Capital Regional District

625 Fisgard St.,
Victoria, BC V8W 1R7

Notice of Meeting and Meeting Agenda
Environmental Services Committee

Wednesday, September 29, 2021 | **1:30 PM** | **6th Floor Boardroom, 625 Fisgard St. Victoria, BC V8W 1R7**

Special Meeting

B. Desjardins (Chair), N. Taylor (Vice Chair), D. Blackwell, L. Helps, M. Hicks, G. Holman, J. Olsen, G. Orr, J. Ranns, K. Williams, R. Windsor, 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. Chair's Remarks

4. Presentations/Delegations

Due to limited seating capacity, this meeting will be held by Live Webcast without the public present.

To participate electronically, complete the online application for "Addressing the Board" on our website. Alternatively, you may email the CRD Board at crdboard@crd.bc.ca.

5. Committee Business

5.1. 21-695 2022 Service Planning - Landfill and Recycling

Recommendation: That the Environmental Services Committee recommends the Committee of the Whole recommend to the Capital Regional District Board:
That Appendix A, Community Need Summary - Landfill & Recycling be approved as presented and form the basis of the 2022-2026 Financial Plan.

Attachments:
Staff Report: 2022 Service Planning - Landfill and Recycling
Appendix A: Community Need Summary
Appendix B: Capital Plan Report
Appendix C: Initiatives Progress Report

5.2. 21-697 2022 Service Planning - Climate Action and Adaptation

Recommendation: That the Environmental Services Committee recommends the Committee of the Whole recommend to the Capital Regional District Board:
1. That Appendix A, Community Need Summary - Climate Action & Adaptation be approved as presented and form the basis of the 2022-2026 Financial Plan; and
2. That staff initiate a bylaw amendment process to increase the requisition limit under Bylaw No. 3510, the Capital Regional District Climate Action and Adaptation Service Establishment Bylaw, 2008.

Attachments: Staff Report: Service Plan - Climate Action

Appendix A: Community Need Summary - Climate Action & Adaptation

Appendix B: Initiatives Progress Report

5.3. 21-601 Solid Waste Management Plan - Implementation Update

Recommendation: The Environmental Services Committee recommends to the Capital Regional District Board:
That this report be received for information.

Attachments: Staff Report: SWMP Implementation Update

Appendix A: SWMP Short-Term Implementation Framework

5.4. 21-701 Updated Capital Regional District Climate Action Strategy

Recommendation: That The Environmental Services Committee recommends to the Capital Regional District Board:
1. That the Capital Regional District Regional Climate Action Strategy be approved; and
2. That staff be directed to forward this report to municipal councils for information.

Attachments: Staff Report: Updated Capital Regional District Climate Action Strategy

Appendix A: Taking Action on the Climate Emergency - Sept. 2021 Report

Appendix B: Taking Action on the Climate Emergency Presentation

5.5. 21-688 Capital Region Energy Retrofit - Business Case

Recommendation: The Environmental Services Committee recommends to the Capital Regional District Board:
That the Capital Region Energy Retrofit - Business Case be received for information and that implementation be considered as part of the Climate Action 2022 Service Planning Process.

Attachments: Staff Report: Capital Region Energy Retrofit - Business Case

Appendix A: CRD Residential Energy Retrofit Program - Business Case Report

6. Notice(s) of Motion

7. New Business

8. Adjournment

Next Meeting: October 20, 2021

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ERM 21-37

REPORT TO ENVIRONMENTAL SERVICES COMMITTEE
MEETING OF WEDNESDAY, SEPTEMBER 29, 2021

SUBJECT **2022 Service Planning – Landfill and Recycling**

ISSUE SUMMARY

To provide the Environmental Services Committee with an overview of core service levels, new and progressing initiatives and performance metrics related to the Landfill & Recycling Community Need. These activities are undertaken by the Environmental Resource Management, Environmental Protection and Engineering Services divisions and deliver on approved Board Strategic Priorities and the Capital Regional District (CRD) Corporate Plan.

BACKGROUND

The CRD Board identified its strategic priorities in early 2019. Subsequently, staff prepared the 2019-2022 CRD Corporate Plan to align with this direction. The CRD Corporate Plan presents the work the CRD needs to deliver over the Board term to meet the region's fifteen most important needs (community needs). These initiatives are delivered in conjunction with the mandated core services and regulatory requirements that the CRD is accountable for delivering. The priorities were reconfirmed by the CRD Board at the annual check-ins on May 13, 2020 and May 12, 2021.

At the start of the Board term, staff identified that the ambitious plan for the region would require a significant amount of effort and resources to action and implement Board and Corporate Priorities, and to keep pace with the anticipated increase in service demands, primarily driven by population growth and construction activity. The general level of effort deployed by the organization has been increasing to keep pace since the direction was set, and in some cases emerging trends and changes in economic activity has had a significant impact on the demand for services driving additional resource requirements.

This is the final year of service plan and budget approvals for this CRD Board, as well as the final year of implementation of its strategic priorities. For 2022, staff are recommending a significant package of work to finalize the delivery of the strategic priorities and Corporate Plan. Implementation timeframes for much of the work initiated in 2022 will carry into 2023.

2022 is a transition year for the CRD Board. Staff anticipate that any service planning requests for 2023 will be focused on operational adjustments while the Board is determining its strategic priorities for the 2023-2026 term.

The Community Need Summary Report (Appendix A) provides an overview of the strategic context for service areas by department, core service levels for services, new initiatives and a summary of the business model and performance metrics associated with targeted outcomes.

A summary of the capital investment made in support of the Community Need (Appendix B) and the initiatives progressed over the course of this Board's term (Appendix C) have been appended to this report.

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 – Landfill & Recycling be approved as presented and form the basis of the 2022-2026 Financial Plan.

Alternative 2

That Appendix A, Community Need Summary – Landfill & Recycling be approved as amended and form the basis of the 2022-2026 Financial Plan.

IMPLICATIONS

Financial Implications

The Executive Leadership Team (ELT) is taking steps to mitigate the financial impacts resulting from the work. ELT has reviewed the phasing of the work for 2022 to ensure that the activities and resources are allocated as efficiently as possible. Phasing out the initiatives over a longer period of time helps avoid delays that can occur when staff are too thinly spread across projects. Additionally, timing initiatives to start mid-year will also reduce the impact in 2022, but will have an incremental annualization impact in 2023 for ongoing impacts.

The CRD continues to look for ways to fund its services in a manner that relieves affordability pressure for the taxpayer. This is reflected in the policy for reserve balance measures and gaps/surplus, which was approved by the CRD Board on July 14, 2021. The CRD has had other funding successes optimizing capital funding and leveraging grant funding in a more aggressive way than ever before.

Finally, where feasible, an incremental change management strategy has been adopted for larger projects. This means that divisions are testing out the objectives and delivery approach with a proof-of-concept and then deploying out more broadly, if the benefits can be demonstrated. This has been a successful strategy adopted for our enterprise asset management strategy deployment, for example.

The financial impact of new staffing requests at the landfill can be fully funded by existing landfill revenues and will not require requisition or third party funding.

A comprehensive overview of the resources required to advance the initiatives listed in all Community Need Summaries, including all proposed staffing changes, will be presented to the Committee of the Whole at the 2022 provisional budget review.

Service Delivery Implications

New staffing requests are associated with significant traffic increase at the Hartland public drop-off area, as well as implementation of the recently updated and approved Solid Waste Management Plan (SWMP). Staffing requests are required to maintain current service levels.

As a result of incremental work content and resourcing through the following initiatives in support of the community need, there is an additional 0.2 FTEs in the area of Finance and Technology to administer required corporate functions.

See Appendix A for more details about core service delivery.

New initiatives proposed for 2022:

Staff have identified three initiatives in support of this community need that will have budget implications in 2022 (Table 1). The key drivers for this work are:

1. Implementation of a Board-approved strategy: the implementation of the SWMP by delivering the initiatives identified in the plan and delivering education and outreach programs to promote waste reduction programmes.
2. Minimize the materialization of risk and maintain service level: a significant maintenance work backlog at Hartland Landfill is putting operations at risk.

Table 1: Landfill & Recycling Community Need Initiatives

#	Initiative	Description	Year(s)	FTE impacts (2022)	Cost impacts (2022)	Funding source
9a-1.2	Solid Waste Initiatives Coordinator	Deployment of planned waste diversion initiatives from the SWMP	2021	+1.0 FTE* ongoing	$119K	Fee-for-service, requisition
9b-2.1	Communications Assistant	Support for SWMP for education and outreach related to waste diversion initiatives	2021	+0.4 FTE ongoing	$35K	Fee-for-service
9d-1	Landfill Maintenance Worker	Staffing increase to address ongoing site maintenance needs	2021	+1.0 FTE ongoing	$99K	Existing operating budget, requisition

Blue highlighted areas are initiatives that directly address a Board Priority.

This information reflects the business case costs that the ELT reviewed as part of its annual assessment of initiatives.

<u>9a-1.2 Solid Waste Initiatives Coordinator</u>

The Board endorsed the new CRD SWMP in May 2021. This plan sets out over 70 actions to be deployed in support of the goal of decreasing waste generation in the capital region by 33% to 250kg per capita by 2030. This directly supports Board Strategic Priority 2c to reduce waste and increase recycling in the region. The timely and effective deployment of planned waste diversion initiatives will be an essential part of achieving this goal.

Initiative 9a-1.2 seeks to create a new ongoing position (+1.0 FTE) in the Environmental Resource Management division to coordinate the deployment of regional resources in support of this ambitious waste reduction goal.

This initiative will also increase demand and requirements for support services (e.g., budget and transaction processing, system access, helpdesk support, etc.). This initiative, alongside others, will result in a small adjustment to the Financial Services and Information Technology & GIS staffing model to accommodate the demand. To provide full transparency, the financial impact of the initiative reflects the whole cost of delivering the work, including flow-down impacts on support services.

9b-2.1 Communications Assistant (Environmental Resource Management Solid Waste Management Plan Support)

In addition to initiative 9a-1.2, in order to successfully implement the SWMP's goal to reduce regional waste, there is a need to put additional efforts towards education and outreach. Initiative 9b-2.1 seeks to increase an existing part-time position in Environmental Protection to a full-time position (+0.35 FTE) to enhance communication support including running education campaigns, developing social media content and other outreach material targeted for multi-family developments, the construction and demolition industry, and general commercial and institutional sectors.

9d-1 Landfill Maintenance Worker

The ongoing work to maintain Hartland Landfill has created a significant work backlog. There is currently only one Landfill Maintenance Worker working and a recent vacancy was filled with a Landfill Gas Technician to address pressing technical requirements at the site. This directly supports Board Strategic Priority 2c by providing sustainable solid waste disposal and extending the life of Hartland Landfill.

Initiative 9d-1 seeks to create a new ongoing position in the Environmental Resource Management division (+1.0 FTE) to address the backlog and allow staff to stay on top of ongoing preventative maintenance at Hartland to allow for more efficient operations and decreased lifecycle costs. The cost of this position will be fully offset by the existing operating budget for auxiliary hours.

This initiative will also increase demand and requirements for support services (e.g., budget and transaction processing, system access, helpdesk support, etc.). This initiative, alongside others, will result in a small adjustment to the Financial Services and Information Technology & GIS staffing model to accommodate the demand. To provide full transparency, the financial impact of the initiative reflects the whole cost of delivering the work, including flow-down impacts on support services.

Alignment with Board & Corporate Priorities

The direction given to staff was to bring forward work that is of essential nature. This was defined as:

- initiatives that provide for public health and safety and/or deliver on a regulatory requirement
- initiatives that are required to deliver the Board Strategic Priorities

- initiatives that will prevent the materialization of significant negative impacts on service customers, partners, the region, local services or the CRD's finances
- initiatives that minimize the materialization of financial, reputational or other risks and liabilities for the CRD by ensuring the organization is keeping pace with expectations and demand
- there is an imperative to deliver the work immediately and/or quickly

The ELT has reviewed and assessed all business cases against the criteria. The consolidated package of work is appropriate and commensurate to the challenge facing the organization.

CONCLUSION

Staff have been progressing initiatives and actions identified in the CRD Corporate Plan, including Board Strategic Priorities. The CRD Board determines resourcing through its annual review and approval of financial plans. As per previous years, to support the Board's decision-making, staff are providing 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 – Landfill & Recycling be approved as presented and form the basis of the 2022-2026 Financial Plan.

Submitted by:	Russ Smith, Senior Manager, Environmental Resource Management
Concurrence:	Larisa Hutcheson, P. Eng., General Manager, Parks & Environmental Services
Concurrence:	Robert Lapham, MCIP, RPP, Chief Administrative Officer

ATTACHMENTS

Appendix A: Community Need Summary – Landfill & Recycling
Appendix B: Capital Plan Report
Appendix C: Initiatives Progress Report

Community Need

2022 Summary

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Landfill & Recycling

Strategy

Target Outcome
We envision minimizing waste disposal and maximizing waste diversion

Strategic Context

Strategies

- Solid Waste Management Plan – guides how the region will manage solid waste, including recyclables, compostable material and garbage from homes, businesses and institutions, as well as construction and demolition sites
- Hartland Environmental Programs – the Hartland Landfill Environmental Programs provide a comprehensive program to monitor and evaluate the effects of landfilling operations on the environment.

Trends, risks and issues

- Hartland public drop-off area continues to experience increased customer volumes, likely resulting from strong housing market activity and COVID-related waste disposal trends. Increased WorkSafe BC requirements when receiving homeowner renovation and demolition materials at the landfill.
- Ongoing consideration of solid waste resource recovery projects to maximize the environmental/economic benefits associated with waste diversion and disposal.
- The new Solid Waste Management Plan (SWMP) was endorsed by CRD Board in May 2021 and submitted to the Province shortly thereafter. Though it approved the SWMP, the Board expressed a desire in its deliberations to achieve waste reduction levels greater than the targets it laid out in it.
- The ongoing efforts to engage with local communities regarding the application of biosolids at Hartland Landfill is likely to continue for the next five years during development of the long-term biosolids management plan.

Community Need

2022 Summary

Services

Core Services Levels	
Service	**Levels**
Diversion Services Responsible for solid waste management planning in the Capital Region, including policy and program development to increase waste reduction or recycling.	• Planning & policy development activities include the SWMP and the administration of 49 contracts and agreements and Compost Facilities Bylaw • Delivery of the recycling programs, which include curbside collection from 123,000 households and packaging, printed paper and glass collection from six electoral area depots. Today, Hartland recycling facility collects over 80 items from 28 product categories
Landfilling Services 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 BC Ministry of Environment landfill regulations, including leachate and landfill gas management infrastructure.	• Administration of five contracts and agreements • Residential service at bin area (9am-6pm weekdays, 9am-2pm Saturdays) • Commercial service at active face (7am-5pm weekdays, 9am-2pm Saturdays)
Resource Recovery Services Installation and operation of landfill 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.	• Electricity generation using landfill gas generates enough electricity to power 1,600 homes
Hartland Environmental Programs Monitoring, assessment and technical reporting to support regulatory compliance and contaminant reduction at Hartland Landfill	• Regulatory compliance monitoring of surface water, groundwater, landfill gas and leachate
Support Services The core services listed rely on the support of several corporate and support divisions to effectively operate on a daily basis. These services are reported on in the Accountability Community Need Summary.	• Services include Asset Management, Facility Management, Financial Services, Information Technology & GIS, Information Services, Human Resources & Corporate Safety, Corporate Communications, Legislative Services, Legal Services, Risk & Insurance and Real Estate Services.

Community Need

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2022 Summary

Initiatives					
Ref	Initiative	Description	Year(s)	2022 impacts	
9a-1.2	Solid Waste Initiatives Coordinator	Deployment of planned waste diversion initiatives from the SWMP	2021	+1.0 FTE ongoing	$119K fee-for-service + requisition
9b-2.1	Communications Assistant	Support for SWMP for education and outreach related to waste diversion initiatives	2021	+0.4 FTE ongoing	$35K fee-for-service
9d-1	Landfill Maintenance Worker	Staffing increase to address ongoing site maintenance needs	2021	+1.0 FTE ongoing	$99K operating budget + requisition

Business Model

Funding

Who contributes

- Every jurisdiction in the region – not requisition/tax based – user fee-for-service based
- Support Services: varies per service

Funding Sources

- Landfill tipping fees and recycling program revenues

Reporting Structure

- Environmental Services Committee
- Project based reporting for Environmental Engineering: Parks Committee, Electoral Areas Committee, Recreations

Community Need

2022 Summary

Performance			
Definition and Source	**2020 Actual**	**2021 Forecast**	**2022 Target**
Metric 1: Solid waste disposal target rate of 350 kg/person per year by 2020 Annual kilos of solid waste per capita; calculation based on provincial Municipal Solid Waste methodology	395	400	380
Metric 2: Capture 75% of landfill gas at Hartland landfill Percentage of landfill gas captured at Hartland Landfill; data from CRD staff measurement and calculation	67%	70%	75%
Metric 3: Waste compaction rate at Hartland Landfill of 850 kg/m^3 Kilos per cubic metre; data from CRD staff measurement	960	960	980
Discussion			

Link to Target Outcome

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).

Discussion

-

Community Need

Capital Plan Report

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Landfill & Recycling

Highlights since 2019

- The CRD has allocated **$16.7M since 2019** on projects across the region that advance the Landfill & Recycling Community Need. This was primarily funded through reserves and capital funds at hand. Projects undertaken included:
    - Production of aggregate for internal use
    - Extension of gas & leachate collection pipe
    - Paving of service roads
    - Acquisition of Hartland north site buffer
    - Deployment of new solid waste scale software
    - Programme of maintenance programme of maintenance, replacement and repairs of equipment and facilities

Planned for 2022

- The CRD will allocate **$18M in 2022** on:
    - Landfill gas utilisation
    - Production of aggregate for internal use
    - Emergency improvements to the lower lagoon bank
    - Paving of service roads and north perimeter haul road
- This work is funded through reserves (including equipment reserve fund) and capital funds on hand.

Community Need

Initiative Progress Report

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Landfill & Recycling

Initiatives approved in 2020 and 2021			
Ref	Initiative	% complete	Progress to date
9a-1	Resource Recovery and Waste Reduction		Lead: Environmental Resource Management (2020) Progressing – new opportunities continue to be evaluated and, where feasible, have been incorporated into the final draft of the new CRD Solid Waste Management Plan.
9a-1.1	Senior Project Coordinator, Resource Recovery		Lead: Environmental Resource Management (2021) Progressing – included in the 2021 and subsequent Environmental Resource Management budgets.
9a-2	Infoline Support	100%	Lead: Environmental Protection (2020) Part of core services
9b-0.1	Hartland Waste Technician	100%	Lead: Environmental Resource Management (2021) Completed – early approval received and positions filled
9b-0.2	Hartland Landfill Attendant	100%	Lead: Environmental Resource Management (2021) Completed – early approval received and positions filled
9b-0.3	Food Waste Attendant	100%	Lead: Environmental Resource Management (2021) Progressing – Included in the 2021 and subsequent Environmental Resource Management budgets.
9b-1	Public Awareness of Extended Producer Responsibility	100%	Lead: Environmental Resource Management (2020) Part of core services
9b-2	Solid Waste Management Plan Update	100%	Lead: Environmental Resource Management (2020) Completed – the Solid Waste Management Plan and next steps were approved by the CRD Board on May 12, 2021. Final plan was submitted to the province in June.
9b-3	Controlled Waste Permits	100%	Lead: Environmental Protection (2020) Part of core services
9b-4	Electronic Stewardship Attendant	100%	Lead: Environmental Resource Management (2020) Completed

Community Need

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Initiative Progress Report

Initiatives approved in 2020 and 2021			
Ref	**Initiative**	**% com-plete**	**Progress to date**
9c-1	Changing Recycling Markets		Lead: Environmental Resource Management (2020) Progressing – Markets for some materials, such as scrap metals, improve as global commodity evolves following the loss of Chinese markets and severe restrictions arising from the pandemic.
9d-1	Hartland Landfill Longevity	100%	Lead: Environmental Resource Management (2020) Completed – in concurrence with 9b-2the final draft of the Solid Waste Management Plan includes a goal of extending Hartland landfill life until at least 2100.
9e-1	Organic Waste Processing Procurement	100%	Lead: Environmental Resource Management (2020) Progressing – implementation of procurement strategy started spring 2021. Update expected to go to April Environmental Services Committee meeting.

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EEP 21-38

REPORT TO ENVIRONMENTAL SERVICES COMMITTEE
MEETING OF WEDNESDAY, SEPTEMBER 29, 2021

SUBJECT **2022 Service Planning – Climate Action and Adaptation**

ISSUE SUMMARY

To provide the Environmental Services Committee with an overview of core service levels, new and progressing initiatives and performance metrics related to the Climate Action & Adaptation Community Need. These activities are undertaken by the Environmental Protection division and deliver on approved Board Strategic Priorities and the CRD Corporate Plan.

BACKGROUND

The Capital Regional District (CRD) Board identified its strategic priorities in early 2019. Subsequently, staff prepared the 2019-2022 CRD Corporate Plan to align with this direction. The CRD Corporate Plan presents the work the CRD needs to deliver over the Board term to meet the region's fifteen most important needs (community needs). These initiatives are delivered in conjunction with the mandated core services and regulatory requirements that the CRD is accountable for delivering. The priorities were reconfirmed by the CRD Board at the annual check-ins on May 13, 2020 and May 12, 2021.

At the start of the Board term, staff identified that the ambitious plan for the region would require a significant amount of effort and resources to action and implement Board and Corporate Priorities and to keep pace with the anticipated increase in service demands, primarily driven by population growth and construction activity. The general level of effort deployed by the organization has been increasing to keep pace since the direction was set and, in some cases, emerging trends and changes in economic activity have had a significant impact on the demand for services, driving additional resource requirements.

This is the final year of service plan and budget approvals for this CRD Board, as well as the final year of implementation of its strategic priorities. For 2022, staff are recommending a significant package of work to finalize the delivery of the strategic priorities and CRD Corporate Plan. Implementation timeframes for much of the work initiated in 2022 will carry into 2023.

2022 is a transition year for the CRD Board. Staff anticipate that any service planning requests for 2023 will be focused on operational adjustments while the Board is determining its strategic priorities for the 2023-2026 term.

The Community Need Summary Report (Appendix A) provides an overview of the strategic context for service areas by department, core service levels for services, new initiatives and a summary of the business model and performance metrics associated with targeted outcomes.

A summary of the initiatives progressed over the course of this Board's term (Appendix B) has been appended to this report.

ALTERNATIVES

Alternative 1

The Environmental Services Committee recommends the Committee of the Whole recommend to the Capital Regional District Board:

1. That Appendix A, Community Need Summary – Climate Action & Adaptation be approved as presented and form the basis of the 2022-2026 Financial Plan; and

2. That staff initiate a bylaw amendment process to increase the requisition limit under Bylaw No. 3510, the Capital Regional District Climate Action and Adaptation Service Establishment Bylaw, 2008.

Alternative 2

That Appendix A, Community Need Summary – Climate Action & Adaptation be approved as amended and form the basis of the 2022-2026 Financial Plan.

IMPLICATIONS

Financial Implications

The Executive Leadership Team (ELT) is taking steps to mitigate the financial impacts resulting from the work. ELT has reviewed the phasing of the work for 2022 to ensure that the activities and resources are allocated as efficiently as possible. Phasing out the initiatives over a longer period of time helps avoid delays that can occur when staff are too thinly spread across projects. Additionally, timing initiatives to start mid-year will also reduce the impact in 2022, but will have an incremental annualization impact in 2023 for ongoing impacts.

The CRD continues to look for ways to fund its services in a manner that relieves affordability pressure for the taxpayer. This is reflected in the policy for reserve balance measures and gaps/surplus which was approved by the CRD Board on July 14, 2021. The CRD had other funding successes optimizing capital funding and leveraging grant funding in a more aggressive way than ever before.

Finally, where feasible, an incremental change management strategy has been adopted for larger projects. This means that divisions are testing out the objectives and delivery approach with a proof-of-concept and then deploying out more broadly, if the benefits can be demonstrated. This has been a successful strategy adopted for our enterprise asset management strategy deployment, for example.

A comprehensive overview of the resources required to advance the initiatives listed in all Community Need Summaries, including all proposed staffing changes, will be presented to the Committee of the Whole at the 2022 provisional budget review.

Service Delivery Implications

The Board has declared a Climate Emergency in February 2019 and tasked staff with developing a comprehensive response. The revised Climate Action Strategy is being actively considered by the CRD Board (refer to the *Updated CRD Climate Action Strategy* staff report, also on the September 29 agenda). To support the Climate Action Strategy, service levels are proposed to be adjusted through the new initiatives and associated service implementation.

As a result of incremental work content and resourcing through the following initiatives in support of the community need, there is an additional 0.1 FTEs in the area of Finance and Technology to administer required corporate functions. Additional support will be required from Legislative and Legal Services to facilitate the required bylaw changes and administer the participant approval process.

Initiative's 5a 1-2: Community Energy Specialist, 5a 1-5: Corporate Climate Action Reserve Fund increase are included in the provisional 2022 budget. Initiative's 5a 1-3: Regional Building Energy Retrofit Program and 5a 1-4: Public EV Coordinator and 5a 1-6: Corporate Energy Key Project Manager are not currently included in the provisional 2022 budget as their inclusion is conditional upon an amendment to Bylaw 3510 – Climate Action and Adaptation to allow for an increase in requisition.

See Appendix A for more details about core service delivery.

New initiatives proposed for 2022:

Staff have identified five initiatives in support of this community need that will have budget implications in 2022 (Table 1). The key driver for this work is to advance the Board's Climate Action & Environmental Stewardship Strategic Priority. In particular, the CRD Board has indicated that it wants to see acceleration of the CRD's Climate Action activities in light of its declaration of a Climate Emergency. The proposed initiatives presented in this report align with inter-governmental priorities and reflect how CRD can best play a leading and coordinating role to accelerate corporate and regional climate action.

Table 1: Climate Action & Adaptation Community Need Initiatives

#	Initiative	Description	Year(s)	FTE impacts (2022)	Cost impacts (2022)	Funding source
5a-1.2	Community Energy Specialist	Convert existing position to maintain existing service level for partners	2022+	1.0 FTE converted	$135K	Requisition, Grant potential
5a-1.3	Regional Building Energy Retrofit Program	Development, administration and implementation of a retrofit program	2022 - 2026	+0.5 FTE Term	$603K	Requisition, Grant potential
5a-1.4	Public EV Coordinator	Implementation of the Capital Region EV Roadmap to increase EV adoption	2022 - 2025	+0.5 FTE Term	$247K	Requisition, Grant potential
5a-1.5	Corporate Climate Action Reserve Fund increase	Increase funding to make up for loss of grant funding	2022+	-	$65K	Requisition from Leg & Gen
5a-1.6	Corporate Energy Key Project Manager	Create new role to coordinate organization-wide approach to energy management in buildings, fleet and infrastructure	2022+	+1.0 FTE ongoing	$142K	Requisition

This information reflects the business case costs, which the executive leadership team reviewed as part of its annual assessment of initiatives.

5a-1.2 Community Energy Specialist

The CRD's Community Energy Specialist position was created in 2019 as a two-year term, $50,000 of the BC Hydro grant funding part-funds the position. The position has been critical in supporting three Board Strategic Priorities (2a declaration of a climate emergency, 2b working with local governments to reduce emissions and 2c development of model bylaws and best practices). The position has also been instrumental in securing grants from the Federation of Canadian Municipalities and BC Hydro Sustainable Communities to advance the Climate Action objectives.

The Board agreed to extend the term by another two years as part of the 2021 budget approval process. Initiative 5a-1.2 seeks to amend the approved approach and instead convert the position to an ongoing role (1.0 FTE) in the Environmental Protection division. Making this adjustment would guarantee the existing level of service to local government partners and reduce the risk of

the position disappearing, should BC Hydro change its grant approach. It will also allow the Climate Action service to reallocate the grant funds to key regional greenhouse grant projects related to transportation and buildings.

5a-1.3 Regional Building Energy Retrofit Program

Existing buildings account for over 30% of the region's greenhouse gas emissions (GHG). The CRD is uniquely positioned to support industry and homeowners to leverage existing funding opportunities by creating a regional program that will help them switch/retrofit to create highly-efficient and low-emission homes.

The CRD Board approved $50,000 in 2021 to develop a business case to scope such a regional retrofit program that will offer coaching, industry capacity building and marketing, and link to financial mechanisms. This funding was leveraged by staff to access a $175,000 Federation of Canadian Municipalities Community Efficiency Financing (CEF) grant to undertake a detailed design study. This is necessary in order to submit a CEF capital funding stream application in 2022. Additional prerequisites include Board approval and foundational funds for management execution of a program. This work supports three Board Strategic Priorities (2a declaration of a climate emergency, 2b working with local governments to reduce emissions and 2c development of model bylaws and best practices).

Initiative 5a-1.3 seek to create a term position (+0.5 FTE) in the Environmental Protection division to support program development, administration and implementation, and secure additional program delivery funding to implement a Regional Residential Energy Retrofit Program (refer to *Capital Region Energy Retrofit Business Case* staff report, also on the September 29 agenda).

5a-1.4 Public EV coordinator

The electrification of vehicles to reduce overall emissions is a key strategy in senior and local government action plans. The CRD recently completed the "Capital Region Electric Vehicle (EV) Roadmap" to widespread EV adoption. The document identifies targets, barriers and opportunities specific to our region. This work supports three Board Strategic Priorities (2a declaration of a climate emergency, 2b working with local governments to reduce emissions and 2c development of model bylaws and best practices).

Initiative 5a-1.4 seeks to create a new term position (+0.5 FTE) with program delivery dollars in the Environmental Protection division to implement this roadmap by taking a regional coordination role. Their objective will be to expand public access to the public charging network for those who cannot access home charging at a reasonable cost, support light-duty vehicle electrification and enable more widespread EV ownership.

5a-1.5 Corporate Climate Action Reserve Fund Increase

The Corporate Climate Action Reserve Fund (CARF) was established in 2017 to support the CRD in achieving its corporate climate action goals. $100,000 a year is allocated from the Legislative & General budget to pay for technical and feasibility studies and corporate planning documents. Funding is a key barrier internally to undertaking GHG reduction projects that have upfront costs (e.g. EV infrastructure, heating system retrofits). In addition, the BC Government recently

discontinued the Climate Action Revenue Incentive program (CARIP), $65,000 of which paid for a corporate climate analysis position.
Initiative 5a-1.5 seeks to increase the CARF to cover the lost funding from the CARIP program. Instead of increasing the fund to pay for capital projects, the CRD will look at the feasibility of implementing a carbon pricing policy for internal decision-making and investigate an internal carbon fee for services.

5a-1.6 Corporate Energy Key Project Manager

The CRD currently lacks an organization-wide approach to energy management; the function falls to a number of facility managers in multiple services among a number of other responsibilities. Typically, organizations the size of the CRD will have a dedicated resource to manage and advance key initiatives to reduce energy consumption (and thereby costs) and support GHG reduction goals.

Initiative 5a-1.6 seeks to create a new ongoing position (+1.0 FTE) in the Environmental Protection division to centralize this work and focus on initiatives that will reduce energy consumption across the wide range of buildings, fleet and infrastructure. This includes energy conservation and efficiency projects, as well as leading innovative clean energy and renewable energy projects.

Staffing changes increases demand and requirements for IT support (e.g. hardware and software procurement, configuration, installation support, devices, access requirements etc.). This initiative, alongside others, will result in a small adjustment to the Information Technology & GIS staffing model to accommodate the demand. To provide full transparency, the financial impact of the initiative reflects the whole cost of delivering the work, including flow-down impacts on support services.

Alignment with Board & Corporate Priorities

The direction given to staff was to bring forward work that is of essential nature. This was defined as:

- Initiatives that provide for public health and safety and/or deliver on a regulatory requirement.
- Initiatives that are required to deliver the Board Strategic Priorities.
- Initiatives that will prevent the materialization of significant negative impacts on service customers, partners, the region, local services or the CRD's finances.
- Initiatives that minimize the materialization of financial, reputational or other risks and liabilities for the CRD by ensuring the organization is keeping pace with expectations and demand.
- There is an imperative to deliver the work immediately and/or quickly.

The ELT has reviewed and assessed all business cases against the criteria. The consolidated package of work is appropriate and commensurate to the challenge facing the organization.

CONCLUSION

Staff have been progressing initiatives and actions identified in the CRD Corporate Plan, including Board Strategic Priorities. The CRD Board determines resourcing through its annual review and approval of financial plans. As per previous years, to support the Board's decision-making, staff are providing 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:

1. That Appendix A, Community Need Summary – Climate Action & Adaptation be approved as presented and form the basis of the 2022-2026 Financial Plan; and

2. That staff initiate a bylaw amendment process to increase the requisition limit under Bylaw No. 3510, the Capital Regional District Climate Action and Adaptation Service Establishment Bylaw, 2008.

Submitted by:	Larisa Hutcheson, P. Eng., General Manager, Parks & Environmental Services
Concurrence:	Robert Lapham, MCIP, RPP, Chief Administrative Officer

ATTACHMENTS

Appendix A: Community Need Summary – Climate Action & Adaptation
Appendix B: Initiatives Progress Report

Community Need

2022 Summary

Making a difference...together

Climate Action & Adaptation

Strategy

Target Outcome

We envision reduced greenhouse gas emissions, triple-bottom-line solutions and progress on adaptation

Strategic Context

Strategies

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

Trends, risks and issues

- 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 research, education and outreach, facilitation, regional program delivery, and managing emissions and adaptation within its own service delivery.
- The Board has declared a Climate Emergency in February 2019 and tasked staff with developing a comprehensive response. The revised Climate Action Strategy, presented to the Environmental Services Committee in September, aligns corporate and regional actions with senior levels of government and local government coordination to meet climate action targets over the next five years. To support the Climate Action Strategy, service levels are proposed to be adjusted through the new initiatives and focused in key areas (EV charging, residential retrofit) along with corporate energy management.
- There was a 1% reduction in the overall regional greenhouse gas emissions (GHG) reductions between 2007 and 2018, equivalent to 14% reduction per capita. CRD will not achieve 2020 GHG reduction targets. 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% increase in corporate GHG reductions between 2007 and 2020. CRD did not achieve the 2020 GHG reduction target of 33% reduction from 2007. With the onboarding of the Mcloughlin Point Wastewater Treatment Plant, the CRD will need to continue to sustain efforts and investment in GHG reduction initiatives to achieve future targets.

Community Need

2022 Summary

Making a difference...together

Services

Core Services Levels	
Service	**Levels**
Community Climate Action 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. Provide climate data and indicators, public education and community programming.	• Advance regional and climate mitigation and adaptation goals. • Lead regional-scale community initiatives and research activities. Pursue grants for regional programming. • Facilitate regional coordination, knowledge sharing, capacity building and advocacy. ➥ Service level adjusted, see IBCs 5a-1.2—6; note that the current service is constrained by max. requisition so bylaw amendment required
Corporate Climate Action 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.	• Development of corporate climate action policy related to corporate fleet, buildings and other capital projects. ➥ Service level adjusted, see IBCs 5a-1.5—6 • Develop and monitor corporate climate action plans and strategies. • Complete annual reporting.
Support Services The core services listed rely on the support of several corporate and support divisions to effectively operate on a daily basis. These services are reported on in the Accountability Community Need Summary.	• Services include Asset Management, Facility Management, Financial Services, Information Technology & GIS, Information Services, Human Resources & Corporate Safety, Corporate Communications, Legislative Services, Legal Services, Risk & Insurance and Real Estate Services.

Community Need

2022 Summary

Initiatives					
Ref	Initiative	Description	Year(s)	2022 impacts	
5a-1.2	Community Energy Specialist	Convert existing position to maintain existing service level for partners	2022+	1.0 FTE converted	$135K requisition, + grants
5a-1.3	Regional Building Energy Retrofit Program	Development, administration and implementation of a retrofit program	2022-2026	+0.5 FTE Term	$603K requisition, + grants
5a-1.4	Public EV Coordinator	Implementation of the Capital Region EV Roadmap to increase EV adoption	2022-2025	+0.5 FTE Term	$247K requisition, + grants
5a-1.5	Corporate Climate Action Reserve Fund increase	Increase funding to make up for loss of grant funding	2022+	-	$65K requisition (from Leg and Gen)
5a-1.6	Corporate Energy Key Project Manager	Create new role to coordinate organization-wide approach to energy management in buildings, fleet and infrastructure	2022+	+1.0 FTE ongoing	$142K requisition (from Leg and Gen)

Business Model

Funding

Who contributes

- All municipalities & Electoral Areas participate in these services.
- Support Services: varies per service

Funding Sources

- Requisitions and grants

Reporting Structure

- Environmental Services Committee

Community Need

2022 Summary

Performance			
Definition and Source	**2020 Actual**	**2021 Forecast**	**2022 Target**
Metric 1: Community GHG Emissions – target to decrease community GHG emissions by 33% from 2007 levels by 2020 and 61% by 2038. Tonnes of CO_2 emissions generated by community activities; data from Regional GHG Inventory Study (Stantec, 2020)	TBC Fall 2021	TBC Fall 2021	Status quo
Metric 2: Corporate GHG Emissions – target to decrease corporate GHG emissions by 33% from 2007 levels by 2020. Tonnes of CO_2 emissions generated by CRD operations; data from CRD 2019 Climate Action Annual Report *McLoughlin WWTP	2,510 tCO2e (10% reduction from 2007)	2,700*	TBC Fall 2021

Discussion

Link to Target Outcome

The metrics included provide community and corporate GHG reduction results.

Discussion

- Metric 1: Includes emissions sources such as stationary energy, transportation, waste, industrial process and product use, agriculture, forestry and other land use.
- Metric 2: Target to decrease tonnes of C02e Corporate GHG emissions by 45% from 2007 levels by 2030. The 2030 target will be confirmed in the renewed Climate Action Strategy (fall 2021).

Community Need

Initiative Progress Report

Making a difference...together

Climate Action & Adaptation

Initiatives approved in 2020 and 2021			
Ref	Initiative	% complete	Progress to date
5a-1	Climate Emergency Response	95%	Lead: Environmental Protection (2021) Progressing – Renewing the CRD's Climate Action Strategy and related IBCs for Board approval fall 2021.
5a-2	Collaborate with local governments	100%	Lead: Environmental Protection (2020) Part of core services – work ongoing on inter-municipal working groups and projects.
5a-3	Model Bylaws	100%	Lead: Environmental Protection (2020) Part of core services – Provide policy guidance and regional coordination support
5a-4	Facilitate networks	100%	Lead: Environmental Protection (2020) Part of core services – Administering Climate Action Inter-Municipal Task Force and Working Group. Participating in BC Hydro Community Energy Manager's Network (as per two year staff support grant).
5a-5	Create partnerships	100%	Lead: Environmental Protection (2020) Part of core services
5b-1	Reduce Corporate Emissions	50%	Lead: Environmental Protection (2020) Progressing – Developing new corporate green fleet policy and green buildings policy. Identifying and pursing key infrastructure upgrades.
5b-2	Landfill Gas Usage	N/A	Lead: Environmental Resource Management (2020) Progressing - the CRD issued a Request for Qualifications seeking submissions for the design and construction of a new facility that will upgrade the biogas generated at Hartland Landfill to renewable natural gas (RNG), and are initiating a RFP in the fall.
5b-4	GHGe Reduction through Alternative Fuel	0%	Lead: Environmental Protection (2020) On hold – Fortis (RNG) alternate fuel not available in 2021.

Community Need

Making a difference...together

Initiative Progress Report

Initiatives approved in 2020 and 2021			
Ref	**Initiative**	**% complete**	**Progress to date**
5c-1	Regional Sea Level Rise	100%	Lead: Environmental Protection (2020) Completed
5c-2	Regional Climate Action Strategy	95%	Lead: Environmental Protection (2020) Progressing – Plan update is underway in concurrence with 5a-1

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ERM 21-35

REPORT TO ENVIRONMENTAL SERVICES COMMITTEE
MEETING OF WEDNESDAY, SEPTEMBER 29, 2021

SUBJECT **Solid Waste Management Plan – Implementation Update**

ISSUE SUMMARY

To provide an update on implementation of the Solid Waste Management Plan.

BACKGROUND

On May 12, 2021, the Capital Regional District's (CRD) new Solid Waste Management Plan (SWMP) was approved by the CRD Board. At the same meeting, staff were directed to submit the plan to the Ministry of Environment and Climate Change Strategy (ENV) for regulatory approval and to immediately begin implementing the plan. In response to this direction, staff have submitted the Plan to ENV for review and approval, have developed a short-term work plan and framework, and have begun plan implementation. Details are provided below for information.

The new SWMP has a goal to surpass the provincial waste disposal target and aspires to achieve a disposal rate of 125 kg/capita/year. By the end of its tenth year, the plan targets a waste disposal rate of 250 kg per capita (or less). This represents an overall regional waste reduction of approximately one-third, or around 40,000 tonnes of waste against 2020 levels within 10-years – a significant challenge for a growing region.

The CRD has focused on waste reduction for many years and has already been successful in diverting a significant portion of the region's waste from the landfill. Between 1989 and 2019, the CRD's per capita waste disposal rate went down approximately 43%, as a result of a variety of CRD initiatives, including the blue box program, recycling depots, landfill disposal bans on materials when viable alternatives exist (including processing systems and end markets), as well as the introduction of the Extended Producer Responsibility programs regulated by the Province.

To meet the targets of the new SWMP, the CRD will need to build on these successes and implement new and expanded programs, policies and regulations, as identified within the plan, to continue to reduce, reuse and recycle materials, and recover materials and energy from the waste stream.

To support meeting the plan's waste disposal target within the timeframe, staff have developed a short-term work plan and framework (Appendix A) and have prioritized the plan's 72 actions through the lenses of those actions that will be most effective in reaching the plan targets, align with community (including municipal) priority areas, and are areas that fall within the CRD's jurisdiction and operational control.

On this basis, staff have identified five short-term focus areas for immediate implementation (see details in Appendix A). The vast majority of waste reduction is expected to be achieved through the targeted material stream diversion of wood waste, organics, paper and plastics, which combined represent about two-thirds of the materials currently being disposed at Hartland Landfill.

At its September 15, 2021 meeting, the Solid Waste Advisory Committee received the SWMP – Implementation Update staff report for information and passed the following related motion:

> *That the Capital Regional District prioritize waste stream management licensing as part of the short-term strategies to support municipalities in their initiatives.*

The Solid Waste Advisory Committee motion, and staff prepared implications report, will be brought to Environmental Services Committee for consideration at their October 20, 2021 meeting.

CONCLUSION

The final draft Solid Waste Management Plan has been submitted to the Ministry of Environment and Climate Change Strategy for regulatory approval. Meeting the targeted waste disposal rate of 250 kg per capita (or less) per year within 10 years represents an overall reduction of approximately one-third of the current solid waste generation and will be a significant challenge for our growing region. Staff have begun plan implementation and have prioritized the 72 plan actions into five short-term focus areas through the lenses of actions that will be most effective in reaching the plan targets, align with community (including municipal) priority areas, and are areas that fall within the CRD's jurisdiction and operational control.

RECOMMENDATION

The Environmental Services Committee recommends to the Capital Regional District Board:

That this report be received for information.

Submitted by:	Russ Smith, Senior Manager, Environmental Resource Management
Concurrence:	Larisa Hutcheson, P. Eng., General Manager, Parks & Environmental Services
Concurrence:	Robert Lapham, MCIP, RPP, Chief Administrative Officer

ATTACHMENT

Appendix A: Solid Waste Management Plan – Short-Term Implementation Framework and Timeline

APPENDIX A

SOLID WASTE MANAGEMENT PLAN
SHORT-TERM IMPLEMENTATION FRAMEWORK

September 2021

Staff have developed a short-term work plan and framework and have prioritized the plan's 72 actions through the lenses of those actions that will be most effective in reaching the plan targets, that align with community (including municipal) priority areas, and are areas that fall within the Capital Regional District's (CRD) jurisdiction and operational control.

Priority Areas

The immediate priority areas include:

- **Targeted Material Stream Diversion:** Wood waste, organics, paper and plastic account for over 65% of the total materials currently sent to the landfill and represent an immediate opportunity for diversion and recovery of material and energy from the solid waste stream. Staff have begun developing new programming and tools to reduce waste and recover energy from these material streams. Actions under evaluation include 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 expanding regulatory enforcement, where required. Staff will be consulting with municipalities and the private sector on proposed operational changes over the fall and expect to bring a proposed material stream diversion program, including associated tipping fee and bylaw changes to the committee for consideration in early 2022.

- **Multi-Family/Industrial, Commercial and Institutional (ICI) Strategy:** ICI refers to waste generated through industrial, commercial and institutional sectors. Multi-family refers to waste generated by residential housing that is not considered single-family. Collectively, these two sectors generate approximately 53% of the solid waste stream. Much of the CRD's historical efforts and successes in diverting 43% of materials from the waste stream over the previous decades have been realized through an early focus on the single-family sector with the residential blue box collection program. Opportunity exists to enhance diversion activities and programming to the ICI and multi-family sectors. This focus area was also identified as a priority by municipalities during the plan's consultation phase. Staff are working to develop an ICI/multi-family sector specific strategy, and have included a budget request through the CRD's annual budgeting process for a new Initiatives Coordinator position, which would begin in early 2022.

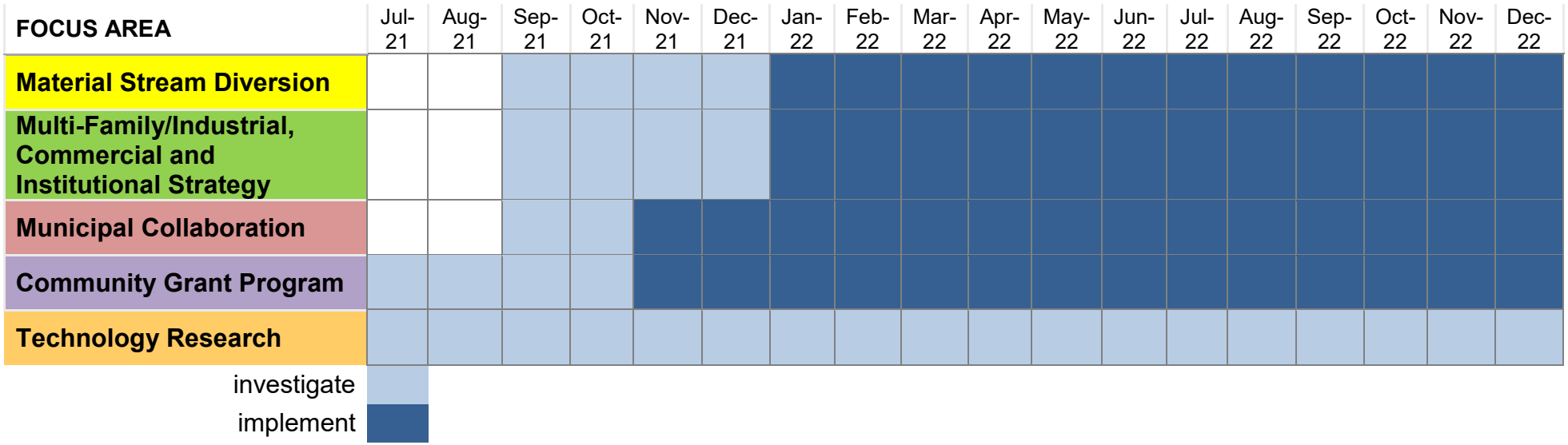
- **Municipal Collaboration***:* Municipalities are primary partners in implementing the Solid Waste Management Plan and provide various curbside collection or drop-off services to residents and other sectors; education and outreach associated with local solid waste services; litter collection, streetscape sanitation and waste collection services for public spaces; along with many other critical roles. Through programming, regulation and bylaws, municipalities have the ability to access waste streams and incent diversion in areas that are outside of the scope or authority of the CRD. Staff are working to enhance the collaboration with municipalities on plan implementation. Immediate first steps include inventorying current municipal initiatives and reenergizing and expanding the existing staff inter-municipal solid waste working group through the development of a terms of reference and populating the working group.

- **Community Grant Program**: Through the Solid Waste Management Plan consultation, the CRD heard many waste reduction ideas with potential from the community. A community-based waste reduction grant program will provide resources and support for individuals and groups that want to turn their ideas into action. Funds have been allocated to the program within the Environmental Resource Management budget, and staff are currently developing program guidelines and looking to launch the program in 2022.

- **Technology Research**: Staff continue efforts researching, investigating and reporting out on emerging waste management technologies, including alternatives to landfilling, such as integrated resource management and gasification. On July 14, 2021, the CRD Board directed staff to facilitate, where possible, the business case process the Township of Esquimalt has undertaken to explore feasibility of gasification of solid waste and kitchen scraps management, and CRD staff continue to work with and support staff at Esquimalt. Additionally, the CRD is investigating the feasibility of testing municipal solid waste in conjunction with the CRD's biosolids gasification testing and will bring results of these investigations to the Environmental Services Committee.

SOLID WASTE MANAGEMENT PLAN SHORT-TERM IMPLEMENTATION TIMELINE

2021



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EEP 21-39

REPORT TO ENVIRONMENTAL SERVICES COMMITTEE
MEETING OF WEDNESDAY, SEPTEMBER 29, 2021

SUBJECT **Updated Capital Regional District Climate Action Strategy**

ISSUE SUMMARY

To present the renewed draft Capital Regional District (CRD) Climate Action Strategy for approval.

BACKGROUND

The CRD has committed to taking action to address climate change within operations at the regional level, as highlighted in the Board's declaration of a climate emergency and accompanying commitment to take a leadership role to pursue regional carbon neutrality. In response, staff led the development of a renewed draft Climate Action Strategy (the strategy), replacing both the CRD 2016 Corporate Climate Action Strategy and the 2017 Regional Climate Action Strategy. The strategy (Appendix A) reflects current Board priorities and provides a clear path for how the CRD will show leadership on climate action.

The strategy outlines how the CRD can influence, lead and support efforts to reduce emissions and adapt to a changing climate. It includes a renewed vision, principles, goals and corporate greenhouse gas (GHG) reduction targets. To leverage and maximize region-wide benefits, it aligns with federal, provincial and local initiatives and policy directives. It is recognized that the success of this strategy relies on our collective commitment to bold climate action at all levels of government.

Over the next five years, the CRD's Climate Action Service, and over twenty CRD divisions, will be responsible for implementation of the strategy's 128 actions. Staff will monitor and assess whether actions need to be adapted, shifted or updated to reflect changing context or opportunities, and report progress annually. After five years, the strategy will be updated to continue advancing the CRD's climate goals.

To develop the strategy, staff and a consultant team engaged staff representatives for numerous CRD divisions, the CRD Climate Action Inter-Municipal Working Group, and elected officials on the CRD Climate Action Inter-Municipal Task Force. Input was embedded into the strategy, and feedback, in general, aligns with the draft Strategy.

ALTERNATIVES

Alternative 1

The Environmental Services Committee recommends to the Capital Regional District Board:

1. That the Capital Regional District Regional Climate Action Strategy be approved; and

2. That staff be directed to forward this report to municipal councils for information.

Alternative 2

That the report be referred back to staff for further review.

IMPLICATIONS

Environmental & Climate Implications

The strategy recognizes that GHG emissions must be reduced and sequestered and, to respond to climate impacts, efforts must focus on understanding vulnerabilities, ensuring natural assets are resilient, and preparing the region's infrastructure and lands.

The strategy sets a new corporate GHG reduction target of 45% below 2007 levels by 2030 (per the Province's reporting framework). The strategy aligns with the regional target to reduce GHG emissions 61% by 2038 based on 2007 levels (per 2018 Regional Growth Strategy). Further, the Intergovernmental Panel on Climate Change states that to limit global temperature rise below 1.5ºC, there must be net-zero emissions by 2050. The strategy includes CRD actions to support this pathway over the next five years.

Intergovernmental Implications

To develop this strategy, staff reviewed municipal climate plans and consulted the region's municipalities and electoral areas to understand priorities for the CRD to play a role in achieving coordinated regional climate action goals. The strategy complements municipal priorities, fills in gaps and aligns with federal and provincial governments. It is intended to inform the service and work plans of CRD community-based services, guide funding applications and highlight partnership and advocacy opportunities.

Supporting Indigenous-led climate solutions is a foundational principle of the strategy. The CRD will continue to look to the region's First Nations to understand priorities and support, as needed.

Regional Growth Strategy Implications

The strategy aligns with the policy direction of the CRD's Regional Growth Strategy.

Social Implications

Development of the strategy identified six principles that guided the selection of actions and will continue to guide their implementation, including a core principle to ensure "actions are inclusive and accessible to residents across the region, and support the most vulnerable."

Financial Implications

While many of the strategy's actions can be accomplished within existing service levels, increased service adjustments have been proposed, starting in the 2022 budget year (refer to *2022 Service Planning – Climate Action & Adaptation* staff report, also on the September 29 agenda). The CRD will continue to leverage partnerships, programs and grant funding opportunities.

Future financial implications associated with service level adjustments, identified by feasibility or other studies, would be considered by the Board in future service planning processes.

Service Delivery Implications

The strategy proposes a service adjustment of two new full-time equivalents (FTE), the conversion of one FTE to a continuous versus contract position, and reallocation of funding due to loss of the Climate Action Revenue Incentive Program. This would allow the CRD to support additional programming related to regional energy retrofits (refer to *Capital Region Energy Retrofit Business Case* staff report, also on the September 29 agenda), public electric vehicle charging (related to the June 16, 2021 CRD Electric Vehicle Infrastructure Roadmap staff report), municipal climate action policy and capacity building, and to advance corporate energy management. Refer to the *2022 Service Planning – Climate Action & Adaptation* staff report, also on the September 29 agenda.

An increase in service delivery to the Climate Action Service requires a bylaw amendment to increase requisition room limits. Should the proposed 2022 service planning adjustments or the amendment of Bylaw No. 3510, Climate Action & Adaptation, not be supported, actions and associated timelines would need to be adjusted within the strategy's five-year action plan.

Alignment with Board & Corporate Priorities

The key driver of the strategy is to advance the Board's Climate Action & Environmental Stewardship Strategic Priority and accelerate the CRD's Climate Action activities in light of its declaration of a Climate Emergency.

Alignment with Existing Plans & Strategies

Embedded through numerous services, climate action at the CRD has strong linkages with several strategic plans across the organization including: 2019-2022 Board Priorities and Corporate Plan, the 2018 Regional Growth Strategy, the 2014 Regional Transportation Plan and Pedestrian and Cycling Master Plans, the 2017 Regional Water Supply Strategic Plan, the forthcoming Regional Parks Strategic Plan, the recently approved Solid Waste Management Plan and regional transportation priorities (Appendix A). Successful implementation of these dependent plans alongside the strategy is integral to fulfilling the CRD's role in climate action.

CONCLUSION

The CRD Climate Action Strategy provides a renewed vision, goals and plan to guide the organization's climate action activities for the next five years. Developed in consultation with municipal partners, the Strategy includes an implementation plan for where and how the CRD will influence, lead or support our region in reducing greenhouse gas emissions and preparing for climate impacts through its various services.

RECOMMENDATION

The Environmental Services Committee recommends to the Capital Regional District Board:

1. That the Capital Regional District Regional Climate Action Strategy be approved; and

2. That staff be directed to forward this report to municipal councils for information.

Submitted by:	Larisa Hutcheson, P.Eng., General Manager, Parks & Environmental Services
Concurrence:	Robert Lapham, MCIP, RPP, Chief Administrative Officer

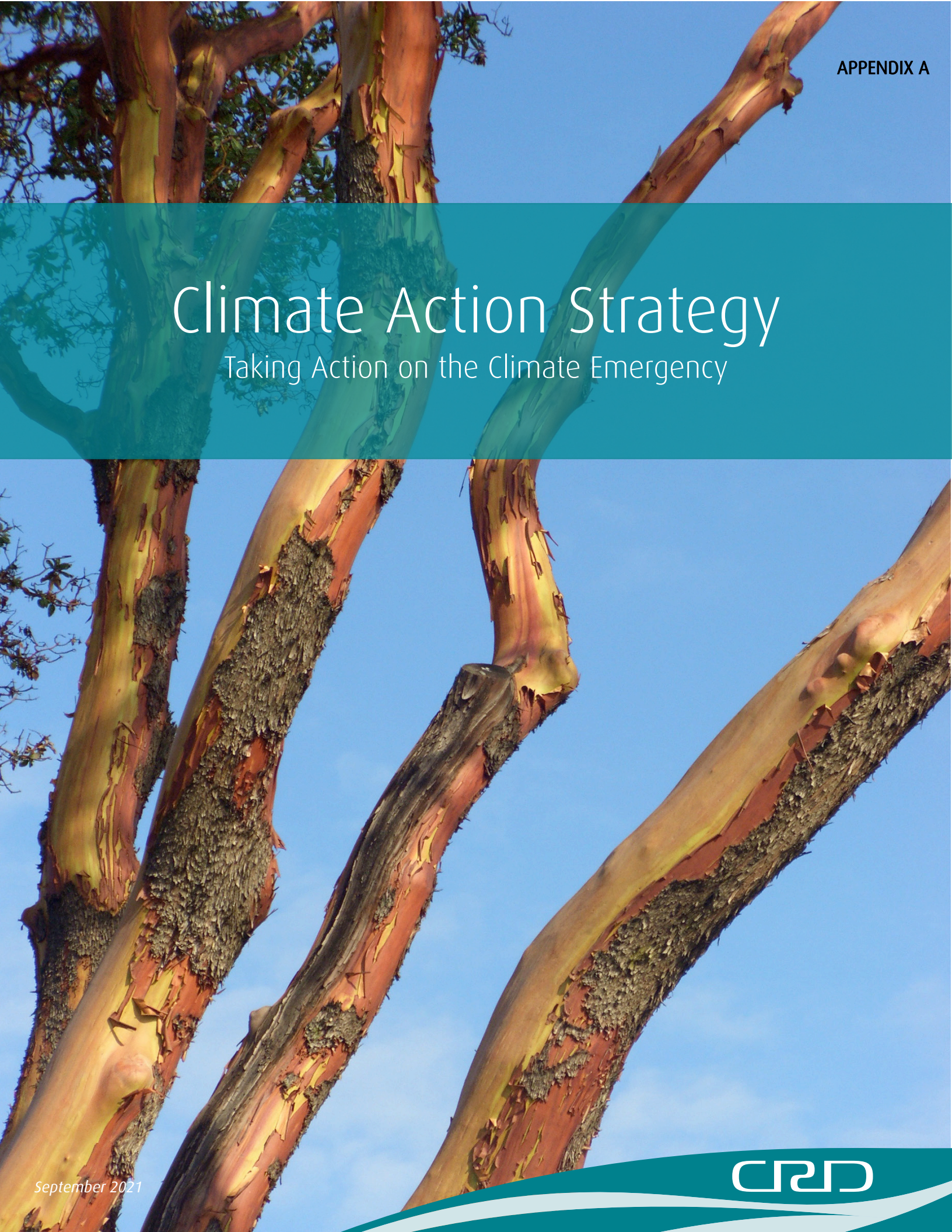
ATTACHMENTS

Appendix A: CRD Climate Action Strategy - Taking Action on the Climate Emergency - September 2021 Report
Appendix B: Climate Action Strategy 2021 - Taking Action on the Climate Emergency - Presentation

APPENDIX A

Climate Action Strategy

Taking Action on the Climate Emergency



September 2021

Territorial Acknowledgement

The CRD acknowledges that it conducts its business in the territory of the Lək̓ʷəŋən (Songhees) and Xwsepsum (Esquimalt) Nations here in the core area, the W̱SÁNEĆ Nations, including W̱JOŁEŁP (Tsartlip), BOḰEĆEN (Pauquachin), SȾÁUTW̱, (Tsawout) and W̱SIKEM (Tseycum) on the Saanich Peninsula and Gulf Islands, Sc'ianew (Beecher Bay), T'Sou-ke, and Pacheedaht to the west as well as MÁLEXEŁ (Malahat) and Pune'laxutth' (Penelekut) Nations. All of whom have lived on these lands since time immemorial.

Table of Contents

Prepared by Pinna Consulting on behalf of Capital Regional District staff.

Introduction

The Climate Emergency

Addressing climate change is one of the most critical issues of our time – both locally and across the planet. The Capital Regional District (CRD) has clearly acknowledged and committed to taking action to address climate change within our operations as well as at the regional level, to reduce emissions and to prepare for the uncertainty a changing climate brings. This was highlighted in the Board's declaration of a climate emergency in early 2019 and commitment to taking a leadership role to pursue regional carbon neutrality.

In response to the climate emergency, the CRD developed this updated five-year Climate Action Strategy in 2021, replacing two former strategies and integrating with existing local, provincial and federal climate action initiatives. The success of this strategy relies on our collective commitment to bold climate action at all levels of government to respond to this emergency.

Climate Action Vision

Through collective action, we eliminate emissions and foster healthy and resilient communities and natural areas now and in the future.

This vision recognizes that the CRD must act in concert with many partners to address the climate emergency, ensuring the region is minimizing its contribution to climate change while also preparing for the changes that have already begun. In this context, "we" is inclusive of all governments, First Nations, residents, businesses, institutions, organizations and residents

in the region. The CRD has many important roles to play in achieving this vision. This plan lays out those roles, as well as specific actions the CRD can take over the next five years to reduce emissions and prepare for changes to our climate.

Guiding Principles

Six principles were identified during the development of this strategy that guided the selection of the actions, and will continue to be used to guide the implementation of actions under each goal area:

- **Leadership:** The CRD takes bold action to rapidly eliminate greenhouse gas (GHG) emissions from corporate operations, prepares CRD assets for the changing climate, and integrates climate action across the CRD's local and regional services.
- **Urgency:** Actions to mitigate the impacts of climate change are swift and substantial to respond to the climate emergency.
- **Collaboration:** Collaborative and collective action among municipal, provincial, federal and First Nations governments, businesses, organizations and residents is critical to advance climate action.
- **First Nations relations:** Actions support Indigenous-led climate solutions that are grounded in Indigenous self-determination, shared prosperity and respect Indigenous relationships with the land, water and all beings.
- **Equity:** Actions are inclusive and accessible to residents across the region, and particularly support those most vulnerable to the impacts of climate change.
- **Co-benefits:** Actions maximize co-benefits, including reducing GHG emissions, increasing resilience, improving affordability, expanding economic opportunities, improving health and well-being, advancing reconciliation, and more.

Climate Commitments by Other Governments

The CRD's 2019 climate emergency declaration was prefaced by the Intergovernmental Panel on Climate Change (IPCC) report released in 2018, which found that limiting warming to a 1.5°C change this century could avoid more catastrophic impacts of climate change that would be experienced at 2°C or more of warming. Further to this, the report identified that to limit global temperatures to an increase of 1.5°C this century, the global community will need to achieve a greenhouse gas (GHG) emissions reduction of about 45% from 2010 levels by 2030 and become carbon neutral by approximately 2050.[1]

In 2021, Canada's federal government passed the *Canadian Net-Zero Emissions Accountability Act,* which sets out targets to achieve net-zero GHG emissions by 2050 and aligns Canada with the IPCC report findings.[2] The government also released a strengthened climate action plan, including a proposal to increase the carbon tax annually from $50 per tonne of CO_2 emissions in 2022 to $170 per tonne in 2030.

Provincially, BC has set targets to reduce GHG emissions 40% by 2030, 60% by 2040 and 80% by 2050, relative to 2007.[3] In 2018, the Province released the CleanBC plan with actions that are estimated to reduce BC's emissions by 18.9 megatonnes of CO_2e, 75% of the amount needed to reach the 2030 target. In 2019, the Province amended the *Climate Change Accountability Act* to include requirements related to climate risk and adaptation. This legislation requires an annual ministerial report on climate change risks, and an overview of government's actions to manage them. Currently, the Province is developing a Climate Preparedness and Adaptation Strategy that outlines actions for 2022-2025 needed to address the greatest risks to BC, building from the 2019 Preliminary Strategic Climate Risk Assessment. This, along with modernizing the BC *Emergency Program Act* and developing the forthcoming BC Flood Strategy, will guide provincial investments, policies and programs on climate adaptation in coming years.

Locally, municipal governments across the capital region have declared climate emergencies, promising to accelerate climate action efforts to achieve net-zero carbon emissions. Many have set very ambitious GHG reduction targets, enacted local policies and undertaken planning exercises aimed at reducing emissions and preparing for a changing climate.

Policies and programs implemented at each level of government are critical to achieving a carbon neutral capital region and improving our regional resiliency to climate change.

1. https://www.ipcc.ch/site/assets/uploads/sites/2/2019/05/SR15_SPM_version_report_LR.pdf
2. Canadian Net-Zero Emissions Accountability Act
3. BC Climate Change Accountability Act, 2007

Targets and Commitments

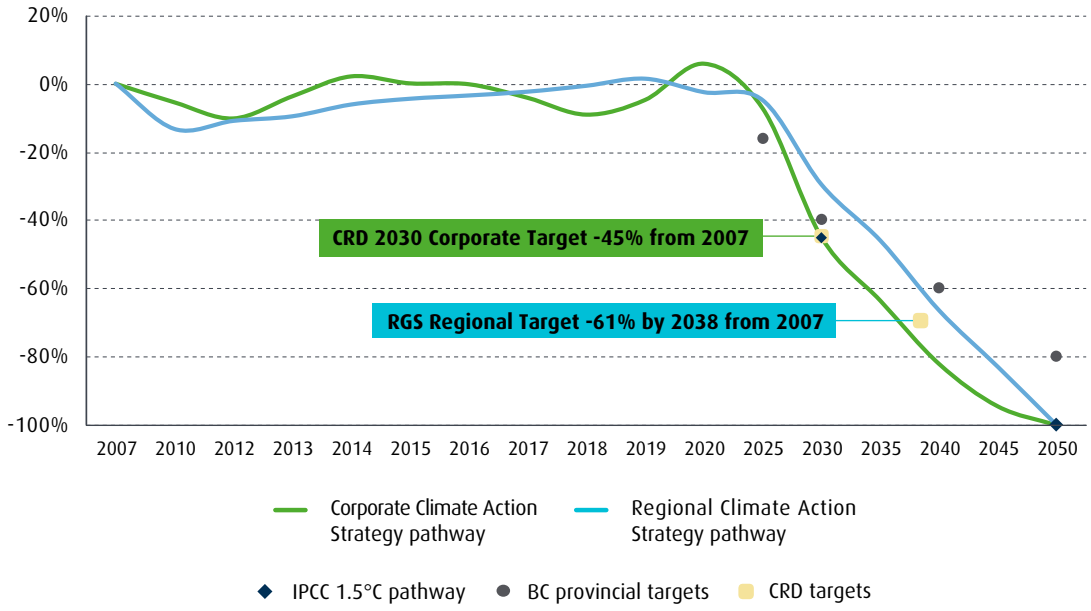
The following targets and commitments provide a set of markers that will help the CRD track and communicate progress on reducing GHG emissions, both at the regional and corporate scales. Figure 1 shows the pathways to reach these targets relative to international and provincial emission reduction goals.

Regional target: Reduce regional GHG emissions 61% by 2038 based on 2007 levels (as per 2018 Regional Growth Strategy).

Corporate target: Reduce corporate GHG emissions 45% by 2030 based on 2007 levels, and reach net-zero GHG emissions before 2050.

Climate emergency declaration: The CRD Board identified Climate Action & Environmental Stewardship as a priority for the region and approved a motion to declare a climate emergency. Through this declaration, the CRD signalled it would demonstrate leadership toward reaching regional carbon neutrality.[4] This strategy outlines a pathway toward net-zero emissions by mid-century, in line with the IPCC modelled pathways to maintain temperatures below 1.5°C this century.

Figure 1. CRD GHG emission reduction pathways and targets



4. The Board declaration stated an aspirational goal to work toward being a carbon-neutral region by 2030. Upon examination of the existing state of the community and corporate greenhouse gas inventories, and the senior government policy positions, no feasible pathway of achieving regional carbon neutrality by 2030 was identified.

The CRD's Role in Climate Action

Building on a Strong Foundation

This 2021 strategy replaces and builds upon two existing CRD climate action strategies: the 2016 Corporate Climate Action Strategy and the 2017 Regional Climate Action Strategy. This 2021 strategy reflects current Board priorities (including the climate emergency declaration) to provide a clear path forward for how the CRD, under its service mandates, will show leadership on climate action, both for the CRD's corporate operations and for its community-focused services.

Corporate operations refer to operations and management of CRD-owned facilities, assets and lands, and corporate greenhouse gas (GHG) emissions refer to those produced by CRD corporate activity. Preparing corporate assets for climate change and reducing corporate GHG emissions are important because the CRD has direct control over these decisions, which provides an opportunity for the CRD to show leadership on climate action.

Community-focused climate action refers to action the CRD can take through its various regional, sub-regional and local services to support the climate mitigation and adaptation across the region. Depending on the service, the CRD has varying levels of control. In many cases, the CRD may influence but does not directly control decisions or outcomes, such as urban land use, transportation choices, energy-efficient building construction and retrofits and community waste reduction. Regional GHG emissions refer to all emissions from activities within the CRD region, a much larger amount of emissions than the CRD's corporate emissions. Enhancing regional resilience to a changing climate and reducing regional GHG emissions both involve significant partnerships with and between municipal, senior and First Nations governments, businesses, organizations and members of the public.

The **corporate** portion of the 2021 strategy builds from the 2016 strategy by involving stronger integration into the decision-making process, identifying key corporate projects, allocating resources and actively seeking grants to support additional investments. The **community** portion of the strategy focuses on areas where the CRD has the greatest influence and areas requiring or benefitting from strong regional coordination.

Throughout the development of this plan, there has been extensive engagement across CRD departments and with municipal representatives. The following groups were consulted, either through workshops or interviews:

- Elected officials from the CRD's Climate Action Inter-Municipal Task Force.
- Municipal staff from the CRD's Climate Action Inter-Municipal Working Group.
- Numerous staff from the CRD's various services that have a role in implementing this strategy, including: facilities, recreation, fleet, purchasing, finance, legislative, risk and insurance, regional and strategic planning, electoral area planning, parks, protective services, building inspections, environmental protection, utilities (water and wastewater), First Nations relations, health and capital planning, housing and environmental resource management.

Collectively, the input from this engagement led to the development of the new vision, guiding principles, goals and a set of actions and metrics to implement and monitor over the next five years.



Overview of the CRD

The CRD has over 200 services, infrastructure and financing agreements with municipalities and electoral areas to deliver services in the following categories:

- Regional, where all municipalities and electoral areas are served.
- Sub-regional, where two or more jurisdictions are served.
- Local, in the electoral areas where the CRD is the local government.

Services encompass the regional water supply, solid waste management, wastewater treatment, regional parks, recreation facilities and more.

In addition, the CRD owns and operates the Capital Region Housing Corporation, a non-profit operator of 2,007 affordable rental units within seven municipalities, and administers the Capital Regional Hospital District (CRHD). The CRHD invests in traditional health care services and provides capital funding for health care infrastructure, such as health facilities and hospital equipment.

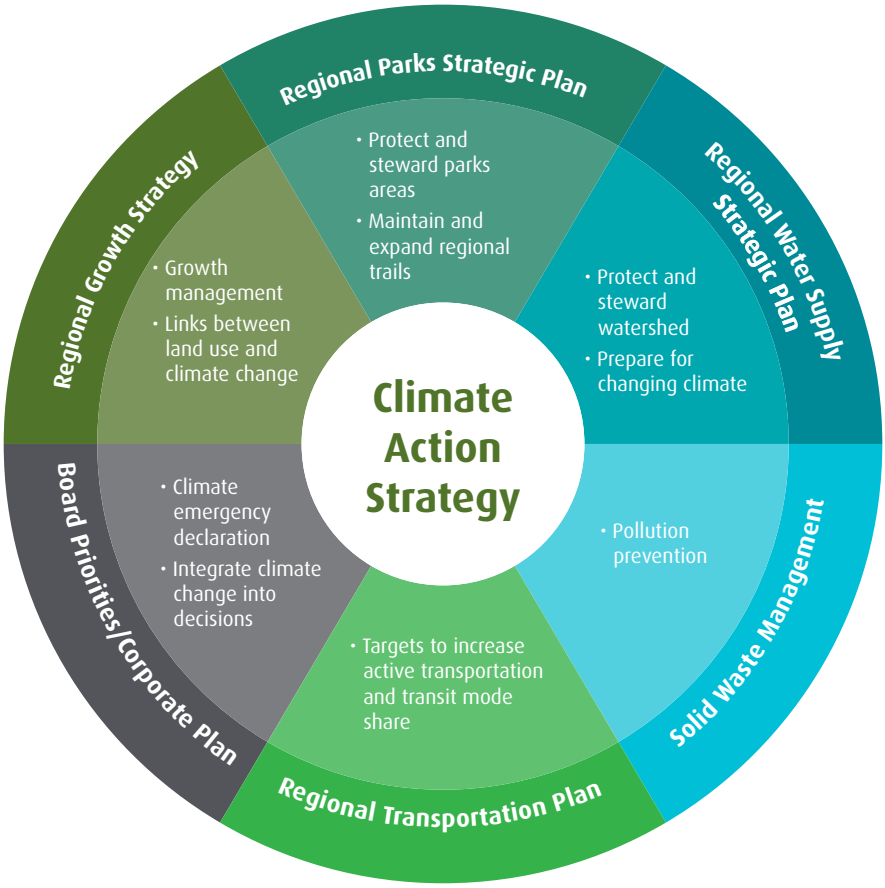
Under Bylaw 3510, the CRD established a climate action service in 2009 to act as a resource and facilitator for local governments, citizens and organizations in the capital region on energy and climate issues. The service has five major focus areas:

- Provide support to local governments in developing and implementing climate action plans and programs (GHG emissions reductions and climate adaptation), as part of legislative requirements under Bill 27 and voluntary commitments under the BC Climate Action Charter.
- 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 by developing and facilitating the implementation of corporate climate action plans, policies and programs and support execution of climate-related Board strategic priorities.

Climate Action Strategy's Relationship to Other CRD Plans

Climate action at the CRD is embedded through numerous services and, as a result, has strong linkages with several strategic plans across the organization. Figure 2 highlights those with the strongest dependencies for this strategy, though there are several more that also influence the outcomes of climate action (see Appendix B). Successful implementation of these plans is integral to fulfilling the CRD's role in climate action.

Figure 2. CRD strategies with strong links to the Climate Action Strategy



Climate Action through the Years

Climate action is a Board priority (2009-11)

Climate action is a Board priority (2012-14)

2003

CRD Headquarters Phase 2 certified Leadership in Energy and Environmental Design (LEED) Gold

2006

CRD Headquarters Phase 2 certified LEED Gold

2007

Acquired Leech Water Supply Area for future drinking water catchment

Developed Community Energy Plan

2008

Developed CRD Corporate Climate Action Plan

Signed BC Climate Action Charter

2009

Acquired Leech Water Supply Area for future drinking water catchment

Established CRD Climate Action Service (1.5 FTE)

2010

Established inter-municipal climate action working group and task force

2011

Saanich Peninsula wastewater treatment plant heat recovery system comissioned

Heat recovery projects started at SEAPARC and Panorama Recreation

2012

Salt Spring Island Library certified as LEED Gold

Climate action is a Board priority (2012-14)

Climate action is a Board priority (2015-18)

Climate action is a Board priority (2019-22)

2013

Began supporting school climate programs

2014

2015

Corporate Climate Analyst position established (1 FTE)

Began offering regional oil to heat pump incentives

Piloted internal climate lens decision-making tool

2016

Corporate Climate Action Strategy developed

2017

Regional Climate Action Strategy developed

Began corporate Zero Emissions Fleet Initiative

Climate Projections for the Capital Region Report released

2018

Corporate Climate Action Reserve Fund established

Regional Growth Strategy adopted (GHG reduction target of 61% by 2038)

Completed EV Infrastructure Planning Guide

FireSmart programs begin in electoral areas

2019

Coastal Flood Inundation Mapping Project initiated

Transition 2050 Residential Acceleration project begins

Community Energy Specialist position established (1 FTE)

2020

Hartland renewable natural gas project approved

McLoughlin Point Wastewater Treatment Plant certified LEED Gold

Regional Greenhouse Gas Inventory Study released

2021

EV Infrastructure Roadmap developed

Regional Retrofit Service business case completed

New CRD climate action strategy developed

Board approves transportation priorities

Adapting to a Changing Climate

Climate Projections and Impacts

Changes to our climate are already noticeable—extreme weather events like droughts, floods, heat waves and fires are happening more often—and these changes are projected to increase in frequency and severity over the coming decades. According to *Climate Projections for the Capital Region*,[5] as a result of global warming, global climate models project the capital region will experience:

- more extreme climate events (such as intense storms or long heat waves).
- an increase in rainfall in fall, winter and spring; and a decrease in rainfall in summer.
- more intense, longer-lasting and more frequent rainfall events.
- frequent heavy snowfalls and rain on snow events in the short-term, less snow in the future.
- hotter summers and less days with freezing in winter.
- increased likelihood of variability of climate within and between years.

Global climate change is also increasing the region's susceptibility to increasing sea level rise. The most vulnerable areas to sea level rise are low-lying and have gently sloping beaches. Recent mapping activities by the CRD identified multiple sites like this in the region.[6]

5. Climate Projections for the Capital Region, CRD, 2017
6. Capital Region Coastal Flood Inundation Mapping Project, CRD, 2020

A changing climate will likely have many implications in this region—negatively affecting health, infrastructure, water supply, agriculture, ecosystems and species. These changes will result in more seasonal variations in water availability, causing droughts; high intensity precipitation events, causing flooding; heavy snow and ice, impacting transportation networks; extreme wind events that may cause power outages; prolonged heat events, increasing wildfire risk; and future coastal storms, flooding homes and infrastructure.

The scientific community agrees that the more we reduce total greenghouse gas emissions in the short term, the less intense these changes will be over time, and that acting earlier is in many cases less costly than delaying action.[7] Public Safety Canada estimates that every dollar invested in mitigation saves $3 to $5 in recovery costs.[8]

CRD Climate Adaptation Planning

Adaptation is defined by the Intergovernmental Panel on Climate Change as the process of adjusting to actual or expected climate and its effects. This includes working to reduce or avoid harm, exploiting beneficial opportunities or facilitating adjustments in natural systems. To be effective in reducing our vulnerability and adapting to a changing climate, we need to improve how we anticipate, respond to and recover from both extreme weather events and more gradual changes occurring over time.

Over the past few years, the CRD has undertaken a number of planning exercises to better understand climate risk and identify actions that would reduce climate risk and support regional efforts on climate adaptation, as listed below. Results and recommendations from these exercises were considered in the development of this plan.

- **Corporate Climate Change Risk Assessment:**[9] This report undertook a screening-level climate change risk assessment at the major asset class level to better understand vulnerabilities to climate change within corporate operations. Results included a list of recommendations to improve climate resiliency. Without undertaking action, a number of CRD assets—including ecological assets and parks; trails, boardwalks and piers; wastewater treatment, storage and conveyance systems; roads; bridge and tunnel assets; and dams and weirs—are most likely to be impacted by climate change.

7. Special Report: Global Warming of 1.5°C, Summary for Policy Makers, IPCC, 2018. C.2.7 states that marginal abatement costs in modelled 1.5°C pathways are quite variable, but roughly 3-4 times higher than pathways limiting to 2.0°C (high confidence).

8. The Cost of Climate Adaptation, Federation of Canadian Municipalities and Insurance Bureau of Canada, 2019

9. Corporate Climate Change Risk Assessment, Stantec Consulting, 2021

- **Adaptation planning for the Greater Victoria Drinking Water Supply Area (GVWSA):** This involves mapping ecosystems, forest characteristics and invasive species to identify potential vulnerabilities to the projected impacts of climate change on the GVWSA. Analysis has pointed to the need to continue emphasizing wildfire prevention and post-fire rehabilitation to protect the water supply and source water quality.
- **Community Climate Change Adaptation Priorities for the Capital Regional District:**[10] Led by ICLEI Canada, the CRD, in partnership with four municipalities, conducted a two-year climate risk assessment for the region, known as the Together for Climate project. This work identified risks and recommended actions the CRD can undertake to further support community preparedness for climate change. Regional risks identified included sea level rise, watershed health, air quality and extreme heat, invasive species, wind, tree health and interface fires. While the CRD is already engaged in advancing preparedness on many of these fronts, it is also well-poised to build capacity across the region in response to local climate impacts. This project recommended the CRD take a leadership role in supporting community-focused actions.

10. https://icleicanada.org/wp-content/uploads/2020/10/CRD-Climate-Adaptation-Resource_FINAL.pdf

Greenhouse Gas Emissions: Now and Looking Forward

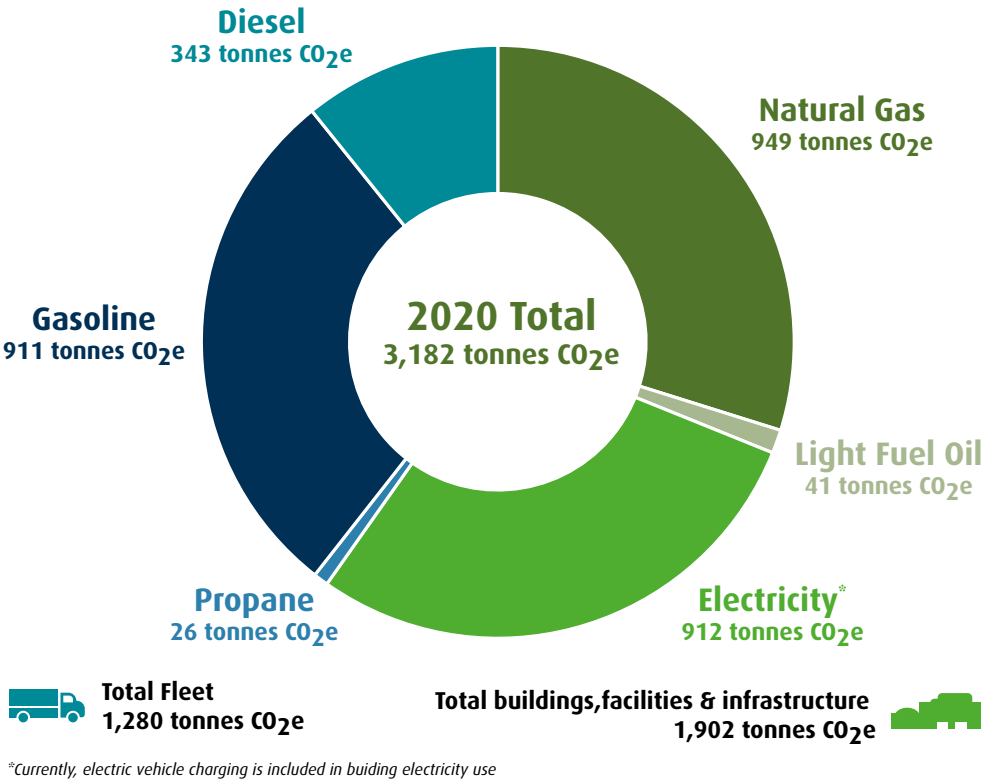
The CRD's Corporate GHG Emissions

In order to deliver services, the CRD operates buildings, infrastructure and a fleet of vehicles and equipment, which result in greenhouse (GHG) emissions – primarily from the use of fossil fuels. Since 2012, the corporation has annually tracked and reported its GHG emissions. Although the CRD's corporate emissions account for less than 1% of regional GHG emissions, reducing the organization's carbon footprint is an important area of action because the CRD can directly address these emissions through decisions made in the purchase, construction and operation of its assets and delivery of its services. In this realm, the CRD can take a leadership role in demonstrating how to rapidly eliminate GHG emissions.

2020 Corporate Emissions Profile and Business-as-usual Forecast

In 2020, the CRD's corporate operations resulted in roughly 3,182 tonnes of CO_2e, where operating fleet vehicles and equipment roughly account for 40%, and operating buildings, facilities and infrastructure account for 60% (see Figure 3). This represents an overall increase of 6% since 2007, while at the same time increasing service levels (including 24% increase in fleet size and 19% in staffing). This fell short of the 30% reduction target set for 2020.

Figure 3. Sources of greenhouse gas emissions from CRD Corporate operations in 2020



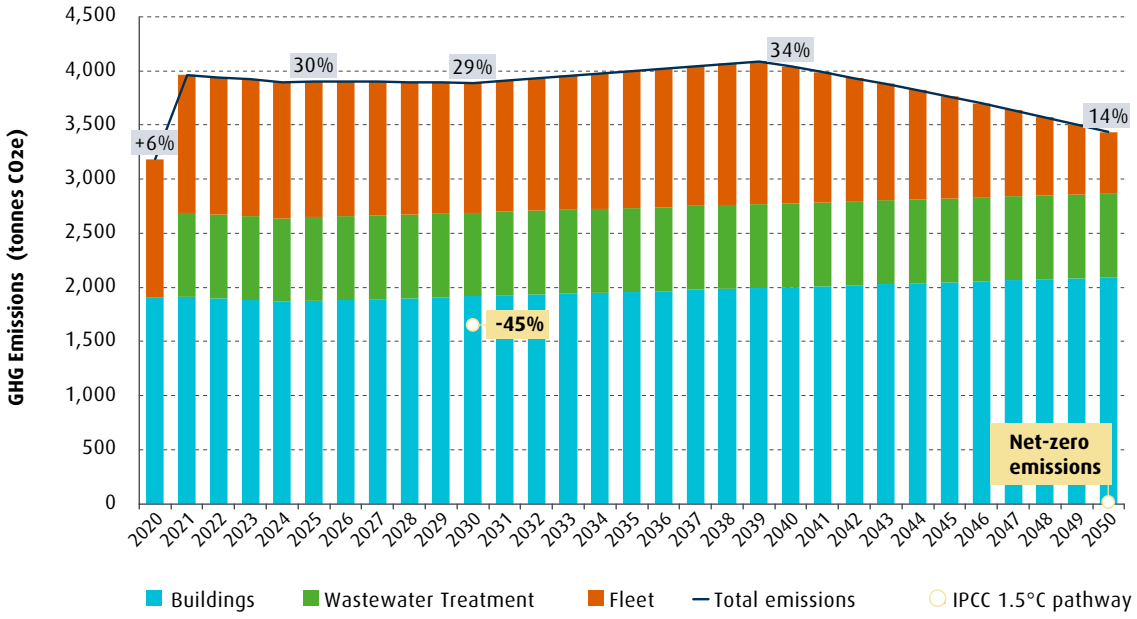
Currently, electric vehicle charging is included in buiding electricity use

Sufficient emission reductions cannot be achieved without an increased corporate effort. A **business-as-usual scenario** (see Figure 4) estimates the change in corporate GHG emissions going forward, based on anticipated changes in service levels to serve a growing population, together with the implementation of senior government policies and regulations currently in place and CRD projects with allocated budget (see Table 1 for a list of assumptions). Following this trajectory, the CRD's corporate GHG emissions are estimated to increase by 33% by 2040, then decrease to +13% relative to the 2007 baseline by 2050—demonstrating that substantial effort is needed to align with the climate emergency commitment.

Table 1. CRD Corporate business-as-usual greenhouse gas emissions scenario assumptions

Sector	Item	Description	Year
Fleet	BC Low Carbon Fuel Regulation	-10% emissions intensity gasoline, diesel	2021-2030
Fleet	Federal Heavy-Duty Vehicle GHG Regulation	-16% fuel use in replacement vehicles from 2027 relative to 2017	2027-2039
Fleet	BC Zero Emission Vehicle (ZEV) Regulation	100% of replacement vehicles are ZEV starting in 2040	2040-2050
Buildings	New McLoughlin Point Wastewater Treatment Plant	18.6 GWh electricity; 145 MWh natural gas estimated	2021
Buildings	Japan Gulch Ultraviolet Plant Upgrade	-60% electricity consumption	2022-2024

Figure 4. CRD Corporate greenhoiuse gas emissions: business-as-usual scenario, 2020-2050, with percent change relative to 2007 (tonnes CO_2e)



CRD Corporate Emissions Reduction Target: 2021-2030

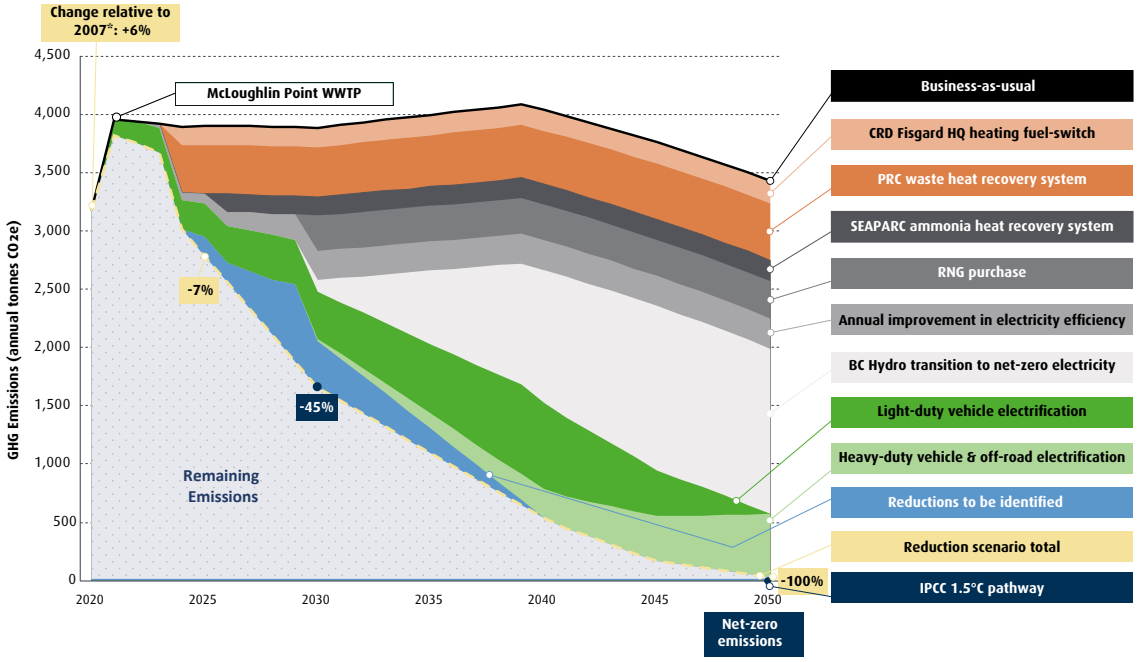
Though ambitious and requiring substantial resources and effort, the CRD can accomplish its reduction targets by ensuring the completion of several critical actions. This pathway includes the critical actions outlined in Table 2, with the resulting estimated impact of each shown in Figure 5. For reference, the IPCC 1.5°C scenario targets are shown in dark blue. Even with these critical actions, further effort is required to identify and implement additional means of reducing emissions.

Guided by the principles of leadership and urgency, the CRD will target to reduce GHG emissions from corporate operations 45% by 2030, relative to 2007, and be net-zero before 2050.

Table 2. Critical Actions of the CRD Corporate Climate Action Strategy Pathway

Sector	Critical Action	Year
Buildings	CRD Fisgard Headquarters heating fuel-switch from natural gas to electricity	2024
Buildings	Install Panorama Recreation Centre heat recovery system	2024
Buildings	Install SEAPARC Recreation Centre heat recovery system	2026
Buildings	Offset remaining gas use with renewable natural gas	2030
Buildings	Annual 5% improvement in electricity efficiency	2023-2030
Buildings	Transition to net-zero emissions electricity (BC Hydro)	2030-2045
Buildings	Maintain (or expand) operation of Saanich Peninsula Wastewater Treatment Plant district energy system	2025
Fleet	100% Light-duty vehicle and truck electrification	2021-2040
Fleet	Heavy-duty and off-road vehicle electrification and renewable fuel use	2030-2050
All	Identify and implement additional reductions of 400 tonnes CO_2e by 2030	2021-2030

Figure 5. CRD Corporate GHG emissions: Climate Action Strategy scenario, 2020-2050 (tonnes CO_2e)



* *Percentage change in GHG emissions in 2020 relative to 2007 is different from the CRD's 2020 Climate Action Annual Report. Corporate GHG emissions inventories and projections in this document have been adjusted to reflect the province-wide reporting change in the BC Hydro's electricity emissions factor, which increases from 10.67 tCO_2e per GWh of BC Hydro electricity to 40.1 tCO_2e per GWh, starting in 2021. This increase reflects the reality that BC Hydro periodically imports high-GHG electricity from other regions*

Regional GHG Emissions

2018 Capital Region Emissions Profile

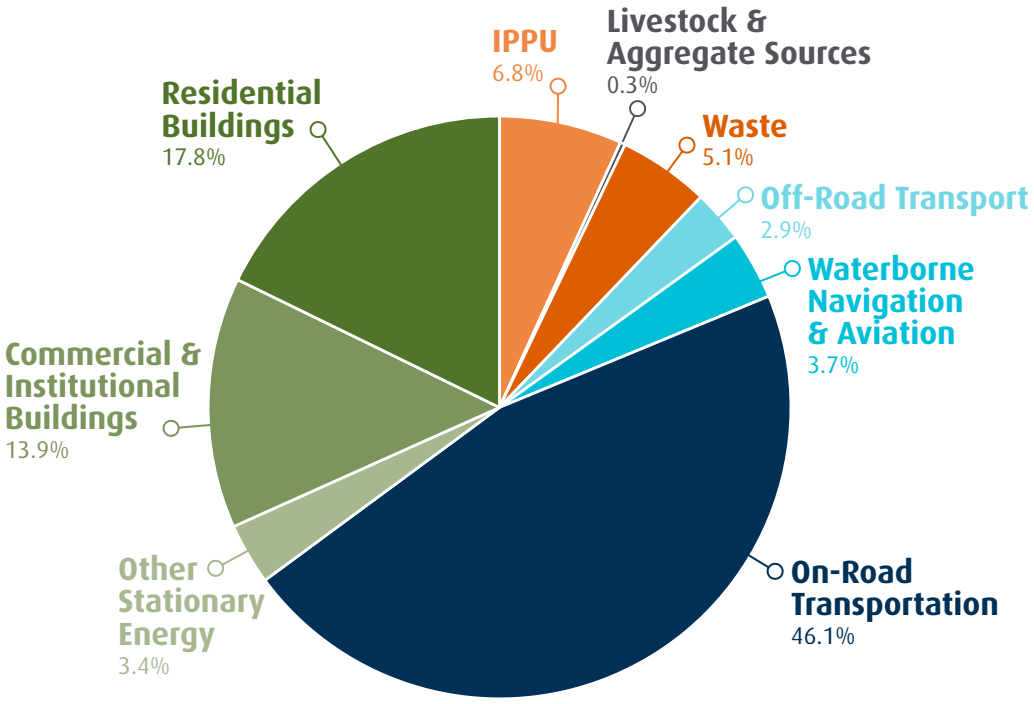
In 2020, the CRD completed a regional energy and emissions inventory to provide a more complete picture of the region's energy consumption and GHG emissions. This followed the Global Protocol Community-Scale Greenhouse Gas Emission Inventories BASIC+ Framework, and included territorial GHG emissions from: stationary energy (e.g., buildings), transportation (e.g., commuter vehicles), waste (e.g., landfills), industrial processes and product use (IPPU), and agriculture, forestry and other land use (e.g., fertilizer application).

The study conducted for the 2018 year shows that approximately 1.7 million tonnes of CO_2e emissions are emitted annually in the capital region, which is relatively unchanged from 2007 levels.[11] Although this does not represent a significant reduction from the 2007

11. Capital Regional District 2018 GPC BASIC+ Community Greenhouse Gas (GHG) Emissions Inventory Report, Stantec, 2020

baseline, the total GHG emissions per capita has decreased by 14%. The two largest sources of GHG emissions in this inventory are transportation – accounting for almost half of regional GHG emissions, and buildings – accounting for another third of regional GHG emissions.

Figure 6. Sources of regional GHG emissions, 2018

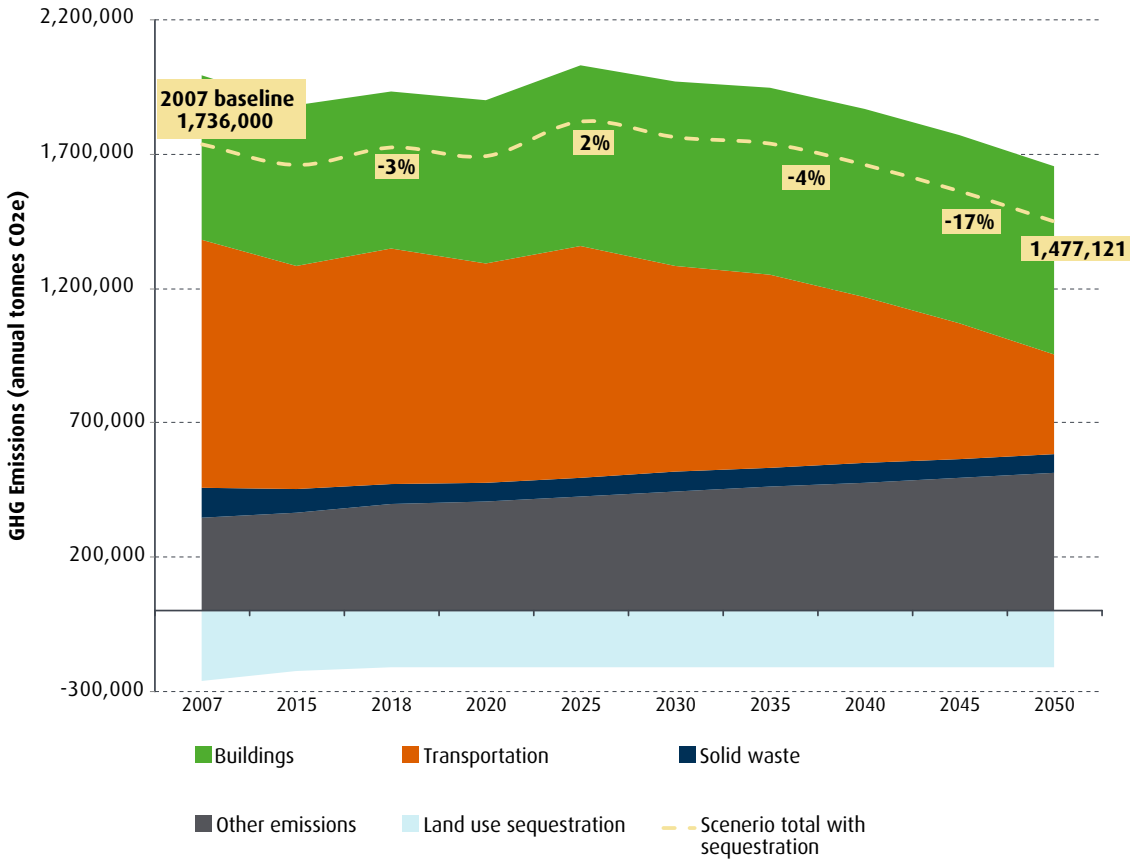


Capital Region Business-as-Usual Emissions Forecast

Continued strong population growth is anticipated for the capital region over the coming decades. Historically, energy consumption and levels of GHG emissions have shown a strong correlation with population growth, though this is weakening over time due to changes in land use and transportation mode shift in urban areas, and more efficient buildings, infrastructure and technology. Although current trends indicate that energy consumption and GHG emissions may reduce over time, much more significant shifts are needed to address the climate emergency. Based on the Capital Regional District 2019-2038 Population, Dwelling Units and Employment Projection Report, the population is anticipated to exceed 450,000 by 2028 and almost 500,000 by 2040, an increase of 20% by 2038, relative to 2019. If the population continued to grow at this rate, the CRD's population would reach over 540,000 by 2050.

Under the assumption that senior governments continue to implement the climate policies and regulations they have committed to, the forecast shown in Figure 7 can be considered a business-as-usual scenario for region-wide GHG emissions. This forecast estimates GHG emissions over time if only senior government policies are implemented and no additional action is taken by the CRD, local governments, residents, businesses, industry and organizations in the region. Under this scenario, GHG emissions are forecast to decrease over time, reaching -23% by 2050; clearly insufficient to align with the climate emergency.

Figure 7. Capital region-wide GHG emissions: Business-as-usual scenario, 2007-2050 (tonnes CO_2e)



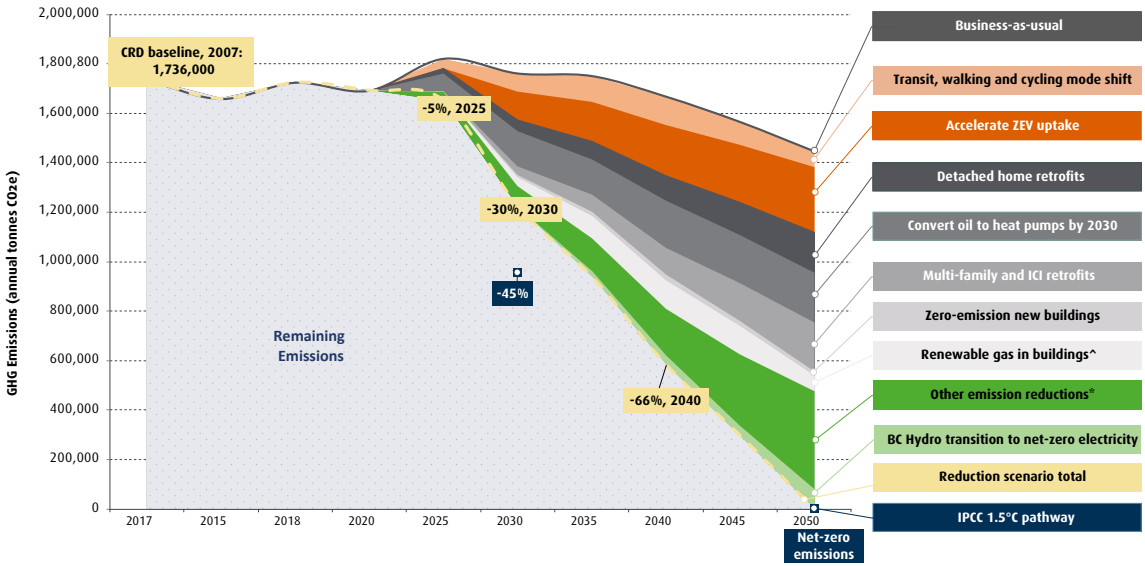
Rapidly Reducing Emissions While Increasing Resilience

A second region-wide scenario, called the **Climate Action Strategy** scenario, demonstrates one potential future trajectory for regional GHG emissions, though there are many more possible outcomes that depend on numerous factors beyond the CRD's control. This GHG emission reduction scenario cannot be achieved by the actions of the CRD alone; it shows the

potential outcome if all players do their part, including the CRD, by investing in the transition off fossil fuels. The scenario shows a pathway to achieve the CRD's regional GHG emission reduction target for 2038 and approach net-zero emissions by mid-century. However, it falls short of meeting the Intergovernmental Panel on Climate Change 1.5°C scenario of reducing global emissions by 45% by 2030, from 2010 levels. **Additional measures need to be identified over the tenure of this plan to address the climate emergency.**

The actions identified in this strategy articulate how the CRD intends to play a leadership role in advancing the initiatives in its areas of influence in the near term. Figure 8 shows the potential reductions in regional emissions from different climate initiatives and Figure 9 shows the emissions that would remain after these reductions. This scenario assumes that the remaining emissions will be reduced by carbon sequestration from land use protection. This is shown as negative emissions in Figure 9 and subtracts from the total remaining emissions, resulting in the dotted-yellow reduction scenario pathway line. Land use protection ensures that natural areas continue to act as a carbon storage through mid-century.

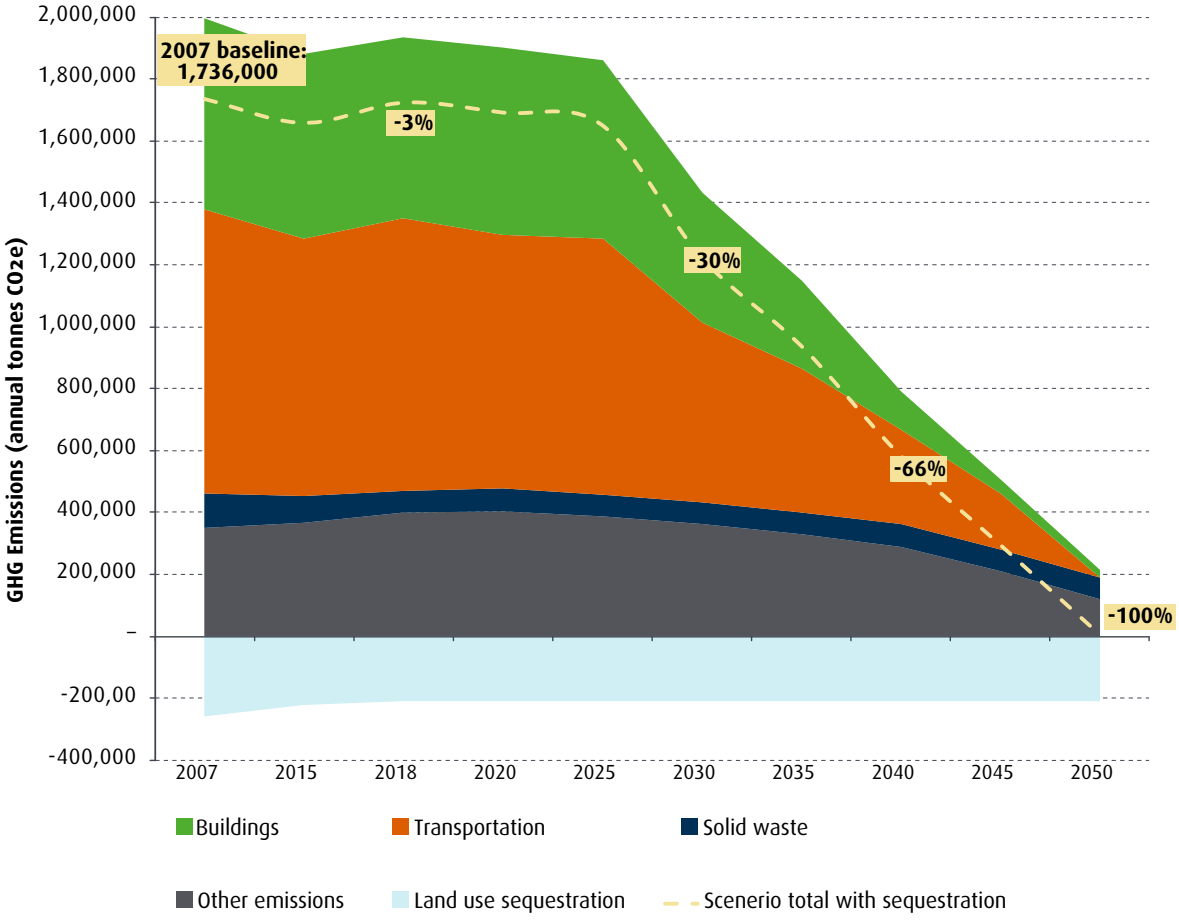
Figure 8. Capital region-wide GHG emissions: Climate Action Strategy scenario, 2007-2050 (tonnes CO_2e)



^ Renewable gas may include several sources, e.g., captured landfill gas, gas from anaerobic digesters, future supply of hydrogen gas.

** Other emissions sources include agriculture, forestry, other land use, fugitive, marine and aviation, product use*

Figure 9. Capital region-wide GHG emissions: Climate Action Strategy remaining emissions, 2007-2050 (tonnes CO_2e)



The CRD's Five-year Action Plan

As highlighted above, substantial action is needed from many parties to set the corporation and the region on paths that align with maintaining global temperature increase below 1.5°C, and that helps us prepare for the climate changes already evident. This section highlights six goal areas where the CRD will focus its efforts, together with numerous actions that will be undertaken by several different services across the organization. As highlighted in the vision and guiding principles, the CRD will also need to work collaboratively with several other organizations, and some of these key partner roles are highlighted below. **Appendix C provides a consolidated list of actions and related sub-actions**, including which division(s) are responsible for leading and supporting the actions, estimated timing of action implementation and whether additional resources are needed.

Climate Action Strategy Goals

- **Climate-focused decision making**
- **Sustainable land use, planning and preparedness**
- **Low-carbon mobility**
- **Low-carbon and resilient buildings and infrastructure**
- **Resilient and abundant nature, ecosystems and food systems**
- **Minimized waste**

Climate-Focused Decision Making

Goal 1: Climate action priorities are integrated at all levels of decision making across the organization.

In order to provide its wide range of services, the CRD maintains and operates vehicles, equipment, buildings, facilities, infrastructure, landfills, paths and parks. Decisions made in each service area can have implications for the amount of GHG emissions generated or sequestrated by CRD assets over time, as well as how prepared these assets are for the changing climate.

There are a number of options to further integrate climate action into the decision-making process, including using a standard climate lens framework that demonstrates the climate impact of operational decisions and identifying an internal carbon price to help with business cases for energy efficiency and emission reduction measures. Effective implementation will require allocating appropriate internal funding and rolling out organizational change efforts to accompany new policies. Through this process, the CRD can also improve the organizational understanding of Indigenous knowledge, laws and perspectives in relation to climate solutions to inform how the CRD approaches climate action.

The CRD's Role

Operational decision making: Decisions at the CRD are guided by various corporate processes and procedures, including budget and capital planning, procurement, asset management and service planning. The CRD can update these to ensure they reflect the climate emergency priority.

Partners' Roles

Utilities: To support the CRD's efforts to improve energy efficiency and reduce GHG emissions through co-funding of staff resources and providing grants and funding to undertake projects.

Federal and Provincial governments: To ensure BC's electricity grid transitions to zero emissions, and to strengthen policies and programs that support rapid market transformation toward zero-emission buildings, infrastructure, vehicles and equipment.

Service providers: To supply CRD with options for reducing emissions during the procurement process.

Actions at a Glance

See Appendix C for related sub-actions, the CRD divisions supporting them, estimated timing of action implementation and whether additional resources are needed.

Corporate actions	Lead CRD divisions
Integrate and standardize the climate lens framework across processes	Environmental Protection Financial Services Legal Services Regional & Strategic Planning
Develop internal carbon pricing policies and procedures	Environmental Protection Financial Services
Identify internal funding sources for climate action	Environmental Protection
Support staff capacity building and coordination	Environmental Protection
Investigate how Indigenous knowledge can inform climate action at CRD	First Nations Relations

Sustainable Land Use, Planning and Preparedness

Goal 2: Support the region on its pathway to livable, affordable and low-carbon communities that are prepared for climate change.

How land use is managed has a strong influence on the regional GHG emissions, by affecting how far we travel to daily amenities, school, work, etc., how we choose to get to those places, as well as affecting how much land can be protected as carbon sinks. The 2018 Regional Growth Strategy (RGS) sets a regional vision and high-level policies for growth management. The key provision is to contain 95% of growth in designated areas, and to concentrate growth in a way that is connected. In turn, this helps protect the region's parks and resource lands. The RGS, which encompasses the entire capital region except for the Islands Trust Areas, sets forth objectives, policies and targets to address climate change and highlights the connection between land use and climate change.

In addition to land use, planning and preparedness efforts across the region are important to increase the resilience of the region by increasing our ability to cope with hazardous or emergency events and other impacts that result from a changing climate. For example, emergency response plans need to be reviewed and refined over time, particularly as the context of our climate changes and shifts to include more extreme weather events that may require responses not anticipated or experienced in the past.

The CRD's Role

Regional planning: The CRD leads the development, monitoring and progress reporting of the RGS.

Juan de Fuca land use planning: The CRD is directly responsible for land use planning in the Juan de Fuca Electoral Area.

Emergency management in electoral areas: The CRD is responsible for emergency management, emergency response, fire protection, and search and rescue in the electoral areas.

Inter-municipal coordination: In relation to climate action, regional planning and emergency management, the CRD facilitates numerous committees that support this goal area: CRD Climate Action Inter-Municipal Working Group, CRD Climate Action Inter-Municipal Task Force, the Development Planning Advisory Committee, the Regional Emergency Management Partnership, Local Government Emergency Program Advisory Commission and the Regional Emergency Planning Advisory Commission.

Data management: The CRD supports an improved understanding of regional climate change issues and opportunities by collecting, analyzing and sharing information with regional partners.

Partners' Roles

Municipalities: Support regional growth planning and make local land use planning decisions.

Islands Trust: Make land use planning and policy decisions for Salt Spring Island and the Southern Gulf Islands electoral areas.

Provincial government: Owns various regulations (including BC Local Government Act and the Emergency Program Act), which provide the legislative framework for the CRD and its local governments. The Ministry of Transportation and Infrastructure is responsible for subdivision approvals in the electoral areas.

First Nations: The CRD will look to First Nations for leadership in understanding how to create new regional planning and decision-making systems together on their Traditional Territories.

Actions at a Glance

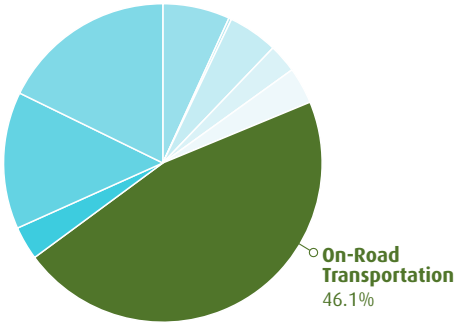
See Appendix C for related sub-actions, the CRD divisions supporting them, estimated timing of action implementation and whether additional resources are needed.

Corporate actions	Lead CRD divisions
Incorporate climate hazards and vulnerabilities into corporate CRD emergency response plans	Protective Services

Community-focused actions	Lead CRD divisions
Monitor Regional Growth Strategy	Regional & Strategic Planning
Integrate climate impacts into Juan de Fuca land use plans and policies	Juan de Fuca Planning
Collect and share pertinent energy, emissions, climate projections and vulnerability data	Environmental Protection
Identify innovative actions to close the regional 2030 emissions reduction gap	Environmental Protection
Coordinate regional climate action, collaboration and capacity building among local governments and interested First Nations	Environmental Protection First Nations Relations Health & Capital Planning Protective Services Regional & Strategic Planning
Incorporate regional climate projections into electoral area emergency planning and enhance FireSmart efforts	Protective Services
Coordinate with emergency management stakeholders on planning and public outreach activities related to climate risks	Environmental Protection
Investigate Transition Salt Spring Island 2.0 Climate Plan implementation	Salt Spring Island Administration

Low-Carbon Mobility

Goal 3: Rapidly reduce corporate fleet emissions. Support, endorse and encourage active, public and zero-emission transportation options across the region.



Almost half of the region's greenhouse gas (GHG) emissions come from transportation (cars, buses and trucks moving people and goods around). Not only do these vehicles release significant GHG emissions, they're also leading to increased traffic congestion in peak periods. Shifting from a vehicle-focus to a low-carbon mobility focus means improving the options to get more people walking, biking and taking transit. Currently, these make up about 27% of trips in the region, but the goal is to reach 45% by 2038.

For trips that use a vehicle, rapidly switching to electric vehicles (EVs) will require building out charging infrastructure throughout the region – making sure they are accessible to those who live in all types of homes and at key locations across the region.

For heavy-duty vehicles and equipment that have no suitable electric option in the near term, alternatives to fossil fuels, such as biodiesel and renewable diesel, can provide an interim option to rapidly reduce emissions where supply is available.

The CRD's Role

CRD fleet: The CRD owns and operates a fleet of approximately 300 vehicles to provide its many services across the region.

Regional trail system: The CRD is responsible for the planning, design, operation, maintenance, regulation and funding of a regional trail system that acts as an active transportation spine.

Regional planning: Together with member municipalities, the CRD developed and implements a Regional Transportation Plan and Regional Pedestrian and Cycling Master Plan.

Electoral area transportation: The CRD provides project management for transportation plans and projects and is a local partner for transit initiatives. The CRD plays an advisory role to the Ministry of Transportation & Infrastructure, which manages the road networks in the Juan de Fuca, Salt Spring Island and Southern Gulf Islands Electoral Areas.

Data management: The CRD collects, analyzes and shares data and information on regional transportation patterns, trips and modes, as well as undertaking modelling activities and providing policy support.

Community programs: The CRD supports local governments and partner agencies to plan for and implement a regional multi-modal transportation system, advance active transportation and electric vehicle programming and support transport projects that benefit the region as a whole.

Partners' Roles

Federal and provincial governments: Implement policy to achieve federal and provincial climate targets, including vehicle emission standards, zero emission vehicle sales, carbon tax, and low carbon fuel standard. Senior governments also provide funding for large infrastructure projects, and are responsible for road infrastructure in electoral areas, highways and through First Nations reserves.

Municipalities: Provide local roads, sidewalks, cycling infrastructure and trails, create land use and development plans, and develop bylaws to support low-carbon travel.

BC Transit: Manage Victoria Regional Transit system operation, advise Victoria Regional Transit Commission, fund provincial portion of the system, partner with Salt Spring Island Transit.

Victoria Regional Transit Commission: Determine transit route configurations, service levels and fares, review and recommend annual operating budgets and capital spending.

Salt Spring Island Transportation Commission: Serve as an advisor to the CRD and to BC Transit on matters related to the transit service and to transportation-related community needs and projects.

First Nations: The CRD will look to First Nations to identify priorities for working together on transportation initiatives.

Actions at a Glance

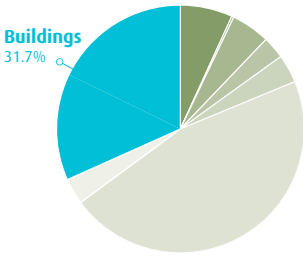
See Appendix C for related sub-actions, the CRD divisions supporting them, estimated timing of action implementation and whether additional resources are needed.

Corporate actions	Lead CRD divisions
Administer and track the new Green Fleet Policy	Customer & Technical Services
Develop electric vehicle (EV) adoption and right-sizing plan for the corporate fleet	Customer & Technical Services Environmental Protection
Develop EV infrastructure plan for the corporate fleet	Environmental Protection Facilities Management & Engineering Services
Investigate the feasibility of bio-based diesel supply and storage for shared regional use	Customer & Technical Services

Community-focused Actions	Lead CRD divisions
Develop a region-wide approach to transportation demand management and safety policy	Regional & Strategic Planning
Collect, analyze and distribute transportation planning data regionally	Regional & Strategic Planning
Accelerate infrastructure improvements that support active transportation	Regional & Strategic Planning Regional Parks Salt Spring Island Administration Southern Gulf Islands Administration
Lead and support regional education programs focused on zero-emission mobility	Environmental Protection Regional & Strategic Planning
Support acceleration of transit improvements and increased service	First Nations Relations Regional & Strategic Planning Salt Spring Island Administration Southern Gulf Islands Administration
Support a public electric vehicle charging network and encourage uptake of zero-emission vehicles	Environmental Protection
Implement Regional EV Charging Roadmap	Environmental Protection
Improve internet access on Southern Gulf Islands	Southern Gulf Islands Administration

Low-Carbon and Resilient Buildings and Infrastructure

Goal 4: Accelerate energy efficiency, emission reductions and enhanced resilience in CRD buildings and infrastructure. Support and encourage the same for all buildings and infrastructure across the region.



Approximately one-third of regional greenhouse gas emissions come from energy used in buildings across the capital region, almost all of which is from fossil fuels for space heating and hot water. Shifting from relying on fossil fuels for space heating and hot water and improving the energy efficiency of our buildings are key to achieving GHG reduction targets. Further, this can support resiliency measures, which may be increasingly important with anticipated increases in high temperatures during the summer. Renewable fuels (such as renewable natural gas or a future supply of green hydrogen) may also provide an alternative for some applications.

While newly-constructed buildings are often more energy efficient, it is important to consider the embodied carbon in the materials selected for those buildings and the emissions associated with construction. Some materials require very high emissions to produce and therefore contribute to increased emissions globally.

As our climate changes, it is increasingly important to prepare our buildings and infrastructure for anticipated changes, which could affect the types of materials and systems selected, the capacity of infrastructure (like stormwater pipes), what climate information to use in design, how the building performs during power interruptions, and how buildings can provide community shelter or emergency support.

The CRD's Role

CRD buildings and infrastructure: The CRD owns and operates a large amount of buildings and infrastructure across its various services, including:

- Administration and operation centres.
- Residential care, social and affordable housing.
- Recreation and community centres.
- Roads, bridges, tunnel, dams and weirs.
- Trails, boardwalks and piers.
- Water storage, treatment and conveyance systems.

Building inspection: The CRD enforces the BC Building Code in the Juan de Fuca Electoral Area, the Southern Gulf Island Electoral Area, Salt Spring Island Electoral Area and, upon request, in First Nations communities.

Data management: The CRD collects, analyzes and shares data and information relevant to new and existing buildings and infrastructure.

Community programs: The CRD offers community programs to educate the public and encourage and incent efficient and low-carbon buildings across the region, including coordinating regional initiatives.

Partners' Roles

Federal and provincial governments: Set building code and equipment standards, and provide funding for incentive programs to support building retrofits to higher energy efficiency and alternative energy systems.

Municipalities: Issue building permits and enforce the BC Building Code, set development permit area requirements, and deliver education and incentive programs.

Islands Trust: Set development permit area requirements.

Utilities: Provide reliable energy, deliver demand-side management programs including incentives, increase capacity for energy efficiency retrofits, and provide educational outreach on building technologies and alternative energy systems.

First Nations: The CRD will look to First Nations to identify priorities for working together on First Nations' building and infrastructure-related initiatives.

Actions at a Glance

See Appendix C for related sub-actions, the CRD divisions supporting them, estimated timing of action implementation and whether additional resources are needed.

Corporate actions	Lead CRD divisions
Develop and implement a corporate Green Building Policy	Environmental Protection Facilities Management & Engineering Services
Develop and implement a Strategic Energy Management Plan	Environmental Protection Facilities Management & Engineering Services
Conduct energy studies for CRD facilities to identify priority emission reduction and energy efficiency projects	Environmental Protection Panorama Recreation Salt Spring Island Administration SEAPARC Water and Wastewater Infrastructure Operations/Engineering
Complete identified high-impact retrofits to CRD facilities	Facilities Management & Engineering Services Panorama Recreation SEAPARC
Pursue climate-friendly development and retrofits for Capital Region Housing Corporation and Capital Region Hospital District facilities	Environmental Protection Health & Capital Planning Regional Housing
Consider climate impacts in risk assessments and infrastructure upgrades	Water and Wastewater Infrastructure Operations / Engineering Watershed Protection

Community-focused actions	Lead CRD divisions
Implement a Regional Energy Retrofit Program	Environmental Protection
Develop, deliver and support building-related energy, emissions and water education	Environmental Protection
Support acceleration of regional building energy benchmarking and local government regulation approaches	Environmental Protection
Coordinate high-performance building policy support and capacity building activities	Environmental Protection
Collect and share data and research on building energy use and emissions	Environmental Protection
Promote green infrastructure and improved stormwater management approaches	Environmental Protection
Understand climate impacts on groundwater resources in Juan de Fuca Electoral Area	Juan de Fuca Planning
Investigate regional renewable energy and storage potential	Environmental Protection

Resilient and Abundant Nature, Ecosystems and Food Systems

Goal 5: Protect, conserve and manage ecosystem health and nature's capacity to store carbon and adapt to climate change. Support the ongoing ability of natural systems to sustain life.

Green spaces, blue spaces and parks provide important services to store carbon in vegetation and soils, while at the same time providing ecological services that support the region's resilience to climate change, and providing buffers to extreme weather events. For example, the forests in the Greater Victoria Water Supply Area contribute to the high quality of water in the supply reservoirs, and green spaces in urban and suburban areas provide natural cooling capacity. In contrast, the built environment largely absorbs heat from the sun, which results in the urban heat island effect. As temperatures in the region rise, natural areas can also serve to reduce the need for energy-intensive air conditioning and provide accessible areas of respite for all residents.

Monitoring ecological changes over time and sharing this across all levels of government, including First Nations, as well as community organizations and citizens can increase our collective understanding of the impacts of these changes and inform how we can collectively respond to support the health of our ecosystems.

The CRD's Role

Land stewardship: Several services within the CRD play an important role in stewarding the CRD's lands, including:

- Managing over 13,000 hectares of natural areas in 34 regional parks and three regional trails.
- Managing over 20,000 hectares of forested land in three watersheds that supply potable water to residents.
- Managing a system of community parks across Salt Spring and the Southern Gulf Islands.

Land acquisition: The CRD plans for future acquisitions, restores and conserves natural resources, and offers interpretive programs for the continued stewardship of regional parks and trails.

Community and inter-municipal coordination: The CRD supports or coordinates a number of stewardship groups related to parks, watershed and harbour protection and invasive species management.

Education and outreach: The CRD develops and delivers education and outreach to help build regional resiliency, promote stewardship, and protect and conserve ecosystems.

Regional planning: The CRD does not have a specific mandate over food and agriculture. However, the CRD administers a Food and Agriculture Task Force to support the goals in the 2016 Regional Food & Agriculture Strategy for a resilient food and agriculture system.

Partners' Roles

Federal and provincial governments: Manage parks and waterbodies in their jurisdictions (e.g., Gulf Islands National Park Reserve, Goldstream Provincial Park, Race Rocks Marine Protected Area), manage forested areas, provide funding and information resources.

Municipalities: Collaborate with the CRD in defining a direction for regional parks, implement integrated watershed management, manage municipal parks and trails, create urban forest strategies, and make land use planning decisions and manage environmental development permit areas.

Islands Trust: Local trust committees make land use planning decisions and manage environment development permit areas. They collaborate with the CRD for new parks when subdividing or rezoning. The Islands Trust Fund secures land in nature reserves and through conservation covenants and collaborates with CRD Parks on projects, as appropriate.

First Nations: The CRD will look to First Nations to identify priorities for working together on nature-based, ecosystem and food initiatives within and around their Traditional Territories.

Actions at a Glance

See Appendix C for related sub-actions, the CRD divisions supporting them, estimated timing of action implementation and whether additional resources are needed.

Corporate actions	Lead CRD divisions
Integrate climate considerations into regional parks strategic planning and management	Regional Parks
Monitor ecosystem health in the Greater Victoria Water Supply Area (GVWSA) and investigate expanding regionally	Regional Parks Watershed Protection
Undertake climate adaptation initiatives to increase the resilience of the GVWSA	Watershed Protection

Community-focused actions	Lead CRD divisions
Provide regional and local ecological data to support planning and policy efforts	Environmental Protection
Coordinate regional invasive species program	Environmental Protection
Support regional forest and urban tree programs	Environmental Protection
Support Indigenous-led monitoring and restoration programs	Environmental Protection First Nation Relations
Support local food and agriculture planning and programs	Environmental Protection Regional & Strategic Planning
Integrate climate impacts and solutions into education and outreach campaigns	Environmental Protection Integrated Water Services Regional Parks Salt Spring Island Administration Southern Gulf Islands Administration

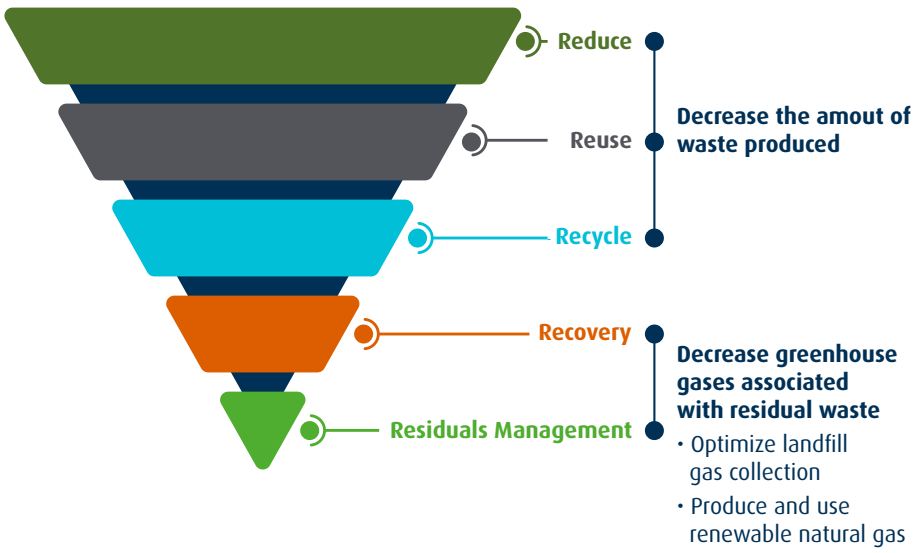
Minimized Waste

Goal 6: Waste generation and the resulting emissions are minimized and remaining waste is transformed into a resource. Follow the 5R pollution prevention hierarchy.

When we buy products and dispose of the waste, we also contribute to greenhouse gas (GHG) emissions in the region. About 6% of regional GHG emissions are associated with waste—and the majority of this comes from decomposing organic waste that was added to Hartland Landfill over the last several decades (e.g., food scraps and construction wood waste).

The most effective way to reduce future emissions from the landfill is to follow the 5R hierarchy – focusing first on decreasing the amount of waste produced, then on decreasing the GHG emissions from remaining waste (see Figure 10). The CRD continues to actively manage residual GHG emissions by maximizing the efficiency of the landfill gas capture system and converting the captured gas into an energy resource. A small portion of the region's waste emissions result from management of liquid waste. Liquid waste management can also provide an opportunity for resource recovery, energy efficiency and energy generation.

Figure 10. 5R pollution prevention hierarchy



The CRD's Role

Solid Waste Management Plan: The CRD is responsible for solid waste management in the region and provides three major services: diversion (recycling and waste diversion programs), recovery (landfill gas capture and energy generation) and landfilling (disposal services and environmental protection).

Waste is seen as a resource and the CRD seeks the highest and best use for these resources, as demonstrated by initiatives such as methane gas capture and the ban on kitchen scraps from the landfill.

The CRD's efforts on solid waste are guided by the Solid Waste Management Plan, which provides a high-level, long-term vision of how to manage solid waste in accordance with the pollution prevention hierarchy, in accordance with the requirements under the provincial Environmental Management Act.

Liquid Waste Management Plan: The CRD, in cooperation with local municipalities, electoral areas, Island Health and industry, works together to develop local services to manage and monitor sewage infrastructure and treatment, stormwater infrastructure and septic systems. These programs and services are aimed at protecting human health, local streams, creeks, the ocean and our environment.

Education and outreach: The CRD delivers education and outreach programs that support the solid waste and liquid waste management services.

Partners' Roles

Federal and provincial governments: Set policies that guide local government and industry waste diversion performance and landfill management and reporting.

Municipalities: Collect solid waste and organics, where applicable.

Industry: Provide waste and recyclable services for residents and businesses without municipal services. Provide funding for products covered under the provincial Recycling Regulation (e.g., printed paper and packaging, paint, electronics, etc.).

Non-profits: Operate recycling facilities on the Southern Gulf Islands. Greater Victoria Compost Education Centre provides composting education to residents across the capital region.

First Nations: The CRD will look to First Nations to identify priorities for working together on waste reduction and management initiatives.

Actions at a Glance

See Appendix C for related sub-actions, the CRD divisions supporting them, estimated timing of action implementation and whether additional resources are needed.

Community-focused actions	Lead CRD divisions
Implement the Solid Waste Management Plan	Environmental Resource Management
Develop and deliver education programs to promote a circular economy, zero waste and the first 3Rs (reduce, reuse and recycle)	Environmental Resource Management
Support education and engagement on waste management to be delivered by and for First Nations communities	Environmental Resource Management
Continue to maximize and optimize the capture of landfill gas for beneficial use	Environmental Resource Management
Consider climate change impacts in liquid waste management	Environmental Protection

Implementation and Reporting

Climate action is integrated into work plans across the CRD departments, divisions and services. Over the next five years, the actions contained within this strategy will be implemented by almost two dozen service areas across the organization (see Appendix B and C). The CRD's Climate Action Program will be responsible for coordinating, monitoring and reporting on this Five-year Climate Action Strategy. Collaboration and involvement of staff across the organization and throughout the community will be integral to its success.

As progress is made in the implementation of this action plan, knowledge and understanding of the growing impacts of climate change will continue to develop, as will new opportunities for accessing external funding. To remain flexible and adaptable, and support implementation over time, program staff will:

- continue to identify opportunities for external funding to support strategy goals and actions.
- participate in regional and provincial forums to share best practices with others and learn from Indigenous knowledge and approaches to climate action.
- remain up-to-date with climate science and potential risks and impacts for the capital region.
- continue to provide data, information and policy support to local government climate action efforts.
- provide updated information about climate change projections and risks to senior management and the Board to inform decisions.
- continue to monitor data to track progress over time.

- identify opportunities for increasing public awareness on climate change risks and opportunities.
- evaluate progress annually and adjust actions, as needed.
- continue to provide annual progress reports to the CRD Board on the Climate Action Strategy.

Other services in the CRD are responsible for leading or supporting actions identified in this strategy, as listed in the detailed action plan (see Appendix C). These services are also responsible for reporting progress annually and supporting with the review and adjustment of actions, as needed.

Performance Indicators and Reporting

Staff will continue to publicly report annually on the progress being made in the implementation of the Five-year Climate Action Strategy. Table 3 summarizes the success measures identified for each goal area proposed for annual reporting. For each goal area, a corporate action status and/or a community-focused action status will reflect general progress made toward all actions in that goal. This helps to summarize at-a-glance progress made on actions that may not be easily measurable or reflected in another indicator, such as actions that are ongoing or taking place over a long period. For other measures, an icon is provided to indicate the desired direction of the measure over time (increasing or decreasing), if applicable, or if the measure is intended to provide contextual information.

In addition to these measures, annual reports to the Board and public will identify key achievements and successes, partnerships and any major barriers.

Table 3. Annual reporting measures

Goal area	Corporate	Community-focused
Goal 1: Climate-focused decision making	Corporate action status	N/A
	Annual CRD Corporate GHG emissions	
Goal 2: Sustainable land use, planning and preparedness	Corporate action status	Community-focused action status
		Regional GHG emissions
		Number of net new dwelling units in areas where more than 42% walk/bike/bus to work*
Goal 3: Low-carbon mobility	Corporate action status	Community-focused action status
	Annual CRD corporate fleet GHG emissions	Regional GHG emissions from transportation
	Number of corporate electric vehicles (EVs) purchased/combustion vehicles replaced	Percentage of total trips made by walking, cycling and transit in the Growth Management Planning Area*
	Number of EV chargers installed	Percentage of the Regional Trail Network completed*
		Number of public EV chargers installed
		Annual EV ICBC registrations (region fleet size)
		Victoria Transit Region fuel sales

Goal area	Corporate	Community-focused
 **Goal 4:** **Low-carbon and resilient buildings and infrastructure**	Corporate action status	Community-focused action status
	Annual CRD corporate facilities GHG emissions	Regional GHG emissions from buildings
	Number of critical emissions reduction projects completed	Natural gas use: • Annual FortisBC consumption numbers • Annual FortisBC connections
	Number of site energy audits completed	Number of fossil-fuel-heated homes sold each year in the capital region
 **Goal 5:** **Resilient and abundant nature, ecosystems and food systems**	Corporate action status	Community-focused action status
	Number of volunteer stewardship hours	Percentage of Sea-to-Sea Green/Blue Belt acquired (RGS)
		Hectares of regional parkland
		Hectares of farmland in the Growth Management Planning Area*
 **Goal 6:** **Minimized waste**	N/A	CRD's per capita disposal rate (reported via *Solid Waste Management Plan* target to reduce to 250kg or less by 2030)

* *Metrics will be drawn from Regional Growth Strategy indicator reporting.*

Adaptive Management

As implementation of this strategy progresses, it will be vital to track progress and assess whether identified actions need to be adapted, shifted to different times or focus, updated to reflect changing context and/or opportunities. Through this process, the CRD will be guided by the underlying guiding principles.

After five years of implementation, the CRD will undertake a thorough review and update to determine what actions are needed to continue advancing the corporation and the region to drastically reduce GHG emissions and foster healthy and resilient communities and natural areas.

Appendix A: Glossary

Adaptation: The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effect.[1]

Biodiversity: The variability among living organisms from terrestrial, marine and other ecosystems. Biodiversity includes variability at the genetic, species and ecosystem levels.[1]

Capacity building: The practice of enhancing the strengths and attributes of, and resources available to, an individual, community, society or organization to respond to change.[2]

Carbon neutrality: See net-zero emissions.[3]

Climate: The average weather over a long period of time. Aspects of climate include temperature, precipitation, wind speed and direction, sunshine, fog and frequency of extreme events.[4]

Climate change: The process by which the average weather becomes different over time. Climate has changed due to natural forces over the course of history (e.g., volcanoes, ocean currents) but human activity (e.g., industry, transportation) is now considered the cause of rapid and severe climate change. These changes include sea level rise, more intense and more frequent extreme weather events (e.g., storms, hurricanes, storm surge) and in Atlantic Canada, warmer, wetter summers and winters.[4]

Co-benefits: The positive effects that a policy or measure aimed at one objective might have on other objectives, irrespective of the net effect on overall social welfare. Co-benefits are often subject to uncertainty and depend on local circumstances and implementation practices, among other factors.[1]

Drought: A period of abnormally dry weather, long enough to cause a serious hydrological imbalance. Drought is a relative term; therefore, any discussion in terms of precipitation deficit must refer to the particular precipitation-related activity that is under discussion.[1]

Ecosystem: A functional unit consisting of living organisms, their non-living environment, and the interactions within and between them. The components included in a given ecosystem and its spatial boundaries depend on the purpose for which the ecosystem is defined: in some cases, they are relatively sharp, while in others they are diffuse. Ecosystem boundaries can change over time. Ecosystems are nested within other ecosystems, and their scale can range from very small to the entire biosphere. In the current era, most ecosystems either contain people as key organisms or are influenced by the effects of human activities in their environment.[1]

Embodied carbon: The GHG associated with the non-operation phase of the building. This includes emissions caused by extraction, manufacture, transportation, assembly, maintenance, replacement, deconstruction, disposal and end-of-life aspects of the materials and systems that make up a building.[5]

Extreme weather event: An event that is rare at a particular place and time of year. Definitions of "rare" vary, but an extreme weather event would normally be as rare as or rarer than the 10^{th} or 90^{th} percentile of a probability-density function estimated from observations. By definition, the characteristics of what is called extreme weather may vary from place to place in an absolute sense. When a pattern of extreme weather persists for some time, such as a season, it may be classed as an extreme climate event, especially if it yields an average or total that is itself extreme (e.g., drought or heavy rainfall over a season).[1]

Fossil fuels: Carbon-based fuels from fossil hydrocarbon deposits, including coal, peat, oil and natural gas.[2]

Greenhouse gas (GHG): Greenhouse gases are those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of terrestrial radiation emitted by the Earth's surface, the atmosphere itself and by clouds. This property causes the greenhouse effect. Water vapour (H_2O), carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4) and ozone (O_3) are the primary greenhouse gases in the Earth's atmosphere. Moreover, there are a number of entirely human-made greenhouse gases in the atmosphere, such as the halocarbons and other chlorine- and bromine-containing substances, dealt with under the Montreal Protocol. Besides CO_2, N_2O and CH_4, the Kyoto Protocol deals with the greenhouse gases sulphur hexafluoride (SF_6), hydrofluorocarbons (HFC) and perfluorocarbons (PFC).[2]

Groundwater: Water below the level of the water table in the ground; water occupying the subsurface-saturated zone.[6]

Infrastructure: The physical capital and associated services are considered basic and necessary to the functioning of the built environment. These include such things as: sanitary sewers, treatment plants, and water pipelines and distribution/collection systems; roads, signals, sidewalks and other components of the transportation system, including transit vehicles, ferries and airports; solid waste management facilities including transfer stations and landfills; and energy supply and distribution systems, including hydroelectric and natural gas transmission and distribution systems. More generally, infrastructure can refer to other tangible public and private assets necessary to support the development of a modern urban settlement, such as hospitals, schools and recreation facilities. In some cases, preserved green space and natural areas, including forest, wetlands and stream corridors have been described as "green infrastructure" essential to the vitality of healthy human communities.

Interface fire: A fire that involves human development and wildland simultaneously.[6]

Invasive species: Any species not native to a particular ecosystem whose introduction causes, or is likely to cause, economic or environmental harm or harm to human health.[6]

Mitigation (of climate change): A human intervention to reduce the sources or enhance the sinks of greenhouse gases.[1]

Net-zero emissions: Net-zero emissions are achieved when anthropogenic emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period.[3]

Resilience: The capacity of social, economic and environmental systems to cope with a hazardous event, trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning and transformation.[6]

Sequestration: The uptake (i.e., the addition of a substance of concern to a reservoir) of carbon-containing substances, in particular carbon dioxide (CO_2), in terrestrial or marine reservoirs. Biological sequestration includes direct removal of CO_2 from the atmosphere through land use change, afforestation, reforestation, revegetation, carbon storage in landfills and practices that enhance soil carbon in agriculture (cropland management, grazing land management).[2]

Storm surge: The temporary increase, at a particular locality, in the height of the sea due to extreme meteorological conditions (low atmospheric pressure and/or strong winds). The storm surge is defined as being the excess above the level expected from the tidal variation alone at that time and place. [1]

Urban heat island: The relative warmth of a city compared with surrounding rural areas, associated with changes in runoff, effects on heat retention and changes in surface reflectivity.[1]

Vulnerability: The degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change. It is a function of the character, magnitude and rate of climate change and variation to which a system is exposed, its sensitivity and its adaptive capacity.[1]

Zero-emission vehicle (ZEV): A vehicle that has the potential to produce no tailpipe emissions. It can still have a conventional internal combustion engine, but must also be able to operate without using it. We consider the following vehicles to be ZEVs: battery-electric, plug-in hybrid electric and hydrogen fuel cell.[7]

1. IPCC, 2014, Climate Change 2014: Impacts, Adaptation, and Vulnerability
2. IPCC, 2014, Climate Change 2014: Mitigation of Climate Change
3. IPCC, 2018, Special Report: Global Warming of 1.5°C – Glossary
4. BC MOE, 2013, Sea Level Rise Adaptation Primer – Appendix A
5. UK Building Council, 2015, Tackling Embodied Carbon in Buildings
6. BC Ministry of Forests, 2008, Glossary of forestry terms in British Columbia
7. Transport Canada, accessed 2021, Zero-emission vehicles (website)

Appendix B: Related CRD Strategies and Plans

CRD Plans intersecting with climate action	Climate Action Strategy Goal					
	1	2	3	4	5	6
2019-2022 Board Priorities	•	•	•	•	•	•
Advocacy Strategy (2019)	•	•	•	•	•	•
Community Health and Well-Being Plan (2017)		•	•	•	•	
Core Area Inflow and Infiltration Management Plan (2017)					•	
Corporate Asset Management Strategy (2019)	•			•	•	
Corporate Plan (2019-2022)	•	•	•	•	•	•
Liquid Waste Management Plans (various)					•	•
Regional Food and Agriculture Strategy (2016)					•	•
Regional Green/Blue Spaces Strategy (1997)					•	
Regional Growth Strategy (2018)		•	•	•	•	
Regional Housing Affordability Strategy (2018)	•		•			
Regional Parks Land Acquisition Strategy (2012-2021) and Fund					•	
Regional Parks Strategic Plan (2012-2021)			•		•	
Regional Pedestrian & Cycling Master plan (2011) and Salt Spring Island Edition (2013)			•			
Regional Trails Management Plan (2015)			•		•	
Regional Transportation Plan (2014)	•		•			
Regional Water Supply Strategic Plan (2017)				•	•	
Solid Waste Management Plan (2021)						•

Appendix C: Detailed Action Plan

CRD Divisions	Abbreviation
Environmental Protection	EPro
Juan de Fuca Electoral Area Planning	JdF Planning
Building Inspections	BI
Corporate Communications	CC
Customer & Technical Services	CTS
Environmental Resource Management	ERM
Facilities Management & Engineering Services	Facilities
Financial Services	Finance
First Nations Relations	FNR
Health & Capital Planning Strategies	HCP
Human Resources & Corporate Safety	HR
Information Technology & GIS	IT
Legal Services	Legal
Panorama Recreation	Pan Rec
Protective Services	PS
Regional & Strategic Planning	RSP
Regional Housing	Housing
Regional Parks	Parks
Risk & Insurance Management	Risk
Salt Spring Island Administration	SSI Admin
SEAPARC	SEAPARC
Southern Gulf Islands Administration	SGI Admin
Water and Wastewater Infrastructure Operation/Engineering	IWS
Watershed Protection	WP

Goal 1: Climate-Focused Decision Making

	Action name	Specific sub-actions	Lead	Support	Resources	Timing
	Corporate					
	1-1 Integrate and standardize the climate lens framework across processes	Prepare a framework to standardize corporate climate action planning and evaluation of the climate impact of operational decisions. Utilize in corporate strategic planning, service planning and annual reporting.	EPro RSP	CC	Core service	2022-2023
		Integrate greenhouse gas emissions and climate risks into capital project planning; work with select services to develop Sustainable Service Delivery Plans.	Finance	EPro Other relevant divisions	Core service + new	2024+
		Incorporate a climate lens when implementing the corporate Asset Management Strategy.	Finance	EPro	Core service	2021+
		Align procurement and vendor selection with the CRD's corporate climate goals, as part of the planned procurement policy update.	Legal	EPro	Core service	2021-2022
		Complete annual corporate GHG reporting and provide to the Board and departments.	EPro	Finance	Core service	Annually
	1-2 Develop internal carbon pricing policies and procedures	Develop an internal carbon pricing policy to support internal decision making. Embed in specified corporate processes and procedures (e.g., net present value and lifecycle cost analyses).	EPro Finance	All relevant divisions	Core service	2021-2023
		Pilot the new internal carbon pricing policy with select department(s).	EPro Finance		Core service	2023-2024
	1-3 Identify internal funding sources for climate action	Continue Climate Action Reserve Fund (CARF) to support corporate climate action goals.	EPro	Finance	Core service	Ongoing
		Identify innovative sources of funding to support climate action programs, including expanded CARF, internal carbon fee and the opportunity for an internally invested project.	EPro	Finance	Core service	2023-2024
	1-4 Support staff capacity building and coordination	Develop an internal climate action SharePoint site to profile key policies, procedures and resources for staff.	EPro	IT	Core service	2021
		Develop a staff climate action outreach program to encourage sustainable behaviour.	EPro	CC	Core service	2022
		Prepare and deliver training in conjunction with the roll-out of the new policies and procedures.	EPro	CTS Facilities Finance RSP	Core service	Ongoing
		Promote CRD climate goals and policies to volunteer committees and commissions. Pilot with Salt Spring Island and Southern Gulf Islands Electoral Areas.	EPro	SGI Admin SSI Admin Other relevant divisions	Core service	2022
		Maintain an ongoing staff climate action working group to share knowledge and continually evaluate best opportunities for climate action initiatives.	EPro	CTS Facilities Finance IWS Pan Rec SEAPARC	Core service	Ongoing

	Action name	Specific sub-actions	Lead	Support	Resources	Timing
	1-5 Investigate how Indigenous knowledge can inform climate action at the CRD	Investigate and understand perspectives on how Indigenous knowledge and Indigenous laws informs and relates to climate action; share this information with CRD departments and with municipalities.	FNR	EPro	Core service	Ongoing
Goal 2: Sustainable Land Use, Planning and Preparedness	**Corporate**					
	2-1 Incorporate climate hazards and vulnerabilities into corporate CRD emergency response plans	Incorporate climate hazards and vulnerabilities into corporate CRD emergency response plans.	PS	All relevant divisions	Core service + grants	Ongoing
		Review and refine existing communication processes as they relate to climate change and extreme weather.	PS	CC	Core service	Ongoing
	Community-focused					
	2-2 Monitor Regional Growth Strategy (RGS)	Review Regional Context Statements for alignment with climate policies in the RGS and publish annual RGS indicators report.	RSP		Core service	Ongoing
	2-3 Integrate climate impacts into Juan de Fuca land use plans and policies	Continue to update and adopt official community plans that are consistent with the climate policies in the RGS.	JdF Planning		Core service + grants	Ongoing
		Review and update development permit flood management guidelines and requirements to ensure appropriate building setbacks from shoreline.	JdF Planning		Core service + grants	2021, 2022
	2-4 Collect and share pertinent energy, emissions, climate projections and vulnerability data	Collect and share pertinent regional energy and emissions and climate projections data with local governments, stakeholders and First Nations.	EPro		Core service	Ongoing
		Conduct regional and local government Global Protocol Community-Scale Basic+ GHG inventories every two years.	EPro		Core service	2021, 2023
		Renew regional downscaled climate projections when updated global climate projections available.	EPro	WP Other relevant divisions	Core service	2022-2023
		Expand data collection and mapping efforts to identify vulnerabilities to the impacts of climate change.	EPro		Core service + grants	Ongoing
	2-5 Identify innovative actions to close the regional 2030 emissions reduction gap	Identify the emission gap between the 2030 target and the 2022 inventory. Initiate a process to identify new actions that will close the gap in emissions by 2030.	EPro		Core service + grants	2023-2024

	Action name	Specific sub-actions	Lead	Support	Resources	Timing
	2-6 Coordinate regional climate action, collaboration and capacity building among local governments and interested First Nations	Facilitate coordinated local government approaches to municipal land use policy, public outreach, data related to sea level rise planning.	EPro		Core service + grants	2021-2024
		Collaborate and coordinate with stakeholders and interested First Nations government to include climate projections and risks into strategies, plan and policies.	EPro		Core service + grants	Ongoing
		Support Indigenous-led climate solutions.	EPro	FNR Other relevant divisions	Core service + grants	Ongoing
		Coordinate Inter-municipal Climate Change Task Force and Inter-municipal Climate Change Working Group.	EPro		Core service	Ongoing
		Incorporate climate action updates, within the CRD Development Planning Advisory Commission meetings.	RSP	EPro	Core service	Ongoing
		Coordinate Local Government Emergency Program Advisory Commission and Regional Emergency Management Partnership.	PS		Core service	Ongoing
		Develop resources identifying connection between climate and health and develop resources for decision makers and public engagement.	HCP	Epro	Core service	2021
		Research and share with local governments best practices for incorporating an equity lens into mitigation, adaptation plans and programs.	EPro HCP		Core service	2022
		To support integration of land use and transportation, seek opportunities for funding, incentives and pilot projects to implement the Regional Growth Strategy land use concept.	RSP		Core service + grants	2022-2024
	2-7 Incorporate regional climate projections into electoral area emergency planning and enhance FireSmart efforts	Include regional climate projections in hazard, risk and vulnerability assessments for the three Electoral Areas' Emergency Operations Work Plans.	PS	EPro	Core service	Ongoing
		Enhance FireSmart efforts in electoral areas.	PS		New + grants	Ongoing
		Complete advance planning for drought and wildfire response in the Electoral Areas.	PS	IWS	Core service	2021-2022
	2-8 Coordinate with emergency management stakeholders on planning and public outreach activities related to climate risks	Work with the Province, Local Government Emergency Program Advisory Commission and the Regional Emergency Management Partnership to share data, support planning, and coordinate public outreach activities related to regional climate risks.	PS	CC EPro	Core service	Ongoing
	2-9 Investigate Transition Salt Spring Island 2.0 Climate Plan implementation	Investigate resource requirements and funding for a new staff to support the implementation of the Transition Salt Spring Island 2.0 plan.	SSI Admin	EPro PS	Core service	2022

Goal 3: Low-Carbon Mobility

	Action name	Specific sub-actions	Lead	Support	Resources	Timing
	Corporate					
	3-1 Administer and track the new Green Fleet Policy	Continuous support and review of Green Fleet Policy to ensure zero-emissions vehicles are selected as replacement options whenever possible.	CTS	EPro	Core service	Ongoing
	3-2 Develop electric vehicle (EV) adoption and right-sizing plan for the corporate fleet	Monitor and adjust for market availability for new low-emission medium and heavy-duty vehicles.	CTS EPro	Facilities	Core service	2021-2022/ Ongoing
		Investigate opportunities for integrating car share into fleet operations.	CTS EPro		Core service	2022
		Explore opportunities for telematics and improved fuel use tracking to determine fleet right sizing.	CTS	EPro IT	New – TBD	2023-2024
	3-3 Develop EV infrastructure plan for the corporate fleet	Develop EV infrastructure plan for the corporate fleet.	Epro Facilities	CTS Other relevant divisions	Core service + grants	2021-2022
		Install chargers to support light-duty EV purchases.	Facilities	All relevant divisions	Core service + grants	2022-2024
	3-4 Investigate the feasibility of bio-based diesel supply and storage	Investigate the feasibility of bio-based diesel storage and supply for shared regional use.	CTS	EPro	Core service	2023-2024
	Community-focused					
	3-5 Develop a region-wide approach to transportation demand management and safety policy	In collaboration with partners, develop options for transportation demand management (TDM) and safety policy.	RSP	EPro	Core Service	
		Work with partners to implement TDM and safety policy approaches across the region.	RSP	EPro	New	2022+
	3-6 Collect, analyze and distribute transportation planning data regionally	Collect, analyze and distribute transportation planning data, including traffic counts, bike counts, and origin-destination survey results.	RSP	EPro	Core service	Ongoing
		Expand the Origin-Destination survey.	RSP		Core service	2022-2024

	Action name	Specific sub-actions	Lead	Support	Resources	Timing
	3-7 Accelerate infrastructure improvements that support active transportation	Support Board advocacy to senior governments for secure funding for local and regional transportation infrastructure improvements.	RSP		Core service	2022+
		Develop a policy framework and partnership agreements for the long-term build out of consistent, connected cycling facilities.	RSP	Parks	Core service	2022
		Implement the Regional Transportation Plan and the Pedestrian and Cycling Master Plan.	Parks RSP		Core service + grants	Ongoing
		Implement priority projects identified in the Regional Trails Management Plan to support active transportation: • Complete the E&N trail and upgrade heavily used urban sections. • Widen and install lighting at priority sections of the Galloping Goose and Lochside regional trails. • Continue to implement the Gulf Islands Regional Trails Management Plan.	Parks	RSP SGI Admin SSI Admin	New + grants	Ongoing
		Implement Pedestrian and Cycling Master Plan: Salt Spring Island Edition.	SSI Admin	RSP	Core service	Ongoing
		Complete Southern Gulf Islands Transportation Integration Plan for the SGI EA Area.	SGI Admin	RSP	Core service	2021
		Implement SGI Transportation Integration Plan through service establishment.	SGI Admin		New	2022-2023
	3-8 Lead and support regional education programs focused on zero-emission mobility	Develop, deliver and support new regional education programs focused on active, public and zero-emission transportation, including electric vehicles and e-bikes.	EPro	Parks RSP	Core service	Ongoing
		Continue to implement active school travel planning (Ready, Step, Roll program at five schools per year).	RSP		Core service	Ongoing
	3-9 Support acceleration of transit improvements and increased service	Support Board advocacy to accelerate implementation of Bus Mass Transit (RapidBus) linking directly to growth centres; secure funding; locate density near nodes.	RSP		Core service	2022+
		Support Board advocacy to improve local transit service in suburban and rural areas, including Park and Rides.	RSP	JdF Planning	Core service	2022+
		Plan for long-term transportation alternatives, including passenger ferry and rail-based transit options in appropriate locations.	RSP		Core service	2022-2024
		Facilitate delivery of the Salt Spring Island (SSI) Community Transit Service. • Work with BC Transit to electrify fleet and increase service.	SSI Admin	RSP	Core service	Ongoing
		Identify low-carbon mobility options as part of planning for an inter-island transportation system. Investigate expanding to Salt Spring Island.	SGI Admin	FNR RSP SSI Admin	TBD	TBD

	Action name	Specific sub-actions	Lead	Support	Resources	Timing
	3-10 Support a public electric vehicle charging network and encourage uptake of zero-emission vehicles	Develop and deliver education programs to encourage the adoption of EVs, and build capacity among EV infrastructure builders, site hosts, electricians and other key sectors.	EPro		Core service	Ongoing
		Support electric vehicle and e-bike adoption and infrastructure by providing guidance and coordinated policy support.	EPro		Core service	Ongoing
		Pursue opportunities to fund and coordinate installation of publicly accessible electric vehicle charging stations.	EPro Other relevant divisions		Core service + grants	Ongoing
	3-11 Implement Regional EV Charging Roadmap	Implement the Capital Region EV Infrastructure Roadmap. • Coordinate funding applications and deployment. • Support planning and coordination on charger site selection. • Engage with BC Hydro on infrastructure planning. • Educate and build capacity of potential EV adopters, infrastructure builders, site hosts, engineers, electricians, and other trades. • Track and share usage at existing sites to monitor performance and inform planning.	EPro		New + grants	2022-2026
	3-12 Improve internet access on Southern Gulf Islands	Support and coordinate broadband internet improvements to enable work from home opportunities and support local economic development.	SGI Admin		Core service	2021
		Establish connectivity service to facilitate senior government funding and internet service provider investment.	SGI Admin		New	2022

Goal 4:
Low-Carbon and Resilient Buildings and Infrastructure

	Action name	Specific sub-actions	Lead	Support	Resources	Timing
	Corporate					
	4-1 Develop and implement a corporate Green Building Policy	Develop and implement a corporate Green Building Policy that prioritizes energy efficiency, electrification and resiliency.	EPro Facilities	All relevant divisions	Core service	2022
	4-2 Develop and implement a Strategic Energy Management Plan	Complete energy audits of corporate facilities to support development of a Strategic Energy Management Plan.	EPro Facilities	All relevant divisions	Core service + grants	2021
	4-3 Conduct energy studies for CRD facilities to identify priority emission reduction and energy efficiency projects	Conduct Net-Zero Energy Pathway Feasibility Study for recreation centres.	Pan Rec SEAPARC SSI Admin	EPro	Core service + grants	2022
		Conduct Saanich Peninsula District Energy System Expansion Study.	IWS	EPro Pan Rec	Core service	2022
		Complete energy audits of all CRD sites with significant GHG impact (e.g., >5 tonnes annually).	All relevant divisions	EPro Facilities	Core service + grants	2022-2024
		Conduct emissions reduction feasibility study for the Integrated Water Services (IWS) building at 479 Island Highway.	IWS	EPro Facilities	Core service	2022
		Identify future energy efficiency upgrades and opportunities in IWS infrastructure. Implement where possible.	EPro	IWS	New energy manager	2023-2025
		Evaluate the business case for installing renewable power at corporate sites, including water and wastewater locations.	EPro IWS	EPro	New energy manager	2024
	4-4 Complete identified high impact retrofits to CRD facilities	Retrofit the HVAC system at Fisgard HQ to switch from fossil fuels to electricity.	Facilities	CTS EPro	Core service	TBD
		Install an Energy Recovery System at SEAPARC.	SEAPARC	EPro	New + grants	TBD
		Replace Fuel Oil Burners and remove underground fuel tanks at SEAPARC.	SEAPARC	EPro	New	TBD
		Install an Energy Recovery System at Panorama Recreation.	Pan Rec	EPro	Core service + grants	TBD
	4-5 Pursue climate-friendly development and retrofits for CRHC and CRHD facilities	Identify and pursue funding opportunities to address energy and GHG saving opportunities during new development and retrofits of housing and healthcare facilities.	HCP Housing		TBD	TBD
		Embed energy reduction and other climate requirements in new developments, as per Island Health or BC Housing policies and other funding requirements.	HCP Housing		TBD	Ongoing
		Seek opportunities to promote housing tenant engagement programs to reduce energy use and energy costs through partnerships.	EPro	Housing	Core service	2022-2023

	Action name	Specific sub-actions	Lead	Support	Resources	Timing
	4-6 Consider climate impacts in risk assessments and infrastructure upgrades	Consider climate change impacts when undertaking risk assessments associated with the water supply and wastewater systems and infrastructure management decision making and plans.	IWS WP		Core service	Ongoing
		Consider future climate projections and review and revise infrastructure design standards, as appropriate. Upsize/right size drainage structures within the Greater Victoria Water Supply Area, based on priority.	WP		Core service	Ongoing
	Community-focused					
	4-7 Implement a Regional Energy Retrofit Program	Implement a Regional Energy Retrofit Program: • Targeted concierge service. • Optional financing component made available. • Coordinate and promote incentives for the provincial and federal retrofit programs.	EPro		New	2022-2026
	4-8 Develop, deliver and support building-related energy, emissions and water education	Develop, deliver and support regional educational programs and community initiatives that achieve reductions in building-related GHG, water and energy use.	EPro		Core service + grants	Core service
	4-9 Support acceleration of regional building energy benchmarking and local government regulation approaches	Coordinate with senior and local government to understand and pursue opportunities related to regional energy benchmarking. Participate in the Building Benchmark BC program.	EPro		Core service	2022-2024
		Advocate to the Province for greater local government authority to decrease community emissions from buildings (including energy benchmarking and labelling and regulating climate pollution for buildings).	EPro		Core service	2022-2024
	4-10 Coordinate high-performance building policy support and capacity building activities	Participate on the provincial local government step code peer network.	EPro		Core service	Ongoing
		Research and share information on best practices and support coordination of local government policy regarding high-performance buildings.	EPro	BI	Core service	Ongoing
		Provide expanded public and industry education on high-performance buildings through workshops, front counter and website resources.	EPro	BI	Core service	2022
	4-11 Collect and share data and research on building energy use and emissions	Collect and share data on pertinent regional building energy use and GHG emissions with local governments.	EPro		Core service	Ongoing
		Research and share information and best practices on embodied carbon in green building standards, land use and infrastructure.	EPro		Core service	2023
	4-12 Promote green infrastructure and improved stormwater management approaches	Work with local governments and community groups to promote, encourage and inform green infrastructure and improved stormwater management approaches.	EPro		Core service	Ongoing
	4-13 Understand climate impacts on groundwater resources in Juan de Fuca Electoral Area	Understand potential impact of climate change on groundwater resources to inform future planning in electoral areas.	JdF Planning		Core service	Ongoing
	4-14 Investigate regional renewable energy and storage potential	Undertake regional mapping of renewable energy potential to inform education and future programming.	EPro		TBD – grants	2024
		Investigate local power storage generation and storage potential.	EPro		TBD – grants	2025

Goal 5:
Resilient and Abundant Nature, Ecosystems and Food Systems

	Action name	Specific sub-actions	Lead	Support	Resources	Timing
	Corporate					
	5-1 Integrate climate considerations into regional parks strategic and management planning	Integrate climate change considerations in forthcoming Regional Parks Strategic Plan and parks management plans.	Parks	EPro	Core service	2022
		Update the CRD land acquisition criteria to include climate change considerations (subject to Regional Parks Strategic plan direction).	Parks	EPro	Core service	2022
		Invite and support First Nations participation in park planning, acquisition and protection of places.	Parks	FNR	Core service	Ongoing
	5-2 Monitor ecosystem health in the Greater Victoria Water Supply Area (GVWSA) and investigate expanding regionally	Continue forest composition, hydrology monitoring and forest health reviews to assess and monitor ecosystem changes within the GVWSA.	WP		Core service	Ongoing
		Prepare business case to undertake planning in order to identify and prepare responses to climate change impacts on regional parks.	Parks		New	TBD
	5-3 Undertake climate adaptation initiatives to increase the resilience of the GVWSA	Complete and implement the Climate Change Adaptation Strategy for the GVWSA.	WP		Core service	Ongoing
		Advance forest fuel management within the GVWSA to mitigate the intensity and extent of potential wildfires.	WP		Core service	2021+
		Investigate options to initiate more active forest management program in the GVWSA to create more resilient forested ecosystems.	WP		New	2022+
	Community-focused					
	5-4 Provide regional and local ecological data to support planning and policy efforts	Compile existing ecological data/mapping from other agencies to create a regional biodiversity inventory.	EPro		Core service	2021
		Undertake regional forest and urban tree monitoring efforts.	EPro		Core service	2021
		Support efforts to monitor stream flows in the region.	EPro		Core service	Ongoing
	5-5 Coordinate regional invasive species program	Deliver regional invasive species programs, coordinate Capital Region Invasive Species Partnership intergovernmental working group. Support capacity building and local government policy development.	EPro		Core service	Ongoing
	5-6 Support regional forest and urban tree programs	Support regional forest and urban tree programming, and coordinated planning efforts to increase canopy and sequestration potential.	EPro		Core service + grants	2023
	5-7 Support Indigenous-led monitoring and restoration programs	Work with First Nations to identify interest in and support First Nations' Guardian programs for monitoring ecosystems.	FNR	EPro Parks	Core service + new	Ongoing
		Where requested, work with First Nations in watershed protection, ecosystem restoration and invasive species management.	EPro	FNR	Core service	TBD

	Action name	Specific sub-actions	Lead	Support	Resources	Timing
	5-8 Support local food and agriculture planning and programs	Administer Food and Agriculture Task Force and facilitate coordination of the Food and Agriculture Strategy implementation. • Support agriculture extension services coordination. • Investigate feasibility for a Regional Foodlands Trust.	RSP		Core Service	Ongoing
		Develop public engagement materials on local food systems and low carbon food choices. Support and promote Indigenous food systems.	EPro	FNR	Core service	2024
	5-9 Integrate climate impacts and solutions into environmental education and outreach campaigns	Integrate education about climate impacts, threats and solutions into public education and outreach campaigns associated with drinking water, regional and community parks, and community watershed and biodiversity programs.	EPro IWS Parks SGI Admin SSI Admin	CC	Core service	Ongoing
		Promote UN Decade on Restoration and encourage groups/residents to get involved.	EPro		Core service	Ongoing
Goal 6: **Minimized Waste**	**Community-focused**					
	6-1 Implement the Solid Waste Management Plan	Implement the Solid Waste Management Plan, consider influence on GHG emissions and climate resilience.	ERM		Core service + new	2021-2031
	6-2 Develop and deliver education programs to promote a circular economy, zero waste and the 3Rs	Develop and deliver education programs to promote the 3Rs (reduce, reuse, recycle), reduce consumption, and promote zero waste and circular economy approaches.	ERM	EPro	Core service	Ongoing
	6-3 Support education and engagement on waste management to be delivered by and for First Nations communities	Collaborate with First Nations to develop and share educational outreach information, and engagement opportunities on waste management with their community members.	ERM	FNR	Core service	Ongoing
	6-4 Continue to maximize and optimize the capture of landfill gas for beneficial use	Continue to maximize and optimize the capture of landfill gas for beneficial use (as per SWMP Strategy 14).	ERM		Core service	Ongoing
		Initiate Hartland Renewable Landfill Gas Initiative.	ERM		Core service	2023
		Continue to actively monitor the landfill's fugitive emissions and undertake operational adjustments to reduce them.	ERM		Core service	Ongoing
		Continue to conduct research, investigate and report out on emerging waste management technologies (including alternatives to landfilling such as integrated resource management and gasification).	ERM		Core service	Ongoing
	6-5 Consider climate change impacts in liquid waste management	Consider climate change impacts in the development of renewed Core Area Liquid Waste Management Plan and Saanich Peninsula Liquid Waste Management Plan.	EPro	IWS	Core service	2022

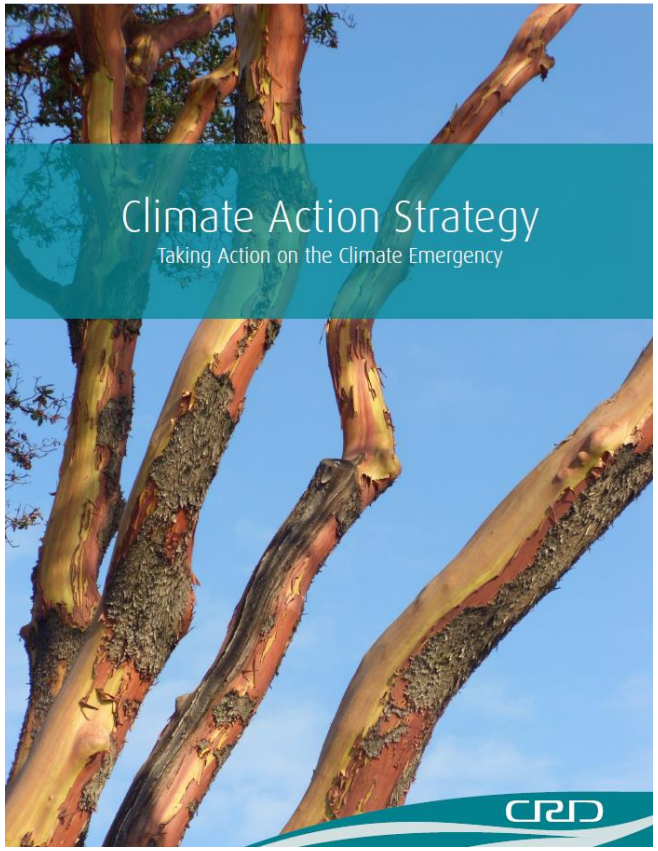
Capital Regional District

625 Fisgard Street
Victoria, BC V8W 2S6
250.360.3000

www.crd.bc.ca
Twitter: @crd_bc
Facebook: Capital Regional District

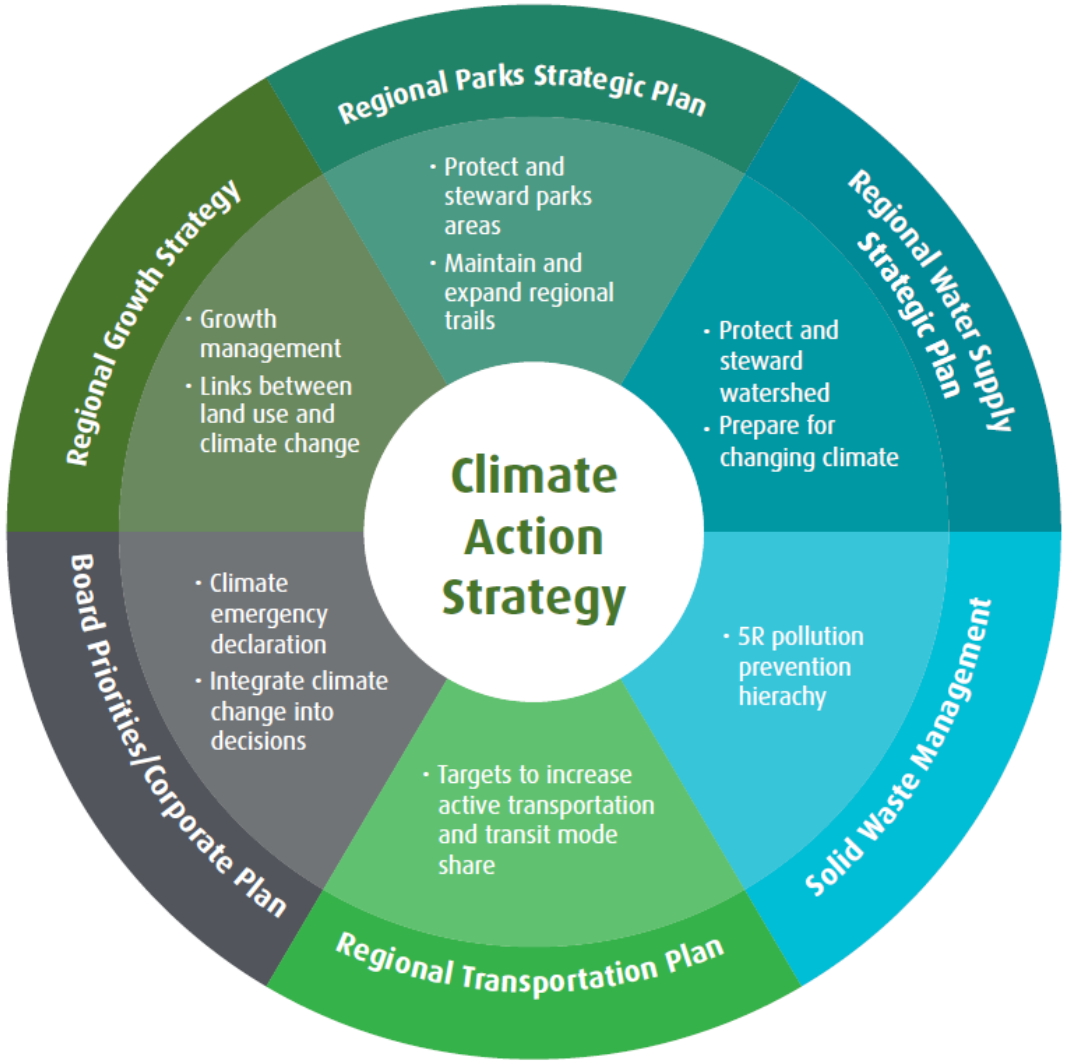
Climate Action Strategy 2021

Taking Action on the Climate Emergency



Development Process

- Review and evaluation
- Best practice review
- Multi-stage engagement
  - Municipal partners
  - CRD divisions and services
- Data analysis
- Development of five-year action plan



Climate Action Vision

Making a difference...together

Through collective action, we eliminate emissions and foster healthy and resilient communities and natural areas now and in the future.

Guiding Principles

Making a difference...together

- **Leadership**: bold action to eliminate greenhouse gas (GHG) emissions from corporate operations, prepare CRD assets for the changing climate, and integrate climate action across the local and regional services.
- **Urgency**: Actions to mitigate the impacts of climate change are swift and substantial.
- **Collaboration**: among municipal, provincial, federal and First Nations governments, businesses, organizations and residents.
- **First Nations relations**: support Indigenous-led climate solutions grounded in Indigenous self-determination, shared prosperity and respect Indigenous relationships with the land, water and all beings.
- **Equity**: inclusive and accessible to residents across the region, particularly those most vulnerable to the impacts of climate change.
- **Co-benefits**: maximize co-benefits, including GHG reductions, resilience, affordability, economic opportunities, health and well-being, reconciliation, and more.

Targets

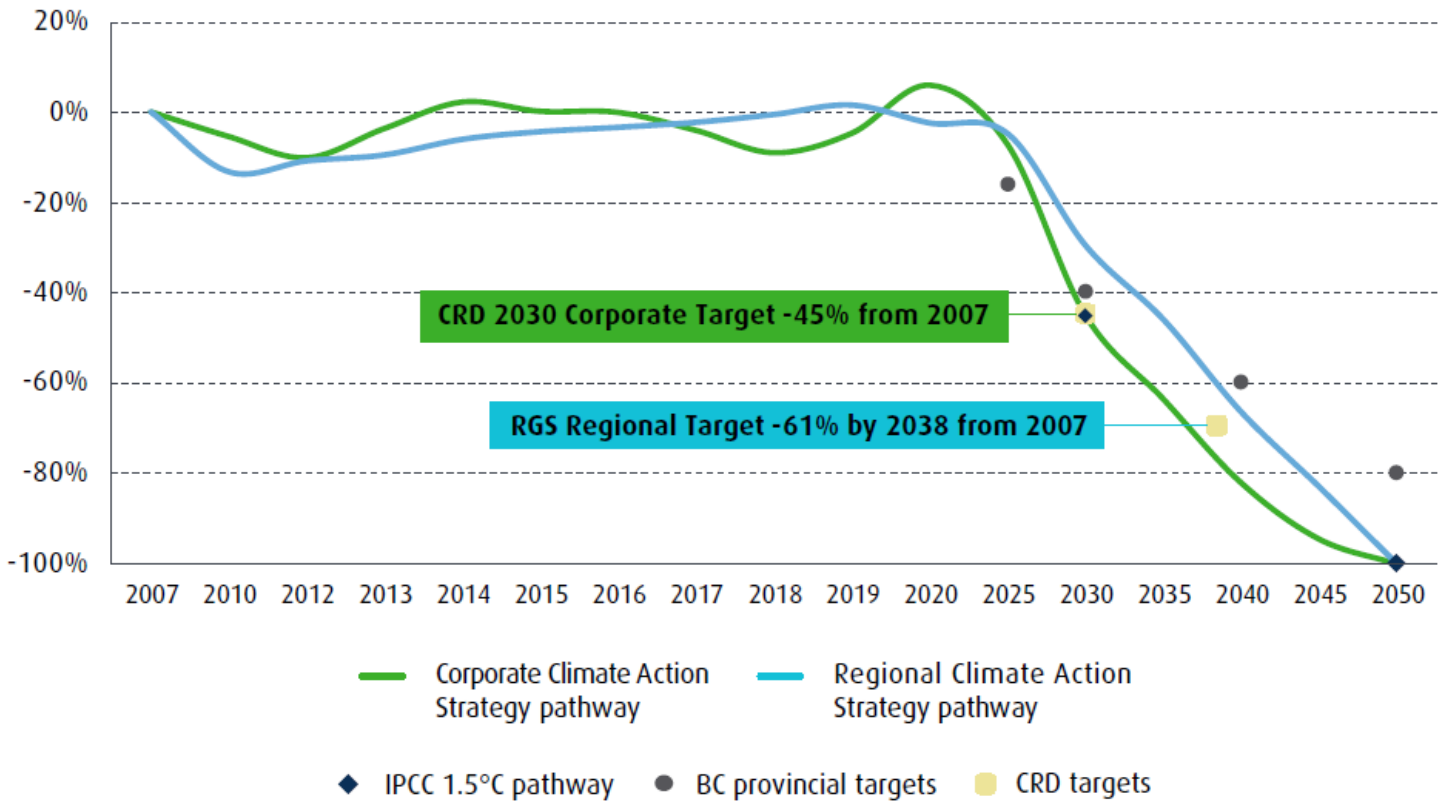
Making a difference...together

Reduce corporate GHG emissions:

- 45% ↓ by 2030
- Net-zero by 2050

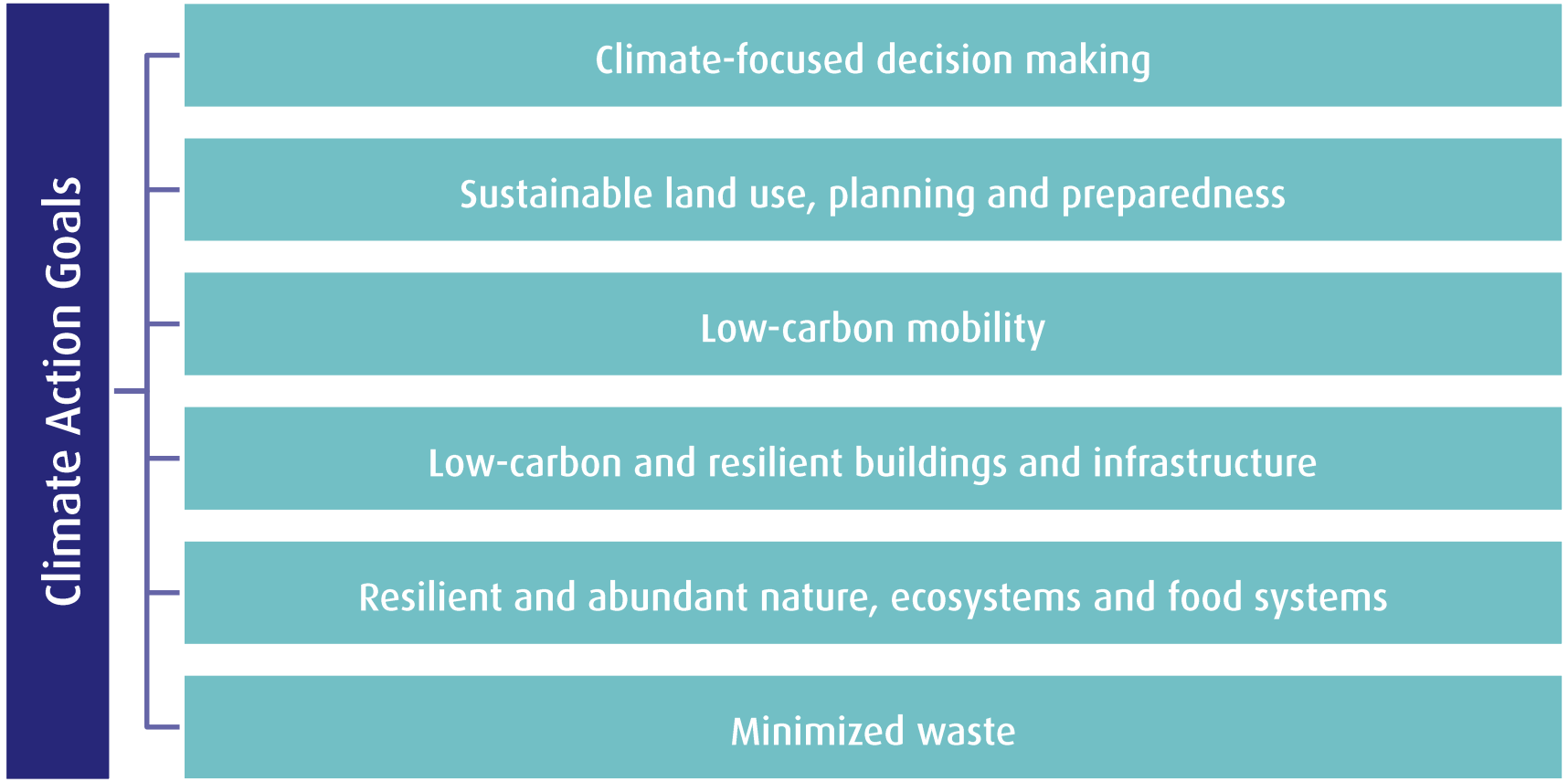
Reduce regional GHG emissions:

- 61% ↓ by 2038
- Net-zero by 2050*



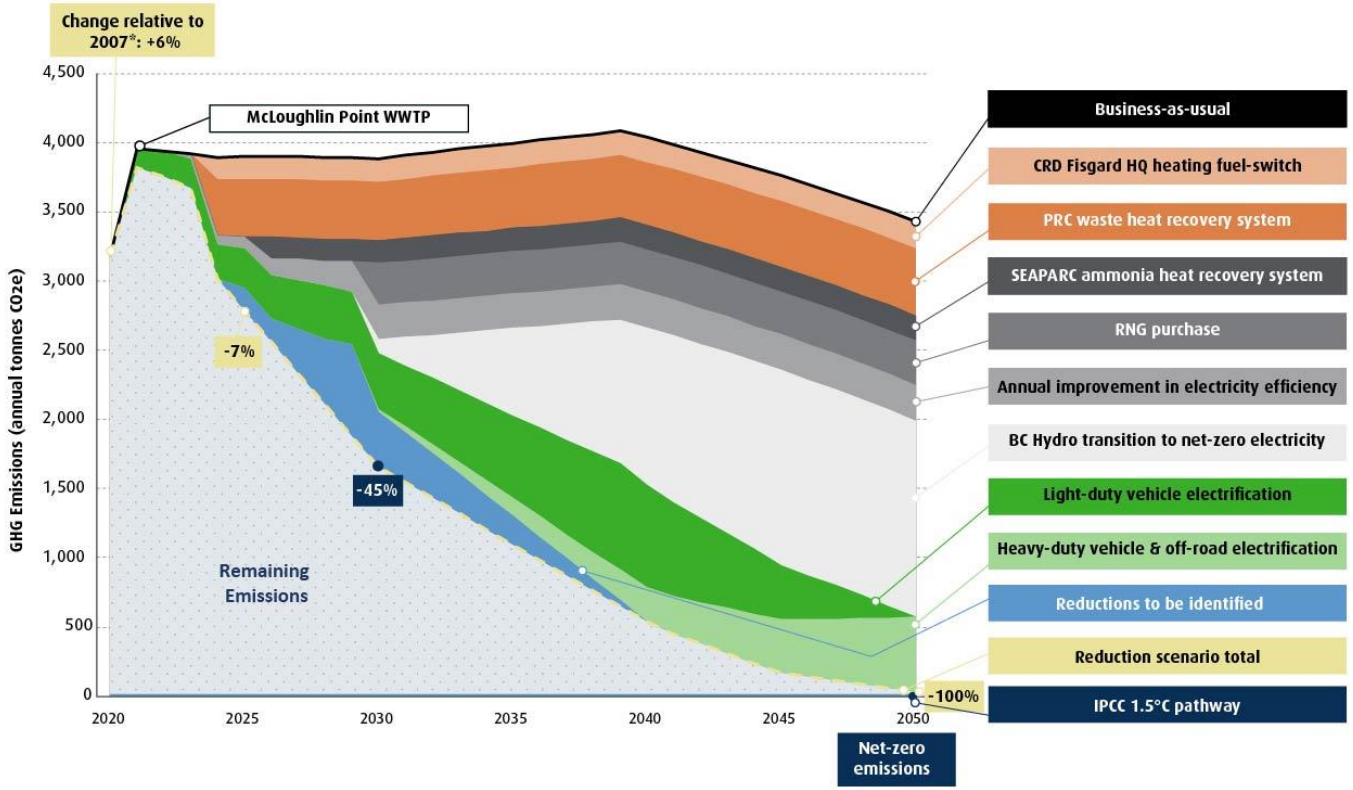
*As per Intergovernmental Plan on Climate Change (IPCC) Pathway/Climate Emergency Declaration

Climate Action Goals



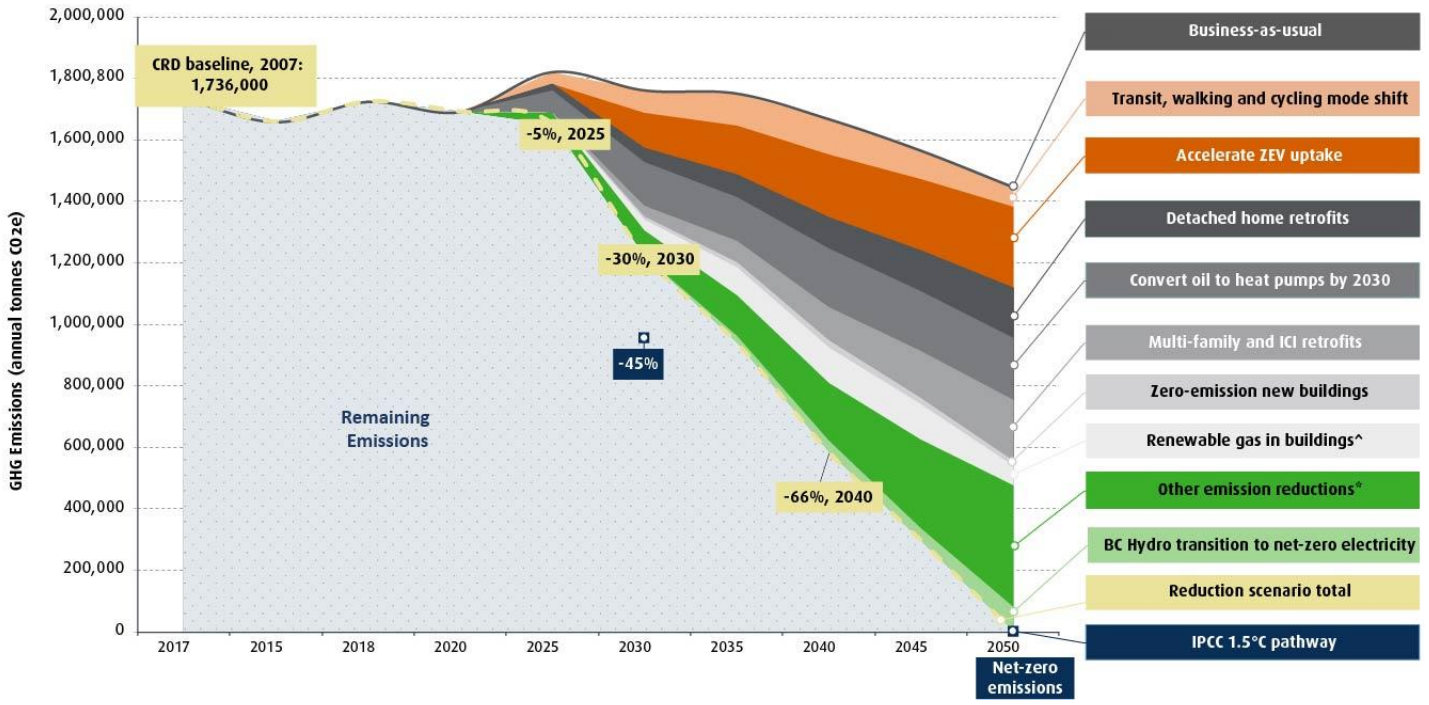
Emissions Reduction Pathway – Corporate Scenario

- There is an identified path to achieving emissions targets
- Each action is critical; we only just meet the target
- Some necessary reductions still need to be identified (blue area)



Emissions Reduction Pathway – Regional Scenario

- Business as usual based on existing policy directives; one potential scenario
- Requires all levels of government and community to achieve
- The CRD can play a role in coordinating local policy and leading programs



Climate Risks and Adaptation

Making a difference...together

- Changes to our climate are already noticeable and will increase
- Potential impacts:
  - transportation network disruptions
  - power outages
  - increasing wildfire risk
  - flooding of homes and infrastructure
  - negative health outcomes

CRD climate adaptation planning

- Climate Projections for the Capital Region
- Capital Region Coastal Flood Inundation Mapping Project
- Corporate Climate Change Risk Assessment
- Adaptation planning for the Greater Victoria Drinking Water Supply Area
- Community Climate Change Adaptation Priorities for the Capital Regional District

Five-year Action Plan

What do we do first?

Climate-Focused Decision Making

Making a difference...together

Goal 1: Climate action priorities are integrated at all levels of decision-making across the organization.

CRD's Role:

- Operational decision-making

Sample summary actions:

- Expanded CRD climate lens framework
- Internal carbon pricing policy
- Staff capacity building
- Embedding Indigenous knowledge

Sustainable land use, planning and preparedness

Making a difference...together

Goal 2: Support the region on its pathway to livable, affordable and low-carbon communities that are prepared for climate change.

CRD's Role:

- Regional planning
- Juan De Fuca land use planning
- Emergency management in Electoral Areas
- Inter-municipal coordination
- Data management
- Southern Gulf Islands Administration & Salt Spring Island Administration

Sample summary actions:

- Monitor Regional Growth Strategy
- Collect and share regional energy, emissions and climate projections data
- Support regional capacity building
- Coordinate with emergency managers & planners on embedding climate risk in planning & outreach activities

Making a difference...together

Goal 3: Rapidly reduce corporate fleet emissions. Support, endorse and encourage active, public and zero-emission transportation options.

CRD's Role:

- CRD fleet
- Regional trail system
- Regional planning
- Electoral Area transportation
- Advisor on transit
- Data management
- Community programs

Sample summary actions:

- Advance zero emission corporate fleet
- Develop regional Transportation Demand Management approach
- Accelerate active transport infrastructure
- Collect transportation planning data
- Zero emission/active travel education
- Support acceleration of transit improvements
- Support public Electric Vehicle charging network

Low-Carbon and Resilient Buildings and Infrastructure

Making a difference...together

Goal 4: Accelerate energy efficiency, emission reductions and enhanced resilience in CRD buildings and infrastructure. Support and encourage the same for all buildings and infrastructure across the region.

CRD's Role:

- CRD buildings & infrastructure
- Electoral Area building inspection
- Data management
- Community programs

Sample summary actions:

- Energy studies and corporate retrofits
- Climate friendly new development in Capital Region's Housing Corporation and Capital Regional Hospital District facilities
- Energy and emissions reduction education
- Support energy retrofit programs
- High performance building policy support
- Promote green infrastructure

Resilient and Abundant Nature, Ecosystems and Food Systems

Making a difference...together

Goal 5: Protect, conserve and manage ecosystem health and nature's capacity to store carbon and adapt to climate change. Support the ongoing ability of natural systems to sustain life.

CRD's Role:

- Land & water stewardship
- Land acquisition
- Community & inter-municipal coordination
- Education & outreach
- Regional planning

Sample summary actions:

- Embed climate into Regional parks strategic planning
- Climate adaptation initiatives in Greater Victoria Drinking Water Supply Area
- Ecological data collection
- Support regional forest and urban tree programming
- Lead regional invasive species program
- Support local food and agriculture

Minimized Waste

Making a difference...together

Goal 6: Waste generation and the resulting emissions are minimized and remaining waste is transformed into a resource.

CRD's Role:

- Solid waste management planning
- Liquid waste management planning
- Education and outreach

Sample summary actions:

- Implement Solid Waste Management Plan
- Promote circular economy, zero waste and 3Rs (recycle, reduce and reuse)
- Support engagement on waste management delivered by First Nations
- Landfill gas collection maximization and beneficial use (e.g. Renewable Natural Gas)

Implementation & Reporting

Making a difference...together

- Performance indicators by goal
- Action tracking
- Annual reporting
- Adaptive management
- Five-year review & update

REPORT TO ENVIRONMENTAL SERVICES COMMITTEE
MEETING OF WEDNESDAY, SEPTEMBER 29, 2021

SUBJECT **Capital Region Energy Retrofit – Business Case**

ISSUE SUMMARY

To provide results of the Capital Region Residential Energy Retrofit Program Business Case.

BACKGROUND

On October 28, 2020, the Capital Regional District (CRD) Board directed staff to pursue completion of a detailed business case for a Regional Energy Retrofit Program and report back in 2021 with 2022 budget implications. At the same time, as part of the 2019-2021 Transition 2050 Residential Retrofit Acceleration Project, the CRD launched the pilot Bring It Home 4 Climate program to support homeowners to overcome barriers associated with home retrofits. Between August 2020 and August 2021, with very little marketing, the program has engaged over 400 homeowners and supported over 100 homeowners with a virtual home energy check-up. Staff have leveraged this, and previous work, to secure Community Efficiency Financing program funding from the Federation of Canadian Municipalities to complete an in-depth design study of a full-scale municipal residential retrofit program. As part of that work, staff have delivered a Capital Region Residential Energy Retrofit Business Case (Appendix A) that offers costs and a design framework for achieving the emission reduction goals associated with the residential built environment.

The business case recommends a regionally coordinated, subsidized and well-marketed program following a "One Stop Shop" model, with an initial focus on Part 9 (i.e., single family homes, duplexes and townhomes). The Program would build on the CRD's Bring it Home 4 Climate program to provide turnkey service to homeowners via a Retrofit Coordinator, operated by a third-party administrator, similar to the provincial programs. The Retrofit Coordinator scope of work is found on page 6 of Appendix A.

ALTERNATIVES

Alternative 1

The Environmental Services Committee recommends to the Capital Regional District Board:

That the Capital Region Energy Retrofit – Business Case be received for information and that implementation be considered as part of the Climate Action 2022 Service Planning Process.

Alternative 2

That staff report back to the committee with further information.

IMPLICATIONS

Environmental & Climate Implications

The business case estimates that the proposed budget would enable an annual 1% regional retrofit rate, estimating an approximate 1,780 to 2,050 tCO_2e in carbon savings annually. Past

and current studies have shown that a 3-5% annual retrofit rate of existing buildings is required to achieve local, provincial and federal greenhouse gas reduction targets. A higher rate would require further support from the provincial and federal levels of government.

The business case targets a Capital Region Residential Energy Retrofit Program that will drastically reduce greenhouse gas emissions in participating homes. This means programming efforts will focus to support residents in fuel switching from carbon intensive energy sources and improve home energy efficiency.

Regional Growth Strategy Implications

This program has the potential to contribute significantly to the Regional Growth Strategy goal of reducing emissions by 61% by 2038.

Social Implications

The business case offers a potential reduction in energy poverty by targeting moderate-income communities where natural gas is less prominent. The Province is shortly releasing a low income-qualified energy retrofit program and recommends that the CRD focus on other demographics until the Province of BC's program is more established.

Retrofitting and improving of homes in the capital region supports healthy homes. For example, heat pumps provide heating and cooling in one appliance and safeguard against increases in summer temperatures and heat waves that will come with climate change. Home retrofits that involve envelope improvements and air filtration also help seal homes from environmental contaminants, such as wildfire smoke, and help regulate moisture.

Financial Implications

The business case indicates that the total core budget required to operate a five-year program would be $602,500 in 2022, increasing to $606,500 in 2026. The detailed budget is found on page 8 of Appendix A. This fixed budget for the first five years is estimated to support the completion of home retrofits in 1% of the homes in the capital region per year.

Service Delivery Implications

This program requires an increase in service levels (refer to *2022 Service Planning – Climate Action & Adaptation* staff report*,* also on the September 29 agenda*),* and would require an increase in the requisition limit under CRD Bylaw 3510 – Climate Action & Adaptation.

Several federal and provincial level programs exist to support homeowners in retrofitting their homes. These include rebate programs (e.g., Better Homes, Canada Greener Homes Grant, and the Better Home Energy Coach). The senior government-led programs are "fuel neutral", meaning upgrades and rebates for both electric and fossil fuel equipment (e.g., natural gas boilers) are available and may be recommended. The business case proposes to leverage those rebate programs for capital region homeowners and address identified gaps (i.e., consumer awareness, acceptance and access to products and services, and complexity navigating home renovations). The program would focus on electrification to meet emission reduction goals.

Alignment with Board & Corporate Priorities

The proposed Program aligns with the CRD Board's Climate Emergency Declaration. This program is embedded with the CRD's forthcoming renewed Climate Action Strategy.

NEXT STEPS

Immediate next steps include completing a retrofit financing study and a detailed study of potential retrofit packages. These items will complete a commitment to Federation of Canadian Municipalities associated with the CRD's design study grant.

The business case identifies the future need to address larger Part 3 (i.e., multi-unit residential buildings), which make up 20% of the rental floor area in the region. Targeted outreach to the owners and property managers for these buildings could have a significant impact on community emissions and would benefit a greater proportion of lower-income households more at risk of energy poverty or climate-related health impacts. Metro Vancouver and a group of local governments are actively exploring the potential expansion of Metro Vancouver's Strata Energy Advisor Program across the province. Staff will keep apprised of this opportunity.

CONCLUSION

The CRD Board directed staff to develop a detailed business case for a Regional Energy Retrofit Program and report back in 2021 with 2022 budget implications. Building off of lessons from previous programs, the CRD completed a CRD Residential Energy Retrofit Program Business Case that provides costs and a design framework that will provide the capital region a pathway to achieving our emission reduction goals associated with the residential built environment. The Board will consider this program, along will other financial implications, through the 2022 service planning process.

RECOMMENDATION

The Environmental Services Committee recommends to the Capital Regional District Board:

That the Capital Region Energy Retrofit – Business Case be received for information and that implementation be considered as part of the Climate Action 2022 Service Planning Process.

Submitted by:	Larisa Hutcheson, P.Eng., General Manager, Parks & Environmental Services
Concurrence:	Robert Lapham, MCIP, RPP, Chief Administrative Officer

ATTACHMENT

Appendix A: CRD Residential Energy Retrofit Program – Business Case Phase 2 Memo – Final

APPENDIX A

CRD Residential Energy Retrofit Program

Business Case Phase 2 Memo – FINAL

September 2021

Prepared by

Integral Group
Suite 180 - 200 Granville Street
Vancouver, BC V6C 1S4

Windfall Ecology Centre
93a Industrial Pkwy S, Aurora, ON L4G 3V5

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EXECUTIVE SUMMARY

Background

Reducing emissions in the buildings sector presents a significant challenge. While new construction standards are continuously improving in energy efficiency (with an emissions target potentially forthcoming), the existing stock of the capital region's homes will need to be retrofitted to reduce energy consumption and shift to renewable, low emissions sources of energy. When combined with the region's existing affordability challenges, retrofits pose a complex issue.

To help address these challenges and support the achievement of the Capital Regional District's (CRD) and local municipal climate change goals, the CRD and local government partners, are exploring the development of a *Regional Residential Energy Retrofit Program* capable of spurring deep emissions retrofit actions by home and building owners across the region. While several programs at the federal, provincial, and regional level have been put in place to support homeowners in retrofitting their homes, they have only begun to address the many barriers that homeowners face, from a lack of awareness of options, to a lack of trust in or access to measures, affordability challenges, and the sheer complexity of the task, among others.

A regionally-coordinated program that builds on these programs and specifically seeks to remove these barriers and provide homeowners with the support they need to make the switch to lower carbon home energy systems will be crucial to meeting the CRD's emissions reduction targets. Such a program would also highlight the many benefits to homeowners that electrification can bring, including:

- **Improved air quality**, by improving filtration and ventilation, regulating moisture, strengthening barriers to outdoor pollutants, and reducing sources of indoor air pollutants that can exacerbate pre-existing conditions.
- **Increased equity and affordability**, by helping homeowners identify and implement measures to reduce their energy consumption, especially when coupled with other incentives that reduce retrofit costs.
- **Improved resilience**, by supporting homeowners install heat pump systems that provide cooling as well as heating, safeguarding against increases in summer temperatures and the incidence of heat waves that will come with climate change. Supporting the addition of enhanced air filtration will also help protect household health against increasing wildfire smoke events.
- **Increased local economic growth**, by increasing the number of higher income/lower barrier jobs in the retrofit industry.

A Regional Home Energy Retrofit Program

To help homeowners identify and implement retrofit measures best-suited for their home, a subsidized "One Stop Shop" model is recommended for the capital region based on its ability to:

- Build on and integrate existing program infrastructure, including the CRD's current Bring It Home 4 Climate (BIH4C) program and the Province's Energy Coach Service, by providing homeowners with much-needed support in choosing the right option for them
- Provide homeowners with enhanced retrofit coordinator support tailored according to their needs, and focused on supporting the decarbonization of existing homes
- Better identify and target local market opportunities and help establish local contractor delivery networks, and
- Monitor performance through post retrofit follow-up to ensure homeowner satisfaction

A new CRD program could leverage the intake process through the Energy Coach program, while placing a concerted focus on fuel switching for emissions reductions as in BIH4C to ensure the benefits of home electrification are reaped. The proposed program design assumes that a moderate level of support could be provided by a Retrofit Coordinator per household to add to existing services, specifically helping alleviate the challenges of navigating the retrofit process once initial support has been provided via the Energy Coach service. Specific services that are assumed will be provided by a Retrofit Coordinator are outlined in the table below. These services build on the information and resources provided by the Federal government and the EnerGuide auditor, while addressing key gaps that prevent residents from translating the EnerGuide recommendations into specific actions and real-world GHG savings.

Step	Tasks
Screen	• Conduct (virtual) home energy check-up/screening
Review and Plan	• Review EnerGuide Renovation Upgrade Report • Assist client with upgrade choices • Consider DIY options and provide contractor selection advice and standardized quotation forms • Direct client to qualified contractor directory
Compare & Select	• Help homeowner scope work, compare contractor bids, ensure rebate eligibility, and provide troubleshooting throughout the process.
Finance	• Help identifying and selecting financing and incentives
Document	• Help getting documentation and assist with submitting rebate applications
Evaluate	• Quality Assurance checks post-retrofit (done in aggregate or spot-check) • Measurement & Verification

An initial focus on Part 9 (i.e., single family homes, duplexes and townhomes) is recommended for the CRD, as this sector represents the most significant opportunity and a potential savings of up to 15% of the capital region's total emissions over current levels. The upper end of this range can be captured by ensuring that most retrofits involve electrification and that the benefits of all electric homes listed above are captured. Some key considerations for the development of a Part 9 focused program are noted below:

- Oil heated-homes constructed before 1940 have the highest GHG emissions and remain a good target for retrofits, though there are fewer of these homes remaining. Oil-heated homes are also high adopters of fuel switching projects and often select heat pumps.
- Pre-1990 gas heated homes are high adopters of insulation upgrades, though they tend to retain or upgrade gas equipment rather than considering fuel switching. Newer homes (i.e., after 1990) are particularly high adopters of heat pumps.
- The rapid increase over the last decade of homes in the capital region adding natural gas furnaces indicates a continued risk of homes fuel switching towards natural gas. Every home that replaces electric resistance heating with a heat pump is one fewer home adding natural gas. As such, homes with electric resistance heating should remain a target area for the program, to forestall increases in natural gas use that could otherwise eliminate the net savings.
- The Province of BC is releasing an income qualified program specifically targeting low-income households and the unique barriers they face in upgrading their homes, the CRD should focus on other demographics in initial stages of the program and seek to strategically fill gaps as these income-qualified programs become established in the market.
- Targeting program outreach materials to the following markets will help to increase uptake in formative program years and build overall market capacity and demand:
    - Demographics and neighbourhoods that may be well equipped to make improvements, including higher income neighborhoods (e.g., Oak Bay and the Uplands), senior populations, and households in need of renewal, can improve program uptake and the overall impact on energy and carbon savings.
    - Newly purchased homes represent an opportunity for upgrades, as many new homeowners often take on renovations early on.
    - Moderate-income communities where natural gas is less prominent, and electric resistance and oil heating are more common, also presents a valuable GHG reduction opportunity alongside a potential reduction in energy poverty.
- Emphasizing the non-financial benefits of retrofits (e.g., increased thermal comfort and cooling, better indoor air quality, and lower carbon footprint), in communication and outreach can help attract homeowners to the program.

A Business Case for the CRD

Total estimated program costs for a Part 9 focused home retrofit program are outlined in the table below:

Program Year	Y1	Y2	Y3	Y4	Y5
Calendar Year	**2022**	**2023**	**2024**	**2025**	**2026**
Budget	**$602,500**	**$602,500**	**$602,500**	**$602,500**	**$602,500**
CRD Staff (0.5 FTE)	$52,500	$53,500	$54,500	$55,500	$56,500
Program Overhead	$240,000	$188,220	$190,484	$192,794	$195,150
Homeowner Support	$310,000	$360,780	$357,516	$354,206	$350,850
Estimated Program FTEs (excluding CRD staff)	3	5	5	5	4
% Program Overhead (excluding CRD staff)	40%	31%	32%	32%	32%
Homes Going Through Program/Year	885	1030	1021	1012	1002
% annual penetration	0.9%	1.0%	1.0%	1.0%	1.0%
Homes/Year with leveraged resources	92	107	106	105	104
% annual penetration with leveraged resources	0.1%	0.1%	0.1%	0.1%	0.1%
Additional tCO_2e abated each year*	1781	2072	2054	2036	2016

Key insights from the cost analysis include the following:

- A CRD-run program that integrates into existing program offerings and provide homeowners with coordinator support not currently offered by existing CleanBC Energy Coach services is estimated to require an average of 7 hours of support or $350 per household. Such levels of support will vary considerably as those engaging in deeper retrofits or with more complex homes may require more, while others will require less.
- Program overhead is estimated at approximately $290,000 in the first year, decreasing to $240,000 in subsequent years as the program gets off the ground and promotional materials are developed.
- Program resources that can be leveraged in a CRD-led program include existing federal and provincial rebates and incentives for pre- and post-retrofit audits, electrical service upgrade top-ups and rebates. In the event that these resources are reduced or eliminated, the CRD will need to reassess the nature and/or level of support for homeowners to reap the best value.
- A fixed budget of $602,500 per year for the first five years is estimated to support the completion of home retrofits in 1% of the homes in the capital region per year, representing a standard but substantial uptake rate. While carbon savings will vary based on the nature of the upgrade, it is estimated that this could yield between 1.18 tCO_2e and 2.43 tCO_2e of emissions savings per home, or a total of over 2000 tCO_2e additional carbon savings across

the capital region each year. This translates into a cumulative29,443 tCO_2e avoided over five years.

- Program costs supporting a 1% uptake rate can be met by applying to the Federation of Canadian Municipalities' *Community Efficiency Financing* (CEF) funding stream. However, an uptake rate of 3% of homes per year is necessary to achieve a full building stock improvement by 2050. The scale of such a program would require significant support at provincial and federal levels, including additional incentives and rebates for electrification equipment and supporting efficiency measures.

Moving Beyond Single-Family Homes

While the GHG savings available in Part 3 multifamily buildings represent only 18% of the GHG savings potential as is available in the Part 9 housing stock, a significant proportion of the building sector in some CRD communities is made up of multi-unit residential buildings. As such, both strata owned and rental, and will require dedicated programming to meet municipal and provincial emission reduction ambitions. With respect to strata, a project currently being led by Metro Vancouver and a group of other local governments is exploring the potential expansion of Metro Vancouver's *Strata Energy Advisor Program* across the province. In its current form, the program is intended to provide strata buildings with a program specifically designed to address their unique barriers. If adopted at the provincial level, such a program would support strata owners and their property managers understand and undertake energy efficiency and emissions reduction upgrades, and fill the gap of retrofit support currently available to strata owners. However, even if the Strata Energy Advisor program is not expanded provincially, it would provide a strong framework on which to expand the CRD's program to strata housing in a later or concurrent phase.

The analysis of the multifamily rental housing stock listed in the BC Assessment data indicates that there are 30 purpose-built rental buildings over 100,000ft^2, accounting for 20% of the rental floor area in the region but only 2.5% of the 1,187 buildings. The overall age of the rental stock is older than the strata stock as well; 15 of the 30 largest rental MURB buildings were built before 1977, with the median year built for the sector overall at 1969. Targeted outreach to the owners and property managers for these buildings could have a significant impact on community emissions across the region, and would benefit a greater proportion of lower-income households or those living in or at risk of energy poverty.

1. INTRODUCTION

1.1. Background

The Capital Regional District (CRD) has set a target of reducing its greenhouse gas (GHG) emissions community-wide by 61% (over a 2007 baseline) by 2038, and working towards regional carbon neutrality by 2030. To meet this goal, emissions reductions will need to be achieved across several sectors, including the building sector, which accounts for over 30% of the capital region's emissions.

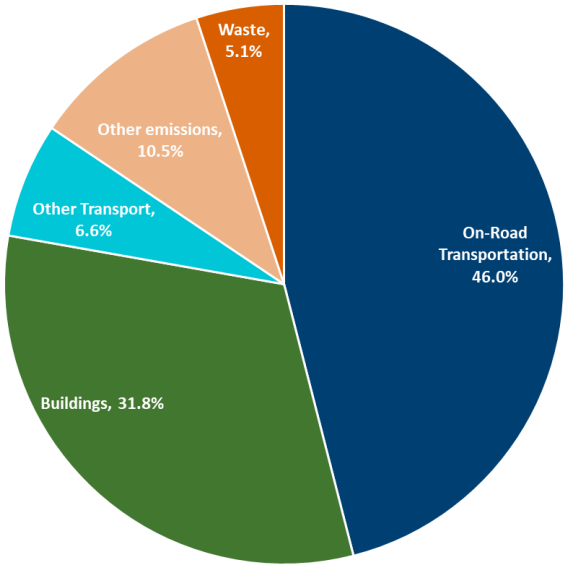

Figure 1: CRD GHG inventory by sector, 2018

Reducing emissions in the buildings sector presents a significant challenge. While new construction standards are continuously improving in energy efficiency (with an emissions target potentially forthcoming), the existing stock of capital region's homes will need to be retrofitted to reduce energy consumption and shift to lower carbon sources of energy. When combined with the region's existing affordability challenges, retrofits pose a complex issue. Indeed, the CRD's *Transition 2050* initiative identified seven key challenges to deep emissions retrofits[1]:

- **Scale of the challenge.** Retrofit uptake has been low across the Province, meaning a rapid increase in the rate, scale and depth of home retrofits will be required for both the CRD and the Province of BC to meet their 2030 GHG reduction targets.
- **Economic barriers.** Changes in utility costs, high upfront costs, overall affordability, and contractual restrictions with some rental properties all constrain retrofit uptake.
- **Awareness and acceptance.** Homeowners lack awareness and understanding of retrofit opportunities, rebates, technologies, and the overall benefits of retrofits.

[1] City Green Solutions & Home Performance Stakeholder Council. *Residential Retrofit Market Acceleration Strategy.*

- **Consumer trust, access, and industry capacity**. There is limited access to high efficiency products, as well as challenges finding qualified contractors.
- **Rental housing and demographic challenges**. Economic barriers are present in low-medium income (LMI) households, while rental properties are faced with a split incentive problem.
- **Complexity**. The overall complexity of the retrofit process and additional barriers associated with hazardous material; for example, asbestos and disposal costs limit homeowners' ability and willingness to engage in retrofits.
- **Psychological barriers.** Physiological barriers to the adoption of residential retrofits include distrust towards experts and authorities, as well as a perceived risk of changing from one system to another.

Coupled with the fact that approximately 15% of the capital region's population is characterized as living in or being at risk of energy poverty, any effort to increase the rate and depth of retrofits must take care to also ensure that the cost of living can be improved or at least maintained. Energy poverty is often defined as households who struggle to meet their home energy needs and spend more than 6% of their after-tax income on their energy needs.[2] Similar concerns also exist around the issue of "renovictions", in which tenants may be evicted to allow for renovations to be made to a unit, often resulting in higher rent units.

1.2. Project Purpose & Approach

To help address these challenges and support the achievement of the CRD's climate change goals, this project is tasked with developing a detailed business case for a successful *Regional Residential Energy Retrofit Program* capable of spurring deep emissions retrofit actions by home and building owners across the region. While several programs at the federal, provincial, and regional level have been put in place to support homeowners in retrofitting their homes, they have only begun to address the barriers noted above. A regionally-coordinated program that builds on these programs and specifically seeks to remove these barriers and provide homeowners with the support they need to make the switch to lower carbon home energy systems will be crucial to meeting the CRD's emissions reduction targets. Such a program would also highlight the many benefits to homeowners that electrification can bring, from improved air quality and resilience, to lower home energy costs and increased local economic activity.

Given the emissions reduction opportunity that this sector faces, this memo has developed a draft program design and business case focused on Part 9 homes (i.e., single-family, duplex and townhouse). The data presented here is based on the following steps and sources of information and analysis:

- A review of available data sources to assess the scale of the retrofit market in the capital region
- A review of existing and planned program offerings in the residential retrofit market in BC and Canada

[2] CUSP. 2019. *Energy Poverty in Canada: a CUSP Backgrounder*

- A scan of best practices in residential retrofit programs to determine potential models
- A workshop and follow-up meetings with an Advisory Committee to review proposed program approaches and costs, representing leaders and key stakeholders in the retrofit market
- Discussions with CRD staff and Steering Committee members, representing staff from member jurisdictions

The information and insights derived from these steps were used to draft a high-level set of assumptions around potential program design, which were then costed based on consultant team, Advisory Committee and CRD and municipal staff experience to inform a business case prior to full program design. Recommendations for Part 3 (i.e., multi-unit residential buildings) are also provided, given the importance of taking advantage of the equity and emissions reduction opportunities in this sector as well.

2. EMISSIONS REDUCTION POTENTIAL IN THE CAPITAL REGION

To assess the potential of a residential retrofit program to help meet the CRD's emissions reduction targets, it is necessary to first identify the region's current residential building stock and its key characteristics. The scale of the retrofit market in the region was assessed by taking the following steps for both Part 9 and Part 3 residential buildings[3]:

1. **Energy Savings Potential:**
    a. *Part 9*: An assessment of available EnerGuide data to show the average pre- and post-retrofit energy use intensities (EUI) and greenhouse gas intensities (GHGI)
    b. *Part 3*: A review of energy savings estimates from the Strata Energy Advisor program and an analysis of the GHG potential for multi-unit residential buildings (MURB) fuel-switching
2. **Building Stock:** An analysis of BC Assessment data to identify the number of homes and floor area across the capital region, grouped by decade built, jurisdiction, and housing type.
3. **Fuel Type Estimates:**
    a. *Part 9*: An exploration of a Victoria Real Estate Board survey of >10,000 homes to estimate primary heating fuel for single family homes.
    b. *Part 3*: A review of the BC Assessment data, coupled with an application of assumptions from previous studies
4. **Region-wide Estimates:** An application of EnerGuide pre-retrofit, post-retrofit, and post-fuel-switch-retrofit[4] EUIs and GHGIs assigned across homes (based on number and floor area) by jurisdiction and building age, to estimate total current emissions and total emissions savings potential across the region

[3] The B.C. Building Code has two main categories of buildings, Part 9 (simple buildings) and Part 3 (complex buildings). Part 9 buildings are generally three stories or less, and under 600 square meters. Some examples include houses and duplexes, small apartment buildings, and small commercial buildings. Part 3 buildings are generally over three stories and more than 600 square meters. Some examples include shopping malls, office buildings, condos, apartment buildings, schools, theaters, and care facilities.

[4] A fuel switch retrofit refers to a replacement of a more GHG emissions-intensive heating system (i.e., one that uses oil or natural gas) with one that is lower in emissions intensity (i.e., electricity)

Each of these steps is discussed in further detail in the sections below.

2.1. Single-Family/Part 9 Savings Potential

EnerGuide for Houses is a program created by Natural Resources Canada (NRCan) that provides homeowners with independent expert advice concerning energy efficiency in their homes. Through the work of Registered Energy Advisors (REAs), homes are evaluated across Canada both before and after energy efficient retrofit projects. By collecting key measurements such as fuel type, floor area and insulation levels, REAs use a home modelling software to derive metrics including GHG emissions, EUI, and EnerGuide ratings, all of which are used to advise the homeowner on making energy efficient improvements to their home. Data from all EnerGuide evaluations are then collected by NRCan, creating a database of houses and home retrofit projects ideal for benchmarking existing homes and estimating emission reduction potential.

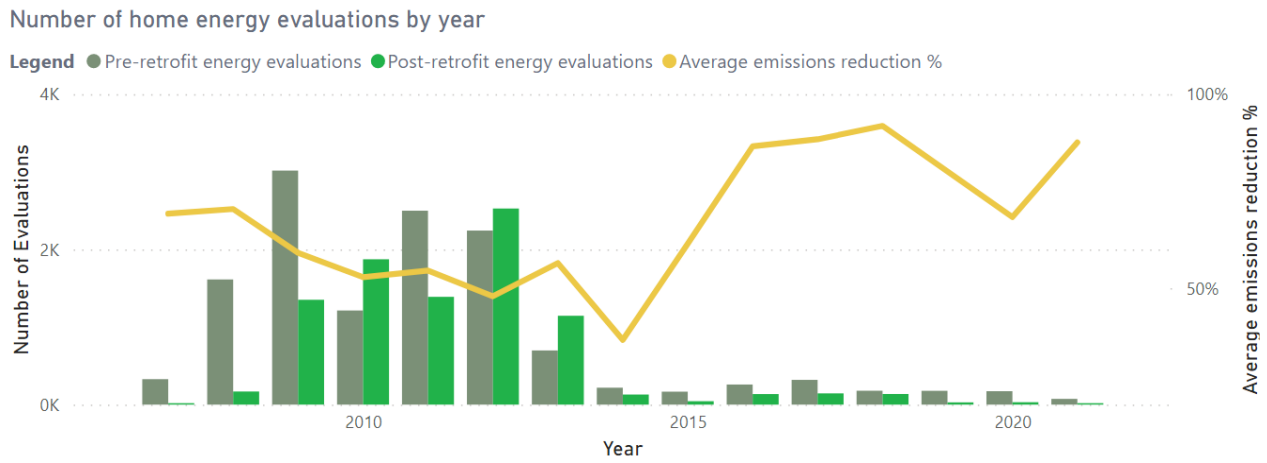

Figure 2: Reviewed EnerGuide data set and average emissions reductions.

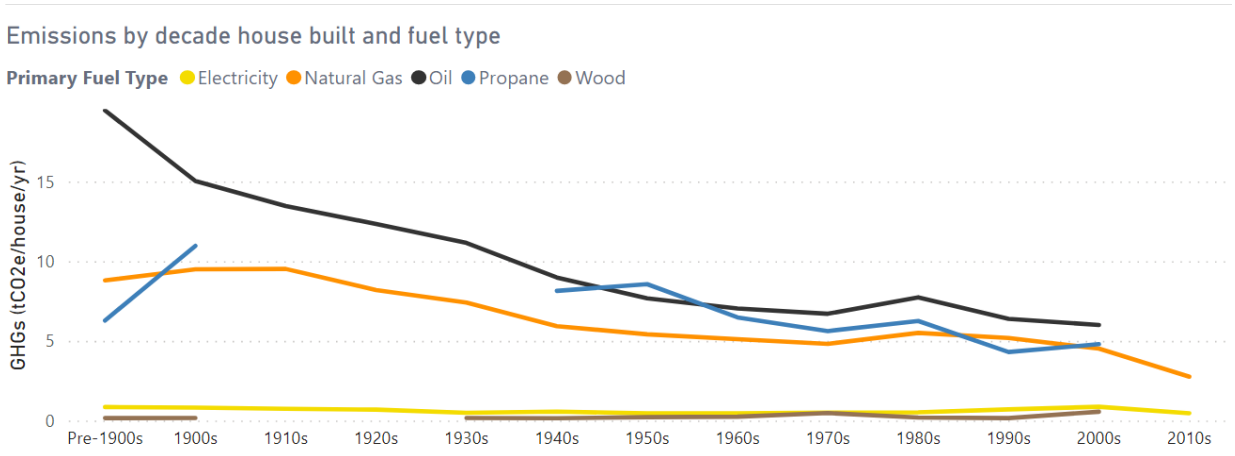

Figure 3: Pre-retrofit emissions by decade and heating fuel type (Note: gaps indicate where no data was gathered on homes of that vintage using that fuel)

For this project, 13,177 pre-retrofit evaluations and 9,117 post-retrofit evaluations within the capital region were analyzed, spanning from 2007 to early 2021 (see Figure 2). Below are some key findings:

- An average retrofit project within the region reduces GHG emissions by 38.45%. When segmented, fuel switching projects save an average of 70.53 of emissions, whereas non-fuel switching projects save 10.58%.
- Fuel switching occurs in 26% of recorded retrofit projects, with 63% switching to electricity and 37% switching to natural gas. 92% of fuel switches see a shift away from oil, with 5% shifting away from natural gas. The high occurrence of fuel switching away from oil reflects the high cost of oil heat, as well as the *Oil-to-Heat-Pump* program that operated in the region from 2015 to 2018.
- Average household GHG emissions vary heavily based on the heating fuel source used. Oil-using homes are the highest emitters with an average of 9.92 tCO2e/year, followed by natural gas at 8.05 tCO2e/year and propane at 7.70 tCO2e/yr. Electric heated homes are considerably lower at 1.52 tCO2e/year. Figure 3 shows the pre-retrofit evaluation GHGs per home by decade.
- The largest quantity of GHG emissions reduced through retrofitting is in 1910 homes, with an average household reduction of 3.32 tCO2e/yr. The average reduction continues to decline with decreasing house age, with homes built in the 2000s only saving an average of 0.52 tCO2e/yr.
- While the high number of EnerGuide evaluations in the sample reflects in part the availability of federal ecoEnergy incentives during the earlier half of the sample period, these 9,117 completed retrofits still represent *less than 10%* of the homes in the capital region.
- Among single family homes, floor area, year of construction and primary pre-retrofit heating fuel are key indicators of GHG savings. These findings drove the structure of the remainder of this analysis.

2.2. Multifamily/Part 3 Savings Potential

Given the absence of EnerGuide data to draw on for Part 3 multi-family buildings, the energy savings potential for the Part 3 building stock was estimated by using findings from Metro Vancouver's *Strata Energy Advisor* program, in addition to a set of studies of retrofit opportunities in MURB properties on Vancouver Island and the Lower Mainland.[5] The *Strata Energy Advisor* pilot program report from 2016 grouped MURB retrofits into several key retrofit tiers.[6] However, this analysis did not examine a change of heating fuel or technology; buildings using natural gas heat were assumed to still be using natural gas heat, and buildings using electric resistance were not assumed to switch to heat pumps. As such, a Tier 4 retrofit opportunity was developed by drawing on an analysis of the heat pump opportunities to estimate the savings opportunity from a fuel switch.[7] The resultant tiers are as follows:

0. *Retrocommissioning / Tune-up only*
1. *Normal Renewal:* code minimum equipment replacement without increased insulation, or air sealing

[5] Metro Vancouver, Strata Energy Advisor. http://www.strataenergyadvisor.ca/Pages/default.aspx
[6] RDH, Strata Energy Advisor Program Recommendations, 2016
[7] Integral Group, Heat Pump Applications in Residential Buildings, 2016

2. *Energy Retrofit:* R5 Wall Insulation, R10 Roof Insulation, Condensing Boiler/furnace
3. *Comprehensive Retrofit*: R10 Wall Insulation / R20 roof insulation, air sealing, U-0.2 windows,93%+ efficient furnace or boilers
4. *Heat Pump Retrofit*: Distributed air source heat pump or 4-pipe air-to-water heat pump with COP of 3.0, and a central air to water heat pump for domestic hot water, along with similar insulation upgrades as Tier 3.

Average emissions savings estimates for MURB retrofits for each of these tiers are shown in Figure 4.

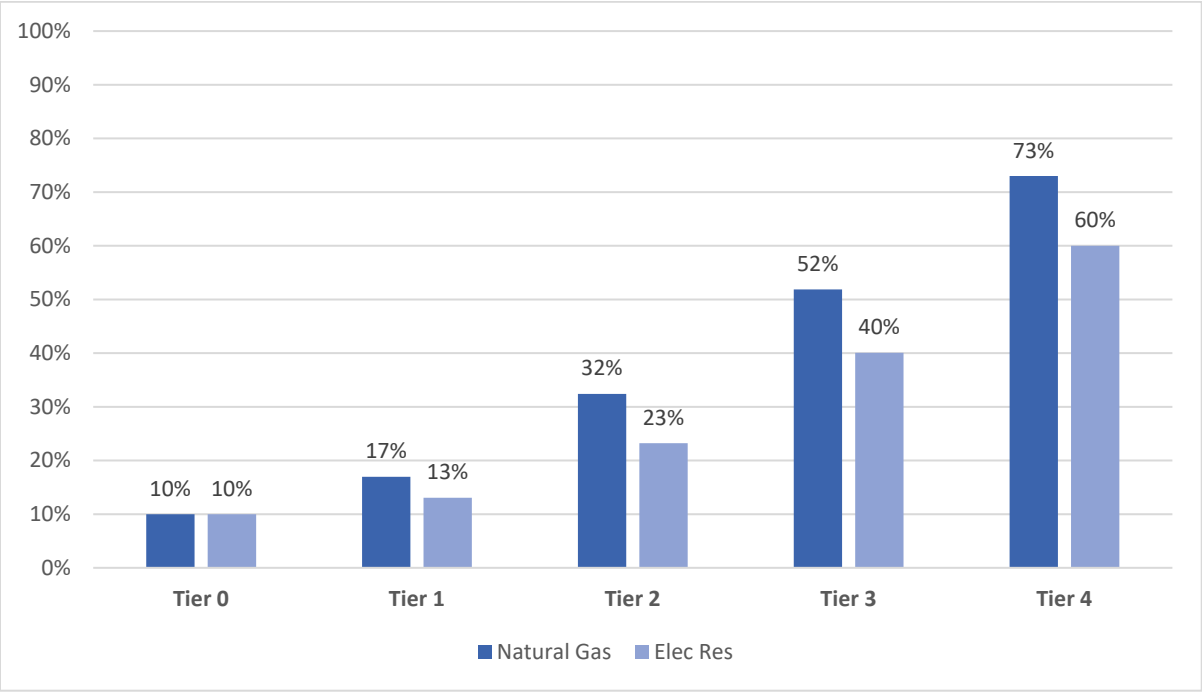

Figure 4: Potential GHG savings in MURB retrofits, British Columbia Climate Zone 4C

2.3. Housing Stock Analysis

A review of the BC Assessment housing data for the region was conducted to identify the floor area of homes by decade and jurisdiction (see Figures 5 and 6 for single family homes, and Figures 7 and 8 for Part 3 Multifamily buildings). This analysis revealed that most homes in the capital region are smaller, single-family homes, and 63% of all residential dwellings and 68% of all residential floor area is represented by Part 9 buildings. These 101,535 homes in the dataset comprise single-family detached homes, townhouses, strata townhouses, duplexes, triplexes, and fourplexes.[8]

The remaining residential floor area is represented by strata multifamily buildings and purpose-built rental multifamily buildings. Stratified condominium buildings (strata) represent 63% of the Part 3 floor area and 20% of the overall residential floor area, while purpose-built rental represents 37% of the Part 3 buildings and 12% of overall residential floor area. The bulk of the Part 3 stock is found in the City of Victoria, home to 49% of all multifamily units, and 61% of the purpose-built rental

[8] As BC Assessment does not account specifically for First Nations homes, they are not represented in this analysis

multifamily units in the Capital Region. Esquimalt, Langford, Saanich, and Sidney are home to 86% of the total multifamily housing stock in the Capital region.[9] *A summary breakdown of all home types across the capital region is shown in Table 1*.

Table 1: Breakdown of home type across the capital region

Typology	Units/ Homes	Buildings	Gross Floor Area (ft^2)	% of Units/Homes	% Buildings	% GFA
Single Family Houses (including suites)	110,034	92,085	133,454,861	56.9%	90.7%	63.9%
Duplex, Triplex, and Fourplex	12,786	6,074	8,523,298	6.6%	6.0%	4.1%
Strata MURB	40,674	2,200	41,954,968	21.1%	2.2%	20.1%
Rental MURB	29,730	1,187	24,772,510	15.4%	1.2%	11.9%
Total Residential	193,224	101,546	208,705,637	100.0%	100.0%	100.0%

[9] Purpose-built rental multifamily floor area and unit counts are both partial estimates. As 75% of the multifamily rental buildings in the BC Assessment dataset have no listed floor area, floor area was estimated based on the number of units. Conversely, as 40% of the buildings with a listed gross floor area had no unit counts, unit counts for those properties were estimated based on the floor area. Both sets of estimates used the ENERGY STAR assumption of 1.2 units per 1,000 ft^2. An additional 272 multifamily properties had neither floor area nor unit counts; these buildings were excluded from the sample entirely.

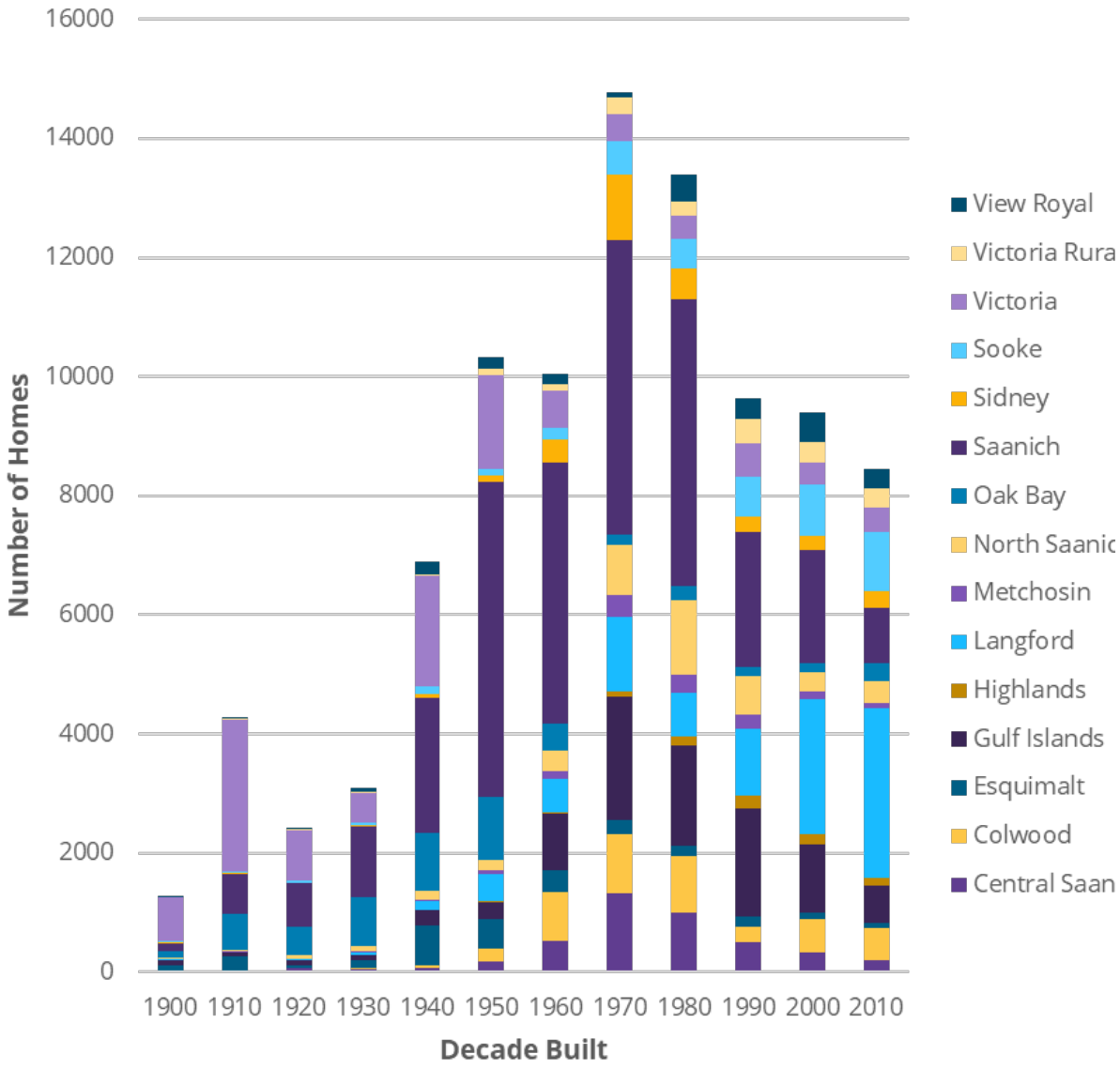

Figure 5: Number of homes in the capital region by decade built and jurisdiction (Victoria Rural here refers to the unincorporated Juan de Fuca Electoral Area)

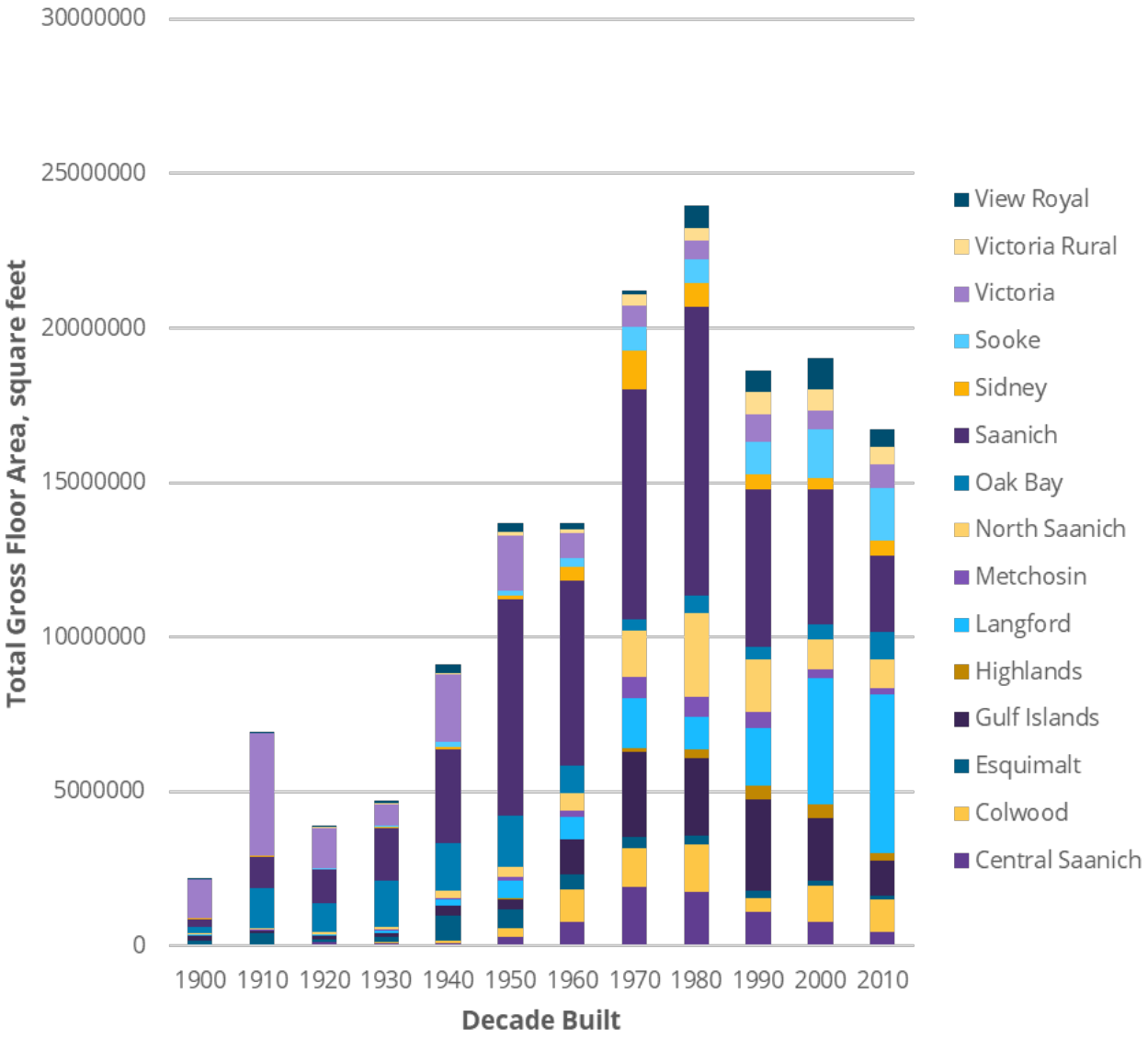

Figure 6: Total floor area of homes in the capital region by decade and jurisdiction (Note: Victoria Rural here refers to the unincorporated Juan de Fuca Electoral Area)

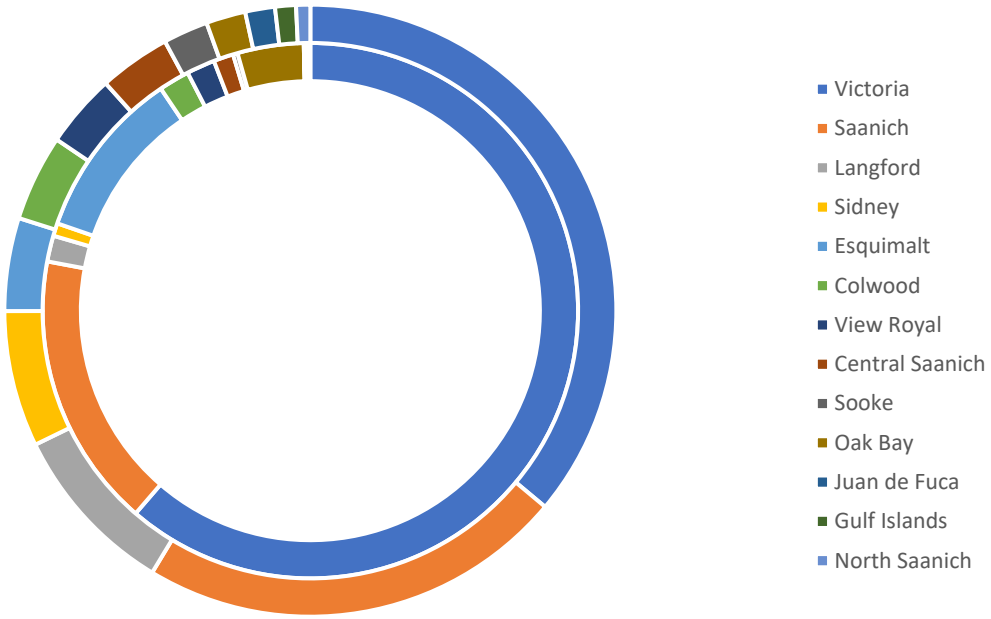

Figure 7: Breakdown of strata-owned MURB (outer ring) and purpose-built rental MURB (inner ring) floor area by jurisdiction

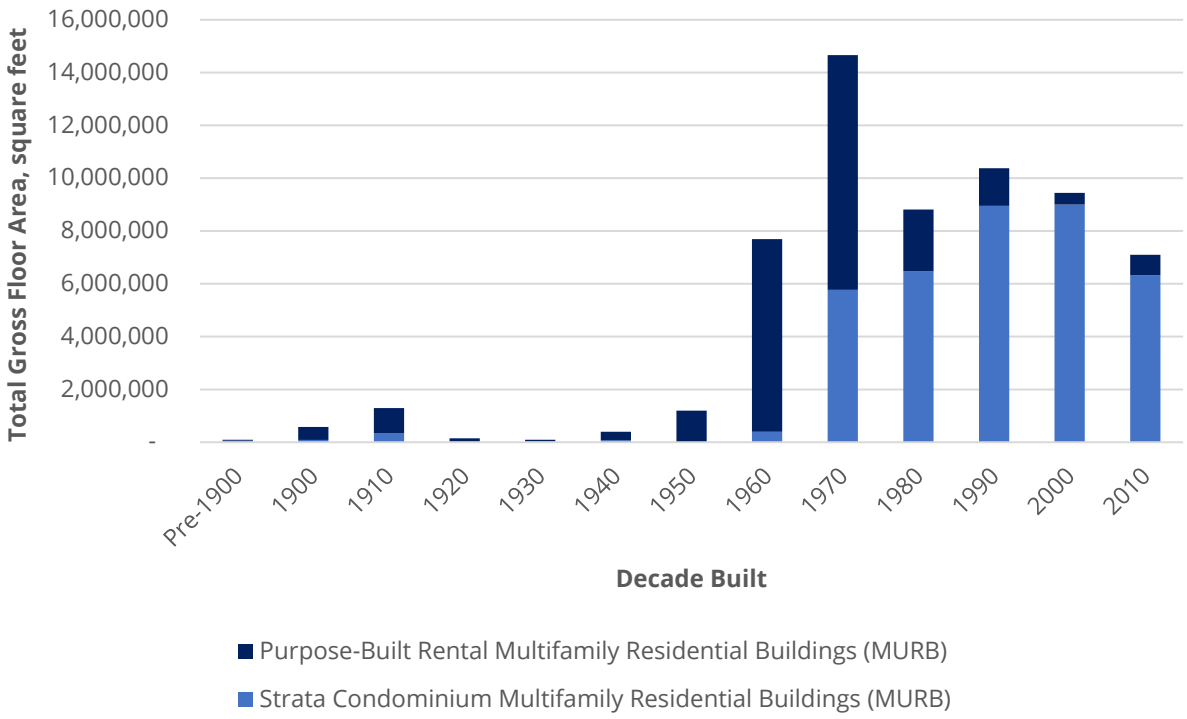

Figure 8: Distribution of Strata and Purpose-Built Rental MURB floor area by decade built in the capital region.

Survey data of 10,000 homes in the capital region was also used to assess heating fuel type distribution. This data shows that natural gas use is also increasing across the capital region, as the rate of gas hookups has gone up five-fold over the last decade (see Table 2and Figure 9). This is an issue of particular concern for a residential retrofit program, as natural gas represents an emissions-intense source of energy.

Table 2: Primary heating fuel breakdown among single family homes in each jurisdiction (Note: some rows do not add up to 100% due to rounding)

Jurisdiction	Electric	Gas	Oil	Propane	Wood
Colwood	39%	42%	6%	3%	9%
Central Saanich	42%	36%	5%	6%	12%
Esquimalt	41%	35%	10%	2%	11%
Gulf Islands	38%	1%	2%	12%	46%
Highlands	44%	24%	2%	11%	19%
Langford	58%	33%	3%	2%	4%
Metchosin	27%	12%	17%	11%	33%
North Saanich	58%	16%	5%	12%	9%
Sidney	42%	46%	3%	2%	7%
Oak Bay	34%	46%	12%	1%	7%
Saanich	42%	34%	12%	3%	10%
Sooke	45%	28%	2%	10%	16%
Victoria	42%	41%	8%	2%	7%
View Royal	46%	44%	2%	3%	4%

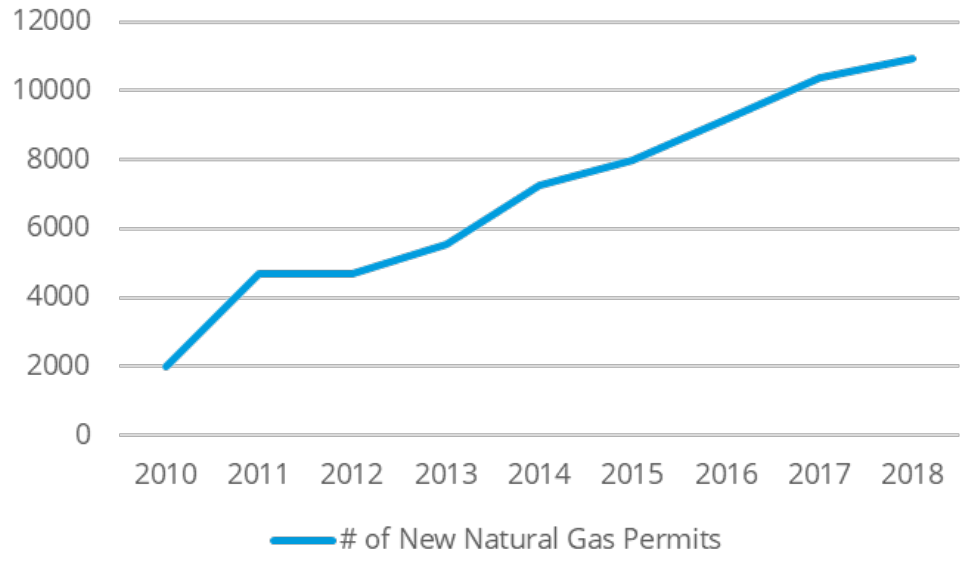

Figure 9: New natural gas connections in the capital region, 2010-2018

2.4. Emissions Reduction Potential Across the Capital Region

Part 9

To model the potential emissions savings from a residential retrofit program, a number of steps were taken. First, home age and the heating fuel survey results were used to assign an assumed heating fuel to each home in region's BC Assessment dataset. Each home was then assigned a pre- and post-retrofit energy use and emissions profile, based on the home's size, age, and assumed heating type, which resulted in 890 possible combinations of heating fuel type, decade built, and jurisdiction. Using EnerGuide data, a pre- and post-retrofit energy use intensity (EUI) and greenhouse gas emissions intensity (GHGI) was calculated for each of the combinations of decade built and primary pre-retrofit heating fuel. Average post-retrofit EUI and GHGI values were also calculated for homes that switched from any heating fuel to electricity. These two sets of EnerGuide-derived EUI and GHGI values were then mapped to homes in the region.

This process allowed for an estimate the pre-retrofit emissions for all homes in the capital region, by jurisdiction, and estimate hypothetical post-retrofit emissions if all homes were to be retrofitted. Estimated pre-retrofit emissions cannot be directly compared to the CRD GHG inventory, due to inconsistencies in the assignment of energy use to sectors of the building stock and the specific emission factors. However, calculated emissions roughly align with the current CRD inventory for residential emissions, which validates the overall approach. Post-retrofit estimates were calculated for two scenarios. Under the "standard" scenario, all homes receive retrofits that achieve the average savings for homes of their age and heating type (with 25% switching to lower emissions heating fuels, in line with historical rates). Under the second scenario, all homes are assumed to switch to high-efficiency electric heating (i.e., heat pump); see Table 3.[10]

Table 3: Potential GHG savings, assuming all Part 9 homes in the capital region are retrofitted

Single Family Scenario	Total GHG (tCO_2e)	Savings Estimate (tCO_2e) vs Calculated Baseline	Average GHG Savings per home	% GHG Savings in Single Family Sector	*Savings as % of CRD 2018 Emissions*
Baseline Calculated Emissions	375,918				
Scenario 1: Post-retrofit with standard approach	248,932	126,986	1.35	**34%**	*7%*
Scenario 2: Post-retrofit with electric heat pump fuel switch	131,498	244,420	2.60	**65%**	*15%*

The variation across jurisdictions as shown in Figure 9 and Figure 10 below is due to the differences in the age of homes, the predominant heating fuels, and the number of homes. Most jurisdictions

[10] As these calculations use the latest 2021 BC Hydro emissions factor of 40.1 tCO_2e/GWh, the comparison with the CRD's 2018 emissions inventory (see Figure 1) is not exact, but gives a general sense of the scale of the potential impact.

will see emissions reductions in the single-family sector of between 30% and 40% in the standard retrofit scenario, and 55% and 70% in the electrification fuel switch scenario. Langford and Sooke are outliers due to the age of their housing stock; new homes see lower emissions savings, and in both jurisdictions, the majority of homes were built in the last 30 years. The unincorporated areas of Juan de Fuca and the Gulf Islands also have lower savings, as a higher proportion of the existing homes in those areas already use a biomass fuel and so see lower emissions savings from retrofits.

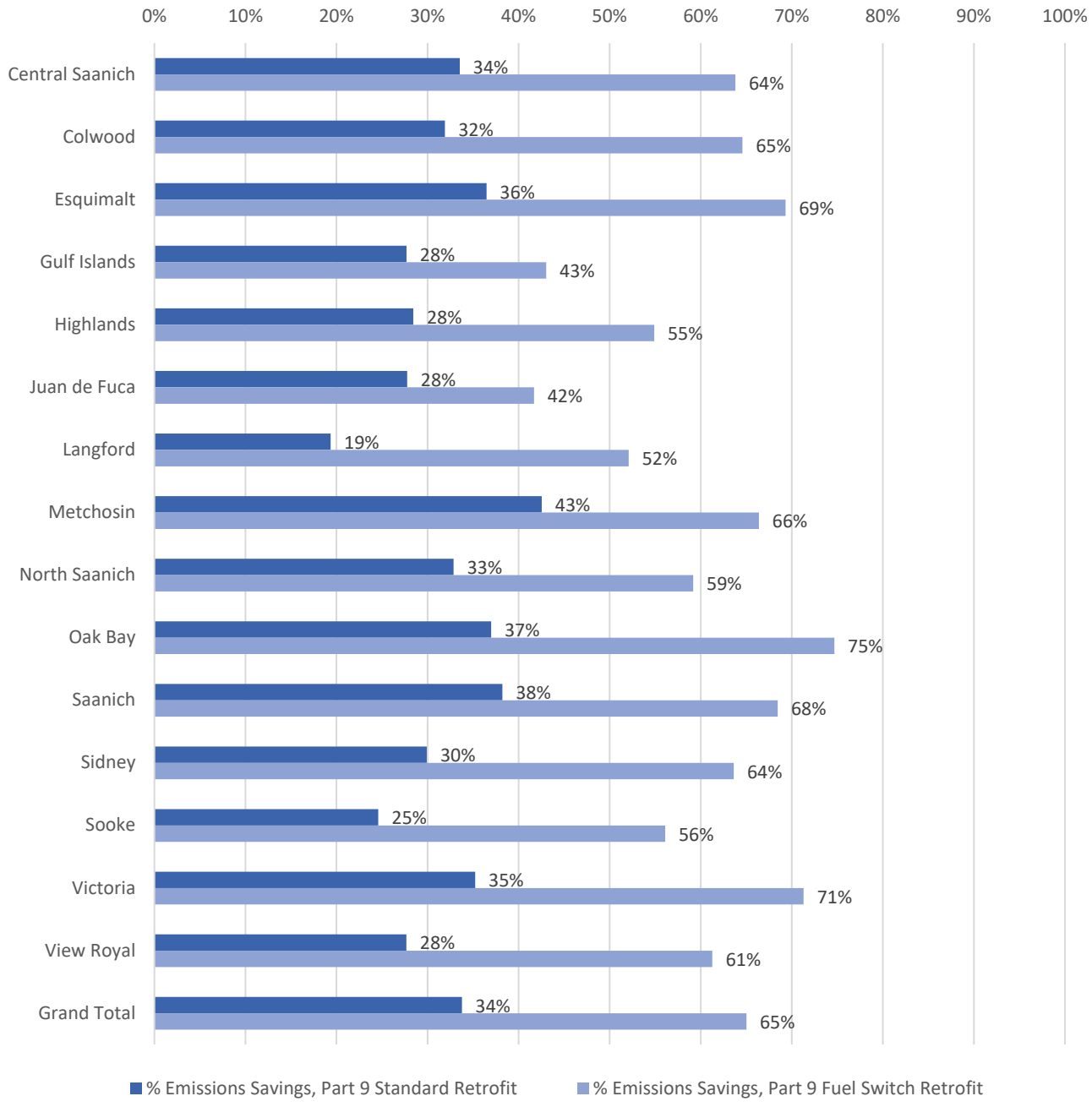

Figure 10: GHG savings potential in Part 9 homes by jurisdiction, percentage

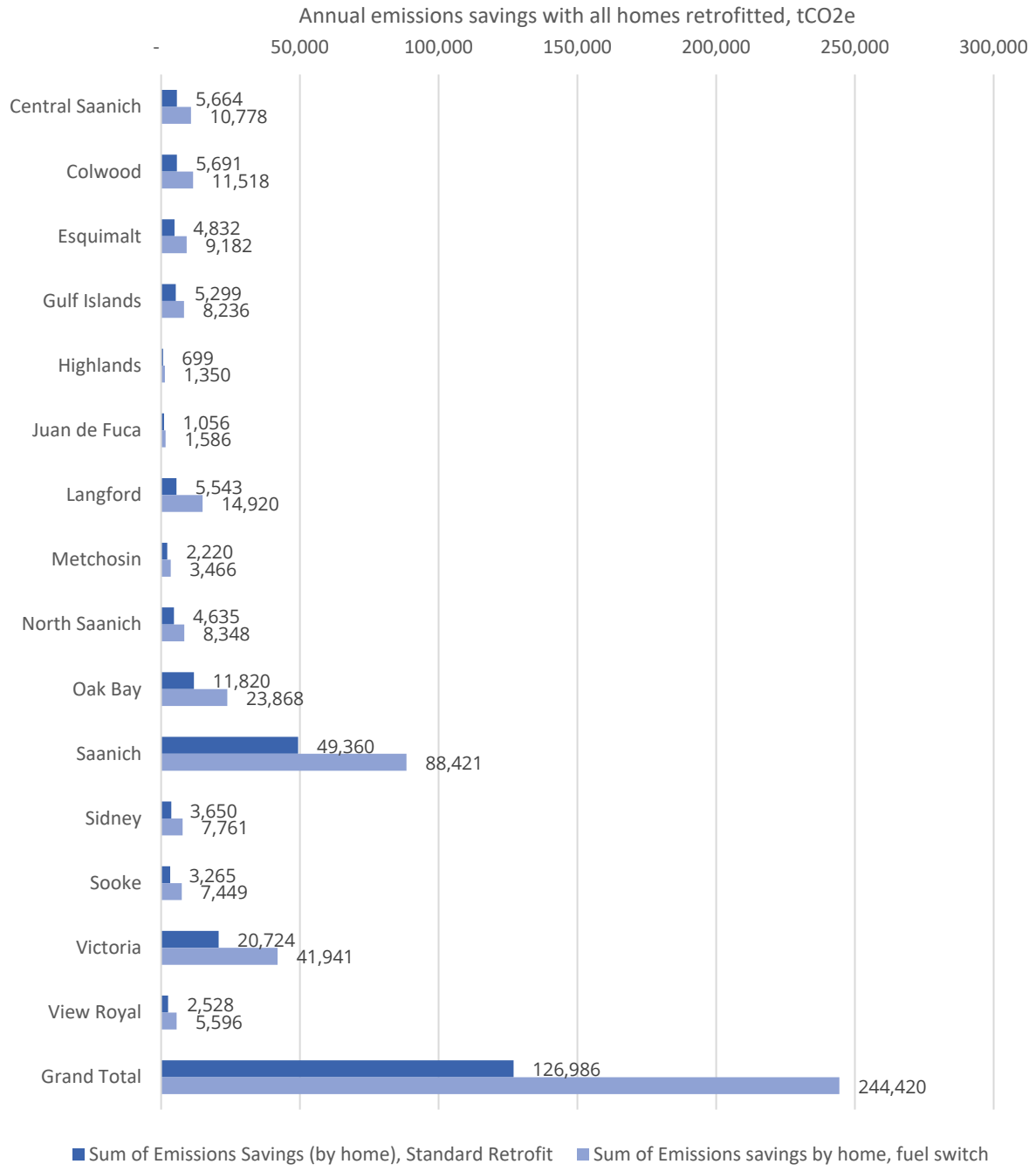

Figure 11: Emissions savings potential in Part 9 homes by jurisdiction, annual avoided tco_2e

Part 3

To model the potential emissions savings from a program targeting Part 3 strata and purpose-built rental homes, data from the Climate Action Secretariat and NRCAN's *Comprehensive Energy Use Database* (CEUD) was used to estimate the division of the multifamily housing stock in the capital region. These estimates were created using five scenarios of space heating energy source and domestic hot water energy source (see Figure 12), each of which have different associated baseline EUIs and GHGIs. Due to lack of localized survey data on heating fuels or achieved emissions reductions for Part 3 MURB in the capital region, Part 3 GHG estimates are higher level than Part 9 estimates described above.

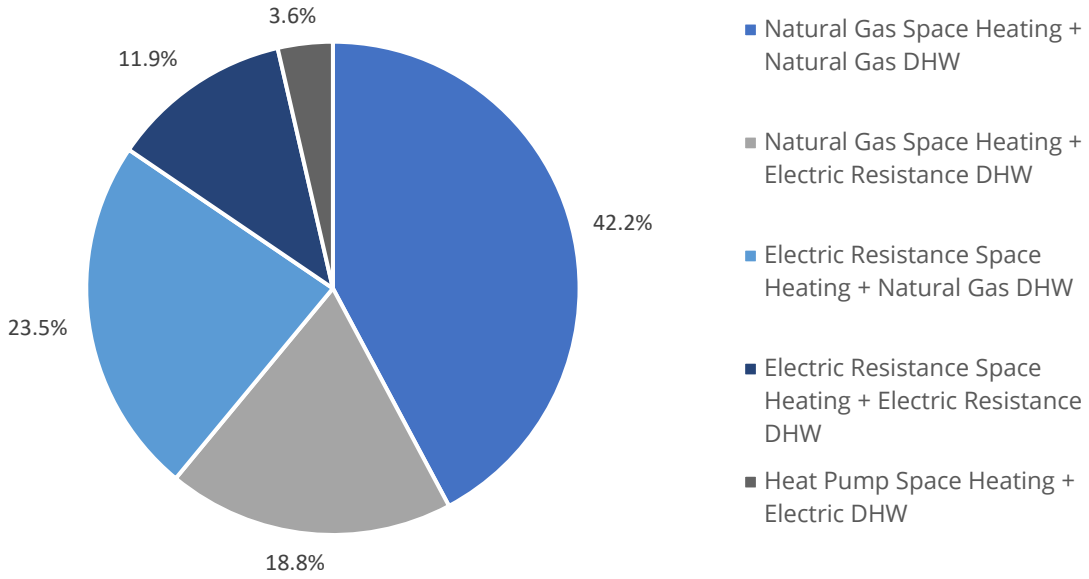

Figure 12: MURB heating sources in British Columbia Climate Zone 4A

EUI, total energy use, and total GHG emissions were then calculated for the estimated MURB floor area for each heating configuration and jurisdiction. GHG savings for the five tiers of MURB retrofits (which also differ by heating configuration) were then calculated and totaled, as shown in Table 4.

Of these five tiers, the Tier 2 "Standard Retrofit" is the closest MURB approximation of the EnerGuide "standard retrofit" shown above, while the Tier 4 fuel switch retrofit is a heat pump-based fuel switch and electrification retrofit. Overall, the potential savings represent approximately one quarter of the estimated savings from the single-family home sector, but remain significant. Savings are broken out between rental and strata buildings; however, as there is insufficient data on the differences in heating types between rental and strata-owned MURB, this is based solely on floor area. As heating sources may vary between strata and rental buildings; the relative savings may also be different. Figure 13 shows the distribution of savings by jurisdiction, which primarily reflects the distribution of MURB floor area across the capital region.

Table 4: Estimated potential energy and GHG savings for Part 3 residential buildings

Scenario	Total GHG Estimates for Part 3 MURB (tCO2e)	Savings Estimate (tCO_2e) for Part 3 MURB	Savings Estimate (tCO_2e) for Strata MURB	Savings Estimate (tCO_2e) for Rental MURB	% GHG Savings in Multifamily Sector	*Savings as % of CRD 2018 Emissions*[11]
Baseline Calculated Emissions	103,740					
Tier 0: Retrocomissioning	93,366	10,374	6,523	3,851	**10%**	*0.6%*
Tier 1: Basic Renewal	87,325	16,415	10,321	6,094	**16%**	*1.0%*
Tier 2: Standard Retrofit	72,888	30,852	19,398	11,454	**30%**	*1.8%*
Tier 3: "Comprehensive" Retrofit	53,505	50,235	31,585	18,650	**48%**	*3.0%*
Tier 4: Fuel Switch Retrofit	32,360	71,380	44,880	26,500	**69%**	*4.2%*

[11] Calculated emissions use the latest 2021 GHGI figures for BC Hydro, which diverges from the assumptions used in the 2018 CRD GHG Inventory, Therefore, the comparison of estimated savings to the region-wide inventory is provided to give a sense of relative scale but does not represent an apples-to-apples comparison.

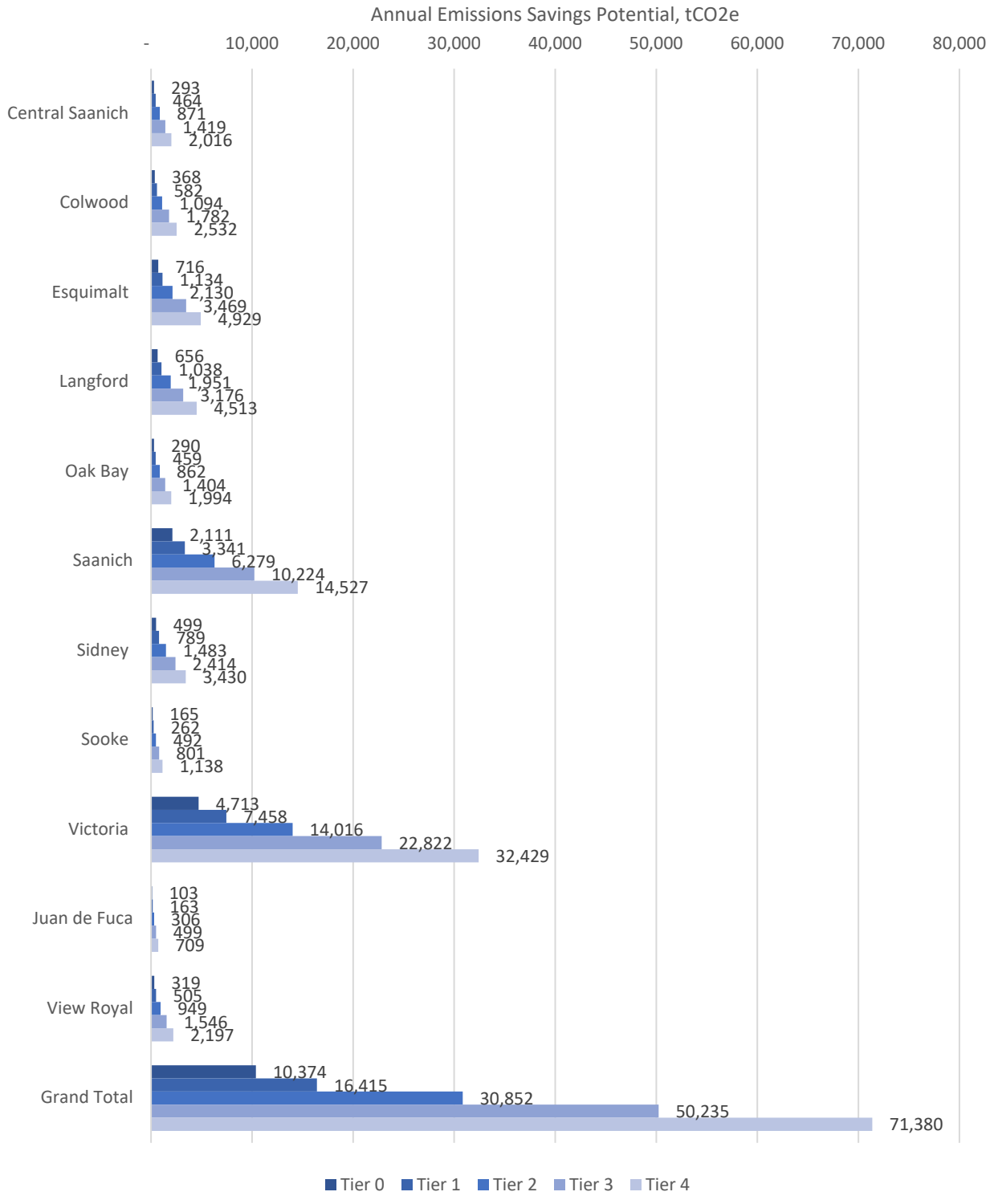

Figure 13: Emissions savings potential at varying Retrofit Tiers in Part 3 MURB by jurisdiction, annual avoided tCO_2e (Note: jurisdictions accounting for less than 1% of total potential emissions savings are not shown).

2.5. Key Takeaways

The analysis above reveals a number of key points of relevance to a potential energy retrofit program in the capital region:

- Overall, there is a large untapped potential for energy retrofits to help reduce emissions from existing homes in the capital region and support the achievement of the CRD's climate targets. Retrofitting every home in the region could achieve a 7% to 15% reduction in region wide GHG emissions relative to current levels, a significant contribution to its goal of reducing emissions by 61% by 2038. The upper end of this range can be captured by ensuring that most retrofits involve electrification (i.e., a switch to a heat pump).
- Part 9 homes represent the most significant opportunity for emissions reductions, while Part 3 residential dwellings make up a much smaller proportion of total homes in the region.
- There is significant emissions reduction potential from fuel switching from high emitting heating sources such as oil, natural gas, and propane towards electric heating.
- Older construction homes and homes using fuel oil are best to target for a residential retrofit program, as they have the highest average GHG emissions and the highest emission reduction potential. However, given the increasing growth of natural gas, retrofitting homes from natural gas to electricity will also be an important program focus.

Targeting homes that are 15 to 25 years old and using natural gas or another fossil fuel are a potential program target, as they will be coming up on their first heating system replacement and will have sufficient insulation to make a switch to a heat pump more cost-effective (in general, residential heating systems have a lifespan of 15 years, though many are used beyond that lifespan).

3. THE EXISTING PROGRAM LANDSCAPE

Prior to developing its own program, it is important for the CRD to explore the existing program landscape to ensure complementarity and avoid duplication or potentially confusing the market. Several programs are already on offer in the Canadian and BC context that have begun to address some of the barriers associated with deep emissions retrofits in the residential sector. However, many still remain, leaving a need and an opportunity for the CRD to go further in supporting homeowners in completing retrofit projects. The success of a residential retrofit program for the CRD will be contingent on its ability to leverage and fit into this existing program landscape, and fill any remaining gaps, while staying within its legal authority and an acceptable budget. The key programs that are either currently offered or have been signalled as forthcoming are summarized briefly below.

3.1. Utility Programs

Part 9

The province's two main utilities, FortisBC and BC Hydro, offer a number of incentives and rebates that support homeowners in reducing the costs of home energy upgrades. Rebates ranging from $100 to $2000 are currently offered for the following upgrades:

- Electrical heating systems to heat pumps
- Furnace upgrades
- Water heater upgrades to high efficiency natural gas heaters
- Window and door upgrades
- Insulation upgrades
- Secondary space heating
- Appliances

Many capital region municipalities also offer top-ups for specific rebate programs, ranging from $350 to $2000. However, it should be noted that a number of these top-ups are currently fully subscribed and are therefore no longer available (e.g., District of Central Saanich, District of North Saanich, Township of Esquimalt, CRD).

Part 3

Utility incentives are also available for improving the performance of multi-unit residential buildings (Part 3). Rebates range from $1,000 - $45,000, and are currently offered for:

- Natural gas furnace and boiler upgrades
- Water heater upgrades to high-efficiency natural gas heaters
- HVAC controls
- Window and door upgrades
- Insulation upgrades
- Secondary space heating
- Lighting upgrades
- Appliances

While many incentives exist for broad upgrade measures that improve the overall efficiency of both Part 9 and Part 3 homes, those that encourage natural gas upgrades are currently incentivizing more emission-intensive choices, making it more challenging for homeowners to make lower-carbon choices.

3.2. CleanBC Better Homes and Buildings

Part 9

CleanBC Better Homes is an online platform funded by the Province of BC and the Government of Canada. The platform provides online resources and support for homeowners and businesses interested in reducing energy use and greenhouse gas emissions from new and existing buildings. CleanBC sponsors a number of rebates, ranging from $100-$3000. This includes the CleanBC Heat Pump *Group Purchase Rebate* (GPR). The GPR rewards groups of homeowners who join together and complete a fuel switch upgrade to an electric air source heat pump. The larger the group, the higher the rebate, ranging from $200 per participant (2-4 homes) to $500 per participant (20-30 homes).

Another notable aspect of the program is the offer of free energy coaching services, provided by trained energy efficiency specialists via email or phone. This service is available at all stages of an energy improvement project. Energy coaches provide information and advice on energy efficiency upgrades and rebates, with translated services are also available in Cantonese, Mandarin, Punjabi and Farsi. It should be noted, however, that this service is "fuel neutral", in that upgrades and rebates for fossil fuel equipment (e.g., natural gas boilers) are available and may be recommended. In addition to the energy coaching service, the following are also available via the Better Homes program:

- Educational materials on types of energy efficiency upgrades available and the interaction of upgrades with the 'House As a System' approach
- Details of the EnerGuide Home Evaluation process, benefits and eligibility
- Energy advisor search tool filtered by upgrade type and area
- Information on the CleanBC Better Homes and Home Renovation Rebate Program
- User-friendly rebate search tool
- Explanation of program requirements and sample contractor invoices
- Help finding a suitable contractor through the Program Registered Contractors list. The database allows the homeowner to filter contractors by location and type of upgrade
- Online application tool to help homeowners and businesses apply for rebates

The Province of BC is also currently considering an income-qualified home retrofit program intended to provide high-value incentives to low- and moderate-income households for a range of space heating, building envelope, ventilation and health and safety measures. While qualification criteria are currently under development, the projected value of retrofits are expected to cover up to 80-90% of costs for low-income households, and 70-80% of costs for moderate-income households. The program is expected to launch in late summer or early fall 2021, and will offer support services tied to the receipt of specific rebates, providing significant cost reduction opportunities for homeowners across the board. The focus of this program on either energy efficiency and/or emissions reductions (and therefore on fuel switching) is currently unknown.

Part 3

CleanBC provides three custom programs focused on electrification of larger residential and commercial buildings. The *Custom*, *Custom-Lite*, and *Commercial Express* programs allocate incentives based on carbon savings, and the CleanBC Small Building Energy Coach program provides support for smaller buildings in accessing these incentives.

- ***The Custom Program*** supports up to 50% of an energy study's cost, up to a maximum of $20,000. based on a rate of $40/tCO2e of lifetime greenhouse gas savings, BC Hydro will support up to $200,000 per customer. For heat pump rooftop units, the Program offers a rate of $60/tCO2e.
- ***The Custom Lite Program*** provides $60/tCO2e of lifetime GHG savings for heat pump rooftop units up to a maximum of $72,000 and $40/tCO2e of lifetime GHG savings for all other qualifying measures up to maximum $48,000 incentive per customer.
- ***The Commercial Express Program*** offers capital incentives up to a maximum of $100,000 per project. Incentives are based on various factors specific to your building, including building: type, age, location, square footage, hours of operation, and the type of equipment being considered.
- ***The CleanBC Small Building Energy Coach*** program currently offers free energy coaching services to assist building owners and operators reduce GHGs through fuel-switching and other electrification measures and take advantage of CleanBC's *Commercial Express* and *Custom Lite* programs.

3.3. Natural Resources Canada

Part 9

The Canadian federal government committed to supporting home and building retrofits in the Pan-Canadian Framework on Clean Growth and Climate Change, which outlined the following commitments:

- Developing a model code for existing buildings by 2022 to be adopted by the provinces and territories
- Requiring benchmarking and labelling of building energy use
- Setting new standards for heating equipment and other key technologies to the highest level of efficiency that is economically and technically achievable, and
- Supporting the continuation and expansion of provincial and territorial efforts to retrofit existing buildings

Since then, the federal government has committed to supporting homeowners in retrofitting their homes via an allocation of $2.6 billion to Natural Resources Canada to supply:

- Canada Greener Homes Grant
    - Up to $5,000 per home in energy efficiency grants
    - $1 million for free EnerGuide assessments ($600 per home)
- Up to $40,000 in interest-free loans, and
- $10 million for EnerGuide Energy Advisor training

Part 3

The Federal Government has committed to investing $2 billion in low-interest financing for energy efficient buildings through the Canada Infrastructure Bank (CIB) Building Retrofit Initiative. The initiative provides funding for large projects with a minimum requirement of $25 million. Two types of project applicants are eligible:

1. Building owners may apply for financing to retrofit one or more of their buildings
2. Third-party retrofit aggregators, including:
    - Existing Energy Service Companies (ESCO) that form a dedicated Special Purpose Vehicle (SPV) to originate and develop retrofit projects
    - Super ESCO models that are SPVs functioning as an intermediary between building owners and multiple ESCO providers
    - New entrants to the energy services market that are working on buildings or investing in retrofit projects
    - Commercial PACE (C-PACE) program administrators

3.4. Bring It Home for the Climate

The *Bring It Home 4 the Climate* program (BIH4C) program is designed to support and engage homeowners in the capital region by addressing barriers to retrofit uptake. The program forms a component of the Transition 2050 *Residential Retrofit Acceleration project* developed by the CRD and City Green Solutions.

To encourage progress towards deep energy and emission retrofits, the program subsidizes EnerGuide energy assessments and provides free materials for shallow retrofits. BIH4C focuses on building community champions and rewarding those who participate to raise awareness and motivate others in the community to explore energy efficiency upgrades. The program includes the offering of a free Virtual Home Energy Check Up (VHEC), which involves an online survey followed by a video call with an energy expert to explore next steps. The BIH4C administrative team is also available to support participants in registering for a subsidized Pre-Upgrade EnerGuide Home Evaluation. A unique element of the program is the seasoned EnerGuide evaluators who operate as program "Energy Experts" available to support homeowners on a wide range of topics related to the retrofit process including accessing rebates. Advice is additionally geared towards supporting low-carbon retrofits, in light of the program's focus on climate change and emissions reductions The BIH4C program is funded to the end of 2021.

3.5. SEA Change – Strata Energy Advisor Program

The *Strata Energy Advisor* pilot program was launched in May 2018 in Metro Vancouver to address the unique barriers strata councils face in retrofitting common space. The program provided strata councils, property managers and strata members free assessments and advice on measures to reduce energy and carbon. Through the initial pilot, 38 buildings completed retrofits resulting in 2,265 tonnes of GHG reductions. Metro Vancouver and UBC are currently exploring opportunities to expand the program provincially.

3.6. Federation of Canadian Municipalities (FCM)

The Federation of Canadian Municipalities (FCM) supports local governments in implementing sustainability practices through the Green Municipal Fund. This program provides funding streams, resources and training to help municipalities deliver their sustainability initiatives. CRD's Residential Energy Retrofit Program Business Case study is supported by FCM's *Community Efficiency Financing*

(CEF) funding stream, as part of a larger program design study in partnership with the City of Victoria and District of Saanich.

The CRD's previous feasibility work in this area identified third-party lending as the preferred financing model to integrate into a residential energy retrofit program. However, the scope and design of the program will remain flexible given the changing financing landscape in the province and country. The CEF funding stream has also made capital funding available to implement municipal retrofit programs. The CRD will have the opportunity to apply to the CEF capital funding stream to support the cost of the programing suggested below.

4. PROPOSED PROGRAM DESIGN

4.1. A Proposed Program Model for the CRD

While the programs noted above have begun to address some of the barriers to deep emissions retrofits in the residential sector, many still remain. Among those that are most under the purview and interest of the CRD are awareness and complexity barriers that limit homeowners' interest in completing retrofits, both as a result of limited understanding and valuation of retrofits, as well as the inconvenience they pose. Moreover, many of the programs offered at federal, provincial and utility scales have shifted considerably over time, changing their offerings, eligibility criteria, application processes, and even branding. As such, there is still considerable value in a consistently offered, CRD-led program that better supports homeowners in understanding and navigating the home retrofit process, especially in a way that meets the CRD's emissions reduction targets.

Overall, an appropriate model for a CRD-led retrofit program is one that will best support and achieve energy and emissions reductions in CRD's residential sector, while leveraging/planning for the support at federal and provincial levels noted in the section above. However, there are several additional program details to consider, including notably the model of program support that the CRD can offer. A review of precedent programs in other jurisdictions (see Appendix A) reveals several potential models, ownership types, and revenue sources.

Among these, **One Stop Shops (OSS)** have been widely adopted and are worth more exploration. OSS are integrated home retrofit services that are designed to eliminate well known barriers to energy efficiency renovations. They provide a turnkey service to homeowners, simplify communications and knowledge sharing, and at their best place a trained independent third-party energy advisor at the side of the homeowner to support the complex decisions clients must make regarding interrelated retrofit measure installation, evaluation of quotes, and contractor selection.

In Europe, OSS retrofit facilitation programs are considered a best practice and have expanded beyond low-income programs and are available in many jurisdictions to all homeowners regardless of family income. For example, almost 4 million homes had been retrofitted under the German OSS *Effizienzhaus* program by 2019. The first such service in Canada was designed and piloted by Windfall Ecology Centre with several indigenous communities beginning in 2006. Today, OSS are a common approach to delivering turnkey home weatherisation programs to low-income families in North America.

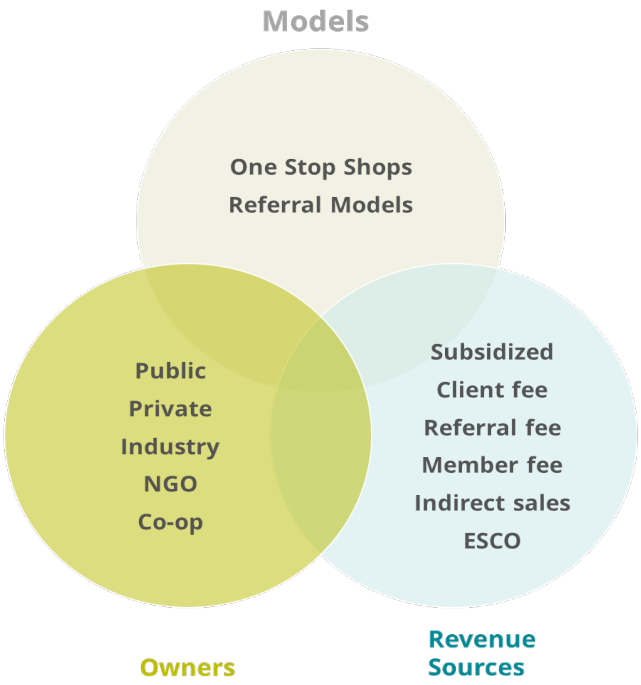

Figure 14: Different program models, ownership types and revenue sources contemplated for this study

Ontario's Winterproofing program is an example of a ratepayer funded OSS that provides free insulation and draft proofing upgrades to income qualified homeowners and renters. The entire upgrade process including pre and post audit, contractor selection, and project management is performed by third party service organizations.

4.2. Proposed Program Design

Based on existing program review, consultant team experience, and feedback from key stakeholders, a subsidized OSS model is recommended for the CRD based on its ability to:

- Build on existing program infrastructure, including current BIH4C program offerings, to simplify the retrofit process for homeowners
- Provide homeowners with enhanced retrofit coordinator support tailored according to their needs, and focused on supporting the decarbonization of existing homes at relatively low cost (when compared to more intensive support programs))
- Avoid the potential risk and liability issues associated with a direct program ownership model
- Better identify and target local market opportunities and help establish local contractor delivery networks, and
- Monitor performance through post retrofit follow-up.

Given the ongoing nature of the existing Energy Coach and BIH4C offerings, it is recommended that the CRD build on the success of these programs to provide additional wrap-around services for homeowners. While the current energy coach program is well-suited to those who are just getting started with a retrofit project, homeowners often need additional support once they are part way

through the process and have been provided baseline information about their building and retrofit options. A new CRD program could leverage the intake process through the Energy Coach program, while placing a concerted focus on fuel switching for emissions reductions as in BIH4C to ensure the benefits of home electrification are reaped.

The proposed program design for the CRD therefore assumes that a moderate level of support could be provided by a Retrofit Coordinator per household to add to existing services, specifically helping alleviate the challenges of navigating the retrofit process once initial support has been provided via the Energy Coach service. Specific services that are assumed will be provided by a Retrofit Coordinator are outlined in Table 5.

As the end goal of this program is not only to increase the number of home retrofits, but to increase the depth of those retrofits (i.e., achieve greater levels of energy efficiency) and promote fuel switching, extending the full level of support to all retrofits may not be appropriate. As a starting point, it is assumed that any customer will be able to access the initial steps of initial screening, and reviewing pre-upgrade EnerGuide audit results—but that fossil fuel-based equipment retrofits should be excluded from further program assistance.

Table 5: Proposed responsibilities of the Retrofit Coordinator

Step	Tasks
Screen	• Conduct (virtual) home energy check-up/screening
Review and Plan	• Review EnerGuide Renovation Upgrade Report • Assist client with upgrade choices • Consider DIY options and provide contractor selection advice and standardized quotation forms • Direct client to qualified contractor directory
Compare & Select	• Help homeowner scope work, compare contractor bids, ensure rebate eligibility, and provide troubleshooting throughout the process.
Finance	• Help identifying and selecting financing and incentives
Document	• Help getting documentation and assist with submitting rebate applications
Evaluate	• Quality Assurance checks post-retrofit (done in aggregate or spot-check) • Measurement & Verification

Given that the GHG savings potential in the Part 9 single-family sector in the capital region is five to six times that of the Part 3 sector, it is both recommended and assumed that an initial program will focus on targeting this sector. Providing a strong level of support for Part 9 homeowners will ensure that the CRD can move more swiftly and efficiently towards meeting its emissions reduction targets, while assisting the largest proportion of residents in the capital region with program support. Further reflections on a future expansion to Part 3 residential buildings are presented at the conclusion of this report.

4.3. Targeting Program Markets

Understanding specific home archetypes is essential to clarifying the market potential of a residential energy retrofit program and developing targeted marketing opportunities, but will also be necessary later on to help support the development of unique retrofit pathways, costing models, and to inform detailed program design. Once a program is up and running, Retrofit Coordinators and/or program application forms can query homeowners to quickly identify their home archetype, narrowing the potential retrofit pathway options available to the homeowner and thereby simplifying the homeowner support process.

To better inform the business case and future program design considerations, statistical cluster analysis techniques were therefore used to further break down the capital region's Part 9 housing sector into specific archetypes. Part 9 housing archetypes were derived from 13,177 pre-retrofit EnerGuide evaluation files, spanning from 2007 to present. Differences in floor area, year of house construction, number of storeys, primary fuel type, and house type were investigated to develop the individual clusters.

To compare differences between these six variables, a Gower distance metric was applied to create a matrix of partial dissimilarities across individuals ranging from 0 to 1, where 0 is most similar and 1 is most dissimilar. Gower distance was used over the K-means method, as it allows for clustering with a mix of numeric and qualitative variables. The optimal number of clusters was determined by running an analysis on groups ranging from 2-10 clusters. Silhouette coefficients ranging from –1 to 1 were then determined for each grouping, where groups nearest 1 show the highest degree of separation between clusters. From this analysis, an initial grouping of seven clusters was chosen, as the silhouette coefficient did not substantially increase with further increasing clusters.

Once the number of clusters was selected, the Gower distance matrix was run through a Partitioning Around Medoids (PAM) algorithm to partition the housing data into seven distinct clusters. The PAM algorithm was chosen over K-means because although it is more computationally intensive, it is more robust and less susceptible to outliers.

Following feedback from the client and Advisory Committee, homes built since 1990 and homes built before 1920 were split out into their own groups, creating nine archetypes in total. These post-process adjustments were needed as newer homes were underrepresented in the source data but represent almost a third of all homes in the capital region, while the oldest homes represent a particularly significant savings opportunity. Upon finding that two-story gas-fired homes built in the interwar period made up only 2% of homes in the capital region and had similar retrofit measures newer single-story gas homes, clusters 6 and 7 were combined into a single archetype.

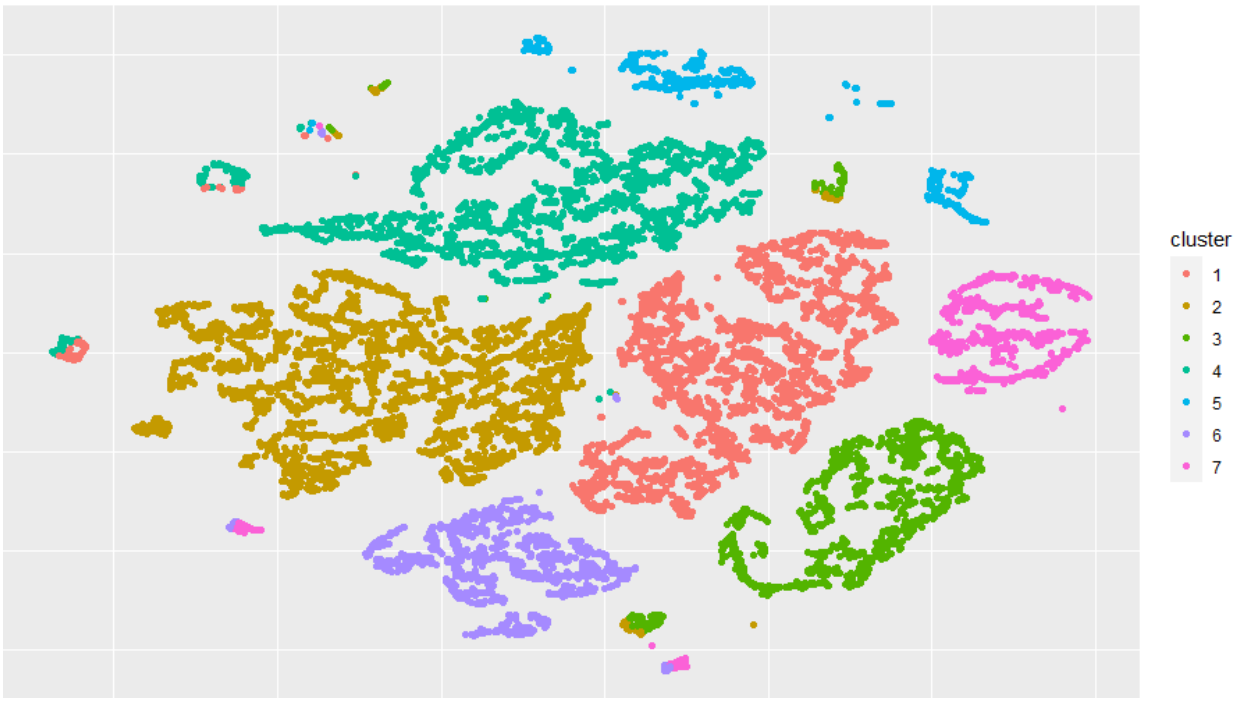

Figure 15: Initial seven clusters

Table 6 lists the defining attributes of each archetype, including common retrofit measures based on which retrofit elements showed up the most frequently in EnerGuide audits of homes in that archetype. Table 7 provides the percentage of EnerGuide audits for each archetype that included that measure, with the most common elements in bold.

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Table 6: Archetype characteristics

1	***Archetype Name***	**Single-Story Electric**
	% of Homes in the Region	23%
	Housing Type	Single Story Detached
	Heating Type(s)	Electric Heating, with some wood or propane
	Primarily Built In	1950s – 1970s
	Median Gross Floor Area	193 m^2
	GHG Intensity per home	1.42 tCO_2e/yr.
	Common Retrofit Measures	• Windows • Ceilings
2	***Archetype Name***	**Mid-Century Oil**
	Housing Type	Single Story Detached
	% of Homes in the Region	7%
	Heating Type(s)	Oil Heating, with some wood or propane
	Primarily Built In	1950s – 1960s
	Median Gross Floor Area	192 m^2
	GHG Intensity per home	8.51 tCO_2e/yr.
	Common Retrofit Measures	• Foundation • Windows • Heat Pumps • Fuel Switch
3	***Archetype Name***	**Interwar Oil**
	Housing Type	Two-Story Detached
	% of Homes in the Region	4%
	Heating Type(s)	Oil Heating
	Primarily Built In	1920s – 1940s
	Median Gross Floor Area	240 m^2
	GHG Intensity per home	11.64 tCO_2e/yr.
	Common Retrofit Measures	• Ceiling • Windows • Heat Pumps • Fuel Switch
4	***Archetype Name***	**Two-Story Electric**
	Housing Type	Two-Story Detached
	% of Homes in the Region	3%
	Heating Type(s)	Electric Heating
	Primarily Built In	1970s – 1980s
	Median Gross Floor Area	248 m^2
	GHG Intensity per home	1.69 tCO_2e/yr.
	Common Retrofit Measures	• Windows • Heat Pumps
5	***Archetype Name***	**Row Homes**
	Housing Type	Two-Story Row House
	% of Homes in the Region	6%
	Heating Type(s)	Predominantly Electric Heating (77%)

	Primarily Built In	1970s – 1980s
	Median Gross Floor Area	143 m^2
	GHG Intensity per home	2.26 tCO_2e/yr.
	Common Retrofit Measures	• Windows • Ceilings
6	***Archetype Name***	**Mid-Century Gas Homes**
	Housing Type	Predominately Single-Story Detached
	% of Homes in the Region	20%
	Heating Type(s)	Gas Heating
	Primarily Built In	1940s – 1970s
	Median Gross Floor Area	Single-Story: 195 m^2 Two-Story: 262 m^2
	GHG Intensity per home	Single-Story: 6.67 tCO_2e/yr. Two-Story: 9.09 tCO_2e/yr.
	Common Retrofit Measures	• Ceiling • Windows • Furnace • Water Heater
7	***Archetype Name***	**Newer Homes**
	Housing Type	Mix of One and Two Story Detached
	% of Homes in the Region	29%
	Heating Type(s)	Predominantly Electric Heating (80%) Gas Fireplaces Common
	Primarily Built In	Since 1990
	Median Gross Floor Area	267 m^2
	GHG Intensity per home	2.40 tCO_2e/yr.
	Common Retrofit Measures	• Heat Pumps
8	***Archetype Name***	**Older Homes**
	Housing Type	Predominantly Two Story Detached
	% of Homes in the Region	9%
	Heating Type(s)	Mix of Gas and Oil
	Primarily Built In	Before 1920
	Median Gross Floor Area	241 m^2
	GHG Intensity per home	10.65 tCO_2e/yr.
	Common Retrofit Measures	• Ceiling • Walls • Foundation • Windows • Fuel Switch

Table 7: Percent of homes in each archetype that undertook a given measure, as identified in the EnerGuide data

#	Name	Ceiling Insulation	Wall Insulation	Foundation Insulation	Windows	Fuel Switch	Furnace	Water Heater	Heat Pump
1	**Single-Story Electric**	41%	16%	19%	**52%**	2%	0%	5%	35%
2	**Mid-Century Oil**	35%	17%	**26%**	43%	**58%**	8%	7%	**48%**
3	**Interwar Oil**	35%	**24%**	22%	38%	**58%**	9%	8%	**47%**
4	**Two-Story Electric**	30%	12%	17%	**54%**	2%	0%	6%	37%
5	**Row Homes**	**48%**	19%	12%	48%	10%	2%	3%	15%
6	**Mid-Century Gas**	**45%**	**28%**	**28%**	**53%**	6%	**22%**	**15%**	14%
7	**Newer Homes**	16%	2%	9%	19%	7%	6%	12%	**60%**
8	**Older Homes**	**45%**	**44%**	31%	**40%**	32%	15%	12%	25%

4.4. Exploring Potential Homeowner Markets

In addition to specific home archetypes, program design must also consider the different needs and opportunities associated with different homeowner markets. Of particular importance is the potential impact of fuel switching on the cost of energy to the consumer, especially given the difference in costs between electricity and natural gas in BC. The impact of energy costs can be expressed as a measure of a region's energy poverty, defined as a condition in which a household is required to spend more than 6% (i.e., twice the national median of 3%) of after-tax income on energy. In the capital region, 14% of households have been found to experience an energy cost burden of 6% of greater. This is especially true in Juan De Fuca, Metchosin, and Sooke, where over 20% of households have high energy cost burdens (see Figure 16).[12] This issue is not unique to the capital region – nationwide, 17% of households in Canada's Census Metropolitan Areas (CMAs) experience high energy cost burden.[13] However, it is nevertheless an important consideration when designing energy and emissions reduction programs.

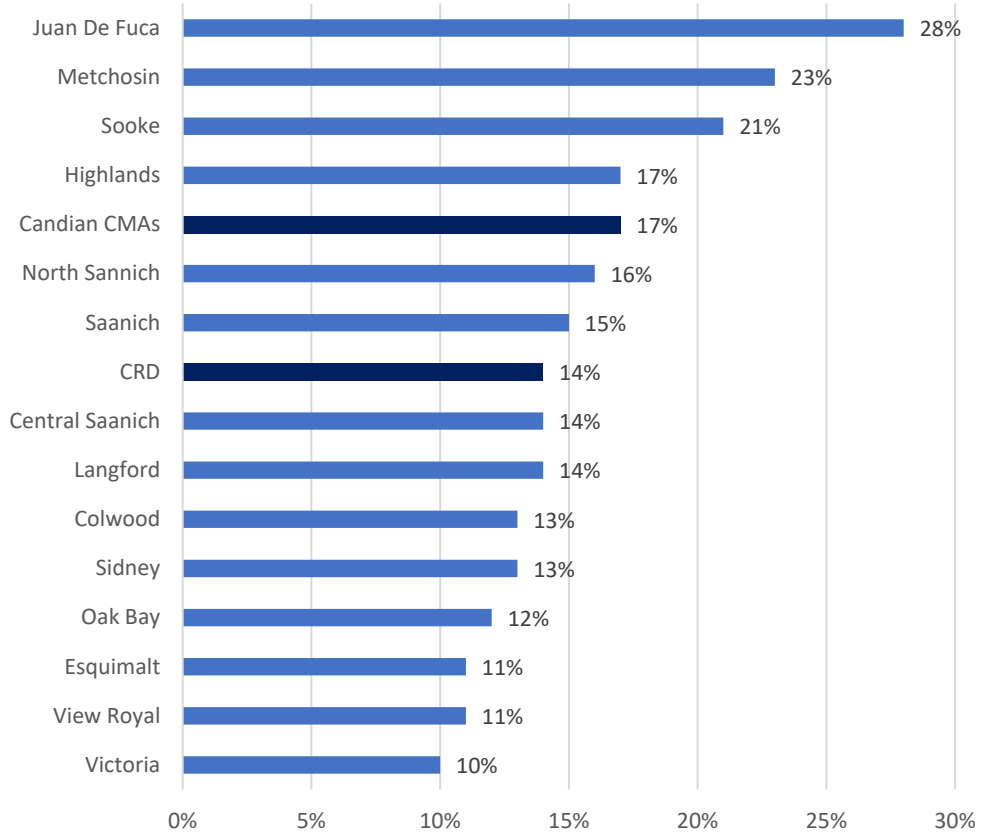
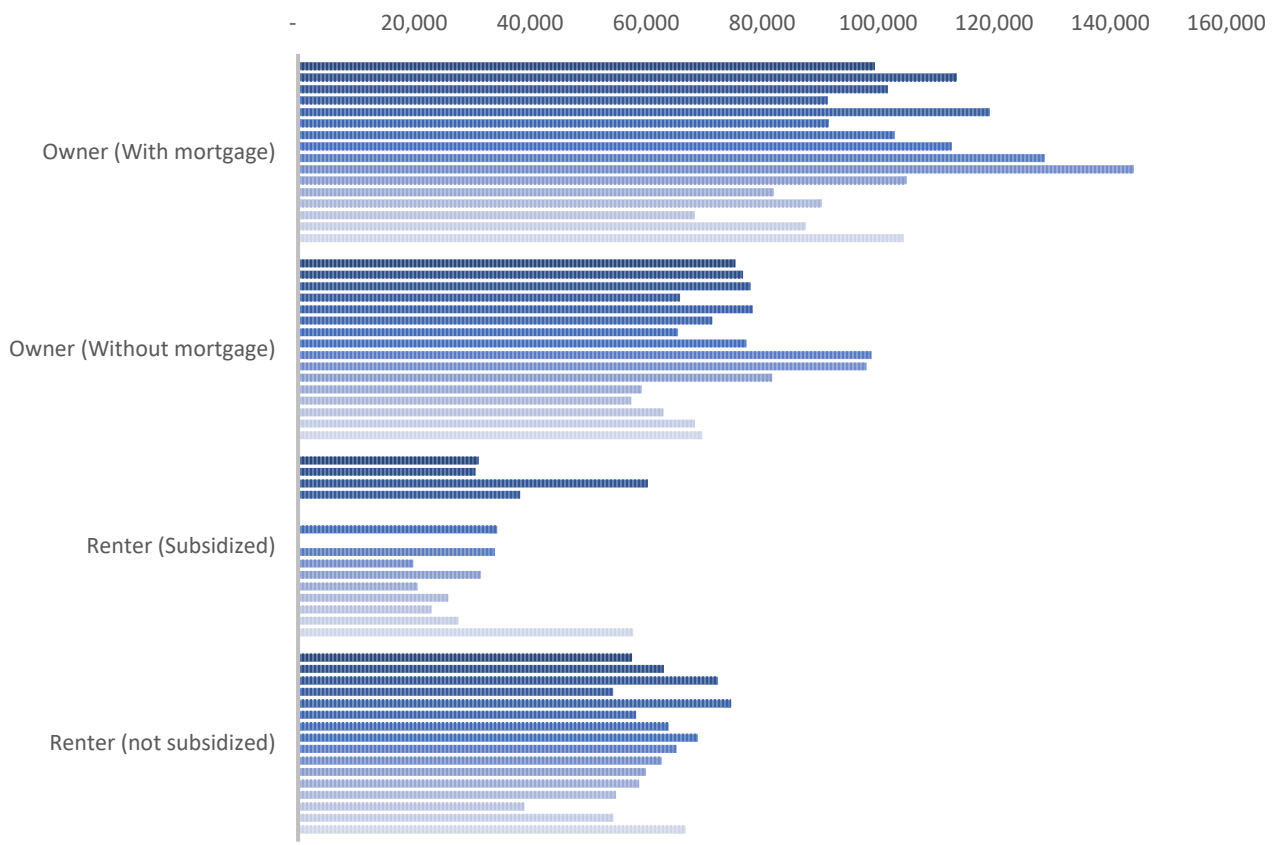


Figure 16: Energy poverty across the capital region (data source did not include Gulf Islands)

[12] M. McNaughton (2020). "Energy Poverty Community Profile: District of Saanich." University of British Columbia. https://sustain.ubc.ca/about/resources/energy-poverty-community-profile-district-saanich

[13] Canadian Urban Sustainability Practitioners (2019). "Energy Poverty Across Canada: A CUSP Backgrounder." https://www.energypoverty.ca/backgrounder.pdf



	Renter (not subsidized)	Renter (Subsidized)	Owner (Without mortgage)	Owner (With mortgage)
CRD	57,546	31,131	75,376	99,389
Central Saanich	63,026	30,590	76,665	113,436
Colwood	72,354	60,292	77,960	101,603
Esquimalt	54,286	38,291	65,800	91,227
Highlands	74,650	-	78,393	119,204
Juan de Fuca	58,202	-	71,331	91,347
Langford	63,822	34,327	65,420	102,684
Metchosin	68,890	-	77,244	112,592
North Saanich	65,231	33,913	98,776	128,590
Oak Bay	62,685	19,938	97,910	143,923
Saanich	59,962	31,551	81,628	104,800
Sidney	58,729	20,664	59,140	81,857
Sooke	54,775	25,928	57,398	90,122
Gulf Islands	39,004	23,006	62,863	68,260
Victoria	54,303	27,622	68,324	87,381
View Royal	66,754	57,752	69,629	104,297

Figure 17: Median income by municipality and tenure type

Other key demographic criteria to explore in program design include the distribution of incomes across the region, as well as the proportion of renters vs. owners and overall homeowner age. With respect to the former, this analysis shows a high proportion of fixed-income homeowners in the region, many of whom are without a mortgage (see Figure 17).

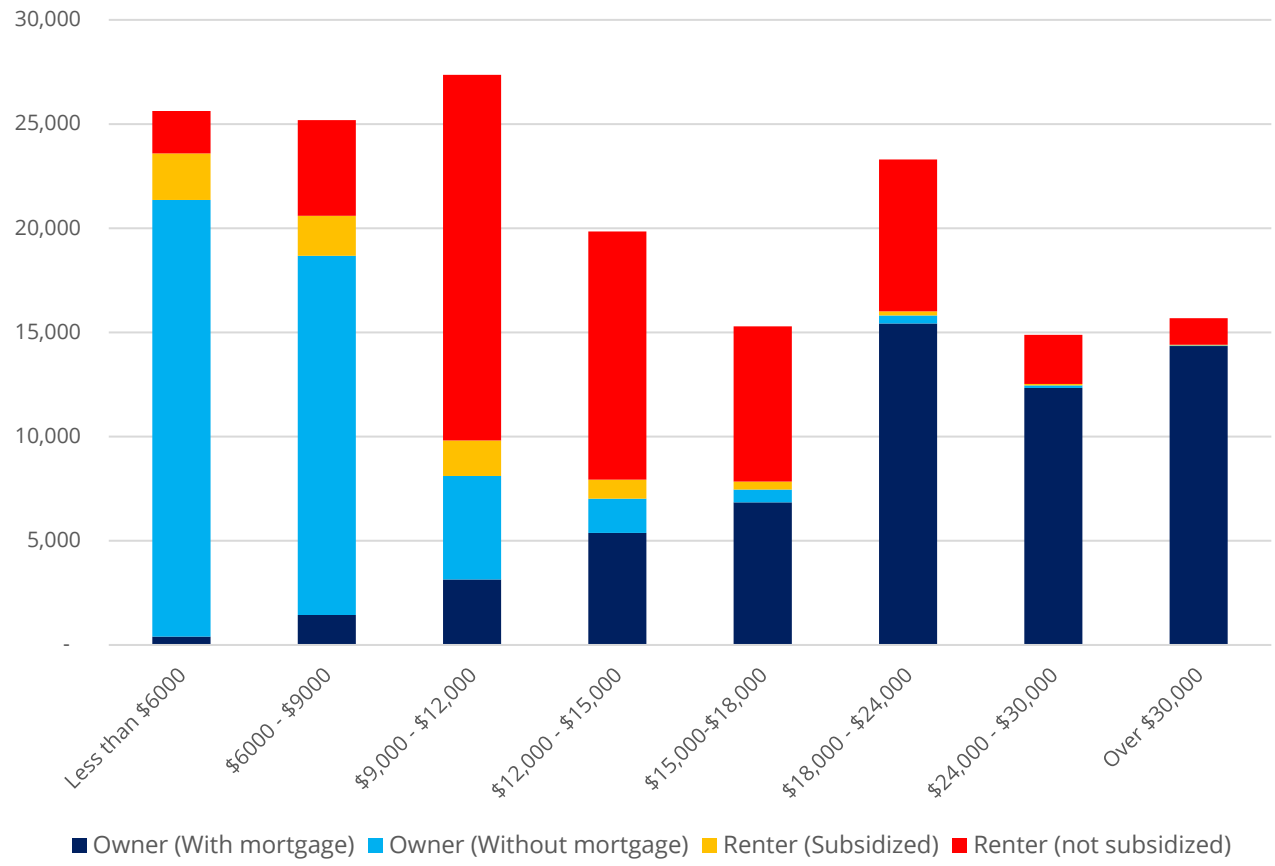


Figure 18: Number of households by annual shelter cost and tenure type

As shown in Figure 18, renters are uncommon in a number of capital region jurisdictions, but make up over 30% of households in the urban areas of Victoria, Esquimalt, Colwood, Saanich, and Langford. Figure 17 also shows that there are significant senior household populations (>30%) across several municipalities/electoral areas: North Saanich, Sidney, Central Saanich, Oak Bay, Metchosin, Juan de Fuca, and the Gulf Islands. As might be expected given the high percentage of seniors, less than half of homeowners still have a mortgage in most of these communities; conversely, there are a low percentage of seniors in Victoria, Esquimalt, Colwood, Saanich, Langford, Highlands and View Royal. These communities also have more renters, and fewer homeowners without a mortgage. Such information is important to consider in program and business case development, as rental housing expenses tend to be less than homeowner expenses (though some renters are burdened with very high annual housing costs as well).

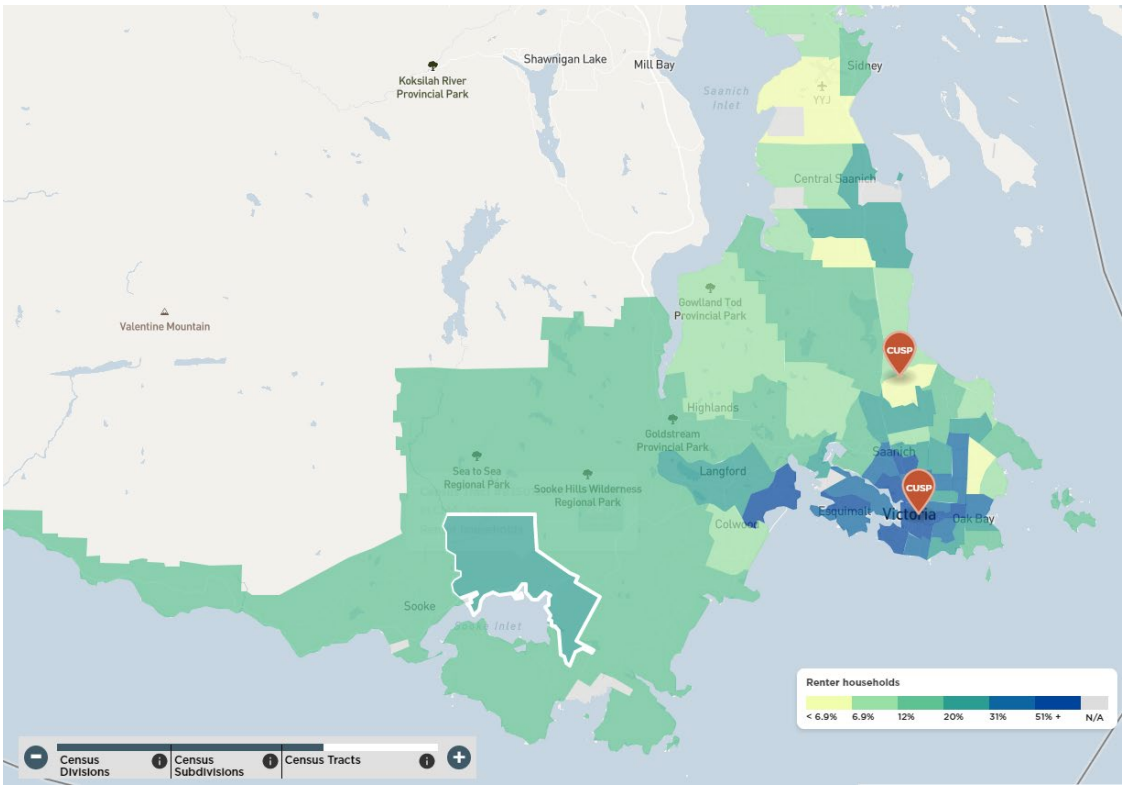


Figure 19: Percent of renters across the capital region census areas (www.energypoverty.ca)

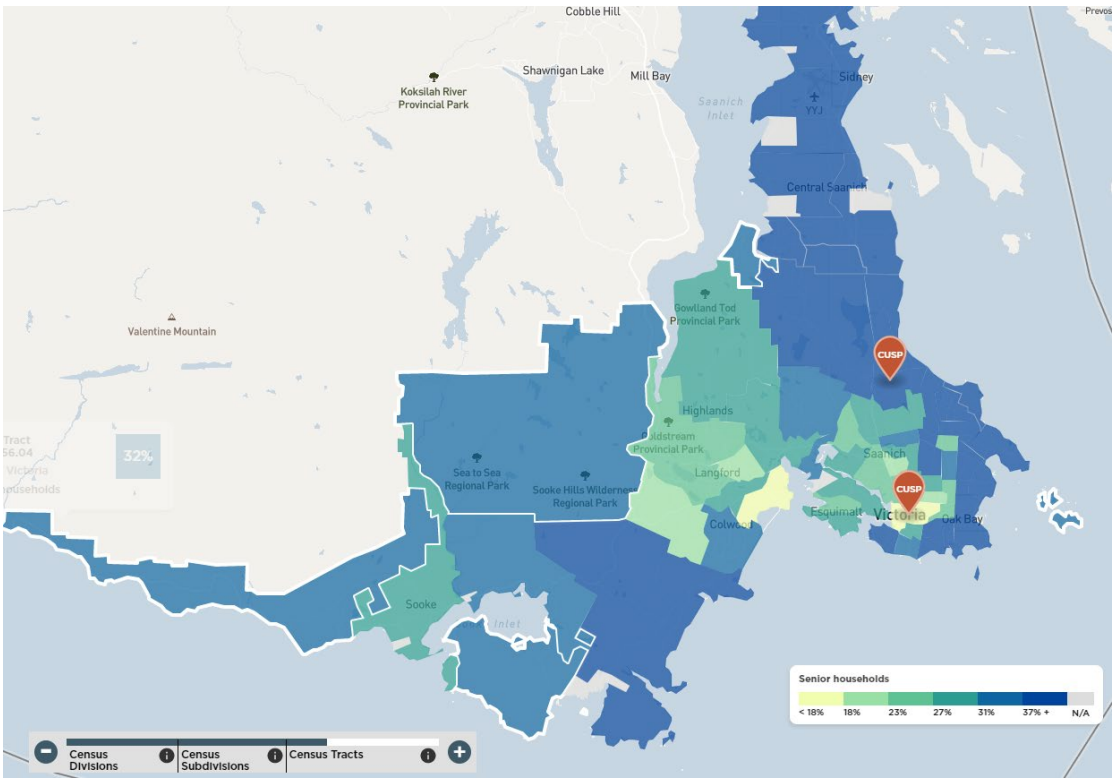


Figure 20: Percent of seniors across the capital region census areas (www.energypoverty.ca)

4.5. Key Takeaways

Drawing on this additional analysis, several key opportunities and challenges emerge:

Home Archetypes

- Interwar oil and older homes have the highest GHG emissions and remain a good target for retrofits, though there are fewer of these homes remaining. Oil-heated homes are also high adopters of fuel switching projects, generally towards heat pumps.
- Pre-1990 gas heated homes are high adopters of insulation upgrades, though they tend to retain or upgrade gas equipment rather than considering fuel switching.
- Newer homes are particularly high adopters of heat pumps.
- While 42% of homes in the capital region are already primarily heated by electricity, the rapid increase over the last decade of homes adding new natural gas connections indicates a continued risk of fuel switching towards natural gas. EnerGuide data shows low rates of gas heated homes fuel switching or adding a heat pump—switching customers off natural gas will be a significant challenge, once they are locked in. Every home that replaces electric resistance heating with a heat pump is one fewer home adding natural gas. Therefore, homes with electric resistance heating should remain a target area for the program, to forestall increases in natural gas use that could otherwise eliminate the net savings.

Homeowner Markets

- As the BetterHomes BC's *Energy Coach* program already provides some OSS services, the CRD should focus on providing additional services that address additional retrofit barriers and support homeowners in making low-carbon retrofits as easy as possible. Aligning any new program with existing offerings will be key to simplifying the experience for homeowners.
- The *Canada Greener Homes Grant* (p.19) will likely increase the demand for home energy advisors, increasing the need for OSS programs that can support homeowners in executing the recommendations in their EnerGuide assessment.
- Any new program must help to avoid and even alleviate energy poverty in the capital region. The relatively high levels of energy burden in the region make it particularly urgent to ensure that energy costs remain low, including through the recommendation of complementary envelope upgrades to reduce energy demand. While natural gas is often seen as a low-cost alternative to electrically heated homes, the costs of energy can vary greatly depending on the condition of the home. Preparing homeowners for the increasing federal carbon tax, as well as BC Hydro's upcoming amendments to rate structures, will help to futureproof upgrades to political and economic factors that are increasingly favouring electrification.
- Fuel switching using heat pumps is still in early adoption phase and may increase utility costs, particularly in large or leaky homes. To avoid exacerbating energy poverty, complementary envelope upgrades should be supported, and an early focus placed on middle and upper-income homeowners to support market development before being rolled out more broadly. Existing programs also already target low-income households and the

unique barriers they face in upgrading their homes; as such, the CRD should focus on other demographics in initial stages of the program and seek to strategically fill gaps as these income-qualified programs become established in the market.

- Targeting the program outreach to larger demographics and neighbourhoods that may be well equipped to make improvements, including higher income neighborhoods (e.g., Oak Bay and the Uplands), senior populations, and households in need of renewal, can improve program uptake and the overall impact on energy and carbon savings. Targeting outreach to more moderate-income communities where natural gas is less prominent and electric resistance and oil heating are more common may also present a valuable GHG reduction opportunity, alongside a potential reduction in energy poverty.
- Emphasizing the non-financial benefits of retrofits (e.g., increased thermal comfort and cooling, better indoor air quality, and lower carbon footprint), in communication and outreach can help attract homeowners.
- Developing a broad set of value propositions that can be tailored to individuals based on their unique needs can increase participant interest and ensure their needs are being met.

4.6. Additional Program Benefits

In addition to GHG reductions, home retrofits create a range of social, environmental and economic benefits. Retrofitting existing buildings can increase safety and health for residents, improve social inequities, and stimulate economic growth and jobs. Designing programs using social, environmental and economic lenses can help optimize these co-benefits, and leverage complementary programs focused in these areas.

Improved health outcomes for residents. Energy inefficient and poorly performing homes can be often overlooked sources of poor occupant health. Poor indoor air quality as a result of poor ventilation can cause headaches, fatigue, coughing, sneezing, sinus congestion, shortness of breath, dizziness, nausea, and irritation of the skin, eyes, nose or throat.[14] It can also trigger or exacerbate allergy and asthma symptoms, as well as increase susceptibility to viruses such as COVID-19 by compromising the immune system.[15] These poor health outcomes disproportionately impact vulnerable groups, including those with pre-existing medical conditions, pregnant women, seniors, and children. With respect to the type of system used, natural gas appliances pose both a risk of fire (due to its flammability) as well as natural gas poisoning via gas leakages. While leakages from gas boilers are less common, natural gas use in cooking equipment are now linked with significant air pollutant levels inside the home.[16,17] Fortunately, significant improvements in air quality can be achieved by increasing filtration and ventilation, regulating indoor moisture, remediating mould, strengthening barriers to indoor and outdoor pollutants, and shifting to less polluting energy

[14] British Columbia. "Indoor Air Quality" (accessed on Aug 10, 2021). https://www.healthlinkbc.ca/healthlinkbc-files/indoor-air-quality
[15] Health Link BC. "Wildfires and Your Health" (accessed on Aug 20, 2021) https://www.healthlinkbc.ca/health-feature/wildfires
[16] Hu, Tianchao, Singer, Brett C., and Logue, Jennifer M. Wed (2012), "Compilation of Published PM2.5 Emission Rates for Cooking, Candles and Incense for Use in Modeling of Exposures in Residences." Lawrence Berkeley National Lab. https://www.osti.gov/servlets/purl/1172959.
[17] Brady Anne Seals and Andee Krasner, (2020), "Health Effects from Gas Stove Pollution," Rocky Mountain Institute. https://rmi.org/insight/gas-stoves-pollution-health/

systems. These changes also have benefits for local governments and health authorities - an analysis of the Toronto building stock found that retrofitting all residential buildings with forced-air HVAC systems and tighter building envelopes could save the province USD2.3 - 3.8 billion a year in healthcare costs due to reduced exposure to particulate matter. [18]

Increased resilience to climate stresses and shocks. Several measures that improve energy efficiency and reduce emissions can also improve resilience, including adding mechanical cooling through electric heat pumps to protect against overheating, improving envelope performance to increase the home's safety in the case of blackouts, and adding mechanical ventilation and filtration to protect residents from wildfire smoke.

Of recent and noteworthy mention is the record-breaking heat, wildfires and drought seen in summer 2021, with heat alone causing 570 premature deaths across the Province during the "heat dome" event in June and July.[19] Seniors and those living with pre-existing health conditions are particularly vulnerable to death or severe illness from sustained high temperatures.[20] The risks inherent in these increasing temperatures have led to increasing pressure for all levels of government to create long-term solutions addressing extreme indoor temperatures. Indeed, the City of Vancouver passed a motion in the aftermath of the heatwave, acknowledging that "*it is time we make maintaining high indoor air quality and energy efficient air conditioning part of our standard expectations of housing just as we do toilets, bathtubs, and heat*." BC Hydro data shows that air conditioning use in BC households has more than tripled to 34% since 2001, and residents are adding an average of $200 to their total summer bills by using A/C inefficiently. [21] The portable A/C units are the most popular and also the least efficient –they use ten times more energy than a central air conditioning system or a heat pump and use twice as much energy as a window unit.

The increased demand for cooling strengthens the business case for heat pumps, and can be leveraged to market electric heat pumps over traditional A/C units. Electric heat pumps can meet dual climate and resilience objectives by providing low-carbon efficient cooling and heating. As such, proactively targeting those looking to purchase A\C units and vulnerable populations can address public health needs and reduce the number of households locking into inefficient cooling systems.

Increased equity and affordability. As noted above, approximately 15% of the CRD's population is characterized as living or at risk of energy poverty, defined as households who struggle to meet their home energy needs and spend more than 6% of their after-tax income on their energy needs.[22] A

[18] Zuraimi, M.S. and Tan, Z (2015), "Impact of residential building regulations on reducing indoor exposures to outdoor $PM_{2.5}$ in Toronto," *Building and Environment*.
[19] Province of British Columbia, Chief Coroner's Statement on Public Safety During High Temperatures (July 30, 2021). https://archive.news.gov.bc.ca/
[20] Smith, K.R., A.Woodward, D. Campbell-Lendrum, D.D. Chadee, Y. Honda, Q. Liu, J.M. Olwoch, B. Revich, and R. Sauerborn, 2014: Human health: impacts, adaptation, and co-benefits. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 709-754.
[21] BC Hydro. "Not-so well-conditioned: How inefficient A/C use is leaving British Columbia out of pocked in the cold" https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/news-and-features/bch-ac-report-aug-2020.pdf
[22] CUSP. 2019. *Energy Poverty in Canada: a CUSP Backgrounder*

retrofit program can help to reduce energy bills and thus energy poverty by recommending retrofit measures that have short payback periods and that can quickly reduce household energy costs. These cost saving measures can be prioritized and paired with incentives for lower-income residents to help reduce overall retrofit costs as well. Energy savings over the long term can also be realized by supporting fuel shifts to electricity where feasible, as the increasing federal carbon tax and upcoming changes to BC Hydro's rate structure that will support electrification will make natural gas the less cost-effective choice.

Create jobs and economic growth. Retrofits drive economic growth and jobs in design, construction, trades, and manufacturing. Governments can support climate action and economic recovery by investing in green industries. Retrofits create a high number of jobs per dollar invested – 9.5 direct and indirect jobs per $1 million invested, compared with 3.6, 2.8 and 5.3 jobs per $1 million invested for the oil and gas sector, electricity generation, and plastic product manufacturing respectively.[23, 24] These jobs are located in communities where people live. Energy efficiency jobs present an attractive mix of higher pay and lower barriers to entry –meaning that workers in the energy efficiency sector have less formal education than the national average, but their income is higher than the national average.[25]

5. ESTIMATED PROGRAM COSTS

Based on the analysis and key takeaways presented above, a business case can be developed based on a set of high-level assumptions around program design and their associated costs. In terms of program design, the following assumptions have been made:

- The program will initially focus on Part 9 homes, with a potential expansion to Part 3 in the future (i.e., Part 3 is not addressed in this business case), and
- The program will leverage existing program architecture at provincial and regional scales to ensure best use of resources.

Specifically, the estimated program costs presented below assume the availability of the following supports and infrastructure to help support the home retrofit process:

- Free pre/post EnerGuide assessments subsidized by the federal government, supplemented as needed by the CleanBC program (i.e., where federal subsidies cover only a portion of the cost of assessments)
- A variety of product rebates, including existing provincial and utility rebates, as well as up to $5,000 in federal rebates
- Additional product rebates for low- and moderate-income households to be offered by the provincial government
- Up to $40,000 in federally funded interest-free loans

[23] Madi Kennedy and Tom-Pierre Frappé-Sénéclauze (2021), "Canada's renovation wave: A plan for jobs and climate." The Pembina Institute. https://www.pembina.org/reports/canadas-renovation-wave.pdf

[24] Statistics Canada, "Input-output multipliers" https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3610059401&pickMembers%5B0%5D=2.3&pickMembers%5B1%5D=4.6&cubeTimeFrame.startYear=2013&cubeTimeFrame.endYear=2017&referencePeriods=20130101%2C20170101

[25] Kennedy, and Frappé-Sénéclauze. "Canada's renovation wave: A plan for jobs and climate.".

- Existing CRD program resources and architecture (e.g., web platforms, outreach materials) that can be supplemented/adapted

In the sections below, cost estimates are broken down into to major categories:

1) *Program overhead*, which represent costs associated with overall program design, marketing, staffing, and administration
2) *Homeowner support*, which provides cost estimates for retrofit support service per home.

These costs are then combined to provide an overall estimate of program costs for the first five years of a regional retrofit program.

5.1. Estimated Costs: Program Overhead

Table 8 below lists one-time and annual overhead costs assumed as a part of the program, including marketing and awareness raising, recruitment, training, staffing (including both CRD and other program staff), and other program materials. It is worth noting that while significant investment in marketing and recruitment would likely yield higher program uptake rates, a more moderate level of investment in these items has been assumed to maintain a more modest program budget. Overall, a greater investment in targeted marketing efforts that identify high-potential demographics (e.g., new millennial homeowners, higher-income, climate-conscious households) and homes (e.g., with near-term heating system replacement needs) is likely to yield improved uptake and is recommended for the first phase of program deployment. Such a targeted approach would also reduce outreach costs, which could be further supplemented by marketing and recruitment support from CRD municipalities, contractors, and community-based organizations (CBO).

Table 8: Estimated costs: program overhead

Program Component	Description	Y1 Costs	Annual Costs, Y2+
Initial marketing & awareness raising	**Targeted marketing by home and demographic** • Development of a fulsome marketing and outreach plan • Segregation of different demographics/home age/needs based on available data • Identification of specific home/owner profiles/archetypes with associated messaging	$25,000	$5,000
	Marketing and educational materials* • Brand development • Website update • Program flyers • Info/fact sheets • Short video production • Testimonials** • Social and newspaper media content • Lawn signs	$30,000	$15,000

Program Component	Description	Y1 Costs	Annual Costs, Y2+
	• Translation into other languages (e.g., French, Cantonese, Mandarin, Punjabi, Farsi)	$3,500	$1,000
Recruitment	**Program outreach** • Paid social and other media • Community events • Targeted door-to-door outreach	$20,000	$15,000
	• Mail blast/bill inserts	$13,000	$13,000
	Contractor outreach/training • Webinar/contractor breakfast • Fact sheet • Homeowner script • Ongoing outreach/relationship building (in concert with HPSC) • Encourage collaboration between contractors to provide coordinated experience and single point of contact for homeowners	$15,000	$8,000
	Community Based Organization (CBO) outreach • Webinar/lunch • Fact sheet • Homeowner script • Ongoing outreach/relationship building	$5,000	$8,000
Training	**Retrofit Coordinator** • Training on CRD program only, including available rebates and financing options	$10,000	$10,000
Staffing* **	CRD staff – Program Coordinator (0.5 FTE)	$52,500	$53,500
	Program manager (1 FTE)	$75,000	$75,000
	Direct supervision	$20,000	$20,000
	Program administration	$16,000	$16,000
Other Materials	**Program Materials** • Development of contractor form, including consultation with contractors	$7,500	$0
Totals	**CRD Staff**	**$52,500**	**$53,500**
	Program Overhead	**$240,000**	**$186,000**
	Total Overhead	**$292,500**	**$239,500**

** Assumes existing materials can be adapted*

*** Testimonials are already being funded under a different program outside the CRD, but can be adapted for CRD program use*

**** Staffing costs do not include Retrofit Coordinator time, as this is captured in homeowner support costs (see Section 5.2)*

5.2. Estimated Costs: Homeowner Support

Table 9 below shows the estimated costs for upgrade support per home. Hourly rates for support are estimated at a blended rate of $50/hour to account for the levels of training/support that are likely required for successful program deployment. Note that a section indicated leveraged resources has been included to demonstrate where current rebates already help reduce the costs associated with home energy retrofits. While there is no indication that such rebates will be discontinued in the near future, the CRD could need to find additional funding or amend the program to address any such gaps in the future.

Table 9: Estimated costs: homeowner support

Step	Tasks	Hours/ Home	Cost/ Home
Screen	• Conduct (virtual) home energy check-up/screening	0.5	$25.00
Review and Plan	• Review EnerGuide Renovation Upgrade Report • Assist client with upgrade choices • Consider DIY options and provide contractor selection advice and standardized quotation forms • Direct client to CleanBC qualified contractor directory	2	$100.00
Compare and Select	• Help homeowner scope work, compare contractor bids, and ensure rebate eligibility	2	$100.00
Finance	• Help identifying and selecting financing and incentives	0.25	$12.50
Document	• Help getting documentation and assist with submitting rebate applications	1.25	$62.50
Evaluate	• Quality Assurance checks post-retrofit (done in aggregate or spot-check) • Measurement & Verification	1	$50.00
TOTAL		**7**	**$350.00**
Leveraged Resources	• Pre/post-audit costs (likely unnecessary due to anticipated Federal programs)	N/A	$500
	• Top-ups for electrical service upgrades / heavy-ups	N/A	$1500
	• Rebate top-ups	N/A	$350 - $1000
TOTAL with Leveraged Resources		**7**	**$2,700 - $3,350**

Table 10 shows total program costs for a fixed budget and approximately 1% uptake, which is fairly standard for an effective, traditional efficiency program. The number of homes retrofitted increase in Year 2, once higher start-up costs are expended in Year 1, and then decrease slightly in Years 3-5 as staff costs increase by 2% per year while the budget stays fixed.

Table 10: Total Program Costs, assuming a fixed budget over five years

Program Year	Y1	Y2	Y3	Y4	Y5
Calendar Year	**2022**	**2023**	**2024**	**2025**	**2026**
Budget	**$602,500**	**$602,500**	**$602,500**	**$602,500**	**$602,500**
CRD Staff (0.5 FTE)	$52,500	$53,500	$54,500	$55,500	$56,500
Program Overhead	$240,000	$188,220	$190,484	$192,794	$195,150
Homeowner Support	$310,000	$360,780	$357,516	$354,206	$350,850
Estimated Program FTEs (excluding CRD staff)	3	5	5	5	4
% Program Overhead (excluding CRD staff)	40%	31%	32%	32%	32%
Homes Going Through Program/Year	885	1030	1021	1012	1002
% annual penetration	0.9%	1.0%	1.0%	1.0%	1.0%
Homes/Year with leveraged resources	92	107	106	105	104
% annual penetration with leveraged resources	0.1%	0.1%	0.1%	0.1%	0.1%
Additional tCO_2e abated each year*	1781	2072	2054	2036	2016

** Carbon abatement assumes savings of 2 tCO2e per home, which represents a mid-point case between the average GHG savings per home for a standard retrofit of 1.35 tCO2e, and the GHG savings of fuel switching retrofits of 2.6 tCO2e per home; see Section 2.1 for more details on these estimates.*

While retrofitting 1% of homes per year is substantial, a higher uptake rate of 3% of homes per year is necessary to achieve a full building stock improvement by 2050. Table 11 shows the costs, program reach, and carbon savings under a higher uptake scenario to demonstrate the scale of the costs and effort that would be required to meet this target. However, it should be noted that to achieve such a high level of program penetration, multiple funding provincial, federal, and utility streams and efforts will be required, making CRD's program one of a larger set of complementary program offerings. In both scenarios, it is assumed that this will be met by a mix of federal incentives, utility incentives, and top-ups from other levels of government.

Table 11: Program budget implications of higher (3%) program uptake

Uptake Scenario	High Uptake
% Annual Penetration	3%
Homes Per Year	**3046**
Total Budget Needed	**$1,305,600**
CRD Staff Support	$53,500
Program Overhead	$186,000
Homeowner Support	$1,066,100
Program FTEs	11
Total budget including leveraged resources	*$10,204,100*
tCO2e abated per year	6129

5.3. Key Takeaways

The cost analysis presented above yields several key pieces of information that are necessary to consider as the CRD moves into the next phase of program design:

- A CRD-run program that integrates into existing program offerings and provide homeowners with coordinator support not currently offered by existing CleanBC Energy Coach services is estimated to require an average of 7 hours of support or $350 per household. Such levels of support will vary considerably as those engaging in deeper retrofits or with more complex homes may require more, while others will require less.
- Program overhead is estimated at approximately $290,000 in the first year, decreasing to $240,000 in subsequent years as the program gets off the ground and promotional materials are developed.
- Program resources that can be leveraged in a CRD-led program include existing federal and provincial rebates and incentives for pre- and post-retrofit audits, electrical service upgrade top-ups and rebates. In the event that these resources are reduced or eliminated, the CRD will need to reassess the nature and/or level of support for homeowners to reap the best value.
- A fixed budget of $602,500 per year for the first five years is estimated to support the completion of home retrofits in 1% of the homes in the capital region per year, representing a standard but substantial uptake rate. While carbon savings will vary based on the nature of the upgrade, it is estimated that this could yield between 1.18 tCO_2e and 2.43 tCO_2e of emissions savings per home, or a total of over 2000 tCO_2e additional carbon savings across the capital region each year. This translates into a cumulative 29,443 tCO_2e avoided over five years.
- Program costs supporting a 1% uptake rate can be met by applying to the Federation of Canadian Municipalities' *Community Efficiency Financing* (CEF) funding stream. However, an uptake rate of 3% of homes per year is necessary to achieve a full building stock improvement by 2050. The scale of such a program would require significant support at provincial and federal levels, including additional incentives and rebates for electrification equipment and supporting efficiency measures.

5.4. Key Barriers and Issues to Resolve

The program and business case described above has been designed to provide homeowners with a significant addition of support to identify and complete deep emissions retrofits, while avoiding duplicating existing and forthcoming programs at federal and provincial scales. However, a number of additional issues remain in need of resolution for the CRD to successfully implement such a program. While some of these issues lie outside of the CRD's direct control, there are nevertheless opportunities to work with other organizations and jurisdictions to support them. Some key issues identified in this preliminary phase of work include:

- **The bespoke nature of many retrofits.** There is a wide variance in the actual conditions in an individual home and the upgrades required in a deep energy efficiency and/or fuel switching retrofit, especially when health issues are considered. This in turn creates a wide variation in costs, much of which is not accounted for in typical energy efficiency incentives. For example, asbestos materials found in many older homes require remediation prior to renovation, which adds costs not covered by rebate or incentive programs.
- **Conflicting messaging of multiple programs.** Both homeowners and contractors can become easily confused and fatigued by the array of programs on offer by different actors, which is only set to increase over the next few months and years. While additional support for retrofits is sorely needed, the CRD will need to work closely with provincial and federal authorities to ensure clear and coordinated messaging. In particular, it will be important to coordinate with the existing provincial Energy Coach program, as this is a strong potential entry point into a CRD-led program.
- **Managing liability.** Feedback from key stakeholders indicates that ensuring objectivity and impartiality with respect to contractor selection is important to maintain to avoid potential conflicts of interest or litigation. This can be accomplished by referring to existing qualified contractor lists where relevant. Homeowner support in understanding contractor quotes would need to be approached carefully by adhering to the risk management practices outlined below.
- **Low contractor interest in retrofit programs.** Stakeholder input indicates that regional contractors are already currently over capacity, making it difficult for them to become familiar with and promote new programs. The CRD will need to work with contractors directly, as well as industry organizations, to ensure a sufficient value proposition is developed that piques the interest of the contractor community in promoting and supporting the program. This is especially important given the multiple federal, provincial and other programs on offer or planned for the near future.
- **Insufficient availability of qualified contractors.** Where contractors are available and interested, there may be relatively few with the skills and training required to complete successful upgrades that meet both emissions reduction and customer satisfaction goals. Furthermore, the recent announcement of federal rebates for efficiency upgrades have made for long wait times to contract with an Energy Advisor. The CRD can partner with organizations such as the Home Performance Stakeholder Council to continue to increase interest in additional contractor training and thus the available pool of qualified contractors capable of meeting program targets.
- **Little authority over quality assurance.** Neither energy advisors nor the CRD have the necessary authority to require contractors to follow up in the event of a dissatisfied program participant. While making use of qualified contractors lists can help reduce this risk, there remains a threat of poor performance, to the detriment of both meeting the CRD's targets and the reputation of the program.
- **Ongoing need for coordination.** The complexity of arranging and coordinating work is a key barrier to home retrofits. This additional service is a common element of best-in-class

retrofit programs from Europe; however, providing this service was estimated to require 6-15 hours of additional work, depending on the number of measures selected. Such a level of support was assumed to be beyond the scope and potential level of support for this program, and would greatly reduce the number of homes the program could reach under the assumed project budget. The CRD may wish to work with existing general contractors to encourage partnerships with program-offered retrofit coordinators to ensure better overall service delivery while maintaining low program costs.

- **Ongoing support for natural gas systems.** Several studies have shown the impact that significant rebates can have on the market adoption of certain products and technologies.[26,27] Ongoing programs at the provincial and utility scales that offer rebates for natural gas heating and domestic hot water systems make such products significantly more attractive than some electrification measures, especially given their already low up front capital costs. In order to make investments into fuel switch renovations more attractive, the CRD has an opportunity to advocate for higher levels of provincial and federal incentives that reduce the capital costs of electrification, in addition to a sufficiently compelling marketing campaign to promote their benefits.
- **Need for additional financial support for low-income homeowners.** While the proposed program reduces the financial and other burden associated with the retrofit process, it does not actually help pay for retrofits themselves. Low-income programs tend to cover a greater percentage of the cost of energy efficiency measures than other programs and in many cases will cover the full cost of selected measures. On average, market-rate multifamily programs cover one-third of the costs of efficiency measures, with the property owner covering the remaining portion. In the low-income space, on average, efficiency programs cover 90% of costs, and the customer covers 10% or less of the costs.[28] Low-income homeowners also need specific marketing and outreach, and programs targeted to their needs. As the CRD does not have the capital to finance low-income retrofits, low-income customer uptake will depend on other incentives available. This gap is expected to be filled by a forthcoming Province-led income-qualified retrofit program.
- **Rental housing.** Rental housing has not been effectively tackled by home retrofit programs, as the tenants typically pay all utilities but have no ability to engage in retrofits, while the landlords have little incentive to upgrade homes. The CRD program may wish to support single family rental dwellers using landlord education and other supportive programs, including guides to help renters engage in conversations with their landlord about retrofits.

[26] Fuller, Merrian C., Cathy Kunkel, Mark Zimring, Ian Hoffman, Katie Lindgren Soroye, and Charles Goldman (2010), "Driving Demand for Home Energy Improvements." Berkeley National Laboratory. https://escholarship.org/content/qt2010405t/qt2010405t.pdf

[27] Stephane de la Rue du Can, Amol Phadke, Greg Leventis, and Anand Gopal (2010), "A Global Review of Incentive Programs to Accelerate Energy-Efficient Appliances and Equipment," Lawrence Berkeley National Laboratory, https://www.osti.gov/servlets/purl/1165201

[28] Ian M. Hoffman, Charles A. Goldman, et al., "The Cost of Saving Electricity Through Energy Efficiency Programs Funded by Utility Customers: 2009–2015," Lawrence Berkeley National Laboratory (June 2018), https://emp.lbl.gov/publications/cost-saving-electricity-through

5.5. Managing Liability and Program Risk

Providing expert advice to homeowners regarding home energy retrofits is widely recognized as an effective support to retrofit uptake and is a best practice in much of the developed world. In Canada, home retrofit advisory services are already offered in BC and Ontario. Windfall Ecology Centre has provided home retrofit advice to homeowners since 2001 and delivered turn-key home retrofit services to low-income families in Ontario on behalf of Enbridge Gas since 2014. In BC, City Green has provided similar services via the Province of BC's *Energy Coach* program, and provided homeowners in the capital region with retrofit advice and support over 2020 and 2021 to considerable success. Retrofit advisory services are now under consideration by the Metro Vancouver Regional District, the City of Vancouver, and several other municipalities across Canada, and will increase in prevalence as existing building emissions reductions become increasingly important to reducing municipal and regional carbon emissions.

Managing potential liability and risk is an important aspect of the CRD business case and is one of the reasons an OSS model delivered by a third party has been recommended. Other risk management measures include advisor training, appropriate insurance coverage, and a simple liability waiver agreed to by program participants as part of the enrollment process. In all cases, advisors should be sure to provide advice and never make decisions on behalf of homeowners.

6. PART 3 MULTIFAMILY HOMES

As shown above, the GHG savings available in Part 3 multifamily buildings represent only 18% of the GHG savings potential as is available in the Part 9 housing stock. As such, it is recommended that the CRD focus its resources on single family, townhome, and duplex/triplex homes to ensure most efficient use of existing capital, ensure access to the service from homes across the region, and leverage ongoing work at the provincial scale (e.g., via the Energy Coach service).

However, a significant proportion of the building sector in some CRD communities is made up of multi-unit residential buildings, both strata owned and rental, and will require dedicated programming to meet municipal and provincial emission reduction ambitions. These building types require a different process than single-family homes—the audit process is different and more expensive (ASHRAE Level 2 or 3, instead of EnerGuide), and the retrofits are often more complex, especially if fuel switching is being considered. Low to moderate income earners are also more likely to be renters and occupy MURBs, and as such present a more acute equity challenge than single family dwellings in the capital region. There are also split incentives between the individual strata owner or tenant and the building management, where the actor footing the bill for a retrofit is not the same actor that receives the resultant benefits in the form of energy and cost savings. Strata-owned and purpose-built rental housing therefore require different forms of support to realize emission reductions. Because the affordability gap — i.e., the difference between the cost of a housing unit and the price a low-income resident can afford— is a central housing issue in the capital region, it also needs to be a core focus of any program focused on these buildings.

Nevertheless, the urgency for electrifying these buildings remains as great or greater than for Part 9 homes, as there are fewer opportunities to replace commercial-scale boilers and furnaces (due to their longer service lives). Moreover, demographic analyses tend to show that lower-income

households disproportionately inhabit multi-family buildings (particularly purpose-built rental) and are more likely to be affected by the health impacts associate with poorly performing buildings and/or those that are ill-equipped to manage the impacts of climate change.

Fortunately, there are some current and potential future programs that are seeking to address this space, including the *Building Benchmark BC* program, designed to support large building and portfolio owners understand, report and publicly disclose their buildings' performance. While not a retrofit support program, *Building Benchmark BC* provides owners and participating jurisdictions with the information necessary to begin to improve performance. Support offered to participating building owners in future years of the program will also receive basic information on potential retrofit opportunities.

As this is also a growing sector, it is worth noting that the BC Energy Step Code (which governs the construction of purpose-built rental in many municipalities in the capital region) will be the most direct way to influence the energy performance of new MURB. Potential changes to the BC Energy Step Code to include carbon regulations and resilience measures, such as high efficiency cooling, could make accelerated adoption of the BC Energy Step Code a high impact way to reduce future emissions from this sector.

Other opportunities for specific ownership types are noted in further detail below.

6.1. Strata Buildings

As noted above, a project currently being led by Metro Vancouver and a group of other local governments is also currently exploring the expansion of Metro Vancouver's *Strata Energy Advisor Program* across the province. In its current form, the program is intended to provide strata buildings with an OSS program designed to address their unique barriers. If adopted at the provincial level, such a program would support strata owners and their property managers understand and undertake energy efficiency and emissions reduction upgrades, and fill the gap of retrofit support currently available to strata owners. However, even if the Strata Energy Advisor program is not expanded provincially, it would provide a strong framework on which to expand the CRD's program to strata housing in a later or concurrent phase.

6.2. Multifamily Rental Buildings

Purpose-built rental buildings are a complex target for a CRD retrofit program, as the sort of guidance, support, and incentives needed for this ownership type differ dramatically from the single family or strata stock. However, an additional targeted outreach opportunity to this sector is likely of high value. The analysis of the multifamily rental housing stock listed in the BC Assessment data indicates that there are 30 purpose-built rental buildings over 100,000 ft^2, accounting for 20% of the rental floor area in the region but only 2.5% of the 1,187 buildings. The overall age of the rental stock is older than the strata stock as well; 15 of the 30 largest rental MURB buildings were built before 1977, with the median year built for the sector overall at 1969. Targeted outreach to the owners and property managers for these buildings could have a significant impact on community emissions across the region, and would benefit a greater proportion of lower-income households or those living in or at risk of energy poverty. As such, it is recommended that a targeted program for

purpose-built rental housing be developed in partnership with capital region municipalities. The City of Victoria's *Market Rental Revitalization Study* (MaRRS) could form a foundation for the CRD to build on, as it characterized the rental building stock in Victoria and explored means of ensuring tenant support and avoid renovictions while undergoing energy and seismic retrofits.

7. CONCLUSION

This report has presented the findings of a set of analysis and engagement intended to inform a business case for a residential energy retrofit program at the CRD. While specifics of program design are out of scope for this work, a broad set of assumptions have been made regarding program design that can be built upon in subsequent phases of program development. Following approval of the business case, program design should be more fully fleshed out using input from key stakeholders, including contractors working in the region. The CRD should also continue to monitor developments at the federal and provincial scales to ensure program developments at these scales can be leveraged for best program results.

APPENDIX A. ONE-STOP-SHOP (OSS) CASE STUDIES

A.1 KFW Effizienzhaus

KFW Effizienzhaus is the German national home retrofit program.

Attributes	Details
Location	Germany
Date Started & Impact	Operating over 10 years
Ownership Model	KFW state bank in partnership with German Energy Agency
Key Activities	KFW provides low interest loans and other incentives. The German Energy Agency licenses Energy Advisors, maintains the Effizienzhaus rating system and quality assurance protocols (similar to NRCan).
Key Resources	• Low interest loans up to 120,000 EUR (up to 35% forgivable) • Incentives for audit and retrofit facilitation costs (including contractor selection and coordination • State licensed independent Energy Advisors provide audit and retrofit facilitation services.
Homeowner Journey	1. Homeowner retains a licensed Energy Advisor. There are over 10,000 licensed Energy Advisors (included among them are trades people, architects, engineers, etc.). KFW supports the cost of the Energy Advisor 2. With assistance from the Energy Advisor apply for a retrofit loan from a local bank which manages loans on behalf of KFW (significant portions of KFW loans are forgiven based on performance achieved). 3. Enter into loan agreement and start retrofit work. 4. Submit confirmation and receive repayment grant. The Energy Advisor plays an important role in the remodeling process. Devises the remodeling plan with the homeowner, based on: • Building specifications, calculations, and experience • Current incentives and rules • The wishes and financial constraints of the homeowner • Reviews bids with the homeowner Directs the actual retrofit and all contractors. • Helps develop contractor RFPs • Helps collecting and comparing bids • Advises homeowner regarding contractor selection • Ensures quality and timeliness of contractors' work • Measures the results (e.g., blower door test) and issues the "Energy ID" • Fills out relevant (technical) forms for KfW and the loan application.

Attributes	Details
Marketing Channels	KFW is a highly recognised brand familiar to most Germans. Information websites are maintained by KFW, the German Energy Agency, and licensed Energy Advisors
Revenue	German government recovers costs through expanded economic activity. Estimated over 200,000 jobs created or protected per year.
Costs	Energy Advisor fees are paid by KFW on a sliding scale with a maximum of EUR 4000 per completed retrofit. Pre and post audits are separately subsidized (EUR 800)
Success & Risks	As of 2019 over 3 million retrofits completed

A.2 Oktave

Oktave is an integrated renovation service model in the French region of Alsace, which aims to increase the number of deep renovations. The model provides the building owner with a main point of contact that guides them throughout the renovation process.[29]

Attributes	Details
Location	Grand Est region, France
Date Started & Impact	Started in 2016 to provide homeowners with an independent renovation advice service specialising in deep energy retrofits. Completed 180 project in first 2 years.
Ownership Model	Regional government agency
Key Activities	Technical renovation advice tailored to the specific building. • Support with a financial plan, combining potential grants, tax rebates and low-interest loans • Project management assistance throughout the renovation process • Personalised "post-works care" for two years after completion of the renovation • A directory of qualified and experienced professionals trained by Oktave to guarantee long-term building performance
Key Resources	• Financial management (accounting, auditing, quality control, litigation) • Operational management (renovation advisors, loan advisors, relationship with contractors and companies)
Homeowner Journey	The retrofit journey follows four main steps: 1. Initial contact and on-site visit, from which the suggested measures are derived. The renovation plan is discussed and outlined based on the need and financial means of the homeowner. Following this, an Oktave contract is signed, stipulating the terms and cost. 2. The Oktave advisor collects offers from relevant building professionals and puts together the most appropriate renovation package. The homeowner agrees on a renovation and financial package suggested by the advisor.

[29] Turnkey Retrofit, 2020, *project n°839134*.

Attributes	Details
	3. The actual renovation works take place, during which the advisor supports the homeowner when needed. A blower-door test is used to control the general quality and performance of each renovation. 4. The final step is the "post-work care", in which the advisor stays in contact with the homeowner and ensures the technical and financial plans work as intended.
Marketing Channels	• Local renovation advice centres • Local network (installers, architects, tradespeople etc.) • Website and social media
Revenue	• Compensation of the technical support in the form of a service package billed to the customer. • Financial income generated through its credit intermediary activity (referrals).
Costs	• Labour cost (advisors, admin personnel etc.) • Information system cost (development, maintenance) • Communication cost
Success & Risks	The program was modestly successful in its first two years of operation and was projecting uptake of 1000+ retrofits per annum post 2020. Since it is operated by a local government agency it is exposed to litigation risk.

A.3 Izigloo

The Izigloo web platform is an intelligent online registry. It keeps track of the maintenance and management of single-family homes on behalf of subscribers. Based on an analysis of data from 70,000 completed renovation projects, it can provide a quick estimation of a homes upgrade potential, which often entices people to engage in a retrofit. The Izigloo renovation service allows homeowners to check their energy consumption online, get personalized advice on how to improve the performance of the home and provide links with qualified professionals to carry out the work.

Attributes	Details
Location	France
Date Started & Impact	The platform launched in 2015 but the company has been retrofitting homes since 2010. It recognised the need for a more structured support for renovation projects because customers, often, perceive them as complicated, expensive, and time-consuming. Few customers were willing to pay for additional services, hence the idea of industrialising the support through a digital platform. The main objective is to trigger renovation work and match customers with building professionals. Since launch the project has supported 40,000 home retrofits with an average project size of EUR 9000
Ownership Model	Privately owned
Key Activities	• Provides automated calculation and estimations of the required cost, energy savings, available subsidies relating to a potential renovation project

Attributes	Details
	• Offers energy renovation advice • Allocates the right building professionals to a project
Key Resources	• Online portal and extrapolation solution • Network of professionals
Homeowner Journey	1. The building owner finds their way to the Izigloo website. User receives an estimate of the total cost (based on decision trees, product list with prices, subsidies and eligibility criteria) 2. If the building owner is interested, an appointment is made with an advisor. The building owner indicates how soon he/she would like to get the work done. 3. The project is published on the portal as an open tender for the professionals to bid on. 4. Up to three professionals can "buy" the prospective project and deliver their proposal. 5. The building owner signs with the preferred professionals. 6. The renovation work is conducted. 7. 8. Follow-up feedback form is filled in by the building owner.
Marketing Channels	Izigloo reaches most customers through online marketing and guides them through the steps of the renovation journey.
Revenue	• Selling potential projects to professionals (i.e., leads) • Percentage of the project value when a project is carried out
Costs	EUR 8 million to develop
Success & Risks	Successful model with high development costs

A.4 SuperHomes

SuperHomes is an integrated renovation service that has been successful in increasing the number of deep energy renovations by providing technological and financial support for homeowners.

Attributes	Details
Location	Tipperary region, Ireland
Date Started & Impact	Started in 2015 and completed approximately 280 retrofits. Average primary energy saving is 71%
Ownership Model	Publicly owned by the Tipperary Energy Agency
Key Activities	• Home energy assessment/survey • Renovation project management • Grant/subsidy application • Post-installation check/evaluation
Key Resources	• Good project managers • Strong local network • Financial package
Homeowner Journey	1. The building owner expresses interest and makes an application on the SuperHomes website. 2. If the project is deemed feasible, a home energy audit is carried out. The assessment includes a blower door test.

Attributes	Details
	3. A suggested package of measures designed to achieve an EPC A-rating is proposed. Some measures are mandatory within the scheme. The complexity of a deep renovation is simplified and presented in a digestible way to the homeowner, while the recommendations are tailored to the specific building and the incentives of the homeowner. 4. SuperHomes provides costs to the homeowner from a pre-approved panel of contractors and sub-contractors. 5. If the homeowner wishes to proceed, TEA accesses subsidies on behalf of the client. 6. The project management and quality assurance of the various contractors and installers is by TEA. 7. A post-audit is carried at the end of the works by TEA.
Marketing Channels	• Local network (companies, association of building managers etc.) • Local renovation advice centres • Website
Revenue	Project management and professional fees which are included in the total cost of the works for the homeowner.
Costs	Labour cost (advisors, admin personnel etc.) • Communication/outreach costs
Success & Risks	Approximately 280 deep retrofits completed in first 3 years. Regional utility absorbs liability risks

A.5 BetterHome

BetterHome is an industry-driven one-stop-shop model. It has proven successful in increasing demand for deep energy renovations. The model reduces the burden on the building owner by streamlining the renovation process.

Attributes	Details
Location	Denmark
Date Started & Impact	Started by 4 retrofit sector suppliers in 2014 the collaboration has generated 1182 retrofit to 2019.
Ownership Model	BetterHome was created as an independent organisation. The overall objective is governed by the private suppliers through regular board meetings (Rockwool, Danfoss, Grundfos, and Velux)
Key Activities	• Renovation advice. The homeowner uses an online tool to enter details about their homes and energy consumption and receive a report and recommendations on renovation measures and offers from local suppliers. • Skilled professionals. Local craftspeople carry out the installation work. The craftspeople receive training and guidelines from BetterHome. • Financial package. The customer discusses the renovation project with his/her usual bank, and the bank can use the BetterHome tool

Attributes	Details
	to refer to the details. The associated banks trust the BetterHome quality and financial characteristics
Key Resources	• Project managers • Smart digital solution • Network of building professionals • Expertise in building components
Homeowner Journey	1. Homeowner uses the BetterHome online portal to get a first estimate for their building and indicates interest in learning more about their retrofit options. If both parties are interested in moving forward, they schedule a date for an on-site visit. 2. During the on-site visit an energy assessment is conducted, for which the installer has an online standardised survey to complete. The installer also discusses different renovation possibilities that they have and informs them about indoor environmental quality aspects and how to improve these. Based on the online survey, the installer can present energy and cost saving potential for different renovation alternatives. 3. If they find a solution that meets the expectations of the building owner, they sign a contract. While BetterHome assists in providing standardised contracts, the contract is between the installer and building owner. 4. Renovation is carried out. 5. Post-retrofit survey to make sure everything went as planned. Installers that receive substantial complaints are removed from the BetterHome network.
Marketing Channels	• Online portal • Network (suppliers, installers, local banks) • Social media
Revenue	Free to the homeowner and there are no payments between BetterHome and the contractors. The industry consortium relies on product sales to generate revenue.
Costs	• Labour cost (project managers, business model developers, admin personnel etc.) • Development and maintenance of the online portal/solution
Success & Risks	1182 retrofits in first 5 years. Product suppliers assume retrofit risks