSION

The CRD Board and Chair received a request from the Vancouver Island and Coastal Communities (VICC) Climate Leadership Steering Committee for funding support towards priority initiatives through 2024. This funding would aid the VICC Steering Climate Leadership Steering Committee, which mainly consists of local elected officials spanning Vancouver Island and surrounding communities, to achieve its mandate to convene, facilitate, and advocate for effective and cohesive climate action across the region.

RECOMMENDATION

The Environmental Services Committee recommends to the Capital Regional District Board:
That the CRD provide $31,500 to the Community Energy Association to act as a secretariat and support priority initiatives of the Vancouver Island and Coastal Communities Climate Leadership Steering Committee through 2024.

Submitted by:	Nikki Elliott, BES, MPA, Manager, Climate Action Programs
Concurrence:	Larisa Hutcheson, P. Eng., General Manager, Parks & Environmental Services
Concurrence:	Nelson Chan, MBA, FCPA, FCMA, Chief Financial Officer
Concurrence:	Ted Robbins, B. Sc., C. Tech., Chief Administrative Officer

ATTACHMENT

Appendix A: Funding Request Letter to CRD Chair and Board – July 24, 2023

APPENDIX A

July 24, 2023

Dear Capital Regional District Chair and Board,

The Vancouver Island and Coastal Communities (VICC) Climate Leadership Steering Committee provides information sharing, project collaboration, and advocacy for climate initiatives across Vancouver Island and Coastal Communities. In our inaugural four-year term, the committee of elected regional district representatives and supporting academic leaders and local government staff achieved the following:

1. Territorial analysis of the region's vulnerabilities to climate change and survey of local government priorities for climate action conducted by UVic researchers in 2020
2. Local Government Climate Resiliency Summit for elected officials, staff and First Nations that gathered over 150 people from across the region in Fall 2020
3. Youth Climate Summit held in Spring 2021
4. First Nations Engagement led by Alderhill, an Indigenous consulting company
5. Establishment of an inter-regional staff network in partnership with the Community Energy Association (CEA)

Through these efforts, the committee strengthened relationships among municipalities, regional districts, and urban and rural communities in our region and identified where the best value exists for ongoing inter-regional coordination. This work reaffirmed the need for and benefit of increased coordination on a regional scale to strengthen climate action, improve information sharing, increase organizational capacity particularly for small and rural communities, improve collaboration on projects of shared interest, enhance staff support in the delivery of cost-effective programs and services, avoid duplication of effort, and to strengthen senior level government advocacy.

To continue this work, the VICC Climate Leadership Steering Committee requires funding from member regional districts. According to a population-based formula, we are requesting $31,500 from your regional district.

Service Proposal:

The research and engagement noted above led the VICC Climate Leadership Steering Committee to determine that its greatest value moving forward is as an inter-regional network convener, facilitator, and advocate for effective and cohesive climate action. This will include the following services:

- Organize annual summit of elected officials, staff, NGO's and businesses for information sharing, relationship building, identifying collaboration opportunities, and advocacy prioritization
- Maintain quarterly steering committee meetings as a strategic planning body
- Liaise with CEA's staff peer network to share best practice and support collaborative initiatives
- Develop a digital resource library for sharing best practices, data, and new initiatives
- Facilitate and administer functional working groups based on shared priorities
- Engage in senior government level advocacy based on climate action advocacy priorities identified through the VICC Climate Leadership Steering Committee and AVICC
- Support continued relationship building with Indigenous communities across VICC

CEA Secretariat:

Currently the convening of the Steering Committee is supported through partnership with the Community Energy Association (CEA) in a secretariat role. CEA is a non-profit organization with extensive experience in climate planning, engagement, convening networks, advancing cross-regional collaboration, and driving project implementation with local governments and Indigenous communities. Along with providing expertise and project management, CEA is the fiscal agent for the project and brings in-kind contributions to the project from other funding sources, valued at close to $100,000.

Funding Request:

To retain CEA in the role of secretariat and to provide the proposed services for the inter-regional climate action network, the VICC Climate Leadership Steering Committee requests the following funding commitment from regional districts across a two-year timeframe of late 2022 through to the end of 2024 (see table 1 below). At the end of this period the funding model will be re-evaluated.

Table 1. Summary of Regional District Funding Allocations

Regional District	Requested Amount*	Status
Alberni-Clayoquot	5,900	
Capital	31,500	Pending
Comox Valley	13,000	Approved
Cowichan Valley	16,000	
Mount Waddington	1,900	
Nanaimo	22,550	
qathet	2,400	Approved
Strathcona	8,400	
Sunshine Coast	5,600	Approved
Islands Trust	250	
Total	**107,500**	

*Funding amount per regional district based on a formula factoring in population with adjustments for density

Table 2 provides the budget for project deliverables. Note that in-kind funding is being provided through contributions from internal staff time as well as CEA's contributions. Significant in-kind funding in the form of volunteer time and other funding sources has been contributed to support the convening of the committee and the project outcomes produced to date. As part of the secretariat role, CEA will continue to seek additional funds to support the project.

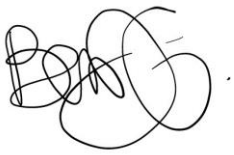
Table 2. Project deliverables and budget highlights

Deliverable	***Cost***
Ongoing Secretariat tasks (CEA): • Coordination of steering committee meetings • Overarching project management • Fiscal and contract management, grant applications • Development and maintenance of digital resource library • Administration and liaison with regional staff network (in-kind)	$30,000/year (with significant additional in-kind contributions from CEA)
Reporting: • Compilation of research and engagement results • Preparation of strategic vision and goals document • Phase 3 end report	$9,500
Events: • Annual Summit in 2024 • Other events (e.g. LGLA)	$28,000
Relationship building with Indigenous partners and others*	$10,000
TOTAL	***$107,500***

*CEA will support grant applications for additional funding to further support this work and other initiatives that may arise (e.g. working groups)

We are happy to share any further information and thank you in advance for your consideration and support.

Sincerely,



Mayor Michelle Staples
City of Duncan
VICC Climate Leadership Steering Committee Co-Chair
mayor@duncan.ca

Councillor Will Cole-Hamilton
City of Courtenay
VICC Climate Leadership Steering Committee Co-Chair
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Councillor Ben Geselbracht
City of Nanaimo
VICC Climate Leadership Steering Committee Co-Chair
ben.geselbracht@nanaimo.ca

Attachments:

1. VICC Climate Leadership Steering Committee DRAFT Terms of Reference
2. Territorial Analysis & Survey of Local Government Priorities for Climate Action
3. VICC Resilience Summit Nov 2020 Outcomes Report
4. VICC Youth Summit May 2021 Outcomes Report
5. VICC Indigenous Engagement Summary Report by Alderhill 2023
6. VICC-CL Budget Summary
7. VICC-CL Phase 1 and 2 Project Budget Summary
8. VICC-CL Phase 3 2022-2024 Detailed Budget

Vancouver Island and Coastal Communities – Climate Leadership (VICC-CL) Steering Committee

Terms of Reference

The purpose of these Terms of Reference is to ensure that members are aware of the expectations and commitments of the Steering Committee.

OVERVIEW

The overarching goal of the VICC-CL Steering Committee is to support effective and cohesive climate action across the VICC region by acting as an inter-regional network convener, facilitator, and advocate through the provision of the following services:

- Organize annual summit of elected officials, staff, NGO's and businesses for information sharing, relationship building, identifying collaboration opportunities, and advocacy prioritization
- Maintain quarterly VICC-CL steering committee meeting as a strategic planning body
- Liaise with CEA's staff peer network to share best practice and support collaborative initiatives
- Develop a digital resource library for sharing best practices, data, and new initiatives
- Facilitate and administer functional working groups based on shared priorities
- Engage in senior government level advocacy based on climate action advocacy priorities identified at the summit, through peer networks and AVICC
- Support continued relationship building with Indigenous communities across VICC

MEMBERSHIP

- First Nations are invited to participate and have a standing invitation to the table
- One elected director from each Regional District appointed by motion of the Regional District board. Each board may also appoint an alternate but is not obligated to do so. Meetings will be attended by the representative and by the alternate if the representative is not able to attend.
- Representatives from Vancouver Island colleges and universities by invitation
- Regional District and local government staff are invited to the table as supports and advisers
- The group will be kept to a manageable size to maintain forward momentum

ROLES & RESPONSIBILITIES

Role of Co-Chairs:

- Two to three local government elected officials and/or First Nation representatives will act as Co-Chairs for the Steering Committee for a one-year term.
- Co-Chair responsibilities include:
    - Leading the development of an annual workplan
    - Liaising with the Steering Committee's secretariat
    - Rotate chairing quarterly Steering Committee meetings.

Role of Members:

Members of the VICC-CLP Steering Committee commit to:

1. Recognizing that local climate solutions are needed to mitigate and adapt to climate change.
2. Attending and actively participating in quarterly meetings organized by the Secretariat.
3. Providing input and feedback to the Secretariat on the administration of the committee
4. Engage in learning, mentoring, and communicating with other elected officials
5. Apply lessons learned to climate action, based on peer-reviewed climate science and best practices.
6. Wholeheartedly championing the Steering Committee within and outside of their work areas and sharing relevant learnings from the Steering Committee with their council and regional district colleagues and local government administration.
7. Fostering a safe environment for exploring challenges and advancing leading edge and collaborative solutions.
8. Notifying the Secretariat and fellow members of the Steering Committee, as soon as practical, if any matter arises which may be deemed to affect the positive progression of the Steering Committee.

Activities members may engage in include:

- Participate at meetings, including making presentations, recommending speakers and topics, and providing an update on climate-related activities;
- Participate in subcommittees and implementation clusters, which may include in-kind or financial support towards special project work; and
- Share best practices and other information and provide links to resources about related activities of interest / relevance to members of the Network.

Associate members:

- Representatives from Vancouver Island universities and colleges, local government staff, or other associate members may be invited to speak at or participate in steering committee meetings, sub-committee working groups, or other events hosted by the Steering Committee

Role of Community Energy Association (CEA):

The Community Energy Association will provide secretariat services to the Steering Committee, including:

- Member management and onboarding of new members
- Coordination of steering committee meetings
- Private webpage hosting & management
- Development and maintenance of digital resource library
- Overarching project management
- Fiscal and contract management, grant applications
- Administration and liaison with regional staff network (in-kind)
- Evaluation and reporting

MEETING PROCESSES

- The Steering Committee will meet virtually for four quarterly meetings annually.
- Meetings will be structured around a workplan that will be generated from feedback of all members and steered by the Co-Chairs.
- Meetings will be structured to encourage free and open discussion of relevant issues, within the constraints of the planned agendas. Each meeting may consist of:
    - (Optional) Closed Discussion – Primary members only
    - Presentations from members or invited guests
    - Roundtable Updates
    - Updates from the VICC regional staff peer network
    - Updates from the Secretariat
- Meetings will typically be scheduled for 2 hours. Occasionally, extended meetings or additional activities may be scheduled that are particularly timely/important.
- Meeting agendas will be provided at least one week prior to the scheduled meeting.
- These terms of reference will be reviewed annually by the members.
- Subcommittees or working groups may form around specific issues and hold additional meetings as needed.

PRINCIPLES FOR ENGAGEMENT

The Steering Committee will adhere to the following principles to promote inclusivity through its work:

- Acknowledge that individuals have unique and particular needs in the learning and work environment
- Promote inclusivity by reasonably adjusting procedures, activities, and physical environments
- Be inclusive in all forms of communication
- Treat all with sensitivity, respect, and fairness

REPORTING

The Steering Committee will report to Regional Districts through the board-appointed representative. A short summary of each meeting will be circulated to Steering Committee members after each meeting, to be used for reporting purposes at the discretion of members.

The Co-Chairs of the Steering Committee, with support from the CEA Secretariat, will send an annual update to:

- The AVICC Executive
- The UBCM Special Committee on Climate Action
- FCM
- The Minister of Environment and Climate Change Strategy
- Climate Solutions Advisory Council
- The Climate Caucus
- First Nations Health Authority
- First Nations (by way of working group members sending to the Nations in their areas)

The working group will apply to present at annual AVICC conferences.

DECISION MAKING

- Non-financial decisions will be made by consensus of all members present
- Financial decisions will be made by majority vote of the committee

EVALUATION

The Network's success will be determined by a process of setting goals and assessing progress against those goals.

REVIEW & CHANGES TO THE TERMS OF REFERENCE

- This Terms of Reference is intended to be a living document and will be reviewed annually at minimum through member feedback.
- Changes may be made at any time by the consensus of the group

Last updated: July 13, 2023

APPENDIX – MISSION, VISION, VALUES

Mission

To connect local elected officials and staff from diverse communities in the VICC region and empower them to accelerate their work on climate change and meet their goals by sharing best practices, collaborating on problem solving and advocating to other orders of government.

Vision

Vancouver Island and Coastal Communities working together to reduce emissions and mitigate climate change at the same time as adapting to a changing climate by creating resilient, regenerative, inclusive and prosperous communities and economies.

Values

We are committed to:

1. Working in a spirit of **reconciliation and decolonization**[1] with the First Nations on whose homelands all of our cities, districts and towns are located.
2. Recognizing that **we need each other to flourish** and that collectively we are more powerful and have greater impact than working alone.
3. Working beyond climate considerations and taking an approach of **inclusive, regenerative community building**.
4. Respecting **local autonomy and decision making** and providing resources and support – especially to smaller local governments.
5. Using our time wisely, **staying focused**, and honouring the energy of those who are doing the work.
6. **Learning from each other** by making time in each meeting to share something we are excited about or struggling with.
7. Shifting the conversation about climate change to **joy, possibility and solutions** in order to create momentum and push through climate despair.
8. Bringing together First Nations, community-based, and academic ways of knowing and **valuing the areas of overlap and the differences**.
9. **Engaging our communities** through our climate action work.
10. Drawing on the **passion and energy of youth** in our communities and creating opportunities for youth involvement and participatory action research.
11. Working with a **sense of urgency while balancing** the need to build support and understanding and bring others along on the journey.
12. **Not duplicating** the efforts of others!

[1] Advancing reconciliation requires renewing and improving relationships with Indigenous peoples. One of the obstacles to this is that how we work together is often shaped by institutions, habits and ideas that reinforce colonial (unequal, unfair, discriminatory) relationships. We must actively commit to reshaping these institutions, habits and ideas so that we can create ways of working together that are fair, equitable and mutually supportive. When we commit to decolonization, then, we are committing to reflecting on and changing our institutions and ways of working, and our own ideas, to ensure that they support reconciliation.

Territorial Analysis and Survey of Local Government Priorities for Climate Action: Vancouver Island and Coastal Communities

PICS
PACIFIC INSTITUTE FOR CLIMATE SOLUTIONS

University of Victoria

We gratefully acknowledge the support of the Pacific Institute for Climate Solutions to undertake this work.

Document produced for the Vancouver Island and Coastal Communities Climate Leadership Plan Steering Committee (VICC CLP SC) by: Tamara Krawchenko, Katya Rhodes, Kimberly Harrison, Katherine Pearce, Kara Shaw, Astrid Brousselle, Tara Ney, Catriona Mallows (University of Victoria).

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COVER PHOTO: Cortes Island, Catriona Mallows

Introduction

Territorial Acknowledgement

The authors respectfully acknowledge that the Vancouver Island and Coastal Communities Region is located upon the traditional unceded territories of many different Indigenous peoples. Although every effort is made to use unbiased data, much of the data is not framed to adequately reflect Indigenous realities.

The climate change challenge

Climate change is a complex and ongoing challenge that communities across the Vancouver Island and Coastal Communities Region (VICC) are tackling through a range of approaches. By 2050, it is anticipated that British Columbia will experience:

- Temperature increases of 1.3 to 2.7 ˚C;
- Increases in average annual rainfall from 2% to 12%, with summers being increasingly drier;
- Loss of glaciers resulting in changes to fish habitat, declining quality and storage of drinking water; and
- Continued rising sea levels along most of B.C.'s coast, more frequent wildfires and rainfalls (Province of British Columbia, 2020).

These environmental changes will have wide-ranging effects, from more frequent and severe heat waves and a greater propensity for forest fires to major disruptions in agricultural growing conditions. Climate change impacts all sectors of society and the economy now and in the future.

Our communities are connected in tackling this challenge. The Vancouver Island and Coastal Communities (VICC) region is already experiencing unique climate changes.

The **Vancouver Island and Coastal Communities Climate Leadership Plan Steering Committee** (VICC CLP SC) has been convened by three Vancouver Island Mayors—Lisa Helps (Victoria), Josie Osborne (Tofino), Michelle Staples (Duncan)—in order to help catalyze climate mitigation and adaptation throughout the region. The VICC CLP SC includes representatives from each of the regional districts on the island and the Sunshine Coast to produce a plan that will catalyze climate mitigation and adaptation throughout the coastal region.

This report summarises the findings of *Territorial Analysis and Survey of Local Government Priorities for Climate Action: Vancouver Island and Coastal Communities.* Please note that the Territorial Analysis (Part 1) covers the full VICC region, while the Survey (Part 2) covers Vancouver Island and the Sunshine Coast.

Why coordinate at the regional scale?

British Columbia has been at the forefront of actions to promote climate change mitigation and adaptation and there is widespread support for these efforts. Communities big and small across the province have adopted a range of initiatives and there are a growing number of regional plans that aim to scale up these efforts and to promote co-ordinated actions. Climate change impacts are experienced at a local level, yet existing municipal and regional district governance structures can constrain climate action plans, making planning at a broader regional scale essential.

Regionally-scaled planning can help municipalities and Regional Districts to:

- Pool knowledge and map and understand functionally connected territories;
- Share expertise and build capacity;
- Share the costs of environmental assessments and other upfront planning needs;
- Co-ordinate and scale-up investments in adaptation and mitigation efforts;
- Speak with a common and louder voice to upper level governments about the region's unique needs and priorities; and
- Mutually support communities of all sizes to meet their climate goals, with larger administrations supporting smaller ones.

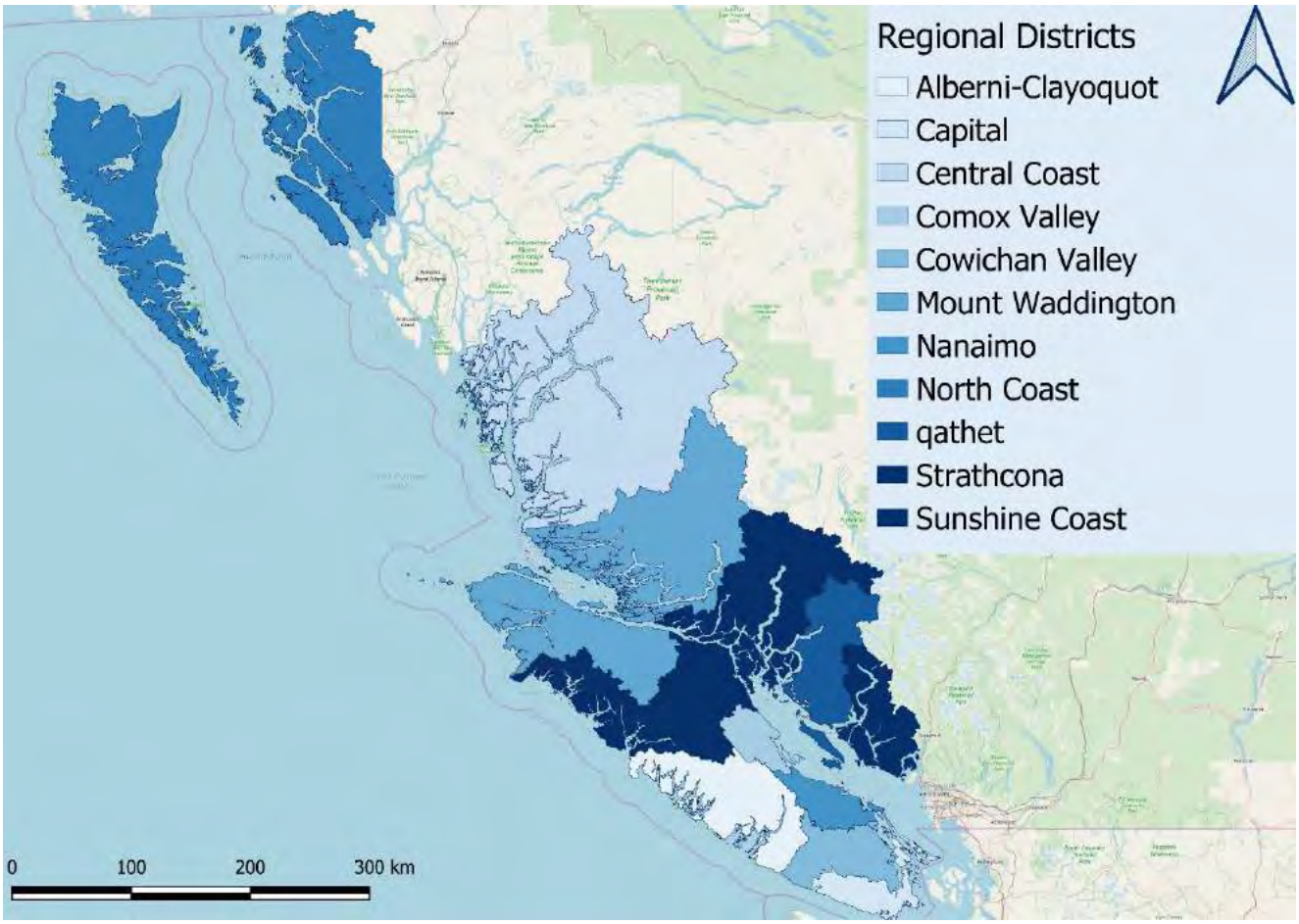
It is for these reasons that the VICC CLP SC has been convened. The VICC CLP SC shares a clear vision and priorities for its work, suggesting the potential for rapid collective progress. Collaborative planning at this scale thus offers a potential to build consensus and poly-benefits for climate action, including a shared regional vision to guide that action effectively and rapidly.

Cyclists on the Galloping Goose, Victoria, Catriona Mallows

Part 1. About the region

The Vancouver Island and Coastal Communities Region is comprised of 11 Regional Districts, 89 First Nations Reserves and Indian Government Districts, and 41 municipalities (Figure 1). The entirety of Vancouver Island and coastal mainland BC are the traditional territories of Indigenous peoples. The region is shaped by its proximity to water and includes approximately 40,000 islands of vastly different sizes and around 67 inhabited major islands, the largest of which is Vancouver Island. Many communities rely on connections to water for both transportation and livelihoods. Given the prevalence of coastlines, sea level changes pose risks as does the prospect of more frequent and severe storms. The mainland part of the region north of Vancouver is coastal and mountainous, with many areas having limited accessibility. In this region land transport connections flow east-west towards the Pacific. Coastal routes are the life-blood of communities.

Figure 1 Vancouver Island and Coastal Communities Regional Districts



Source: British Columbia Data Catalogue. https://catalogue.data.gov.bc.ca/dataset/d1aff64e-dbfe-45a6-af97-582b7f6418b9 & https://catalogue.data.gov.bc.ca/dataset/nts-bc-coastline-polygons-1-250-000-digital-baseline-mapping-nts#edc-pow

Much of the region is low density, characterised by small communities—rural-urban connections are critical to this region

> "Small islands have a more obvious finite land base and natural resources and any climate impacts will have a greater impact to our communities."
>
> – Islands Trust

The vast majority (80%) of the VICC population resides in small to large population centers, while the remaining 20% live in what can be defined as rural areas—i.e., those without a population centre (Figure 2 Urban Hierarchy by Population Centre, VICC, 2016). However, despite this definition, rurality is best understood along a gradient of more connected and dense places to less connected and dense ones. Smaller communities and rural areas may access services and labour markets in larger population centres; at the same time, these communities provide many resources and amenities that larger communities consume and enjoy, and are also a source of employment. Rural-rural connections are equally important. Across VICC, the nature of these connections and interrelationships are a key character of society and economy.

Figure 2 Urban Hierarchy by Population Centre, VICC, 2016

Type	Large urban population centres	Medium urban population centres	Small urban population centres	Rural area
Population range	100,000+	30,000 – 99,999	1,000-29,999	<1,000
Population by type	335,696	172,160	168,017	171,630
Share of population out of total	40%	20%	20%	20%

Source: Statistics Canada; Population Centre and Rural Area Classification 2016 & Population Centre Profiles, 2016 Census

The unique geography of VICC creates both opportunities and challenges

VICC is a complex terrain with landcover ranging from Alpine areas to Wetlands. The variety of landforms create great topographic relief, resulting in various climatic shifts and ecosystem changes. There is an abundance of precipitation resulting in rich rainforests flanking the coast. Much of the VICC is covered by forest: 45% of VICC is classified as old forest (140 years or older); 14.7% is young forest (less than 140 years old) and large tracts of the forest have been designated for logging.[1] Approximately 7.5% of the total land of VICC is either recently or selectively logged, providing revenue and jobs for the region.[2]

Coastal British Columbia is known for its rich ecosystems, and many areas within the VICC region have been placed under protection in the form of Protected Areas and Marine Protected Areas. Protected Areas of all types are important to the VICC region in many ways, not only are they crucial for protecting wildlife and ecosystems, but also to preserve areas of important cultural significance.

Tahsis 7, Sarah Fowler

VICC is well connected to population centres, but some rural areas are at risk

Though VICC is physically expansive, the vast networks of roads, ferry routes, and air travel connect people and trade. There are 16 highways, 73 ferry routes, 12 airports and numerous aerodromes and seaplane landings. Connectivity is most concentrated in the southern reaches of VICC, linking population centres to the mainland and Vancouver. The four largest population centres in VICC (Victoria, Nanaimo, Courtenay, and Campbell River) are the most connected, with several highways and ferry terminals boasting high traffic thoroughfare daily. The northern communities, such as Bella Coola and Prince Rupert, are more isolated from the rest of the territory, as the only vehicle access is through the two highways which terminate at these cities or the ferry services. Some of the more rural reaches of VICC have fewer links to depend on, which creates a vulnerability especially when storms or other hazards threaten to block or wash out the local roads.

Population centers in the south are growing, while many rural areas are shrinking

The Regional Districts of VICC have a wide range of population growth in the ten-year period from 2006-2016, ranging from an increase of 12.3% to a decrease of –7.8%. The Regional District of Nanaimo has grown the most in the ten-year period while the Comox Valley and Capital Regional Districts had the second and third highest population growth respectively. The three districts with the highest growth rates from 2006-2016 all correspond to districts with large or medium population centres. The only other regional district with a medium population centre is the Strathcona Regional District, which falls in the middle of the range with population growth of 6.3% over 2006-2016. Between 2006-2016, a mix of urban and rural census subdivisions (CSDs) experienced population growth: Langford at 57.3%, Central Coast A at 47%, and South Saanich 1 at 44%. Those CSDs that have seen the greatest population declines over the 2006-2016 period are largely rural and remote.

There is a large and growing senior population across the VICC

The average age of population in the VICC region is 44.8 years; this is above the provincial average of 42.3. The dependency ratio (the ratio of the young and working age versus seniors 65+) is 72% in the region and 63.2% across the province.[3] Thus, the VICC has an older age profile than that of the province as a whole.

Certain CSDs within VICC are experiencing changes in age balances more acutely than others; during the ten-year time span of 2006-2016, the Southern Gulf Islands experienced a -14% and -21% decrease of young and working age cohorts, while simultaneously having an increase of seniors by 51%. Even more profound are the changes found in the CSD of Sunshine Coast D: the youth population decreased by -23%, the working age population decreased by -10%, and the senior population increased by 97%. These examples illustrate the more extreme cases of changing population demographics within VICC.

An uncertain economic climate

The BC economy overall has experienced solid growth and a favourable labour market climate. Following strong momentum in 2019, BC was forecast to lead economic growth in Canada in 2020 (Government of British Columbia, 2019). However, the COVID-19 crisis has brought great uncertainty; economic growth forecasts for all provinces have declined with many forecasting negative growth in 2020. The TD Bank has forecast BC's economic growth at 0.5% for 2020 (on par with Ontario).

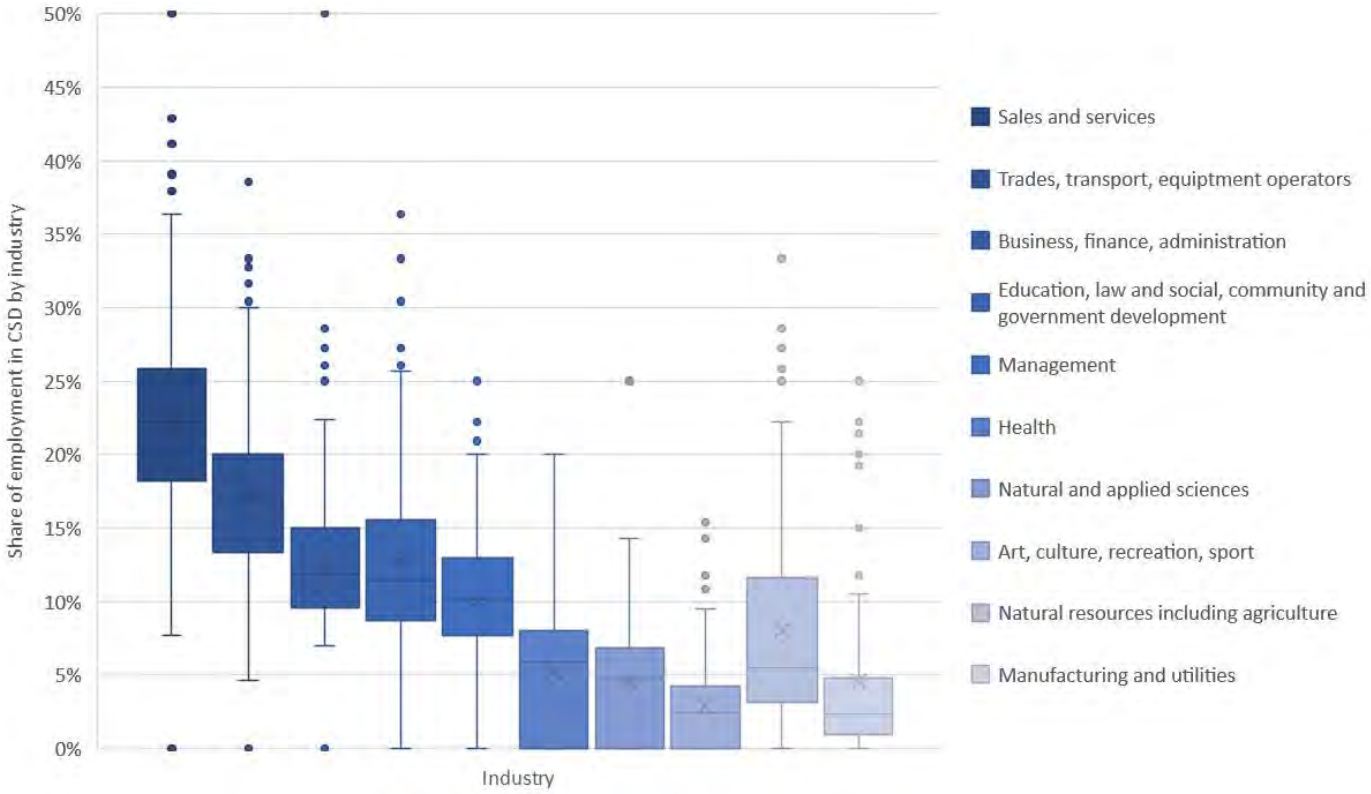
The VICC has a services-dominated economy—which in the short term is vulnerable to the impacts of COVID 19

Like the province as a whole, the VICC has a services dominated economy. Across the VICC, 87% of all occupations are service-based (CHASS, 2020). The largest services sectors by occupation are sales and services, trades and transport, and business, finance and administration. Some areas, especially those closest to population centres, are almost entirely services-based. The impacts of COVID-19 and negative price shocks have harmed all economic sectors, however they have been particularly harmful to services sector industries like tourism which are an important economic contributor across the VICC and the rest of BC. In 2018, the tourism sector in BC contributed $8.3 billion to GDP, which is higher than that of the mining ($5.2 billion), oil and gas ($4.9 billion) and agriculture and fishing industries ($3.2 billion).

> "The speed with which all levels of government and community responded to [the COVID-19] health crisis demonstrates the possibility, should the climate emergency be considered with a similar sense of urgency. There is a substantial opportunity for investment in climate change mitigation and adaptation as part of a green economic stimulus package."
>
> – Saanich

While the services sector is dominant, communities across the VICC also have important goods-based economies including the forestry, agriculture, and energy sectors. Goods-based industries are especially important in the northern halves of Vancouver Island and Haida Gwaii, as well as the mainland sections of the North Coast. BC's largely mountainous topography is not amenable to agriculture and the sector is relatively small; the smallest among Canadian provinces second only to Newfoundland. However, some of the province's prime agricultural areas are in the VICC such as Comox, Sayward and Cowichan valleys, Saanich Peninsula, Nanaimo lowlands, Alberni Valley, Powell River lowlands and many Gulf Islands. Farms in these areas tend to be smaller and specialized: the region accounts for only around 2% of total provincial farmland but 15% of total farms (Government of British Columbia, 2011).

Figure 3 Share of Employment by Industry, CSD, VICC, 2016



Note: Occupational categories by industry according to single digit National Occupational Classification codes, NOC.
Source: Statistics Canada; 2016 Census Labour Data, Accessed via Canadian Census Analyser (CHASS, 2020).

On average, residential GHG emissions have declined across the VICC

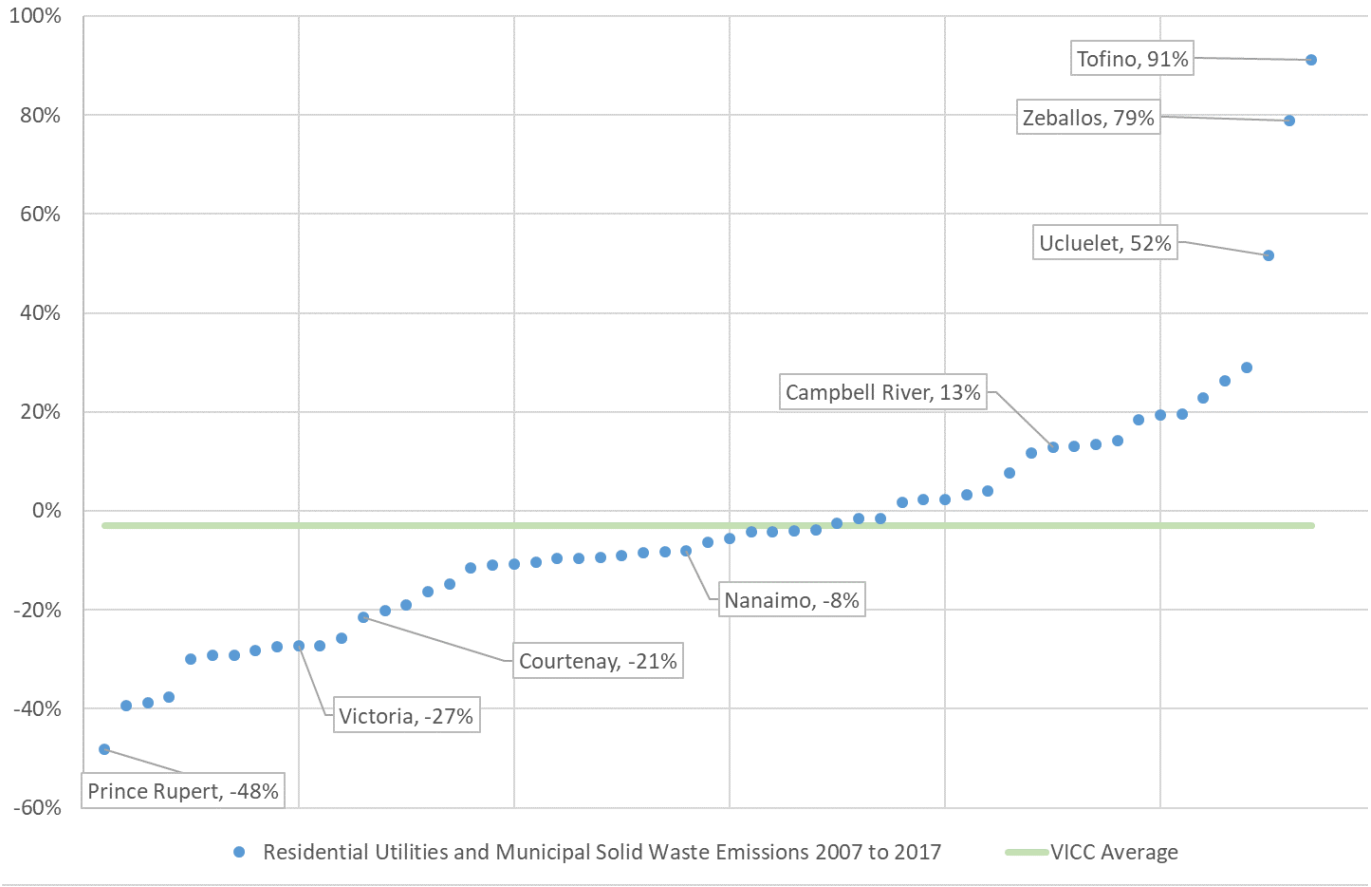
Residential GHG emissions from utilities and solid waste across the VICC decreased by 3% between 2007-2017 (Figure 4). At the lowest end, Prince Rupert has the greatest decrease in GHG emissions, at –48%, as well as having the lowest per capita residential utilities emissions for 2017 at 0.14 tonnes of carbon dioxide equivalent (tCO2e) (CAS, 2019). Port Edward, another northern community, has a decrease of -20% (CAS, 2019). However, not all northern communities are experiencing decreases in emissions; Masset and Queen Charlotte (Charlotte) on Haida Gwaii both have increases over the decade. This is likely a reflection on the remoteness of the islands, and is reflected in other island communities such as the Gulf Islands, which also are experiencing an increase in emissions. Another disparity is the difference within the Sunshine Coast communities; Gibsons and Sechelt are among the top five communities with the largest decreases, yet Sechelt Band Indian Government District is in the top five communities with the largest increases in utilities and solid waste emissions (CAS, 2019).

The community which had the highest residential emissions per capita in 2017 was Tahsis, at 7.40 tCO2e; but they also have among the lowest commercial and industrial GHG emissions per capita (at 0.13 in 2017) (CAS, 2019). More rural and isolated communities tend to have higher emissions because they do not have the capital to invest in the same scale of projects as more urban areas do, and often have to rely on diesel generators for much of their energy. These generators are not only high in emissions, but also in cost - a heavy burden for smaller communities. Higher energy demands may also be related to their location in colder climates.

The medium and large population centres of VICC all have changes below the territorial average, ranging from –8 to -27% (CAS, 2019). The decrease in tCO2e reflects the ability for urban areas to invest in greener infrastructure, low-emissions public transportation, and sustainable energy. These urban areas have had the ongoing opportunity to make such changes and investments and the data reflects the effectiveness of some of these initiatives.

PHOTO: Tahsis 6, Sarah Fowler

FIGURE 4 Percent Change in Residential Utilities and Solid Waste Emissions, per capita tCO2e, 2007 to 2017

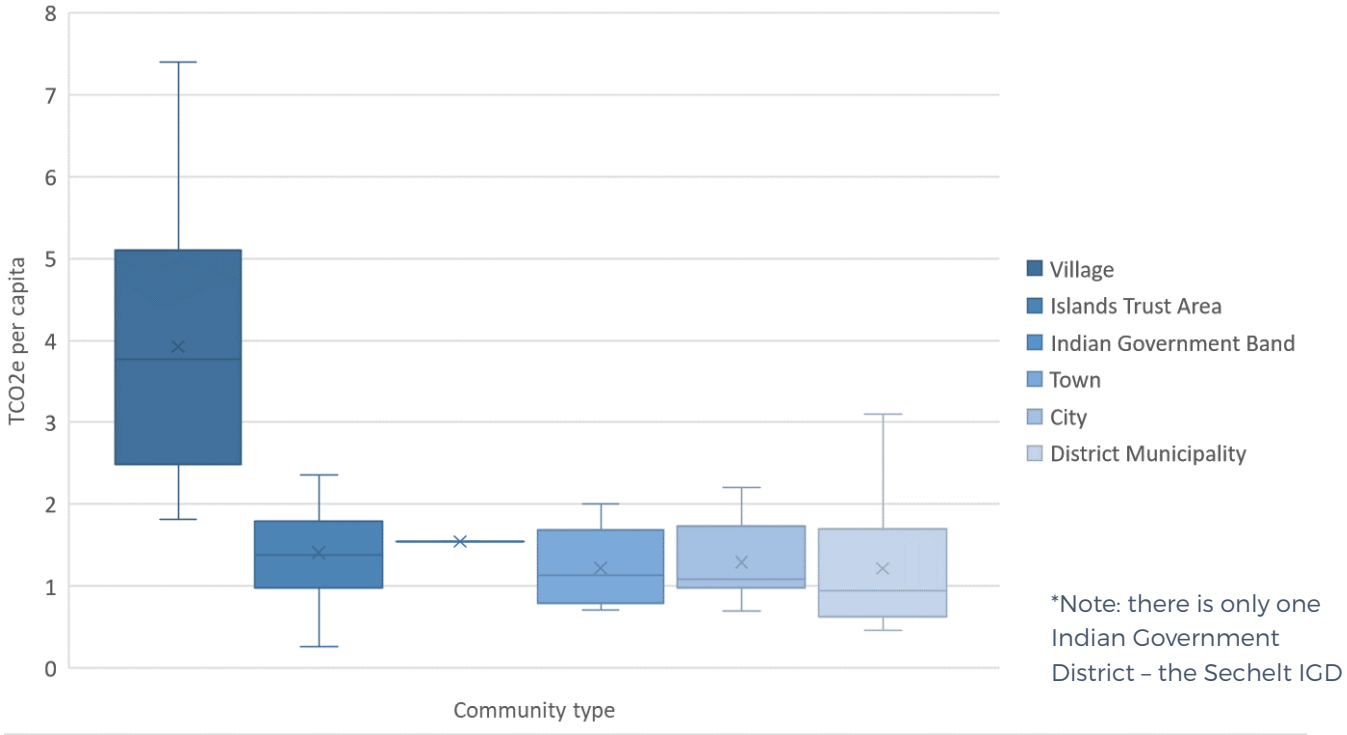


Source: Government of British Columbia Climate Action Secretariat (2019). BC utilities energy data at the community level, BC landfill waste data at the community level

Rural communities have the highest GHG emissions on average

Figure 5 Tonnes of Residential GHG Utilities and Solid Waste Emissions per capita, by Community Type, VICC, 2017 further illustrates the disparity between smaller communities and urban areas; the rural communities (villages) of VICC have the highest average residential GHG emissions in 2017, and includes places such as Tahsis, Zeballos, Masset, and Port Clements. These areas are all very remote in comparison to the population centres of VICC, and do not have access to the same connectivity or capital resources. Villages also display the largest range in emissions, indicating that some communities have invested in cleaner energy options, and others do not have that ability yet.

FIGURE 5 Tonnes of Residential GHG Utilities and Solid Waste Emissions per capita, by Community Type, VICC, 2017



Source: Government of British Columbia Climate Action Secretariat (2019). BC utilities energy data at the community level, BC landfill waste data at the community level

Energy use is by far the highest emitting sector for BC

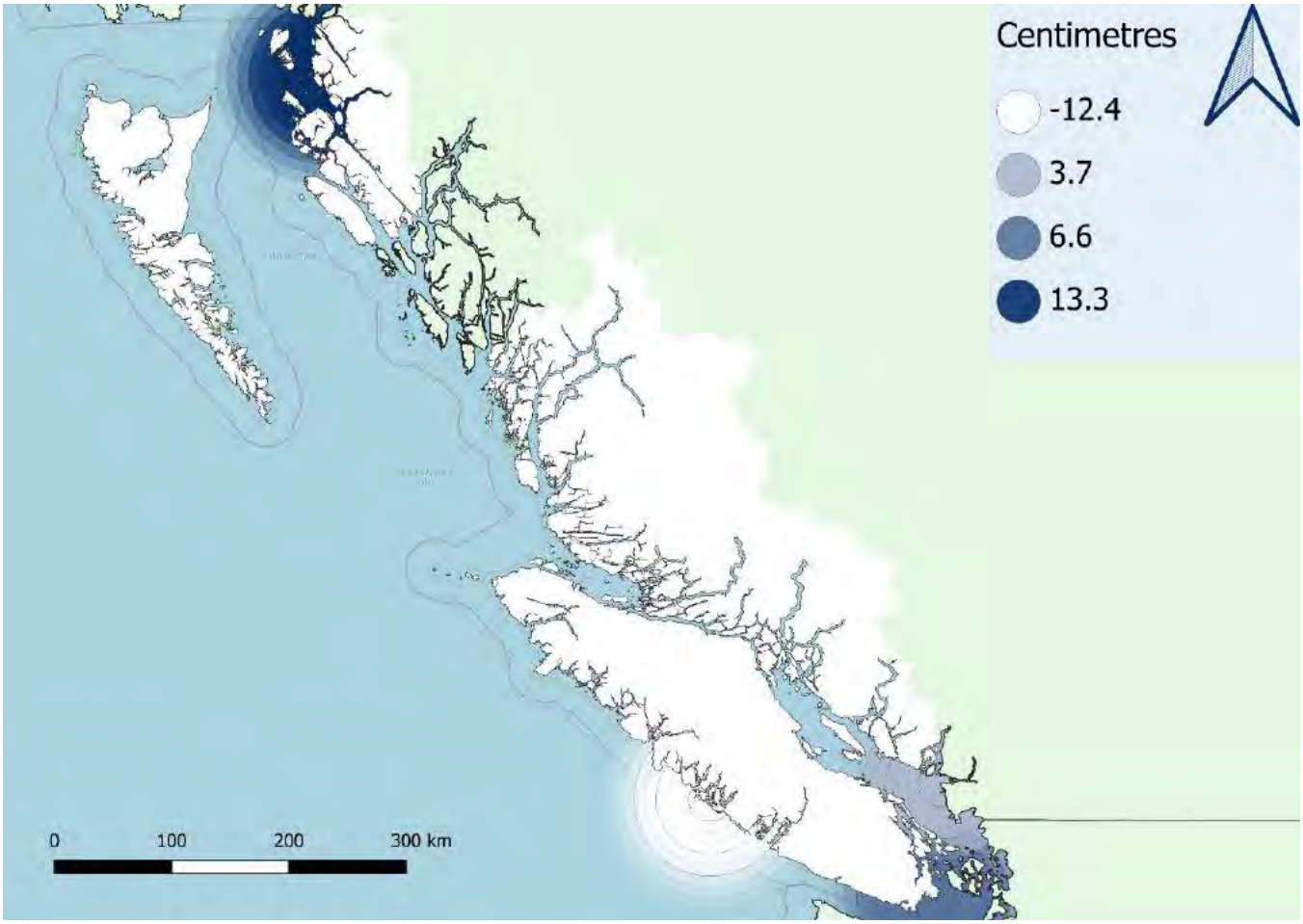
Although there are no further sectoral and sub-sectoral emissions data available for VICC, the Provincial Inventory can provide blanket characteristics for the region, drawing on the provincial trends. Energy is the largest sectoral contributor to total emissions, making up 81% of total BC emissions in 2017. The four other sectors, Industrial Processes and Product Use, Waste, Agriculture, and Afforestation and Deforestation, are all very similar in numbers, accounting for 6%, 5%, 4%, and 4% of total emissions respectively.

Transportation encompasses 50% of energy sector emissions. The VICC is heavily reliant on transportation in several ways; the region imports many of its goods (especially food) from other parts of BC by way of ferry systems and large transport trucks. Road Transportation makes up 34% of BC's energy emissions. Also, the rurality of VICC lends itself to an increased transportation sub-sector, as it requires significant travel to reach many of the remote and rural communities of the region. Oil and Gas Extraction is the next highest energy emitter at 14%, and Manufacturing Industries at 10%; both are part of the Stationary Combustion Sources sub-sector which is the second largest and accounts for 41%. These are not as dominant in VICC. Agriculture and Forestry are relatively low emitters, accounting for only 1% of the total energy emissions in BC.

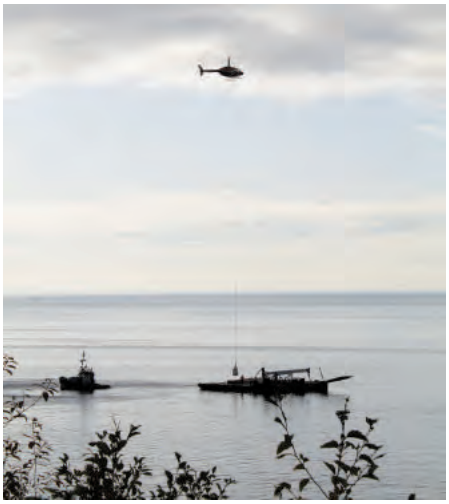
As a coastal territory, the changes in the ocean pose a serious threat to communities within VICC

Sea level rise varies across the VICC. In Prince Rupert the average sea level rise was 0.13m/century, and 0.06m/century in Victoria, while in Tofino the average sea level dropped at -0.12m/century (BCMoE, 2016). At first this may seem counter-intuitive, but there is a simple explanation; due to the isostatic rebound from the last glaciation, parts of Vancouver Island are rising at ~0.25m/century, while other areas are not moving (to a significant degree) (BCMoE, 2016).

FIGURE 6 Observed Change Sea Level, Centimeters per Century, Coastal BC, 1910-2014



Sources: BC sea level data (Government of British Columbia, 2020c); *US cartographic file* (US Census Bureau, 2020); *BC cartographic file* (Government of British Columbia, 2020b).



The implications of sea level rise within VICC are vast, including:

- Flooding, especially beaches, wetlands, coastal dunes, and waterfront properties;
- More frequent extreme high-water occurrences, impacting property, infrastructure (docks, wharves, port facilities), especially in Prince Rupert;
- Salinification of agricultural lands from intrusion of saltwater into groundwater aquifers and;
- Wave changes, including magnitude and direction, as well as storm waves and surges (BCMoE, 2016).

In addition to sea level rise, the oceans are also experiencing an increase in temperature. From 1971 to 2010, the ocean surface increased on average by 0.11˚C/decade globally (IPCC, 2014). In BC, sea surface temperatures (SSTs) have increased since—although trends vary depending on areas, data availability, and seasons 1935 (Talloni-Álvarez, Sumaila, Le Billon, & Cheung, 2019). In the southern region of BC, sea surface temperatures have increased 0.56 degrees Celsius per decade since 1935, and are expected to increase by 3 degrees Celsius by the end of the 21st century (Talloni-Álvarez et al. 2019, 166). The increasing amount of CO_2 entering the ocean is altering the pH of the water, making it more acidic (Canadian Climate Forum, 2017). Nearshore and coastal waters on BC's coast are particularly vulnerable to acidification, as freshwater inputs from rivers, glacial meltwater and sea-ice melt decrease the ability for coastal waters to buffer CO2 (Bush & Lemmen, 2019, 399).

VICC is experiencing rising temperatures, putting vulnerable populations at a higher risk

Globally, temperatures have increased on average by 0.85˚C/century, while BC on average has experienced increases on average of 1.4˚/century from 1900-2013 (BCMoE, 2016). Due to the complex geography of VICC, there are variations in the average temperature increases. The southern coastal reaches of VICC have experienced increases of 0.8˚/century, while more northern areas, such as Prince Rupert, have experienced increases of 1.1˚C (BCMoE, 2016).

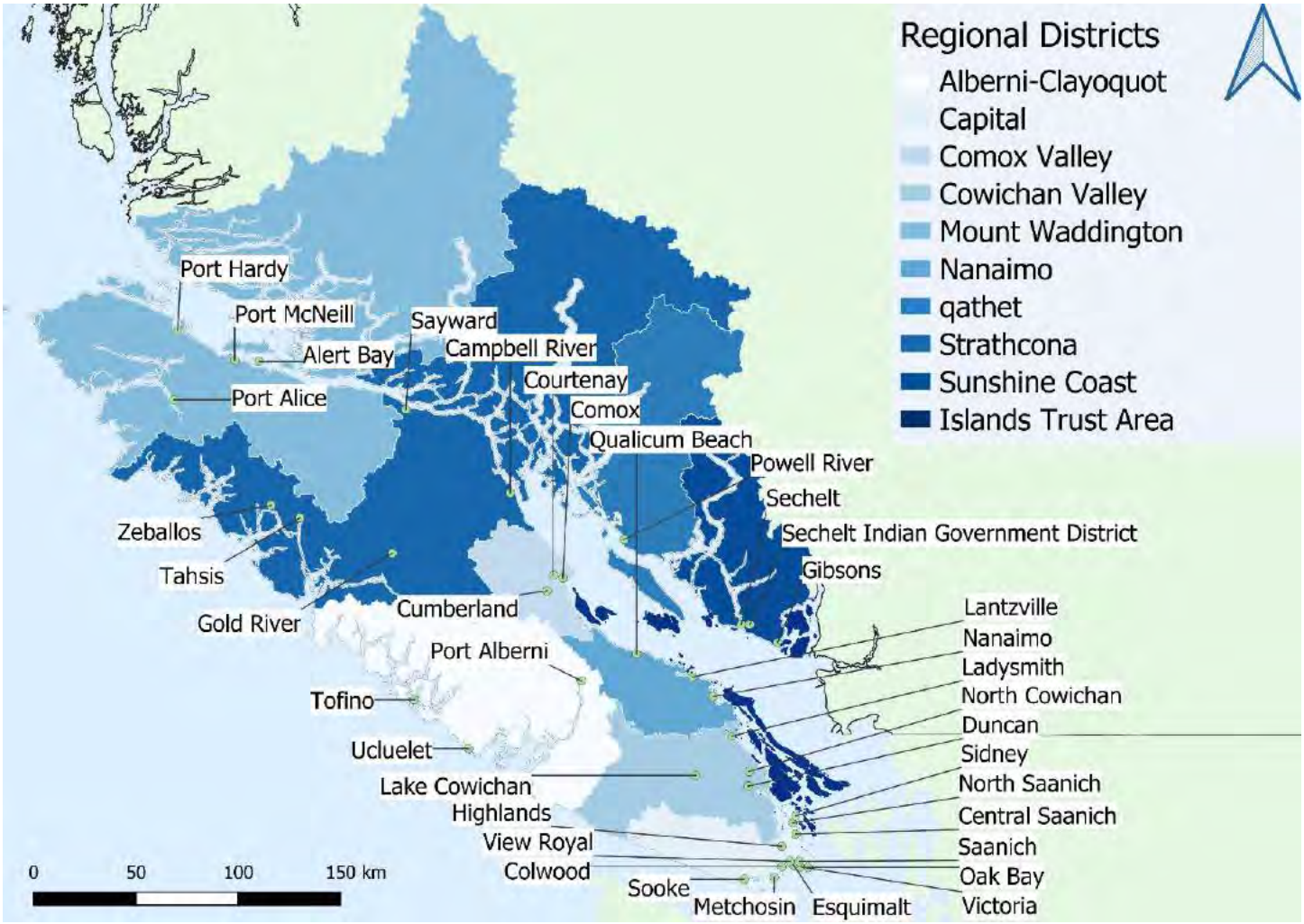
Heat waves are expected to happen more often in urban areas, because the built environment (paved roads, buildings, other infrastructure) retains heat more so than the natural environment (BCMoE, 2016). In Victoria, between 1951-1980, there were usually only 3 days a year which reached temperatures above 30˚C, but within this century that is expected to increase more than four-fold, to 13 days per year (BCMoE, 2016).

> "Cumulative/ compounding impacts will become increasingly challenging to address."
>
> – Capital Regional District

Part 2. Climate Adaptation and Mitigation Policies and Priorities

An understanding of the various climate impacts and policy priorities across the region is a key part of the regional climate planning process. This survey identifies the key climate impacts, policies, priorities, barriers, and opportunities that currently guide decision-making about climate change mitigation and adaptation in the region. A total of 106 government officials, including 69 elected representatives and 35 staff from 38 municipalities and 10 regional districts participated in the survey resulting in a 96% response rate. Only two municipalities did not participate in the survey (i.e., Langford and Parksville); all regional districts completed the survey. Multiple individuals from each local government were invited to participate in the survey, with responses for a single municipality or regional district aggregated into one complete response.

FIGURE 7. Regional districts and municipalities participating in the survey



Municipalities and regional districts are overwhelmingly supportive of climate action

The survey found that both municipalities and regional districts are overwhelmingly supportive of climate action: 100% of municipalities and regional districts answered that climate change mitigation and adaptation are "important" or "somewhat important" to their community.

An analysis of open-ended responses found that the top five common themes of motivation to act include: (1) public and/or political demand; (2) science and data on climate change, including observable impacts from changing weather patterns such as increased storms, droughts, and wildfires; (3) concern about sea level rise; (4) preparation for the future and concern for future generations; and (5) support and funding from senior levels of government. Several municipalities referenced their declarations of climate emergency and mentioned emissions reductions targets and/or climate action committees that have been established. Regional districts were particularly likely to mention senior government funding and support as an enabling factor in being motivated and able to take action

Climate change hazards and impacts are already being experienced

Virtually all municipalities and regional districts are already experiencing hazards and impacts related to changing weather patterns caused by climate change. The unique island and coastal geography of the region influences the types of hazards and impacts that are experienced in this area compared to other regions of the province. A 'hazard' refers to the potential occurrence of a natural or human-induced physical event or trend or physical impact that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources. "Impacts" refer to effects on natural and human systems of extreme weather and climate events and of climate change. Impacts generally refer to effects on lives, livelihoods, health, ecosystems, economies, societies, cultures, services, and infrastructure due to the interaction of climate changes or hazardous climate events occurring within a specific time period and the vulnerability of an exposed society or system.

> "Climate change is a public and therefore political priority. CRD and Islands Trust emergency declaration is spurring action. Climate change impacts such as forest fires and drought are already being felt here."
>
> – Islands Trust

All except for one municipality indicated that they have experienced hazards related to climate change with wildfires, extreme rainfall, sea level rise, storm surges, extreme winds, and droughts being the key hazards. Municipalities and regional districts identified additional hazards other than those listed in multiple choice responses including tsunamis, earthquakes, heating tank oil spills, air quality, and pandemics. Tsunamis and earthquakes were the most frequently mentioned "other" hazards.

Wildfire and extreme rainfall were top hazards in municipalities of all sizes

Hazards were identified as more prevalent in large municipalities than small and medium sized municipalities. Although heat waves were not a top hazard overall, they were identified as more of a problem in urban areas, and are a top concern in two out of three of the largest urban municipalities. Landslides stood out as being more a concern for small municipalities as compared to medium and large municipalities, which may relate to the remote nature of many of the smallest municipalities.

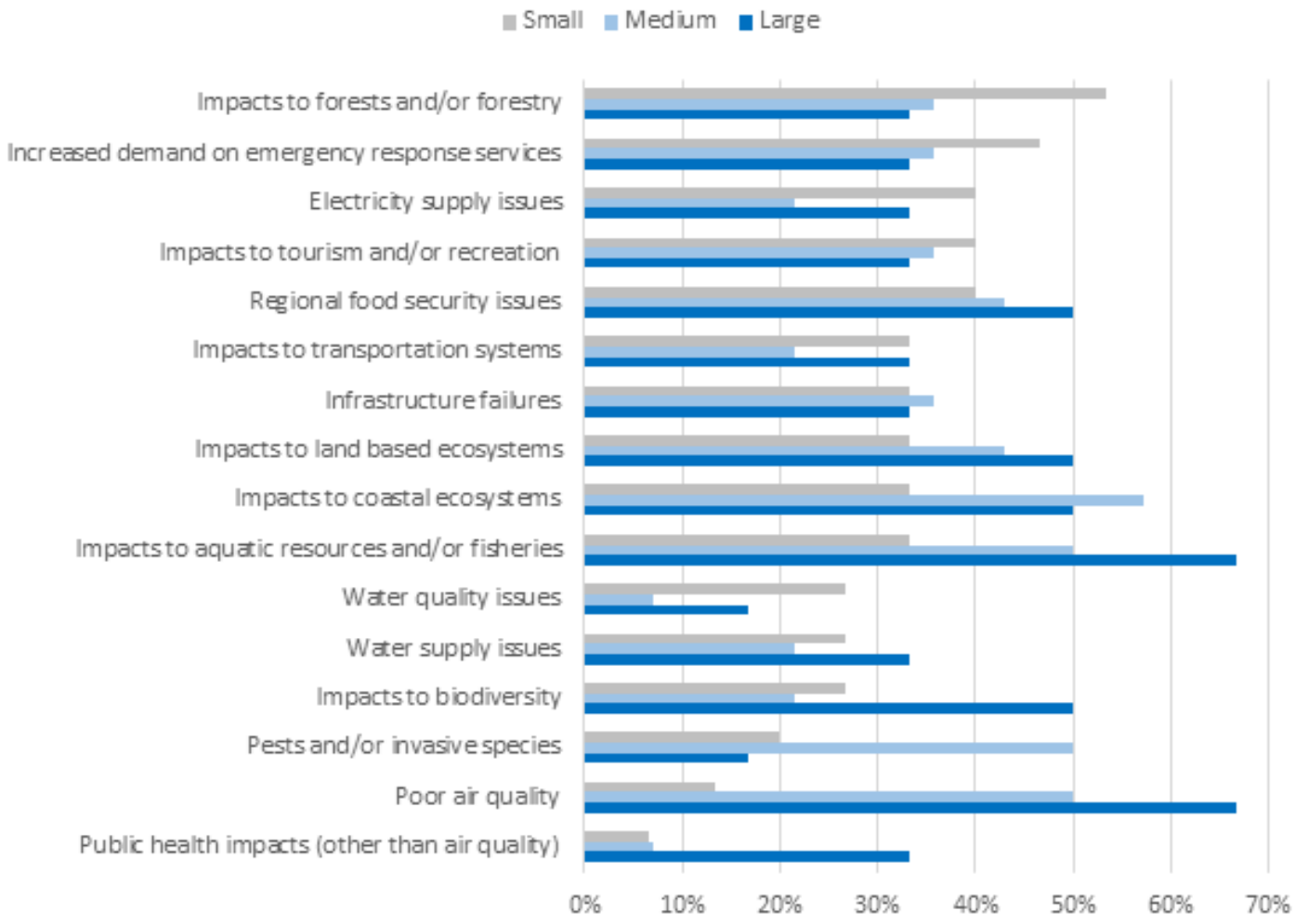
Russel Road washed away from heavy rain, Sunshine Coast, Donna McMahon

There are distinct regional differences in the impacts experienced

Small municipalities were more likely than mid-sized and large municipalities to identify impacts to forests and forestry, emergency response resources, electricity supply, tourism/recreation, and water quality. The impacts that are important to small communities reflect to some extent the closer linkage and dependency on natural resources, especially the importance of forestry. The demand on emergency response services may be a bigger problem for these small municipalities due to their smaller administrative capacity and the remoteness of many small communities.

Medium and large municipalities were more likely to identify impacts to aquatic resources, coastal ecosystems, and land-based ecosystems as a top impact compared to small municipalities. Large municipalities were the most likely to identify impacts to biodiversity compared to smaller municipalities. Air quality and health impacts were the least frequently chosen for small municipalities, but medium and large municipalities are much more affected by poor air quality and other types of public health impacts as compared to small and medium sized municipalities. These differences are even more pronounced when examining only the largest urban municipalities, all three of which indicated poor air quality as a top impact, with two out of three indicating other public health impacts.

Figure 8. Comparison of climate change Impacts by size of municipality

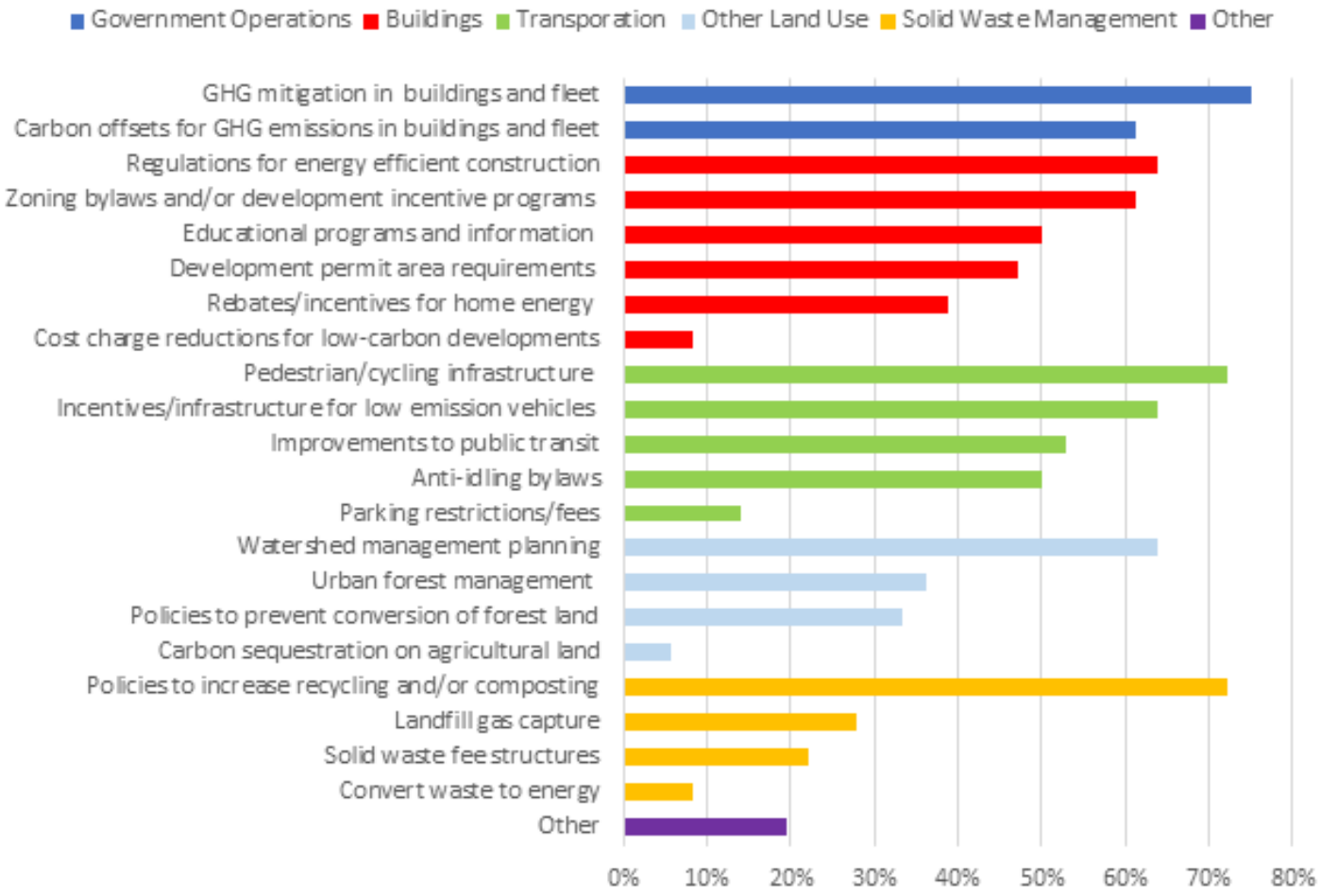


There is a high level for support for climate mitigation policies and practices

Municipalities and regional districts overall are highly supportive of taking action to mitigate climate change, and almost all have mitigation policies in place. Some of the most frequently mentioned priorities for climate change mitigation include: land use planning, green infrastructure, public transit, pedestrian and cycling infrastructure, building standards including civic buildings, fleet management, tree and forest conservation, and general community emissions reductions.

Municipalities and regional districts have implemented mitigation policies across a range of sectors, including government operations, buildings, transportation, land use, and solid waste management. Policies exist in almost all municipalities (Figure 9. Municipal mitigation policies by sector); only two indicated they have no mitigation policies currently in place. Most policies are investment-like policies, followed by regulations and incentives. The most frequently selected policy options included GHG mitigation in buildings and fleet (75%), pedestrian/cycling infrastructure (75%), and policies to increase recycling and/or composting (72%). Respondents were given the choice to indicate other policies not included in the list of options. They identified policies such as asset management, flood/sea level rise impact and mitigation studies, use of bio-diesel or renewable natural gas, investments in urban forest/tree planting, public education, corporate catering related to lower impact food choices, and establishing environment committees.

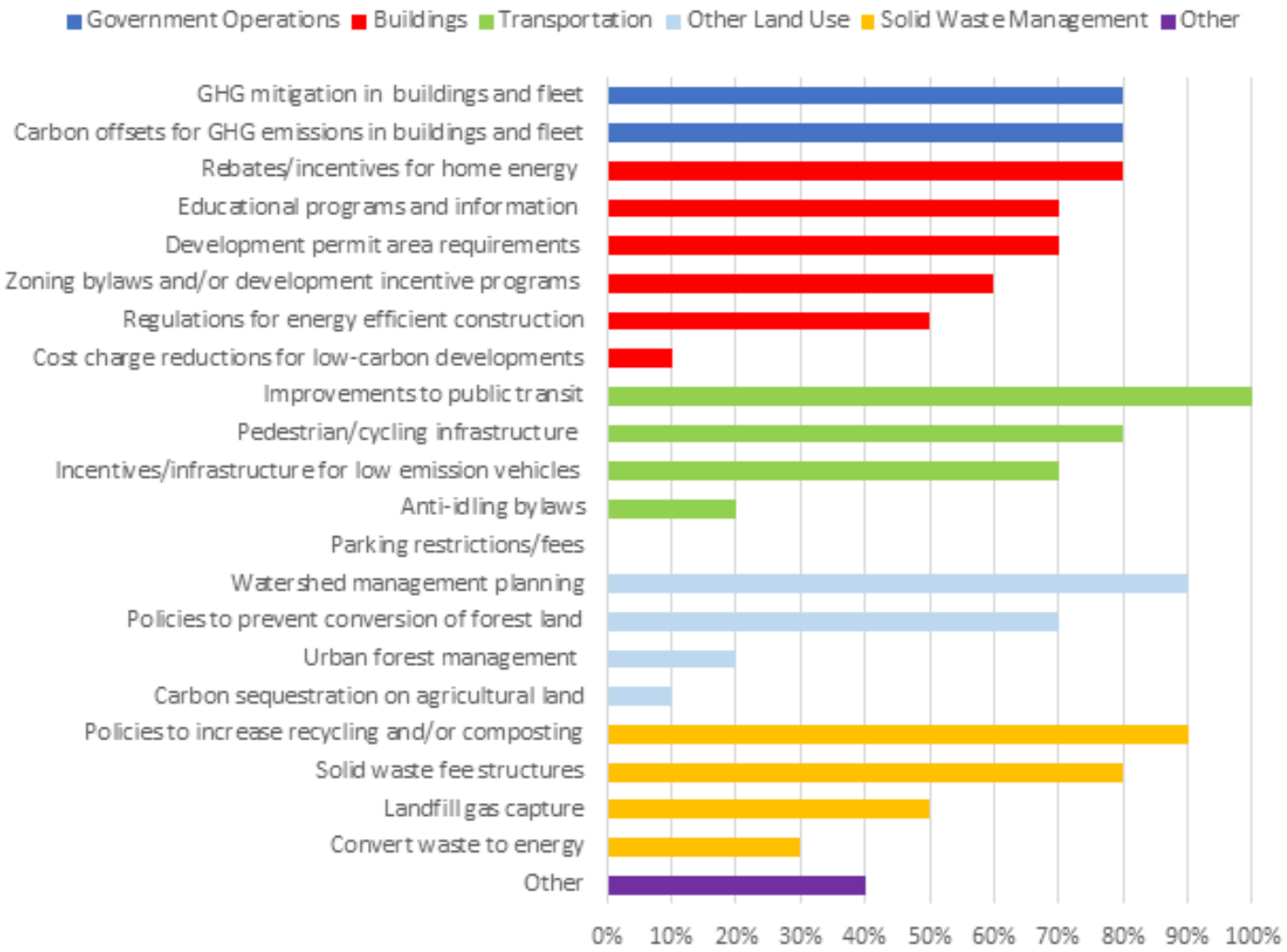
FIGURE 9. Municipal mitigation policies by sector



Climate change mitigation policies exist in all regional districts, across all sectors

Regional districts tend to have a higher number of mitigation policies in place compared to municipalities (average of 13 versus 9 for municipalities). The most frequently implemented policies in regional districts included improvements to public transit (100%), watershed management planning (90%), and policies to increase recycling and/or composting (90%). Differences in jurisdiction explain some of the differences in policies between regional districts as compared to municipalities; for example, regional districts tend to have more policies in the area of solid waste management. "Other" policies indicated by regional districts included water conservation measures, heat recovery, biosolids/woodwaste composting, integration of mitigation into plans including Official Community Plans and regional growth strategies, urban containment boundaries, emission reduction targets, and protection of Douglas fir.

FIGURE 10. Regional districts' mitigation policies by sector



Pedestrian and cycling infrastructure have the highest support

When asked about community support for different policy types, respondents indicated the highest level of support for investments in pedestrian and cycling infrastructure (69%), GHG mitigation in civic buildings & fleet (69%), and improvements to public transit (67%). In regional districts, the policies with the highest support included pedestrian & cycling infrastructure, rebates/incentives for home energy upgrades, and watershed management planning (100% each). Government investment and incentives, as well as voluntary actions tend to receive higher support than regulations and pricing.

> "Our staff is at capacity with existing work. We need more staff to manage new projects such as climate adaptation planning or even to finish the work on the list now."
>
> – Cumberland

It is uncommon to have dedicated staff working on climate issues

In terms of capacity, the majority of municipalities and regional districts do not have dedicated staff working on climate issues. Only 32% of municipalities and 40% of regional districts indicated that they have dedicated climate staff. Although the majority of municipalities do not have dedicated climate staff, four small municipalities do: Tofino, Ucluelet, Highlands, and Sechelt Indian Government District. Larger municipalities are more likely to have climate staff, with the four largest municipalities indicating that they all have dedicated staff. Regional districts with climate staff indicated they have between 1 to 4 staff.

There is a high level of support for climate adaptation policies

Similar to mitigation, municipalities and regional districts are overall highly supportive of taking action to help their communities adapt to climate change, and almost all have adaptation policies in place. Some of the top priorities for climate change adaptation mentioned in open-ended comments included emergency management planning, land use planning, infrastructure upgrades, green infrastructure, forest management and conservation, watershed management, asset management, water conservation, urban forests, food security and local food production, civic building standards, air quality, and planning for sea level rise. All regional districts and all but three municipalities have adaptation policies.

Support for adaptation policies varies

In municipalities, the most supported policies included storm water management (77%), emergency management planning (71%), and food security programs (71%). In regional districts, the policies with the most support included emergency management planning (100%), integration of adaptation into OCP/plans (100%), and lot level resiliency such as shade structures, rain gardens, rain barrels etc. (90%). One respondent noted that it is very difficult to gauge community support for the various policy options. Also, it was noted that in the case of regional districts, support can vary widely between communities.

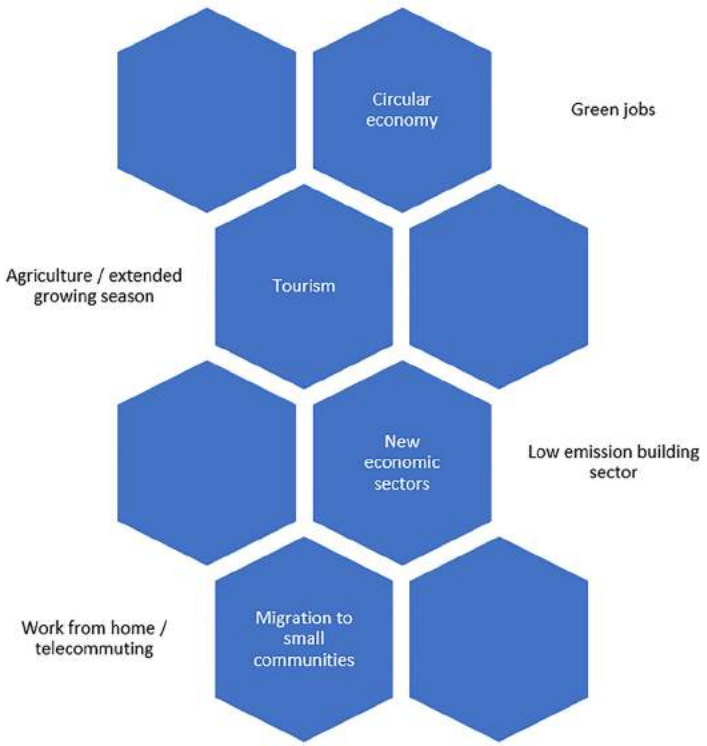
Barriers to action include a lack of financial resources and a lack of staff

Despite high levels of support for climate change mitigation and adaptation, local governments face a number of barriers to action, with lack of financial resources indicated as the top barrier for both municipalities and regional district. The second major barrier for municipalities is lack of staff capacity. Small municipalities face additional barriers including lack of expertise and limited data. Regional districts also tend to face additional barriers as compared to municipalities, struggling with limited authority and feeling a stronger lack of senior government support.

Opportunities for Climate Action: Green growth, clean energy, new jobs, rural vitality

Although responding to climate change is a huge challenge and local governments face a number of barriers to climate action, the climate crisis also presents opportunities for the future. Almost half (49%) of municipalities see new opportunities for their community as the climate changes; another 17% answered "maybe." Among regional districts, 70% anticipate new opportunities and 30% answered "maybe." Some examples of opportunities mentioned by respondents include building a circular economy, green jobs, benefits to agriculture including an extended growing season, tourism, new economic sectors such as the low emissions building sector, work from home/telecommuting opportunities, and increased migration to small communities, such as those in the VICC region.

Figure 11 Opportunities for climate action



Our shared future

> "Remarkable response to COVID by all levels of govt and by the public suggests we are capable of rising to the climate challenge. COVID has reinforced concerns about and is encouraging changes to address self-sufficiency (e.g., reliance on imported food and tourism)."
>
> – Islands Trust

Nearly all communities in the VICC region are already experiencing hazards and impacts related to changing weather patterns caused by climate change and most expect these hazards and impacts to continue and/or worsen into the future. Both municipalities and regional districts are overwhelmingly supportive of climate action, with 100% of local governments surveyed answering that climate change mitigation and adaptation are either important or somewhat important to their community. The vast majority of municipalities and all regional districts also indicated that their communities are supportive of implementing mitigation and adaptation policies. Most municipalities and all regional districts have implemented policies related to climate change mitigation and adaptation, with the numbers and types of policies varying by geography and by size of municipality. Despite these high levels of support for climate action, local governments face multiple barriers, particularly related to lack of financial resources and staffing capacity.

A lack of funding is a major barrier to local governments when it comes to climate change mitigation and adaptation. Limited authority and lack of senior government support were also important barriers, especially for regional districts, and survey respondents called for more regulatory and financial support from senior levels of government. This support could help build essential low-carbon infrastructure and fund community-level modelling projections to assess localized climate change impacts as well as the impacts of various policies on GHG emissions and costs to choose among most effective and efficient municipal and regional climate policies.

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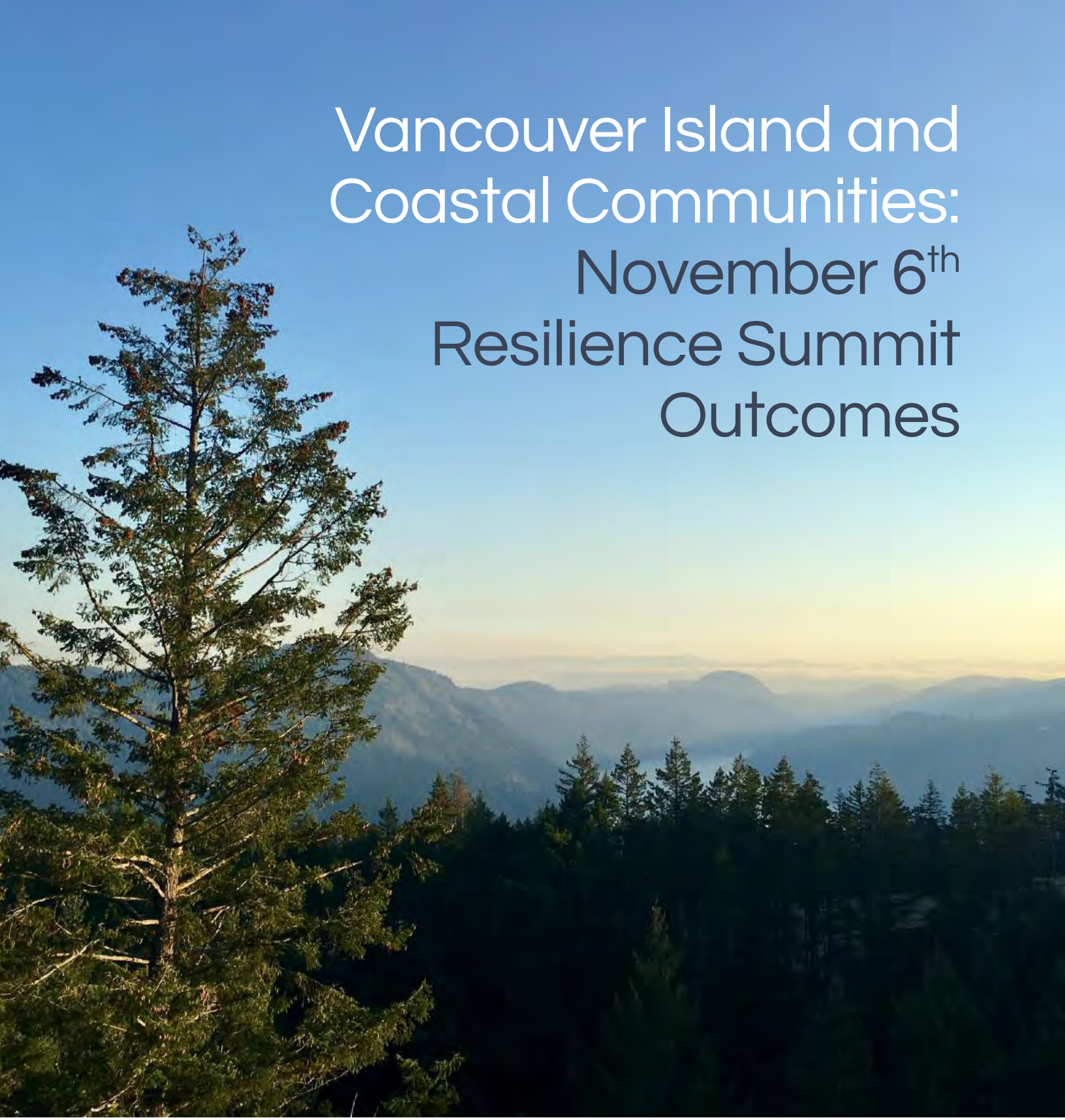
Notes

[i] The government of BC's land use data may overestimate the share of old growth forest by including low productivity bog and subalpine forests; they should thus be interpreted with a note of caution (Ancient Forest Alliance, 2016). Furthermore, there is no commonly accepted definition of an old growth forest but that "most of B.C.'s coastal forests are considered to be old growth if they contain trees that are more than 250 years old. Some types of Interior forests are considered to be old growth if they contain trees that are more than 140 years old" (Government of British Columbia, 2020a). A report by Price et al. (Price, Holt, Bio, & Daust, 2020) on BC's old growth forest disaggregates old growth forest by different sizes and across different ecosystems (biogeoclimatic variants) and productivity classes. By their assessment, the vast majority (80%) of old growth forest in BC is comprised of small trees and only 3% of BC's remaining forests support large trees (Price et al., 2020).

[ii] Recently logged timber is that which was harvested within the past 20 years, or older if tree cover is less than 40% and under 6 metres in height. Selectively logged timber does not have a defined timeline, it is determined by viewing aerial imagery (areas where the practice of selective logging can be clearly interpreted on the Landsat TM image and TRIM aerial photography).

[iii] Dependency ratio calculated according to Stats Can age groups of 0-19, 19-64, and 65+.



Vancouver Island and Coastal Communities: November 6th Resilience Summit Outcomes

PICS
PACIFIC INSTITUTE FOR CLIMATE SOLUTIONS

University of Victoria

Vancouver Island and Coastal Communities Climate Leadership Plan (VICC-CLP) Steering Committee
viccclp.com

We respectfully acknowledge that the Vancouver Island and Coastal Communities Region is located upon the traditional unceded territories of many different Indigenous peoples.

Our climate change challenge

Climate change is a complex and ongoing challenge facing communities across the Vancouver Island and Coastal Communities Region (VICC). By 2050, it is anticipated that British Columbia will experience:

- Temperature increases of 1.3 to 2.7 °C;
- Increases in average annual rainfall from 2% to 12%, with summers being increasingly drier;
- Loss of glaciers resulting in changes to fish habitat, declining quality and storage of drinking water; and
- Continued rising sea levels along most of B.C.'s coast, more frequent wildfires and rainfalls.

Climate change will impact all sectors of society and the economy now and in the future. Communities large and small, rural and urban have adopted a range of initiatives and there are a growing number of regional plans that aim to scale up these efforts to promote co-ordinated actions. Climate change impacts are experienced at a local level, yet existing municipal and regional district governance structures can constrain climate action plans, making planning at a broader regional scale essential. This is why we need to plan at a Vancouver Island and Coastal Communities wide scale.

Our communities are connected in tackling this challenge. Our overarching goal is for all our climate actions to increase community resilience across the Vancouver Island and Coastal Communities region, which in turn will better prepare our communities to navigate climate challenges.

The plan

The **Vancouver Island and Coastal Communities Climate Leadership Plan Steering Committee** (VICC CLP SC) was convened by three Vancouver Island Mayors—Lisa Helps (Victoria), Josie Osborne (Tofino), Michelle Staples (Duncan)—to catalyze climate mitigation and adaptation throughout the region. The VICC CLP SC includes representatives from each of the regional districts on the island and the Sunshine Coast (urban and rural), working together to produce a regional plan that will catalyze climate mitigation and adaptation projects and activities throughout the coastal region.

This shares the outcomes and a preliminary set of goals and actions that were jointly developed with participants in the VICC's Community Resilience Summit which took place on November 6th 2020. Over 150 elected officials and members of staff from across the VICC region engaged in a series of workshops to begin the first steps of developing a Climate Action and Resilience Plan to 2030 for the island and coastal communities. Two additional engagement opportunities will contribute to the development of the plan: a youth climate summit and an opportunity for Indigenous-informed Indigenous engagement.

Equity and Social Justice

Equity and social justice principles strive for a fair and equal society in which each individual matters, their rights are recognized and protected, and decisions are made in ways that are fair. This includes: Accessibility (what programs or services are truly accessible, particularly to those without financial means) and Choice (who has agency to choose and what impacts the ability to choose?).

GOAL 1:

A social justice and equity lens must be placed on all climate change decision making

- Develop a social justice charter in order to ensure that the VICC's work is grounded in a vision of climate justice and equity.
- Establish an enabling a space for those with lived experience to contribute, creating an accountability structure to inform what is meant by 'equity & social justice', developing a clear picture of the impacts, etc.
- Ensure that actions/policies/etc. distribute the benefits of climate mitigation and adaptation. This may include reducing energy poverty and reno/demovictions with retrofit policies, designing sliding scales for financial incentives, defining and supporting food security, access to housing, expansion of public transit, and eliminating the unequal burdens caused by climate change.

GOAL 2:

By 2021 there is a framework established to ensure that the voices at the planning and decision making tables that develop this Island and Coastal Community Climate Strategy are diverse and inclusive

- **Diversify voices and facilitate equal participation:** de-stigmatize those in the community needing support, encourage youth voices and participation, remove barriers for youth, BIPOC, LGBTQ, and women to have a say at the table and get into leadership positions, and design policy for all working and/or planning tables that clearly identifies who has to be represented.
- **Identify and invite diverse groups/voices to participate:** measure equity and set goals (who is involved, are our systems changing to be representative of and responsive to diversity in community?), exploring language and engagement practices.

- **Improve engagement and diversity:** Set expectations for participation, identify facilitators, educate students, develop training in intersectional equality and accessibility, provide education about climate justice, increase opportunities for public engagement, remove financial barriers to participation and secure funding to support participation.

GOAL 3

Indigenous priorities must be centered within the planning and implementation process

- Recognize and acknowledge reconciliation and Indigenous knowledge in planning and decision-making from the beginning. Reconciliation involves recognition of history and centering Indigenous priorities within the planning process.
- Meaningfully include Indigenous Peoples in decision-making and consultation, including fair compensation for their involvement. Incorporate UNDRIP/DRIPPA/Truth & Reconciliation into the work. First Nations must have a say in decisions about their land.
- Recognise colonization and actively work towards decolonizing practices of government.
- Protect ecosystems and lands, particularly with regards to First Nations food systems.

It is important that a diversity of voices inform decision making.

The unique opportunities and barriers facing First Nations communities, as well as the ongoing traditional relationship with the land, mean that First Nations must be participants in the process. It is also important to understand the unique circumstances and needs of different populations, including children, youth, families living on lower incomes, renters, and those living on the edge, recognising that there are differences in how people can manage when a crisis occurs.

Healthy Communities and Social Resilience

Resilience is the ability to *persist, adapt, and transform*, and is a characteristic of healthy communities**.** We need to work together to prioritize and foreground this to senior levels of government as part of Climate Mitigation and Adaptation planning. In everything we do we must support the health and well-being of our most vulnerable populations; this will increase overall community resilience and a community's ability to better withstand the shocks and disruption that climate change will bring.

GOAL 1:

By 2030 everyone across the VICC has access to adequate health and wellbeing supports as per the social and ecological determinants of health

- Establish a VICC housing corporation to achieve economies of scale in building new zero emissions affordable housing.
- Set up opportunities for health professionals, elected officials and municipal staff to work together and share best practices; enhance information sharing through community health networks.
- Facilitate development of health and wellness hubs (e.g. recreation centres, food banks) where community groups collaborate with health professionals.
- Support all communities to incorporate the social determinants of health into local decision-making.
- Take a Health in All Policies approach to municipal (land use) planning.
- Island Health, BC Housing and the First Nations Health Authority develop a VICC wide partnership to address unmet needs.

GOAL 2:

By 2030 all communities on VICC use a common measurement of wellbeing and there is a 50% improvement from when we started measuring in 2022

- Determine the most suitable and EASIEST way to measure that is also culturally appropriate and incorporates Indigenous ways of knowing.
- Work through Community Health Networks (an existing entity focused on social determinants of health) to implement the wellbeing measurement function.
- VICC communities agree to using a common wellbeing measurement by Dec 31, 2021, to be used going forward.

- VICC communities will start measuring wellbeing (using the agreed-to measurement), and provide an initial report by Dec 31, 2022.
- Following the first set of reports, VICC communities will agree on which metric(s) to focus on collectively.

GOAL 3:

By 2030 we have a VICC wide emergency management plan with actions that achieve 100% resilience and address the needs of priority populations.

- Establish a VICC wide emergency management and resilience planning body/table to develop an Emergency Management Plan for the VICC region.
- Ensure that the VICC emergency management plan explicitly incorporates the needs of vulnerable populations and uses an equity lens.
- Advocate to Emergency Management BC for a broader scope in the emergency planning process that incorporates people who are already homeless or displaced in emergency management plans.
- Engage impacted people through participation in the planning process and in Emergency Response debrief sessions.
- Connect residents VICC wide to share best practices on social resilience and emergency preparedness at the street or neighbourhood level.

All of the actions to achieve these goals require a culture shift and transformation from the way projects are funded to the way we develop policy.

Targets and benchmarks are critical to keep progress on track and hold ourselves accountable to the linkages between the health of people and the health of the environment. Buy-in and involvement from other community stakeholders (fire, police, hospitals, VIHA, etc.) will be critical to the success of these actions.

Food Security

Healthy food systems and ecosystems are the foundations of healthy communities. Food security entails universal access to safe, healthy, culturally-appropriate food all year around and across the region. An overarching goal is the achievement of food sovereignty, in which communities are taking an *active* role in co-managing their food systems to ensure that these systems express their values.

GOAL 1:

By 2022, all communities have access to resources to support embedding food policy into their policies and practices, and region-wide forums exist to support and scale up these actions

- Support every community to incorporate food (sovereignty/ security) into their planning and policies.
- Develop resources to inform leadership and staff about how this can be done.
- Establish forums for sharing community knowledge, advice, successes, and templates, and for identifying and lobbying for policy changes at other levels of government that would support this work.

GOAL 2:

We have complete local food systems that include infrastructure for production (growing, harvesting and processing), distribution and access by 2030, including the local knowledge and capacity to support them

- Support local growing and harvesting capacity, including access to lands and waters (develop land registries; innovative land-sharing programs; lobby for local access to and benefit from marine resources; develop research, training and knowledge transfer resources, etc.).
- Support local and regional processing and distribution capacity, at both household and regional scale (develop and support community kitchens; processing, storage, and distribution facilities; farmers markets, etc.).

- Enhance capacity by increasing learning and knowledge transfer about food systems, both to increase food literacy and to support those seeking to build careers, companies or organizations in sustainable food systems (reinvigorate farmers' institutes; develop new and expand existing educational programs to support food entrepreneurship and to braid local and Indigenous knowledge of food systems into courses and degrees).

GOAL 3:

Land and water-based ecosystems essential to food production are protected and restored region-wide by 2030

- Ensure ALR land is protected, and this is embedded in OCP and RGS language.
- Ensure that food systems are part of all land use planning and management.
- Advance the creation of Indigenous Protected and Conserved Areas and co-management agreements for important growing and harvesting areas, for marine as well as terrestrial species.
- Support and expand Indigenous Guardian Programs and other regional, place-based monitoring and stewardship initiatives that inform adaptation and serve as early warning systems for food safety.
- Develop systems for integrated community-based monitoring of productive ecosystems, and use this to shape adaptive management; ensure these processes consider connections and cumulative effects.
- Embed shoreline protection and restoration in OCPs to enhance "common" harvesting areas (with adequate monitoring for safety and to prevent overharvesting).

To be resilient, food systems need to be supported and organized across a variety of scales (household, neighborhood, community, regions) and they both require and support healthy lands and waters.

They also have the potential to help mitigate climate change and increase the resilience of communities to adapt to it. Prioritizing healthy lands and waters in all actions is essential. We need to recognize, respect, and develop synergistic relationships across First Nations' and Settler approaches to food systems. We can build upon the extraordinary variety of work that is already underway towards enhancing local, sustainable and resilient food systems.

Building resilient economies

A resilient economy is diverse, inclusive, and has the capacity to adapt and innovate. We need to think regionally as we build economies that transition from unsustainable resource extraction and carbon dependant industries to resilient regional economies that support responsible energy use and can generate *more* employment and deliver *higher* returns.

GOAL 1:

By 2030 all municipalities in the VICC will invest in clean, renewable energy industry to diversify the economy and create jobs in the region

- Grand plan for municipalities and regional districts to electrify fleets:
    - Senior government commit to eliminate fossil fuels;
    - Support clean industry and tech, and research and development; and
    - Incentivize energy retrofits.
- Determine barriers to such investments:
    - Incentivize rural/urban/indigenous partnerships;
    - Incentivize revisions of OCPs to align with this goal; and
    - Work with provincial government to incentivize funding approaches.

GOAL 2:

By 2030 incentivize small businesses and rural communities through investing in tourism, innovation, and internet access

- Incentivize and support for cottage/small business industry start ups.
- Support Island Coast Economic Trust to start climate-related economic investment.
- Ensure funding is not administratively onerous.
- Invest in sustainable tourism (e.g. Forest Bathing).
- Invest in First Nation-led and owned tourism.
- Facilitate regional networking and regional project.

GOAL 3:

Develop policy framework for measuring success of resilient economies (emphasis on triple bottom line)

- Coordinate all local governments to use common framework to measure prosperity and economic resilience:
    - Monitor support in various programs;
    - Be sure communities have resources to do this work;
    - Create platform to share results;
    - Adopt triple bottom line framework; and
    - Train local governments to apply framework.

We have a vision for a greener, smarter, and more inclusive economy.

Environmentally sustainable businesses that use clean and renewable energy are fundamental to building resilient economies that can regenerate rapidly after stress, and will often improve their situation compared to the pre-shock world.

Circular Economy

A circular economy aims to eliminate waste and pollution, keep products and materials in use, and regenerate natural systems. In order to minimise the use of resource inputs and the creation of waste, pollution and carbon emissions, products of non-biological "technical materials" such as metals, plastics and synthetic chemicals are kept cycling in the economy through the design of systems that facilitate reuse, sharing, repair, refurbishment, remanufacturing and recycling. Organic based biological materials are managed to ensure that at end-of-life they are properly decomposed to return nutrients to the environment to support the regeneration of natural systems.

GOAL 1:

Reduce 50% of food waste and divert 100% of organic material from landfill and incineration and by 2030

- Increase food waste reduction education for residential and commercial.
- Coordinate with forestry, restaurants and grocery stores to create new collection streams
- Ban organics from co-mingled waste streams.
- Establish organics processing infrastructure at all scales – rural, small and large municipalities.
- Capture forestry and industrial waste in the accounting of waste organic material.
- Refine regulations to improve quality of composted materials and their distribution.
- Develop local food production and supply chains.

GOAL 2:

Reduce per-capita disposal of material and consumer good waste to 150kg (85% Diversion) by 2030

- Increase and highlight re-use, repair, rental and sharing skills and services.
- Advocacy for right to repair.
- Regulations to decrease packaging waste/ban single-use items.
- Expand and reform extended producer responsibility (EPR) programs - recovery standards and percentage of recycled materials, incentives for redesign to support circularity.
- Increase access to recycling for rural communities through strengthening EPR programs and service levels.
- Address Industrial, Commercial & Institutional and Construction &Demolition waste streams.

GOAL 3:

Re-localize supply chains and increase local circular business

- Establish VICC circular procurement policy and systems.
- Increase skills training for trades and local resource manufacturing and food production.
- Establish hubs for re-use, sharing and repairing.
- Maximize local food chain capacity and remove regulatory and capacity barriers, such as over-restrictions of FoodSafe meant for large industrial food processing but penalizing small, local suppliers.
- Develop educational campaign promoting local services and products.
- Examine supply management.
- Incentivize and support circular business development.

There is great potential for impact.

According to a 2009 US EPA study, 50% of total Green House Gas emissions result from the provision of food and goods (products and packaging). These emissions are accrued at each step of the item's value chain from material extraction, production, transportation, consumption and disposal. By systemically addressing how we manage materials by reducing extraction of raw materials, re-localizing supply chains, designing materials for re-use, repair and recycle, and reducing waste, large reductions in GHG emissions across sectors can be achieved – by some estimates, up to 2/3rds of the emissions in the provision of food and goods.

Resilient Infrastructure

Infrastructure is the basic physical and organizational structures and facilities (e.g. buildings, roads, power supplies) needed for the operation of a society or enterprise; infrastructure resilience is the ability to reduce the magnitude and/or duration of disruptive events. The effectiveness of a resilient infrastructure or enterprise depends upon its ability to anticipate, absorb, adapt to, and/or rapidly recover from a shock.

GOAL 1:

Resilient Water Management

- Develop plans to assess capacity, durability and redundancy of water management systems regarding runoff, drinking water and non-potable water under potential climate change scenarios.
- Collaborate to identify capacity, jurisdiction, treatment, existing water uses, etc.
- Develop a common model of risk assessment.
- Integrate an understanding of systems, both natural and built, into water management.
- Ensure preparedness of existing systems.
- Develop integrated watershed management.

GOAL 2:

Resilient transportation Infrastructure for all modes of transportation

- Identify modes of transport, hubs, corridors, safety nets.
- Institute broad collaborative planning.
- Develop a united front to lobby province.
- Free electrified transit.
- Shared roads for all modes.
- Lobby to change MOTI's operating principles, road definitions.
- Lobby TC public transportation infrastructure.
- Improve data sharing.

GOAL 3:

Identify Infrastructure needs (both new and replacement) and funding

- Develop plans to assess risks and redundancy of infrastructure for transport of people, goods, resources, etc. under potential climate change scenarios.
- New building planning should be multifunction.
- Increase capacity to deal with as much waste processing locally as possible, including recycling, salvage, etc.
- Identify and upgrade existing infrastructure.
- Develop integrated plans on how to recover / rebuild after major events.
- Develop new funding models (new taxation tools), criteria that support the development of resilient infrastructure.
- Planning for collapse.

We need new ways of working to support infrastructure resilience.

We need flexible and scaleable projects. We need to support and celebrate the leaders and champions and to develop community education and consultation. We need better resources and information sharing. We need to collaborate with industry, trades, communities, volunteer groups (e.g. streamkeepers), First Nations, labour unions and youth.

Green Infrastructure

Green infrastructure incorporates both the natural environment and engineered systems to provide clean water, conserve ecosystem values and functions and provide a wide array of benefits to people's health and wellbeing. Green infrastructure solutions can be applied at the scale of a building through to the broad landscape. Examples of green infrastructure practices at a local level are permeable pavements, green roofs, and rainwater harvesting systems while across a landscape the preservation and restoration of an interconnected network of natural and semi-natural areas is key.

GOAL 1:

By 2030, embed the use of sustainable, renewable materials and permeable living surfaces into all new and retrofit built infrastructure to achieve 100% increase from 2020 levels

- Think of roads as pathways for the whole community and design for mixed-use active transport, reduced impermeability, and protection and restoration of natural assets.
- Expand the use of green roofs, carbon sequestering materials in building supplies, rain gardens, bioswales etc. in new builds and retrofits.

GOAL 2:

By 2030 ecosystem-based management underpins all land use in VICC to maintain and restore healthy aquatic and terrestrial ecosystems and to optimize the rebuilding of carbon stores

- Expand the protection and restoration of natural areas and ecological features.
- Develop water sustainability plans for all watersheds.
- Ensure local communities and First Nations are part of forest management decision making.
- Design and manage for ecological connectivity on the local and regional scale.

GOAL 3:

By 2030, VICC local governments will have integrated natural amenity accounting

- Develop VICC-wide data inventory of natural assets and amenities.
- Ensure that natural amenity accounting is developed with key stakeholders--including First Nation--and the data is shared in order to improve decision making and track progress.

Green infrastructure is a cost-effective, resilient approach to reducing flood risk and the impacts of heat and drought while providing many community benefits such as carbon storage, clean drinking water, fish and wildlife, and spaces to recreate.

Meeting these goals will take strong advocacy to communicate and coordinate across jurisdictions and First Nations. Key stakeholders include the ministries of Agriculture, Food and Fisheries, Environment and Climate Strategy, Finance, Forests, Lands and Natural Resource Operations and Rural Development, Indigenous Relations and Reconciliation, Municipal Affairs, and Transportation and Infrastructure, the AVICC, UBCM, First Nations communities, the BC Products Stewardship Council and the CRD interprovincial working group.

Buildings: getting to net zero through retrofits and new builds

Resilient and zero-emissions buildings can help achieve climate goals, reduce home-heating costs, and enable new skills-building for construction workers. Both emissions reductions and adaptation to changing climate conditions need to be accounted for when planning new builds and upgrading existing infrastructure. This is critical for mitigation.

GOAL 1:

By 2030, existing buildings will reduce energy usage and GHGs by 40%. All new retrofits must consider resiliency and adaptation.

- Develop retrofit financing tools (like PACE - Property Assessed Clean Energy) that work for everyone and cover all types of buildings (residential, commercial, industrial, institutional).
- Generate research-based metrics and targets that can be used to track progress, improved access and quality of data, and enhance capacity of energy advisors to support these targets.
- Create an advocacy, education and action plan for all local governments through AVICC, including hazard mapping to support appropriate land use and resilience planning.
- Lobby provincial government to pass legislation to ban oil heating, mandate point of sale building energy labelling and a building benchmarking program for large buildings.
- Work with communities to develop official retrofit programs plans, including a retrofit builders training program, one stop retrofit program for homeowners, and regional teams to facilitate, educate and support public uptake of rebate programs.

GOAL 2:

By 2030, all new buildings will be net-zero and resilient to the localized impacts of climate change.

- Alter the step code to include GHG emissions.
- All VICC Communities adopt step code by 2025.
- Local governments require low carbon heating and cooling systems through building bylaws (Greenhouse Gas Inventory, GHGi).
- Advise and offer training to local developers and builders to meet this goal.
- Adopt hazard lands development permit areas (sea level rise, wildfire interface, steep slope).
- Adopt development permit area guidelines for energy efficiency.

GOAL 3:

By 2025 (at the latest) we have the capacity across the island to support net zero and resilient buildings.

- Develop enough expertise to achieve goals 1 and 2 through increased training programs and green qualifications and licensing of trade.
- Ensure that a broad cross section of community is recruited (better representation of women and other equity seeking groups), including potentially workers from the fossil fuel sector.
- Ensure that funding and capacity for retrofits is in place and that building owners are aware of who can do the work in their communities.
- Develop programs and networks to support net-zero and climate resilient buildings, including energy auditor programs available remote communities, and net-zero and climate resilient building awards.

Switching to low-carbon technologies and increasing energy efficiency of buildings can move us forward to a future where buildings produce no emissions at all.

Regulatory changes, advocacy initiatives, and financing tools can help communities save money on heating, create new 'green' jobs, and be prepared to resist upcoming climate-related natural hazards.

Decarbonised transport

Transportation is one of the biggest contributors to greenhouse gas emissions in the region. In line with the provincial CleanBC strategy, the region needs to move to a zero-emission vehicle future with widely available charging infrastructure. We also need to connect all communities via transit, railway, and biking to allow for decreased reliance on driving and complete streets development of communities across the region.

GOAL 1:

By 2025, have accessible electric vehicle (EV) charging infrastructure for personal & commercial transport in all VICC communities in all sectors

- Build EV infrastructure including acquiring land that can be used for Level 3 charging.
- Collaborate with the private sector including partnering with car share and ride sharing companies to electrify their fleets.
- Develop a secure written agreement with all regional districts (RDs) to build and coordinate the charging system with support from BC Hydro and the provincial government.
- Increase broad education on the benefits of electrification, existing policy and costs of installing stations—use data and technology to increase support for EVs.
- Prioritize areas with greater density of apartments to have more access to public charging infrastructure—this infrastructure placement should be informed by good transportation data and projections.
- Provide rebates for charging infrastructure to home owners and developers.
- Use provincial post-COVID and other funding (e.g., CleanBC) to invest into EV charging stations in existing attached buildings.
- Develop regulations/bylaws for new developments requiring installation of EV charging stations.

GOAL 2:

By 2030, connect communities via biking, transit, and railway corridors and EV rentals in VICC

- Create an intergovernmental task force to model interconnectivity infrastructure.
- Develop public-private partnerships to enable collaborations between BC Transit, BC Ferries and the private sector (i.e., car share, e-mobility, rental companies).
- Enable full cost accounting/economic analysis of different transportation options and communication to public (i.e., account for co-benefits including safety, benefits for tourism and environmental benefits).
- Develop zoning requirements to enable EV rentals in appropriate places.
- Lobby BC and federal governments to develop a regional transportation plan and to receive their support/buy-in.
- Learn from leading jurisdictions on how such interconnectivity can be achieved and what policies and governance institutions need to be developed.

GOAL 3:

By 2025, allow for only complete streets design approach including transit-oriented development, densification and access to services

- Provide education to governments (i.e., elected representatives and staff) and developers about the benefits of this design approach and how it can be implemented.
- Write these principles into Official Community Plans (OCPs).
- Offer tax incentives or benefits to projects/developments that use this approach.
- Enable municipalities to buy land next to future transit/railway corridors to build housing, and then use money and profits to fund sustainable transportation projects.
- Lobby the provincial government for legislation mandating the implementation of these approaches by every level of government across the province—BC's Ministry of Transportation and Infrastructure can be used an active partner.

Electrifying vehicles and connecting communities via zero-emission transportation modes will lead to substantial environmental and socio-economic benefits.

To accelerate the transition, the region needs to have an integrated regional transportation plan. The plan will enable conversations with the provincial government to seek funding for EV charging infrastructure in all types of buildings, implementing new infrastructure to connect communities by rail and biking, and developing communities in a transit-oriented manner.

Active Transportation

Active transportation is central to health and wellbeing. Active transportation is any human-powered transportation like walking and cycling; it can be combined with other modes like transit. Investing in infrastructure to support active transportation protects the safety and wellbeing of friends and family and creates liveable spaces. Increasing active transportation can reduce trips made by vehicles and help us to meet our climate goals. Presently around 80% of GHG emissions in the province are from energy of which half are from transportation.

GOAL 1:

Two-thirds of trips to be made by active transport by 2030

- Mandate Vision Zero: No traffic fatalities.
- Update provincial road construction guidelines using Vision Zero, System Safety approach to road design, AAA (all ages and abilities) lens, prioritizing vulnerable road users and active transportation.
- Support cultural shift to active transportation in education and training.
- Reallocate street space for active transportation.
- Secure reliable, stable multi-year funding to implement Active Transport planning.
- Ensure that there is a rural lens on Ministry of Transportation and Infrastructure (MOTI) road guidance. Rural communities face different constraints and needs.
- Establish a VICC platform for shared policy learning.

GOAL 2:

Implement integrated regional transportation planning (inclusive of active transport) by 2030

- Jointly address Interregional planning gaps and identify priorities.
- Develop regional Memorandum of Understanding to convene municipalities and Electoral Areas at the Regional District Level to conduct regional transportation planning.
- Advocate for the Province to invest in inter-community connections for active transportation and transit. Ensure Province and BC Transit prioritize active transportation and inter-jurisdictional connections.
- Advocate for dedicated funding for integrated transportation planning across functionally connected areas. Establish fiscal incentives for joint planning and transportation infrastructure delivery.

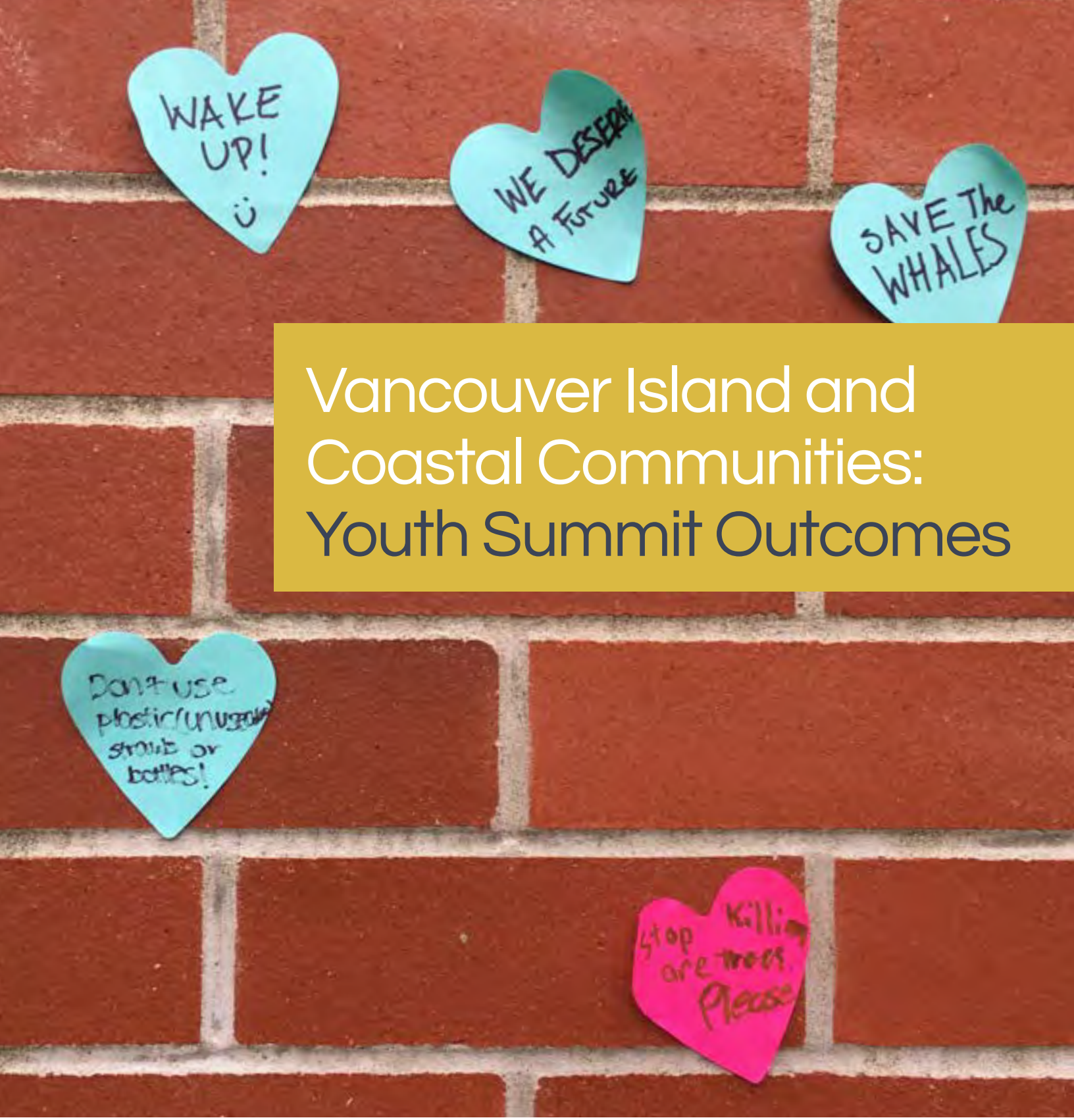
GOAL 3:

Ensure dedicated, stable, long-term funding for active transport by 2025

- Advocate for safe pathway maintenance to be covered in maintenance agreements and contracts to reduce barriers for small communities.
- Adopt fiscal incentives for employees who commute by active transport.
- Advocate for 1% of sales tax to municipalities.
- Advocate for a usage-based insurance system for vehicles in order to incentivise a reduction in vehicle use.
- Advocate for an increase in Federal Gas Tax funding.
- Advocate for green infrastructure stimulus for active transport from the federal government.

We have the vision and the will. We know what to do. We need the capacity and agency to pull it off!

Upper level governments, in particular the Provincial government, set the incentives for investment in active transportation. This includes regulatory and implementation guidance that is often out of date or contradictory when it comes to active transportation. Too often incentives are set against active transportation. We need solutions that work for communities of all sizes—rural and urban.



Vancouver Island and Coastal Communities: Youth Summit Outcomes

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University of Victoria

Vancouver Island and Coastal Communities Climate Leadership Plan (VICC-CLP) Steering Committee
viccclp.com

We respectfully acknowledge that the Vancouver Island and Coastal Communities Region is located upon the traditional unceded territories of many different Indigenous peoples.

Our climate change challenge

Climate change is a complex and ongoing challenge facing communities across the Vancouver Island and Coastal Communities Region (VICC). By 2050, it is anticipated that British Columbia will experience:

- Temperature increases of 1.3 to 2.7 °C;
- Increases in average annual rainfall from 2% to 12%, with summers being increasingly drier;
- Loss of glaciers resulting in changes to fish habitat, declining quality and storage of drinking water; and
- Continued rising sea levels along most of B.C.'s coast, more frequent wildfires and rainfalls.

Climate change will impact all sectors of society and the economy now and in the future. Communities large and small, rural and urban have adopted a range of initiatives and there are a growing number of regional plans that aim to scale up these efforts to promote co-ordinated actions. Climate change impacts are experienced at a local level, yet existing municipal and regional district governance structures can constrain climate action plans, making planning at a broader regional scale essential. This is why we need to plan at a Vancouver Island and Coastal Communities wide scale.

Our communities are connected in tackling this challenge. Our overarching goal is for all our climate actions to increase community resilience across the Vancouver Island and Coastal Communities region, which in turn will better prepare our communities to navigate climate challenges.

Young people are leading the charge. Today's young people are crucial to building a fairer, more sustainable future.

The plan

The **Vancouver Island and Coastal Communities Climate Leadership Plan Steering Committee** (VICC CLP SC) was convened by three Vancouver Island Mayors—Lisa Helps (Victoria), Josie Osborne (Tofino), Michelle Staples (Duncan)—to catalyze climate mitigation and adaptation throughout the region. The VICC CLP SC includes representatives from each of the regional districts on the island and the Sunshine Coast (urban and rural), working together to produce a regional plan that will catalyze climate mitigation and adaptation projects and activities throughout the coastal region.

This document shares the **VICC's Climate Action Goals: Youth** across several thematic areas. These goals were jointly developed with participants in the VICC's Youth Climate Forum which took place May 8th, 2021. This event brought together youth and young adults between the ages of 13-26 to collaborate on visions, goals, and actions for the region.

Theme 1: Equity, Healthy Communities, Social Justice, and Social Resilience

Resilience is the ability to *persist, adapt, and transform*, and is a characteristic of healthy communities. In everything we do, we must support the health and well-being of our most vulnerable populations; this will increase overall community resilience and a community's ability to better withstand the shocks and disruption that climate change will bring.

Equity and social justice principles strive for a fair and equal society in which each individual matters, their rights are recognized and protected, and decisions are made in fair ways. This includes Accessibility (what programs or services are truly accessible, particularly to those without financial means) and Choice (who has the agency to choose and what impacts the ability to choose?).

GOAL 1:

Live according to the principles of UNDRIP

- Ensure that the principles of UNDRIP are upheld;
- Ensure that communities are connected and that they work together to protect the environment;
- Recognize and acknowledge reconciliation and Indigenous knowledge in planning and decision-making from the beginning. Reconciliation involves recognition of history and centering Indigenous priorities within the planning process;
- Develop principles and legislation so that lands and waters have the opportunity to be recognised as living beings with rights.

GOAL 2:

By 2030, a social justice and equity lens must be placed on all climate change decision making

- Ensure that no one is unhoused in BC by 2025 and ensure that everyone has enough food;
- Ensure there is equitable access to mitigate climate emissions for everyone;
- Develop better mental health resources and education in schools, universities, institutions, and workplaces;
- Research barriers to taking climate action and ensure that these are considered in climate mitigation and adaptation policies;
- Implement Green New Deals across municipalities.

GOAL 3:

Promote more education and equal opportunities for people to act and live in harmony with land, waters and people

- Develop more resources and educational materials for individuals to be sustainable, ensuring throughout that people feel empowered through the educational system;
- Develop alternative economies so that people do not have to choose between a healthy environment or a healthy economy;
- Develop more opportunities for outdoor education schemes for all age ranges;
- Establish more opportunities for people to spend time outdoors to aid health conditions;
- Ensure that climate science is included in every school's curriculums;
- Diversify voices and facilitate equal participation: de-stigmatize those in the community needing support, encourage youth voices and participation, remove barriers for youth, BIPOC, LGBTQ, and women to have a say at the table and get into leadership positions, and design policy for all working and/or planning tables that clearly identifies who has to be represented.

All of the actions to achieve these goals require a culture shift and transformation from the way projects are funded to the way we develop policy. We think it is important that a diversity of voices inform decision making.

Theme 2: Food Security and Sovereignty

Healthy food systems and ecosystems are the foundations of healthy communities. Food security entails universal access to safe, healthy, culturally-appropriate food all year round and across the region. An overarching goal is the achievement of food sovereignty, in which communities are taking an active role in co-managing their food systems to ensure that these systems express their values.

GOAL 1:

By 2025, most of our food is from the island and grown sustainably

- Grow food in public areas wherever possible and equip communities with the policies and financial means to get this started;
- Work with the province and federal government to support the development of kelp farming;
- Develop a programme where every school can set up a community garden;
- Advocate that local universities and institutions invest in and research cultivated meats;
- Encourage the phasing out and banning of fish farms;
- Establish forums for sharing community knowledge.

GOAL 2:

By 2022, all communities have access to resources to support embedding food policy into their policies and practices

- Ensure First Nations can harvest important food sources;
- Reduce cost barriers for the new generation of farmers (ecosystem service enhancement).

GOAL 3:

By 2030, land and water-based ecosystems that are essential to food production are protected and restored region-wide

- Ensure Agricultural Land Reserve (ARL) is protected and increased its productivity;
- Encourage landlords to allow (and encourage) renters to grow their own food;
- Ensure that food systems are part of all land use planning and management;
- Advance the creation of Indigenous Protected and Conserved Areas and co-management agreements for important growing and harvesting areas.

To be resilient, food systems need to be supported and organized across a variety of scales (household, neighborhood, community, regions) and they both require and support healthy lands and waters.

They also have the potential to help mitigate climate change and increase the resilience of communities to adapt to it. Prioritizing healthy lands and waters in all actions is essential. We need to recognize, respect, and develop synergistic relationships across First Nations' and Settler approaches to food systems. We can build upon the extraordinary variety of work that is already underway towards enhancing local, sustainable and resilient food systems.

Theme 3: Circular Economy

A circular economy aims to eliminate waste and pollution, keep products and materials in use, and regenerate natural systems. To minimise the use of resource inputs and the creation of waste, pollution and carbon emissions, products of non-biological "technical materials" such as metals, plastics and synthetic chemicals are kept cycling in the economy through the design of systems that facilitate reuse, sharing, repair, refurbishment, remanufacturing and recycling. Organic-based biological materials are managed to ensure that at end-of-life they are properly decomposed to return nutrients to the environment to support the regeneration of natural systems.

GOAL 1:

By 2025, reduce 50% of food waste and divert 95% of organic material from landfill and incineration

- Legislate to ensure that businesses dispose properly of their waste;
- Learn from and build upon existing models that work for reducing and redirecting food waste;
- Develop efficient and effective composting systems that are required in all schools;
- Establish better educational materials on how to manage food waste and compost for residential and commercial properties;
- Provide greater access and funding for recycling depots in more parts of cities and rural areas;
- Coordinate with forestry, restaurants and grocery stores to create new collection streams;
- Ban organics from co-mingled waste streams;
- Coordinate compost audits with farmers;
- Discourage 'throw-away' culture, and where it exists, ensure that there are means for people to re-use safely.

GOAL 2:

By 2023, ban all plastic packaging and mandate that all sellable goods are either recyclable or reusable

- Develop alternative materials which are less energy-intensive;
- Legislate that packaging be compostable or re-usable (see Good Natured Products Inc);
- Develop regulations to decrease packaging waste/ban single-use items;
- Establish a strategy to manage 'bioplastics'.

GOAL 3:

Support communities via education and opportunities to grow more, compost more, and promote circular economies

- Support more education programmes around composting, recycling and reusing;
- Create programmes for students to connect with farmers;
- Encourage institutions, workplaces and businesses to promote multi-use products and/or compostable items;
- Devote sufficient funding so that local circular businesses can thrive;
- Encourage more food growing areas in urban spaces.

There is great potential for impact.

According to a 2009 US EPA study, 50% of total Green House Gas emissions are from the provision of food and goods (products and packaging). These emissions are accrued at each step of the item's value chain from material extraction, production, transportation, consumption and disposal. By systemically addressing how we manage materials by reducing extraction of raw materials, re-localizing supply chains, designing materials for re-use, repair and recycle, and reducing waste, large reductions in GHG emissions across sectors can be achieved – by some estimates, up to 2/3rds of the emissions in the provision of food and goods.

Theme 4: Green and Resilient Infrastructure

Infrastructure is the basic physical and organizational structures and facilities (e.g. buildings, roads, power supplies) needed for the operation of a society or enterprise; infrastructure resilience is the ability to reduce the magnitude and/or duration of disruptive events. The effectiveness of a resilient infrastructure or enterprise depends upon its ability to anticipate, absorb, adapt to, and/or rapidly recover from a shock.

Green infrastructure incorporates both the natural environment and engineered systems to provide clean water, conserve ecosystem values and functions and provide a wide array of benefits to people's health and wellbeing. Green infrastructure solutions can be applied at the scale of a building through to the broad landscape.

GOAL 1:

To preserve, protect, fund and restore 80% of essential natural assets and carbon sinks by 2030 (e.g. wetlands, salt marshes, old-growth, kelp forests)

- By 2022, all old-growth forests and sensitive ecosystems are protected and their health is continuously monitored;
- Expand co-management of natural areas with local First Nations;
- Develop conservation and restoration of native ecosystems (e.g. Garry Oak meadows, wetlands, forests);
- Develop regional care of marine ecosystems for local seafood;
- Monitor populations of key species;
- Host invasive species removal and native plant propagation in collaboration with First Nations.

GOAL 2:

By 2030, ecosystem-based management underpins all land use in VICC to maintain and restore healthy aquatic and terrestrial ecosystems and to optimize the rebuilding of carbon stores

- Expand the protection and restoration of natural areas and ecological features;
- Develop water sustainability plans for all watersheds;
- Ensure local communities and First Nations are part of forest management decision making;
- Design and manage ecological connectivity on the local and regional scale.

GOAL 3:

By 2030, all infrastructure is climate-ready

- Ensure BC is net-zero by 2035!
- Develop adaptation mechanisms such as sea walls and rain gardens;
- Ensure resilient water management;
- In coordination with the goals set out for active transport, ensure an increase in safe bike lanes.

We need new ways of working to support infrastructure resilience.

We need flexible and scalable projects. We need to support and celebrate the leaders and champions and to develop community education and consultation. We need better resources and information sharing. We need to collaborate with industry, trades, communities, volunteer groups (e.g. streamkeepers), First Nations, labour unions and youth.

Green infrastructure is a cost-effective, resilient approach to reducing flood risk and the impacts of heat and drought while providing many community benefits such as carbon storage, clean drinking water, fish and wildlife, and spaces to recreate.

Meeting these goals will take strong advocacy to communicate and coordinate across jurisdictions and First Nations.

Theme 5: Buildings: Getting to Net-Zero through Retrofits and New Builds

Resilient and zero-emissions buildings can help achieve climate goals, reduce home-heating costs, and enable new skills-building for construction workers. Both emissions reductions and adaptation to changing climate conditions need to be accounted for when planning new builds and upgrading existing infrastructure. This is critical for mitigation.

GOAL 1:

By 2030, all new buildings are powered by 100% renewable energy, will be net-zero and resilient to the localized impacts of climate change

- Phase out fossil fuel extraction by 2027 and subsequently ban oil heating;
- Work with communities to develop official retrofit programs plans;
- Promote lifecycle costing so that more sustainable building options are assessed based on the cost throughout the entire life of the infrastructure;
- Encourage the building of smaller houses and apartments;
- Ensure that no one is unhoused by 2025 and embed social justice in all new building developments.

GOAL 2:

By 2030, all existing buildings are retrofitted

- Ensure all existing buildings are powered by renewable sources;
- Ensure there is sufficient funding and support for retrofits and that building owners are aware of who can do the work in their communities;
- Establish more heat-pump rebates;
- Encourage the re-use of building materials wherever possible and ensure greater transparency in what happens in building waste;
- Prevent demolishing buildings and start re-using them as much as possible.

GOAL 3:

By 2025 (at the latest), we have the capacity across the island to support net-zero and resilient buildings.

- Establish a legislative authority (i.e. in LGA) so that local governments can regulate fuel usage in new buildings and promote fuel switching in existing buildings;
- Have local governments 'lead by example';
- Create partnerships between communities to get to net-zero together and share good practices;
- Raise awareness in the community of what types of community energy programs are available, types of funding, contractors in the area, etc.;
- Adopt a low-interest renewable energy and retrofit program.

Switching to low-carbon technologies and increasing the energy efficiency of buildings can move us forward to a future where buildings produce no emissions at all.

Regulatory changes, advocacy initiatives, and financing tools can help communities save money on heating, create new 'green' jobs, and be prepared to resist upcoming climate-related natural hazards.

Theme 6: Decarbonised Transport

Transportation is one of the biggest contributors to greenhouse gas emissions in the region. In line with the provincial CleanBC strategy, the region needs to move to a zero-emission vehicle future with widely available charging infrastructure. We also need to connect all communities via transit, railway, and biking to allow for decreased reliance on driving and complete streets development of communities across the region.

GOAL 1:

By 2030, everyone has access to free public transportation within and between communities

- Establish sustainable transport options: e.g. island corridor from Victoria to Courtney;
- Shift away from Victoria Regional Transit Commission model toward CRD-based transit governance with lots of voting seats for riders/stakeholders (e.g. First Nations, students, seniors, people with disabilities);
- Ensure user groups always have a say in their transport systems.

GOAL 2:

By 2025, all public transport is electric and there is at least one bike parking space for every car parking space in BC

- Electrify all public transport;
- Ensure that everyone can access free public transport: i.e. free bus, free train, with no age restrictions;
- Develop more EV infrastructure;
- Develop regulations/bylaws for new developments requiring the installation of EV charging stations;
- Develop and promote the use of bikes, bikeable cities and bikeable rural areas.

GOAL 3:

By 2025, there is an island-wide transportation plan

- Ensure that there are viable, affordable options connecting communities via (bike share, car share, bus, rail);
- Implement this system using passes, such as the Marmot card.

Electrifying vehicles and connecting communities via zero-emission transportation modes will lead to substantial environmental and socio-economic benefits.

To accelerate the transition, the region needs to have an integrated regional transportation plan. The plan will enable conversations with the provincial government to seek funding for EV charging infrastructure in all types of buildings, implementing new infrastructure to connect communities by rail and biking, and developing communities in a transit-oriented manner.

Theme 7: Active Transportation

Active transportation is central to health and wellbeing. Active transportation is any human-powered transportation like walking and cycling; it can be combined with other modes like transit. Investing in infrastructure to support active transportation protects the safety and wellbeing of friends and family and creates liveable spaces. Increasing active transportation can reduce trips made by vehicles and help us to meet our climate goals. Presently around 80% of GHG emissions in the province are from energy, of which half are from transportation.

GOAL 1:

By 2030, everyone has access to safe active transportation options

- Roll out a new 'bikes for everyone' programme which accommodates everyone's need: i.e. has a strong equity focus;
- Ensure that transport networks are connected rural-urban and between communities.

GOAL 2:

By 2030, build out more multi-use paths and bike lanes that build interconnectivity within the existing network across the island

- Ensure all major commercial and institutional centres have secure bike parking by 2025;
- Establish more bicycle hub repair centres;
- Implement lower speed limits for electrified transport;
- Promote separate bike and walking lanes and always ensure that transport is safe;
- Offer bike safety courses for all ages.

GOAL 3:

By 2030, plan active transportation and electric transit networks across the region, rather than by municipality

- Ensure that a coordinated, equitable approach is taken across all active transport planning.

We have the vision and the will. We know what to do. We need the capacity and agency to pull it off!

Upper level governments, in particular the Provincial government, set the incentives for investment in active transportation. This includes regulatory and implementation guidance that is often out of date or contradictory when it comes to active transportation. Too often incentives are set against active transportation. We need solutions that work for communities of all sizes—rural and urban.

VICC - CLP Budget Summary	Cash	In-kind	Total
Total Phase 1 & 2 (complete)	$83,952	$54,910	$134,862.00
Total Interim phase (Sept 2022 - Feb 2023)	$6,000	$19,000	$25,000
Total Phase 3 (March - Dec 2023)	$41,500	$42,000	$83,500
Total Phase 3 (2024)	$60,000	$27,000	$87,000
Total Phase 3 (& interim)	$107,500	$88,000	$195,500
TOTAL PROJECT	$191,452	$142,910	$330,362

TOTAL REQUEST: **$107,500**

VICC - CLP Budget

Phase 1 & 2 (2019-2022)			
	Cash	**In-kind**	**Total**
Steering Committee Meetings		$12,000	$12,000
Phase 1 - Research and Data Collection	$10,000	$4,000	$14,000
Territorial Analysis			
Local Government Priorities Survey			
Total Phase 1	**$10,000**	**$4,000**	**$14,000**
Phase 2 - Engagement	$11,952	$4,000	$15,952
Local Government Resilience Forum	$3,000	$9,000	$12,000
Youth Climate Forum	$3,000	$5,010	$8,010
First Nations Survey and Engagement	$46,000	$900	$46,900
Total Phase 2	**$73,952**	**$38,910**	**$108,862.00**
Total Phase 1 & 2	**$83,952**	**$54,910**	**$134,862.00**

VICC-CLP Budget	Phase 3: Inter-regional Collaboration (2023-2024)						
	Sept 2022 to Dec 2023			2024			
	Cash	In-kind	Total	Cash	In-kind	Total	Project totals
CEA Secretariat - Events							**$26,000**
Presentation at Liveable Cities Forum Oct 2023		$2,000	$2,000			$0	$2,000
Planning and facilitation of in-person steering committee workshop at LGLA Feb 2023	$6,000	$2,000	$8,000			$0	$8,000
Presentation at AVICC April 2023		$2,000	$2,000			$0	$2,000
2024 events: LGLA, AVICC				$2,000	$2,000	$4,000	$4,000
Annual Summit 2024 (planning & facilitation)				$10,000		$10,000	$10,000
CEA Secretariat - Ongoing tasks							**$139,500**
Preparation of new appointments and onboarding of new members		$4,000	$4,000			$0	$4,000
Preparation of funding requests, fiscal management, potential grant applications, contract management	$7,500			$3,000			$0
Coordination of steering committee meetings and working groups, overarching project management	$20,000	$6,000	$26,000	$25,000		$25,000	$51,000
Development and maintenance of webpages and digital resource library	$2,500	$5,000	$7,500	$2,000		$2,000	$9,500
Administration of CEA regional staff network (in-kind separate funding)		*$50,000*	*$50,000*		*$25,000*	*$25,000*	$75,000
CEA Secretariat - Reporting							**$9,500**
Compilation of research and engagement results	$3,000		$3,000			$0	$3,000
Preparation of strategic vision and goals document	$3,500		$3,500			$0	$3,500
Phase 3 report			$0	$3,000		$3,000	$3,000
Total CEA	**$42,500**	**$71,000**	**$106,000**	**$45,000**	**$27,000**	**$69,000**	**$175,000**

Non-CEA expenses and contributions							**$35,000**
Steering Committee Meetings		$6,000	$6,000		$4,000	$4,000	$10,000
Annual Summit expenses (venue & catering, etc)			$0	$10,000		$10,000	$10,000
Relationship building with Indigenous partners and others (incl potential contract with Alderhill)	$5,000		$5,000	$5,000		$5,000	$10,000
Other in-kind contributions		$15,000	$15,000			$0	$15,000
Total Non-CEA	**$5,000**	**$21,000**	**$26,000**	**$15,000**	**$4,000**	**$19,000**	**$45,000**
Total per phase	**$47,500**	**$92,000**	**$139,500**	**$60,000**	**$31,000**	**$91,000**	**$230,500**

Total Cash Request - Phase 3 (2022-2024)	**$107,500**		
Total CEA funding request - secretariat role, reporting, and event organization	**$87,500**		
Total CEA in-kind contributions		**$98,000**	
Total non-CEA funding request	**$20,000**		
Total in-kind (other)		**$25,000**	
Total Project Phase 3			**$230,500**

Making a difference...together

ERM 23-35

REPORT TO ENVIRONMENTAL SERVICES COMMITTEE
MEETING OF WEDNESDAY, SEPTEMBER 27, 2023

SUBJECT **Vancouver Island and Coastal Communities Committee on Solid Waste and Circular Economy – Terms of Reference and CRD Appointment**

ISSUE SUMMARY

To seek Capital Regional District (CRD) Board endorsement of the Vancouver Island and Coastal Communities Committee on Solid Waste and Circular Economy (VICC-CSWCE) Terms of Reference (Appendix A) and to get direction on CRD elected representative appointments to the VICC-CSWCE.

BACKGROUND

The VICC-CSWCE is a regional district led committee, initially constituted by the Association of Vancouver Island and Coastal Communities (AVICC), with a vision that local governments on Vancouver Island, Qathet and the Sunshine Coast are working together to address the opportunities and challenges of managing solid waste.

The goals of the VICC-CSWCE are to:

1. Ensure information is shared between VICC local governments to encourage best practices and common solutions in solid waste management and consistent messaging to our residents.
2. Collect and maintain appropriate and consistent data associated with solid waste management within the VICC.
3. Support an informed and unified voice to assist efforts with the Province, non-governmental organizations and other partners in developing effective waste management solutions and policies towards the development of a regional circular economy.

Since 2015, CRD elected representatives and solid waste staff have been participating in a Vancouver Island focused local government solid waste committee. The committee started out as AVICC-facilitated meetings and is now transitioning to meetings coordinated directly by Vancouver Island and Coast Community regional districts, with a third party providing administrative support (Appendix B).

ALTERNATIVES

Alternative 1
The Environmental Services Committee recommends to the CRD Board:
1. That the Vancouver Island and Coastal Communities Committee on Solid Waste and Circular Economy Terms of Reference be endorsed; and
2. That the Environmental Services Committee Chair be appointed as the Vancouver Island and Coastal Communities Committee on Solid Waste and Circular Economy as the Capital Regional District elected representative, with the Environmental Services Committee Vice-Chair as alternate.

Alternative 2
That the CRD Board not endorse the VICC-CSWCE Terms of Reference nor CRD representation.

RECOMMENDATION

The Environmental Services Committee recommends to the CRD Board:

1. That the Vancouver Island and Coastal Communities Committee on Solid Waste and Circular Economy Terms of Reference be endorsed; and
2. That the Environmental Services Committee Chair be appointed as the Vancouver Island and Coastal Communities Committee on Solid Waste and Circular Economy as the Capital Regional District elected representative, with the Environmental Services Committee Vice-Chair as alternate.

Submitted by:	Russ Smith, Senior Manager, Environmental Resource Management
Concurrence:	Larisa Hutcheson, P. Eng., General Manager, Parks & Environmental Services
Concurrence:	Ted Robbins, B. Sc., C. Tech., Chief Administrative Officer

ATTACHMENTS

Appendix A: Draft Terms of Reference for Vancouver Island and Coastal Communities Committee on Solid Waste and Circular Economy

Appendix B: Request for Proposal: Committee Secretariat and Administrative Services – Vancouver Island and Coastal Communities Committee on Solid Waste and Circular Economy

Vancouver Island and Coastal Communities Committee on Solid Waste and Circular Economy

(VICC-CSWCE)

Terms of Reference

DATE ADOPTED

Vision

That local governments on Vancouver Island, Qathet and the Sunshine Coast are working together to address the opportunities and challenges of managing solid waste. Our residents are aware of, and support the need to reduce and manage our waste in a sustainable manner as we work toward achieving a circular-economy through the application of zero-waste principles.

Goals

1. Ensure information is shared between Vancouver Island and Coastal Community (VICC) local governments to encourage best practices and common solutions in solid waste management and consistent messaging to our residents.
2. Collect and maintain appropriate and consistent data associated with solid waste management within the VICC.
3. Support an informed and unified voice to assist efforts with the Province, non-governmental organizations and other partners in developing effective waste management solutions and policies towards the development of a regional circular economy.

Special Committee Membership

The Committee membership will be composed of one elected representative and alternate from each VICC regional district board. Each elected representative will be accompanied by a staff member from their member regional district.

Term

The VICC Special Committee on Solid Waste and Circular Economy will begin *DATE TBD* and review its Terms of Reference during the year following each provincial municipal election.

Special Committee Chair and Vice-Chair

A Chair and Vice-Chair will be elected by the Committee at the Committee's annual elected official and staff meeting for a two-year term. The Chair is responsible for establishing the meeting schedule, reviewing agendas and minutes, facilitating and managing meetings, contact with media, and presenting to AVICC, UBCM and the Province of BC as required.

Administrative Support

- Meeting support will be provided by a lead regional district or by a third-party secretariate.
- Administrative and technical support shall be provided by VICC member regional districts as assigned by the Chief Administrative Officer for each regional district.
- The Special Committee may contract with any person, so long as that contract is within its budget allocation, and approved by the Committee

Expert Members and Invited Guests

The Special Committee on Solid Waste and Circular Economy may, from time-to-time, require experts, academics, or other government/voluntary sector representatives to attend meetings, as presenters, advisors or observers because of their knowledge of the topic, subject to working within its budget allocation.

Confidentiality

While the results of the special committee will be presented in a public forum and community engagement will be important if any outcomes are proposed for implementation, the deliberations of the special committee are to be confidential. Members are committed to respecting the personal privacy of the Special Committee on Solid Waste and Circular Economy and agree not to disclose personal information or views expressed during meetings. Deliberations may be shared within the various agencies represented by the Committee but should remain confidential until there is general agreement and consensus to make them public.

Agendas and Minutes

Agendas shall be approved by the Chair and provided to committee members a minimum of three days in advance of the meeting. A copy of the approved minutes shall be forwarded to VICC member regional districts to ensure that all regional district elected officials are informed of the Special Committee's proceedings.

Deliverables

1. Partnership – Compile annually comparative solid waste metrics of member regional districts and produce an annual "State of VICC Solid Waste" Report. Continue to work on standardizing comparative metrics across regional districts.
2. Partnership – meet at a minimum annually – to discuss comparative metrics, identify issues and challenges, identify areas of collaboration, discuss best practices for alignment and identify points of advocacy.
3. Partnership – member regional district staff meet twice annually to compile comparative data, identify points of collaboration and advocacy
4. Advocacy – engage the British Columbia Ministry of Environment and industry groups to review and expand waste reduction and diversion policies.
5. Long-term Disposal – review annual opportunities for collaboration.
6. Regulations and Enforcement – ensure that, where practicable, disposal bans and bylaws are consistent across regions to reduce leakage across borders.

Resources and Funding
The VICC member led Special committee on solid waste will utilize the $12,374 originally allocated to fund programming and administration of the AVICC Special Committee on Solid Waste Management to:

1. administer a base level of activity of an annual staff and elected representative meeting/workshop to discuss comparative metrics, identify issues and challenges, identify areas of collaboration, discuss best practice and identify areas of advocacy;
2. administer two staff meetings to discuss technical elements of alignment, collaboration and advocacy; and
3. compile annual comparative solid waste metrics of member regional districts and produce an annual "State of VICC Solid Waste" Report.

Once a preliminary budget has been established and agreed upon by Committee members, funds remaining after 4 years of base level administration will be held in reserve to be used for any identified shared initiatives approved by the Committee. If potential collaborative project budgets exceed the reserve funds, participating member regional districts will be asked to contribute the remainder of the funding to complete the deliverables based on a fair cost-sharing formula to be established through discussion with the CAOs and approved by the Committee. In-kind contributions may be considered in the funding formula if the contributions will be substantial and measurable.

Meetings
Staff and elected representatives meet once a year in a workshop environment for a review of comparative data and effectiveness of local policy and programs, discuss current issues, new and emerging issues, areas of overlap with opportunities for collaborations and identify year's points of advocacy and potential area association resolutions. The annual meeting will be held in a hybrid format to accommodate all forms of participation.

It is expected that two virtual staff meetings will take place. Other than the annual meeting/workshop of elected officials and staff, meetings will be held virtually to minimize time commitment.

Wherever possible and feasible, in-kind contributions of technical and administrative support will be utilized.

Outside of the baseline activity of one annual meeting and two virtual staff meetings, CAOs and staff can meet as needed to discuss current issues, new and emerging issues, areas of overlap with opportunities for collaboration.

Quorum and Voting
A majority of appointed elected official Committee members present and voting at the annual meeting of elected officials and staff constitutes a quorum. A simple majority of

Committee members present at a meeting is sufficient to pass a resolution of the Committee, however consensus decision making may be given priority.

Code of Conduct (Bill 14 WorkSafe BC)

It is the responsibility of all participants to act in accordance with WorkSafe BC legislation, with specific attention to Bill 14 requirements, (s 5.1 WCA Pt II) to ensure the work environment is free of discrimination, bullying and harassment. The committee will support an atmosphere of understanding and respect for the rights and dignity of all individuals. All members must carry out their responsibilities professionally and to the highest standard of integrity to ensure that all actions of the committee are conducive to a positive collaborative working relationship. This will require consistent adherence to legislation to support principles of respect and professional veracity

July 4, 2023

Request for Proposal: Committee Secretariate and Administrative Services

Project Title: Vancouver Island and Coastal Communities Committee on Solid Waste and Circular Economy (VICC-CSWCE)

Introduction: The Vancouver Island and Coastal Communities Committee on Solid Waste and Circular Economy (VICC-CSWCE) is seeking proposals from qualified organizations to act as a Committee Secretariate and provide administrative and meeting support services. The purpose of this request for proposal (RFP) is to identify a third party that can support administratively the Committee in achieving its goals and objectives outlined in the Terms of Reference.

Background: The VICC-CSWCE is a committee composed of representatives from regional district boards, the Association of Vancouver Island and Coastal Communities (AVICC) Executive, and their respective staff members. The Committee aims to take a collaborative regional approach in addressing the challenges and opportunities in managing solid waste, promote sustainable waste management practices, and work towards achieving a regional circular economy.

Scope of Work: The selected third party will be responsible for providing administrative support services to the VICC-CSWCE. The scope of work includes the following activities:

- Meeting support: Organize and coordinate committee meetings, including scheduling, agenda preparation, and distribution of meeting materials. Meeting support may include logistical arrangements for in-person or virtual meetings.

- Administrative support: Assist in maintaining committee records, including minutes, reports, and correspondence. Ensure timely dissemination of information to committee members and member regional districts.

- Stakeholder coordination: Facilitate correspondence among committee members, regional districts, provincial government agencies, NGOs, and other relevant stakeholders.

Deliverables: The selected third party will be responsible for delivering the following key outcomes:

1. **Annual "State of VICC Solid Waste" Report**: Coordinate with a third-party consultant and member regional districts to compile annual comparative solid waste metrics of member regional districts.
2. **Annual elected representative and staff meeting/workshop:** Work with Committee Chair to schedule, prepare agendas, distribute meeting materials and make logistical arrangements to organize an annual Hybrid meeting of Committee elected officials

and staff for annual information sharing, review of waste comparative data and issue and advocacy identification.

3. **Organize Virtual staff meetings:** Work with committee Chair and regional district CAO's and solid waste managers to arrange and coordinate two virtual staff meetings per year to discuss technical elements of alignment, collaboration, and advocacy.

Proposal Submission: Interested organizations should submit their proposals containing the following information

- Organization profile: Provide an overview of the organization, including its experience in providing administrative and meeting support services and supporting similar committees or initiatives.
- Proposed approach: Describe the approach and methodology that the organization will employ to fulfill the requirements outlined in the scope of work.
- Budget: Present a cost proposal that includes all relevant expenses, such as personnel, materials, and any additional costs. Clearly outline the basis for the proposed budget.

Evaluation Criteria: Proposals will be evaluated based on the following criteria:

- Experience and qualifications of the organization in providing administrative support services.
- Understanding of the objectives and scope of work outlined in the RFP.
- Proposed approach and methodology to meet the Committee's needs.
- Demonstrated ability.

Please Submit proposals to ben.geselbracht@nanaimo.ca

For more information or questions on scope please contact Ben Geselbracht at 250-713-4173