METRO VANCOUVER REGIONAL DISTRICT
CLIMATE ACTION COMMITTEE

MEETING

Thursday, September 7, 2023
9:00 AM
Meeting conducted electronically/in-person pursuant to the Procedure Bylaw
28th Floor Committee Room, 4515 Central Boulevard, Burnaby, British Columbia

A G E N D A[1]

1. ADOPTION OF THE AGENDA

1.1 September 7, 2023 Meeting Agenda

That the Climate Action Committee adopt the agenda for its meeting scheduled for September 7, 2023 as circulated.

2. ADOPTION OF THE MINUTES

2.1 July 6, 2023 Meeting Minutes

pg. 4

That the Climate Action Committee adopt the minutes of its meeting held July 6, 2023 as circulated.

3. DELEGATIONS

4. INVITED PRESENTATIONS

5. REPORTS FROM COMMITTEE OR STAFF

5.1 Appointment of Enforcement Officers

pg. 9

That the MVRD Board:

a) pursuant to the *Greater Vancouver Regional District Air Quality Management Bylaw 1082, 2008* and the *Environmental Management Act*:
   i. rescind the appointment of Ana Nic Lochlainn as an officer; and
   ii. appoint Metro Vancouver employees Jason Assam, Karnjit Bains, Cynthia Barros, Amanda Craft, and Mike Mijares as officers; and

b) pursuant to section 28 of the *Offence Act* for the purpose of serving summons for alleged violations under the *Greater Vancouver Regional District Air Quality Management Bylaw 1082, 2008*:
   i. rescind the appointment of Ana Nic Lochlainn; and

[1] *Note: Recommendation is shown under each item, where applicable.*

ii. appoint Metro Vancouver employees Jason Assam, Karnjit Bains, Cynthia Barros, and Amanda Craft.

5.2 Metro Vancouver's Climate 2050 Agriculture Roadmap *pg. 11*

That the MVRD Board:

a) endorse the Climate 2050 Agriculture Roadmap as attached to the report dated July 27, 2023, titled "Metro Vancouver's Climate 2050 Agriculture Roadmap" as the initial Roadmap to achieve the Climate 2050 vision, goals, and targets for a net-zero and resilient agricultural sector; and
b) direct staff to continue working with member jurisdictions and other partners to implement the actions in the Climate 2050 Agriculture Roadmap; and
c) direct staff to update the Roadmap, as needed, in response to new information.

5.3 Metro Vancouver Climate 2050 Annual Report 2022/2023 *pg. 83*

That the MVRD Board receive for information the report dated July 24, 2023, titled "Metro Vancouver Climate 2050 Annual Report 2022/2023".

5.4 Initial Engagement Outcomes on Developing GHG Emission Reduction Requirements for Existing Large Buildings *pg. 131*

That the MVRD Board receive for information the report dated August 22, 2023, titled "Initial Engagement Outcomes on Developing GHG Emission Reduction Requirements for Existing Large Buildings".

5.5 Metro Vancouver's Application to Intervene in the BC Utilities Commission Proceeding Related to BC Hydro's 2021 Integrated Resource Plan *pg. 138*

That the MVRD Board receive for information the report dated August 16, 2023, titled "Metro Vancouver's Application to Intervene in the BC Utilities Commission Proceeding Related to BC Hydro's *2021 Integrated Resource Plan*".

5.6 Manager's Report *pg. 141*

That the Climate Action Committee receive for information the report dated August 31, 2023, titled "Manager's Report".

6. INFORMATION ITEMS

7. OTHER BUSINESS

8. BUSINESS ARISING FROM DELEGATIONS

9. ADJOURNMENT/CONCLUSION

That the Climate Action Committee adjourn/conclude its meeting of September 7, 2023.

Membership:

Dominato, Lisa (C) – Vancouver
Johnstone, Patrick (VC) – New Westminster
Berry, Ken – Lions Bay
Bose, Mike – Surrey
Carr, Adriane – Vancouver
Gu, Alison – Burnaby
Lahti, Meghan – Port Moody
Leonard, Andrew – Bowen Island
McCutcheon, Jen – Electoral Area A
McNulty, Bill – Richmond
Pope, Catherine – North Vancouver District
Ross, Jamie – Belcarra
Ruimy, Dan – Maple Ridge
vanPopta, Misty – Langley Township
Wallace, Rosemary – Langley City

METRO VANCOUVER REGIONAL DISTRICT
CLIMATE ACTION COMMITTEE

Minutes of the Regular Meeting of the Metro Vancouver Regional District (MVRD) Climate Action Committee held at 9:00 am on Thursday, July 6, 2023, 2023 in the 28th Floor Committee Room, 4515 Central Boulevard, Burnaby British Columbia.

MEMBERS PRESENT:
Chair, Councillor Lisa Dominato, Vancouver
Vice Chair, Mayor Patrick Johnstone, New Westminster
Mayor Ken Berry, Lions Bay
Councillor Mike Bose, Surrey
Councillor Adriane Carr, Vancouver (arrived at 9:05 am)
Councillor Alison Gu*, Burnaby (arrived at 9:03 am)
Mayor Meghan Lahti*, Port Moody (arrived at 9:31 am; departed at 10:32 am)
Mayor Andrew Leonard*, Bowen Island
Councillor Bill McNulty, Richmond
Councillor Catherine Pope*, North Vancouver District (arrived at 9:04 am)
Mayor Jamie Ross*, Belcarra
Mayor Dan Ruimy, Maple Ridge
Councillor Rosemary Wallace, Langley City

MEMBERS ABSENT:
Director Jen McCutcheon, Electoral Area A
Councillor Misty vanPopta, Langley Township

STAFF PRESENT:
Heather McNell, Deputy Chief Administrative Officer, Policy and Planning
Rapinder Khaira, Legislative Services Coordinator, Board and Information Services

1. ADOPTION OF THE AGENDA

1.1 July 6, 2023 Meeting Agenda

It was MOVED and SECONDED
That the Climate Action Committee adopt the agenda for its meeting scheduled for July 6, 2023 as circulated.

CARRIED

*denotes electronic meeting participation as authorized by section 3.6.2 of the *Procedure Bylaw*

2. ADOPTION OF THE MINUTES

2.1 June 8, 2023 Meeting Minutes

It was MOVED and SECONDED
That the Climate Action Committee adopt the minutes of its meeting held June 8, 2023 as circulated.

CARRIED

3. DELEGATIONS

No items presented.

4. INVITED PRESENTATIONS

No items presented.

5. REPORTS FROM COMMITTEE OR STAFF

5.1 Annual Regional Greenhouse Gas Emissions for Onroad Transportation and Buildings

Report dated June 23, 2023, from Shelina Sidi, Senior Project Engineer, Air Quality and Climate Change and Derek Jennejohn, Lead Senior Engineer, Air Quality and Climate Change, providing the MVRD Board with an inventory of Greenhouse Gas Emissions from onroad transportation and buildings in Metro Vancouver.

9:03 am Councillor Gu arrived at the meeting.
9:04 am Councillor Pope arrived at the meeting.
9:05 am Councillor Carr arrived at the meeting.

Members were presented an overview of the regional emissions inventory initial regional results for onroad transportation and buildings.

Presentation material titled "Annual Regional Greenhouse Gas Emissions from Onroad Transportation and Building" is retained with the July 6, 2023 Climate Action Committee agenda.

It was MOVED and SECONDED
That the MVRD Board receive for information the report dated June 23, 2023, titled "Annual Regional Greenhouse Gas Emissions for Onroad Transportation and Buildings".

CARRIED

5.2 Changes in Provincial Legislation Needed to Address Gas Utilities in British Columbia

Report dated June 19, 2023, from Nicole Change, Project Engineer, Air Quality and Climate Change, providing the MVRD Board with an opportunity to support Richmond City Council's recommendation to the Province relating to changes in provincial legislation needed to address gas utilities in British Columbia.

9:31 am Mayor Lahti arrived at the meeting.

It was MOVED and SECONDED

That the MVRD Board:

a) send letters to the Premier, the Minister of Municipal Affairs, the Minister of Environment and Climate Change Strategy, and the Minister of Energy, Mines and Low Carbon Innovation, in response to Richmond City Council's request for support, asking the Government of British Columbia to reform the British Columbia Utilities Commission in the context of a changing climate and urgently enact legislation that regulates greenhouse gas emissions from gas utilities, in alignment with the strategies and actions in the *Climate 2050 Energy Roadmap*; and

b) request meetings between Metro Vancouver staff and the appropriate provincial ministries, to discuss the issues raised in the letters.

CARRIED

5.3 Phase 2 Engagement Summary and Next Steps on Managing Emissions from Cannabis Production and Processing

Report dated June 23, 2023, from Esther Berube, Division Manager, Air Quality and Climate Change and Laura Taylor, Senior Engagement Specialist, External Relations, seeking MVRD Board support for enhanced collaboration with the Ministries of Agriculture and Food, Environment and Climate Change Strategy, and Public Safety and Solicitor General on developing a concerted approach for managing emissions from cannabis production and processing.

Members were provided with a presentation highlighting health and environmental impacts of cannabis production, including the role of volatile organic compounds in ground-level ozone formation, and importance of collaboration with respective Ministries for an in-depth understanding of cannabis production impacts on health and environment.

Presentation material titled "Managing Emissions from Cannabis Production and Processing" is retained with the July 6, 2023 Climate Action Committee agenda.

It was MOVED and SECONDED

That the MVRD Board:

a) send a letter to the Ministers of Agriculture and Food, Environment and Climate Change Strategy, and Public Safety and the Solicitor General requesting collaboration with Metro Vancouver on developing a concerted approach for managing emissions from cannabis production and processing in the Metro Vancouver region in a manner that protects public health and regional economic prosperity; and

b) direct staff to continue developing options to manage emissions from cannabis production and processing as described in the report dated June 23, 2023, titled "Phase 2 Engagement Summary and Next Steps for Managing Emissions from Cannabis Production and Processing".

CARRIED

5.4 2023 Update on Water Sustainability Innovation Fund Projects

Report dated June 23, 2023, from Linda Parkinson, Director, Water Services, providing the Climate Action Committee an annual update on projects funded under the Water Sustainability Innovation Fund.

Members were presented with an update on Water Services projects currently in progress and completed that are funded through the Sustainability Innovation Fund.

Presentation material titled "2023 Update on Sustainability Innovation Fund Projects" is retained with the July 6, 2023 Climate Action Committee agenda.

It was MOVED and SECONDED

That the Climate Action Committee receive for information the report dated June 23, 2023, titled "2023 Update on Water Sustainability Innovation Fund Projects."

CARRIED

5.5 Manager's Report

Report dated June 29, 2023, from Conor Reynolds, Director, Air Quality and Climate Change, providing the Climate Action Committee with an update on the Climate Action Committee 2023 Work Plan, BC Hydro's move to clean power to electrify BC's future, border carbon adjustments, consultation on Minister's Bylaw Standards for cannabis production facilities in the Agricultural Land Reserve, and new resources for dealing with extreme weather events and wildfire smoke.

10:32 am Mayor Lahti departed the meeting.

It was MOVED and SECONDED

That the Climate Action Committee receive for information the report dated June 29, 2023 titled "Manager's Report".

CARRIED

6. INFORMATION ITEMS

No items presented.

7. OTHER BUSINESS

No items presented.

8. BUSINESS ARISING FROM DELEGATIONS

No items presented.

9. RESOLUTION TO CLOSE MEETING

No items presented.

10. ADJOURNMENT/CONCLUSION

It was MOVED and SECONDED

That the Climate Action Committee conclude its meeting of July 6, 2023.

CARRIED

(Time: 10:36 am)

Rapinder Khaira, Legislative Services Coordinator	Lisa Dominato, Chair

60937062 FINAL

To: Climate Action Committee

From: Julie Saxton, Program Manager, Enforcement and Regulation Air Quality, Parks and Environment

Date: August 16, 2023 Meeting Date: September 7, 2023

Subject: **Appointment of Enforcement Officers**

RECOMMENDATION

That the MVRD Board:

a) pursuant to the *Greater Vancouver Regional District Air Quality Management Bylaw 1082, 2008* and the *Environmental Management Act*:
   i. rescind the appointment of Ana Nic Lochlainn as an officer; and
   ii. appoint Metro Vancouver employees Jason Assam, Karnjit Bains, Cynthia Barros, Amanda Craft, and Mike Mijares as officers; and

b) pursuant to section 28 of the *Offence Act* for the purpose of serving summons for alleged violations under the *Greater Vancouver Regional District Air Quality Management Bylaw 1082, 2008*:
   i. rescind the appointment of Ana Nic Lochlainn; and
   ii. appoint Metro Vancouver employees Jason Assam, Karnjit Bains, Cynthia Barros, and Amanda Craft.

EXECUTIVE SUMMARY

Recent changes in staffing have resulted in a need to update staff appointments as Metro Vancouver Regional District (MVRD) Board-designated officers under the *Greater Vancouver Regional District Air Quality Management Bylaw 1082, 2008*, the *Environmental Management Act*, and the *Offence Act*. Staffing changes are a result of retirements and promotions within Metro Vancouver. Staff recommend that the MVRD Board appoint staff and rescind appointments accordingly.

PURPOSE

To appoint five Metro Vancouver employees as Board-designated officers, and to rescind the appointment of one former officer.

BACKGROUND

Metro Vancouver's Air Quality Regulatory Program supports the goals of the *Clean Air Plan* by promoting compliance with air quality management bylaws and regulating the discharge of air contaminants.

Employment status changes for Metro Vancouver environmental regulatory staff have resulted in a need to update staff appointments to ensure appropriate authority to advance air quality management goals. Three retirements and two promotions within Metro Vancouver resulted in five vacancies recently being filled. Section 31 of the *Environmental Management Act* and the *Greater*

Vancouver Regional District Air Quality Management Bylaw No. 1082, 2008 grant authority to Board-designated officers.

ROLE OF ENFORCEMENT OFFICERS

Officers may enter property, inspect works, and obtain records and other information to promote compliance with the *Environmental Management Act* and MVRD air quality management bylaws.

The *Offence Act* allows regional districts to appoint enforcement officers for the purpose of serving summons for bylaw violations. Officers, if appointed for that purpose, may serve a summons in respect of alleged offences under the *Greater Vancouver Regional District Air Quality Management Bylaw 1082, 2008*.

ALTERNATIVES

1. That the MVRD Board:
   a) pursuant to the *Greater Vancouver Regional District Air Quality Management Bylaw 1082, 2008* and the *Environmental Management Act*:
      i. rescind the appointment of Ana Nic Lochlainn as an officer; and
      ii. appoint Metro Vancouver employees Jason Assam, Karnjit Bains, Cynthia Barros, Amanda Craft, and Mike Mijares as officers; and
   b) pursuant to section 28 of the *Offence Act* for the purpose of serving summons for alleged violations under the *Greater Vancouver Regional District Air Quality Management Bylaw 1082, 2008*:
      i. rescind the appointment of Ana Nic Lochlainn; and
      ii. appoint Metro Vancouver employees Jason Assam, Karnjit Bains, Cynthia Barros, and Amanda Craft.
2. That the MVRD Board receive for information the report dated August 16, 2023, titled "Appointment of Enforcement Officers" and provide alternate direction to staff.

FINANCIAL IMPLICATIONS

There are no additional financial implications as the MVRD appointees are already employed by Metro Vancouver and there are no costs associated with rescindments.

CONCLUSION

Recent changes in staffing have resulted in a need to update staff appointments as the MVRD Board-designated officers under the *Greater Vancouver Regional District Air Quality Management Bylaw 1082, 2008*, the *Environmental Management Act*, and the *Offence Act*. Staff recommend that the MVRD Board adopt Alternative 1.

To: Climate Action Committee

From: Carla Stewart, Senior Planner, Regional Planning and Housing Services

Date: July 27, 2023 Meeting Date: September 7, 2023

Subject: **Metro Vancouver's Climate 2050 Agriculture Roadmap**

RECOMMENDATION

That the MVRD Board:

a) endorse the Climate 2050 Agriculture Roadmap as attached to the report dated July 27, 2023, titled "Metro Vancouver's Climate 2050 Agriculture Roadmap" as the initial Roadmap to achieve the Climate 2050 vision, goals, and targets for a net-zero and resilient agricultural sector; and
b) direct staff to continue working with member jurisdictions and other partners to implement the actions in the Climate 2050 Agriculture Roadmap; and
c) direct staff to update the Roadmap, as needed, in response to new information.

EXECUTIVE SUMMARY

The *Climate 2050 Agriculture Roadmap* is one in a series of 10 *Climate 2050* Roadmaps that present a pathway to achieving a carbon neutral and resilient region by the year 2050. Agriculture in Metro Vancouver contributes approximately 4 percent of the region's total GHG emissions from using fertilizer, farm equipment, and fossil natural gas to heat greenhouses. The *Agriculture Roadmap* establishes a target of reducing GHG emissions by 35 percent, relative to 2010 levels, by 2030. This will be achieved by maximizing carbon sequestration and by implementing the best management practices and technologies available to support powering agricultural operations, equipment and machinery with clean, renewable energy. The long-term resilience of the region is the biggest climate challenge facing the sector, and therefore, increasing the resilience of local agriculture is a significant focus.

The *Agriculture Roadmap* sets out 4 strategies and 68 actions to help agricultural producers transition to clean, renewable energy and to increase their resilience. Of these, 12 have been identified as 'big moves', focusing on the most impactful actions to support nature-based solutions, address soil health, support using new technology and reduce emissions from agricultural sources. The majority of these 'big moves' support increasing the overall resilience of the agricultural sector, but five in particular focus on what Metro Vancouver has the most influence over:

- Prepare an agricultural land protection and viability strategy;
- Implement soil movement tracking within agricultural areas;
- Reduce the encroachment of urban uses into agricultural areas;
- Build a long-term payment for ecosystem services funding mechanism for agriculture; and
- Explore innovative sources and new technologies for water use and water conservation for long-term agricultural use.

The *Agriculture Roadmap* will be a dynamic document that evolves over time to stay responsive to advancements in technology and production methods, and responds to new challenges that arise. This report seeks endorsement of the *Agriculture Roadmap* by the MVRD Board.

PURPOSE

This report presents the *Climate 2050 Agriculture Roadmap*, seeking endorsement by the MVRD Board.

BACKGROUND

Following the MVRD Board adoption of the *Climate 2050 Strategic Framework* in September 2018, staff began an integrated engagement process for *Climate 2050*, using a series of issue area discussion papers (Reference 1). A discussion paper on the *Agriculture Roadmap* was received by the Climate Action Committee at its May 2020 meeting, followed by a draft *Agriculture Roadmap* at its November 2021 meeting (References 2 and 3). With the completion of engagement, staff have finalized the *Agriculture Roadmap* and are seeking endorsement by the MVRD Board (Attachment 1).

CLIMATE 2050 STRATEGIC FRAMEWORK

Climate 2050 is an overarching long-term strategy that will guide the region's policies and collective actions to transition to a carbon neutral and resilient region over the next 30 years (Reference 1). Metro Vancouver is implementing *Climate 2050* through a series of 10 issue area Roadmaps, which describe long-term goals, targets, strategies and actions to reduce regional greenhouse gases (GHGs) and ensure that the region is resilient to climate change impacts.

Implementation of the Roadmaps will be driven by Metro Vancouver's management plans, including the *Clean Air Plan*, *Metro 2050*, and updated management plans in the areas of liquid waste, solid waste, drinking water, and regional parks (Reference 4). For actions that are within the jurisdiction or responsibility of others, Metro Vancouver can play supporting, convening, and advocacy roles, working closely with other orders of government, First Nations, and member jurisdictions, along with other key stakeholders to advance implementation.

METRO VANCOUVER'S CLIMATE 2050 AGRICULTURE ROADMAP

The agricultural sector contributes approximately 4 percent of the region's total GHG emissions. The *Agriculture Roadmap* sets out Metro Vancouver's pathway to a net-zero, resilient agriculture sector. It establishes a target of reducing GHG emissions by 35 percent from the agriculture sector, relative to 2010 levels, by 2030. This will be achieved by maximizing carbon sequestration where opportunities exist, and by implementing the best available management practices and technologies available to support powering agricultural operations, equipment and machinery with clean, renewable energy.

The agriculture sector is highly vulnerable to climate change, and therefore increasing the resilience of local agriculture is a significant focus of the *Agriculture Roadmap*. One important action to support resilience is to increase the degree to which ecosystem services are utilized and protected by agricultural producers on their lands by developing a regional program that supports the use of these areas over the long-term, both financially and administratively (Reference 5).

Strategies, Actions and Big Moves in the Agriculture Roadmap

To support a net-zero, resilient agricultural sector, the *Agriculture Roadmap* sets out 4 strategies, 68 actions, and identifies 12 'big moves' to help agricultural producers transition their operations to using clean, renewable energy and increase resilience to climate change by embracing nature-based solutions, addressing soil health, and supporting new technologies. The *Agriculture Roadmap* is intended to be updated over time to stay responsive to advancements in technology and production methods, and respond to new challenges that arise related to extreme weather events.

The *Agriculture Roadmap* identifies the following 12 big moves, which are foundational actions needed to achieve the goals and targets:

1. Prepare an Agricultural Land Protection and Viability Strategy.
2. Implement soil movement tracking within agricultural areas.
3. Reduce the encroachment of urban uses into agricultural areas.
4. Explore opportunities to reduce emissions from greenhouses.
5. Develop actionable programs specific to carbon storage on agricultural lands.
6. Support and streamline the operation of anaerobic digestion facilities in the region.
7. Prepare a regional vulnerability assessment of agricultural lands.
8. Build a long-term payment for ecosystem services funding mechanism for agriculture.
9. Explore innovative sources and new technologies for water reuse and water conservation.
10. Integrate climate change considerations into agricultural business operations.
11. Establish pilot projects that carry the financial and operational burden of testing new agri-tech systems.
12. Establish a cost-sharing or group purchase program to reduce the risks of adopting new agri-tech processes and systems.

Nine out of the twelve 'big moves' support increasing the overall resilience of the agricultural sector. Five of those 'big moves' focus on areas Metro Vancouver has the most influence over including protecting agricultural land, tracking soil movement, reducing urban use encroachment, supporting payment for ecosystem services and exploring options for access to water.

Relationship Between the Agriculture Roadmap and *Clean Air Plan*

The *Clean Air Plan*, approved by the MVRD Board in September 2021, supports *Climate 2050*'s vision by identifying the initial actions needed to meet an overall 45 percent reduction in GHG emissions from 2010 levels by 2030 and achieve carbon neutrality for the region by 2050 (Reference 4). The *Agriculture Roadmap* advances the *Clean Air Plan's* GHG reduction target of 35 percent for agricultural-sourced emissions by 2030. There are additional actions in the Roadmap that are not included in the *Clean Air Plan* but were added as a result of engagement feedback related to soils, testing zero-emission agriculture equipment, and supporting anaerobic digestion facilities.

Relationship between the Agriculture Roadmap and *Metro 2050*

Metro 2050, adopted by the MVRD Board in February 2023, is the region's collective vision for how growth will be managed to support complete, connected and resilient communities, while also protecting important lands such as those that support agricultural operations (Reference 6). While *Metro 2050* includes many policies supportive of the long-term protection of agricultural land, some policy improvements to *Metro 2050* are proposed in the *Agriculture Roadmap* intending to reduce

the pressures on agricultural land, which is often viewed as an easy and suitable location to accommodate the region's increasing residential and industrial growth.

ENGAGEMENT PROCESS

A draft *Agriculture Roadmap* was presented to the Climate Action Committee and MVRD Board in November 2021. Between February 2022 and May 2023, staff completed an extensive engagement process including: hosting workshops, offering online surveys, and providing multiple presentations with opportunities for feedback. Engagement focused on providing the Metro Vancouver Agricultural Advisory Committee (AAC) the opportunity to comprehensively review the proposed strategies and actions. Staff also engaged with several Metro Vancouver departments, with team leads preparing other *Climate 2050* Roadmaps intersecting with agriculture including the *Nature & Ecosystems, Energy, Industry & Business, Land Use & Urban Form*, and *Human Health & Well-being Roadmaps,* and with the members of the Regional Planning Advisory Committee and its Environment and Social Issues Sub-committees. Combined, all feedback received from the AAC, First Nations participants, member jurisdictions, Metro Vancouver staff, and the general public, produced over 50 pages of comments, all of which were reviewed, considered and, where appropriate, incorporated into the *Agriculture Roadmap*.

Agriculture Sector Engagement

Metro Vancouver's AAC membership comprises local farmers, representatives from agriculture industry associations and commodity groups, and agriculture and food-focused researchers from local post-secondary institutions. The AAC was instrumental in supporting the preparation of the *Agriculture Roadmap* as the members are best positioned to clarify and provide solutions to the production and climate change issues the sector is challenged with, including how best to support net-zero agriculture and other new action items that do not appear in the *Clean Air Plan*. In addition, the feedback obtained from the AAC, summarized in Table 1, resulted in a higher number of action items and big moves and a different format for the *Agriculture Roadmap* as compared to the other completed Roadmaps.

Table 1: Agricultural Advisory Committee Roadmap Engagement Summary

Interest	How We're Responding
Strategy 1: Protect Agricultural Land	*What we heard:* - Need stronger land use regulatory tools and enforcement penalties for illegal uses on agricultural land; - Agricultural Impact Assessments should be required for any development adjacent to agricultural land; and - Support via incentives, tax breaks, education, and investment coming from all orders of government is vital. *Proposed response:* - Strengthen protection of agricultural land through the preparation of an Agricultural Protection and Viability Strategy; - Re-examine soil movement and tracking on agricultural land; and - Strengthen regional policy in *Metro 2050* to protect agricultural and rural lands from urban encroachment.

Strategy 2: Support Farmers as Climate Action Leaders	*What we heard:* - Cost to transition is a huge barrier; - Knowledge sharing and access to data is a big hurdle; - Existing government programs are under-resourced; and - Anaerobic digestion expertise and cost of maintenance is a challenge. *Proposed response:* - Advocate to the Province to adjust the Environmental Farm Plan program requirements; and - Address the barriers to utilizing anaerobic digestion including: economies of scale; access to waste materials; lack of guidance and understanding from member jurisdictions; and coordinated regulations, policies, and guidelines.
Strategy 3: Support Long-term Farm Health and Resilience	*What we heard:* - Education and lack of understanding is a barrier for farmers; - Financial incentives and investments from all orders of government is needed; - Cost-sharing with farmers to adjust production is necessary; and - Stronger water management is needed. *Proposed response:* - Commit to expanding communication materials and styles; - Advance a project on payment for ecosystem services; and - Examine alternate sources of water including water recycling.
Strategy 4: Support a Viable, Profitable, and Stable Agricultural Sector	*What we heard:* - More investments from all levels of government are needed; and - Lack of understanding that agriculture is a business that needs to be profitable. *Proposed response:* - Support the agriculture sector in testing new agri-tech systems; and - Recognize the business component of agricultural operations by adjusting Strategy 4 to "Support a Viable, Profitable, and Stable Agricultural Sector".

First Nations Engagement

During engagement on the *Agriculture Roadmap*, staff met with the Tsawwassen First Nation Agricultural Advisory Committee and staff to tour their farm site and discuss and better understand the challenges affecting agriculture practices, particularly from a resilience perspective. The valuable information shared about Tsawwassen's farming programs and partnerships was used to inform the final content of the Roadmap. Staff also presented to Kwantlen First Nation in December 2022, and received information about how they are affected by nearby commercial agricultural operations, an issue intended to be reviewed in greater depth as part of the upcoming Regional Food System Strategy update project.

Combined, all feedback received from the AAC, First Nation participants, member jurisdictions, Metro Vancouver staff, and the general public, was reviewed, considered, and where appropriate, applied to the *Agriculture Roadmap*.

ALTERNATIVES

1. That the MVRD Board:
   a) endorse the *Climate 2050 Agriculture Roadmap* as attached to the report dated July 27, 2023, titled "Metro Vancouver's *Climate 2050 Agriculture Roadmap*" as the initial Roadmap to achieve the *Climate 2050* vision, goals, and targets for a net-zero and resilient agricultural sector;
   b) direct staff to continue working with member jurisdictions and other partners to implement the actions in the *Climate 2050 Agriculture Roadmap*; and
   c) direct staff to update the Roadmap, as needed, in response to new information.

2. That the MVRD Board:
   a) endorse the *Climate 2050 Agriculture Roadmap* as attached to the report dated July 27, 2023, titled "Metro Vancouver's *Climate 2050 Agriculture Roadmap*" as the initial Roadmap to achieve the *Climate 2050* vision, goals, and targets for a net-zero and resilient agricultural sector, with amendments proposed by the Climate Action Committee; and
   b) direct staff to update the Roadmap, as needed, in response to new information and as directed.

3. That the MVRD Board receive for information the report dated July 27, 2023, titled "Metro Vancouver's *Climate 2050 Agriculture Roadmap*" and provide alternate direction to staff.

FINANCIAL IMPLICATIONS

The resources required to develop and engage on the *Climate 2050* Roadmaps were approved in the 2021 and 2022 program budgets, including staff time and consulting expenditures. Current and ongoing Regional Planning projects that align with actions in the *Agriculture Roadmap*, include the Ecosystem Services on Agricultural Land Scoping Project, Agricultural Land Use Inventory, and Regional Food System Strategy Update, all of which were included in the Board-approved 2022 and 2023 Regional Planning budgets. Additional implementation actions from the *Agriculture Roadmap* will be advanced through subsequent annual budgets and five-year work plans.

CONCLUSION

The *Climate 2050 Agriculture Roadmap* presents a robust plan for the region to achieve a net-zero, resilient agricultural sector by the year 2050. In laying out that pathway, it identifies key issues, including supporting the region's agricultural operations to reduce their GHG emissions and reducing their vulnerability to climate change including significant changes in temperature and rainfall, managing new shifts in pests and diseases, and adapting to extreme flooding events. Staff recommend Alternative 1, that the MVRD Board endorse the *Climate 2050 Agriculture Roadmap* and direct staff to continue working with member jurisdictions and other partners to implement the actions.

ATTACHMENTS

1. *Climate 2050 Agriculture Roadmap*, dated July 2023
2. Presentation re: *Climate 2050 Agriculture Roadmap*, dated September 7, 2023

REFERENCES

1. *Climate 2050* Strategic Framework
2. Climate Action Committee staff report dated April 17, 2020, titled "Clean Air Plan and Climate 2050 Discussion Paper on Agriculture".
3. Climate Action Committee Staff report dated October 13, 2021, titled "Draft Climate 2050 Agriculture Roadmap".
4. *Clean Air Plan, Issue Area 4: Agriculture*
5. Climate Action Committee Staff report dated May 15, 2023, titled "Agricultural Ecosystem Services in Metro Vancouver".
6. *Metro 2050,* Strategy 2.3 – Protect the supply of agricultural land and strengthen agricultural viability

CLIMATE **2050 Roadmap**

Agriculture

A pathway to a net-zero carbon, resilient Agriculture in Metro Vancouver

July 2023

FRONT COVER: FARMING IN METRO VANCOUVER

Metrotower III,
4515 Central Boulevard,
Burnaby, BC, V5H 0C6
www.metrovancouver.org

July 2023

Metro Vancouver acknowledges that the region’s residents live, work, and learn on the shared territories of many Indigenous peoples, including 10 local First Nations: q̓íc̓əy̓ (Katzie), q̓ʷɑ:n̓ƛ̓ən̓ (Kwantlen), kʷikʷəƛ̓əm (Kwikwetlem), máthxwi (Matsqui), xʷməθkʷəy̓əm (Musqueam), qiqéyt (Qayqayt), se’mya’me (Semiahmoo), Sḵwx̱wú7mesh Úxwumixw (Squamish), scəw̓aθən məsteyəxʷ (Tsawwassen), and səl̓ílwətaʔɬ (Tsleil-Waututh).

Metro Vancouver respects the diverse and distinct histories, languages, and cultures of First Nations, Métis, and Inuit, which collectively enrich our lives and the region.


CRANBERRY PRODUCTION IN PITT MEADOWS

Metro Vancouver

Metro Vancouver is a federation of 21 municipalities, one electoral area, and one treaty First Nation that collaboratively plans for and delivers regional-scale services. Metro Vancouver's core utility services include drinking water, sewage treatment, and solid waste management, along with regional services like regional parks, affordable housing, regional land use planning, and air quality and climate action that help keep the region one of the most livable in the world.

Mission

Metro Vancouver's mission is framed around three broad roles:

1. **Serve as a Regional Federation**

Serve as the main political forum for discussion of significant community issues at the regional level, and facilitate the collaboration of members in delivering the services best provided at the regional level.

2. **Deliver Core Services**

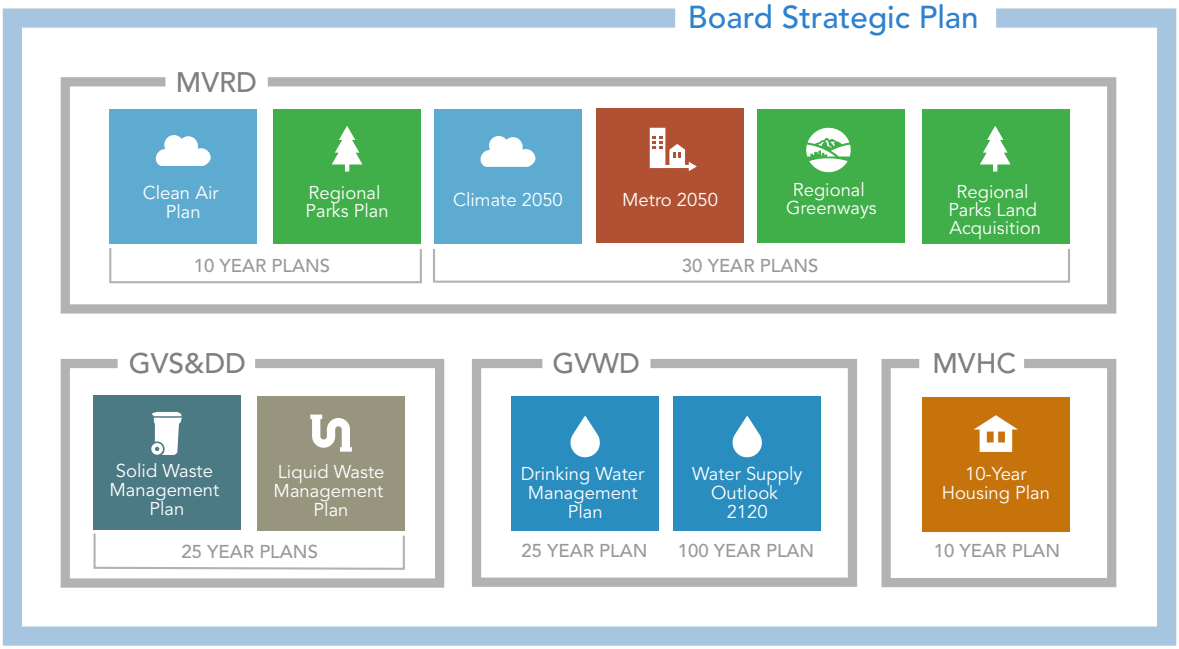
Provide regional utility services related to drinking water, liquid waste, and solid waste to members. Provide regional services, including parks and affordable housing, directly to residents and act as the local government for Electoral Area A.

3. **Plan for the Region**

Carry out planning and regulatory responsibilities related to the three utility services as well as air quality, regional planning, regional parks, Electoral Area A, affordable housing, labour relations, regional economic prosperity, and regional emergency management.

Building a Resilient Region

Building the resilience of the region is at the heart of Metro Vancouver's work. Each of Metro Vancouver's regional plans and strategies adopts a vision, guiding principles, goals, strategies, actions and key performance measures that will support a more resilient, low carbon, and equitable future. Metro Vancouver's interconnected plans and strategies are guided by the *Board Strategic Plan*, which provides strategic direction for each of Metro Vancouver's legislated areas of responsibility, and the *Long-Term Financial Plan* which projects total expenditures for capital projects and operations that sustain important regional services and infrastructure. Together these documents outline Metro Vancouver's policy commitments and specific contributions to achieving a resilient region.




AGRICULTURAL LANDS IN SURREY

Metro Vancouver's Roles and Responsibilities for Climate Action

The three broad roles outlined in Metro Vancouver's mission demonstrate responsibilities related to climate change. More specifically, under the *Environmental Management Act*, Metro Vancouver has the delegated authority to provide the service of air pollution control and air quality management and may, by bylaw, prohibit, regulate and otherwise control and prevent the discharge of air contaminants, including greenhouse gas emissions. Through *Metro 2050*, the Regional Growth Strategy, Metro Vancouver and its members, plan for compact, complete communities that are foundational to enabling a carbon neutral, resilient region. As part of delivering its core services, Metro Vancouver also generates and uses clean, renewable energy from its facilities and is working to ensure core regional services and infrastructure are prepared for and resilient to climate change.

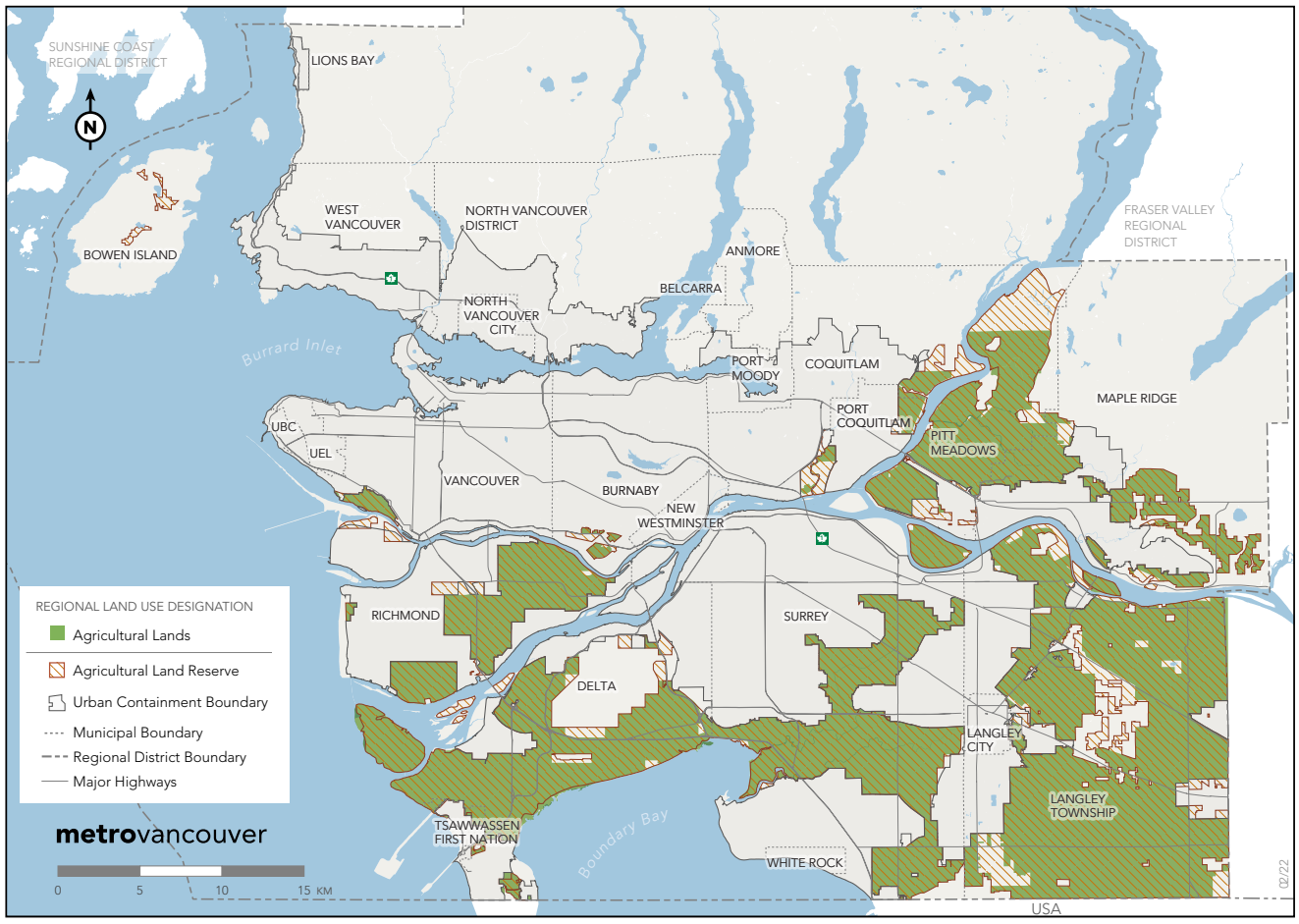
In its role as a regional forum, Metro Vancouver builds and facilitates collaborative processes which engage the public and build partnerships to address significant regional issues like climate change. As part of this role, Metro Vancouver coordinates with and advocates to other governments and regional partners on behalf of its member jurisdictions on greenhouse gas management and climate change adaptation initiatives. Many regional partners will be looked toward to lead the implementation of key actions in the *Climate 2050 Roadmaps*, highlighting the importance of ongoing collaboration with other governments and partners.

The Roadmap at a Glance

Supporting the viability and long-term productivity of agricultural land in Metro Vancouver is incredibly important to the region's urban population. Comprising approximately 20% of the land base in the region, agricultural land supports the local economy (12,148 direct farm jobs (2020, Census Canada)), supplies residents with healthy, fresh food ($1.3 billion annual operating revenues (2020, Census Canada)), and provides valuable ecosystem services such as flood control, wildlife habitat, and clean air. Additionally, agricultural producers rely on healthy ecosystems, balanced soils, and predictable growing conditions in order to manage and support a healthy and complete food system. The agricultural sector, however, has increasingly been facing difficult challenges due to the effects of climate change.

Like many sectors, agriculture is affected by higher temperatures, shifting precipitation patterns, severe weather events, and ongoing sea level rise. In response to these complicated and challenging climate change impacts, this Roadmap focuses on supporting new technologies, using renewable energy sources, supporting healthy soils, conserving ecosystem services, and encouraging adaptation as a method to support a resilient agricultural community that will survive, thrive, and also contribute to reducing the effects of climate change.

The *Climate 2050 Agriculture Roadmap* is about taking the necessary steps to ensure the agricultural sector is supported in its journey to resilience and enabling the long-term production of the food this region relies on. This Roadmap lays out four key strategies and actions that will reduce the region's greenhouse gas emissions and create a strong, adaptive agricultural community in Metro Vancouver by 2050.



METRO VANCOUVER'S DESIGNATED AGRICULTURAL LANDS

BLUEBERRY FIELD

The *Agricultural Roadmap* sets out actions reducing emissions and increasing resilience, organized under the following 4 strategic areas:

1. Protect Agricultural Land
2. Support Farmers as Climate Action Leaders
3. Support Long-Term Farm Health and Resilience
4. Support a Viable, Profitable and Stable Agricultural Sector

To achieve a carbon neutral agricultural sector in this region, farmers will need support to transition their operations to use sustainable technologies (e.g., solar power) and to incorporate regenerative agriculture and nature-based solutions into their daily practices. Farmers should not be left to manage this transition on their own, as the food availability in this region, both today and well into the future, relies on making these adjustments as a collective whole, with each stakeholder playing a vital and unique part:

- **For Farmers** – this includes using climate smart, ecologically-minded regenerative agriculture to increase resilience and investing in new available technologies to take advantage of digital systems and processes;
- **For Industry** – this includes funding new research and embracing digital innovations or supporting information sharing to create new low-carbon options (e.g., electric farm equipment);
- **For Consumers** – this includes increasing awareness (e.g., connection between agriculture and climate change resilience), adjusting personal choices (e.g., eating more local food and reducing food waste), and becoming stronger advocates (e.g., supporting structural and regulatory change that protects agricultural land and the longevity of farming in the region); and
- **For Government** – this includes collectively establishing policies, creating programs, and providing financial assistance to support needed changes in the agricultural sector in order for it to become resilient to the climate challenges ahead.

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AGRICULTURAL LAND IN LANGLEY TOWNSHIP

The Vision: Net-Zero Carbon, Resilient Agriculture by 2050

In 2050, agriculture is a key contributor to a low-carbon future having embraced clean, renewable energy sources, switched to regenerative farming practices, and utilized farm land for both carbon capture and local food production.

Agriculture continues to significantly contribute to Metro Vancouver's regional economy, provides fresh, healthy food for local use and export markets, and operates in a sustainable and resilient capacity. Agricultural land is protected for future farming needs, and it helps to manage floods, captures carbon and provides habitat for pollinators and other wildlife while also benefitting from these ecosystem services.

Agricultural production practices have evolved and continue to adapt to the vulnerabilities of climate change. Farmers are able to adapt operations to manage changes in temperature and rainfall and modify farming practices to extreme weather events by using technological innovations and by taking advantage of new or expanded capacity and financial support systems. The agricultural community has seen noticeable improvement and maintenance of soil health and has increased and expanded its agricultural viability overall, ensuring a long-term succession of farming and sustainable local food production for future generations.

The Challenge

A pathway to net-zero carbon, resilient Agriculture in Metro Vancouver

Agriculture in the Metro Vancouver region contributes to the regional economy and provides fresh, healthy food for residents, visitors, businesses, and export markets. In addition, agricultural land provides an aesthetic landscape and other public benefits referred to as ecosystem services, including wildlife habitat, carbon sequestration, water infiltration, and flood management. At the same time, some agricultural activities cause greenhouse gas (GHG) and health-harming air contaminant emissions. These typically come from livestock production, farm equipment, excess fertilizer applications, burning of organic residues, and the heating of greenhouses with fossil natural gas and other fossil fuels.

From an emissions perspective, compared to other, more significant contributors of greenhouse gases (GHG) in the region, agriculture sources make up approximately 4% of the total, largely from three main areas: 1. carbon dioxide produced from fossil fuel combustion to heat greenhouses and to run farm equipment; 2. methane from livestock and manure storage; and 3. nitrous oxide from fertilizer and manure soil treatments. While the agricultural community is not a significant contributor to the region's overall GHG emissions, for Metro Vancouver to achieve carbon neutrality by 2050, all sectors will need to do their part to lower emissions or eliminate them entirely.

From a climate change perspective, agricultural activity is vulnerable to and continuously impacted by the worsening effects of extreme weather events including atmospheric rivers and extended droughts. Farmers are subjected to such things as flooding, salt intrusion into soils, and an increase in new pests and plant diseases - all of which affect local food production. To increase agricultural resilience, we need to support farming practices that embrace nature-based solutions, improve soil health, including reducing contamination and the spread of invasive species, strengthen agricultural viability, and sustain local food production for future generations.

This Roadmap is being created to help the region reach a low-carbon, resilient future while also improving air quality. By 2050, the agricultural sector can become carbon neutral and be powered with clean, renewable energy. Farmers can use regenerative farming practices to capture carbon and build the soil for long-term productivity. Agricultural land can be protected and invested in to enable food production and provide secure tenure to farmers to sustain the agricultural community over the long term.

What is a Carbon Neutral Region?

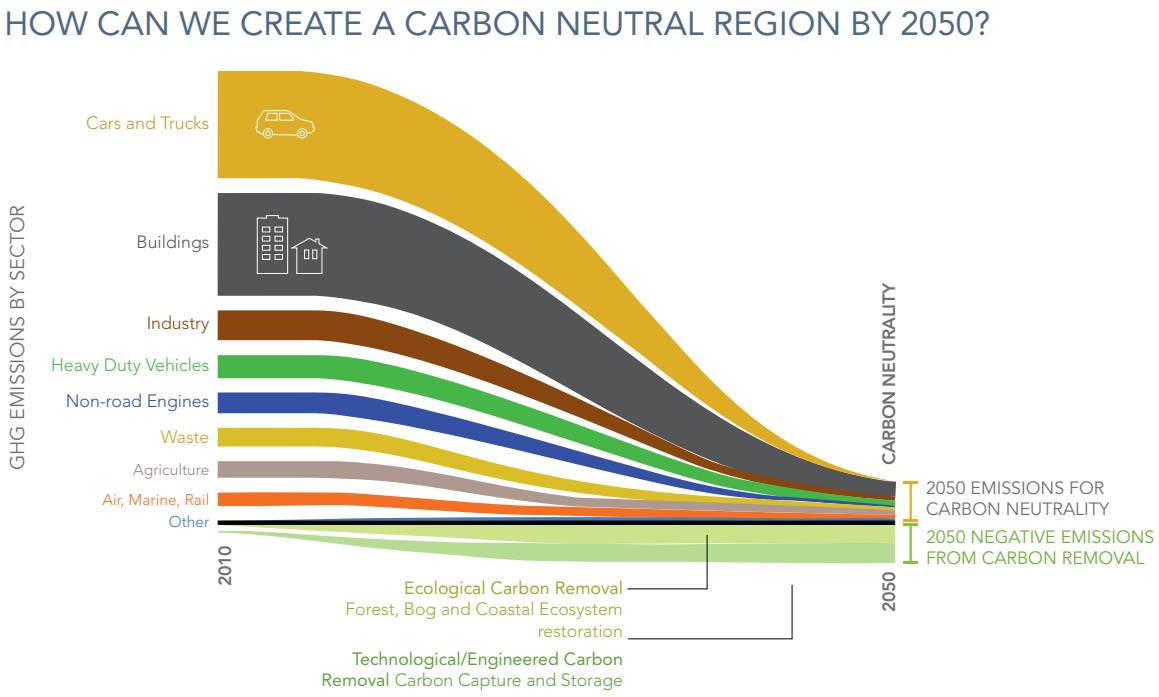
A carbon neutral region generates no net greenhouse gas emissions. This is achieved through the deepest greenhouse gas emission reductions possible across all economic sectors. Any remaining emissions are balanced out by the carbon dioxide that the plants, trees, and soil in the region remove and capture from the atmosphere, or potentially through technological means.

A carbon neutral region is the best option for future generations to maintain a good quality of life beyond 2050. Some difficult decisions and investments have to be made today to not pass these challenges onto upcoming generations at higher costs and consequences. Metro Vancouver, and many of its member jurisdictions, has committed to ambitious targets and bold leadership to respond to the climate crisis. This Roadmap responds to the specific issues and ideas raised by the region's agricultural sector and responds to the global challenge to come together, think big, and act now.

The Goals

GOALS	TARGETS AND MEASURABLE OUTCOMES
GOAL: The agricultural sector is carbon neutral and maximizes carbon sequestration.	**TARGET:** 35% reduction in greenhouse gas emissions from the agricultural sector by 2030, relative to 2010 levels.
GOAL: All agricultural operations minimize greenhouse gas emissions using best available management practices and technologies, and are powered by clean, renewable energy.	
GOAL: The agriculture community consistently applies its knowledge of the benefits of ecosystem services to support the resilience of local farming operations.	**MEASURABLE OUTCOMES:** To Be Determined. Measurable climate-resilient outcomes are currently unknown for the agricultural community. Additional review and consultation will be required to determine what outcomes are attainable and measurable on how well the region's agricultural producers are adapting to climate change impacts.
GOAL: Metro Vancouver's complete food system is adaptable and resilient.	
GOAL: Long-term investment in the agriculture community is coordinated and successful.	

While the agriculture sector is one of the lowest GHG emission sources in the region, efforts to reduce these emissions are required from all sectors in order to reach the 2050 carbon neutrality goal.



DAIRY FARM

The Connection Between Climate and Air Quality

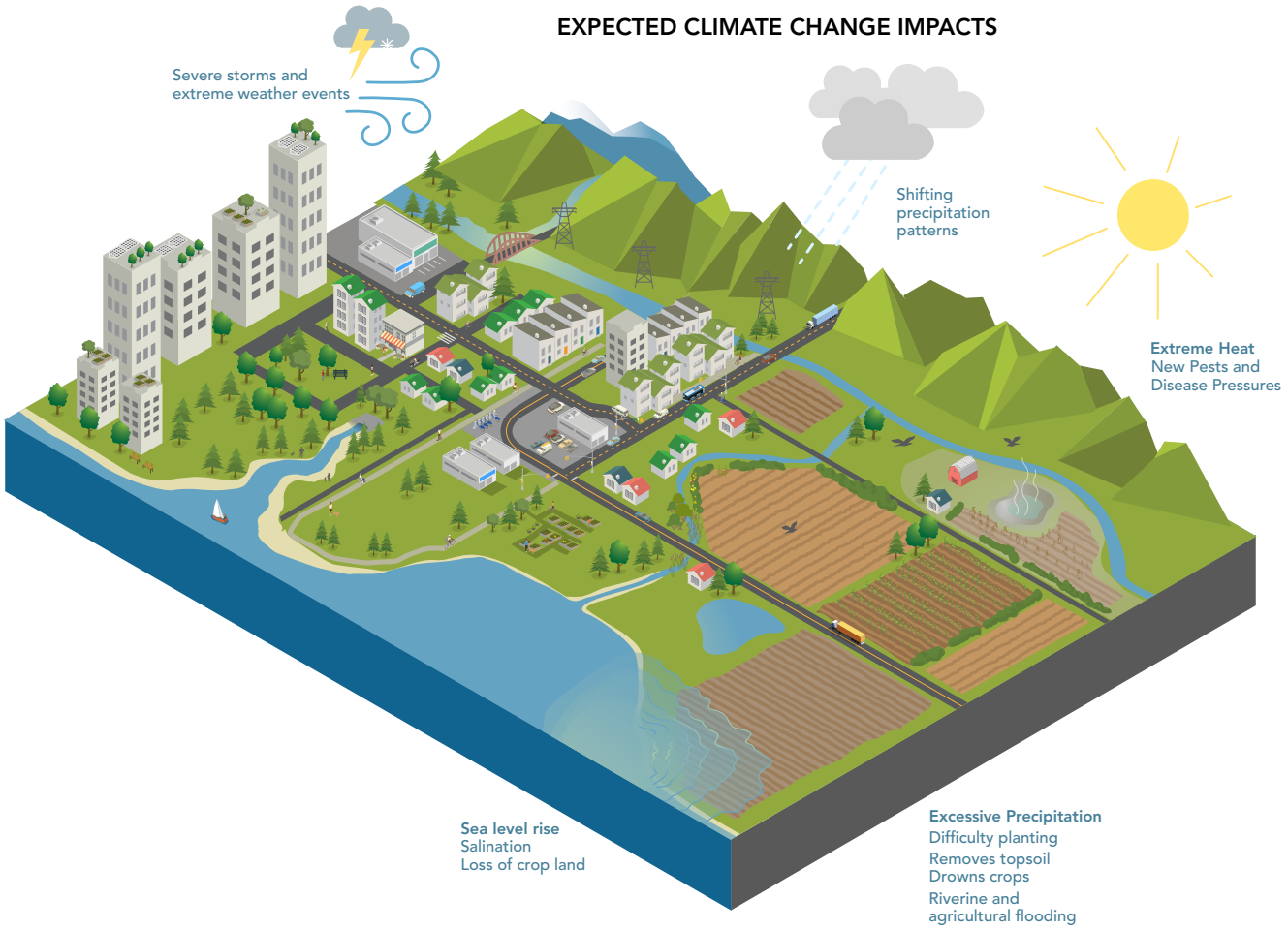
The *Clean Air Plan* is Metro Vancouver's air quality and greenhouse gas management plan. Actions in the Plan will reduce air contaminant emissions and impacts, including greenhouse gases in our region, to 2030. Implementing these actions also supports the 2030 target of reducing total regional greenhouse gas emissions by 45%, including a 35% reduction within the agricultural sector, compared to 2010 levels, and establishes the foundation for the 30-year commitment of a carbon neutral region by 2050. The *Clean Air Plan* also includes air quality targets for the region.

Agricultural activities, such as fuel combustion, manure management, and fertilizer use, generate greenhouse gases and air contaminants with direct health impacts. Actions in this Roadmap and the *Clean Air Plan*, combined with policy in *Metro 2050*, the Regional Growth Strategy, which also supports carbon neutrality by 2050, will help reduce these emissions to protect human health and the environment.

The Impacts: Climate and Agriculture

The agricultural sector is one of the most vulnerable sectors to the impacts of climate change. Farmers manage their operations and grow high quality local food while continually dealing with significant changes in temperature and rainfall, extended droughts, shifting pests and diseases, and extreme weather events that can drastically affect their businesses and production yields. These impacts are not unique to this region; all parts of the world, including areas that grow food that residents of Metro Vancouver rely on, have been and will continue to be affected by changes in climate.

While climate change-caused temperature increases may benefit agriculture by expanding the growing season and enabling a wider variety of crops that can be produced locally, overall, there is more uncertainty about how these significant climate risks will negatively affect agriculture. Ultimately, regardless of what the exact impacts are, the ripple effects result in an increase in the costs of crop and livestock production, a reduction of the economic viability of the agricultural sector, and an increase in food insecurity for the region as a whole.



Based on climate projections to the 2050s we can expect the following climate changes and the resulting impacts felt on the agricultural sector in the Metro Vancouver region:

Climate Changes

Hotter temperatures, overall, with higher daytime and nighttime temperatures, and more hot summer days. This will lead to increased frequency and severity of heatwaves, wildfires and droughts.

Shifting precipitation patterns, including more rainfall in every season except the summer, and less precipitation falling as snow.

Severe storms and extreme weather events, including high winds and heavy rainfall.

Sea level rise, with 0.5 m expected by 2050, which will impact coastal communities in our region. Sea level rise is an important aspect of climate change with significant regional impacts.

Drought, increasing in length during summer months, is exacerbated with an increase in hotter temperatures.

Impacts Felt

Adjustments in temperature disrupt expected seasonal temperature changes affecting livestock and crop mortality and the increase in the prevalence of new parasites and diseases. A longer growing season can lead to earlier harvests, a greater range of crop suitability, and a decrease in heating costs for greenhouses in cooler months; however, warmer temperatures will lead to an increase in demand for water for irrigation during the growing season and exacerbate pest and disease problems that are often controlled by cooler temperatures.

Variations in temperature increase the variability in growing conditions which can impact crop quality, pollination, and the life-cycle of pests and disease. These changes create challenges in aligning production with processing schedules. Hotter summers and heat waves also decrease crop productivity and quality and increase losses. Heat stress may require more heat-tolerant plants which may not currently be in use and may increase stress on limited water resources placing additional demands for irrigation. Energy use increases for the cooling and ventilation of greenhouses, crop storage and livestock.

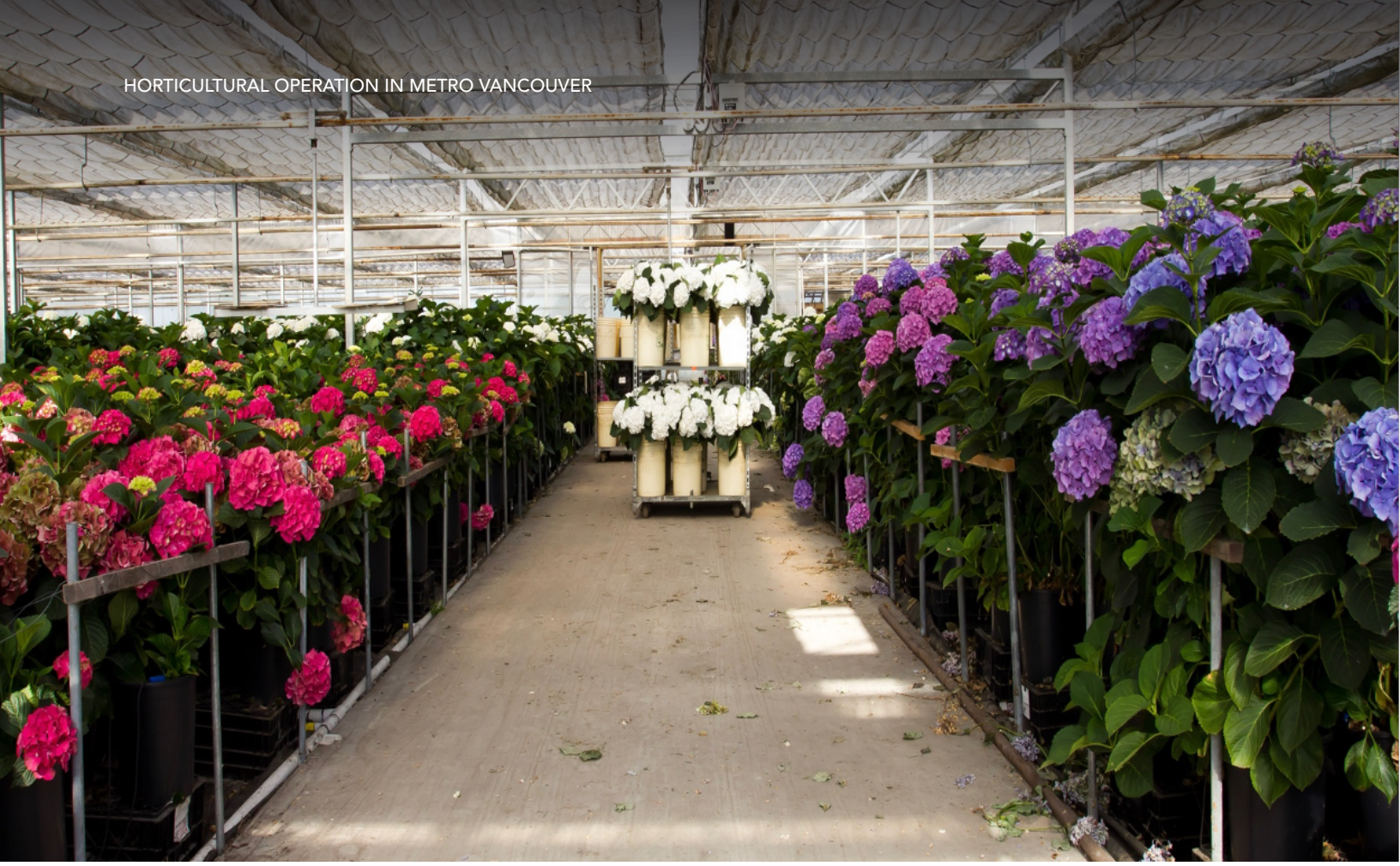
Changes in precipitation increases the demand for supplementary irrigation that could put pressure on local water supplies and on adjacent ecosystems and riparian areas. Unreliable rainfall during the growing season increases irrigation requirements that didn't previously exist and waterlogged soils lead to delayed planting, soil compaction, and nutrient leaching. Crop damage, crop loss, livestock relocation, and soil erosion are all additional challenges agricultural producers are facing due to the changes in precipitation experienced within this region.

SMALL LOT FARMING IN METRO VANCOUVER

Riverine and field flooding from periods of extreme rainfall and increased runoff from adjacent urban development reduces ground permeability and causes long-term inundation of water into agricultural lands. This water intrusion reduces and limits agricultural production potential and causes root rot damage to year-round crop varieties.

More incidences of coastal flooding from higher tides and more severe storm surges causes immediate and long-term damage to agricultural land and operations including increased salinization of soils from brackish water, increased coastal erosion, loss of livestock and crops, reduced fish passage and a decrease in water quality used for irrigation and ecosystems. Coastal flooding also places additional pressures on ensuring flood prevention mechanisms, such as dykes, spillways and pumps, are all adequately maintained.

Food loss from climate change impacts affects the availability and pricing of local food and international food markets, to produce enough food for human consumption. Local food systems impacted by climate change also experience disruptions to regional infrastructure, supply and delivery lines, a skilled agricultural labour force, and trade markets. This may lead to food price increases, food shortages of some agricultural products, distribution disruptions, and an overall increase in food insecurity.



HORTICULTURAL OPERATION IN METRO VANCOUVER

The Emissions: Agriculture in Metro Vancouver

Metro Vancouver's 2015 regional emissions inventory estimates that agricultural activities generate 4% of total GHG emissions in the region. Sources of agriculture-related GHG emissions in this region include: carbon dioxide from fuel combustion in greenhouses and farm equipment; methane from livestock and manure storage; and nitrous oxide from fertilized and manured soils (Note: Greenhouses referenced in this Roadmap also include licensed cannabis greenhouses).

Agriculture emits approximately 10% of the total GHGs in Canada, with similar estimates for agriculture globally. While this figure measures emissions from agricultural production (including for food and non-food products) it does not reflect the full spectrum of emissions caused by a complete food system from upstream fertilizer and farm equipment manufacturing, nor downstream from food transportation, refrigeration, processing and food waste disposal.

Opportunities to reduce GHG emissions from agriculture in Metro Vancouver include using cleaner, more renewable fuels, reducing energy demands and improving the energy efficiency of greenhouses, improving fertilizer and manure management, and altering livestock diets. Agriculture can also contribute to carbon sequestration by supporting ecosystem services through natural vegetation and forests, planting trees and hedgerows, and using regenerative farm practices that add carbon to soil. Protecting agricultural land for farming also prevents land conversion and development that generally emits more GHGs.

An Overview: Net-Zero Emissions, Resilient Agriculture

Reaching net-zero emissions and resilience in the agriculture sector involves considering and balancing, wherever possible, necessary elements of climate change action:

- **Reducing Greenhouse Gas Emissions** that accelerate climate change; and
- **Increasing resilience** and the agriculture sector's ability to prepare, respond, and recover from the effects of climate change that cannot be avoided.

A "net-zero emissions and resilient" agricultural sector is one that emits low-to-no GHG emissions and is able to withstand the negative effects of a changing climate, ensuring farm yield and business livelihoods are maintained. Looking to 2050, this Roadmap seeks to support the continued transition of agriculture toward a net-zero emissions future where renewable energy systems, innovative farm practices, and grazing and crop techniques support a sustainable and thriving future. By aiming for all of these desired outcomes simultaneously, we can identify ways to reduce emissions and vulnerability to climate change impacts at the same time.

For meaningful change to take place within the agriculture community, it is helpful to examine how it is connected to the three pillars of sustainability: economic, environmental and socio-cultural. These three pillars can also be used to structure and support necessary solutions and actions for change.

1. Economic – agricultural operations are businesses that need to make profits to survive and continue to function; these businesses can be difficult to adjust and may rely on expensive innovations and new technologies that still need to be developed in other sectors. For example, farmers cannot stop using diesel tractors until alternative fuel source (e.g., electric) tractors have been developed, commercialized, and made widely available. When appropriate funding, incentives and technologies are offered to the agricultural sector, farmers can begin to implement these new innovations while still maintaining profitable businesses.

2. Environmental – farming relies on and is affected by the environment. Producers can transition to new fertilizer types and application methods, incorporate new irrigation systems, and adjust soil quality to increase carbon sequestration, but such adjustments to farming practices may take multiple growing seasons before success can be determined. Using nature-based solutions to solve problems is likely the best case scenario; however, outcomes are hard to determine in the short term.

3. Socio-cultural – many farms are family-run businesses with generational ties to farming practices and many farms operate within a region where most residents have limited experience with the challenges and realities of running a farm. While these can be difficult to overcome, farming is faced with the need to adjust its practices and generational knowledge as well as recognize that residents want to have a closer connection to their food.

POTATO FIELD

What is the difference between "Zero Carbon", "Zero Emissions", and "Net-Zero"?

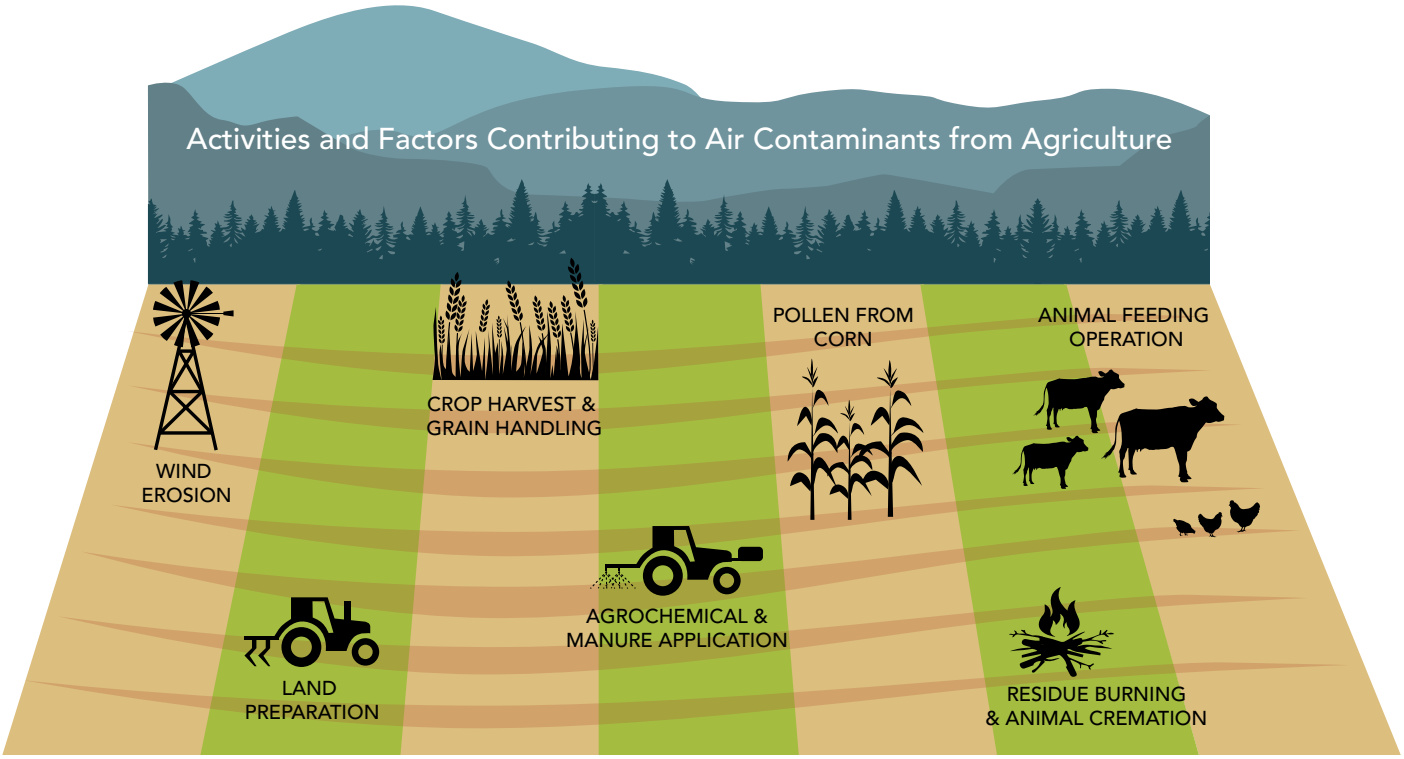
"Zero Carbon" also known as Zero Carbon Emissions, is reached when no greenhouse gas emissions exist at the point of use. A zero carbon fuel source either produces no GHG emissions, or the emissions produced are offset by renewable energy (either generated onsite or purchased).

"Zero Emissions" are reached when no greenhouse gases or other air contaminants are generated at the point of use. Zero emissions include zero carbon and the elimination of or non-existence of health-harming air contaminants (e.g., fine particulate matter and nitrogen oxides).

"Net-Zero" is reached when there is a balance between the whole amount of greenhouse gases that are released into the atmosphere and the amount that is taken out.

Lower Emissions: Clean, Renewable Energy and New Technology

Some agricultural operations emit air contaminants that can impact human health and the environment. These contaminants are sourced from a variety of farming practices including: poultry and cattle manure use, greenhouse heating by-products, types of livestock feed, fertilizer application, and pesticide application.



Each of these contributors to air contaminants can be mitigated and addressed, with varying levels of success, by using a combination of renewable energy sources, new technologies, new management practices, and new input application methods.

1. Renewable Energy Sources

Adjusting fuel sources used by trucks, tractors, greenhouses, and agricultural buildings and equipment represent opportunities for the agricultural sector to transition to the use of clean, renewable energy sources. This transition, however, comes with significant challenges that cannot be managed or funded solely by agricultural producers. For example, while farmers do need to replace vehicles or equipment and modify buildings with clean or renewable fuel sources, much of the required technology to do so is not currently available, let alone within reach financially.

2. New Technologies

New technologies across all components of the agricultural sector are being invented, tested and applied to mainstream uses on a regular basis (e.g., through support from the BC Agri-tech Grant Program). New energy sources such as renewable natural gas, hydrogen energy, biogas from manure digesters, and re-using captured carbon dioxide are all options that have potential to transform agricultural operations into carbon neutral producers. Greenhouses have the most to gain from these new technologies; however, more

work is required to fully understand how fuel is used and released, how different technologies and fuel types can be applied to existing buildings and production systems, and how the costs and financial feasibility of retrofitting existing structures can be managed. These new technologies can be used in conjunction with improving the energy efficiency of greenhouses (e.g., improving thermal performance) to increase the overall sustainability of the agriculture sector.

3. New Management Practices

Adjusting farm management practices to support lowering agriculture-based air emissions is an area where the agricultural community has more direct control, including:

- enhancing grazing practices and optimizing grass and forage to reduce methane emissions from cattle;
- expanding the practice of on-farm crop and food waste composting solutions; and
- using regenerative agricultural practices to increase carbon storage in soils.

Additional data collection to support these practices is vital to understanding the degree to which the agricultural community can contribute to a reduction in GHG emissions in the region and also contribute to the long-term resilience of agricultural operations.

4. New Input Application Methods

In farming, field crops use nutrients, or inputs, such as potassium, phosphorous, and nitrogen to increase yields. These nutrients are replaced back into the soil for each growing cycle through the use of mineral fertilizers. As these fertilizers are applied to crops, often through a standardized application process regardless of plant need, GHG emissions (e.g., nitrous oxide) are released into the atmosphere. Research, and the application of agri-tech solutions, has shown that slow-release fertilizers and precision applications (e.g., field mapping captured from drones) can more specifically determine which parts of the crop need the fertilizer resulting in an overall reduction of emissions from this input type.

FIELD MAPPING CAPTURED BY DRONES

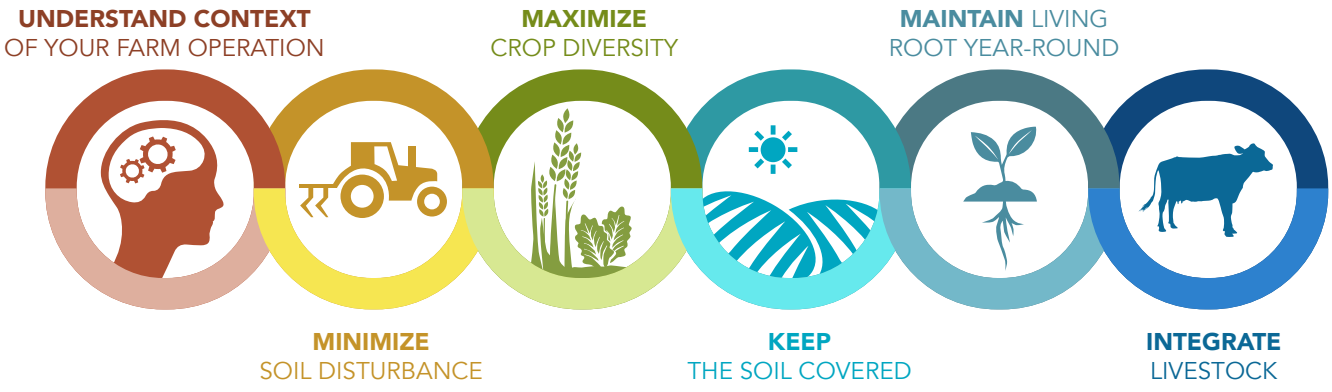
Ecosystem Services: Understand, Benefit From, and Support

The agriculture sector within the Metro Vancouver region, British Columbia, Canada and across the globe is at a turning point of needing to adapt to the increasingly extreme effects of climate change. When they occur, floods, rainfall events, heat waves, and droughts are lasting longer or are more severe. Crop losses are becoming more extensive, pest management is more difficult, and production costs are more expensive. Through all of this, farmers are relied upon and expected to increase production yields while maintaining crop quality even though it becomes harder and more challenging to do so. In order to continue to fill this economic and social demand, farms must become as healthy and resilient as possible. This is best achieved by understanding and benefiting from the ecosystem services provided by nature and working with those systems to ensure the long-term viability of agricultural producers (see page 34).

1. Regenerative Agriculture

The agricultural sector is affected by and relies upon the natural environment. As the negative effects of climate change continue to increase and take their toll on farming operations, natural systems are increasingly being identified as something farmers can turn to, not only to help them adjust to the changing conditions, but to also counteract the impacts of climate change. Regenerative agriculture focuses on restoring high-quality soils and the biodiversity and water resources on land focusing on working in sync with nature. Regenerative land management practices such as agroecology and agroforestry are increasingly being applied by farmers globally and show promising signs of success.

6 Core Principles of Regenerative Agriculture



2. Ecosystem Services

On farmland throughout the region, existing healthy ecosystems and their natural processes provide benefits to humans known as "ecosystem services".These services help farmers manage against the uncertainty of extreme weather conditions (e.g., wetlands can store excess water during a flood event), help combat against invasive species, provide habitat for pollinators, create shade areas for livestock, beneficial insects and animals, reduce wildlife conflicts with field crops, and provide an opportunity to increase the overall resilience of agricultural operations. Identifying the best ways to enhance ecosystem services on farmland, as well as natural areas adjacent to farmland in Metro Vancouver, depends on understanding the unique landscapes that exist here (e.g., rain, wind and sun microclimates, ocean and riverine environments, species-at-risk locations, and soil composition) so they can be collectively leveraged to create a resilient agricultural sector.

SOIL-BASED AGRICULTURE

3. Payment and Programs for Ecosystem Services

To increase the resilience of the region's agricultural sector, adaptation will need to take place at the farm level. A viable and increasingly common adaptation strategy is the retention and restoration of natural areas such as forests, wetlands, streams, hedgerows, and fallow or "old fields", which provide important ecosystem services that benefit producers, biodiversity, and regional resiliency. Accommodating ecosystem services at the farm level requires individual farmers to take some land out of production and place them in "set-asides" which can result in the loss of production and loss of income. Organizations such as Delta Farmland & Wildlife Trust and Farmland Advantage provide payment for ecosystem services on farmland in Metro Vancouver but these programs rely on short-term payment programs and are not guaranteed from year-to-year. For long-term resilience to be achieved, a stable region-wide program with payment options is required.

4. Soil Health

Healthy soil is the backbone to a sustainable, resilient agricultural sector. Healthy soil helps to:

- retain water and increase infiltration;
- reduce the effects of drought;
- reduce fertilizer application needed for crops;
- reduce the proliferation of invasive species;
- improve soil nutrients; and
- support deeper plant root growth which helps sequester carbon and reduce carbon dioxide release into the atmosphere.

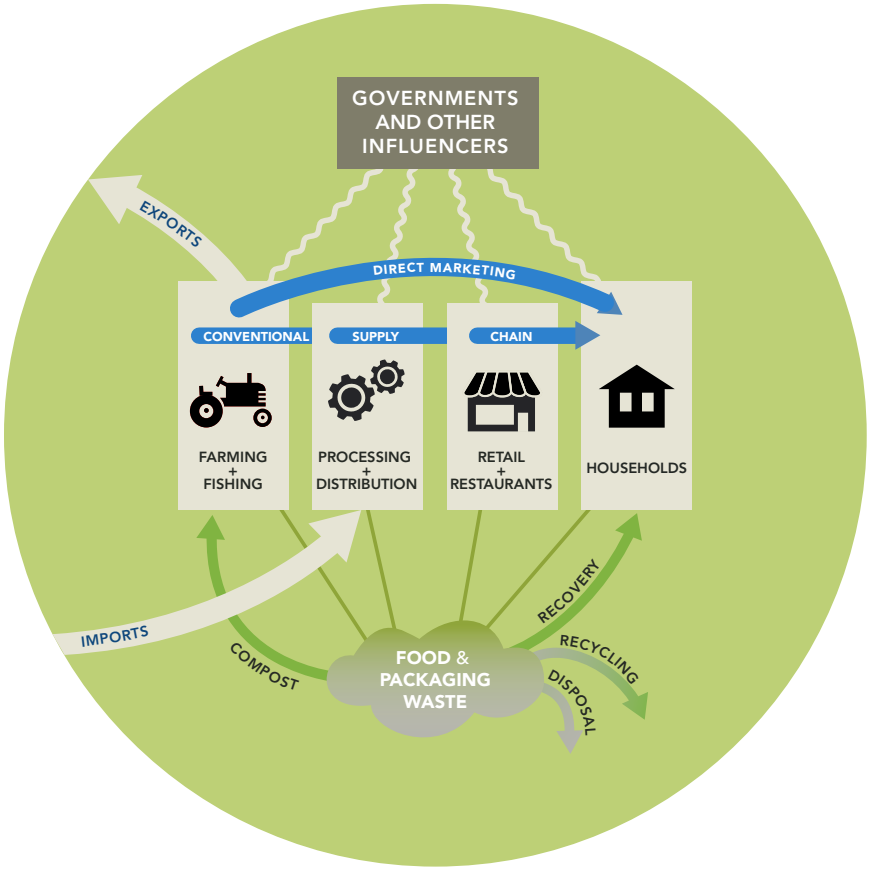
Research is ongoing at all levels, including at local universities, to determine the benefits of healthy soils, which is imperative to help all aspects of the agricultural sector understand how it can benefit from the soil it depends on. Addressing soil degradation, including hydrological changes, contamination, and an increasing prevalence of invasive species, is also important to address to ensure overall optimum soil health for agricultural production is achieved.

Food Systems: Adaptation and Resilience

The Metro Vancouver region is one of the most important food producing areas in British Columbia. The systems that support food production in this region are comprised of a myriad of players engaged in farming, processing, transporting, distributing, and consuming food as well as managing packaging and food waste and nutrient recovery. These players function as individual units yet are simultaneously part of a larger natural, social, economic, and political system that is incredibly complex, layered, and multi-jurisdictional. Food systems that are sustainable and able to adapt to changing climate, economic and societal conditions are energy efficient, protect ecosystems as part of their operations, build and bind a local community, and provide for sustained and attainable economic development opportunities.

In the context of this Roadmap, sustainable food systems are not just about providing local, healthy food, they are about ensuring the resilience of the farm system in the context of significant major driving forces such as development pressures, climate change impacts, GHG emissions reductions, increasing transportation costs, pandemics and global health crises, international conflicts, and droughts, floods and an increased incidence of severe weather events, to name a few. Transitioning to a sustainable, adaptable, and resilient food system will require a multitude of interventions, decisions and changes in business and consumer practices both at the community and individual level.

FOOD SYSTEM COMPONENTS



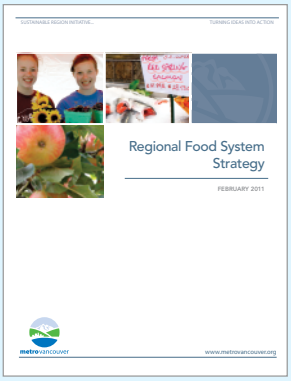
1. Food System Strategy

A key step in examining the resilience of Metro Vancouver's food system is to update the existing *Regional Food System Strategy*. This would allow for a separate process to answer the challenging questions about sustainability, adaptability, and resilience solely from the perspective of food. New experiences such as a global pandemic and exacerbated experiences such as extended heat waves and droughts can be examined cohesively with other issues such as vulnerabilities in the food chain, Indigenous access to traditional foods, Indigenous knowledge of food biodiversity and its cultural significance, inefficiencies in the transportation system, reducing agricultural and pre- and post consumer waste, and Agri-tech and the role of technology and innovation.

2. Systemic Agricultural Changes

Large portions of the region's most productive agricultural lands that occupy low-lying reclaimed coastal regions are susceptible to coastal flooding and are at risk from increased soil salinization, widespread water inundation, and crop loss. A significant amount of work has already been done to examine how communities can manage sea level rise; however, on-going frequent coastal flooding has driven new research to focus on how this is impacting the agricultural community. A general lack of understanding is still present however, on what systemic changes are needed to ensure the long-term viability of the region's farms. Focusing on cover crops, improving soil structure, switching to salt-tolerant crops and ensuring long-term protection of agricultural areas from the negative impacts of adjacent urban development (e.g., on farm changes in hydrology and drainage patterns) are all elements that need to be examined in more detail and applied at a regional scale.

Regional Food System Strategy



In 2011, the MVRD Board endorsed the *Regional Food System Strategy* to create a collaborative approach to a sustainable, resilient and healthy food system. Since that time, the Metro Vancouver region has experienced a significant amount of change including:

- A considerable increase in region-wide urban growth placing unprecedented pressure on agricultural lands to accommodate non-farm uses, urban transportation overflow, and space for recreational uses;
- An increase in food insecurity among vulnerable populations as well as new demographic sectors as a result of a global pandemic, military conflicts, and inflation;
- A change to local weather patterns such as heat domes and extended droughts resulting in crop damage and food unavailability.

These changes place substantial pressures on the regional food system increasing food insecurity for all residents.

These issues, as well as a gap in the acknowledgement and strengthening of Indigenous food sovereignty, will need to be examined within the broader framework and context of the complete regional food system. To accomplish that effectively, the *Regional Food System Strategy* will require an audit to determine if its policies are still relevant and are broad enough to address the identified gaps.

Of particular note, the following items should also be explored from a food system point of view:

i. examine the Milan Urban Food Policy Pact to determine what regional monitoring frameworks can be implemented to evaluate gaps in policy and resource mobilization and reveal overall food system improvements;

ii. examine the entire food system chain from a regional level to determine where emissions can be reduced and what efficiencies can be achieved;

iii. examine the Food and Agriculture Organization of the UN to determine what sustainability indicators can be applied regionally to Metro Vancouver;

iv. work with First Nations, the BC Government and the Indigenous Advisory Council on Agriculture and Food, to identify opportunities to strengthen Indigenous food systems and increase Indigenous participation in the agriculture and food sectors;

v. examine how the local agriculture community can diversify, including: new, more resilient crop species; appropriate locations for crops based on soil type and hazard vulnerabilities (e.g., coastal flooding); and new adaptive agricultural management and production models;

vi. establish inter-municipal learning opportunities for staff, administration and council to learn from each other, and understand how municipal interests and activities intersect with food systems planning and decision-making;

vii. determine the content for a step-by-step instructional toolkit to be used by new or young farmers interested in starting a farm operation within Metro Vancouver; and

viii. address the tension that exists between food safety (e.g., health protection that places restrictions on food processing) and food security (e.g., health promotion that can be disconnected from food safety requirements) activities.

Long-Term Investment: Enable and Support Resilience and Economic Opportunities

Agricultural producers understand and largely support the need to adapt and adjust their processes to remain viable as a sector; however, they have experienced many gaps in knowledge, financial support, policy structure or understanding of what these adjustments should be, how to go about making them happen, and how and when they can be applied to their business practices.

AGPAL Program and Service Finder

BC Agritech

1. Champions and Strong Leadership

For the agricultural sector to make the necessary adjustments to manage for climate change, long-term investment in agriculture and farming operations is necessary at all levels and through multiple streams, including: financial, support services, leadership, innovation, education, policy, and regulation. While climate adaptation requires changes to business practices, these changes are often unsuccessful without the necessary champions and leaders (e.g., BC Climate and Agricultural Initiative). For agricultural producers to be successful, regulators will need to show leadership and an understanding that conventional farming models will likely require adjustments in the future and that alternative models with new and multiple objectives should be pursued. Tax reform, incentive programs, learning opportunities, research funding, and an overall recognition and understanding of the importance of supporting the agricultural sector as it adjusts and adapts to the new climate realities, will go a long way.

2. Policy, Regulatory and Financial Support

For the agriculture sector to remain viable and to continue to adapt to changing climate conditions, all levels of government in Canada will need to ensure there are adequate policies and regulations established to support innovation and to create opportunities for businesses to be flexible to adjust to changing international, national, local, and sector needs. These adjustments will likely require new policy, regulatory, and financial support mechanisms and support structures will include simplifying and adjusting complicated tax structures, finding ways to reduce the impact of the high cost of land in the Metro Vancouver region, and offering programs that provide specialized agricultural advice to primary producers to support new technology or pilot program trials, and to supply extension services that support marketing and distribution commitments.

3. Extension Services

The agricultural sector is governed by extensive regulations and licensing requirements and is abundant with ideas on how to adjust production practices or use new ag-focused technologies and resources. Many of these new practices however, require data collection or testing services that are often not available to producers in an accessible or cost-effective manner. Many farmers are keen to implement new practices or try new equipment but lack the resources to determine if a new farming method is viable. Online programs like AgPal (Government of Canada) allow farmers and agri-businesses to find relevant resources and information (e.g., funding and grants, licensing and regulations, business practices, science, environment and sustainability) in an easy to access platform that can be used at a time that is suitable to them. Expanding and supporting these types of resources goes a long way in increasing a farmer's ability to be self-sufficient and able to adjust and pivot to outside changes and pressures.

GREENHOUSE FOOD PRODUCTION

4. Technological Solutions

The agricultural sector is making great strides in using regenerative agricultural practices and ecosystem services to create sustainable farming operations and in using technology to play a vital part in helping farmers adjust to climate change and increase overall operational resilience. Supporting technology to optimize fertilizer application, generating renewable energy from agricultural residues, and assisting with pest, water and soil management are great examples of how farming is benefiting from high-tech innovations. Continuing to innovate and use new technology, combined with Provincial programs such as Agritech, which supports agriculture and food and seafood processing, will help the agriculture sector in Metro Vancouver, and throughout the province, remain competitive, diverse, resilient, and adaptive.

Barriers and Opportunities

Barriers to achieving a net zero carbon and resilient agricultural sector are plentiful and challenging to overcome. In some instances, great effort re-imagining solutions beyond what we are aware of in the present day will be required to meet the vision and goals established for farming in this region. While it's important to get a clear picture of the challenges ahead, it is also beneficial to determine if there are opportunities that can be leveraged to reduce the negative impact of the barriers that have been identified to-date.

INTERNATIONAL PRESSURES

	BARRIER	OPPORTUNITY
1.	Farm businesses are expected to accommodate all climate-related policy and regulatory changes while working with global commodity prices and competing with cheaper imports.	▶ Solutions can be shared across the globe by those actively engaged in the research and development of sustainable farming practices.

SEA-LEVEL RISE AND EXTREME WEATHER EVENTS

	BARRIER	OPPORTUNITY
2.	Salt water intrusion is an on-going issue and drainage problems and flooding pose great risks to agricultural production; the extreme land shortage in the Metro Vancouver region doesn't provide opportunities to "move" farmland somewhere else. (Note: See also *Nature & Ecosystems Roadmap*)	▶ On-going challenges necessitate collaborative solution development between the agricultural sector, researchers and all levels of government. ▶ Supporting salt-resistant crop diversification in flood plains is an opportunity to increase resilience. ▶ Vertical farming production may create opportunities to replace some vulnerable crops in flood plains.
3.	Consumers lack a deeper knowledge and understanding of how extreme weather events affect their own food security. Crop damages due to extended droughts and high temperatures not only affect crop production, they affect a farmer's livelihood, decrease the amount of food available for consumption, and increase food costs.	▶ Using imaginative educational information campaigns can memorably connect with consumers about the challenges of the farming sector.
4.	Significant rainfall events are increasing in frequency in the region, particularly at the end of farming season when fields are harvested and soil is left bare and susceptible to rain erosion and runoff. Continued and ongoing erosion degrades soil quality overtime reducing yields and significantly affecting overall productivity.	▶ Expanding cover crop programs on agricultural land is an opportunity to improve soil structure and retain the viability and productivity of open field farming.
5.	Ongoing insufficient access to water for irrigation for agricultural purposes.	▶ Utilizing regenerative agricultural practices is an opportunity to better manage water resources more efficiently.

LOCAL DECISION MAKING

	BARRIER	OPPORTUNITY
6.	Financial costs from the effects of climate change hinder the agricultural sector's ability to produce food in the long term.	▶ Adjusting policies, regulations, and financial structures collectively can cohesively support the agricultural sector in becoming more resilient to the climate challenges ahead.
7.	Urban development impacts and the effects of climate change have neither been factored into managing and protecting local agricultural land, nor into managing water shortages on farmland.	▶ Complex challenges create opportunities to showcase leadership in collaborative solution development and strategy execution.
8.	The agricultural sector faces significant financial and operational challenges that are often misunderstood by consumers who are not aware of risks that go into local farming.	▶ Communicating with surrounding urban residents about the realities of agricultural production is an opportunity to establish a relationship with local farmers.
9.	Agricultural production is often impeded due to the lack of access to irrigation for a myriad of reasons including: water licences being over prescribed; water removed from waterways without a licence; marginal ground water quality; and difficulty accessing ground water sources.	▶ Utilizing alternative water storage and recycling methods can showcase leadership in collaborative solution development and strategy execution.
10.	Agricultural producers are impeded in being able to fully integrate adaptability and sustainability into their farm operations due to their limited capacity to manage these types of process changes and due to lengthy, costly, and prohibitive application and permitting processes.	▶ Supporting existing programs or expanding extension services exponentially increase the capacity of agricultural producers.
11.	The high percentage of non-farm landowners in the Agricultural Land Reserve (ALR) restricts the ability for local farmers to expand operations and restricts comprehensive use of agricultural land for climate change management. Absentee landlords in the ALR make it difficult to access underused, idle agricultural land.	▶ Adjusting policies, regulations, and financial structures collectively to increase the viability of agriculture can cohesively support the sector in becoming more resilient.
12.	Ongoing tension and pressure from urban areas to expand into and convert agricultural land to ease regional industrial land and housing shortages.	▶ Complex challenges create opportunities to showcase leadership in collaborative solution development and strategy execution.
13.	Ongoing degrading of soil and changes in hydrology of farm land adjacent to urban land uses due to increases in runoff and changing drainage patterns supports continued expansion of urban uses into farmland.	

ONGOING RESEARCH AND SUPPORT

	BARRIER	OPPORTUNITY
14.	Switching to high-value crops may be challenged by exposure to pests, soil salinization, etc.	▶ Creates opportunities to utilize research and / or technology to support adjustments in agricultural production.

The Journey: Net-Zero Emissions, Resilient Agriculture

Agriculture contributes to the regional economy and provides fresh, healthy food for local consumption and export. Protecting agricultural land supports regional food security and provides ecosystem services, and other important public benefits including flood management, carbon sequestration and wildlife habitat; however, some agricultural activities also generate emissions of GHGs and other air contaminants.

Linkages to Other Issue Areas

There are several climate linkages between agriculture and other issue areas and Metro Vancouver is exploring which linkages must be considered when developing policies and actions. This Roadmap primarily addresses agriculture within our region and the impacts and actions related to climate change. Other climate related issues connected to agriculture are addressed in the following:

Land Use & Urban Form Roadmap – Containing urban growth protects agricultural land for farming over the long term. Agriculture is vulnerable to impacts from adjacent land uses, new development, and the expansion of transportation infrastructure.

Human Health & Well-being Roadmap – Fresh local and imported food, especially fruits and vegetables, support healthy communities; food choices affect health, emissions, and agricultural viability.

Transportation Roadmap – Transporting imported and exported foods and food distribution within the region are sources of GHG emissions.

Waste Roadmap – Food loss and food waste increase greenhouse gases.

Energy and Industry & Business Roadmaps – Production of renewable natural gas from agricultural organic residues has the potential to supply energy to the agriculture sector as well as other industries thereby reducing GHG emissions from manure and industrial energy use.

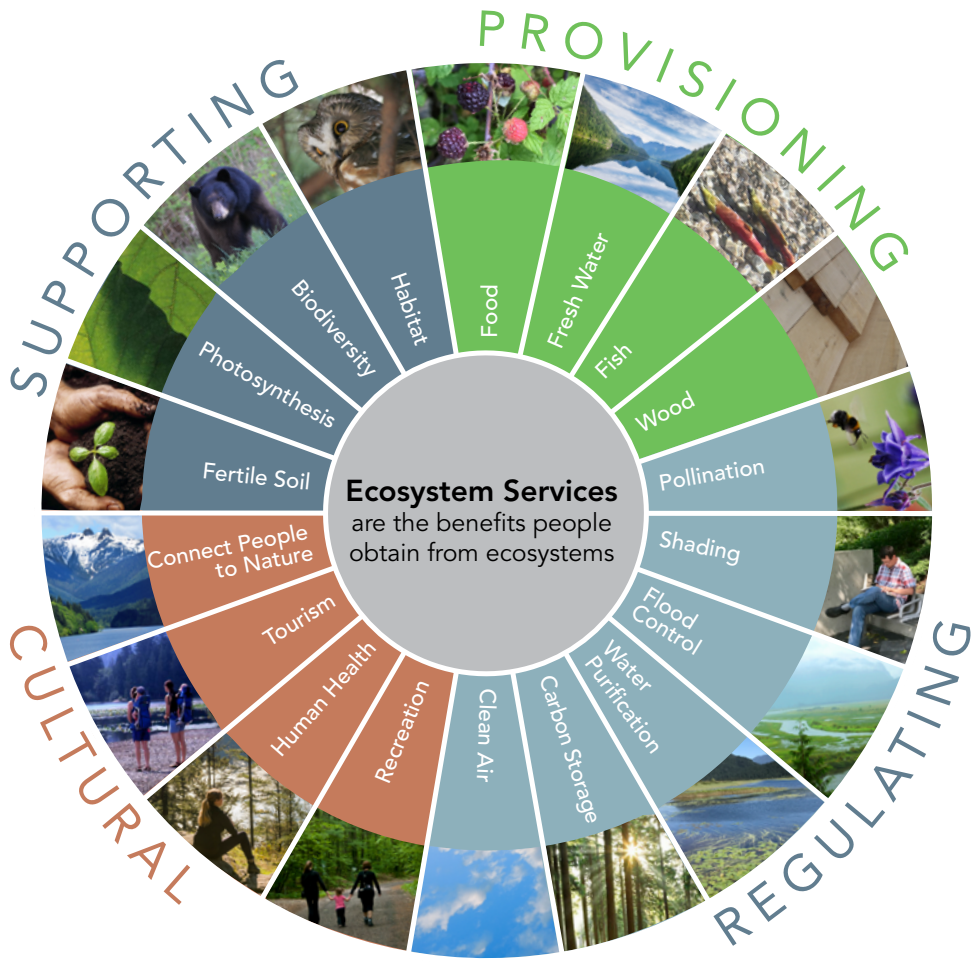
Nature & Ecosystems Roadmap – Protecting, restoring and connecting natural areas, and enhancing ecosystem services on agricultural land support a climate resilient agriculture sector. The significant connection the *Nature and Ecosystems Roadmap* has to the agricultural sector is explored in more detail on the next page.

Climate 2050 Nature & Ecosystems Roadmap - Connection To Agriculture

While there are several linkages between the *Agriculture Roadmap* and the other issue areas of *Climate 2050,* more than any of the others, the *Nature & Ecosystems Roadmap* is the most inter-connected and related to the *Agriculture Roadmap*.

The *Nature & Ecosystems Roadmap* and *Agriculture Roadmap* largely connect through the co-benefits each provides the other:

- **Ecosystems** provide crop pollinator habitat, flood and erosion control and natural pest management; and
- **Agricultural lands** support ecosystems by providing a wide range of bird and wildlife habitat, hosting regional park space, supporting natural asset management (e.g., stormwater and flood control overflow), and providing potential connections and linkages to the Regional Green Infrastructure Network.



ECOSYSTEM SERVICES PROVIDED BY HEALTHY ECOSYSTEMS

Strategies and Actions

Roles and Responsibilities

Under authority delegated by the BC Government through the *Environmental Management Act*, Metro Vancouver is responsible for managing and regulating air quality and GHG emissions in the region, including air contaminants from agricultural sources. Metro Vancouver is also responsible for developing, implementing, and stewarding *Metro 2050*, the Regional Growth Strategy. *Metro 2050* contains Metro Vancouver's GHG reduction targets and includes strategies to protect agricultural land and promote agricultural viability through the Agricultural regional land use designation and through policies such as the Urban Containment Boundary.

While Metro Vancouver plays a pivotal role in advancing climate strategies and actions for the agricultural community in response to climate change issues, air quality management and climate action require close coordination among all governments, as well as private businesses, utilities, institutions, and residents. The government agencies and organizations that fill key roles in reducing agricultural emissions and that are helping increase the resilience of Metro Vancouver's agricultural community are outlined below:

KEY STAKEHOLDER ROLES AND RESPONSIBILITIES

ENTITY	ROLE
BC Ministry of Agriculture, Food and Fisheries	Supports the production, marketing, processing, and merchandising of agricultural products, provides guidance for agricultural operations and secures agricultural production through the mandate of the Agricultural Land Commission.
Agricultural Land Commission	Preserves agricultural land, encourages farming in British Columbia, and encourages local governments to enable and accommodate farm use of agricultural land.
BC Ministry of Environment and Climate Change Strategy	Responsible for the protection, management, and conservation of BC's water, land, air, and living resources, and leads climate action through various policies, legislation, regulation, and programs.
Government of Canada	Establishes standards for agricultural operations and agricultural equipment as well as supports agricultural research.
Member Jurisdictions	Have authority over local land use decisions and support agriculture through zoning, environmental policies, and engaging with residents. Some member jurisdictions can manage agriculture through Farm Bylaws approved by the BC Ministry of Agriculture.
Energy Utilities	Provide rebates, infrastructure, and energy for agricultural operations as well as access to market for renewable energy sources.
Farm Industry Review Board	An independent administrative tribunal that is responsible for hearing complaints from persons aggrieved by odour, noise, dust, or other disturbances arising from agriculture; may also study and report on farm practices.
Industry Associations	Support agricultural producers with the latest information on technologies, policies, and regulations.
Academic Institutions	Conduct research and provide education and training as well as advocate and inform others about ways to transition to a low-carbon and resilient future.
Non-Profits	
Other Organizations	
Local Residents	Make food choices that sustain agricultural operations by buying and supporting local food.

AGRICULTURAL LAND IN METRO VANCOUVER

BIG Move **Big Moves** are foundational to achieving the 2030 and 2050 targets, and should lead to the most significant greenhouse gas reductions and/or climate resilience.

METRO 2050 **Metro 2050** identifies actions that are already adopted through *Metro 2050*, the regional growth strategy.

Corporate LEADERSHIP **Corporate Leadership** actions are ones Metro Vancouver will implement in its corporate operations to demonstrate leadership and support regional actions.

CAP **Clean Air Plan** actions are ones adopted within Metro Vancouver's *Clean Air Plan*.

Strategy 1: Protect Agricultural Land

Agricultural land in Metro Vancouver is increasingly threatened from urban impacts and encroachment, including from: the piecemeal accommodation of commercial and industrial uses; soil degradation; changes in ground hydrology from urban-sourced runoff; and a proliferation of non-farm uses in agricultural and rural areas such as estate-style housing. Currently, there are more non-farm landowners in the Agricultural Land Reserve (ALR) than there are farm owners and development applications to re-purpose farmland, whether in or outside of the ALR, are ever increasing as land pressures within the Urban Containment Boundary spill onto agricultural areas which are typically cheaper to purchase and develop. A collective, on-going region-wide effort will be required to reduce this pressure and safeguard agricultural land for agricultural purposes to ensure that it continues to supply residents with healthy, fresh food, and continues to support valuable ecosystem services for flood control, wildlife habitat, and clean air.

The constant pressures on agricultural land to accommodate urban uses is a significant barrier to: turning unused or non-productive land into operating farms; to ensuring the ALR is cohesively used to support and expand farming operations; to providing new or young farmers access to farmland on a long term basis; and to ensuring natural areas on agricultural land can be appropriately leveraged to increase the overall resilience of farming and food production in the region. The following actions are intended to protect agricultural land and support a resilient agriculture sector for the long-term within the Metro Vancouver region:

Protect Agricultural Land From the Impacts of Urban Land Development

1.1 Prepare an Agricultural Land Protection and Viability Strategy to identify how to protect and increase the active production of agricultural land within the region including:

BIG Move

- Identifying the most feasible and beneficial opportunities for regional, inter-governmental and industry collaboration;
- Supporting and expanding land matching initiatives; and
- Increasing long term access to farmland for young and new farmers.

1.2 Advocate to member jurisdictions to limit the extension of water, sewer and communication utility services through agricultural land.

METRO 2050

1.3 Work with member jurisdictions, the BC Government, the Agricultural Land Commission, and industry to require and implement soil movement tracking within agricultural areas.

BIG Move

Corporate LEADERSHIP

1.4 Advocate to the BC Government for changes to the tax structure for agricultural properties to include the nuances of production types, yields and sizes into the farm status calculation to reduce incentives for non-farm use development in the Agricultural Land Reserve.

Enable Long-term Soil-based Use of Agricultural Lands

1.5 Work with member jurisdictions, the BC Government, and industry to incentivize, increase the viability of, and prioritize the use of soil-based agriculture in the region.

1.6 Work with member jurisdictions, the BC Government, industry and educational institutions to determine appropriate agricultural-focused and agricultural-supportive uses (e.g., planting woody perennials to capture carbon or supporting ecosystem services to manage flooding) on land classified as having limited potential for soil-based agricultural uses.

Strengthen Regional Land Use Policy

1.7 Work with member jurisdictions to review how regional and local land use policy can be strengthened to reduce the encroachment of urban uses into agricultural areas including:

BIG Move

- Ensuring existing or future agricultural uses are not negatively affected by an extension to regional sewerage services;
- Protecting agricultural uses within the Rural regional land use designation from urban development expansion and impacts;
- Ensuring an analysis of the regional effects of the loss of agricultural land is included with any regional land use amendment application involving the Agricultural or Rural land use designations; and
- Updating policy 6.3.4 of *Metro 2050* to discourage the conversion of Agricultural or Rural designated lands to support urban uses.

1.8 Work with member jurisdictions to review how regional and local land use policy can be strengthened to reduce the negative impacts of urban development on adjacent agricultural uses through the use of agricultural impact assessments.

METRO 2050

1.9 Update Section 2.2 of *Metro 2050* to be consistent with the November 29, 2019 MVRD Board decision specifying that the Regional Industrial Land Strategy support solutions to the shortage of industrial lands that do not include encroachment onto agricultural land.

1.10 Work with the BC Government, Agricultural Land Commission, and member jurisdictions to better define agricultural uses, define agricultural-supporting uses, and clarify the role of rural lands to the viability of the agricultural sector across the region.

1.11 Work with the BC Government, Agricultural Land Commission, and member jurisdictions to develop a comprehensive strategy on how to manage parcels less than 0.4 hectares (2 acres) in the ALR that may fall within the potential exceptions from the restrictions of use in the Agricultural Land Commission Act.

1.12 Work with First Nations, the BC Government, member jurisdictions and the agricultural sector to review how regional policy can recognize and support Indigenous food sovereignty throughout the region.

Corporate LEADERSHIP

Community Efforts...

YA YOUNG AGRARIANS

The BC Land Matching Program provides personalized land matching and business support services to farmers looking for land to start or expand their farm, and landowners interested in finding someone to farm their land. The program is delivered by Young Agrarians and addresses the high cost of land as a significant barrier for those seeking to enter the agriculture industry in BC.

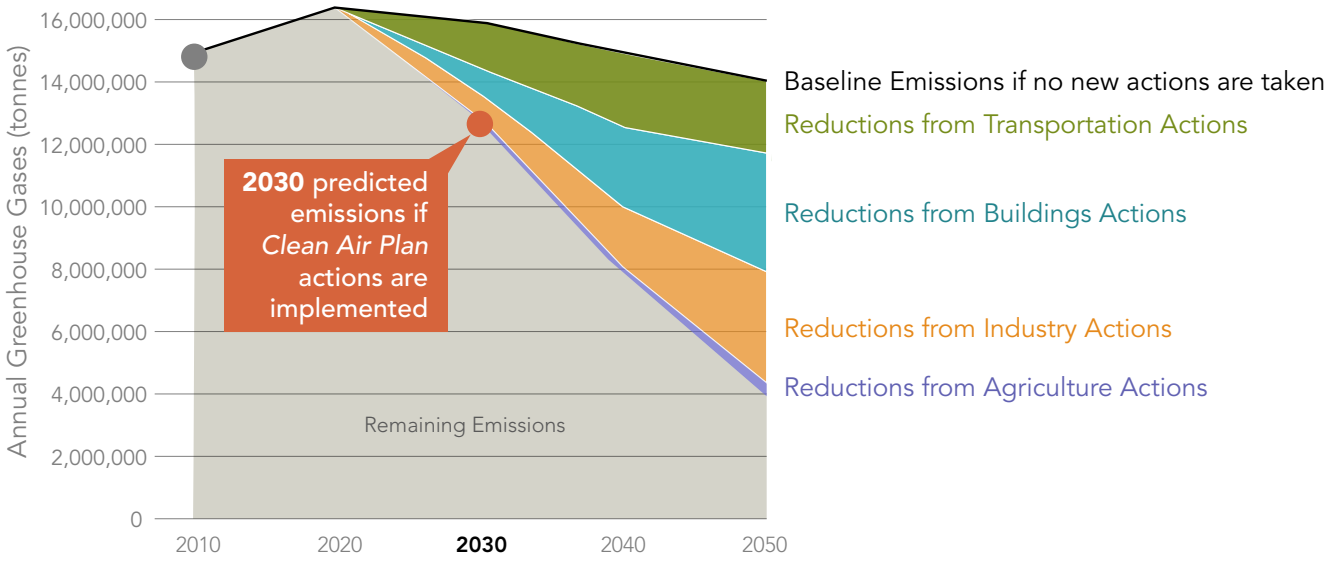
Strategy 2: Support Farmers as Climate Action Leaders

Some agricultural activities generate 4% of regional GHG emissions, including heaters and boilers in greenhouses, agricultural equipment, and the keeping of livestock. Improving energy efficiency and switching to clean, renewable energy for greenhouses and agricultural equipment and using enhanced Beneficial Management Practices will help achieve 2030 agriculture emission targets for GHGs. Expanding smaller-scale composting solutions in conjunction with producing renewable natural gas through anaerobic digestion of agricultural (crop and food) and other waste will help to displace natural gas from fossil fuels in the agricultural sector where zero emission solutions are more challenging.

The agricultural sector has demonstrated its leadership in continually looking at ways to adjust production methods to increase efficiencies and has demonstrated its willingness to continue to innovate and make adjustments to remain competitive, viable, and be a positive, contributing factor to a healthy future. Supporting farmers and the agricultural sector in continuing this tradition of leadership is an essential step in reaching a net-zero GHG emissions future. The following actions, largely identified in the *Clean Air Plan*, are intended to support the farming community expand its role as a climate action leader within the Metro Vancouver region:

STRATEGY 2	Potential Impacts of Strategy	Key Partners
	• Reduce annual greenhouse gases by up to 100,000 tonnes by 2030	• Government of Canada • BC Government • Agriculture Community • Member Jurisdictions

Potential Reductions in Regional Greenhouse Gases



Reduce Emissions from Greenhouses

2.1 Work with the BC Government and industry to explore opportunities to reduce emissions from greenhouses, including:

- improving energy performance; and
- transitioning to clean, renewable energy while also considering the need for supplemental carbon dioxide to support plant growth.

2.2 Prepare passive design standards specific to greenhouse operations.

2.3 Provide online decision support tools to help greenhouse operators manage upgrades.

2.4 Update the regional emissions inventory with greenhouse-specific data.

2.5 Work with the greenhouse industry to collect data on greenhouse carbon dioxide requirements.

Improve Soil Health to Help Address Carbon Emissions

2.6 Expand our collective knowledge and understanding of the role of soil health in supporting long-term agricultural viability and resilience and as a local source that can be used to help reduce carbon emissions within the Lower Mainland.

2.7 Work with the BC Government, member jurisdictions, the agricultural industry and other regional partners to support the long-term collection and open source provision of soil carbon data.

2.8 Work with the BC Government and other key stakeholders to develop actionable programs specific to soil carbon storage and wood perennial sequestration on agricultural lands, including providing benchmarking data.

Industry Efforts...

Dairy Farmers of Canada are committed to reaching net-zero greenhouse gas emissions from farm-level dairy production by the year 2050. Dairy farmers will reach net-zero through emissions reduction, carbon removals and carbon capture. This transition includes using renewable energy through anaerobic digestion, improving animal nutrition to reduce methane emissions, and implementing crop rotation and cover cropping to improve soil health.

Strengthen Outreach Program on Reducing Agricultural Emissions

2.9 Work with the agriculture sector, member jurisdictions and the BC Government, to supplement and expand on existing programs by developing and implementing an awareness and outreach program specific to reducing agricultural GHG emissions (e.g., adjusting cattle feed to reduce methane emissions).

Enhance Funding and Access to Environmental Farm Plans

2.10 Advocate to the Federal Government and the BC Government to enhance funding to develop and implement Environmental Farm Plans to support the reduction of nitrous oxide, methane, carbon dioxide, and other air contaminant emissions from agricultural operations. CAP

2.11 Advocate to the Federal Government and the BC Government to continue to develop and promote Beneficial Management Practices in the application of an Environment Farm Plan. CAP

2.12 Advocate to the Federal Government and the BC Government to continue to provide reliable incentives and technical guidance to farms to support adoption of low emission practices and technologies. CAP

2.13 Advocate to the BC Government to increase awareness of and accessibility to the Environment Farm Plan program including expanding application deadlines, aligning reporting deadlines with production schedules, increasing capacity of program advisors, and adjusting current messaging to better communicate the benefits of the program.

Establish Incentives to Transition to Lower Emission Agricultural Equipment

2.14 Advocate for funding programs (e.g., incentives, tax credits, loans, etc.) that make accelerating the use of cleaner-running agricultural equipment more financially viable to agricultural producers. CAP

2.15 Establish incentives or programs that help decommission old equipment in place of zero emission equipment to make the transition more financially viable to agricultural producers. CAP

Develop Pilot Studies to Test Zero Emission Agricultural Equipment

2.16 Work with the BC Government, industry, and the agriculture community to develop a pilot study to test the feasibility and logistical requirements for the wide-spread use of zero emission agriculture equipment (e.g., electric tractors).

Expand, Support and Streamline the Use of Anaerobic Digestion of Agricultural Waste

2.17 Advocate to the Federal Government, BC Government, energy utilities and member jurisdictions to expand development of anaerobic digestion facilities to process manure, other agricultural waste and commercial food waste. CAP

2.18 Advocate to the Federal Government, BC Government, energy utilities and member jurisdictions to establish financial incentives that help establish new anaerobic digestion facilities, ensuring that any expansion avoids the loss of agricultural land in the Metro Vancouver region. CAP

2.19 Advocate to the Federal Government, BC Government, energy utilities and member jurisdictions to create financial incentives and remove barriers to ensure the successful operation of existing, agricultural waste anaerobic digestion facilities in the Metro Vancouver region. CAP

2.20 Support and streamline the operation of anaerobic digestion facilities in the region by developing an emission regulation for anaerobic digestion of agricultural and commercial food waste that is simple and maintains existing permitting processes while also ensuring equivalent protections for regional air quality and human health. CAP


GREENHOUSE OPERATION

2.21 Support and streamline the operation of anaerobic digestion facilities in the region by developing a multi-stakeholder centralized agricultural waste collection facility in the Metro Vancouver region to support meeting the Provincial Agricultural Environment Management Code of Practice and improve the cost-benefit return on running anaerobic digestors for agricultural producers.

BIG Move | Corporate LEADERSHIP

2.22 Support and streamline the operation of anaerobic digestion facilities in the region by creating a comprehensive information package for the agricultural sector that communicates all permitting and regulatory requirements for the successful operation of an anaerobic digestion facility. (See also Strategy 4.3)

Corporate LEADERSHIP

2.23 Support and streamline the operation of anaerobic digestion facilities in the region by creating a comprehensive information package for member jurisdictions on how to accommodate anaerobic digestors in their community including sample land use policies and zoning regulations that can be applied at the local level.

Corporate LEADERSHIP

Encourage and Prioritize Local Agriculture

2.24 Advocate to member jurisdictions and other regional partners to address regional food security, encourage more local food production, and prioritize agricultural practices that reduce emissions or help maintain or sequester carbon.

CAP

Strategy 3: Support Long-Term Farm Health and Resilience

Farmers and agricultural producers have successfully adapted and evolved over time accommodating changes in economics, consumer choices, weather patterns, technology, transportation, and market demands. Resilience, while not a new concept, is becoming increasingly important to plan for and accommodate in agricultural operations as the degree to which farmers need to adapt to continue to succeed in the face of an ever-changing climate is evolving rapidly.

Farmers and their businesses will be significantly challenged to withstand the effects of climate change, feed present and future populations, and provide ecosystem services to adjacent urban areas without adjusting practices to ensure the long-term health and resilience of their farms. These adjustments, coordinated with the use of conventional farming practices, will need to better incorporate and connect to natural ecosystems, biological-focused applications and regenerative techniques more than ever before. This involves first understanding a farm's specific vulnerabilities and second, pursuing actions so that they can directly benefit from the ecosystem services (e.g., soil nutrient and organic matter, pollinator habitat, and flood management) provided by or adjacent to their agricultural land. The following actions are intended to support and increase the long-term health and resilience of the agricultural sector within the Metro Vancouver region:

Plan for Climate Change Impacts on Agricultural Land

3.1 In conjunction with the BC Government's Pilot Extreme Weather Preparedness for Agriculture Program, prepare a regional vulnerability assessment of agricultural lands to identify which areas are the most at risk to specific climate change impacts (e.g., flooding, extreme heat). BIG Move

3.2 Determine how the agricultural sector can benefit from the protection and rehabilitation of natural areas that provide ecosystem services to farms. METRO 2050

3.3 Prepare a comprehensive regional high resolution map of ecosystem services locations on agricultural land identifying the highest opportunities for focused stewardship efforts to support the long-term resilience of the agricultural sector. (See also Strategy 3.7)

3.4 Work with the Federal Government, BC Government and agricultural sector to introduce and support the use of biovigilance by local farmers to increase resilience against the impacts of new pests and invasive species.

Industry Efforts...

FARMLAND ADVANTAGE

Farmland Advantage (FLA) is a research and development program that works with farmers to protect and conserve critical natural lands, streams, and habitats in British Columbia. FLA helps farmers identify natural values, or ecosystem services, on their land which can be protected and enhanced. FLA also develops recommendations and plans for preservation and ensures farmers are compensated for stewardship actions and regenerative agricultural practices that support ecosystem services. FLA is an Investment Agriculture Foundation of BC program.

WETLAND ECOSYSTEM SERVICES ON FARMLAND

Support Long-term Use of Ecosystem Services

3.5 Estimate the financial value of ecosystem services on agricultural land in the Metro Vancouver region and determine how farmers and land owners can be compensated for setting aside natural areas for the benefit of ecosystem services.

3.6 Collaborate with the BC Government and member jurisdictions to explore and build a long-term funding mechanism that includes payment for ecosystem services on agricultural land.

BIG Move | Corporate LEADERSHIP

3.7 Review and assess options to align with the ongoing work to establish a Regional Green Infrastructure Network to support ecosystem services on agricultural land.

3.8 Develop guidance materials to support natural asset management and provide a forum to share best practices among member jurisdictions. (Note: See also *Nature & Ecosystems Roadmap*; Action 3.4)

Expand the Use of Regenerative Agriculture

3.9 Work with the BC Government and member jurisdictions to address the knowledge gap between the agricultural sector and the benefits and applications of regenerative farming practices including providing examples of its economic benefits and how they can be applied and combined with conventional farming practices.

3.10 Work with the BC Government and member jurisdictions to establish and support pilot projects or demonstration projects that illustrate how regenerative agriculture can be applied to agricultural operations, both large and small, and how transitions to regenerative practices can be supported from a financial risk perspective.

3.11 Monitor the outcome of the Agricultural Climate Solutions BC Living Lab research and pilot projects to determine alignment with regional policies and projects.

3.12 Work with the BC Government, member jurisdictions and the agricultural sector to develop a pilot program focused on expanding pollinator populations (e.g., honey bees) in the region.

Ensure Long-term, Reliable Access to Water

3.13 Work with the BC Government, water districts and member jurisdictions to develop a comprehensive analysis of the sub-regional sources of water used by the agricultural sector in Metro Vancouver and the ongoing challenges with accessing that water for agricultural purposes.

3.14 Work with the BC Government, water districts and member jurisdictions to provide viable and tangible solutions to ensuring water resources needed by the farming community are provided in a sustainable, consistent, and reliable manner.

Corporate LEADERSHIP

3.15 Explore innovative sources and new technologies for water reuse (e.g., municipal waste water, agricultural drainage water) and water conservation (e.g., applying mulches to field crops).

BIG Move

3.16 Explore ways to take advantage of rainfall collection when it is abundant to be used during periods of low or no rainfall during the growing season.

3.17 Update the agricultural water demand model to incorporate current climate conditions, crop irrigation systems and soil information data to contribute to the discussion of water availability for the agricultural community.

3.18 Develop a toolkit on how a circular water economy can be supported within the Metro Vancouver farming community, including new technologies and techniques for water reuse.

Corporate LEADERSHIP

Help Farmers Build Capacity to Adapt to Climate Change

3.19 Work with the BC Government, member jurisdictions, industry, and other regional partners to increase the agricultural community's capacity to integrate climate change considerations into business operations, including:

BIG Move

- Aiding in the farm-level preparation of emergency plans;
- Helping producers implement water back-up plans;
- Increasing producer access to programs, tools, practices, equipment and finances to help them self-monitor and manage soil (e.g., US Department of Agriculture online COMET carbon sequestration evaluation tool); and
- Helping farmers prepare business continuation plans for prolonged extreme weather events and disruptions to water and energy supplies.

3.20 Work with member jurisdictions to examine the feasibility and benefits of committing to established reporting frameworks that use measurable targets to determine the effectiveness of adaptation policy for agricultural operations, for example:

- The Mexico City Pact; and
- Milan Food Policy Pact.

Strategy 4: Support a Viable, Profitable and Stable Agricultural Sector

The agricultural sector requires long-term investment, financial support, and leadership from all levels of government (federal, provincial, regional, and local), from private industry (transportation, finance, support services, logistics, retail, and research), and from society (consumers, education, non-profits, and places of worship). Farming, as the cornerstone to the agricultural sector, is a vital component of the local and regional economies and stimulates links with restaurants, retail businesses, food processors, transportation companies and tourism, making its long-term viability and profitability a regional priority.

The current imbalance of land ownership of agricultural land by non-farmers, the encroachment of urban uses into the ALR for non-farm purposes, and the significant costs and barriers borne by producers to adjust their practices to meet resilience and GHG emissions reduction goals, represents a loss of economic prosperity for the region. The following actions are intended to support a viable, profitable and stable agricultural sector for the long-term within the Metro Vancouver region:

Continue Long-term Financial Investment in the Agricultural Sector

4.1 Work with the Federal Government and BC Government to support financial investment in the agricultural sector by:

- Providing incentive programs to help farmers adjust their operations to become more sustainable;
- Supporting long-term, consistent and reliable funding for agricultural producers to advance the resilience of farming operations in the Metro Vancouver region; and
- Designating resources for testing practices and technology to help farmers effectively use soil as a means to store carbon.

Collaborative Efforts…

Sustainable Canadian Agricultural Partnership
Competitive. Innovative. Resilient.

The Sustainable Canadian Agricultural Partnership brings together federal, provincial and territorial governments with a $3.5 billion, 5-year agreement to strengthen and grow Canada's agricultural sector.

Increase Access to Information for Local Farmers and Agricultural Producers

4.2 Work with the BC Government to develop an agricultural information network that provides peer-to-peer knowledge sharing opportunities about research and pilot project outcomes focusing on the cost benefit analysis needed for farmers to make decisions about implementing new innovations into farming operations.

4.3 Work with the BC Government, educational institutions and industry partners to prepare an interactive information resource toolkit that brings together Federal, Provincial, Regional, and Municipal legislation, bylaws, regulations and permitting requirements applicable to agriculture to help the farming community navigate through the array of regulatory information that applies to agricultural operations in the Metro Vancouver region.

Corporate LEADERSHIP

4.4 Collaborate with the BC Government, member jurisdictions and the agricultural sector to support farmers in overcoming the challenges identified as part of the Provincial Stewarding Agricultural Watercourse study.

Support Long-term Local Food Production

4.5 Work with the BC Government, member jurisdictions, industry, First Nations and other regional partners to undertake a review of the Regional Food System Strategy to address:

Corporate LEADERSHIP

- Climate-related food-specific challenges, gaps and opportunities;
- Local food production vulnerability and longevity within the region;
- Role of urban agricultural in regional food security;
- Lack of succession planning and labour shortage and living wage challenges;
- Indigenous food sovereignty;
- Impacts of the global COVID-19 pandemic; and
- Impacts of international conflicts on local agriculture production capacity.

4.6 Work with the BC government, member jurisdictions, and agricultural producers to support pilot projects that focus on diversifying food production in the region to reduce the reliance on food imports (e.g., local citrus fruit production).

Corporate LEADERSHIP

Bridge the Gap Between the Agricultural Community and the Consumer

4.7 Work with the BC Government and member jurisdictions to develop engaging and approachable educational campaigns aimed on connecting consumers more closely with the realities and challenges of producing food in the Metro Vancouver region, including:

- How agriculture is affected by climate change;
- What costs and processes go into producing food (e.g., the farm-to-food cost spectrum);
- What actions farmers are taking to adapt to significant regional climate issues; and
- How consumers can be a positive contributor to agricultural resilience through their actions and decision making.

4.8 Work with member jurisdictions to develop a coordinated regional signage campaign to raise awareness and showcase the location and benefits of locally-grown crops.

Increase Entry to Local Farming

4.9 Advocate to the BC Government for changes to the tax structure for agricultural properties to reduce the incentives for non-farm use development in the Agricultural Land Reserve.

Support Innovations in Agricultural Operations

4.10 Work with the Federal Government, BC Government, and industry to establish pilot projects that carry the financial and operational burden of testing new technological and agri-tech systems (e.g., GPS-guided machinery, drone monitoring, and data collection) that can work to increase the resilience and longevity of agricultural operations in the region.

4.11 Work with the BC Government to establish a cost-sharing or group purchase program to spread the risks of the purchasing and operating costs associated with new agri-tech innovations across the agricultural sector.

4.12 Collaborate with agricultural-focused research and innovation entities (e.g., Agri-Food Innovation Council, Agritech BC, Canadian Food Innovation Network) to advance the use of technological innovations into local agricultural production.

Setting the Path Ahead

The "Setting the Path Ahead" section will eventually be found on Metro Vancouver's Climate 2050 webpage under "Agriculture" and will serve as a companion to the *Agriculture Roadmap*. This will allow Metro Vancouver to track progress towards targets and add and adjust strategies and actions in response to performance measurements.

The timeline below includes all of the actions in this Roadmap: some actions are already underway, some will be initiated over the next several years and some require an ongoing, consistent infusion of resources to ensure their effectiveness over the long-term.

CLIMATE 2050 AGRICULTURE ROADMAP ACTION TIMELINE

STRATEGY	2023-2025	2026-2030	ONGOING
STRATEGY 1 Protect Agricultural Land	Prepare Agricultural Land Protection and Viability Strategy		
		Advocate to limit utility services extension	
	Implement soil movement tracking within agricultural areas		
		Change tax structure to reduce incentives for non-farm use development in ALR	
	Incentivize, increase viability of and prioritize soil-based agriculture		
		Determine appropriate agricultural-focused uses on land with limited potential for soil-based agriculture	
	Review how regional policy can be strengthened to reduce encroachment of urban uses		
	Review how regional policy can be strengthened to reduce negative impacts of urban development on adjacent agricultural uses		
	Update Section 2.2 of *Metro 2050* to be consistent with November 2019 MVRD Board decision		
		Better define agricultural uses, agricultural-supporting uses and clarify role of rural lands	
		Develop a comprehensive strategy to manage small lot agricultural lands potentially exempt from the ALCA	
		Review how regional policy can recognize and support Indigenous food sovereignty	
STRATEGY 2 Support Farmers as Climate Action Leaders	Explore opportunities to reduce emissions from greenhouses		
		Prepare passive design standards specific to greenhouse operations	
		Provide on-line decision support tools to help greenhouse operators manage upgrades	
		Update regional emissions inventory with greenhouse-specific data	
		Collect data on greenhouse carbon dioxide requirements	
	Expand knowledge and understanding of role of soil health in agricultural viability		
		Support long-term collection and open source provision of soil carbon measuring data	
		Examine ways to financially support data collection of soil carbon measuring	
		Examine actionable programs on soil carbon storage and provide benchmark data.	
		Develop and implement an awareness outreach program specific to reducing agricultural GHG emissions.	
	Expand awareness and outreach programs focusing on reducing agricultural emission		
	Determine how agricultural practices can be adjusted to reduce agricultural emissionss		
		Enhance funding to develop and implement Environmental Farm Plans	
		Enhance funding and develop and promote BMPs to support using Environmental Farm Plans	
		Provide reliable incentives and technical guidance to support low emission practices	
	Increase awareness and accessibility to the Environment Farm Plan		
		Funding for programs that accelerate the use of cleaner agricultural equipment	
		Incentives or programs that help to decommission old equipment in place of zero emission equipment	
		Develop pilot study to test wide-spread use of zero emission agriculture equipment	
		Expand development of anaerobic digestion facilities	
		Help establish new anaerobic digestion facilities	
		Support successful operation of existing anaerobic digestion facilities	
		Develop simple anaerobic digestion emission regulation	
		Develop multi-stakeholder centralized agricultural waste collection facility in the region to support anaerobic digestion	
		Create comprehensive information package for the agricultural sector to support anaerobic digestion facilities	
		Create comprehensive information package for member jurisdictions on how to support anaerobic digestion facilities	
	Address regional food security, encourage local food production and prioritize agricultural practices that reduce emissions or help to sequester carbon		

CLIMATE 2050 AGRICULTURE ROADMAP ACTION TIMELINE – Continued

STRATEGY	2023-2025	2026-2030	ONGOING
STRATEGY 3 Support Long-Term Farm Health and Resiliency	Prepare a regional vulnerability assessment of agricultural lands specific to climate change impacts		
	Determine how agriculture can benefit from restoration and protection of ecosystems		
		Prepare a comprehensive, regional high resolution map of ecosystem services locations on agricultural land	
		Introduce and support biovigilance programs to local farmers	
	Estimate financial value of ecosystem services on agricultural land and determine compensation for farmers		
	Explore and build a long-term funding mechanism to support payment for ecosystem services		
	Align with the Regional Green Infrastructure Network project		
		Develop guidance materials to support natural asset management	
		Address knowledge gap between agricultural sector and the benefits and applications of regenerative agriculture	
	Support pilot projects to illustrate regenerative agriculture		
	Monitor outcomes of the BC Living Lab projects to determine alignment with regional projects		
		Pilot program to expand local pollinator populations	
	Develop a comprehensive analysis of the sub-regional sources of water used by agricultural sector		
	Provide viable and tangible solutions to ensuring water resources needed by agriculture are sustainable		
		Explore innovative sources and new technology for water re-use	
		Explore ways to take advantage of rainfall collection opportunities	
		Update water demand model	
		Develop a toolkit about a circular water economy	
			Increase the agricultural community's capacity to integrate climate change into their business operations
		Examine feasibility and benefits of committing to programs that address the effects of climate change on agricultural operations	
STRATEGY 4 Support a Resilient, Robust, and Healthy Urban Forest	Support financial investment in the agricultural sector through incentive programs and funding sources		
		Develop an agricultural information network focusing on cost benefit analysis needed for farmers	
		Prepare an interactive information resource toolkit	
	Determine how the agricultural community can address issues raised during the Provincial Stewarding Agricultural Watercourse study		
	Undertake a review of the Regional Food System Strategy		
		Support pilot projects that focus on diversifying local food production.	
			Develop engaging and approachable educational campaigns aimed at consumers and the realities of food production
		Develop regional signage campaigns to showcase local food production	
		Advocate for changes to the tax structure for agricultural properties	
		Establish pilot projects that carry the financial and operational burden of testing new technological and agri-tech systems	
		Establish a cost-sharing or group purchase program to share new agri-tech innovations across the agricultural sector	
		Collaborate with agricultural-focused research and innovation entities	

AGRICULTURAL LANDS ON BARNSTON ISLAND

Measuring Our Progress

The table below lists examples of some of the data performance indicators that could be used to help Metro Vancouver measure regional progress towards supporting a net-zero, resilient agricultural sector. The performance indicators used will depend on the availability of this information from other organizations. Because the *Climate 2050 Agriculture Roadmap* is calling for actions from many different partners and stakeholders, and because, in some instances, it is suggesting using technology that either does not currently exist or that is not readily available at a consumer level, data availability may be limited until technologies advance and industry markets further advance toward full operational sustainability. Additionally, data sharing from partner organizations will be foundational to understanding the pace of progress towards our common goals and will help governments to continue to shape equitable and cost-effective pathways to a zero emission and resilient future.

ROADMAP ELEMENT	KEY PERFORMANCE INDICATOR	DATA SOURCE	DATA IS CURRENTLY COLLECTED
Resilient Agriculture	% ALR used for long-term set aside ecosystem services	Agricultural Land Use Inventory	no
Protected Agricultural Land	% ALR actively farmed	Agricultural Land Use Inventory	yes
Regional GHG Impact	The agricultural sector is carbon neutral by 2050	various	yes
	% regional greenhouse gas emissions from greenhouses	various	no
	The agricultural sector produces clean, renewable energy to meet all its production needs by 2050	various	no
	The agricultural sector provides clean, renewable energy to other energy users by 2050	various	no

Feedback and Engagement Process

This Roadmap was generated with input from many organizations, including multiple levels of government, the agricultural sector, and residents across the region. The project team is continuously assessing that input, and many of the recommendations are reflected in the structure and content of this Roadmap.

This Roadmap reflects current policies and the best ideas, approaches and technologies available at the time of writing. As with all climate planning, it must be viewed as an iterative, dynamic path forward. The goals remain clear, and new policies, ideas, approaches and technologies must be considered as they arise and reflected through updates to the Roadmap over time.

The project team continues to be open to feedback, at any time, in this *Climate 2050 Agriculture Roadmap* and any other aspect of the climate action initiatives led or coordinated through Metro Vancouver. Send any comments direct to the Project Team through Climate2050@metrovancouver.org or phone 604-432-6200.

AGRICULTURE LANDS IN DELTA

Glossary

Adaptation means anticipating, planning for, and responding to the adverse effects of climate change and taking appropriate action to prevent or minimize the damage it can cause, or taking advantage of opportunities that may arise. It has been shown that well planned, early adaptation action saves money and lives later.

Adaptive capacity means the ability of ecosystems, economies, infrastructure, and communities to adjust to climate change (including climate variability and extremes) by moderating potential damages, taking advantage of potential opportunities, or coping with consequences.

Agroecology applies ecological principles to agriculture ensuring a regenerative use of natural resources and ecosystem services while addressing the need for food sovereignty. While the practices can be wide-ranging, agroecology is characterized by diversifying farms and farming landscapes, replacing chemical inputs with organic materials and processes, optimizing biodiversity, and stimulating interactions between different species.

Agroforestry is a collective name for land-use systems and technologies where woody perennials (trees, shrubs, palms, bamboos, etc.) are deliberately used on the same land-management units as agricultural crops and/or animals, in some form of spatial arrangement or temporal sequence.

Air contaminants refer to any substance that is emitted into the air that (a) injures or is capable of injuring the health or safety of a person; (b) injures or is capable of injuring property or any life form; (c) interferes or is capable of interfering with visibility; (d) interferes or is capable of interfering with the normal conduct of business; (e) causes or is capable of causing material physical discomfort to a person; or (f) damages or is capable of damaging the environment.

Biovigilance describes an innovative, multi-disciplinary approach to understanding and combating the negative effects of newly introduced pests, new agricultural farming practices, new crops, and climate change on plant health. Relies on a continuous cycle of awareness, identification, assessment, understanding, mitigation, and appropriateness to ensure that solving one problem doesn't lead to another. The goal is to proactively mitigate potential threats from plant diseases, weed species, and insects before they impact the agricultural sector on a larger scale.

Carbon dioxide is the primary driver of climate change, and is produced primarily by burning fossil fuels. In agriculture, carbon dioxide is primarily generated by fuel combustion by greenhouses, and agricultural equipment. Carbon dioxide is also released from farm fields during soil cultivation as organic materials undergo biological decomposition. Plants, trees and soils can sequester carbon in stable organic matter.

Carbon neutral region is a region that has achieved the deepest greenhouse gas emissions reductions possible across all economic sectors, and removes or captures sufficient carbon dioxide to balance any remaining regional greenhouse gas emissions.

Carbon sequestration is the removal of carbon dioxide from the air and the long-term storage of carbon to mitigate climate change. Carbon enriched soils on farmland are healthier, have better resilience to extreme weather, better water permeability, microbial diversity, higher yields, and reduced input requirements.

Carbon sinks are natural systems that absorb more carbon dioxide than they release. The main natural carbon sinks are plants, the ocean and soil.

Clean, renewable energy is low or zero emissions energy that is replenished over days or years. In Metro Vancouver, clean, renewable energy is primarily electricity from renewable sources such as hydro or solar.

Climate change adaptation means anticipating, planning for and responding to the adverse effects of climate change and taking appropriate action to prevent or minimize the damage it can cause, or taking advantage of opportunities that may arise. It has been shown that well planned, early adaptation action saves money and lives later.

Ecosystem services are the benefits people obtain from ecosystems. Ecosystem services provided by farmland include nutrient and organic matter recycling (from food waste), food for pollinators, wildlife habitat, flood control, and carbon sequestration.

Greenhouse gases are air contaminants that trap heat and are the cause of climate change. Greenhouse gases include carbon dioxide and nitrous oxide, as well as short-lived climate forcers such as methane, halocarbons, black carbon, and ozone. Limiting or preventing greenhouse gas emissions and removing these gases from the atmosphere is critical to avoiding catastrophic climate change (generally referred to as climate change mitigation).

Green Infrastructure is the natural, enhanced, and engineered assets that collectively provide society with ecosystem services required for healthy living.

Hazard refers to a dangerous phenomenon, substance, human activity, or condition. In this context, hazards are caused or made worse by climate change. Examples include rainstorms, extreme weather, wildfires, storm surges, and landslides.

Health-harming Air Contaminants are air contaminants that can harm public health and reduce residents' quality of life and life expectancy by causing heart and lung diseases, cancer, asthma, and other impacts. Health-harming air contaminants include fine and coarse particulate matter, diesel particulate matter, ground-level ozone, nitrogen dioxide, sulphur dioxide, volatile organic compounds, and ammonia.

Impacts refers to the consequences of realized risks on ecosystems, economies, infrastructure, and communities. Impacts may be referred to as consequences or outcomes, and can be adverse or beneficial.

Methane is a short-lived greenhouse gas and is 25 times more effective than carbon dioxide at trapping heat in the atmosphere. Methane emissions from agriculture are produced by ruminant animals such as cattle and sheep through a bacterial process called enteric fermentation, as well as being released from manure storage sites, especially when wet because of the lack of oxygen during decay. Fossil natural gas is mostly composed of methane.

Natural assets are the stock of natural resources and ecosystems (including geology, soil, air, water and all living things) that provide benefits to people. Examples include forests, wetlands, and streams. It is from these natural assets that humans derive a wide range of services, often called ecosystem services, which make human life possible.

Nature-based solutions are actions that protect, sustainably manage, and restore natural or modified ecosystems but also address societal challenges (such as climate change), thereby providing both human well-being and biodiversity benefits.

Nitrous oxide is a long-lived greenhouse gas, and is 298 times more effective than carbon dioxide at trapping heat in the atmosphere. Nitrous oxide emissions from agriculture is primarily produced by microbes as they process nitrogen in soils from fertilizers, manures, and other inputs.

Regenerative agriculture can rebuild soil organic matter, restore degraded land, and improve the water cycle by utilizing natural nutrient cycles, restoring soils, raising carbon levels, protecting water, and enhancing biodiversity and ecosystem services.

Resilience capacity to withstand and/or recover from hazards, risks, and challenges associated with a changing climate. Also referred to as adaptive capacity which is the capacity of ecosystems, economies, infrastructure, and communities to absorb the impacts of climate change while maintaining essential services and functions needed to support health and well-being. In some cases, resilience involves changing services and functions so they are more sustainable.

Sensitivity is the degree to which a community or system is affected (positively or negatively) by climate variability or change. The effect may be direct or indirect.

Vulnerability is the degree to which ecosystems, economies, infrastructure, and communities are susceptible to, or unable to cope with, the adverse effects of climate change. Vulnerability varies based on exposure, sensitivity, and adaptive capacity. Geographic location, socio-economic conditions, and other factors can impact susceptibility to harm and adaptive capacity.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SERVICES AND SOLUTIONS FOR A LIVABLE REGION

ATTACHMENT 2

Climate 2050 Agriculture Roadmap

A PATHWAY TO NET-ZERO CARBON, RESILIENT AGRICULTURE IN METRO VANCOUVER

Carla Stewart

Senior Planner (Agriculture and Food Security), Regional Planning and Housing Services

Climate Action Committee | September 7, 2023

60762913

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VISION

In 2050…

Net-Zero, Resilient Agriculture

- Contributes to low-carbon future
- Clean renewable energy
- Regenerative farming
- Sustainable, adaptive and resilient
- Long-term food production

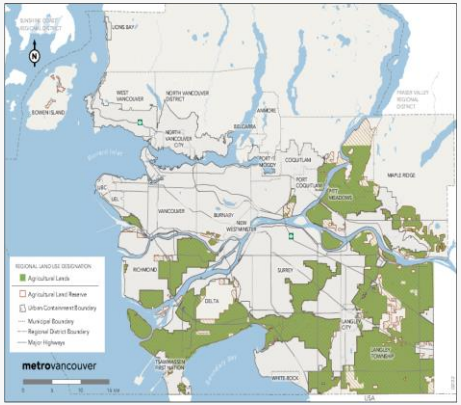
GOALS AND TARGETS

GOAL: The agricultural sector is net-zero; minimizes GHG emissions and is powered by clean, renewable energy.

- **By 2050:**
- 35% reduction in greenhouse gas emissions from the agricultural sector by 2030, relative to 2010 levels

STRATEGIES FOR ACTION

1. Protect Agricultural Land
2. Support Farmers as Climate Action Leaders
3. Support Long-Term Farm Health and Resilience
4. Support a Viable, Profitable and Stable Agricultural Sector

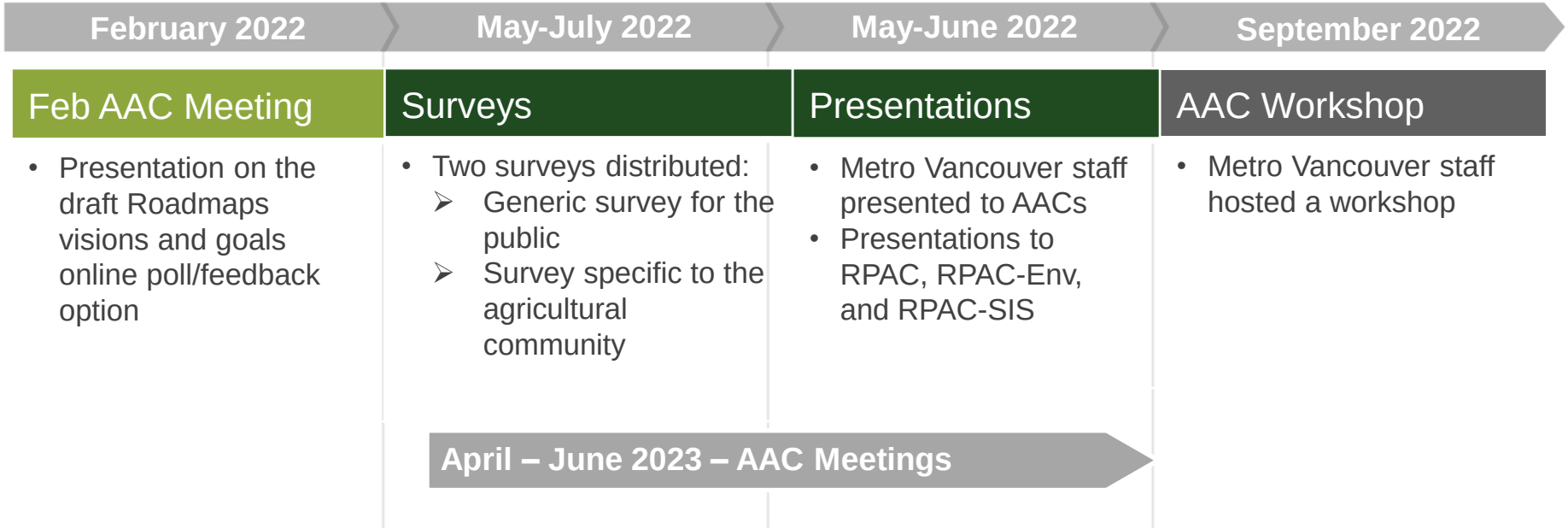


BIG MOVES

- 12 Big Moves
  - 25% Emissions Focused
  - 75% Resilience Focused

ENGAGEMENT TIMELINE

Extensive engagement occurred in 2022 on the contents of the draft Roadmap



KEY ENGAGEMENT FEEDBACK

- Stronger use of land use regulatory tools and enforcement / penalties / Agriculture Impact Assessments
- Stronger role for the Province; review farm tax program
- Farmers need incentives, tax breaks, education, and investment
- Cost, knowledge sharing and access to data are huge barriers
- Existing government programs are under-resourced
- Stronger water management is needed

NEXT STEPS

- Ecosystem Services on Agricultural Land
- Agricultural Land Use Inventory
- Regional Food System Strategy Update
- Agriculture Protection and Viability Strategy
- Soil Tracking Pilot Project

Greenhouse Operation in Metro Vancouver

Thank you

metrovancouver
Together we make our region strong

To: Climate Action Committee

From: Johann Zerbe, Policy Analyst, Air Quality and Climate Action Services

Date: July 24, 2023 Meeting Date: September 7, 2023

Subject: **Metro Vancouver Climate 2050 Annual Report 2022/2023**

RECOMMENDATION

That the MVRD Board receive for information the report dated July 24, 2023, titled "Metro Vancouver Climate 2050 Annual Report 2022/2023".

EXECUTIVE SUMMARY

The *Climate 2050 Annual Report 2022/2023* reports progress toward Metro Vancouver's approved climate targets, the status of *Climate 2050* Roadmap development and implementation of their actions, and project highlights addressing both regional and corporate climate action. The actions in the *Climate 2050* Roadmaps are expected to achieve over 80% clean, renewable energy by 2050, but accelerated, scaled-up and coordinated action is needed by Metro Vancouver and others to meet the 2030 and 2050 emissions reduction targets.

This annual report highlights projects that have the potential to significantly reduce regional and corporate emissions and improve resilience to climate impacts. Among these, proposed requirements for existing large buildings, the Driving Down Emissions initiative for transportation, and various corporate emissions reduction initiatives are critical for meeting Metro Vancouver's climate commitments.

PURPOSE

To inform the Climate Action Committee and MVRD Board about work completed in 2022/2023 in implementing *Climate 2050*. This is the second annual progress report on *Climate 2050* and replaces the *Climate 2050 Snapshot*, reflecting a shift to more comprehensive progress reporting.

BACKGROUND

In September 2018, the MVRD Board adopted *Climate 2050* and directed staff to initiate development of 10 issue-based *Climate 2050* Roadmaps. *Climate 2050* is an overarching, long-term strategy that guides the region's policies and collective actions to transition to a carbon-neutral and resilient region by 2050. The *Climate 2050* Roadmaps represent near-term actions to make progress towards meeting the 2030 and 2050 targets and will be driven by Metro Vancouver's management plans and other policies including the *Clean Air Plan* and *Metro 2050*.

Climate 2050 also includes public outreach with regular reporting on progress. The Climate Action Committee 2023 Work Plan identifies reporting on Metro Vancouver's progress on *Climate 2050* Roadmap implementation as a priority for the year. The *Climate 2050 Annual Report 2022/2023* is the second annual progress report on *Climate 2050* Roadmap implementation, providing

information on specific roadmap actions being advanced, and other climate action projects supporting progress in the *Climate 2050* issue areas.

CLIMATE 2050 ANNUAL REPORT 2022/2023

The *Climate 2050 Annual Report 2022/2023* provides an overview of *Climate 2050*, and context on the challenges of reducing emissions and adapting to climate impacts in our region. It provides a status update on GHG emissions for 2022, including corporate energy-related emissions as well as regional GHG emissions. For each of the ten *Climate 2050* issue areas, the report covers:

- An update on *Climate 2050* Roadmap development
- Status of regional emissions inventory and modelled emissions reduction for *Climate 2050* Roadmap implementation
- (For board-endorsed roadmaps only): A status update for actions which are complete or in-progress
- Highlights of key climate action projects implemented during 2022 and 2023 year-to-date
- Corporate and regional key performance indicators, where data is available

The *Climate 2050 Annual Report 2022/2023* is one of several reports providing information and progress updates on Metro Vancouver's climate action programs. This report is intended to update elected officials, residents, and other stakeholders on *Climate 2050* implementation, inclusive of both regional and corporate progress. The report supports Metro Vancouver's *Climate 2050* Engagement and Public Education Strategy. The report is complementary to Metro Vancouver's other public reporting commitments and obligations, including submissions for the *Carbon Disclosure Project (CDP)* as well as the *Local Government Climate Action Program (LGCAP)* survey, which is a requirement for receiving provincial funding under the program.

The *Climate 2050 Annual Report 2022/2023* also includes a summary of corporate emissions, which will be reported in more detail through an annual technical report "Managing Metro Vancouver's Corporate Energy and Emissions*"* forthcoming in fall 2023, and completion of Metro Vancouver's regional emissions inventory, which will be released as it is completed.

The *Climate 2050 Annual Report 2022/2023* emphasizes the need for coordinated and accelerated action across governments and other organizations. It highlights a number of actions and projects being undertaken by Metro Vancouver, and in partnership with member jurisdictions, TransLink, BC Hydro, and other partners in the region. It also includes a number of key performance indicators, measuring corporate and regional progress across the various *Climate 2050* issue areas. These indicators will be further refined as *Climate 2050* actions are implemented, and as new data becomes available.

ROADMAP PROGRESS

As of June 2023, five *Climate 2050* Roadmaps have been endorsed by the Metro Vancouver Board*:* Buildings, Transportation*,* Nature and Ecosystems*,* Energy*,* and Industry and Business*.* The Agriculture Roadmap is in *draft* status and is included in the September 2023 Climate Action Committee Agenda Package. Metro Vancouver staff are currently working on the drafts of four

additional Roadmaps: *Waste*; *Water & Wastewater Infrastructure*; *Land Use & Growth Management;* and *Human Health & Wellbeing*.

REGIONAL EMISSIONS TRENDS

An update to Metro Vancouver's regional emissions inventory is currently in progress. To date, updated emissions inventories from on-road transportation and buildings have been provided with annual totals from 2010 to 2022. Transportation emissions have decreased slightly over this time, while buildings emissions have increased. As the *Climate 2050* Roadmaps are implemented, regional emissions are expected to decline.

Staff have also modelled the expected greenhouse gas emissions reductions from implementing the *Climate 2050* Roadmaps. These actions represent a substantial reduction compared to current policies in place or confirmed, including those of senior governments. However, they are not sufficient to meet the 2030 and 2050 targets.

Significant emissions reductions across the *Climate 2050* sectors are needed to meet the 2030 and 2050 targets. In addition to implementing the *Climate 2050* Roadmaps, expanded, accelerated, and coordinated action will be needed by Metro Vancouver and at all levels of government, in collaboration with partner organizations and the community.

CLIMATE 2050 ACTION STATUS

Each *Climate 2050* Roadmap includes a timeline for implementation of actions. For each Roadmap, action status is provided as an indicator of implementation progress. As implementation of the *Climate 2050* Roadmaps requires coordinated action across multiple organizations and governments, many actions will remain "in-progress" until the *Climate 2050* targets are achieved. Similarly, Metro Vancouver will continue to advance work related to many actions after they are marked "complete".

Climate 2050 Action Status as of Q2 2023 (for board-endorsed Roadmaps):

- Complete: 5
- In-progress: 73
- Not started (denotes actions that are expected to start by 2023): 43
- Planned for future years (denotes actions that are expected to start in 2024 or later): 64

Projects and actions are also highlighted in the following ways in the report:

- Big Move: Actions that are foundational to achieving the 2030 targets set out in *Climate 2050*, and which should lead to the most significant emission reductions or progress on adaptation and resilience;
- Corporate Leadership: Actions implemented by Metro Vancouver in its corporate operations to demonstrate leadership and support regional actions;
- GHG reduction: Actions that reduce greenhouse gas (GHG) emissions; and
- Adaptation & Resilience: Actions that will support adaptation and resilience in a changing climate.

CLIMATE ACTION PROJECT HIGHLIGHTS

Projects highlighted in the *Climate 2050 Annual Report 2022/2023* representing Big Moves and/or that address multiple actions identified in the *Climate 2050* Roadmaps with the potential to significantly reduce regional emissions and/or improve resilience to climate impacts include:

- **Buildings – Action by Others:** In May 2023, the Government of BC enacted the *Zero Carbon Step Code*, which provides tools for local governments to set lower or zero emissions requirements for new buildings, and updated the Energy Step Code for higher levels of energy efficiency. Several member municipalities are in the process of updating their requirements. Metro Vancouver played a role in advocating for these regulatory changes.
- **Buildings – Action by Metro Vancouver:** Metro Vancouver is in the process of developing greenhouse gas performance requirements for existing large buildings, a Big Move in the *Climate 2050 Buildings Roadmap*. An update on engagement to date is provided in the September 2023 Climate Action Committee Agenda Package.
- **Transportation – Action by Others:** The pending provincial *Zero Emissions Vehicle Act* will require 100% of light-duty vehicle sales to be zero-emission by 2035. The Province is also consulting on a *Clean Transportation Action Plan* to support shifting to sustainable modes.
- **Transportation – Action by Metro Vancouver and Others**: Metro Vancouver is working with TransLink on the Driving Down Emissions project, to explore policies to reduce GHG emissions from light-duty vehicles by 65% by 2030.
- **Ecosystems – Action by Metro Vancouver and Others**: To support the implementation of *Metro 2050*, Metro Vancouver is collaboratively planning for a regional green infrastructure network, a network of habitat hubs and corridors that supports the movement of species across the landscape, maximizing resilience, biodiversity, and human health benefits.
- **Metro Vancouver's Corporate Emissions:** Metro Vancouver is taking action to reduce its own emissions from operations and services, including through the production and provision of renewable energy, transitioning the corporate fleet to zero emissions vehicles, and deep retrofits of buildings owned by Metro Vancouver Housing. More details will be advanced for the Committee and Board's information in a forthcoming report.

ALTERNATIVES

This is an information report. No alternatives are presented.

FINANCIAL IMPLICATIONS

The resources to develop the *Climate 2050 Annual Report* as well as to maintain an ongoing web presence, are approved within current program budgets. Implementing *Climate 2050* to meet the targets with the urgency demanded by the climate crisis is likely to require additional resources in some areas, and may confer long-term economic benefits in others, necessitating innovative approaches and partnerships. As specific proposals are developed such costs and benefits will be clarified and Board approval for expenditures will be sought as per current financial practices.

CONCLUSION

The *Climate 2050 Annual Report 2022/2023* provides an overview of *Climate 2050* Roadmap development and implementation in 2022 and 2023 year-to-date, including updates on key actions and projects that support progress towards the *Climate 2050* objective of a carbon neutral, resilient region. As work on *Climate 2050* continues to shift from roadmap development to implementation, the *Climate 2050 Annual Report* will continue to report progress on action implementation along with corporate and regional indicators of progress towards the targets in the various Roadmaps.

Expanded and accelerated action on the part of Metro Vancouver in collaboration with other levels of government and partners is needed to meet the 2030 and 2050 targets.

ATTACHMENTS

1. Metro Vancouver Climate 2050 Annual Report 2022/2023, dated June 2023
2. Presentation re: Metro Vancouver Climate 2050 Annual Report 2022/2023, dated September 7, 2023

REFERENCES

1. Climate 2050 Roadmaps
2. Clean Air Plan
3. Climate 2050 Strategic Framework

Climate 2050
Annual Report
2022/2023

Indigenous Territorial Recognition

Metro Vancouver acknowledges that the region's residents live, work, and learn on the shared territories of many Indigenous peoples, including 10 local First Nations: qícəý (Katzie), qʷɑ:ńx̌əń (Kwantlen), kʷikʷəx̌əm (Kwikwetlem), máthxwi (Matsqui), xʷməθkʷəýəm (Musqueam), qiqéyt (Qayqayt), se'mya'me (Semiahmoo), Sḵwx̱wú7mesh Úxwumixw (Squamish), scəẃaθən məsteyəxʷ (Tsawwassen), and sə́lílwətaʔɬ (Tsleil-Waututh).

Metro Vancouver respects the diverse and distinct histories, languages, and cultures of First Nations, Métis, and Inuit, which collectively enrich our lives and the region.

About Metro Vancouver

Metro Vancouver is a federation of 21 municipalities, one electoral area and one treaty First Nation that collaboratively plans for and delivers regional-scale services. Metro Vancouver's core utility services include drinking water, sewage treatment, and solid waste management, along with regional services like regional parks, affordable housing, regional land use planning and air quality and climate action that help keep the region one of the most livable in the world.

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metrovancouver.org
June 2023

Contents

Climate 2050 Annual Report 2022/2023

Climate change is both a global and a local challenge, and it is already affecting our planet and our region in profound ways, making our summers hotter and drier, our winters warmer and wetter, and increasing the occurrence of extreme weather events. Recognizing the need for urgent and transformative action, Metro Vancouver takes an "action while planning" approach, implementing climate actions while at the same time progressing development of the Climate 2050 Roadmaps, which lay out the strategies and actions needed to reach a low carbon, resilient region.

The *Climate 2050 Annual Report* is intended to meet Metro Vancouver's commitment to regular and transparent reporting on *Climate 2050* progress, and progress towards Metro Vancouver's established climate commitments and targets. For each of the 10 Climate 2050 Roadmap issue areas, the *Climate 2050 Annual Report 2022/2023* highlights climate actions implemented by Metro Vancouver, and key performance indicators to help measure progress towards our targets. The report supports Metro Vancouver's objectives to build strong awareness and support for climate action from key stakeholders and the public in the region.

Climate 2050

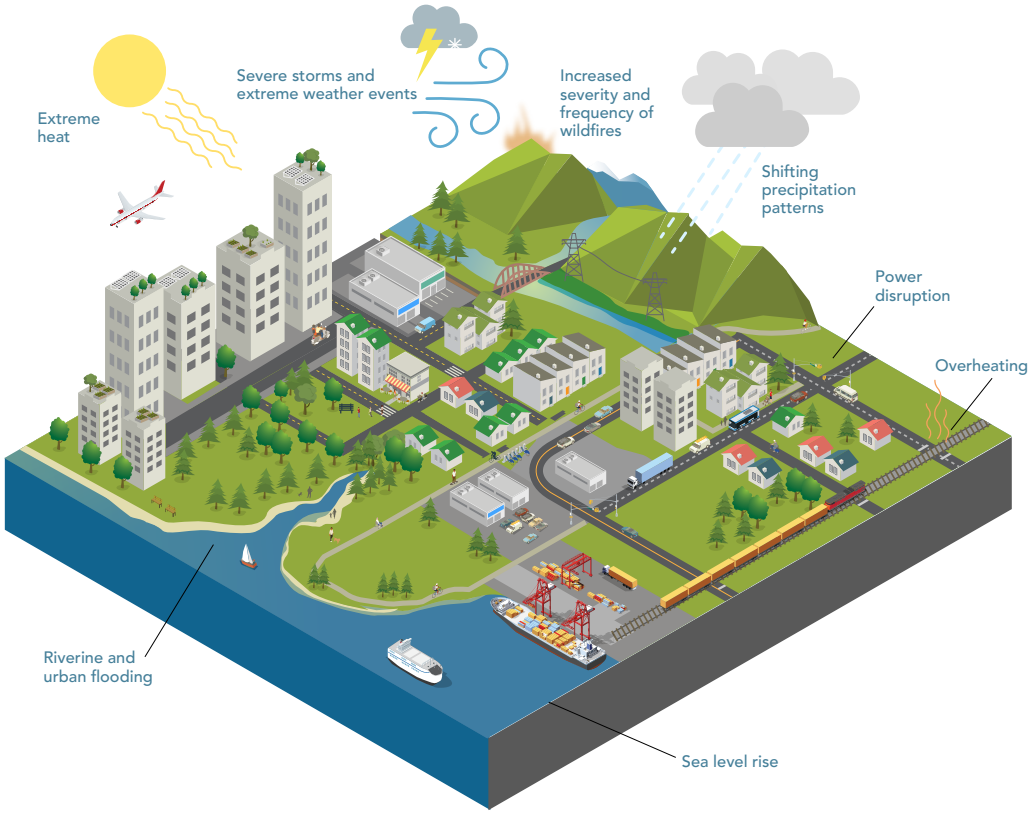
While Metro Vancouver and its 23 member jurisdictions have been taking action for over 20 years to address climate change mitigation and adaptation, we recognize the need to do more and move more quickly. In 2018, the Metro Vancouver Board of Directors adopted Climate 2050, a regional climate strategy. Climate 2050 commits to bold leadership to reduce greenhouse gas emissions and ensure that our infrastructure, ecosystems, and communities are resilient to the impacts of climate change. Climate 2050 includes the following commitments:

- Achieving a carbon neutral region by 2050
- Ensuring that infrastructure, ecosystems, and communities are resilient to the impacts of climate change
- Achieving an interim target of 45% reduction of GHG emissions from 2010 levels by 2030

Achieving a carbon neutral region by 2050 will require unprecedented greenhouse gas reductions across most sectors. Many sectors must become "zero emissions", and any remaining greenhouse gas emissions will need to be balanced with ecological and technological carbon removal approaches. Initial modeling as a part of Metro Vancouver's Carbon Neutral Modeling Study, and research across the international community shows us that the 2020s needs to be a decade of urgent action on climate solutions.

Climate change impacts are already evident in our region, and will become more marked in the near future. Metro Vancouver's Climate Projections Report provides details of the projected impacts of climate change in this region. Every fraction of a degree of warming avoided by taking collective action to reduce human-caused greenhouse gas emissions will save lives and avoid damage to infrastructure and ecosystems.

EXPECTED CLIMATE CHANGE IMPACTS

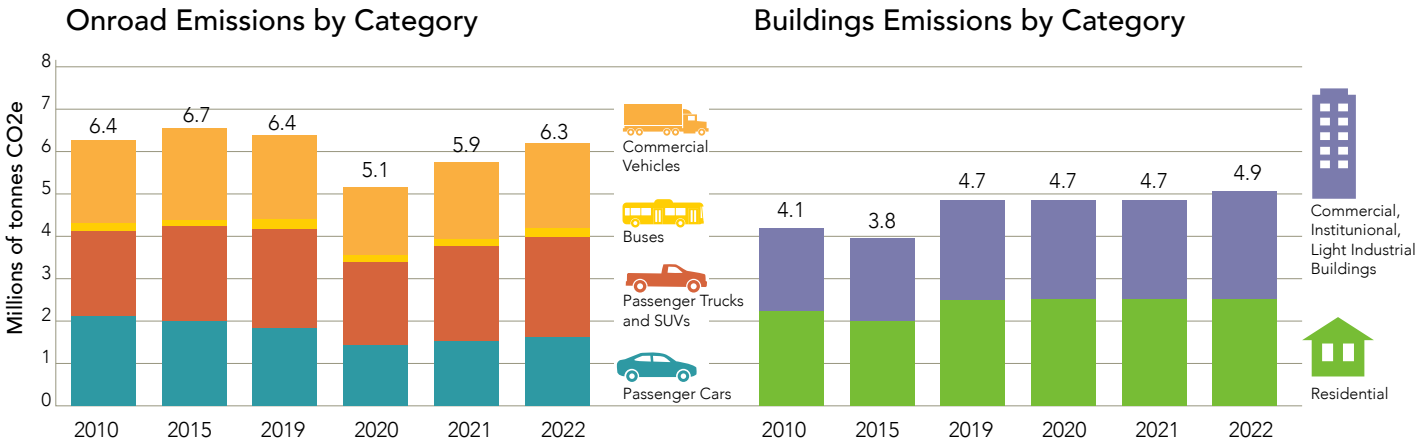


Metro Vancouver Regional Emissions

Metro Vancouver has historically compiled a regional emission inventory every five years, covering greenhouse gas and other air contaminants emitted in the region. Metro Vancouver is moving towards an annual emissions inventory, which will improve our ability to track and measure the impacts of Climate 2050 and other climate actions taking place in the region. Metro Vancouver will be updating the 2019-2022 regional emission inventory throughout 2023. As of July 2023, Metro Vancouver has updated regional emissions inventories for on-road transportation and buildings. See the below figures for more information. As annual GHG inventories for other sectors are completed, results will be available through a publicly accessible platform.

Regional GHG emissions from on-road transportation were 6.3 million tonnes carbon dioxide equivalent ($Mt\ CO_2e$) in 2022, which is relatively unchanged from 2010. Despite significant increases in both vehicle population (29% increase) and distance travelled (25% increase), regional GHG emissions have held steady, due to improvements in vehicle fuel efficiency and increasing uptake in zero emission technology. GHG emissions from buildings increased from 2010 to 2022, although emissions have been relatively constant from 2019 to 2022; these trends reflect the continued use of fossil fuels for heating and hot water in buildings.

These emissions are expected to decline in future years, as actions in the Climate 2050 Roadmaps are implemented and new policies and market shifts take effect, however, accelerated and expanded action will be needed to achieve the approved 2030 and 2050 climate commitments.



Metro Vancouver Corporate GHG Emissions

Metro Vancouver is a diverse organization that plans for and delivers regional utility services, including water, sewers and wastewater treatment, and solid waste management. It also regulates air quality, plans for urban growth, manages a regional parks system and provides affordable housing. The delivery of these services generates emissions from the use of energy as well as process related emissions at our solid waste and liquid waste facilities. In addition to using purchased energy, Metro Vancouver generates energy itself. Most of the self-generated energy is used by Metro Vancouver (e.g. biogas at wastewater treatment plants) while some is sold to others (e.g. electricity generated at the Waste-to-Energy facility sold to BC Hydro, or renewable natural gas sold to Fortis). Metro Vancouver tracks GHG emissions resulting from generation and consumption of all of these forms of energy.

In 2022, Metro Vancouver's total corporate GHG emissions from all energy use was approximately 28,000 tonnes CO_2e. Metro Vancouver reports annually on corporate GHG emissions, with reporting for 2022 forthcoming in fall 2023.

In addition to GHG emissions originating from corporate energy use, Metro Vancouver's other GHG emissions include industrial process emissions of approximately 130,000 tonnes CO_2e annually. This includes combustion of solid waste at the Waste-to-Energy Facility, the majority of which is plastics. Metro Vancouver is investigating methods for more accurately quantifying and reporting process emissions from its operations (e.g. emissions from wastewater treatment plants).

Metro Vancouver has a Corporate Energy Management Program aimed at reducing its operational carbon footprint through energy efficiency improvements, energy recovery initiatives, and transitioning to lower-carbon energy sources. Metro Vancouver is advancing a number of initiatives to reduce its corporate carbon footprint and provide renewable energy to the region, including:

- Providing clean, renewable energy to the region, including plans to provide waste heat from Metro Vancouver's sewer collections system, wastewater treatment plants, and the Waste-to-Energy facility to communities in the region, and production of renewable natural gas at our wastewater treatment plants.
- Electrification of Metro Vancouver fleet vehicles, and planning and deploying electric vehicle charging infrastructure at our operations to support this transition.
- Switching to lower-carbon fuel sources in our operations, including transitioning to renewable natural gas at our Parks, wastewater treatment plants, and Waste-to-Energy Facility.
- Implementing deep energy retrofits to Metro Vancouver Housing Corporation (MVHC) buildings, and designing new MVHC buildings to be fully electric, helping to reduce GHG emissions in these buildings by up to 98%.

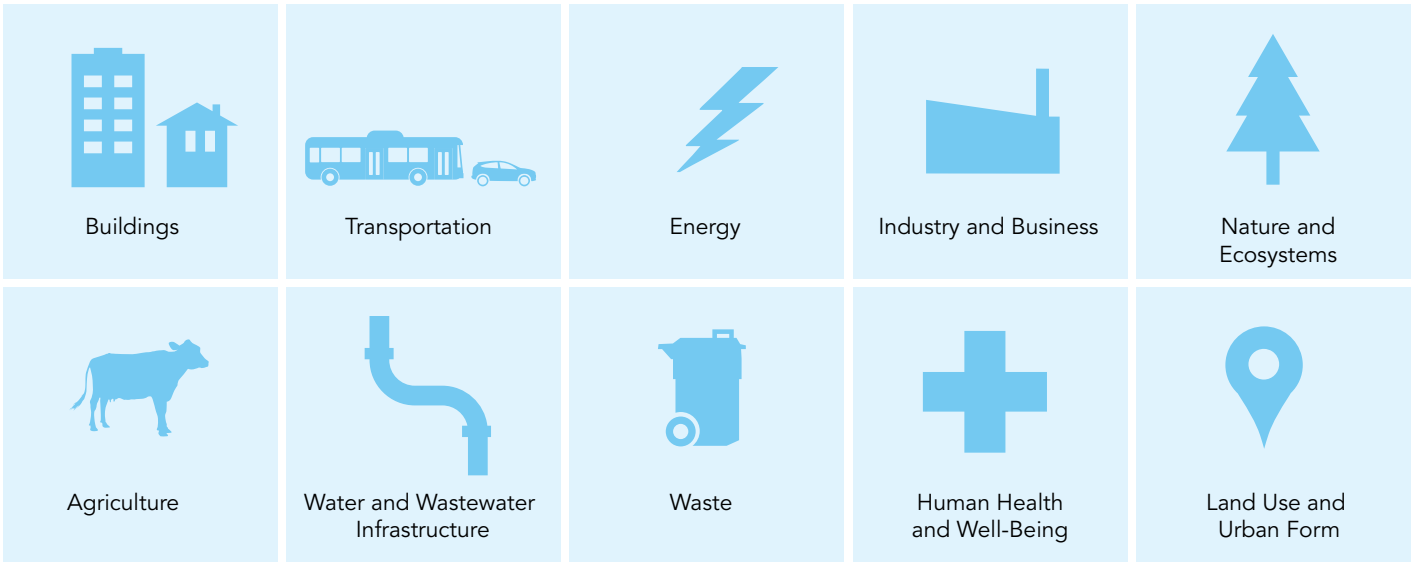
Metro Vancouver also implements a portfolio of non-energy related projects that have emissions reductions benefits, including avoided forest conversion, ecological area restoration, landfill gas capture, and solid waste reduction projects.

Climate 2050 Roadmaps

Climate 2050 is organized around ten issue areas, intended to provide groupings of climate goals, targets, and actions. They reflect the functions and responsibilities under Metro Vancouver's mandate and the range of climate related challenges and initiatives affecting the region. For each issue area, Metro Vancouver is developing a *Climate 2050 Roadmap* that outlines regional and corporate goals, strategies, actions, and performance metrics. Together, these Roadmaps will provide a comprehensive view of the path towards a low carbon, resilient region.

The Climate 2050 Roadmaps are being developed by Metro Vancouver with input from governments, partner organizations and residents and business across the region. The Roadmaps include a call to action for other jurisdictions and key partners across the region including: member jurisdictions, residents, businesses, academic institutions, First Nations and others. Metro Vancouver will take a strategic approach to assessing fairness, equity and affordability in the *Climate 2050 Roadmaps*.

Many of the goals, targets, and actions in the Climate 2050 Roadmaps are also reflected in other Metro Vancouver management plans, including the *Clean Air Plan* and *Metro 2050*, and are being developed to align with other municipal, regional, provincial and federal climate policies.



Progress Towards Targets

Local governments have taken action on climate for many years, but we need to do more. Cumulatively, the actions across the Climate 2050 Roadmaps represent a substantial reduction compared to current policies. This includes actions from senior governments. However, they are not sufficient to meet the 2030 and 2050 targets. Expanded action will be needed at all levels of government, in collaboration with partner organizations.

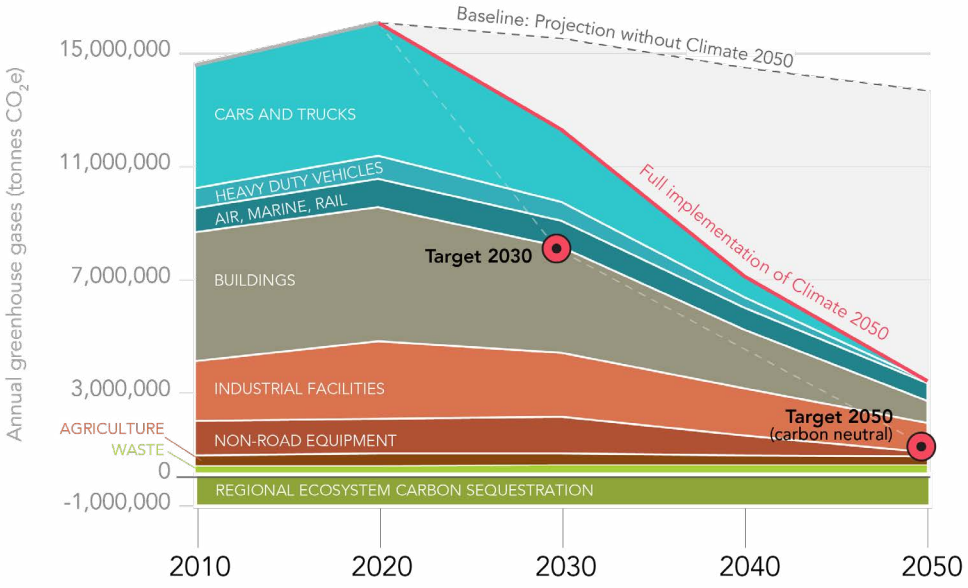
The transition to a low carbon future is likely to be accelerated by;

- technological advancements such as solar energy, batteries and heat pumps;
- electrification across many sectors including vehicles, buildings and industry; and,
- societal shifts such as the rise of micromobility (e.g e-bikes and e-scooters) supported by strong action by local governments to build protected cycling networks; and improvements in land use planning and consumption patterns.

Conversely, challenges include; expansion and subsidies for fossil fuel industries, a divisive political climate, and low climate literacy and/or misinformation.

The Climate 2050 Roadmaps reflect current knowledge and technology. Meeting the targets will depend on advancing the actions in the roadmaps as quickly as possible, while continuing to expand and collaborate with partner organizations.

Climate 2050 Roadmaps: **GHG Emissions Reductions (2021 estimate)**



Climate 2050 Implementation Update- 2022/2023

Achieving a carbon neutral, resilient region will require urgent and coordinated action on the part of Metro Vancouver, its member jurisdictions, and other governments and partners. Metro Vancouver has a long history of working with other governments and partners towards common goals. Reflecting this need for collaboration, the *Climate 2050 Roadmaps* include actions which Metro Vancouver will lead, as well as actions where Metro Vancouver's role is to support other organizations leading an action, or advocate to other governments and partners for an action or policy change to take place.

For each of the ten *Climate 2050* issue areas, the *Climate 2050 Annual Progress Report* includes highlights on: 1) Roadmap development and 2) implementation of Roadmap actions and other climate action projects.

The icons below indicate the outcomes supported by these actions:

BIG Move	Actions that are foundational to achieving the 2030 targets set out in *Climate 2050*, and which should lead to the most significant emission reductions or significant progress on resilience and adaptation
GHG	Actions that reduce greenhouse gas (GHG) emissions
	Actions that will support adaption and resilience in a changing climate
Corporate LEADERSHIP	Actions implemented by Metro Vancouver in its corporate operations to demonstrate leadership and support regional actions

Climate 2050 Roadmap Status

Climate 2050 Under Development	***Climate 2050*** Draft Roadmaps	***Climate 2050*** Board endorsed Roadmaps
Waste	Agriculture	Transportation
Water & Wastewater Infrastructure		Buildings
Land Use and Urban Form		Industry & Business
Human Health & Well-being		Energy
		Nature & Ecosystems

Carbon Neutral Region by 2050

Measuring Our Progress

Climate 2050 Action Status

Each *Climate 2050 roadmap* includes a timeline for implementation of actions. The *Climate 2050 Annual Report* reflects the status of that implementation. For each roadmap, action status is provided as an indicator of implementation progress. As implementation of the *Climate 2050 roadmaps* require collaboration and ambitious action across organizations and governments, many actions will remain 'in-progress' until the *Climate 2050* targets are achieved. Similarly, Metro Vancouver will continue to advance work related to many actions after they are marked 'complete'.

Climate 2050 Roadmap Action Status- Q2 2023 (Board-endorsed Roadmaps)	
Complete	**5**
In Progress	**73**
Not Started [1]	**43**
Planned for Future Years [2]	**64**

1 Denotes actions that are expected to start by 2023.

2 Denotes actions that are expected to start in 2024 or later.

Key Performance Indicators:

6.3 million tonnes CO_2e: Total regional on-road transportation emissions (2022)

4.9 million tonnes CO_2e: Total regional buildings emissions (2022) [3]

For each issue area, Metro Vancouver will be developing Key Performance Indicators (KPIs) to help us track progress on implementation of the *Climate 2050 Roadmaps*, and progress towards our targets of a carbon neutral, resilient region by 2050. Metro Vancouver will develop KPIs to measure progress at a corporate level and at a regional level to measure the impacts of actions by Metro Vancouver, other governments, and partners, towards achieving our regional targets. KPIs will be refined and added as data becomes available.

3 Includes buildings emissions from natural gas heating only; does not include residential fuel oil or wood heating emissions, which make up less than 1% of building emissions.

2022/2023 Implementation:

Complete	3
In Progress	15
Not Started	18
Planned for Future Years	2

Buildings

Buildings will shape our low-carbon future by using clean and renewable energy, becoming highly energy efficient, and improving human health through design and retrofits.

Climate 2050 Roadmap Development:

Final ***Climate 2050* Buildings Roadmap** endorsed by the Metro Vancouver Board in November 2021

	IN-PROGRESS & COMPLETE ACTIONS	STATUS
BIG Move	New Buildings are Highly Efficient and Electric	Complete
BIG Move	Building Electrification Mandate for BC Hydro	Complete
	Building Decarbonization Coalition	Complete
	High Performance Heating and Cooling Equipment Import and Sale Standards	In progress
BIG Move	GHG Requirements for Existing Large Buildings	In progress
BIG Move	GHG Performance Requirements for Existing Houses and Townhomes	In progress
BIG Move	Require Greenhouse Gas Reductions During Renovations	In progress
	Energy Labels for Homes and Buildings	In progress
	Energy Advisor Services for Homes and Large Buildings	In progress
	Make Electricity Upgrades Faster and Cheaper	In progress
Corporate LEADERSHIP	Share Lessons from Transitioning Metro Vancouver Corporate Buildings to Zero Emissions	In progress
	Low Carbon District Energy Policies	In progress
Corporate LEADERSHIP	Strengthen Metro Vancouver's Corporate Sustainable Design Requirements	In progress
	Broaden Applications of Non-Potable Water Use in Buildings	In progress
	Support Capacity Building of Non-Potable Water Use Applications on Building Sites	In progress
	Require Cooling Measures in New Buildings and Major Retrofits	In progress
	Expand the Network of Public Buildings that can serve as Cool, Clean Air Centres	In progress
	Understand Climate Risk and Resilience for Public Buildings Across the Region	In progress

Heather Place

2022/2023 Project Highlights

Zero Carbon Step Code

In May 2023, the Government of BC enacted the Zero Carbon Step Code, which provides tools for local governments to set lower or zero emissions requirements for new buildings. Changes were also introduced to require 20% better energy efficiency in most new homes and buildings in BC as part of the **BC Energy Step Code**. The changes meet commitments in the *CleanBC Roadmap to 2030* to gradually lower emissions from buildings until all new buildings are zero carbon by 2030 and are net-zero energy ready by 2032. Metro Vancouver with its member jurisdictions strongly advocated for the establishment of GHG requirements for new buildings, including enabling local governments to voluntarily establish zero emission targets earlier than the BC-wide requirements, which will come into force in 2030. GHG requirements to make new buildings highly efficient and electric is a Big Move in the Buildings Roadmap and this action is now complete.

Building 2 Electrification Coalition

In 2022, Metro Vancouver joined the **Building 2 Electrification Coalition** (B2E), Canada's first building electrification coalition, based in British Columbia. B2E brings together industry, housing providers, researchers, policy makers, electric utilities and other stakeholders, to identify and address barriers to electrification and take actions that contribute to a meaningful market shift to low carbon building electrification. B2E aims to build demand for building electrification technologies, and support the transformation of policy, workforce, and supply chains to deploy these technologies widely across BC. B2E is a program area of the Zero Emissions Building Exchange (ZEBx), and part of the **Metro Vancouver Zero Emissions Innovation Centre** (ZEIC), an independent non-profit and charitable organization that is part of the Low Carbon Cities Canada (LC3) network.

Metro Vancouver's Approach to Managing Emission from Large Buildings

In 2022, Metro Vancouver completed engagement on an **approach to manage GHG emissions from large buildings over 25,000 ft²**. In 2023, Metro Vancouver is developing more detailed GHG reporting and performance requirements for existing large buildings, and will be seeking feedback on this proposal in late 2023 and into 2024.

Transitioning Metro Vancouver Housing Buildings to Zero Emissions

Metro Vancouver Housing (MVH) buildings are being retrofit to reduce GHG emissions by up to 98%, with some new MVH buildings designed to be fully electric. In 2022, Metro Vancouver Housing also progressed the **Reframed Initiative**, a multi-partner project to undertake deep energy retrofits on existing multi-unit residential buildings (MURBs) to reduce both energy use and GHG emissions. These projects demonstrate the feasibility of electric buildings today, and illustrate the benefits of low carbon buildings such as reduced GHG emissions, reduced energy use and costs, and increased resilience to extreme weather.

Key Performance Indicators

4.9 million tonnes tCO_2e – total regional GHG emissions from buildings [4]

1,957 new residential heat pumps installed in region through the CleanBC Better Homes Program (2022) replacing natural gas systems

Total corporate GHG emissions from buildings in 2022 (tCO_2e)- data forthcoming in 2023.

4 Includes buildings emissions from natural gas heating only; does not include residential fuel oil or wood heating emissions, which make up less than 1% of building emissions.

2022/2023 Implementation:

Complete	1
In Progress	18
Not Started	25
Planned for Future Years	8

Transportation

Transportation will help shape our low-carbon future by prioritizing zero-emission vehicles, increasing active and public transportation, and making improvements that increase system resilience.

Climate 2050 Roadmap Development:

Final ***Climate 2050* Transportation Roadmap** endorsed by the Metro Vancouver Board in November 2021.

	IN-PROGRESS & COMPLETE ACTIONS	STATUS
BIG Move	Accelerate Sales Targets for New Electric Passenger Vehicles	Complete
	More Stable Infrastructure Funding for Regional Active Transportation Networks	In progress
	More Stable Funding for Regional Transit	In progress
	Support Residents and Businesses in Active Transportation	In progress
BIG Move	Enhance and Improve Regional Transit	In progress
BIG Move	Use Pricing to Reduce Driving and Emissions	In progress
	Regional Parking Strategy to Reduce Driving	In progress
Corporate LEADERSHIP	Support Low Emissions Commuting by Staff	In progress
BIG Move	Develop Regional Emission Requirements for Passenger Vehicles	In progress
BIG Move	Make Electric Vehicles More Affordable	In progress
	Regional Electric Vehicle Charging Strategy	In progress
	Electric Vehicle Outreach Programs	In progress
Corporate LEADERSHIP	Transition the Corporate Fleet to Zero Emissions	In progress
BIG Move	Regulate Existing Medium and Heavy Trucks	In progress
BIG Move	Require Zero Emission Sales Targets for New Medium and Heavy Trucks	In progress
BIG Move	More Stringent Low Carbon Fuel Standards	In progress
	Long-term Emissions Strategy for Medium and Heavy Trucks	In progress
	Reduce Refuse Trucks Emissions	In progress
	Identify Regional Climate Hazards, Risks, and Vulnerabilities Impacting Transportation Networks	In progress

2022/2023 Project Highlights

Strengthening the BC Zero Emissions Vehicle Act

In 2022, the BC Government consulted on proposed regulatory changes to the *BC Zero Emissions Vehicles Act* (ZEVA), to come into effect in 2023. The accelerated sales targets in ZEVA will require 26% of light-duty vehicle sales to be zero-emission by 2026, 90% by 2030, and 100% by 2035. Previously, the ZEVA had required sales to reach 100% zero-emission by 2040. The changes to BC's ZEVA will help accelerate the transition to a low-carbon transportation system, and improve availability of electric vehicles to British Columbians. Metro Vancouver and its member jurisdictions provided input and advocated for the ZEVA to be strengthened, and continues to advocate for similar requirements at the federal level. Accelerating the Sales Targets for new electric passenger vehicles is a Big Move in the Transportation Roadmap and is now complete.

Driving Down Emissions: Developing a Policy Bundle to Reduce Light Duty Vehicle Emissions

Light-duty vehicles (e.g., cars, light trucks, SUVs) are the largest source of GHG emissions in the region, at about 35%. Solutions exist to reduce these emissions, including supporting low or zero emission modes of transport (e.g., walking, rolling, biking and public transit), switching to zero emission vehicles, and building complete, compact communities to support reduced driving. The Driving Down Emissions project, which is being undertaken in partnership with TransLink, aims to develop recommendations for policies to reduce GHG emissions from light-duty vehicles, targeting a 65% reduction by 2030, from 2010 levels. Currently, the project team is conducting technical research and analysis of a list of policy options, and researching public attitudes towards those policies. This project advances several actions in the Transportation Roadmap.

Regional Electric Vehicle Charging Strategy and Guidance Document

This project aims to determine what electric vehicle (EV) charging infrastructure is needed in the Metro Vancouver region to support charging needs for the rapid uptake of light-duty EVs over the next 30 years. The final deliverable for this project will be a publicly available regional EV charging guidance document, as well as regional EV uptake projections. This work will support investments in the regional EV charging network by key EV charging providers including local governments, utilities, private companies, and other governments and public sector organizations by developing recommendations and guidance on charging locations, costs, and policy. The project is being undertaken in partnership with BC Hydro and TransLink.

Transition the Corporate Fleet to Zero Emissions

Metro Vancouver Fleet Climate Action Strategy will support a goal of transitioning Metro Vancouver's corporate on-road fleet to use only zero emission or low carbon fuels between 2035 and 2040, and to be fully zero emission by 2050. In 2022, progress included the acquisition of 10 EV pickup trucks and cargo vans; deployment of fleet EV charging infrastructure at our facilities, continuing to conduct a feasibility studies for EV infrastructure upgrades, and assessing the use of renewable fuels for Fleet vehicles. From 2016 to 2021, the size of the corporate fleet increased by 13% while the percentage of vehicles fueled only by fossil fuels decreased by 7%. Total emissions from the corporate fleet decreased by 14% during this time.

Key Performance Indicators

6.3 million tonnes tCO_2e – total annual regional GHG emissions from on-road vehicles (2022)

22.5% – new passenger vehicles sold in region that are electric (2022)

2,177 publicly available EV Chargers in region[5] (cumulative as of 2023)

68 – Annual public transit journeys per capita in region (2022)

2,349 tCO_2e- total corporate GHG emissions from vehicles (2021). Note: 2022 data forthcoming in 2023

5 Cumulative regional total as of June 2023: 2,177 EV chargers; includes 1,904 level 2 chargers and 273 DCFC (Fast Chargers).

2022/2023 Implementation:

Complete	0
In Progress	11
Not Started	21
Planned for Future Years	4

Energy

Energy will help shape our low-carbon future through reduced energy use, enhanced energy efficiency and transitioning to clean, renewable energy.

Climate 2050 Roadmap Development:

Final ***Climate 2050* Energy Roadmap** endorsed by the Metro Vancouver Board in April 2023.

	IN-PROGRESS & COMPLETE ACTIONS	STATUS
	Regional Climate Action in Energy Utility Regulatory Processes	In progress
	Implement Tracking, Verification, and Reporting Requirements for Renewable Natural Gas Supply	In progress
Corporate LEADERSHIP	Transition Corporate Energy Use to 100% Clean, Renewable Energy	In progress
BIG Move	Electrification Rates	In progress
	High Performance Heating and Cooling Equipment Import and Sale Standards	In progress
BIG Move	More Stringent Low Carbon Fuel Standards	In progress
	Regional Hydrogen Hub	In progress
	Regional Sources of Liquid Biofuels	In progress
Corporate LEADERSHIP	Metro Vancouver as a Regional Clean, Renewable Energy Provider	In progress
Corporate LEADERSHIP	Innovative Research on Optimizing Energy Recovery from Waste Streams	In progress
	Eliminate Subsidies and Public Financing for Fossil Fuels	In progress

Lulu Island Renewable Natural Gas Facility

2022/2023 Project Highlights

Participating in Energy Utility Regulatory Processes

Metro Vancouver is participating as an intervener in three BC Utilities Commission proceedings related to renewable natural gas rate design and FortisBC's long term gas resource plan, and BC Hydro's Integrated Resource Plan. These proceedings will have a significant role in guiding the transition away from fossil natural gas, and planning for the transition to clean, renewable sources of energy.

Metro Vancouver as a Regional Clean, Renewable Energy Provider

Metro Vancouver is developing a **Waste-to-Energy Facility District Energy system** to supply heat and hot water to up to 30,000 homes in Vancouver, Burnaby and potentially New Westminster. As of 2023, Metro Vancouver is in the early design phase of this project. Construction is expected to take place from 2024 to 2026, in multiple phases. See more on this initiative in the Waste Roadmap section of this report.

Turning Wastewater into Renewable Natural Gas

Metro Vancouver's wastewater treatment plants produce biogas as part of their treatment processes. Biogas is a valuable resource that can be used instead of conventional natural gas, reducing greenhouse gas emissions. See more on this initiative in the Water and Wastewater Infrastructure Roadmap section of this report.

Using Sewage for Heating and Cooling

There is enough excess heat in Metro Vancouver's wastewater to heat about 700 high rises. Recovering heat from sewage can provide renewable, fossil fuel-free heat to residents and businesses in the region, reducing greenhouse gas emissions. Several projects to recover heat from wastewater are currently under design or in construction:

- The new North Shore wastewater treatment plant, currently under construction, will recover 5 MW of heat and sell it to the nearby Lonsdale Energy Corporation, which is owned by the City of North Vancouver.
- In Richmond, a project is being designed to recover heat that can be used by residents and businesses in the Richmond Oval area.
- Metro Vancouver is helping to invest in fund a project within the City of New Westminster that will recover heat and use it at the Royal Columbia Hospital and in the Sapperton District.
- In Surrey, Metro Vancouver is also investing in a project that will recover heat to service the expansion of district energy in Surrey City Centre.
- The Effluent Heat for RNG project at Lulu Island wastewater treatment plant, currently in detailed design, will utilize heat pump technology to recover heat from the Plant's effluent which will be used for process heating, thus allowing additional quantities of biogas to be cleaned and sold to FortisBC.

Preliminary Feasibility Study of Green Hydrogen Production from Hydropower at Cleveland Dam

In 2023, Metro Vancouver initiated a project to assess the feasibility of producing hydrogen from electrolysis at the Cleveland Dam, located in the Capilano watershed. The project will also explore the market potential for green hydrogen in the region.

Key Performance Indicators

KPI's for this issue area are under consideration for future reporting. This might include clean energy provided by Metro Vancouver to the region (MW).

2022/2023 Implementation:

Complete	1
In Progress	5
Not Started	10
Planned for Future Years	12

Industry & Business

Industry will help shape our low-carbon future by reducing emissions with better technology, using clean and renewable energy, and setting high standards for products and their manufacturing processes

Climate 2050 Roadmap Development:

***Climate 2050* Industry & Business Roadmap** endorsed by Metro Vancouver Board in June 2023.

	IN-PROGRESS & COMPLETE ACTIONS	STATUS
BIG Move, GHG	Tighten Emissions Regulation for Non-Road Diesel Engines	Complete
BIG Move, GHG	Integrate Greenhouse Gases into Emission Regulations and Permits	In progress
GHG	Develop Sector-Specific Regulations	In progress
GHG	Emission Standards for New Non-Road Equipment	In progress
GHG	Encourage Cleaner Non-Road Equipment through Municipal Approvals	In progress
GHG	Carbon Capture in Metro Vancouver Region	In progress

2022/2023 Project Highlights

Tighten Emissions Regulation for Non-Road Diesel Engines BIG Move GHG

Diesel particulate matter (DPM) contributes to climate change and reduced visibility and is associated with both short and long-term health effects, including asthma, heart and respiratory diseases and cancer. To further reduce DPM emissions and address harmful nitrogen oxides (NOx) produced by all tiers of non-road diesel engines, in October 2021 the Metro Vancouver Board adopted MVRD Non-Road Diesel Engine Emission Regulation Bylaw No. 1329. The new Bylaw includes provisions to eliminate operation of Tier 0 and Tier 1 engines within 100 meters of hospitals, elementary schools, and other community care facilities, and includes registration and labelling requirements for Tier 2, 3, and 4 non-road diesel engines, starting in 2023.

Assessment of Carbon Capture Technology in the Metro Vancouver Region GHG

Industrial facilities contribute approximately 17% of the 15 million tonnes of greenhouse gas emissions in the Metro Vancouver region, next to buildings and transportation emissions. With support from the Government of BC, UBC Clean Energy Research Center, and Metro Vancouver's Solid Waste Services, this project aims to evaluate technological approaches for capturing carbon dioxide (CO_2) from flue gas streams in large industrial facilities in the region, and storing the collected CO_2 in a way that prevents its release into the atmosphere. The project involves assessing carbon capture, utilization, and storage (CCUS) systems that may play a role in decarbonizing industrial sources of CO_2 emissions in the region. It also includes identifying risks and opportunities as well as a review of the policy and regulatory landscape associated with CCUS that may be relevant to the region.

Kennedy Newton Water Main Construction

Lights, Camera, Climate Action!

This project aims to explore alternative solutions to portable diesel generators which are extensively used in the film industry, with the aims of reducing GHG emissions, improving air quality, and reducing ambient noise while continuing to meet film production needs. The initial phase of the project includes a report that makes several recommendations for Metro Vancouver and member jurisdictions to promote the use of clean power alternatives. A second phase of the project will include the installation of a permanent clean power kiosk at a Metro Vancouver regional park site to demonstrate the benefits of clean power use by the film industry.

Key Performance Indicators

Total regional emissions from industrial sector in 2022 (tCO_2e) – Data forthcoming in 2023

2022/2023 Implementation:

Complete	0
In Progress	24
Not Started	2
Planned for Future Years	5

Nature & Ecosystems

Nature and ecosystems will help shape our low-carbon future by capturing carbon, cooling our streets, and enhancing livability.

Climate 2050 Roadmap Development:

***Climate 2050* Industry & Business Roadmap** endorsed by Metro Vancouver Board in June 2023.

IN-PROGRESS & COMPLETE ACTIONS	STATUS
Protect an Additional 10% of the Region for Nature	In progress
Protect, Restore, and Enhance Natural Areas at the Regional Scale	In progress
Protect, Restore, and Enhance Nature at the Local Scale	In progress
Support Ecosystem Protection, Enhancement, and Restoration	In progress
Manage invasive species	In progress
Develop a Regional Green Infrastructure Network	In progress
Green Urban Areas	In progress
Green the Regional Greenways Network	In progress
Minimize Ecosystem Fragmentation	In progress
Develop Data and Resources to Support Ecosystem Connectivity	In progress
Incorporate Natural Assets into Asset Management and Financial Planning	In progress
Integrate Ecosystems and their Services into the Design of Major Infrastructure	In progress
Consider Ecosystems and their Services in Major Development Decisions	In progress
Support Natural Asset Management at the Local Level	In progress
Achieve 40% Tree Canopy Cover Within the Region's Urban Areas	In progress
Provide Data and Resources to Support Urban Forest Management	In progress
Improve Local Regulations and Management Practices	In progress
Convene Partners on Urban Forestry Issues	In progress
Consider Equity and Human Health in Urban Forestry Planning	In progress
Explore Innovative Funding and Incentive Programs	In progress

Support the Implementation of Nature-based Solutions	In progress
Manage Forests in the Context of a Changing Climate	In progress
Advance Nature-Based Solutions to Address Flood Hazards	In progress
Partner with Others to Address Climate Change Issues in Coastal and Marine Ecosystems	In progress

2022/2023 Project Highlights

Develop a Regional Green Infrastructure Network

To support the implementation of Metro 2050, Metro Vancouver is collaboratively planning for a regional green infrastructure network, a network of habitat hubs and corridors that supports the movement of species across the landscape, maximizes resilience, biodiversity and human health benefits. Key work streams will include First Nations engagement, collaborative network identification, mapping, research and design, and the development of Metro 2050 guidelines to support member jurisdictions in implementation the network.

Provide Data and Resources to Support Urban Forest Management

To support member jurisdictions in identifying and achieving local tree canopy cover targets, Metro Vancouver is updating the regional tree canopy cover and impervious surfaces database. Work is also underway to update the Metro Vancouver Tree Regulations Toolkit, which provides regulatory guidance and best practices for member jurisdictions to retain trees and increase tree canopy cover. The update will provide information on the land-use-focused sections of the document.

Protect, Restore, and Enhance Natural Areas at the Regional Scale

In 2022, Metro Vancouver protected over 21 hectares of new regional parkland, resulting in over 7,300 Tonnes CO_2e of avoided emissions as a result of newly protected forested land. In 2023, Metro Vancouver completed the acquisition of 97 hectares of land at Cape Roger Curtis on Bowen Island for the purpose of establishing a new regional park. The proposed park would preserve a large area of ecologically important and sensitive forest and dry coastal bluff ecosystem and provide opportunities for residents of the region and the Bowen Island community to connect with nature. Protecting these ecosystems also results in over 40,000 tonnes CO_2e of avoided emissions.

In 2022, Metro Vancouver implemented 27 restoration projects in 15 regional parks including riparian and wetland enhancement at Crippen, Capilano River, and ƛ̓éxətəm (pronounced tla-hut-um) regional parks, coastline restoration and wetland habitat creation at Pacific Spirit Regional Park, and dune protection at Boundary Bay Regional Park. In total, over 11,765 native trees and plants were planted in regional parks in 2022.

Burns Bog Ecological Restoration

In partnership with the City of Delta, Metro Vancouver has been working to restore the Burns Bog Ecological Conservation Area (BBECA) to its former condition as an open heath raised bog ecosystem, after decades of industrial peat extraction and human disturbance. The BBECA is a globally significant bog ecosystem, and an important carbon sink in the region. The main objective of the restoration work is to raise the water table to be similar to typical healthy bog conditions. This work includes blockage of drainage ditches, construction of peat berms along unpaved service roads, and tree and seedling removal, and monitoring of water levels utilizing a network of piezometers to observe and quantify the effectiveness of measures taken. Since measurement of GHG emissions reductions started in 2008, restoration of the Bog has led to over 120,000 tonnes CO_2e of avoided emissions.

Key Performance Indicators:

21 – hectares protected for regional parkland by Metro Vancouver in 2022

32% – proportion of region/urban containment boundary with tree canopy cover

11,765 – native trees and plants planted in regional parks in 2022, to support restoration work

Agriculture

Agriculture will help shape our low-carbon future by using clean and renewable energy and using regenerative farming practices. We all need to protect agricultural land for future food production and carbon storage.

Climate 2050 Roadmap Development:

Draft *Climate 2050* Agriculture Roadmap published October 2021.

2022/2023 Project Highlights – Action While Planning:

Ecosystem Services on Agricultural Lands Study
A study was conducted to identify ecosystem types on agricultural land and determine the benefits residents and the agricultural community receive from them. The study also examined ways in which the region can continue to benefit from these ecosystem services in the long-run including through policy and regulation and through a payment for ecosystem services program. The study was completed in January 2023, endorsed by the Board in May, and is now proceeding to a white paper phase to support additional research of the study's final recommendations.

Protecting and Strengthening the resilience of Agricultural Land in Metro 2050
Adopted by the MVRD Board in February 2023, Metro 2050, the regional growth strategy, supports the on-going protection of agricultural land in the region to ensure the on-going viability and resilience of farming within Metro Vancouver. It includes policies to prioritize the protection of farm land for food production, encourage land management practices that reduce GHG emissions, maintain ecosystem services from agricultural land, and support climate change adaptation and resilience.

Agricultural Land Use Inventory (ALUI)
The most comprehensive land use analysis for agriculture in the region. The ALUI is completed every five years, in partnership with the Ministry of Agriculture, and identifies changes in use including crop types, construction, and natural areas. The ALUI is an invaluable data source that is used to prepare agriculture land protection policies and used to determine sector diversification. The ALUI has been under preparation since 2022 and is expected to be completed by end of 2023.

Westham Island, Delta

Agricultural Industry Efforts Showcase

Many stakeholders and participants in the agriculture sector are engaged in direct action that helps to reduce agriculture-sourced GHG emissions, increase resilience and transition farming to the next generation. Some of these efforts are highlighted as follows:

- **Dairy Farmers of Canada Net-Zero by 2050 Campaign** – actions initiated by this association are also reflected in the actions within the Roadmap including expanding the use of anaerobic digestions, reducing methane outputs from animals, and implementing cover crop use.
- **Young Agrarians** – supports a BC land matching program that connects agricultural land owners with farmers looking for land helping to reduce the high and costly barrier new farmers experience trying to access land for farming in the region.
- **Farmland Advantage and Delta Farm & Wildlife Trust** – provide support to the farming community by restoring ecosystems, creating projects that use cover crops, and providing payment for ecosystem services programs. These programs work directly with the farming community to increase their resilience against the impacts of climate change such as increased flooding and a reduction in pollinators.

Key Performance Indicators:

Total regional emissions from agricultural sector in 2022 (tCO_2e) – Data forthcoming in 2023

Water and Wastewater Infrastructure

Water and wastewater infrastructure will help shape our low-carbon future by protecting and conserving water resources, generating low-carbon energy, and planning for resilience across the region.

Climate 2050 Roadmap Development:

***Climate 2050* Water & Wastewater Discussion Paper** approved for engagement in January 2021.
Draft Roadmap under development in 2023.

Metro Vancouver takes an "action while planning" approach, implementing actions to reduce greenhouse gas emissions and increase resilience, while progressing development of the roadmaps. Development of the roadmaps is being coordinated with ongoing updates to the Drinking Water and Integrated Liquid Waste Management Plans, which are the overarching strategic plans for the regional water and wastewater utilities.

2022/2023 Project Highlights – Action While Planning:

Using Sewage for Heating and Cooling

There is enough excess heat in Metro Vancouver's wastewater to heat about 700 high rises. Recovering heat from sewage can provide renewable, fossil fuel-free heat to residents and businesses in the region, reducing greenhouse gas emissions. Several projects to recover heat from wastewater are currently under design or in construction:

- The new North Shore wastewater treatment plant, currently under construction, will recover 5 MW of heat and sell it to the nearby Lonsdale Energy Corporation, which is owned by the City of North Vancouver.
- In Richmond, a project is being designed to recover heat that can be used by residents and businesses in the Richmond Oval area.
- Metro Vancouver is helping to invest in fund a project within the City of New Westminster that will recover heat and use it at the Royal Columbia Hospital and in the Sapperton District.
- In Surrey, Metro Vancouver is also investing in a project that will recover heat to service the expansion of district energy in Surrey City Centre.
- The Effluent Heat for RNG project at Lulu Island wastewater treatment plant, currently in detailed design, will utilize heat pump technology to recover heat from the Plant's effluent which will be used for process heating, thus allowing additional quantitiesof biogas to be cleaned and sold to FortisBC.

Turning Wastewater into Renewable Natural Gas

Metro Vancouver's wastewater treatment plants produce biogas as part of their treatment processes. Biogas is a valuable resource that can be used instead of conventional natural gas, reducing greenhouse gas emissions. Biogas is currently used at our wastewater treatment plants in a range of ways:

- At the Annacis Island and Iona Wastewater Treatment Plants, the biogas is used to produce both heat and electricity ("co-generation") that is used at the plants. The new North Shore Wastewater Treatment Plant will do this as well.
- At the Lulu Island Wastewater Treatment plant, the biogas is used to generate all plant heating needs. A facility was installed at the Lulu Island Wastewater Treatment Plant in 2021 to clean up excess biogas and sell the resulting renewable natural gas to Fortis BC.
- Metro Vancouver is assessing how best to use the biogas at its other facilities, including the upgraded Northwest Langley and Iona Island Wastewater Treatment Plants.

Snowpack Monitoring

Hydrothermal Liquefaction to Produce Low-Carbon Fuels from Wastewater

In 2022, detailed design progressed for the world's first hydrothermal liquefaction facility to process sewage sludge at Metro Vancouver's Annacis Island Wastewater Treatment Plant. Hydrothermal liquefaction uses temperature and pressure to convert wastewater sludge into biocrude, which can be refined into low-carbon transportation fuels. The biocrude from the demonstration facility will be sent to project partner Parkland's nearby refinery for processing.

Next Generation Snowpack Monitoring – Phase 3

This project involves reviewing and applying new technologies to measure snow in the watersheds and quantify the amount of stored water in the seasonal snowpack. Metro Vancouver has historically used helicopters to transport crews to manually collect snowpack measurements throughout the year. This involves flying to three sites at least eight times per year. This project aims to reduce Water Service's GHG emissions by replacing the conventional fossil fuel-intensive methods historically used to complete the snowpack monitoring with new technologies such as satellite imagery and machine learning/artificial intelligence algorithms.

Hydrodynamic Modelling of Sewer Outflows

Building on previous hydrodynamic models generated for the Burrard Inlet and the Fraser River, modelling will be performed to evaluate potential management options for the region's sewer network to reduce environmental and human health impacts of storm events on regional wastewater management. Options such as opening and closing of storm gates will be tested within the model, improve the region's storm and flooding resilience.

Biorock for Shore Protection, Habitat Creation and Carbon Sequestration

Biorock is an innovative underwater building material formed by running a mild electric current through a submerged metal frame, which causes naturally occurring ingredients in sea water to accumulate a concrete-like material. In 2022, Metro Vancouver began to evaluate the feasibility of using biorock for shore protection, habitat creation and carbon sequestration near our coastal infrastructure.

Climate Change Monitoring

Metro Vancouver manages a robust climate monitoring network with streamflow and snowpack datasets dating back to the early 1900s. Monitoring conditions in the water supply areas, including the use of remote sensing tools such as satellites and aerial LiDAR surveys, tells a clear story of how our climate is rapidly changing, presenting increasing challenges for the utilities in drought, fire conditions, record high temperatures and extreme precipitation events.

Pilot Digestion Optimization Facility to Improve Biogas Production

The recently commissioned Pilot Digestion Optimization Facility at the Lulu Island Wastewater Treatment Plant consists of three small digesters that allow testing of different operating parameters for improving biogas production without disrupting the plant's full-scale digesters. The facility's modular design also allows pilot testing of emerging technologies including Metro Vancouver's patented SEED Reactor, which promotes the growth of specific microbes to produce additional biomethane that can be used as renewable natural gas. In addition, this facility will test the production of green hydrogen from ammonia in wastewater effluent.

Key Performance Indicators:

8,339 tCO_2e- Total corporate energy-related GHG emissions from Liquid Waste Services (2021)

2,074 tCO_2e- Total corporate energy-related GHG emissions from Water Services (2021)

Note: 2022 data forthcoming in 2023.

Waste

Waste management will help shape our low-carbon future by reducing and diverting waste, promoting a circular economy, and generating low-carbon energy.

Climate 2050 Roadmap Development:

***Climate 2050* Waste Discussion Paper** approved for engagement in June 2020.
Draft Roadmap under development

Metro Vancouver takes an "action while planning" approach, implementing actions to reduce greenhouse gas emissions and increase resilience, while progressing development of the Roadmaps.

2022/2023 Project Highlights – Action While Planning:

Opened two new Recycling and Waste Centres in Surrey and Coquitlam

In 2022, Metro Vancouver opened the Central Surrey and the United Boulevard Recycling and Waste Centres. These facilities will make waste management and recycling more convenient for residents and play an important role in achieving the region's waste reduction goals. The new facilities use energy efficient lighting and heating systems, and offer electric vehicle charging opportunities on-site. The Central Surrey Recycling and Waste Centre will reduce travel distances by about two million kilometers per year and in turn reduce greenhouse gas emissions by about 500 tonnes CO_2e.

Waste-to-Energy District Energy System

Metro Vancouver is developing a Waste-to-Energy Facility District Energy system to supply heat and hot water to up to 30,000 homes in Vancouver, Burnaby and potentially New Westminster. Metro Vancouver is in the early design phase of this project. Construction is expected to take place from 2024 to 2026, in multiple phases. The first phase will be the construction of an approximately 6 km heat transmission piping system from the Waste-to-Energy Facility to the River District community in Vancouver. The energy centre and piping systems will be sized to support future district energy systems in Burnaby and potentially other municipalities.

Coquitlam Landfill Gas Capture

Since 2012, Metro Vancouver has implemented a project to capture and reduce methane emissions from the closed Coquitlam Landfill, which Metro Vancouver manages. By flaring the captured methane instead of letting it be released to atmosphere, the project reduces greenhouse gas emissions by approximately 1,000 tonnes CO_2e annually.

Non-Ferrous Metals Recovery

Metro Vancouver also works to advance the region's zero waste goals, through projects such as the Non-Ferrous Metals Recovery project at the Waste-to-Energy Facility. The project uses magnetic separators and an eddy current separator to recover valuable non-ferrous metals such as aluminum and copper from bottom ash collected at the Waste-to-Energy Facility. Greenhouse gas emissions are reduced by allowing these materials to stay in use. In 2022, this project recovered 286 tonnes of non-ferrous metals.

Central Surrey Recycling and Waste Centre

Construction and Demolition Waste Reduction and Recycling Toolkit

In 2021, about a third of the 1.3 million tonnes of waste disposed in the region came from the construction and demolition sector. 79% percent of the construction and demolition waste generated is recycled. With the recently updated Construction and Demolition Waste Reduction and Recycling Toolkit, Metro Vancouver is helping boost reuse and recycling of building materials such as wood. This toolkit provides practical information for contractors, designers and homeowners on the reuse and recycling of building materials, including a contact directory of service providers and facilities. It also highlights the benefits of alternative demolition methods such as home relocation and deconstruction, which can salvage and redistribute up to 95% of building materials for reuse or recycling. Almost 50% of the carbon emissions of new construction are embodied carbon while the other half is operational carbon. Restoration, reuse and salvage could play a big part in reducing embodied carbon from buildings.

Key Performance Indicators:

2,351,848 tonnes of waste diverted from landfill in the region (2021) [6]

79% – Diversion rate of construction and demolition waste in the region (2021) [6]

70,383 tonnes of reduced CO_2e emissions in 2022 as a result of municipal household organic waste programs in the region

160,150 MWh of electricity generated at Waste to Energy Facility in 2022

10,685 tCO_2e - total corporate energy-related GHG emissions from Solid Waste Services (2021). Note: 2022 data forthcoming in 2023.

6 Metro Vancouver Recycling and Solid Waste Management 2021 Report

Human Health & Well-Being

Anticipating and preparing for climate change impacts including storms, flooding, heat waves, and wildfires, protects our health and safety.

Climate 2050 Roadmap Development:

Climate 2050 Human Health & Wellbeing Roadmap under development in 2023.

Metro Vancouver takes an "action while planning" approach, implementing actions to reduce greenhouse gas emissions and increase resilience, while progressing development of the Roadmaps.

2022/2023 Project Highlights – Action While Planning:

Expand the Network of Public Buildings that can serve as Cool, Clean Air Centres

To prepare for and respond to the increased risk of extreme heat and air quality events in the region, Metro Vancouver is working to develop a guidance document for municipalities to identify, select, implement, and expand availability to cooler and cleaner air centres in their communities to protect residents during these events with a focus on vulnerable and equity-denied residents.

Improved Climate Resilience of Metro Vancouver Housing buildings

Completed full building envelope renewals in 2022 to Metro Vancouver Housing (MVH) buildings, including improvements to building insulation, and addition of electric air-source heat pumps to provide heating and cooling. These upgrades lead to reduced GHG emissions of up to 51%, and are important for health & well-being as we anticipate more extreme heat events in the region.

Key Performance Indicators:

22 Air Quality Advisory Days in Fraser Valley Airshed (2022)

Coneflowers in Urban Garden

Land Use & Urban Form

The location of new homes and businesses strongly influences both GHG emissions and exposure to risks associated with climate change.

Climate 2050 Roadmap Development:

Climate 2050 Land Use & Urban Form Roadmap under development in 2023. Metro Vancouver takes an "action while planning" approach, implementing actions to reduce greenhouse gas emissions and increase resilience, while progressing development of the Roadmaps. ***Metro 2050*** is the regional growth strategy and the primary land use plan for the region, and is supported by *Climate 2050*.

2022/2023 Project Highlights – Action While Planning:

Regional Parking Strategy

Metro Vancouver is collaborating with TransLink and member jurisdictions to jointly develop a regional parking strategy to right-size the supply of parking, reduce the number of vehicles, and improve efficiency in land use. All of these have greenhouse gas benefits, from the construction stage (using less concrete for underground parking) through to Transportation Demand Management (enabling residents to use active transportation, transit and other alternative modes). The strategy will take the form of guidance to inform municipal parking requirements (e.g. eliminating parking minimums or introducing maximums) and will include complementary on-street parking management approaches. *The Regional Parking Strategy* is identified as an action in the *Transportation Roadmap*, and also supports priorities related to *Land Use and Urban Form*.

Natural Hazard Data Inventory and Multi-Hazard Mapping

In 2022, Metro Vancouver developed a Natural Hazard Data Inventory, which provides a high-level desktop analysis of available natural hazard and climate change impact data across the region. This project can inform future work on climate adaptation and resilience, in alignment with the regional growth strategy. In 2023, Metro Vancouver will build on the results of the inventory to develop regional multi-hazard mapping. Metro Vancouver is also working to incorporate natural hazard data into its land use model, which forecasts land use change in the region annually from 2020 to 2050. Incorporating the hazard data into the growth model is a first step in developing the Metro Vancouver Hazard Model, which will be developed in future years.

Enhancing Climate Policy in Metro 2050

Metro 2050, the updated regional growth strategy, was adopted by the Metro Vancouver Board in February 2023. *Metro 2050* contains stronger climate policy than the previous iteration of the regional growth strategy, including new climate actions throughout each Goal area. Building on this work, Metro Vancouver has initiated a *Metro 2050* Climate Policy Enhancement Study to identify additional opportunities for stronger climate action policies in *Metro 2050*.

Key Performance Indicators:

98% of Regional growth within the Urban Containment Boundary (2021)

40% of dwelling unit growth in Urban Centres and 27% of dwelling unit growth to frequent transit corridors (2021)

68 – Public transit journeys per capita in region in 2022

King Tide West Vancouver Seawall

Conclusion

The *Climate 2050 Annual Report 2022/2023* provides an overview of *Climate 2050* Roadmap development and implementation in 2022 and 2023 year-to-date, including updates on key actions and projects that support progress towards the *Climate 2050* objective of a carbon neutral, resilient region. As work on *Climate 2050* continues to shift from roadmap development to implementation, the Climate 2050 Annual Report will report progress on action implementation along with corporate and regional indicators of progress towards the targets in the various Roadmaps.

The *Climate 2050* Roadmaps reflect current knowledge and technology. Meeting the targets will depend on advancing the actions in the roadmaps as quickly as possible, while continuing to expand and collaborate with partner organizations.

Burnaby Lake Regional Park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SERVICES AND SOLUTIONS FOR A LIVABLE REGION

ATTACHMENT 2

Climate 2050 Annual Report - 2022/2023

Johann Zerbe

Policy Analyst, Air Quality & Climate Action Services

Lise Townsend

Division Manager, Air Quality and Climate Change Policy, Air Quality and Climate Action Services

Climate Action Committee | September 7, 2023

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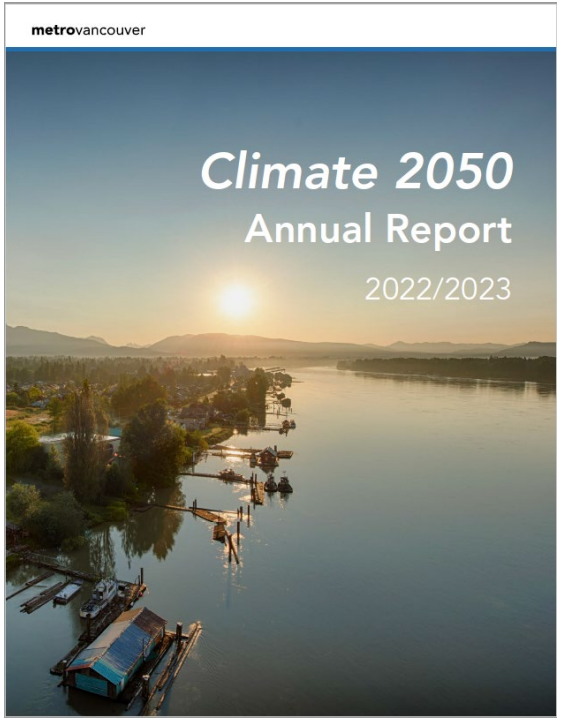
INSIDE THE CLIMATE 2050 ANNUAL REPORT

- Overview of Climate 2050 strategy, targets, and modelled emissions reductions
- Update on corporate and regional GHG emissions
- Update on roadmap development

- For board-endorsed Climate 2050 roadmaps:
  - Status update for *complete* and *in-progress* actions
  - Highlights on key roadmap actions and climate action projects implemented during 2022 and 2023 YTD
  - Corporate and regional key performance indicators, where data is available



INSIDE THE CLIMATE 2050 ANNUAL REPORT

Climate 2050 Roadmap Status

Climate 2050 Under Development	*Climate 2050* Draft Roadmaps	*Climate 2050* Board endorsed Roadmaps
Waste	Agriculture	Transportation
Water & Wastewater Infrastructure		Buildings
Land Use and Urban Form		Industry & Business
Human Health & Well-being		Energy
		Nature & Ecosystems

INSIDE THE CLIMATE 2050 ANNUAL REPORT

- Status update for all Climate 2050 actions in board-endorsed Roadmaps, as an indicator of implementation progress
- Reporting on corporate and regional Key Performance Indicators (KPIs) for each issue area

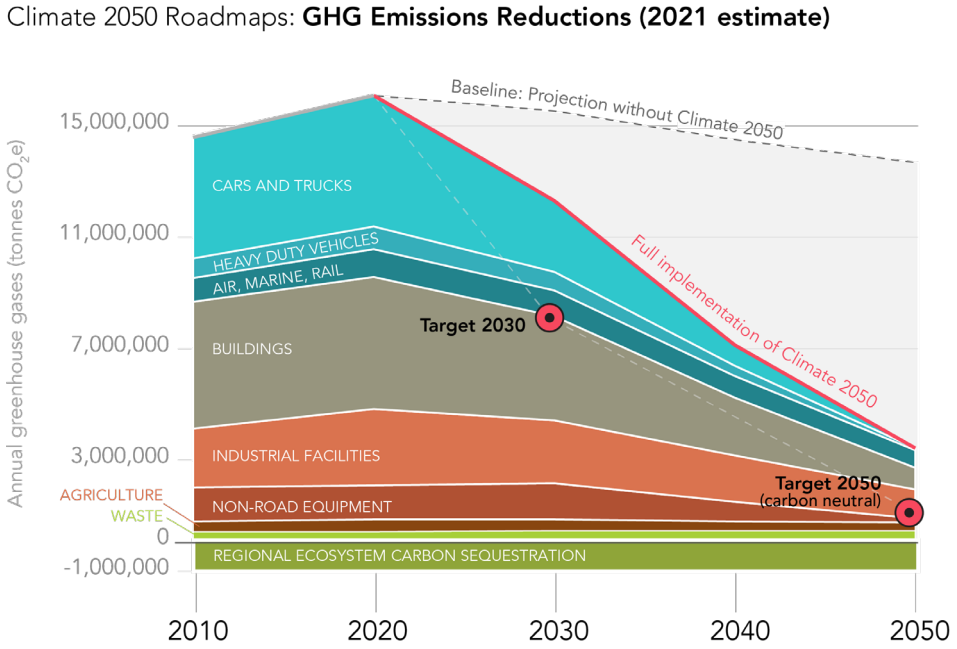
Climate 2050 Roadmap Action Status- Q2 2023 (Board-endorsed Roadmaps)	
Complete	**5**
In Progress	**73**
Not Started [1]	**43**
Planned for Future Years [2]	**64**

1 Denotes actions that are expected to start by 2023.

2 Denotes actions that are expected to start in 2024 or later.

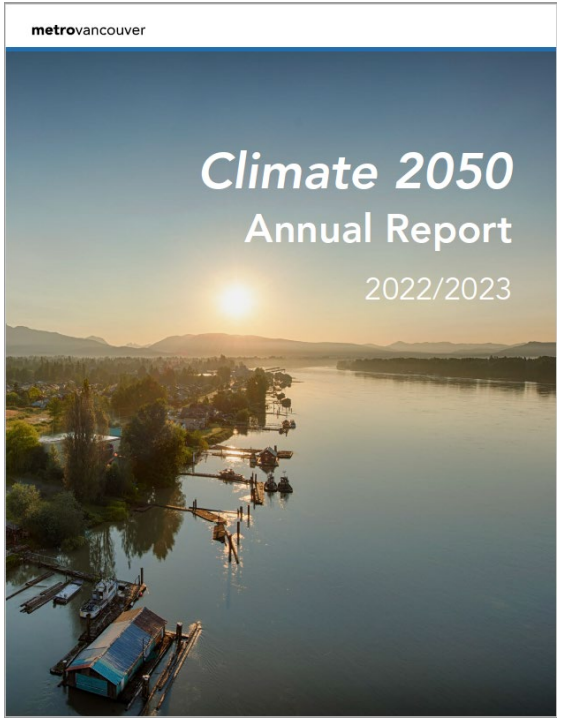
CLOSING THE GAP

- Roadmaps represent current knowledge and technology.
- Meeting the targets requires more rapid and expanded action in collaboration with others.
- Critical projects with large potential emissions reduction include large existing buildings regulations and Driving Down Emissions.



ALIGNMENT WITH OTHER CLIMATE REPORTING

- Climate 2050 Annual Report is complementary to other climate action reporting, including:
    - BC Local Government Climate Action Program
    - Carbon Disclosure Project
    - Managing Metro Vancouver's Corporate Energy and Emissions (fall 2023)
    - Regional emissions inventory reporting (ongoing)



Thank you! Questions?

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To: Climate Action Committee

From: Navjot Hundle, Senior Policy and Planning Analyst, Air Quality and Climate Action Services
Lucy Duso, Division Manager, Collaboration and Engagement, External Relations

Date: August 22, 2023 Meeting Date: September 7, 2023

Subject: **Initial Engagement Outcomes on Developing GHG Emission Reduction Requirements for Existing Large Buildings**

RECOMMENDATION

That the MVRD Board receive for information the report dated August 22, 2023, titled "Initial Engagement Outcomes on Developing GHG Emission Reduction Requirements for Existing Large Buildings".

EXECUTIVE SUMMARY

This report provides an update on work to date to develop requirements to reduce greenhouse gas (GHG) emissions from existing large buildings (over 2,322 m^2 or 25,000 ft^2). Buildings comprise a quarter of the region's GHG emissions, and large buildings make up approximately 35% of this amount, while representing less than 2% of the region's building stock. Reducing this source of emissions is a priority climate action, and referred to as a 'big move' in Metro Vancouver's *Clean Air Plan* and *Climate 2050 Buildings Roadmap*. This action would have the largest impact on reducing GHG emissions from the building sector and address a gap in GHG emission reduction policy for existing buildings across the region.

From June through November 2022, staff engaged with audiences connected to the building sector, focusing on those most likely to comment, be impacted by, or have a role in reducing emissions from large buildings. Engagement was supported by a discussion paper, which described a proposed approach to develop reporting requirements and GHG emission limits for buildings. There was broad general support for the proposal, but there were also concerns identified. Concerns were related to implementation, financial and affordability implications, and jurisdictional alignment. Staff are developing a regulatory intentions paper with more details that will reflect input heard to date. Later in 2023, staff will seek direction from the Board to use the intentions paper as the basis for a second phase of engagement.

PURPOSE

To share the results of initial engagement and next steps for the development of Metro Vancouver GHG emission reduction requirements for existing large buildings over 2,322 m^2 (25,000 ft^2).

BACKGROUND

In May 2022, the Board authorized staff to proceed with engaging with the building sector to develop an approach for managing greenhouse gas emissions from existing large buildings

(Reference 1). This report highlights input staff received and how it is being considered in developing a detailed proposed regulatory approach in the form on an intentions paper. This priority climate action is in both the *Clean Air Plan* (2021) and *Climate 2050 Buildings Roadmap* (2021) as, "develop greenhouse gas performance requirements for existing large buildings".

EMISSIONS FROM BUILDINGS AND REGULATORY ACTION

Buildings make up a quarter of Metro Vancouver's regional GHG emissions and they have risen by almost 10% since 2010, as described in the staff report received by the Board, titled "Annual Regional Greenhouse Gas Emissions for On Road Transportation and Buildings" dated June 23, 2023 (Reference 2). These emissions are largely due to the growing use of fossil natural gas for space and water heating in buildings.

Reducing GHG emissions from buildings is central to responding to the climate emergency and to meeting the Board's regional climate targets of a 45% reduction in GHG emissions from 2010 levels by 2030 and achieving carbon neutrality by 2050. Actions in the *Clean Air Plan* and *Climate 2050 Buildings Roadmap* ("the Plans") will contribute to significantly reducing GHG emissions from buildings, and both documents include the following GHG emission reduction targets:

- By 2030: A 35% reduction in GHG emissions from buildings, relative to 2010 levels
- By 2050: All buildings are zero emissions in their operations, deriving all energy needs from 100% clean and renewable sources

The plans outline the strategies and actions needed to transition our buildings to zero emissions, including an action to develop requirements for existing buildings. This action is described as a 'big move' in Metro Vancouver's *Clean Air Plan* and *Climate 2050 Buildings Roadmap*, that would result in major GHG emission reductions. It will contribute significantly to meeting the MVRD Board endorsed climate targets, as well as the emissions targets for member jurisdictions and the Province. The transition to zero emissions is also an opportunity to prevent the discharge of health-harming air contaminants, such as nitrogen oxides associated with fuel combustion, which is regulated under the *Greater Vancouver Regional District Boilers and Process Heaters Emission Regulation Bylaw No. 1087*.

It is important for Metro Vancouver's strategies and actions to align with provincial and municipal policies for the building sector. Current provincial policy focuses on reducing emissions from new buildings through the newly enacted *BC Zero Carbon Step Code* that will require buildings constructed after 2030 to be zero carbon in their operation. However, there is a gap in addressing emissions from the larger pool of existing buildings across the region. The Metro Vancouver Regional District has delegated authority from the Province to manage the discharge of air contaminants within the region, including GHG emissions. Under this authority, Metro Vancouver can regulate emissions from existing large buildings. Municipalities do not have this authority, with the exception of the City of Vancouver that has adopted its *Annual Greenhouse Gas and Energy Limits By-Law No. 13472*. A Metro Vancouver requirement to reduce GHG emissions from existing buildings would address this gap in a consistent manner at a regional scale.

This work also complements pending provincial regulations that would apply to new and existing buildings. The *CleanBC Roadmap to 2030* states that after 2030, all new space and water heating equipment sold and installed in BC will be at least 100% efficient. This will create a market shift in the supply of efficient equipment and gradually reduce the use of conventional gas equipment in favour of heat pumps over time. A Metro Vancouver requirement would go further to ensure that buildings are implementing measures proactively within a timeframe that is necessary to achieve the Board-approved climate targets. Metro Vancouver's work also complements the *BC Zero Carbon Step Code*. Like the *BC Energy Step Code*, member municipalities have the option to enact the *Zero Carbon Step Code* before 2030.

Buildings can also become more resilient to climate impacts such as extreme heat and wildfire smoke through the installation of zero-emission space heating and cooling systems that offer better ventilation, filtration, and cooling.

REDUCING GHG EMISSIONS FROM EXISTING LARGE BUILDINGS

Large buildings, as defined in this report, account for about 40% of the gross floor area and about 35% of building sector emissions. They also make up less than 2% of the region's building stock, meaning that a small number of buildings can make a big impact on regional emissions.

Initial Proposed Approach

Metro Vancouver's proposed approach to developing GHG emission reduction requirements for existing large buildings is outlined in the discussion paper titled, "Potential Approaches for Managing Greenhouse Gas Emissions from Large Buildings in Metro Vancouver", dated June 2022 (Reference 3). The discussion paper focuses on the following elements, which align with regulatory best practices from jurisdictions across North America and with the City of Vancouver's *Annual Greenhouse Gas and Energy Limits By-Law No. 13472*:

1. Annual GHG emission **reporting requirements** for building owners.
2. Setting and phasing-in increasingly stringent **GHG emission limits** tailored to building types, to achieve zero emissions by 2050.
3. **Compliance pathways** for building owners to achieve compliance with emission limits.
4. **Exemptions and flexibility** for certain building types or circumstances.
5. **Program fees** that would encourage emission reductions and recover program costs fairly and efficiently.
6. **Technical support** that would assist building owners with planning for cost-effective transitions to zero-emission technology.

ENGAGEMENT TO DATE

Staff undertook initial engagement from June to November 2022, to seek input from those likely to be interested, impacted, or have a role in implementation of an approach to reduce GHG emissions from large buildings. The opportunity to provide input was also shared to in-region First Nations, member jurisdiction staff, a project mailing list, and was promoted publically through social media. The purpose was to listen, learn, and ask for input to help shape Metro Vancouver's approach. This was done in parallel with engagement on potential amendments to Bylaw 1087, which focused on

reducing nitrogen dioxide emissions from boilers and process heaters in buildings and other facilities.

Engagement activities included introductory webinars, one-on-one meetings with key audiences, six industry and organization meetings, and a series of six roundtables with building owners, building facility managers, equipment manufacturers, non-profit housing representatives, and others. Additional sessions were delivered in partnership with the Building Owners and Managers Association (BOMA) for some members who were interested in providing input. All participants were encouraged to provide input directly or through an online feedback form, with 80 forms received. The engagement was supported by a project website, introductory video, and promotions on social media, and was amplified through professional and industry associations, such as the Urban Development Institute (UDI) and BOMA.

The table below summarizes the key findings from the engagement summary (Reference 4).

Interest	What we Heard and How we're Responding
Climate Impacts	**What we heard:** There is general support for setting GHG limits for large buildings to meet climate targets. A majority of participants who completed a feedback form agreed with the approach. Those who disagreed expressed a desire for a stronger approach (e.g., faster implementation or stronger compliance). **How we're responding:** Staff will consider proposing GHG limits that significantly reduce emissions to meet regional climate targets. Staff are also considering equity and affordability in the approach taken to achieve GHG reductions.
Financial & Affordability Impact	**What we heard:** For some building types (i.e., multi-unit residential), there are greater financial constraints to reporting and reducing GHG emissions. There is also a concern that increased costs could result in increased rent for tenants. **How we're responding:** Metro Vancouver is working to develop a Retrofit Accelerator program, which will act as a one stop support service for building owners. The Retrofit Accelerator will be delivered in partnership with the Zero Emissions Innovation Centre (ZEIC) and will look at feasible options to reduce financial barriers for building owners. There are also government and utility incentives available. Metro Vancouver will continue its advocacy to identify additional incentives and grant opportunities. Staff are also conducting an equity analysis to identify impacts and consider regulatory design options to address concerns such as increased rent in the development of a more detailed proposal.

Interest	What we Heard and How we're Responding
	With respect to technical supports to reduce additional administrative costs to a building owner, staff are researching best practices in other jurisdictions that are implementing reporting and GHG emission requirements. For example, many jurisdictions have call centres that provide technical support for registration and reporting of building emissions data.
Implementation Considerations	**What we heard:** The main pathways for buildings to transition to zero-emissions are through electrification and zero-emission district energy. This raised questions about whether there is enough electricity supply to respond to the demand and whether BC Hydro will reduce the cost of extending electrical distribution to new or under-served areas. There was also feedback that, for some buildings, the only feasible option may be to transition to hybrid (gas and electric) heating and hot water systems to satisfy peak heating demand and that property managers may not be able to access utility data for energy purchased by tenants. The range of input indicated more complexity for building types near the threshold of 2,322 m^2 to respond to requirements for reporting and reducing their GHG emissions. **How we're responding:** BC Hydro submitted an updated Integrated Resource Management Plan (Reference 5) to the BC Utilities Commission (BCUC) on June 15, 2023, which includes near-term actions to meet the demand resulting from an accelerated electrification scenario. Some near-term actions include a call for power to acquire approximately 3,000 GWh/year from clean and renewable energy sources and work to accelerate demand-side management actions. BC Hydro is also seeking input on proposed changes to its electrical distribution extension policy that will share costs across all new projects and existing building electrical load improvement projects, subject to approval from the BCUC. In response to feedback on collecting data from building tenants, a proposed regulatory approach would accept aggregated data directly from utilities. The concerns related to complexity for buildings of the smaller threshold (2,322 m^2) to meet requirements is being considered in the development of a more detailed proposal. Some reporting may still be needed so that staff can gain a better understanding of building attributes and associated GHG emissions.
Coordination and Alignment (Provincial, Local Jurisdictions)	**What we heard:** Feedback emphasized the need to align with other orders of government that have or may develop requirements for building GHG emission reductions. Some specific examples included provincial *Clean BC* commitments and the

Interest	What we Heard and How we're Responding
	City of Vancouver's *Annual Greenhouse Gas and Energy Limits By-Law No. 13472* that was adopted under authority from the *Vancouver Charter*. There were also questions raised on how to reduce the risk of creating an over-regulated environment and conflicting requirements. **How we're responding:** Regulatory alignment is being carefully considered in the development of a proposed regulatory approach. For example, Metro Vancouver staff are working closely with staff from the City of Vancouver and other member jurisdictions to ensure alignment and reduce redundancy where feasible. Current legislative requirements from the Province relate only to new building construction. Through the newly established *Zero Carbon Step Code*, there is a pathway for new construction to meet zero GHG emission requirements by 2030. Additionally, the *Clean BC Roadmap to 2030* proposes to address some of the operational emissions of large buildings through creating point-of-sale equipment replacement standards that would require all space and water heating equipment sold in British Columbia to be 100% efficient by 2030. Metro Vancouver's proposed regulatory approach to reduce GHG emissions during the operational life of a building would be a complementary initiative to those being pursued by other governments, that ensures buildings are continuously reducing GHG emissions and achieve zero emissions before 2050.

NEXT STEPS

Staff intend to present a regulatory intentions paper informed by the initial engagement feedback presented in this report to the Climate Action Committee and MVRD Board in 2023, and seek direction to conduct a second phase of engagement. The regulatory intentions paper will set out the details of a proposed regulatory approach.

ALTERNATIVES

This is an information report. No alternatives are presented.

FINANCIAL IMPLICATIONS

This is an information report, and there are no financial implications presented.

CONCLUSION

Staff undertook a first phase of engagement from June through November 2022 on a proposed approach to reduce GHG emissions for existing large buildings, defined as those over 2,322 m^2. This report provides an update on input received to date and how this input is being considered in the forthcoming intentions paper.

The proposed approach included GHG emission reporting requirements and GHG emission limits for buildings. Staff engaged with key audiences, largely in the buildings sector, who were likely to comment, be impacted, or have a role in implementation. Input identified concerns but also broad general support for the proposal. Much of the input received related to implementation, financial and affordability implications, and jurisdictional alignment. Staff are taking this input into consideration in developing a regulatory intentions paper that will describe a detailed proposed regulatory approach. This intentions paper and a plan for a second phase of engagement will be brought to the MVRD Board in a subsequent report for consideration in 2023.

REFERENCES

1. "Initial Engagement to Develop an Approach for Managing Greenhouse Gas Emissions from Large Buildings in Metro Vancouver", dated April 20, 2022
2. "Annual Regional Greenhouse Gas Emissions for On Road Transportation and Buildings", dated June 23, 2023
3. Potential Approaches for Managing Greenhouse Gas Emissions from Large Buildings, June 2022
4. Metro Vancouver: Large Buildings Emissions Reduction (LBER) Phase 1 Report, January 2023
5. BC Hydro and Power Authority 2021 Integrated Resource Plan – 2023 Update

To: Climate Action Committee

From: Nicole Chan, Project Engineer, Air Quality and Climate Action Services

Date: August 16, 2023 Meeting Date: September 7, 2023

Subject: **Metro Vancouver's Application to Intervene in the BC Utilities Commission Proceeding Related to BC Hydro's 2021 Integrated Resource Plan**

RECOMMENDATION

That the MVRD Board receive for information the report dated August 16, 2023, titled "Metro Vancouver's Application to Intervene in the BC Utilities Commission Proceeding Related to BC Hydro's *2021 Integrated Resource Plan*".

EXECUTIVE SUMMARY

In December 2021, BC Hydro submitted its *2021 Integrated Resource Plan* (IRP) to the BC Utilities Commission (BCUC). On July 25, 2023, the BCUC re-scoped this proceeding to focus on BC Hydro's load forecast scenarios and their near-term acquisition of 3,700 GWh of clean power, and opened the process to late intervener registration. BC Hydro's demand forecast and energy acquisitions could potentially impact the ability of Metro Vancouver to achieve its greenhouse gas reduction and air quality improvement targets, as it directly relates to the ability of BC Hydro to supply sufficient clean electricity to the region.

Metro Vancouver has applied as a late intervener in the BCUC proceeding, and is coordinating with member jurisdictions that are also interveners, to evaluate the potential impacts of BC Hydro's plan on Metro Vancouver's and member jurisdictions' interests. Staff will report back to the Board, through the Climate Action Committee, with an evaluation of BC Hydro's plan for alignment with *Climate 2050*, and seek direction on Metro Vancouver's position.

PURPOSE

To provide information to the Board regarding Metro Vancouver's application as an intervener in the BC Utilities Commission (BCUC) proceeding related to BC Hydro's 2021 Integrated Resource Plan (IRP) and describe the process by which staff will evaluate the Plan for alignment with *Climate 2050*.

BACKGROUND

In 2023, the Board endorsed the *Climate 2050 Energy Roadmap*, which established a target that 60% of the energy used in the region be derived from clean, renewable sources by 2030, and 100% by 2050. The Roadmap includes key strategies to plan for the transition to clean, renewable, and resilient energy, and accelerate electrification, including an action for "Regional Climate Action in Energy Utility Regulatory Processes".

At its meeting on September 9, 2022, the Board directed staff to participate as interveners in FortisBC's *2022 Long Term Gas Resource Plan* (LTGRP), and report back with a recommended position. There are numerous interlinkages between this Proceeding and FortisBC's 2022 LTGRP,

which staff are analyzing. This report describes BC Hydro's *2021 Integrated Resource Plan* and Metro Vancouver's application to intervene in this proceeding, in line with the strategies and actions of the *Climate 2050* Roadmaps.

BC HYDRO 2021 INTEGRATED RESOURCE PLAN

On December 21, 2021, BC Hydro submitted its *2021 Integrated Resource Plan* for the BCUC's review, in accordance with the BCUC's Resource Planning Guideline and Section 44.1(2) of the *Utilities Commission Act*. The BC Hydro IRP covers a 20-year time frame and will guide decisions related to BC Hydro's system to ensure that it can meet the future electricity needs of its customers. BC Hydro is seeking acceptance of its IRP through this Proceeding. At the time when BC Hydro submitted its IRP, Metro Vancouver did not register as an intervener.

On July 25, 2023, the BCUC limited the scope of the proceeding to a recent update to BC Hydro's load forecast scenarios and BC Hydro's resulting near-term planned acquisition of approximately 3,700 GWh of clean, renewable energy. The increase in the load forecast after fiscal 2030 is largely due to increased electrification of the oil & gas sector (including new liquefied natural gas projects) and the mining sector, as well as enhanced electrification in new buildings and medium- and heavy-duty vehicles.

In line with the revised scope, the BCUC also opened the process to late intervener registrations, with a deadline of August 18, 2023. As a late intervener, Metro Vancouver staff can ask questions, submit evidence, and convey to the BCUC panel the implications of BC Hydro's IRP load forecast scenarios and near-term energy acquisitions on Metro Vancouver's interests. Staff will be unable to provide comment on evidentiary phases of the proceeding that have already passed prior to the late intervener registration deadline, which limits Metro Vancouver's scope of participation; however in the view of staff it is still worthwhile to participate so that staff can develop a deeper understanding of future electricity supply.

Alignment with Climate 2050 and Provincial Plans/Legislation

The Proceeding directly relates to the ability of BC Hydro to supply sufficient clean electricity to the region, and could therefore potentially impact the ability of Metro Vancouver to achieve its goals and targets related to greenhouse gas emissions and air quality, as articulated in the *Clean Air Plan*, *Climate 2050* and *Metro 2050*. As an intervener, staff plan to evaluate:

- The interaction of BC Hydro's plan with municipal, regional, and provincial climate policy, including but not limited to Metro Vancouver's *Clean Air Plan*, the *Climate 2050* Roadmaps, and the Province's *CleanBC Roadmap to 2030*;
- The impact of BC Hydro's plan on greenhouse gas reduction targets and climate change policies in the Metro Vancouver region;
- Demand for electricity to meet the Province's greenhouse gas reduction targets, the supply required to meet that demand, and the impacts of new electrical infrastructure projects, as it relates to Metro Vancouver's regional interests;
- Impact on emissions of health-harming air contaminants associated with use of electricity in place of combustion fuels;

- The interlinkages between the BC Hydro's plan and FortisBC's Long Term Gas Resource Plan; and
- Other issues that are raised by the BCUC or interveners that may be relevant to Metro Vancouver's or its member jurisdictions' interests.

BC UTILITIES COMMISSION PROCESS

Metro Vancouver filed its application to participate in the BCUC proceeding as a late intervener, in accordance with the August 18, 2023 deadline. Metro Vancouver staff will work closely with member jurisdiction staff to coordinate participation in the BCUC Proceeding. Three member jurisdictions (City of Richmond, City of Surrey, and City of Vancouver) have also applied as interveners. Staff will report back to the Board, through the Climate Action Committee, with an evaluation of the potential impact of BC Hydro's plan on achievement of regional greenhouse reduction targets and air quality improvement targets, and to seek direction on Metro Vancouver's position.

ALTERNATIVES

This is an information report. No alternatives are presented.

FINANCIAL IMPLICATIONS

The costs for participation in the proceeding is difficult to estimate at this stage, but staff anticipate the costs to be manageable, through funds in approved budgets for the implementation of actions associated with the *Climate 2050* Roadmaps. There is the potential to incur additional costs for legal support or technical experts, but staff will explore cost sharing opportunities with member jurisdictions that are also interveners. Staff will monitor resource implications and update the Climate Action Committee and Board accordingly.

CONCLUSION

Staff have applied to participate as a late intervener in the BC Utilities Commission related to BC Hydro's *2021 Integrated Resource Plan*. Staff will analyze BC Hydro's plan with respect to its potential impact on Metro Vancouver's ability to achieve the goals and targets outlined in the *Climate 2050* Roadmaps and the *Clean Air Plan*. Staff will report back to the Board, through the Climate Action Committee, with an evaluation of the BC Hydro's plan, and seek direction on Metro Vancouver's position.

REFERENCE

BCUC Proceeding relating to BC Hydro's *2021 Integrated Resource Plan*

To: Climate Action Committee

From: Conor Reynolds, Director, Air Quality and Climate Action Services

Date: August 31, 2023 Meeting Date: September 7, 2023

Subject: **Manager's Report**

RECOMMENDATION
That the Climate Action Committee receive for information the report dated August 31, 2023, titled "Manager's Report".

Climate Action Committee 2023 Work Plan
The attachment sets out the Committee's Work Plan for 2023. The status of work plan priorities is indicated as pending, in progress, or complete. The work plan is updated, as needed, to include new priorities that arise, items requested by the Committee, and changes to the schedule.

2023 UBCM Resolutions on Air Quality and Climate Action from Metro Vancouver Member Jurisdictions
A key function of the Union of British Columbia Municipalities (UBCM) is to pass resolutions on behalf of its membership. UBCM members will vote on those resolutions at its 2023 convention, taking place in Vancouver on September 18-22, 2023. In total, Metro Vancouver's member jurisdictions put forward seven resolutions linked to air quality and climate change, with a number of them aligning with current or planned Metro Vancouver actions in the *Clean Air Plan* and the *Climate 2050* Roadmaps. These resolutions focus on a number of themes including buildings, biodiversity and ecological health, and energy.

Attachment 2 provides a summary table of Metro Vancouver member jurisdictions' 2023 UBCM resolutions related to air quality and climate change, categorized based on relevance to specific issue areas (i.e., buildings, nature and ecosystems, and energy).

Water Sustainability Innovation Fund Project: Next Generation Snowpack Monitoring
At its meeting on June 8, 2023, the Climate Action Committee received a report titled "2023 Update on Water Sustainability Innovation Fund Projects", and members expressed interest in receiving more information on the Next Generation Snowpack Monitoring project.

Metro Vancouver's regional water system relies on rainfall and runoff from snowmelt to refill reservoirs in the spring, and keep them topped up until the early part of the summer. Temperature and precipitation are key factors affecting seasonal snowpack. In a warming climate, more precipitation will fall as rain, particularly at lower elevations, which will reduce the extent and depth of snowpack in the water supply areas. The snowpack in the water supply areas varies considerably from season to season; however, we are seeing some clear trends, and we are anticipating more dramatic changes in the coming years. These trends are most evident in manual snow measurements due to the length of record (1936 to present), but there are also trends in more

recent satellite observations, which were incorporated into the snowpack monitoring program during the first phase of the WSIF Snowpack Monitoring project in 2020. The most notable trend is a decline in peak snowpack levels at lower elevations (below 1000 m). At Palisade Lake (Figure 1), peak snow water equivalent (SWE) values occurred in the mid-1970s. Since this time, we've seen an approximately 50 per cent decrease in peak SWE values. The graph below (Figure 2) highlights this change (red line is 10-year moving average).

Satellite observations are showing a trend towards shorter snow covered periods and earlier spring snow melt. For example, the warm and dry spring conditions in 2023 resulted in rapid snowmelt. The snowpack disappeared almost two weeks earlier than previous seasons with similar peak snow depth values.

In summary, climate change is impacting seasonal snowpack in Metro Vancouver's water supply areas. Lower elevations have seen significantly less snow than in the past, and snow covered periods have generally become shorter. As our planet and region continue to warm, we can expect snow to become less reliable, and the Water Services Department is planning new infrastructure projects to address these changes. The WSIF funded Next Generation Snowpack Monitoring project has introduced new tools to more accurately quantify stored water in the seasonal snowpack, which will be increasingly important in the coming years. Phases 1 and 2 are complete and are already providing value by enabling the Water Services department to more accurately monitor and quantify the snowpack each year. Phase 3 is underway, with the primary goal of fully incorporating these tested new tools into the snowpack monitoring program. A detailed analysis of local snowpack trends will be provided in a report at the conclusion of this project, which is currently estimated to be complete in 2025.

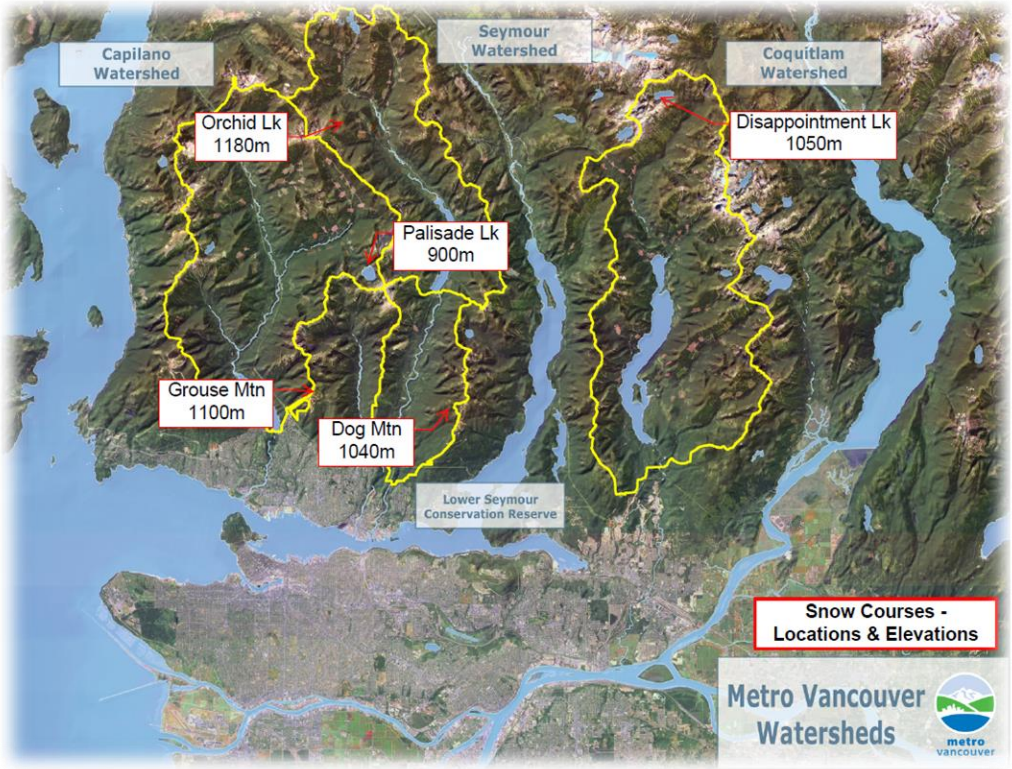

Figure 1: Metro Vancouver snow course location map. Palisade Lake is on the east side of the Capilano Watershed.

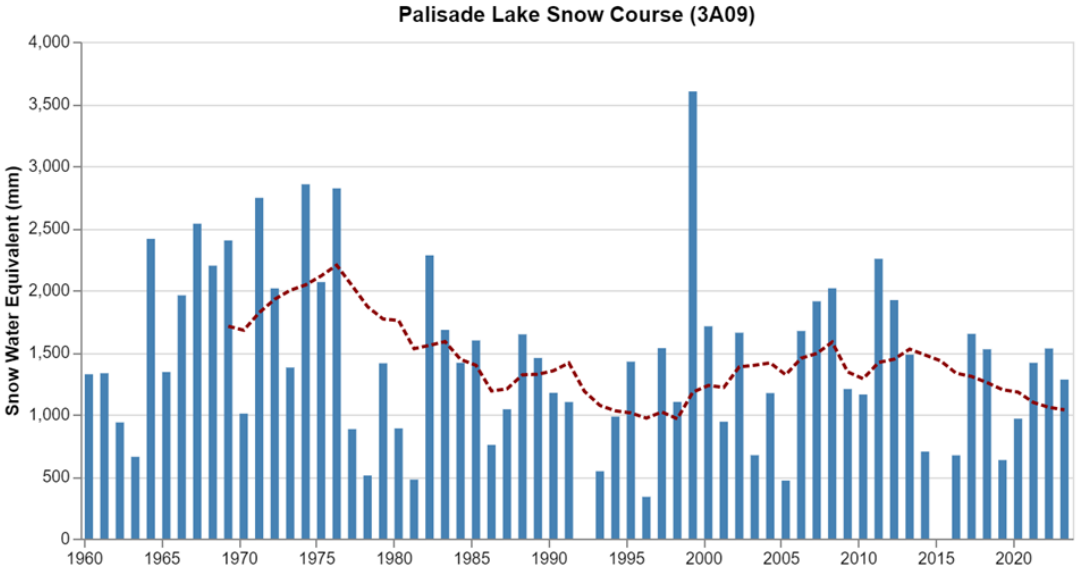

Figure 2: May 1 snow water equivalent values at Palisade Lake (900 m) from 1960 to 2023. The red dashed line highlights the 10-year moving average.

ATTACHMENTS

1. "Climate Action Committee 2023 Work Plan", dated, August 31, 2023
2. "Metro Vancouver Member Jurisdictions' 2023 UBCM Resolutions Related to Air Quality and Climate Action", dated August 31, 2023

Climate Action Committee 2023 Work Plan
Report Date: August 31, 2023

Priorities

1st Quarter	**Status**
Climate Action Committee orientation	Complete
Climate Action Committee meeting schedule and work plan	Complete
Amendments to air quality ticketing bylaws	Complete
Sustainability Innovation Fund (SIF) – 2023 proposals	Complete
2nd Quarter	**Status**
Climate 2050 nature and ecosystems roadmap	Complete
Climate 2050 industry and business roadmap	Complete
Climate 2050 energy roadmap	Complete
SIF - status report on previously approved liquid waste projects	Complete
SIF - status report on previously approved regional district projects	Complete
Overview of air quality advisory program and preparedness for 2023 season	Complete
3rd Quarter	**Status**
Emission regulation for cannabis production and processing	Complete
SIF - status report on previously approved water projects	Complete
Climate 2050 annual progress report	In progress
Draft Climate 2050 roadmap for land use and urban form	In progress
Climate 2050 agriculture roadmap	In progress
Draft Climate 2050 roadmap for human health and well-being	In progress
Annual air quality report	In progress
Update to internal carbon price policy	In progress
Amendments to boilers and process heaters emission regulation	In progress
Next phase of engagement on large buildings GHG emission regulation	Pending
4th Quarter	**Status**
Climate 2050 human health and well-being roadmap	Pending
Climate 2050 land use and urban form roadmap	Pending
Draft Climate 2050 roadmap for water and wastewater infrastructure	Pending
Corporate status report on energy and GHG management	In progress
Initiate engagement on emission regulation for lawn and garden equipment	Pending
Update to regional ground level ozone strategy	In progress
Report on 2023 air quality advisory season	Pending
Annual budget and five-year financial plan	Pending

Metro Vancouver Member Jurisdictions' 2023 UBCM Resolutions
Related to Air Quality and Climate Action
Report Date: August 31, 2023

Category	Resolution Title	Jurisdiction	Resolution Summary
Buildings	EB19: Mitigating Heat-Related Health Impacts in Residential Buildings	Delta	Resolution (with amendment) requests that the Province enact legislation to prohibit stratas and landlords from disallowing lifesaving temperature controls, subject to reasonable safety considerations, including portable or window air conditioners and window coverings that keep out heat, to protect the health and safety of people living in those buildings during periods of extreme heat.
Buildings	EB20: Incentives for Heat Pumps and Other Climate Resilience Retrofits in Multi-Residential Buildings	Port Moody	Resolution requests that the Province make the necessary changes to the *CleanBC* Better Homes program to ensure that all dwelling types are eligible for incentives and rebates for retrofits to ensure the health and safety of all British Columbians, particularly the most vulnerable, while working towards the Province's GHG reduction targets.
Nature and Ecosystems	EB35: Ban on the Sale of Invasive Plant Species	West Vancouver	Resolution requests that the Province ban the sale and distribution of invasive plants within the jurisdiction of the Province of British Columbia, except for plants that have been determined to be non-invasive.
Buildings	NR29: Updating the Strata Property Act to Include Allowances for Heat Pumps and Other Medical Cooling Systems	Port Moody	Resolution requests that UBCM ask the Province of BC to amend the Strata Property Act to allow the addition of heat pumps or other efficient mechanical cooling systems without the need to amend individual Strata corporation bylaws.
Energy	NR44: Increasing BC Hydro's Pricing for Renewable Energy Production	Vancouver	Resolution requests that UBCM urge the BC Government to require that BC Hydro increase the price they will pay for municipal, First Nations and private production of renewable energy, including solar, wind, geothermal energy, sufficient to stimulate the increased investment and production at all scales— including household and municipal—needed to tackle the climate emergency, while also ensuring reasonable energy affordability and that natural environments are protected.

Category	Resolution Title	Jurisdiction	Resolution Summary
Buildings	RR26: BC Affordable, Net Zero, Offsite Wood Housing Industrial	Vancouver	Resolution requests that UBCM calls on the Government of BC to collaborate with diverse sectors to establish a BC-based Offsite Wood Construction Industrial Policy Framework and steadily grow demand and capacity by working with interested public sector organizations to use offsite construction to build permanently affordable, zero carbon housing on underutilized public land close to jobs and services. In addition, the resolution requests that UBCM works with the BC Government to develop an Affordable Housing Offsite Wood Construction Early Adopter Program with voluntary municipal actions that aggregate demand like pre-approved designs, zoning and permits for different housing types; and voluntary actions for other sectors like developers, builders, school boards, health authorities, and forestry companies.
Energy	RR27: Equitable BC Hydro Pricing in Distribution Energy Policy	Vancouver	Resolution requests that UBCM communicate its support for Option 3 for BC Hydro's Distribution Extension Policy Update to BC Hydro, the BC Government, and the BC Utilities Commission, and encourage that option be implemented as quickly as possible.