

**METRO VANCOUVER REGIONAL DISTRICT
CLIMATE ACTION COMMITTEE**

REGULAR MEETING

Friday, July 12, 2019

1:00 p.m.

28th Floor Committee Room, 4730 Kingsway, Burnaby, British Columbia

A G E N D A¹

1. ADOPTION OF THE AGENDA

1.1 July 12, 2019 Regular Meeting Agenda

That the Climate Action Committee adopt the agenda for its regular meeting scheduled for July 12, 2019 as circulated.

2. ADOPTION OF THE MINUTES

2.1 June 14, 2019 Regular Meeting Minutes

That the Climate Action Committee adopt the minutes of its regular meeting held June 14, 2019 as circulated.

3. DELEGATIONS

4. INVITED PRESENTATIONS

5. REPORTS FROM COMMITTEE OR STAFF

5.1 Board Strategic Plan 2019 - 2022

Designated Speakers:

Ann Rowan, Manager, Collaboration and Engagement, External Relations Department

Megan Gerryts, Corporate Projects Coordinator, CAO Executive Office

That the Climate Action Committee endorse the Air Quality and Climate Change Strategic Directions as presented in the attachment dated June 25, 2019, titled "Strategic Directions: Air Quality and Climate Change".

5.2 Aligning *Climate 2050* with the IPCC Special Report on Global Warming of 1.5°C

Designated Speakers:

Roger Quan, Director, Air Quality and Climate Change

Jason Emmert, Senior Planner

Conor Reynolds, Division Manager, Air Quality and Climate Change Policy

Planning and Environment Department

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

That the MVRD Board:

- a) endorse the proposed amendments to the *Climate 2050 Strategic Framework* to reflect a commitment to a carbon neutral region by 2050, and an interim target of reducing greenhouse gas emissions by 45% from 2010 levels by 2030;
- b) direct staff to bring forward a proposed amendment to *Metro 2040*, the regional growth strategy, to the Metro Vancouver Board for consideration, to incorporate revised greenhouse gas reduction targets (including interim targets).

5.3 Metro Vancouver's Climate Actions and Carbon Neutral Progress in 2018

Designated Speakers:

Amy Thai, Environmental Technician II

*Conor Reynolds, Division Manager, Air Quality and Climate Change Policy
Planning and Environment Department*

That the Climate Action Committee receive for information the report dated June 14, 2019, titled "Metro Vancouver's Climate Actions and Carbon Neutral Progress in 2018".

5.4 Strata Energy Advisor Pilot Program Update

Designated Speakers:

Jason Emmert, Senior Planner

Erik Blair, Air Quality Planner

Planning and Environment Department

That the Climate Action Committee receive for information the report dated June 18, 2019, titled, "Strata Energy Advisor Pilot Program Update".

5.5 Update on Metro Vancouver's Grow Green Website

Designated Speaker:

*Larina Lopez, Division Manager, Corporate Communications
External Relations Department*

That the Climate Action Committee receive for information the report dated June 7, 2019, titled "Update on Metro Vancouver's Grow Green Website".

5.6 Manager's Report

Designated Speaker:

*Roger Quan, Director, Air Quality and Climate Change
Planning and Environment Department*

That the Climate Action Committee receive for information the report dated June 27, 2019, titled "Manager's Report".

6. INFORMATION ITEMS

7. OTHER BUSINESS

8. BUSINESS ARISING FROM DELEGATIONS

9. RESOLUTION TO CLOSE MEETING

Note: The Committee must state by resolution the basis under section 90 of the Community Charter on which the meeting is being closed. If a member wishes to add an item, the basis must be included below.

10. ADJOURNMENT/CONCLUSION

That the Climate Action Committee adjourn/conclude its regular meeting of July 12, 2019.

Membership:

Carr, Adriane (C) - Vancouver
Dhaliwal, Sav (VC) - Burnaby
Arnason, Petrina - Langley Township
Baird, Ken - Tsawwassen First Nation
Dupont, Laura - Port Coquitlam

Hocking, David - Bowen Island
Kruger, Dylan - Delta
McIlroy, Jessica - North Vancouver City
McLaughlin, Ron - Lions Bay

Pettigrew, Steven - Surrey
Steves, Harold – Richmond
van den Broek, Val - Langley City
Yousef, Ahmed - Maple Ridge

**METRO VANCOUVER REGIONAL DISTRICT
CLIMATE ACTION COMMITTEE**

Minutes of the Regular Meeting of the Metro Vancouver Regional District (MVRD) Climate Action Committee held at 1:03 p.m. on Friday, June 14, 2019 in the 28th Floor Committee Room, 4730 Kingsway, Burnaby, British Columbia.

MEMBERS PRESENT:

Chair, Councillor Adriane Carr, Vancouver
 Vice Chair, Councillor Sav Dhaliwal, Burnaby
 Chief Ken Baird, Tsawwassen
 Councillor Petrina Arnason, Langley Township
 Councillor Laura Dupont, Port Coquitlam
 Councillor David Hocking, Bowen Island
 Councillor Dylan Kruger, Delta
 Councillor Jessica McIlroy, North Vancouver City
 Mayor Ron McLaughlin, Lions Bay
 Councillor Steven Pettigrew, Surrey
 Councillor Harold Steves, Richmond
 Mayor Val van den Broek, Langley City
 Councillor Ahmed Yousef, Maple Ridge (arrived at 1:03 p.m.)

MEMBERS ABSENT:

None.

STAFF PRESENT:

Roger Quan, Director, Air Quality and Climate Change, Planning and Environment
 Carol Mason, Chief Administrative Officer
 Genevieve Lanz, Legislative Services Coordinator, Board and Information Services

1. ADOPTION OF THE AGENDA

1.1 June 14, 2019 Regular Meeting Agenda

It was MOVED and SECONDED

That the Climate Action Committee:

- a) amend the agenda for its regular meeting scheduled for June 14, 2019 by adding on-table additional material related to Item 5.1 from the City of Surrey; and
- b) adopt the agenda as amended.

CARRIED

1:03 p.m. Councillor Yousef arrived at the meeting.

2. ADOPTION OF THE MINUTES

2.1 May 17, 2019 Regular Meeting Minutes

It was MOVED and SECONDED

That the Climate Action Committee adopt the minutes of its regular meeting held May 17, 2019 as circulated.

CARRIED

3. DELEGATIONS

No items presented.

4. INVITED PRESENTATIONS

No items presented.

5. REPORTS FROM COMMITTEE OR STAFF

5.1 Metro Vancouver Draft *Clean Air Plan* Discussion Paper

Report dated June 5, 2019 from John Lindner, Air Quality Planner, and Derek Jennejohn, Lead Senior Engineer, Planning and Environment, presenting the draft *Clean Air Plan* for endorsement.

Members were provided with a presentation on the draft *Clean Air Plan*, highlighting key elements, issues and long-term goals, proposed vision and regional targets for 2030, and next steps for engagement and finalization.

Discussion ensued on increasing regionally designated clean air zones, restricting industrial emissions, intensifying organic regenerative agriculture, clarifying regional targets for 2030 and *Climate 2050* targets, and investigating pro-active measures including building retrofits and solar panel programs.

On-table additional material from the City of Surrey and presentation material titled "Metro Vancouver's *Clean Air Plan* Draft Discussion Paper" are retained with the June 14, 2019 Climate Action Committee agenda.

It was MOVED and SECONDED

That the Climate Action Committee:

- a) endorse the draft *Clean Air Plan* Discussion Paper as amended in the report dated June 5, 2019, titled "Metro Vancouver Draft *Clean Air Plan* Discussion Paper"; and
- b) direct staff to report back with a finalized *Clean Air Plan* Discussion Paper and associated engagement plan, for endorsement by the MVRD Board.

CARRIED

5.2 Metro Vancouver's Carbon Price Policy Implementation Update

Report dated May 21, 2019 from Joshua Power, Senior Policy and Planning Analyst, Conor Reynolds, Division Manager, Air Quality and Climate Change Policy, Planning and Environment, and Jeffrey Lovell, Division Manager, Capital and Financial Planning, Financial Services, providing an update on the impact of the implementation of the *Carbon Price Policy*.

It was MOVED and SECONDED

That the Climate Action Committee receive for information the report dated May 21, 2019, titled "Metro Vancouver's Carbon Price Policy Implementation Update".

CARRIED

Councillor Yousef absent at the vote.

5.3 Best Management Practices for Invasive Species: English Holly, English and Irish Ivies, Yellow Archangel, Himalayan Balsam, and Parrot's Feather

Report dated May 21, 2019 from Laurie Bates-Frymel, Senior Regional Planner, Planning and Environment, and Tasha Murray, Executive Director, Invasive Species Council of Metro Vancouver, providing best management practices for English Holly, English and Irish Ivies, Yellow Archangel, Himalayan Balsam, and Parrot's Feather.

Members were provided with a presentation on invasive species best management practices highlighting monitoring, disposal, and next steps.

Presentation material titled "Best Management Practices for Invasive Species in the Metro Vancouver Region" is retained with the June 14, 2019 Climate Action Committee agenda.

It was MOVED and SECONDED

That the MVRD Board:

- a) receive for information the report dated May 21, 2019, titled "Best Management Practices for Invasive Species: English Holly, English and Irish Ivies, Yellow Archangel, Himalayan Balsam, and Parrot's Feather"; and
- b) direct staff to forward the report to member jurisdictions for information.

CARRIED

Mayor van den Broek absent at the vote.

5.4 Measuring Ecosystem Services – Metro Vancouver's Carbon Storage Dataset

Report dated May 16, 2019 from Josephine Clark, Regional Planner, Planning and Environment, providing information on the regional carbon storage dataset and potential applications.

Members were provided with a presentation on the Carbon Storage Dataset, highlighting project objectives, limitations, uses and linkages to *Climate 2050* roadmaps.

Presentation material titled “Metro Vancouver’s Carbon Storage Dataset - Measuring Ecosystem Services” is retained with the June 14, 2019 Climate Action Committee agenda.

It was MOVED and SECONDED

That the Climate Action Committee receive for information the report titled “Measuring Ecosystem Services – Metro Vancouver’s Carbon Storage Dataset”, dated May 16, 2019.

CARRIED

5.5 Urban Forest Climate Adaptation Initiative Update

Report dated May 21, 2019 from Edward Nichol, Senior Policy and Planning Analyst, Planning and Environment, providing an update on the Urban Forest Climate Adaptation Initiative, highlighting the addition of 160 species to the Tree Species Selection Database.

It was MOVED and SECONDED

That the Climate Action Committee receive for information the report dated May 21, 2019, titled “Urban Forest Climate Adaptation Initiative Update.”

CARRIED

5.6 Board Appointments and Rescindments of Staff as Officers

Report dated May 27, 2019 from Kathy Preston, Lead Senior Engineer, Planning and Environment, presenting appointments and rescindments pursuant to the *Greater Vancouver Regional District Air Quality Management Bylaw*, *Environmental Management Act* and *Offence Act*.

It was MOVED and SECONDED

That the MVRD Board:

- a) pursuant to the *Greater Vancouver Regional District Air Quality Management Bylaw* and the *Environmental Management Act*:
 - i. appoint the following Metro Vancouver employee as an officer: Permitting and Enforcement Officer, Brian Kerin; and
 - ii. rescind the appointments of the following persons as officers: Lynne Bosquet and Donna Hargreaves; and
- b) pursuant to section 28 of the *Offence Act*:
 - i. appoint the following Metro Vancouver employee for the purpose of serving summons for alleged violations under the *Greater Vancouver Regional District Air Quality Management Bylaw*: Permitting and Enforcement Officer, Brian Kerin; and
 - ii. rescind the appointments for the purpose of serving summons of the following persons: Lynne Bosquet and Donna Hargreaves.

CARRIED

5.7 Manager's Report

Report dated June 7, 2019 from Roger Quan, Director, Air Quality and Climate Change, Planning and Environment, providing an update on the 2019 Climate Action Committee Work Plan, highlighting 2019 air quality advisories, Lower Fraser Valley Air Zone Report for 2015-2017, International Airshed Strategy meeting and Non-Road Diesel Engine Emission Regulation Program compliance.

It was MOVED and SECONDED

That the Climate Action Committee receive for information the report dated June 7, 2019, titled "Manager's Report".

CARRIED

6. INFORMATION ITEMS

It was MOVED and SECONDED

That the Climate Action Committee receive for information the following Information Items:

- 6.1 Correspondence to The Honourable Ginette Petitpas Taylor, Minister of Health re: Consultation on a Cannabis Production Emission Regulation for Metro Vancouver from Sav Dhaliwal, Chair, Metro Vancouver Board, dated April 23, 2019
- 6.2 Correspondence to Chris Plagnol, Corporate Officer, Metro Vancouver re: Request from Village of Lions Bay for Exemption from Proposed Wood Burning Restrictions from Peter DeJong, CAO, Village of Lions Bay, dated May 7, 2019

CARRIED

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 regular meeting of June 14, 2019.

CARRIED

(Time: 3:44 p.m.)

Genevieve Lanz,
Legislative Services Coordinator
29997758 FINAL

Adriane Carr, Chair

To: Climate Action Committee

From: Ann Rowan, Manager, Collaboration and Engagement
External Relations Department
Megan Gerryts, Corporate Projects Coordinator
CAO Executive Office

Date: June 25, 2019

Meeting Date: July 12, 2019

Subject: **2019-2022 Board Strategic Plan**

RECOMMENDATION

That the Climate Action Committee endorse the Air Quality and Climate Change Strategic Directions as presented in the attachment dated June 25, 2019, titled "Strategic Directions: Air Quality and Climate Change".

The Climate Action Committee responsibilities, as included in the Committee Terms of Reference, include the following:

The Climate Action Committee is the standing committee of the Metro Vancouver Board that provides advice and recommendations on policies, bylaws, plans, programs, budgets and issues related to the Air Quality & Climate Change service, and the Environmental Planning function within Regional Planning.

The proposed Air Quality and Climate Change Strategic Directions for the *2019-2022 Board Strategic Plan* is presented to the Climate Action Committee for review and comment prior to consideration by the Finance and Intergovernment Committee at its meeting on July 17, 2019.

Attachment: (Doc# 29844116)

1. Draft report dated June 26, 2019, titled "2019-2022 Board Strategic Plan".
2. Strategic Directions: Air Quality and Climate Change, dated June 25, 2019

To: Finance and Intergovernment Committee

From: Carol Mason, Commissioner/Chief Administrative Officer

Date: June 26, 2019 Meeting Date: July 17, 2019

Subject: **2019-2022 Board Strategic Plan**

RECOMMENDATION

That the MVRD Board approve the *2019-2022 Board Strategic Plan* as presented in the report dated June 26, 2019, titled “2019-2022 Board Strategic Plan”.

PURPOSE

To present to the Finance and Intergovernment Committee and the MVRD Board for consideration and approval the *2019-2022 Board Strategic Plan*, which will establish the strategic priorities of the Board over its four-year mandate.

BACKGROUND

On April 26 and 27, 2019, the members of the MVRD Board participated in a strategic planning workshop with the objective of developing a strategic plan for its four-year mandate, within a 30-year planning context. The *2019-2022 Board Strategic Plan* details strategic directions for each function of Metro Vancouver, as recorded at the planning workshop.

This report brings forward the *2019-2022 Board Strategic Plan* for Committee and Board consideration and approval which, if approved, will establish strategic priorities for the Board’s four-year mandate. The draft strategic directions have also been reviewed for input by applicable standing committees that oversee the functions contained in the plan.

2019-2022 BOARD STRATEGIC PLAN

The April 2019 Board strategic planning workshop was timed early in the Board’s four-year mandate to grant the opportunity to set direction for the term. The new Plan will replace the current *2015-2018 Board Strategic Plan*.

The *2019-2022 Board Strategic Plan* as presented for Board consideration comprises three sections:

- *Metro Vancouver* – Provides general information about the region, an overview of the governance of Metro Vancouver the organization, and a map depicting the geographical distribution of key Metro Vancouver facilities and services.
- *Planning for the future* – Outlines the value of strategic planning and Metro Vancouver’s integrated approach to building a livable region; also lays out Metro Vancouver’s vision and statements, which have been updated to reflect the Board’s vision.
- *Strategic directions* – Provides the Board’s priorities and directions for the regional federation and each of Metro Vancouver’s functions.

A number of common topics emerged from workshop discussions, which are reflected in the *2019-2022 Board Strategic Plan*. The value of long-term financial planning, including the development and implementation of a 30-year financial framework, was confirmed. Related to this was the need to ensure the resilience of infrastructure in the face of anticipated natural hazards, more extreme events related to climate change, and other significant disruptions. In their visioning exercise the Board strongly identified the need to account for current and future generations and this was reflected in the value placed on long-term planning and collaboration especially in the context of climate action. Other cross-cutting priorities were the value of continued leadership in environmental stewardship and embracing innovation in projects and operations.

The *2019-2022 Board Strategic Plan* provides guidance to Metro Vancouver staff in their work and planning. As part of the budget process, annual work plans are prepared for Metro Vancouver's business areas, articulating how proposed budgets address priorities from the *Board Strategic Plan*. Staff also provide annual updates on progress in delivering the strategic directions of the plan.

The *2019-2022 Board Strategic Plan* also has important communication value beyond Metro Vancouver staff. It is used to increase awareness among the public, member jurisdictions, other orders of government, and key stakeholders about Metro Vancouver's important role in the region today and in the future.

Thirty-Year Financial Planning

Over the past four years Metro Vancouver has undergone a process, including implementing internal systems and budgeting software, focused on multi-year business planning. This process was initiated to ensure the long-term serviceability of assets and funding sources. Earlier this year, the first annual *Five Year Outlook* was published – a five-year financial plan that covers key initiatives and anticipated costs for the region's four legal entities over the next five years.

The organization is now undertaking a process to develop a *30-Year Financial Framework*, which, along with the *Board Strategic Plan*, regional management plans, and organizational policies, will guide budgeting and funding decisions that put financial sustainability as a central theme in delivering services. Discussions from the April 26 and 27 strategic planning workshop are being incorporated into the development of the *30-Year Financial Framework*, which will be presented to the Board this fall.

ALTERNATIVES

1. That the MVRD Board approve the *2019-2022 Board Strategic Plan* as presented in the report dated June 26, 2019, titled "2019-2022 Board Strategic Plan".
2. That the MVRD Board approve the *2019-2022 Board Strategic Plan* as amended in the report dated June 26, 2019, titled "2019-2022 Board Strategic Plan".
3. That the Finance and Intergovernment Committee receive for information the report dated June 26, 2019, titled "2019-2022 Board Strategic Plan" and provide alternate direction to staff.

FINANCIAL IMPLICATIONS

If Alternative 1 is approved, staff will finalize the *2019-2022 Board Strategic Plan* as presented. Implementation of the strategic directions identified in the *2019-2022 Board Strategic Plan* may require the reallocation of some existing resources, as well as the need for additional resources over time. All proposed reallocations and additions of resources will be brought to the Board through the annual budget process.

Under Alternative 2, the Committee may wish to amend the draft strategic plan with additional input on the strategic directions and direct staff to finalize the strategic plan with these changes.

SUMMARY / CONCLUSION

Members of the MVRD Board met on April 26 and 27, 2019, to set strategic directions for the organization over the next four years, within a 30-year planning context. Key themes that emerged from the workshop include the need to take a long-term view in planning for the region, the importance of ensuring infrastructure is resilient to climate change and other hazards, the vital role of Metro Vancouver in fostering regional collaboration, and the on-going value of leadership in environmental stewardship and pursuing innovation in identifying solutions.

This report presents the *2019-2022 Board Strategic Plan*, which has been prepared using table discussion notes and report backs from the Board workshop. Once adopted by the MVRD Board, the *2019-2022 Board Strategic Plan* will guide the work of staff over the next four years and will assist in communicating the important role of Metro Vancouver in the region among the public, member jurisdictions, government and key stakeholders of Metro Vancouver. Staff recommend approving Alternative 1.

References

[Five Year Outlook 2019-2023](#)

29844116

June 25, 2019

Strategic Directions: Air Quality & Climate Change

1 TAKING LEADERSHIP ON CLIMATE ACTION THROUGH *CLIMATE 2050*

Guide climate change policy and action for the Metro Vancouver region for the next 30 years with Metro Vancouver's *Climate 2050* strategy.

1.1 Update Metro Vancouver's greenhouse gas emission targets.

- Revise the target for 2050 to reflect current science, capturing the need to move to carbon neutrality by 2050.
- Support long-term targets with interim targets, and report progress towards meeting those targets.

1.2 Develop and advocate for actions fundamental to reducing regional greenhouse gas emissions and ensuring our region is resilient to the impacts of climate change.

- Include actions that will facilitate the transition to clean, renewable sources of fuel in transportation and in energy provision.
- Advocate for changes in provincial legislation to accelerate the uptake of low emissions technologies for buildings, such as low or zero carbon heating/cooling systems and electric vehicle infrastructure.
- Explore opportunities for creating carbon sinks to sequester carbon, including through ecosystem restoration projects and by increasing urban and rural forest canopies.

1.3 Undertake corporate climate action that supports regional climate change mitigation and adaptation goals and targets and demonstrates leadership.

- Continue to explore options for generating clean, renewable sources of energy from Metro Vancouver utilities.
- Expand opportunities for greater use of electric vehicles in the corporate fleet.
- Ensure that Metro Vancouver asset management policies incorporate climate change adaptation actions.

2 IMPROVING AIR QUALITY

Improve air quality by mitigating threats to public health and the environment.

2.1 Improve understanding of air quality issues in the region by expanding air monitoring capacity.

2.2 Continue to identify air contaminants in the region, identify priorities and pursue effective actions to reduce pollutants.

2.3 Explore solutions for mitigating health impacts of diminished air quality due to wildfires.

3 FOSTERING COLLABORATION & ENGAGEMENT

Strengthen awareness among and engagement with the public, members, other orders of government, and other stakeholders in the implementation of *Climate 2050*, and foster regional coordination to help implement effective adaptation measures and achieve the long-term targets in reducing greenhouse gas emissions.

- 3.1 Monitor evolving science and technology related to climate change, and provide the public with more information on the science of climate change, its implications for the Metro Vancouver region, and the scope of actions required to both reduce greenhouse gas emissions and adapt to the changes already triggered by climate change.
- 3.2 Engage members, industry and business associations, community and non-governmental organizations, post-secondary institutions, indigenous peoples, and youth in the implementation of *Climate 2050*.
- 3.3 Engage with provincial and federal governments on specific actions to reduce greenhouse gas emissions and adapt to climate change.
 - Pursue partnerships with other orders of government to fund innovative projects that will generate clean, renewable sources of energy from Metro Vancouver utilities.
 - Work with the provincial government to address the changing conditions for farming in the region, including consideration of new irrigation infrastructure and changes in farming techniques.
- 3.4 Develop partnerships with industry to replace fossil fuels with clean, renewable energy that can be generated from Metro Vancouver utilities.

To: Climate Action Committee

From: Roger Quan, Director, Air Quality and Climate Change
Jason Emmert, Senior Planner
Conor Reynolds, Division Manager, Air Quality and Climate Change Policy
Planning and Environment Department

Date: June 17, 2019 Meeting Date: July 12, 2019

Subject: **Aligning *Climate 2050* with the IPCC Special Report on Global Warming of 1.5°C**

RECOMMENDATION

That the MVRD Board:

- a) endorse the proposed amendments to the *Climate 2050 Strategic Framework* to reflect a commitment to a carbon neutral region by 2050, and an interim target of reducing greenhouse gas emissions by 45% from 2010 levels by 2030;
- b) direct staff to bring forward a proposed amendment to *Metro 2040*, the regional growth strategy, to the Metro Vancouver Board for consideration, to incorporate revised greenhouse gas reduction targets (including interim targets).

PURPOSE

To advise the Climate Action Committee and MVRD Board on proposed measures to align Metro Vancouver's greenhouse gas (GHG) emissions reductions targets and actions with the latest science in the Intergovernmental Panel on Climate Change (IPCC) Special Report on Global Warming of 1.5°C.

BACKGROUND

At its March 29, 2019 meeting, the MVRD Board adopted the following resolution:

That the Metro Vancouver Regional District Board direct staff to report back with measures necessary to align Metro Vancouver's Climate 2050 Strategic Framework and Roadmaps with the 2018 Intergovernmental Panel on Climate Change special report on global warming, and to report back with recommended changes to Climate 2050 Strategic Framework targets, including interim targets.

Metro Vancouver's current targets (33% reduction in GHGs by 2020 and 80% by 2050, compared with 2007 levels) were adopted as part of *Metro Vancouver 2040: Shaping our Future*, the regional growth strategy, and are reflected in the *Climate 2050 Strategic Framework*. Metro Vancouver is currently implementing *Climate 2050* through a series of *Roadmaps*, which will describe goals, strategies, and actions to reduce GHGs and adapt to climate change impacts in each of ten issue areas. Metro Vancouver is also developing a new *Clean Air Plan*, which will identify actions to reduce air contaminant and GHG emissions in the region over the next five to ten years, and which will be aligned with the *Climate 2050 Roadmaps*.

The Board held its strategic planning workshop in April 2019 and the *2019-2022 Board Strategic Plan* is the subject of Report 5.1 in the Climate Action Committee's July 12, 2019 agenda. The report describes new strategic directions for air quality and climate change for the Committee's consideration and endorsement.

This report outlines the proposed steps to amend the targets and actions in Metro Vancouver's policy documents to more closely align with the level of global emissions reductions necessary to keep average global temperature rise below 1.5°C, and direction in the *2019-2022 Board Strategic Plan*.

LIMITING GLOBAL WARMING TO 1.5°C

The Intergovernmental Panel on Climate Change (IPCC) is the United Nations body that provides the global community with regular assessments of the scientific basis of climate change, its impacts and future risks, as well as options for adaptation and mitigation. The October 2018 IPCC Special Report on Global Warming of 1.5°C highlights the importance of maintaining global temperature rise to a maximum of 1.5°C above pre-industrial levels (Reference 1). The report also sets out technological and energy system changes necessary to maintain global average temperatures at this level. To achieve this, the report indicates that global net carbon emissions (i.e., greenhouse gases – CO₂, methane, and nitrous oxide – as well as other climate forcers such as black carbon) will need to be reduced by about 45% below 2010 levels by 2030, net zero by 2050, and net negative in the second half of the century.

A staff report was presented to the Climate Action Committee at its March 15, 2019, meeting, describing the IPCC Special Report, as it is a key climate change development since the adoption of the *Climate 2050 Strategic Framework* (Reference 2).

Avoiding Climate Breakdown

According to the IPCC, the global average temperature has already risen by 1°C and impacts on natural and human systems are already being observed, including more severe storms, flooding, drought, forest fires, and species extinction around the world. The severity of future climate-related risks depends on the rate, peak and duration of warming. Each degree of additional warming beyond 1.5°C will increase the impacts and make it increasingly difficult for human society to adapt. If global GHG emissions continue as projected (based on current commitments), global temperature is projected to rise by 3°C.

Climate Risks to the Metro Vancouver Region

Metro Vancouver is already experiencing the impacts of climate change. As one example, the region has been impacted by smoke from unprecedented wildfire activity in western North America in three of the past four summers. Expected future climate impacts include more wildfire smoke, an increase in rainfall intensity by 20-45% by 2050 and 40-75% by 2100, and at least 1 meter of sea level rise. This level of environmental change will entail significant costs and impact quality of life for residents and businesses in the region.

Metro Vancouver's Climate Projections Report summarizes the impacts of climate change expected under a business as usual emissions scenario, with 3°C temperature rise (Reference 3), as well as impacts on precipitation and stormwater management (Reference 4).

Global Equity Considerations

The IPCC Special Report also highlights the need to consider global equity and the uneven distribution of climate impacts on poor and disadvantaged people around the world. Historically, and continuing to this day, wealthier countries have contributed more GHGs to the atmosphere and in the process have realized an abundance of social and economic benefits. The IPCC report states that, to take responsibility for past emissions and the associated climate impacts around the world, wealthier countries have an obligation to make deeper emissions reductions than lower income countries, as well as to help those countries follow a low-carbon pathway as their per capita income rises.

CLIMATE EMERGENCY DECLARATIONS AND NEW TARGETS

Recognizing the urgent need to keep global temperature rise below 1.5°C, national, state and local governments around the world are declaring climate emergencies and adjusting greenhouse gas emission reduction targets. The revised targets are now driving accelerated actions to reduce emissions. In Canada more than 250 local governments, many in Quebec, have declared climate emergencies. A number of local governments in Metro Vancouver and across British Columbia have also taken similar steps.

Targets Consistent with the IPCC Special Report

To align local targets with global targets, local jurisdictions around the world have committed to achieving zero or near zero carbon emissions by 2050. Some of the common terms used by jurisdictions to articulate their commitment to deep emission reductions include carbon neutral, net zero emissions, and 100% renewable energy. Carbon neutral and net zero emissions are functionally equivalent, with both meaning that, on balance, a jurisdiction will emit no GHG emissions into the atmosphere. 100% renewable energy is another target that focusses on emissions associated with the energy used in a jurisdiction, but it does not necessarily result in that jurisdiction being carbon neutral. A 100% renewable energy target can be complementary to carbon neutrality, as it can yield significant emission reductions and can be easily connected to tangible changes in everyday life.

The definitions and approaches to achieving deep emission reductions vary to some degree from jurisdiction to jurisdiction. However, most approaches include: a dramatic increase in the use of clean, renewable, non-fossil fuel energy sources (such as renewable electricity and biogas); a combination of demand-side energy efficiency across all sectors of the economy (such as in heating equipment for new buildings); and shifts in land-use and transportation approaches. Practically, achieving a carbon neutral region means that any remaining emissions must be balanced by “negative emissions”, i.e., by sequestering an equivalent amount of carbon dioxide through ecological and technological approaches. The IPCC Special Report indicates that, after 2050, net negative emissions will be required in the second half of the century to keep global temperature rise below 1.5°C.

There are a number of global initiatives for local governments that are adopting commitments to zero and near zero emission reduction targets, such as:

- **Carbon Neutral Cities Alliance**, a collaboration of leading global cities working to cut greenhouse gas emissions by 80-100% by 2050 or sooner; and

- **Global 100% RE Cities/Renewable Cities**, an initiative where participating cities and other jurisdictions have committed to 100% renewable energy in the power, heating/cooling, and transport sectors.

PROPOSED 2050 AND INTERIM TARGETS

Consistent with direction from the Climate Action Committee and Board, and in the *2019-2022 Board Strategic Plan*, staff recommend that Metro Vancouver adopt the following targets:

- become a “carbon neutral region” by 2050; and
- reduce greenhouse gas emissions by 45% from 2010 levels by 2030.

This approach would align Metro Vancouver’s 2050 GHG targets with the science summarized in the IPCC Special Report, which states the need for net zero emissions by 2050 in order to keep global temperature rise below 1.5°C and avoid climate breakdown.

In the Metro Vancouver regional context, achieving carbon neutrality would require achieving the deepest GHG emissions reductions possible across all economic sectors, and would likely require a commitment to using 100% renewable, fossil fuel-free energy by 2050. It would also mean that any remaining emissions would need to be balanced by removing carbon dioxide from the atmosphere through methods such as reforestation, bog restoration, enhanced carbon storage in aquatic ecosystems, improvements in agricultural soil greenhouse gas management, and potentially the use of technological carbon capture and storage at energy plants and industrial facilities.

By adopting a commitment to become a carbon neutral region, the Metro Vancouver region would become a member of the leadership group of metropolitan regions taking climate action in line with the recommendations of the IPCC. In adopting this target, Metro Vancouver can set the path towards carbon neutrality, but it will not be able to achieve the target on its own. No single jurisdiction can obtain the necessary reductions in regional emissions without significant cooperation, collaboration, and commitment from member jurisdictions, other orders of government, partner organizations, stakeholders, and the public.

Interim GHG reduction targets will help define the path towards a carbon neutral region. The interim target of 45% reduction by 2030 aligns with the IPCC Special Report.

Proposed Next Steps to Adopt New 2050 Target and Interim Target

As part of the development of the *Climate 2050 Roadmaps* and the *Clean Air Plan*, Metro Vancouver will be proposing specific goals, strategies and actions that define the path towards a carbon neutral region, including an interim GHG reduction target. In conjunction with the development of these *Roadmaps*, Metro Vancouver is exploring enhanced and new approaches to reducing GHG emissions in the region, including under its authority to control the discharge of air contaminants and manage air quality in the region.

Recognizing the legislated requirements for establishing GHG emission targets and the processes underway to develop the *Climate 2050 Roadmaps* and the *Clean Air Plan*, staff are proposing the following steps to align these policy documents with a carbon neutral region and interim targets.

- 1) Amend the *Climate 2050 Strategic Framework* as per Attachment 1, including amending the vision statement to:
 - Metro Vancouver demonstrates bold leadership in responding to climate change*
 - *Ensuring our infrastructure, ecosystems, and communities are resilient to the impacts of climate change, and*
 - *Pursuing a carbon neutral region by 2050.*
- 2) As part of the development of the *Climate 2050 Roadmaps*, identify a comprehensive set of substantive emission reduction actions that will set the region on the path towards achievement of the interim target and longer term carbon neutrality. This will include an analysis of the impact of the actions by other orders of government and other key stakeholders.
- 3) Include the 2050 target for a carbon neutral region, and interim target in the first iteration of the *Climate 2050 Roadmaps* as they are developed. Also include the targets in the forthcoming *Clean Air Plan* engagement process, as part of the new *Clean Air Plan*.
- 4) Bring forward a proposed amendment to *Metro 2040*, the regional growth strategy, for Board consideration, to integrate the 2050 target for a carbon neutral region and interim greenhouse gas reduction targets.
- 5) Continue to implement climate actions to make progress toward the targets.

ALTERNATIVES

1. That the MVRD Board:
 - a) endorse the proposed amendments to the *Climate 2050 Strategic Framework* to reflect a commitment to a carbon neutral region by 2050, and an interim target of reducing greenhouse gas emissions by 45% from 2010 levels by 2030;
 - b) direct staff to bring forward a proposed amendment to *Metro 2040*, the regional growth strategy, to the Metro Vancouver Board for consideration, to incorporate revised greenhouse gas reduction targets (including interim targets).
2. That the MVRD Board receive for information the report titled “Aligning Climate 2050 with the IPCC Special Report on Global Warming of 1.5°C”, dated June 17, 2019 and provide alternate direction to staff.

FINANCIAL IMPLICATIONS

The development of the *Climate 2050 Roadmaps* has been included in the 2019 operating budget. Re-assessment of greenhouse gas reduction targets and actions, the development of interim targets, and the incorporation of these into the *Climate 2050 Strategic Framework*, and the *Climate 2050 Roadmaps* has been accommodated within existing budgets.

If the Board approves Alternative 1, the additional financial implications of adopting a carbon neutral region target for 2050, and an interim target of 45% reduction by 2030, will be incorporated into annual and 5-year work plans and long term financial planning within each of Metro Vancouver’s legal entities, as appropriate. As outlined in the *Climate 2050 Strategic Framework*, the 2020 provisional budget will include resources necessary to complete the *Climate 2050 Roadmaps*, and associated climate actions to meet the revised targets.

SUMMARY / CONCLUSION

Consistent with direction from the Climate Action Committee and Board, and in the 2019-2022 Board Strategic Plan, this report outlines the proposed steps to align Metro Vancouver's greenhouse gas reduction targets and actions with the IPCC Special Report on Global Warming of 1.5°C, by committing to pursuing a carbon neutral region by 2050, with an interim target of 45% reduction by 2030. Through this commitment, the Metro Vancouver region would become a member of the leadership group of metropolitan regions taking climate action in line with the recommendations of the IPCC. In adopting these targets, Metro Vancouver can set the path towards carbon neutrality, but it will not be able to achieve the targets on its own. To obtain the necessary reductions in regional emissions, significant cooperation, collaboration, and commitment will be required from member jurisdictions, other orders of government, partner organizations, stakeholders, and the public.

As part of the development of the *Climate 2050 Roadmaps* and the *Clean Air Plan*, Metro Vancouver will identify the goals, strategies, and actions necessary to achieve the targets. Metro Vancouver will adopt the revised targets and actions as part of the *Climate 2050 Roadmaps*, *Clean Air Plan* and *Metro 2040*. Staff recommend Alternative 1, that the Climate Action Committee support the proposed amendments to the *Climate 2050 Strategic Framework*, and forward the recommendations to the MVRD Board for consideration.

Attachment

Revised *Climate 2050 Strategic Framework* (29699161)

References

1. [IPCC Special Report on Global Warming of 1.5°C](#)
2. [Key Climate Change Developments Since the Adoption of the Climate 2050 Strategic Framework](#)
3. [Metro Vancouver Climate Projections Report](#)
4. [Climate change Impacts on Precipitation and Stormwater for 2050 and 2100 – Technical brief](#)

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DRAFT

Climate 2050 STRATEGIC FRAMEWORK

SEPTEMBER 2018



SERVICES AND SOLUTIONS FOR A LIVABLE REGION

Metro Vancouver acknowledges the input and feedback that contributed to the development of this *Climate 2050 Strategic Framework*. Input came from a range of organizations and individuals including other orders of government, First Nations, industry and business associations, academics, Metro Vancouver's members, and many engaged residents, with particular note to the youth from across the region who provided an inspiring and motivating voice. The support and guidance of Metro Vancouver's Climate Action Committee is gratefully acknowledged.

The *Climate 2050 Strategic Framework* document is first published in 2018. Further content, resources, a history of current and past climate actions, and the next stages to develop the actions and supporting policies can be found at metrovancover.org, search 'Climate 2050'.

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. Its core services are drinking water, wastewater treatment and solid waste management. Metro Vancouver also regulates air quality, plans for urban growth, manages a regional parks system and provides affordable housing. The regional district is governed by a Board of Directors of elected officials from each local authority.

Member jurisdictions of Metro Vancouver include:

Village of Anmore	City of North Vancouver
Village of Belcarra	District of North Vancouver
Bowen Island Municipality	City of Pitt Meadows
City of Burnaby	City of Port Coquitlam
City of Coquitlam	City of Port Moody
City of Delta	City of Richmond
Electoral Area A	City of Surrey
City of Langley	Tsawwassen First Nation
Township of Langley	City of Vancouver
Village of Lions Bay	District of West Vancouver
City of Maple Ridge	City of White Rock
City of New Westminster	

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INTRODUCTION

Climate Change: The Challenge and Opportunity

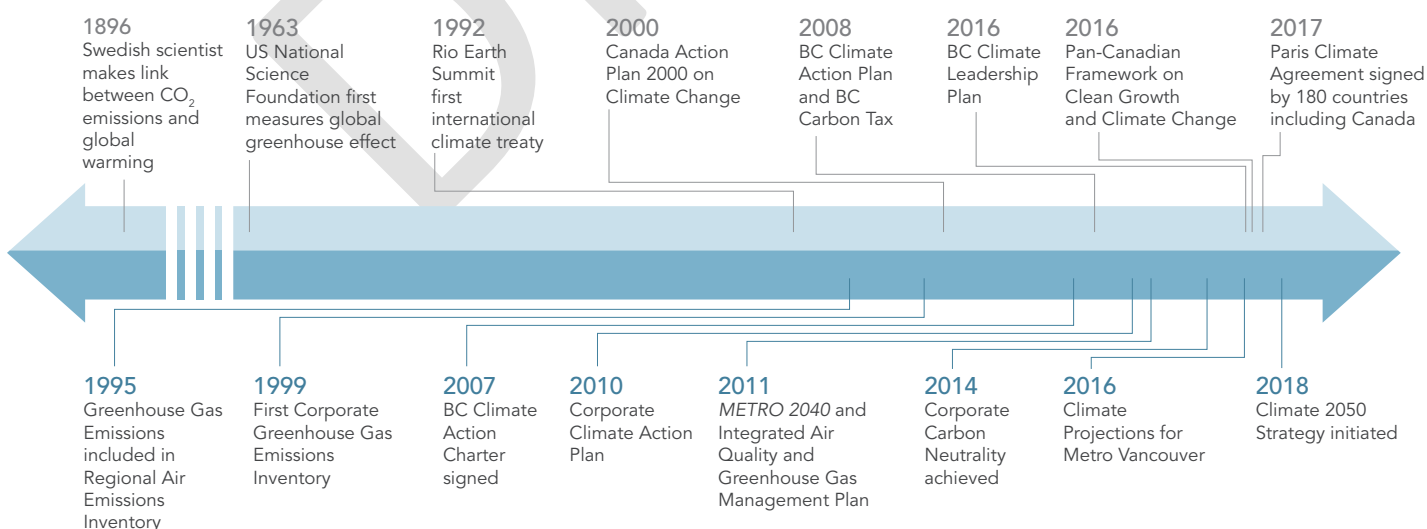
Climate Change is both a global and a local challenge, and it is already affecting our planet and our region in profound ways, making our summers hotter and drier, our winters warmer and wetter, and increasing the occurrence of extreme weather events. Furthermore, when climate change is viewed in the context of other challenges like affordability, equity, shifting jobs, economic insecurity, and the degradation of natural systems, it becomes clear that our response needs to be closely linked with other regional goals and initiatives.

Without strong action to reduce greenhouse gas emissions, both locally and globally, these trends will accelerate over the coming decades and it will become increasingly difficult and expensive to maintain the high quality of life

we experience in our region. At the same time, we need to ensure our ecosystems, infrastructure, and communities are resilient to the climate changes that have already been locked in due to past and current greenhouse gas emissions.

Every challenge that presents an opportunity and a robust, thoughtful response to climate change will create a more livable and sustainable region. Actions to adapt our communities and reduce greenhouse gas emissions can save money, create new businesses, improve air quality, protect nature, and provide many other benefits. Addressing this challenge effectively and taking advantage of these opportunities requires bold leadership and broad collaboration.

Global and Canadian Climate Action Milestones



Metro Vancouver Climate Action Milestones

Accelerating Early Success

Metro Vancouver and its 23 member jurisdictions have been enacting climate policy and taking climate action for over 20 years. For example, 18 years ago Metro Vancouver upgraded the energy system at Annacis Island Wastewater Treatment Plant to utilize more biogas to generate heat and electricity for the treatment processes. These upgrades significantly reduced the amount of natural gas used by the plant and its greenhouse gas emissions.

In 2008 the Metro Vancouver Regional District Board adopted a regional target of 80% reduction in greenhouse gas emissions below 2007 levels by 2050 and climate policies and actions are embedded in Metro Vancouver's management plans. For example, *Metro Vancouver 2040: Shaping Our Future (Metro 2040)*, the regional growth strategy, sets the framework for compact, complete communities that support a sustainable urban form and low carbon modes of transportation like walking, cycling and transit.

Within the water, liquid waste, and solid waste utilities, Metro Vancouver is reducing greenhouse gas emissions from its operations and recovering resources and energy from its waste streams, as well as planning improvements to the climate resilience of regional infrastructure. Actions in the *Integrated Air Quality and Greenhouse Gas Management Plan* enable policies and programs to support Metro Vancouver's member jurisdictions, businesses, and residents in reducing greenhouse gas emissions. In 2019, Metro Vancouver initiated development of a new Clean Air Plan in conjunction with Climate 2050 that will advance greenhouse gas reduction actions in the region.

Despite this progress, we need to do more if our region and planet are to continue supporting a high quality of life for future generations. In 2015, the Metro Vancouver Board of Directors directed staff to incorporate strategies and actions into all Metro Vancouver functions to mitigate and adapt to climate change, and to develop and implement

a regional climate action strategy, now called the *Climate 2050* strategy. In 2019, the MVRD Board amended this *Climate 2050 Strategic Framework*, committing to a carbon neutral region and associated interim targets.

Climate Action Yields Many Benefits

Climate actions yield a range of benefits and opportunities that improve our quality of life. The adoption of electric vehicles reduces greenhouse gas emissions and other types of air pollution. Energy efficient homes and buildings are more comfortable and healthier. Protecting and enhancing natural areas and robust ecosystems increases our resiliency to climate change through flood control and heat reduction, while also providing increased support for biodiversity and human health and well-being. A region better prepared for climate risks like sea level rise, flooding and heat events is also better prepared for other major risks such as earthquakes.

The shift to a circular economy underpinned by renewable, low carbon energy is already generating thousands of new local jobs and businesses. New entrepreneurs and well-established businesses are creating new goods and services that turn waste into resources. Entrants into the market are offering new low carbon transportation options as well as products that support the building of energy efficient homes.

Continued local government leadership and investment in a resilient, low carbon future will contribute to additional economic opportunities in clean transportation, renewable energy, energy efficient buildings, recycling, local food, clean tech, and many other sectors.

Fairness, Equity and Affordability

Climate change will not affect everyone in the region to the same degree. Lower income and socially marginalized populations will have more difficulty coping with the impacts of climate change. Those with less financial resources will have fewer options to protect themselves when a major weather event occurs, and may have more difficulty recovering from impacts. They are more likely to have more difficulty adapting their homes to protect them from extreme weather events, less access to green spaces or air conditioning, and may have underlying health issues that can be exacerbated by extreme heat and air pollution.

Policies and programs to reduce greenhouse gas emissions and adapt to the changing climate must not exacerbate existing economic, social, or geographic disparities. The design of policies and programs should consider how low carbon options for transportation and buildings can be accessible to all Metro Vancouver residents. They should also strengthen relationships with First Nations including contributing to Reconciliation with First Nations peoples in the region.

Fairness, equity, and affordability will be central considerations in the development of goals, strategies and actions for the *Climate 2050* strategy.



Leadership, Collaboration, and Local Expertise

Metro Vancouver and other orders of governments play a role in establishing policies, delivering programs, and setting regulations, but effective climate action will require the efforts of all orders of government, combined with the energy, expertise and innovation of residents, businesses, academia and non-profit organizations. As a regional federation, Metro Vancouver has an important leadership role to innovate and demonstrate best practices, convene member jurisdictions to collaborate on joint initiatives, and liaise with other orders of governments.

Our region has become a hub for innovators, businesses, and professionals working on sustainability and climate change problems. *Climate 2050* will draw upon local and traditional knowledge from experts in the region, as well as global best practices. Such expertise will help develop solutions to local challenges and ideas that can contribute to climate action in other parts of the world.

The traditional knowledge of the region's First Nations has accumulated over thousands of years, and can also be incorporated into planning processes that identify climate action priorities. Combining traditional knowledge and wisdom with new information, evidence and technologies can help Metro Vancouver develop more holistic strategies and actions that address the short term challenges while still considering the long term sustainability of our communities.



LOCAL GOVERNMENTS LEADING ON CLIMATE ACTIONS

While federal governments are building an international consensus on climate action, local governments are working together to respond to climate change. Provincial, national and international organizations are linking local governments together to share climate change information and best practices, reaffirm commitments, and advocate to other orders of government. Some of the leading organizations are described here:

C40 Cities Climate Leadership – A network of the world's megacities that are committed to addressing global climate change, C40 supports cities to collaborate effectively, share knowledge and drive meaningful, measurable and sustainable action on climate change. C40 currently has 17 networks that cover the mitigation, adaptation and sustainability topics that are of highest priority to C40 cities and that have the potential for the greatest climate impact. c40.org

BC Municipal Climate Leadership Council (BCMCLC) – A group of Mayors and Councillors from large and small communities across BC who have volunteered to help other locally elected officials advance climate action through leadership that goes beyond politics as usual. The Council provides non-partisan education, support and mentoring for peers on the value of taking climate action in their communities. bcmclc.ca

Federation of Canadian Municipalities – Partners for Climate Protection Program is a network of 350 Canadian municipal governments that have committed to reducing greenhouse gases and acting on climate change. A five-milestone process guides members through the process of creating greenhouse gas inventories, setting reduction targets, developing local action plans, implementing actions, and monitoring and reporting on results. pcphub.fcm.ca

Climate Mayors – Climate Mayors (aka the Mayors National Climate Action Agenda) is a Mayor-to-Mayor network of US Mayors collaborating on climate. Cities are pursuing actions to achieve their emissions reduction objectives through undertaking community greenhouse gas inventories, setting targets to reduce emissions, and developing climate action plans. climatemayors.org



Global Covenant of Mayors for Climate and Energy – An international alliance of cities and local governments with a shared long-term vision of promoting and supporting voluntary action to combat climate change and move to a low emission, resilient society. This alliance serves cities and local governments by mobilizing and supporting ambitious, measurable, and planned climate and energy action in their communities. It emphasizes the importance of both climate change mitigation and adaptation, as well as increased access to clean and affordable energy.
globalcovenantofmayors.org

Building Adaptive & Resilient Communities (BARC) Network – A network of Canadian communities, hosted by ICLEI Canada, which shares experience in responding to the impacts of climate change and strategies to protect the people, property, and prosperity of your community.
icleicanada.org/programs/adaptation

VISION AND GUIDING PRINCIPLES

Vision Statement

Metro Vancouver demonstrates bold leadership in responding to climate change

Ensuring our infrastructure, ecosystems, and communities are resilient to the impacts of climate change.

~~Pursuing a regional target of 80% reduction in greenhouse gas emissions from 2007 levels by 2050.~~ Pursuing a carbon neutral region by 2050.

This vision statement will guide Metro Vancouver's response to climate change in each of its roles: delivering core services, planning for the future, and acting as a regional forum. It establishes Metro Vancouver's intention to develop specific goals, strategies, and actions for its own assets and operations, as well as recognizing the need to support its member jurisdictions, residents, and businesses to take their own climate action.



Guiding Principles

To guide the *Climate 2050* strategy, the following principles have been identified to reflect Metro Vancouver's mandate and role and the specific climate challenges of our region. These principles are based on the United Nations-Habitat principles for local-level climate action, which were established to encourage consistent and comparable approaches to developing effective climate action planning by local and regional governments around the world.¹

The *Climate 2050* strategy is:

- **Ambitious** – Demonstrate global and local leadership by ambitiously tackling our local climate challenges.
- **Dynamic** – Evolve our approach to respond to new information, support innovation, and take advantage of opportunities.
- **Evidence-based** – Inform decision-making with the most current scientific information, traditional knowledge, and local understanding to assess vulnerability and emissions.
- **Relevant** – Design actions to respond to Metro Vancouver's unique challenges and opportunities and deliver local benefits.
- **Comprehensive** – Undertake climate actions across Metro Vancouver's functions and support actions across sectors and communities.
- **Integrated** – Ensure actions are integrated with other municipal and regional policy priorities and are coordinated with Provincial and Federal initiatives.
- **Fair** – Seek solutions that equitably address the risks of climate change, fairly share the costs and benefits of action, and support a livable and affordable region, including responsibility to future generations.
- **Actionable** – Propose actions that can realistically be implemented given Metro Vancouver's mandate, finances and capacities; if necessary evaluate changes to mandate.
- **Inclusive & Collaborative** – Involve Metro Vancouver's members, strategic partners and communities in the planning and implementation of the *Climate 2050* strategy.
- **Transparent & Verifiable** – Follow an open decision-making process, and set goals that can be measured, reported, verified, and evaluated.

¹ The United Nations-Habitat principles were generated through a robust, global, multi-stakeholder process including climate action NGOs, academics, engineering and planning associations, and public agencies, and have been endorsed by multiple global organizations including ICLEI-Local Governments for Sustainability, UCLG (United Cities and Local Governments), and FCM (Federation of Canadian Municipalities), among many others. See: <http://e-lib.iclei.org/wp-content/uploads/2016/02/Guiding-Principles-for-City-Climate-Action-Planning.pdf>

CONCEPTUAL FRAMEWORK

Components of *Climate 2050* Strategy

The purpose of the *Climate 2050* strategy is to guide climate change policy and action for Metro Vancouver for the next 30 years. The *Climate 2050* strategy is made up of three main components: *Climate 2050 Strategic Framework*, *Climate 2050 Roadmaps*, and *Online Reporting and Communication Tool*.

Climate 2050 Strategic Framework: The *Strategic Framework* sets the 30-year vision for Metro Vancouver's climate policies and actions, lays out guiding principles, and describes a dynamic and adaptive approach. The *Framework* includes summaries for each of the key Issue Areas that will become the *Climate 2050 Roadmaps* (see below).

Climate 2050 Roadmaps: The *Roadmaps* will describe the trajectory toward a resilient, low carbon region for each Issue Area. They will outline regional and corporate

goals, strategies, actions, and performance metrics. The *Roadmap* development process is designed to engage other organizations and stakeholders, and set priorities that may require strategic partnerships. The *Roadmaps* will evolve dynamically in response to new technologies and innovation, policies of other orders of government, measurement of performance, or other emerging factors.

Climate 2050 Reporting and Communication Tool: The *Climate 2050* strategy will be supported by an online reporting and communication tool. This hub will feature examples of current actions from both Metro Vancouver and its members, showcase best practices, engage the public and stakeholders, contain background and reference materials, and report on targets and measures.



The *Roadmaps* will guide the implementation of **climate action projects** under specific Issue Areas. Projects will be identified and approved through regular annual departmental work plans, budgets, and 5-year financial plans rather than a separate *Climate 2050* planning process. Staff will report to the Metro Vancouver standing committees and Boards to seek guidance and approval for any major climate projects.

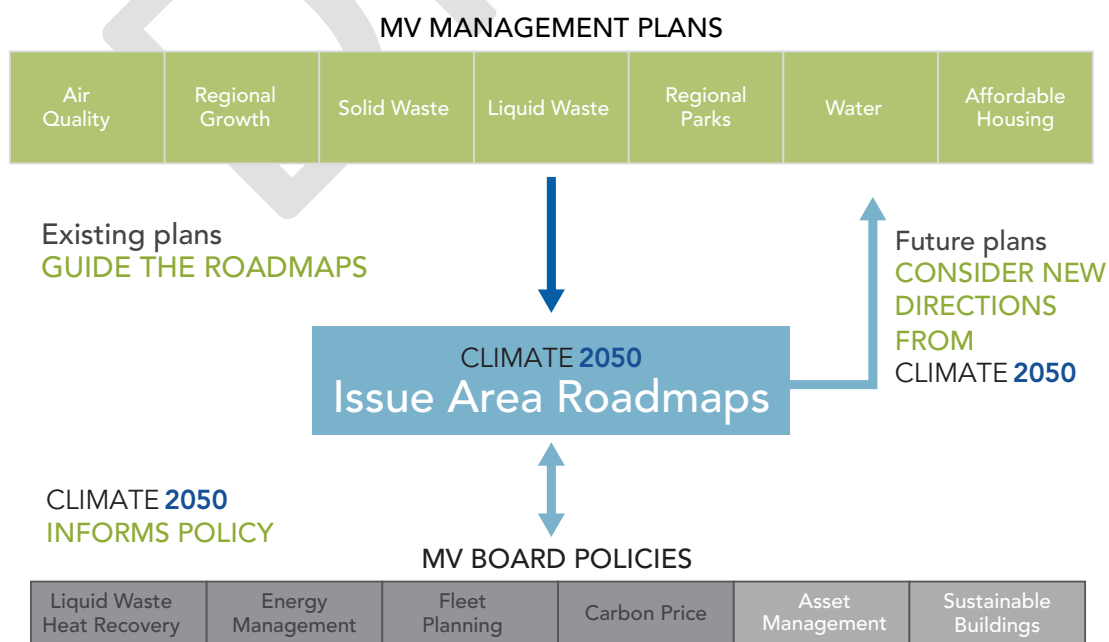
Throughout the document, several **cross cutting themes** are identified in the coloured call out boxes. Cross cutting themes are important topics that will be addressed by actions across Issue Areas.

ISSUE AREAS

Climate 2050 is organized around ten Issue Areas, intended to provide logical groupings of climate goals, strategies, 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. Each Issue Area may consider climate adaptation and greenhouse gas reductions and it is intended that climate strategies and actions may meet goals in more than one Issue Area. Issue Area descriptions can be found in Appendix 1.

Relationships to Other Plans and Policies

Climate 2050 will be closely linked to Metro Vancouver's other plans and policies. The *Climate 2050 Roadmaps* will build on climate actions that have already been adopted in the existing Metro Vancouver management plans while also proposing new directions that can be considered in future management plans. The *Roadmaps* may suggest revisions or the development of new Board and Corporate policies that guide organizational decision-making regarding climate issues.



ROLES AND RESPONSIBILITIES

Metro Vancouver's role in climate change

Metro Vancouver has three broad roles in the region: **deliver core services, plan for the future, and act as a regional forum.** Through each of these roles, Metro Vancouver has responsibilities related to climate change.

Changes in weather patterns and rising sea level will require investments to prepare and adapt core regional services and infrastructure, including drinking water supply, liquid waste management, air quality management, and regional parks. Through its core services, Metro Vancouver also has opportunities to generate and use renewable energy from its facilities.

Metro Vancouver is considering climate change when it plans for the future of our region. Included in this planning role is the management and regulation of air contaminants, including greenhouse gas emissions. With its members, Metro Vancouver helps to plan for compact, complete communities that are foundational to enabling low carbon solutions. Metro Vancouver is also evaluating how climate change will affect future development and growth in the region.

Metro Vancouver has approval authority over key funding sources in the Federal Gas Tax and the Sustainability Innovation Funds, which can enable greenhouse gas and climate adaptation projects in corporate operations and the region.

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. Metro Vancouver will continue to engage its members and other partners to develop the *Climate 2050 Roadmaps* and implement joint climate action projects.

AUTHORITY AND MANDATE

Metro Vancouver's authority and mandate to address climate change flows from several areas of Provincial legislation and policy. The *Green Communities Act* (Bill 27) requires regional growth strategies to include targets for reducing greenhouse gas emissions and proposed policies and actions for achieving those targets. 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. Also under the *Environmental Management Act*, Waste Management Plans are regulatory instruments that can address strategic and operational requirements that are specific to a local government's solid waste and liquid waste services such as responding to climate impacts and reducing greenhouse gas emissions.

In 2007, Metro Vancouver signed the BC Climate Action Charter, making the voluntary commitment to take actions to pursue carbon neutrality in its corporate operations and reduce community-wide emissions by creating more complete, compact and energy efficient rural and urban communities.

Roles and Responsibilities of Others

The **Federal Government** has jurisdiction over policies to set standards and regulate the design and manufacture of many products that directly or indirectly contribute greenhouse gas emissions (e.g., vehicles, appliances, buildings, industrial and commercial equipment). It is responsible for regulating emissions for Federal undertakings, including ports, airports and rail corridors, and shipping lanes.

In 2016, the Federal Government adopted the *Pan-Canadian Framework on Clean Growth and Climate Change* as the national climate change plan. The *Framework* set a national carbon price to help drive down greenhouse gas emissions, and established several funding mechanisms, including the Clean Energy Fund, the Green Infrastructure Fund, the Clean Growth Program, and the Low Carbon Economy Fund.

First Nations in the Metro Vancouver region provide services to their communities that will be impacted by climate change. Some First Nations in the region have adopted sustainability and/or land use plans that include a response to climate change such as protection and restoration of marine, coastal, and terrestrial ecosystems.

The **Provincial Government** has a significant influence on greenhouse gas emissions through policy and regulation in the areas of energy, transportation, buildings, forestry and industry. Funding for large infrastructure projects such as roads, bridges, transit, and dikes are critical for preparing for climate impacts, and project design can reduce emissions.

Since 2008, the Province has enacted climate change legislation including a carbon tax. It has established a *Climate Solutions and Clean Growth Advisory Council* to provide strategic advice to government on climate action and clean economic growth. In July 2018 the Province released intentions papers on: Clean Transportation; Clean, Efficient Buildings; and A Clean Growth Program for Industry as the first step towards developing a new long-term clean growth strategy for BC.

Member Jurisdictions are responsible for land-use policy and for investments in transportation, sewer, water, and other infrastructure. They are also responsible for enforcing the BC Building Code and can adopt the BC Energy Step Code to encourage lower carbon buildings. Members also have a key role in preparing for the impacts of climate



change, including investments in stormwater infrastructure and dikes, and responding to emergencies such as flooding in their communities.

Many members have adopted climate action plans and they are taking many actions to ensure their communities are adapting to climate change and reducing greenhouse gas emissions. They are using their land-use planning authority to encourage the growth of compact communities and investments in walking and cycling infrastructure consistent with the provisions of *Metro 2040*. All of the municipalities in Metro Vancouver have shown leadership by signing the BC Climate Action Charter for local governments.

TransLink is responsible for long-term investments in regional transit as well as road and bridge infrastructure that enable low carbon transportation options. It is also responsible for regional transportation demand management programs that encourage residents to choose low carbon forms of transportation. Through its management of, and investment in, the transit fleet TransLink can also reduce greenhouse gas emissions from transit vehicles. In 2018, TransLink started the development of a new long range (30 year) Regional Transportation Strategy.

Energy utilities in the region (e.g. BC Hydro and Fortis BC) are responsible for energy supply and distribution. They are responsible for programs and infrastructure investments that will increase the supply of low carbon energy to the region. They administer energy conservation incentives to encourage residents and businesses to reduce their energy demand and indirectly reduce greenhouse gas emissions. Energy utilities ensure that the energy infrastructure both inside and outside the region is resilient to the impacts of climate change.



REGIONAL CLIMATE IMPACTS AND GREENHOUSE GASES

Climate Change Projections for Our Region

Climate change impacts are already evident in our region, and will become more marked in the near future. Even if global greenhouse gas emissions were cut drastically tomorrow, our region – and the rest of the globe – will inherit the impacts of the previous 150 years of human generated greenhouse gas emissions, and the climate will continue to change.

Metro Vancouver's Climate Projections Report² provides details of the projected impacts of climate change in this region. There is confidence in the projections through to the 2050s. However, projections to 2080 and beyond are more uncertain, because the impacts in the latter part of this century are highly dependent on how successful the global community is at reducing greenhouse gas emissions in the next couple of decades. This underscores the importance of taking action now.

Climate change is projected to drive changes to weather patterns. The “new normal” for the region may be very unlike the past. Climate projections for the 2050 timeframe are described below.

- **More extreme precipitation events:** more rain will fall during the wettest days of the year and the frequency of extreme rainfall events will increase.
 - **Decreased snowpack:** the deep spring snowpack in the mountainous watersheds is expected to decrease by over 50% compared to present day.
 - **Sea level rise:** in addition to these weather-related changes predicted in our region, warming global temperature is projected to bring at least 1 metre of sea level rise by 2100, which will impact coastal communities in our region.
- **Warmer temperatures:** with increasing daytime and nighttime temperatures, there will be more hot summer days and fewer winter days with frost or ice.
 - **Longer summer dry spells:** summer rainfall will decline by nearly 20%, with increased likelihood of extended drought periods.
 - **Wetter fall and winters:** although on average the total annual rainfall is expected to increase by just 5%, there will be a large increase in rainfall during fall and winter.



Last glacier in Metro Vancouver Watersheds

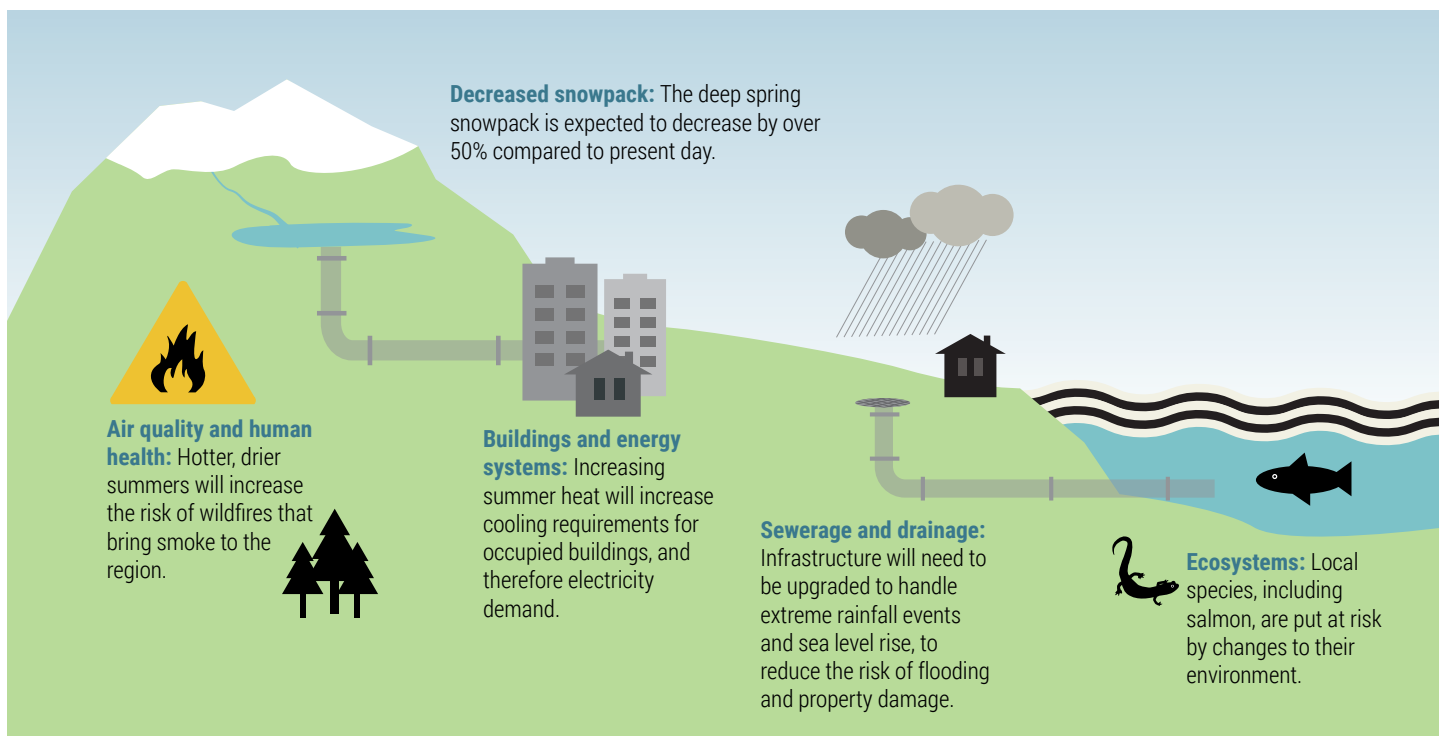
² Climate Projections for Metro Vancouver, 2016. Available at: metrovancover.org (search: climate projections 2016)

Anticipated Impacts on Regional Systems and Services

Across our region, changing weather patterns and sea level rise are expected to impact many regional services and lead to new concerns. Adaptation responses, including significant investment by the public and private sectors, will be required to upgrade our infrastructure, protect our ecosystems, and prepare for the impacts of climate change.

The following list highlights critical areas of concern.

- **Drinking water supply and demand:** Reduced snowpack and hotter, drier summers could strain the existing water supply during times of the year when temperatures are high and water is in greatest demand. The risk of landslides affecting water quality in supply reservoirs may increase due to more frequent extreme precipitation events and higher risk of wildfires in the watersheds.
- **Sewerage and drainage:** Wastewater treatment facilities will be impacted by higher influent volumes and sea level rise, both of which increase the energy required for pumping. Increasing rainfall intensity means drainage systems will be more likely to experience flooding. Sewers near the Fraser River and the ocean will be impacted by sea level rise. Infrastructure will need to be upgraded to maintain current expectations of drainage and flood protection.
- **Ecosystems and agriculture:** As the climate shifts, it will disrupt the complex natural systems that have evolved over time. The plants, trees, and animals within the ecosystems that have historically thrived in our region will be impacted or could be displaced entirely. Sea level rise may flood some coastal parks and natural areas. Shifts in weather patterns will also impact agricultural crops and the region's food security.
- **Air quality and human health:** Increases in the number, extent and duration of wildfires in BC will impact air quality in Metro Vancouver. Higher temperatures also have the potential to increase the formation of air contaminants like ground-level ozone. Increased frequency of extreme heat events can cause heat stress in vulnerable populations, especially in a region that has historically moderate temperatures.
- **Buildings and energy systems:** Increasing summer heat will increase cooling requirements for occupied buildings, leading to higher electricity demand. This in turn will impact the provincial energy infrastructure, which is designed for peak winter demand. Energy efficiency and passive cooling will become increasingly important in buildings, and the business case to build and retrofit to high efficiency standards will improve.
- **Transportation, recreation and tourism:** Warmer winters and less frost may improve road safety and present more opportunities to walk or cycle year round. However, warmer temperatures will mean less snow in the local mountains, which is a concern for the winter sport recreation and tourism industries.
- **Communities and infrastructure – flood risk:** sea level rise, storm surge, more extreme rainfall and changes in river hydrology all combine to increase the risk of flooding in Metro Vancouver communities. Most dikes were built in the 1970s and 1980s, and they were not designed to withstand the level of floods now projected. A major flood in this region could have direct and indirect losses estimated at \$20-30 billion, four to five times the losses from the Alberta floods of 2013. Flooding presents a risk to people, homes, businesses and infrastructure.



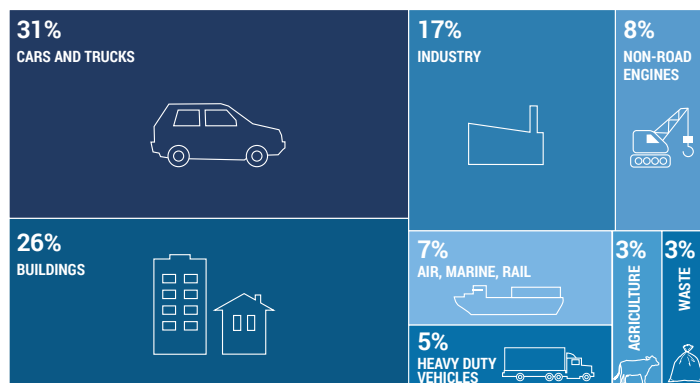
MEASURING RESILIENCE TO CLIMATE CHANGE

Local governments are developing methods and approaches to measure progress towards more climate-resilient infrastructure, and a more resilient region. Vulnerability assessments provide baseline data on ecosystems, infrastructure, and communities, but other indicators are needed to understand our region's resilience to climate changes. Metro Vancouver has already assessed the vulnerability of some of its infrastructure and services to specific risks such as flooding and drought events. Additional vulnerability assessments could help in prioritizing actions that aim to protect ecosystems, infrastructure, and communities from other climate risks such as extreme heat and wildfires. Through the *Climate 2050 Roadmap* process, Metro Vancouver will work with partners to develop appropriate indicators and measures of regional climate resilience.

Regional Sources of Greenhouse Gas Emissions

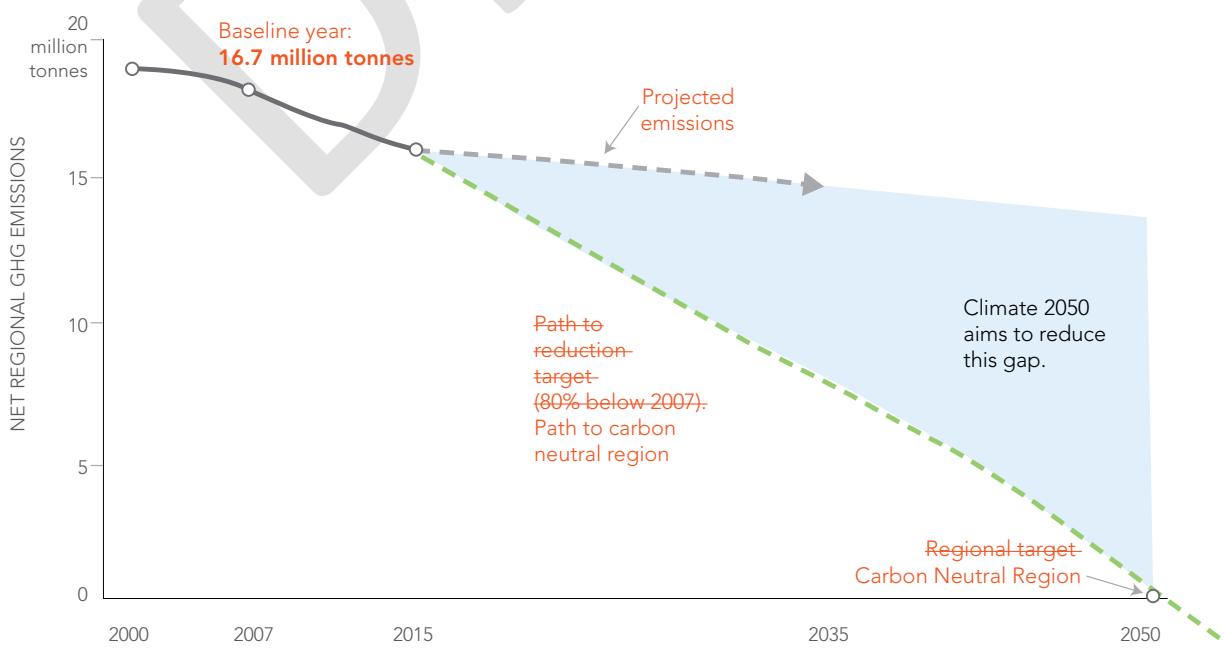
Metro Vancouver has influence on the activities of residents and businesses that produce greenhouse gas emissions, particularly through its planning and policy functions, and through its role as a regional forum for its member jurisdictions. Less than 1% of regional emissions is directly associated with the corporate activities of Metro Vancouver and its member jurisdictions.

Metro Vancouver compiles periodic emissions inventories to quantify greenhouse gas emissions from the various sources across the region. Between 2007 (the baseline year for Metro Vancouver's greenhouse gas reduction target) and 2015, regional greenhouse gas emissions dropped by almost 12%. The reduction in emissions is due to a number of factors including improvements in buildings and vehicle energy efficiency, switches to lower carbon energy sources such as electricity and renewable fuels, and shifts in types and volumes of industrial activity in the region.



Above is a summary of how different sources contributed to the regional "carbon footprint" (approximately 14.7 million tonnes of greenhouse gases in 2015). Transportation and buildings continue to contribute the greatest share of greenhouse gas emissions in Metro Vancouver's emission inventory.

Regional Greenhouse Gas (GHG) Emissions Trend: How Are We Doing?



Creating a Carbon Neutral Region

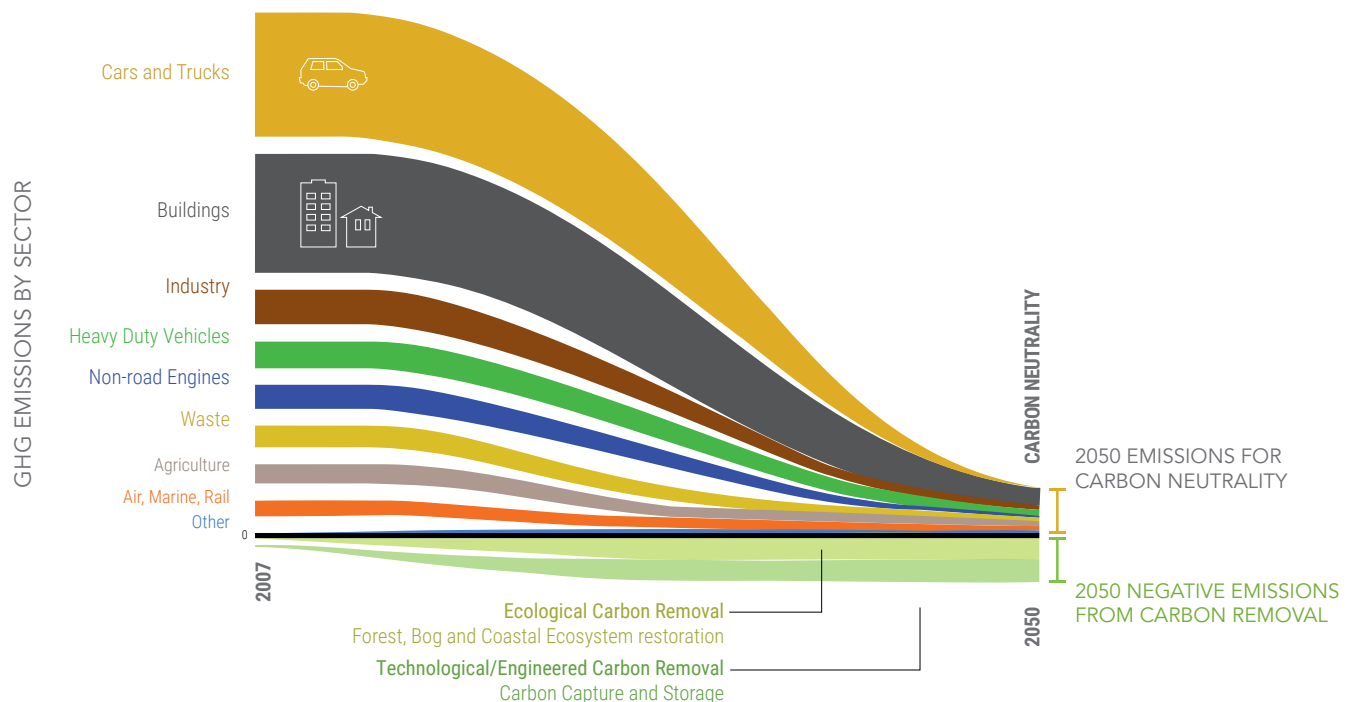
Reaching the 80% reduction target by 2050 (from 2007 levels) will require unprecedented greenhouse gas emission reductions across most sectors, with some sectors becoming essentially “zero emissions”. The graphic below illustrates one possible scenario, demonstrating how the region could reach the greenhouse gas reduction target by 2050.

Creating 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. The graphic below illustrates how a carbon neutral region can be achieved by a combination of deep emissions reductions in all sectors and some carbon removal.

To define the path toward a carbon neutral region, and continue to build on existing actions and accelerate new ones, an interim target of a 45% reduction from 2010 levels, by 2030, is established.

As part of the development of the *Climate 2050* Roadmaps, further analysis will be completed for each of the emissions sources to understand the pathways to deep emissions reductions including costs and benefits. Collaboration with other orders of government, partner organizations and key stakeholders will be critical to identify effective actions to reduce emissions in each sector.

HOW CAN WE ACHIEVE AN 80% GREENHOUSE GAS (GHG) REDUCTION BY 2050? HOW CAN WE CREATE A CARBON NEUTRAL REGION BY 2050?



TOWARDS 2050: NEXT STEPS

Dynamic Approach: a living, breathing strategy

Recognizing the magnitude of the climate challenge, the urgency for action, and the evolving science and data, policy responses need to be adaptive. A dynamic approach is needed for the *Climate 2050* strategy.

Climate 2050 Roadmaps will be developed for each issue area. Together they describe how Metro Vancouver – in collaboration with others – will achieve a low carbon, resilient region. They are intended to be flexible and will be revised if significant opportunities arise that can accelerate progress towards the goals. Their five year planning horizon synchronizes with Metro Vancouver's annual budget and work plan cycles and five year financial plans.

Roadmap Structure

Each *Roadmap* will provide a summary analysis of the current conditions and potential challenges for each Issue Area. The *Roadmaps* will include regional and corporate goals for each Issue Area that help visualize the changes necessary for a particular issue area to achieve a low carbon, resilient region. The goals will align or be incorporated into the goals of management plans for each of Metro Vancouver's functions.

The *Roadmaps* will describe the strategies and actions necessary to achieve the goals for each Issue Area. The *Roadmaps* are intended to align with the relevant management plans and will reflect existing priorities. Through gap analyses and engagement with the public and stakeholders, new directions will likely be identified as part of the *Roadmap* process. As a result, the final list of strategies and actions in the *Roadmaps* will be a combination of strategies and actions already in existing plans and new directions that can be implemented directly,

or adopted as part of the new management plans and other policies.

Finally, performance metrics will track progress towards the overall *Climate 2050* vision, breaking the tasks in each *Roadmap* into measurable and manageable sections. These performance metrics will be designed to provide a picture of progress by issue area and more broadly towards the *Climate 2050* vision.

Roadmap Development Process

Metro Vancouver will work with its members and other stakeholders to develop *Climate 2050 Roadmaps* for each of the Issue Areas described below. The first *Roadmaps* will be developed over 2019 and 2020. The *Roadmap* development process coincides with the planned review of several existing management plans.

Roadmap development process will consist of three types of activities, as described below:

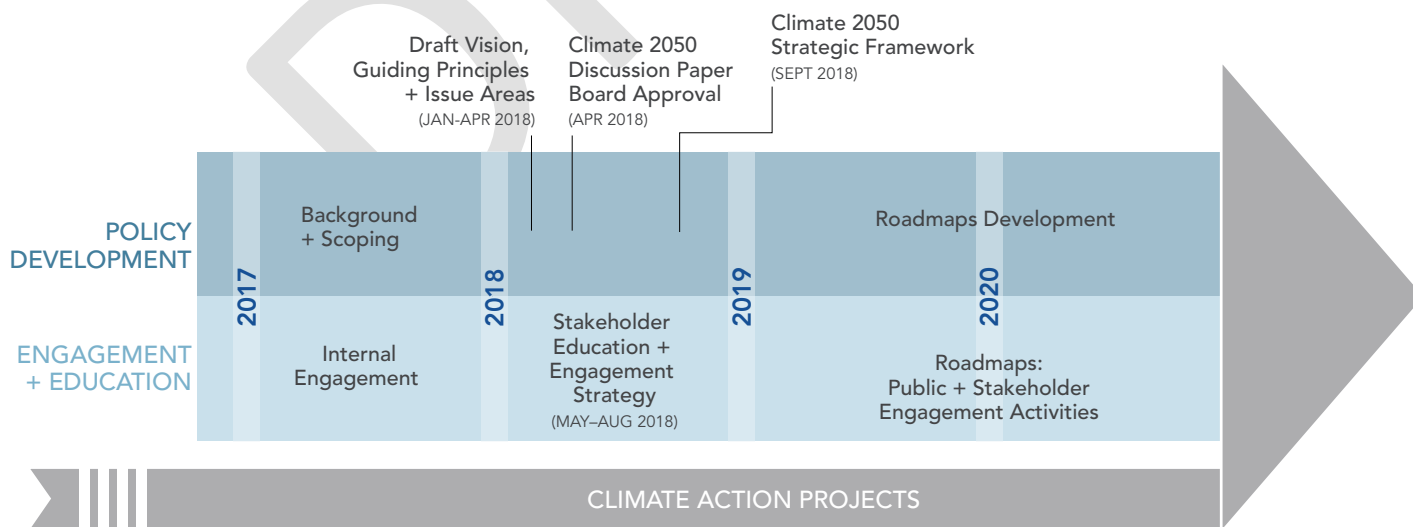
- **Research and analysis** that will include gathering existing information and conducting analyses to support the development of evidence to understand the impacts of proposed actions.
- **Goal and performance** metric setting that will be informed by goals and strategies adopted in existing management plans, but adapted to specifically describe the desired outcomes for each Issue Area and how they will contribute to the overall *Climate 2050* vision. They will include quantifiable measures to track progress toward the goals.

- **Action Planning** that will include a process to develop actions drawn from Metro Vancouver’s existing management plans and through an engagement process, identify new directions that can be implemented directly or adopted as part of future management plans. Actions will be evaluated to ensure alignment with *Climate 2050 Guiding Principles*.

Over the next two years, Metro Vancouver will engage the public and stakeholders to support the above activities at key stages of the *Roadmap* development process, in alignment with Metro Vancouver’s Public Engagement Policy and Guide. The intention is to draw on the interest and expertise of the region’s residents and businesses.

Once completed, the *Climate 2050* strategy will provide a comprehensive view of the path towards a low carbon, resilient region, Metro Vancouver’s contribution, and how Metro Vancouver is tracking our progress over time. Metro Vancouver aims to demonstrate bold leadership in responding to climate change, while working closely with its member jurisdictions, the public, stakeholders and partners. We will ensure that our infrastructure, ecosystems, and communities are resilient to the impacts of climate change, while pursuing a regional target of 80% reduction in greenhouse gas emissions from 2007 levels by 2050.

CLIMATE 2050 STRATEGY TIMELINE



APPENDIX 1

Issue Areas

THE TEN ISSUE AREAS ARE:





Nature and Ecosystems

Metro Vancouver is a region with a rich and diverse natural environment that provides important ecosystem services including clean air and water, pollination, flood control, and cooling of urban areas. Furthermore, many aspects of the region's ecosystems hold cultural significance to First Nations, and healthy ecosystems provide the basis for local food security and prosperity for us all. Soil, forests, wetlands and other ecosystems also contribute to the regulation of the global climate by removing and storing carbon dioxide from the atmosphere.

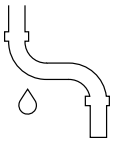
However, the health of our region's ecosystems is deteriorating and vulnerable to further degradation, especially with a changing climate. Many species and ecosystems in the region are at risk of being impacted or displaced entirely due to climate change because they cannot adapt fast enough. This is a complex issue and our understanding is incomplete, but protecting and enhancing natural areas and their connectivity will be essential in helping species and ecosystems adapt to climate change.

Natural areas and greenspaces will play a key role in assisting the region's communities to adapt to climate change. Soils and vegetation capture rainwater, protect the foreshore, and moderate the impacts of extreme weather events, reducing the need for built infrastructure. Trees provide shading in urban areas, which reduces the energy needed to cool buildings and gives relief to residents during extreme heat events. Maintaining tree canopy and managing urban forests so they are resilient to the impacts of climate change will mean they are able to continue to provide these adaptation benefits. Incorporating green infrastructure such as rain gardens, bioswales and green roofs into development projects will increase resilience and help to mitigate environmental impacts, particularly in more urban areas.

MARINE AND INTERTIDAL ECOSYSTEMS

Our rich marine and coastal areas provide important habitat for fish and wildlife including endangered killer whales, salmon, and hundreds of species of resident and migratory shorebirds. The ocean has spiritual, cultural and ceremonial value for local First Nations, and it provides traditional foods. Salt marshes and seagrasses can store carbon and mitigate flooding in coastal communities. However, these complex intertidal and marine ecosystems are particularly vulnerable to climate change. With rising seas and storm surge, intertidal wetlands will be lost as they are unable to move higher due to sea walls and other man-made structures. In marine environments, warmer temperatures, increased run-off from more extreme rainfall events, and changes in ocean chemistry will alter ecological processes. Federal, provincial, and local governments, First Nations, researchers and conservation groups will need to work together to improve understanding and better protect marine and coastal environments from a changing climate.





Infrastructure

Local government infrastructure is foundational to the region's economy and its residents' quality of life. The reservoirs, pipes, pumps, treatment plants, roads, power lines, dikes, and other built infrastructure provide essential services such as drinking water, sewage treatment, stormwater drainage, solid waste disposal, transportation, and energy to residents and businesses. The region's water, wastewater and drainage infrastructure is vulnerable to anticipated climate change impacts such as more frequent extreme precipitation events that will increase localized flooding and may overwhelm sewer systems, and heat and drought that will challenge the drinking water system.

Incorporating climate change into local government infrastructure planning, design and operation can help maintain these essential services in the face of climate impacts. By considering climate change, local governments can invest in actions that improve infrastructure and contribute to the overall resilience of the region. By jointly considering climate risks and other physical risks such as seismic events, local governments are able to find cost efficiencies and more effective approaches to infrastructure upgrades, and sustain long-term levels of service.

The construction, maintenance and operation of infrastructure all contribute to greenhouse gas emissions in the region. Innovation in infrastructure design, upgrades, and operations can significantly reduce associated greenhouse gas emissions.

WATER

Climate change will affect the quantity and quality of water in the region, which has implications for many of the Issue Areas. It will increase the likelihood that there is too much or too little water (see section on Climate Impacts). Water-related actions will be central to our climate change response and be included under a number of Issue Areas. Managing water demand, protecting and restoring streams, lakes, bogs, and coastal estuaries, and protecting communities against sea level rise and flooding will be important components of creating a region resilient to the impacts of climate change.





Human Health and Well-Being

Climate change will affect the health of people living and working in this region. Direct health impacts will come from air and water deterioration, wildfires, flooding, extreme heat, as well as from increased pathogens and disease incidence associated with climate change. Some of the most significant climate change impacts may be indirect, such as compromised food security, chronic stress, displacement due to flood or fire risk, loss of livelihood, and adverse mental health effects. The health burden of climate change will not be felt equally. For example, the very young, the elderly, or people with underlying health issues can be more vulnerable to heat or smoke exposure, and lower income and homeless people will likely have fewer options to protect themselves from extreme weather events and fewer resources to recover from their impacts. Lower income neighbourhoods tend to have fewer green spaces or air conditioned community spaces which provide relief in extreme heat events.

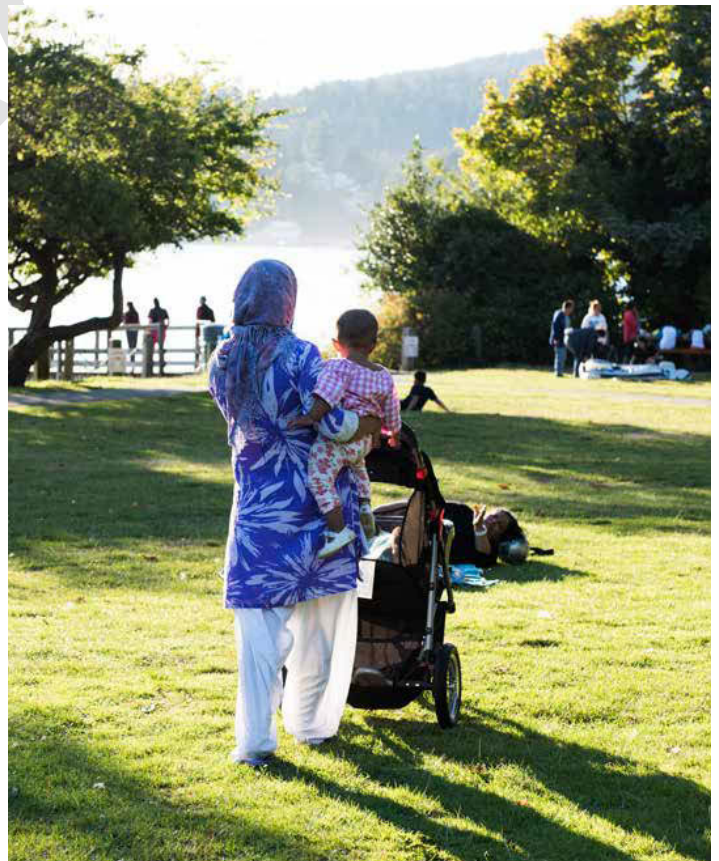
All orders of government will need to enact policies and implement projects to reduce the long term exposure to these health risks, as well as to increase capacity to respond to more frequent emergency situations (see inset box). Working closely with the local health authorities and the Provincial government, local governments can take actions that will reduce health risks due to climate change. Examples include: improving our system of air quality advisories and education about wildfires, planning for building cooling systems, supporting access to local food for low income residents, greening neighbourhoods that house vulnerable people, and ensuring neighbourhoods are prepared for flooding events.

There are health co-benefits from some of the climate actions that reduce greenhouse gas emissions. For example, walkable communities with increased green spaces promote physical activity and social connections. Reducing vehicle emissions improves air quality and noise pollution. More energy efficient, well ventilated buildings can improve indoor air quality and create more comfortable homes.

EMERGENCY MANAGEMENT

Climate change will increase the need for local governments, residents, and businesses to be better prepared for and respond to emergencies like wildfires, flooding, storms and droughts. Local governments can help mitigate risks to health and safety and build resilience through increased emergency management planning and response services.

In some cases, better planning may alleviate some of the damage, and in others, a coordinated response will improve outcomes and recovery. Communities resilient to climate change-related emergencies will be more resilient to other emergencies.





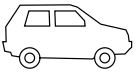
Buildings

Buildings generate greenhouse gas emissions from burning fossil fuels, (primarily natural gas), for space and water heating. The region's greenhouse gas emissions from buildings are second only to transportation, accounting for approximately one quarter of all regional greenhouse gas emissions.

Improving energy efficiency and switching to low carbon energy systems (e.g., district energy, electric heat pumps, solar, renewable natural gas) can reduce greenhouse gases from buildings. Trees can be used to reduce the energy required to heat and cool buildings. Local governments can influence building energy efficiency and the use of low carbon energy systems by adopting the BC Energy Step Code. They can also deliver programs that encourage building and home owners to improve energy efficiency and switch to low carbon energy sources. Buildings are long-lived assets (50 years or more) so energy efficiency requirements and programs to reduce emissions from buildings will have a long-term impact on greenhouse gas emissions.

Climate change will increase the incidence of extreme heat events, average summer temperatures and the need to cool buildings. Governments, utilities, and building owners need to consider how this will impact building design and energy use, and in response, modify policy and planning for energy demand, and building management. Increased risk of flooding due to climate change needs to be considered in the design and siting of new buildings and the retrofit of existing buildings. Also see the Land-Use and Growth Management Issue Area for further discussion of land-use planning for climate impacts.





Transportation

Transportation emissions come from the movement of goods, materials and people, whether by land, air, or sea. In this region, transportation is the single largest source of greenhouse gas emissions, accounting for approximately 45% of the regional total.

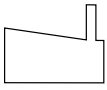
The dominant emission contributors in the transportation sector are cars and light trucks. Today, there are 1.4 million cars and trucks operating across the Metro Vancouver region, which emitted more than 4.7 million tonnes of greenhouse gases in 2015. In addition, heavy duty vehicles, trains, ships, and airplanes accounted for about 1.8 million tonnes of greenhouse gas emissions.

Today, about 70% of personal trips in the region are made by vehicles, compared to 13% by walking and cycling, and 14% by transit. Significant effort is needed to shift trips to non-vehicular modes and transit, both of which have

lower emissions. This transition will require infrastructure investments and changes to land-use policy, so that walking, biking and transit becomes the most convenient way of getting around for most personal trips. It will also mean transitioning almost all remaining personal vehicle trips to low carbon emission vehicles. Reducing emissions from the heavy duty vehicles, air, marine and rail sectors will require transition to low carbon fuels such as renewable diesel, renewable natural gas, and electricity.

Some transportation infrastructure will be impacted by climate impacts such as sea level rise and more frequent flooding. Special attention will need to be given to adapting this infrastructure to ensure that people, goods and services can continue to get around without disruption.





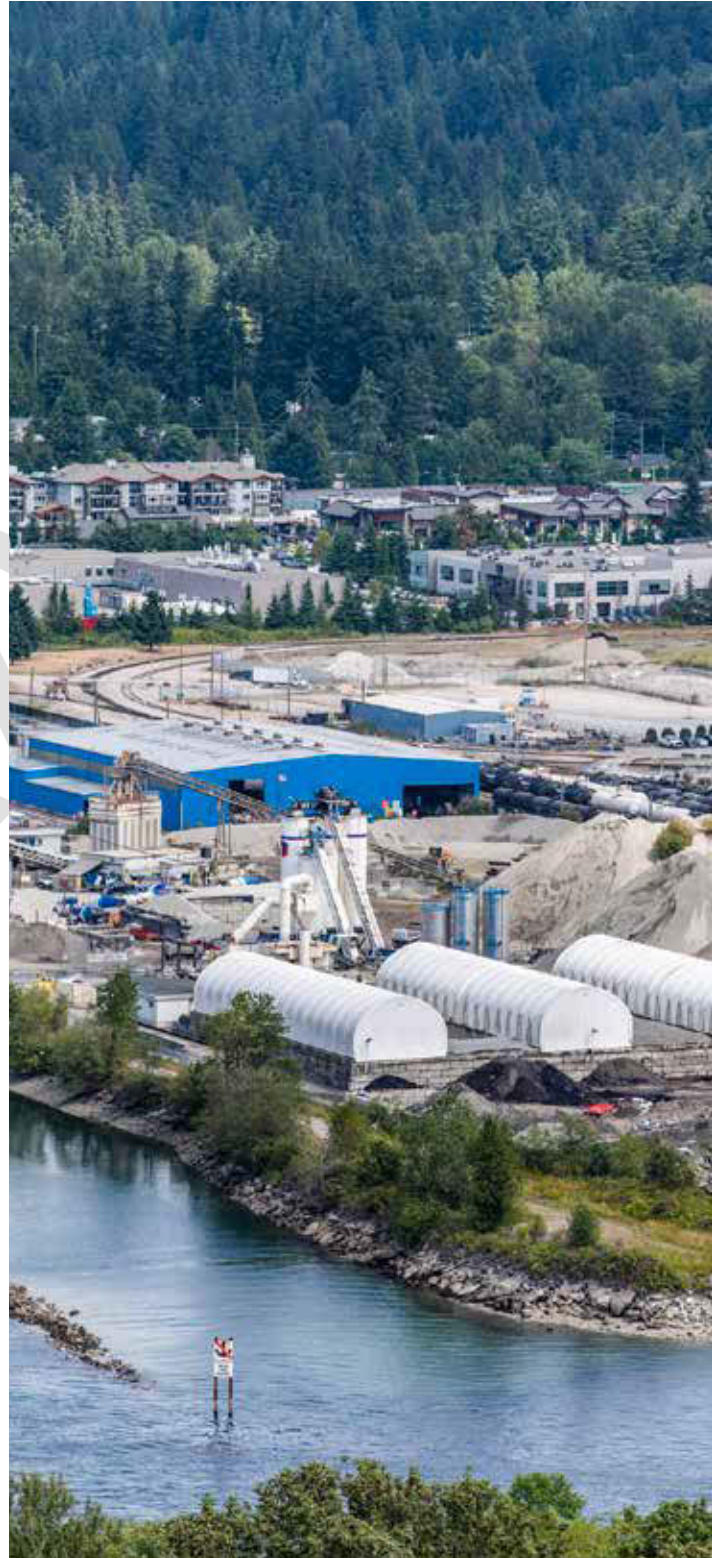
Industry

The region's relatively small but diverse manufacturing sector (e.g., cement production, food processing, metal fabrication, chemical manufacturing, forest products, and petroleum refining), in addition to the construction industry, combine to contribute approximately 23% of the region's total greenhouse gas emissions.

In the Metro Vancouver region, industrial facilities generate greenhouse gas emissions from burning natural gas, propane and fuel oil to produce heat for industrial processes, using diesel fuel in non-road engines, and other smaller sources. Industrial chemical processes such as cement production also produce a significant amount of greenhouse gas emissions. Reducing emissions from the various industrial sectors will require targeted approaches that are appropriate to those sectors, such as encouraging or requiring a switch to low carbon fuels like renewable natural gas.

RESEARCH AND INNOVATION

Many proven technologies exist in the market today to dramatically reduce greenhouse gas emissions and help build more resilient ecosystems, infrastructure, and communities. However, climate change still poses difficult technical and economic challenges to achieving an 80% reduction in greenhouse gas emissions and protecting against climate change impacts like sea level rise and extreme weather events. These problems will require the development of new technologies and approaches. Actions to support research and innovation will be an important part of the *Climate 2050 Roadmaps*.





Energy

Residents and businesses use energy to heat buildings and water, fuel vehicles, and power industrial processes. Using fossil fuel energy such as gasoline, diesel, propane, and natural gas results in greenhouse gas emissions. In this region, there are many opportunities to generate renewable and low carbon energy, and switch away from fossil fuels.

Switching from fossil fuel-based energy sources to low carbon electricity and fuels is essential to decarbonize our region's energy system. Investing in local low carbon energy systems such as renewable natural gas, waste heat recovery, solar, and heat pumps can support business development, job creation and energy self-sufficiency while reducing greenhouse emissions. Eliminating sources of energy waste (e.g., heated/cooled air leakage from buildings) and improving energy efficiency (e.g., through equipment upgrades and process improvements) should be an integral part of reducing energy-related emissions. Grid electricity in British Columbia is primarily generated by hydroelectric dams.

Recovering energy from waste streams produces a renewable and clean energy that can replace fossil fuel use or electricity. Metro Vancouver currently produces renewable natural gas at several of its wastewater treatment plants, which displaces the use of fossil fuels for operation of these facilities. There is potential to produce additional renewable natural gas or other biofuels at Metro Vancouver facilities. There are also opportunities to capture more waste heat from its utility processes, solid waste management facilities, and liquid waste collection system. Recovered heat can be used to generate electricity, or in district energy systems that provide energy to buildings for space heating and water heating. Through its policies and programs, Metro Vancouver can also support other projects in the region that generate renewable, low carbon energy.





Land-Use and Growth Management

The Metro Vancouver region is growing rapidly. Our population is increasing by 30,000 residents each year and it is anticipated that the regional population could reach 3.6 million people by the year 2050. The location of new homes, businesses and institutions strongly influences both greenhouse gas emissions and exposure to risks associated with climate change.

Land use decisions determine where residents live, work and play. Metro Vancouver and its member jurisdictions are working to reduce greenhouse gases by focusing growth in a network of transit-oriented urban centres, and building compact, complete communities that offer amenities close to home. This focused growth reduces emissions by supporting low carbon transportation such as walking, cycling and public transit. Actions in this Issue Area will be complementary to those contained in the *Transportation* Issue Area.

Where and how the region accommodates growth also determines how much residents, businesses and infrastructure are exposed to physical risks associated with climate change, such as flood risk from rising seas and rivers. Land use planning is an important tool for directing growth away from higher risk areas and natural areas that can alleviate negative impacts, thereby increasing community resilience to flooding. For buildings and other infrastructure that remain in flood-prone areas, protection such as dikes may need to be built or upgraded to mitigate increasing climate risk (see *Infrastructure* Issue Area), and additional resources may need to be allocated to emergency response planning (see *Emergency Management* inset box, pg 27).

LAND-BASED CARBON INVENTORY

As the region urbanizes, areas that were once forests, bogs, or agricultural land are changing to residential, commercial, or industrial uses. Often when these changes occur, greenhouse gases are released into the atmosphere through soil disturbance and decomposition or burning of wood and other plant material. In this process, local carbon sinks (e.g., trees, soil, bogs, and estuaries) are disturbed or lost entirely. Our current emissions inventory approach does not capture the potentially significant changes in emissions associated with land development in the region.

A land-based carbon inventory would provide a better understanding of the impact that land-use changes are having on the region's ability to sequester carbon and inform *Climate 2050* actions to protect local carbon sinks.





Agriculture

The combination of mild climate, fertile soils and demand for locally produced food has enabled a thriving agricultural industry that contributes to the region's food security. Uncertainty around the supply of food is emerging in many parts of the world due to a changing climate and limited fresh water resources. Protecting agricultural land and enhancing local food production are a priority for resilience in the region.

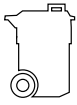
Climate models predict there will be both positive and negative consequences for agriculture. Rising average temperatures shifts the types of crops that can be grown and decreases heating costs for greenhouses. At the same time, rising temperature will introduce and exacerbate pest and disease problems, and increase irrigation demand. Changes in seasonal precipitation patterns could limit water supply during the growing season, putting increased stress on crops and livestock.

Heat waves can damage crops and increase the need for cooling of livestock barns and expanded use of refrigerated crop storage, which leads to higher costs and energy use. Rising sea levels can limit access to irrigation water from the Fraser River, and storm surges may require dike upgrades and other coastal flood protection measures to prevent agricultural land from flooding during the growing season.

Agricultural activities are also a source of greenhouse gas emissions. Around 3% of the regional greenhouse gas emissions come from agriculture, primarily methane from livestock and manure, nitrous oxide from the application of fertilizer and soil management, and carbon dioxide from burning fossil fuels to heat greenhouses and operate farm equipment. The good news is that agricultural soils can play a substantial role in carbon sequestration, which has the added benefit of maintaining soil productivity over the long term.

Securing local food production means that some of the food consumed by residents is available year round and during emergency situations. Equally important is the role agricultural land plays in providing ecosystem services. Nutrient and organic matter recycling on farmland supports regional efforts to recycle organic waste. Agricultural land also provides important habitat for migratory birds and other wildlife. Both agricultural land and natural areas can help communities manage river water levels and extreme precipitation events through groundwater infiltration and flood management.





Waste

Fossil fuels are used to manufacture, transport, and ultimately dispose of all the goods we consume, and when waste is disposed in a landfill it produces methane, a potent greenhouse gas. The actions we take in this region have a significant influence on the lifecycle greenhouse gas emissions related to the goods consumed in the region.

Much of our waste can be reduced, reused, or recycled, so we need to ensure that waste is always considered a potential resource. Transitioning to a circular economy helps to further reduce waste (and associated emissions), because the circular economy concept aims to retain the value of products, materials, and resources in the economy through non-linear business models, maximized product lifespans, and closed production and consumption loops. For example, preventing methane emissions through source reduction, composting, or capturing methane at digestion facilities and landfills are effective greenhouse gas reduction strategies. The captured gas can be upgraded to renewable natural gas, and used to replace fossil-based natural gas (see also Energy Issue Area). Policies incentivizing or requiring the reuse, recycling, and recovery of energy from waste materials can generate new business and create new economic opportunities.

CONSUMPTION-BASED EMISSIONS INVENTORY

Metro Vancouver has been preparing sector-based emissions inventories (as described above) since 1985. But sector-based inventories only account for emissions that are released directly in the region, mostly related to fossil fuel use for transportation and building heat. They don't account for the lifecycle greenhouse gas emissions associated with the goods and services consumed in the region, because they are not emitted directly in the region. A consumption-based inventory attributes the greenhouse gas emissions associated with the full lifecycle of goods and services including emissions from the production, transport, wholesale and retail, use, and disposal.

Since greenhouse gases have the same impact on the global climate regardless of where they are emitted into the atmosphere, Metro Vancouver will explore conducting a consumption based inventory to measure the full emissions impact of choices made in the region. Evaluated together, these different inventory approaches can provide a more complete picture of the region's greenhouse gas emissions and offer insights into the most effective actions to reduce global emissions.



APPENDIX 2

GLOBAL CLIMATE CHANGE DATA AND TRENDS

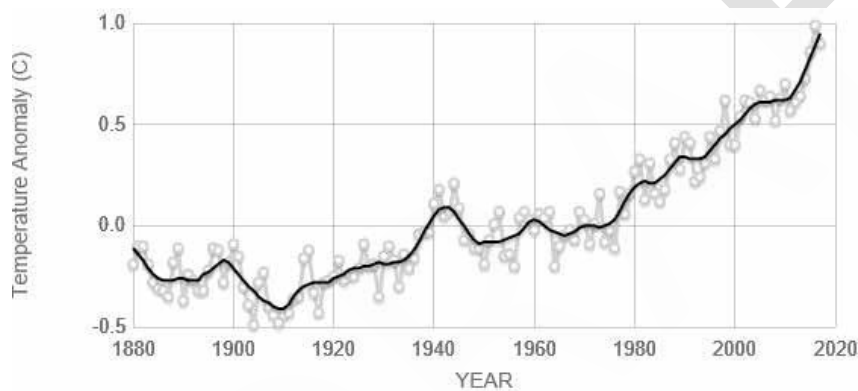
Increasing levels of greenhouse gas emissions are warming our planet and driving climate change. How do scientists know this? This appendix provides a snapshot of some of the key data points and observed trends related to global climate change. References and links are provided to sources of information that provide more in-depth data, trends, and scientific analysis.



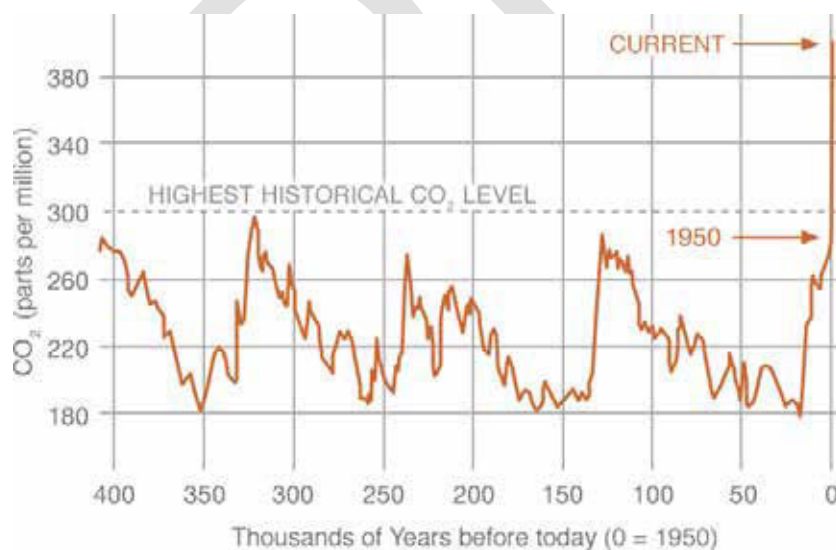
Watershed Protection staff helicopter eight times a year to the remote wilderness behind the North Shore Mountains to measure the snowpack. They go to five different sites, taking samples to determine the quantity of stored water for our reservoirs.

Global Average Temperature

The planet's average surface temperature has risen about 1.1°C since 1880, based on measurements made on land and at sea. Human-induced warming reached approximately 1°C above pre-industrial levels in 2017, increasing at 0.2°C per decade according to Global Warming of 1.5°C, a special report by the Intergovernmental Panel on Climate Change (IPCC)¹. Both past and future warming in Canada is, on average, about double the magnitude of global warming. Northern Canada has warmed and will continue to warm at more than double the global rate.² Most of that warming has occurred in the past 35 years, with polar regions experiencing greater warming than the more temperate regions.³ Sixteen of the seventeen warmest years on record have occurred since 2001. Scientific research has shown this change is driven primarily by increased carbon dioxide and other human-made greenhouse gas emissions into the atmosphere. Although the global atmospheric concentrations of carbon dioxide have varied over the millennia, since the industrial revolution in the mid-1700s it has increased to unprecedented levels.⁴



Global surface temperature change (land and ocean, compared to 1951-1980 average)¹



Global atmospheric concentrations of carbon dioxide over the past 400,000 years³

¹ IPCC, 2018: Summary for Policymakers. In: Global Warming of 1.5°C.

² Government of Canada, Canada's Changing Climate Report, 2019

³ IPCC, 2013: Summary for Policymakers. In: Climate Change 2013: The Physical Science Basis

⁴ NASA Global Climate Change – Evidence

Changing Global Climate System

Scientists have projected that increasing global temperatures would cause a number of significant changes to the global climate system. Some of these changes, such as declining global snow and ice cover and rising sea levels, are happening gradually as temperatures rise. Other changes are a consequence of amplified climate instability,

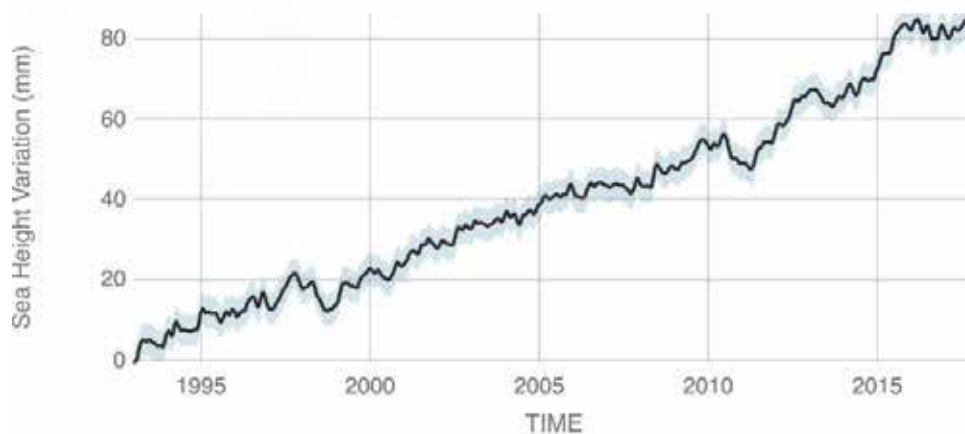
for example the increasing frequency and intensity of extreme weather events such as heat waves, heavy precipitation, and storms. Below is a description of three of the expected changes to earth systems caused by rising global temperatures: sea level rise, decreased snow and ice cover, and extreme weather events.

SEA-LEVEL RISE

As the climate warms, sea levels are rising worldwide.⁵ Higher global temperatures contribute to sea-level rise in two ways. First, as ocean temperatures increase, seawater expands and the overall volume of oceans increases. Second, higher temperatures accelerate the melting of glaciers and ice caps, also increasing the volume of the oceans.

Globally, sea levels have risen at an average rate of 1.8 mm per year from 1961 to 2003 and approximately 20 cm since 1880. Sea levels are expected to rise by an additional 30 to 120 cm by the year 2100.

Coastal regions face several risks from rising seas. Higher sea levels will flood unprotected low lying areas such as islands and coastal river deltas. Wave action combined with higher sea levels will make more land vulnerable to coastal erosion. Moreover, in the next several decades, storm surges and high tides combined with sea level rise will further increase flooding risk. In some coastal areas, groundwater and/or surface water will be contaminated with sea water as sea levels rise. This could impact the water available for irrigation and drinking water.



Sea Level Rise from 1993 to Present⁴

⁵ NASA Global Climate Change – Vital Signs

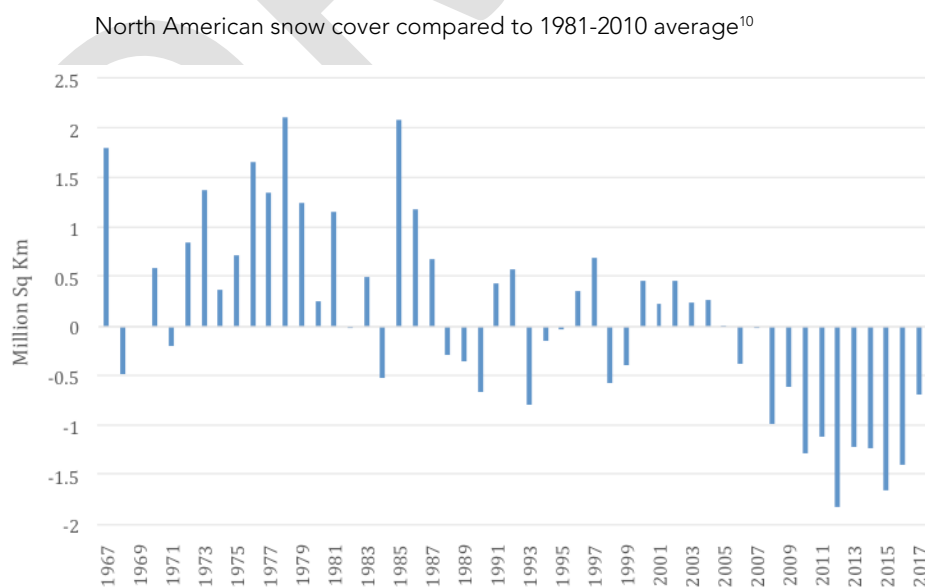
Decreased Snowpack / Snow Cover

Snow and ice cover helps regulate the climate by reflecting incoming solar energy back into space. Over the next century, water contained in glaciers, ice caps and annual snowpack are expected to continue to decline. With less snow cover and a decrease in the amount of reflected sunlight, the ground absorbs four to six times as much heat.

Monitored snowpack levels in western North America are decreasing, with record lows observed throughout the United States. Since 1955, average snowpack has declined on average by 14 percent including areas in California, Oregon, and Washington, with some sites recently experiencing snow-free periods for the first time ever. Glaciers have been retreating at least since the 1960s and mountain snow cover has declined on average in both the Northern and Southern hemispheres. Monitored snowpack levels in western North America are decreasing⁶. Data from 1981–2015 shows the proportion of days within each month

that snow was present on the ground is decreased by 5% to 10% across most of Canada during most seasons⁷. Glaciers have been retreating at least since the 1960s and mountain snow cover has declined on average in both the Northern and Southern hemispheres⁸. Over the past three decades, the proportion of Canadian land and marine areas covered by snow and ice have decreased, and permafrost temperatures have risen⁹.

The decline of glaciers and annual snowpack will reduce freshwater availability in regions supplied by meltwater, where more than one sixth of the world population currently lives. Rapidly melting snowpack can also lead to springtime flooding and lower river and reservoir levels in the late summer. Changes in melting patterns and reduced stream flow will also affect hydro-electric power generation that is reliant on the water that is supplied through melting snowpack.



⁶ Rutgers University Global Snow Lab – North American Snow Cover Anomalies

⁷ Government of Canada, Canada's Changing Climate Report, Chapter 5, 2019

⁸ National Snow & Ice Data Center – State of the Cryosphere

⁹ Government of Canada, Canada's Changing Climate Report, Chapter 5, 2019

¹⁰ Rutgers University Global Snow Lab – North American Snow Cover Anomalies

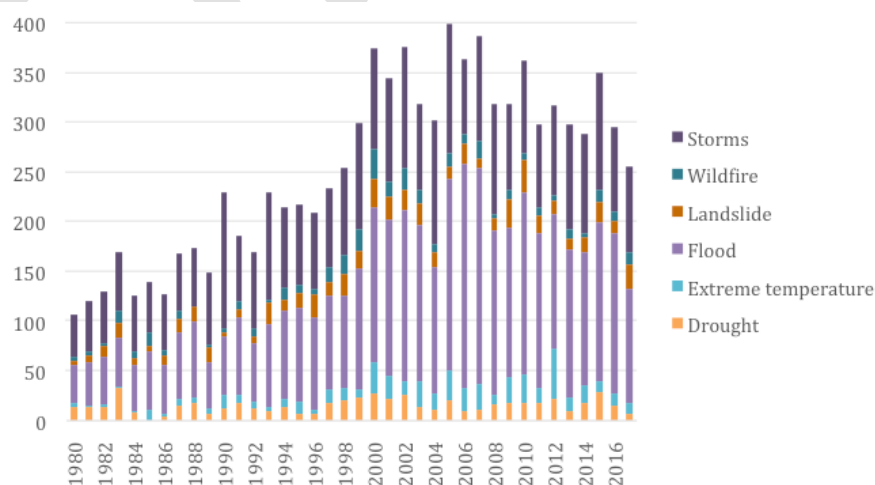
Extreme Weather Events

Climate change is increasing the frequency and intensity of extreme weather events. Climate-change-related risks from extreme weather events are already considered moderate to high with 1°C of warming, and those risks are expected to increase as temperatures continue to rise. International agencies that are tracking extreme events are already observing an increase.¹¹ Scientists are increasingly able to evaluate the contribution of climate change to specific extreme events.

Although there has been a slight increase in the frequency or duration of droughts over the last 50 years, scientists expect climate change to increase the intensity and duration of droughts to increase after 2050, especially if global GHG emissions do not decline. Less snow and a lack of moisture in the ground increases the likelihood and prevalence of wildfires and dry spells. Longer dry spells and drought in the summer months also increase wildfire risk.

Scientists are studying how the frequency and severity for floods will change due to climate change. Globally, the amount of damage caused by extreme weather events, including flooding, is increasing dramatically – both from the number of events and the increasing value of the built environment. In BC, flood risk is exacerbated by sea level rise, particularly during events such as king tides and storm surges.

Climate-related weather extremes and shifting temperature patterns can put stress on ecosystems, disrupt food production and water supply, damage infrastructure and urban settlements, lead to loss of life, and have consequences for population health. These interrelated challenges pose a particular threat to cities with aging infrastructure such as water and sewage systems, roads, bridges, and energy grids. Governments, including municipalities, are spending more on climate change adaptation to protect essential services, with costs rising from \$4 billion globally in 2010 to \$25 billion in 2014.¹²



Reported Extreme Weather-related natural disaster events 1980-2017 ⁷

¹¹ EMDAT (2017): OFDA/CRED International Disaster Database

¹² US Global Change Research Program – National Climate Assessment

DRAFT



metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

To: Climate Action Committee

From: Amy Thai, Environmental Technician II
Ali Ergudenler, Lead Senior Engineer
Planning and Environment Department

Date: June 14, 2019 Meeting Date: July 12, 2019

Subject: **Metro Vancouver's Climate Actions and Carbon Neutral Progress in 2018**

RECOMMENDATION

That the Climate Action Committee receive for information the report dated June 14, 2019, titled "Metro Vancouver's Climate Actions and Carbon Neutral Progress in 2018".

PURPOSE

To inform the Climate Action Committee of Metro Vancouver's Climate Actions 2018 report submitted to the Province on May 31, 2019, under the Climate Action Revenue Incentive Program (CARIP), and how the CARIP report links to the *Climate 2050* strategy.

BACKGROUND

As a signatory to the BC Climate Action Charter and participant in the Climate Action Revenue Incentive Program, Metro Vancouver prepares an annual climate action report to the Province. The "Metro Vancouver Climate Actions 2018: Climate Action Revenue Incentive Program Public Report" (Attachment) describes Metro Vancouver's actions to adapt to the changing climate as well as to reduce greenhouse gas (GHG) emissions, and also quantifies Metro Vancouver's net GHG footprint.

This report responds to an action in the 2019 Climate Action Committee work plan to provide an update on Metro Vancouver's climate actions and carbon neutral progress for 2018.

CLIMATE ACTION REVENUE INCENTIVE PROGRAM

In 2007, by signing the BC Climate Action Charter, Metro Vancouver committed to measure and report GHG emissions, aim for carbon neutrality in its own operations, and create compact, energy efficient communities. The Climate Action Revenue Incentive Program (CARIP) arose from the BC Climate Action Charter; requiring signatories to annually report their energy-related corporate GHG emissions, implement and report on actions to reduce those emissions, and demonstrate progress towards carbon neutrality in their corporate operations. Local governments that fulfill these requirements are eligible to receive a refund of their carbon taxes paid on direct fuel purchases.

Links to Metro Vancouver's *Climate 2050 Strategy* and *Clean Air Plan*

Metro Vancouver and its member jurisdictions have been enacting climate policy and taking climate action for over 20 years. The *Climate 2050 Strategy* will guide climate policy and action for the next 30 years. *Climate 2050* includes direction for Metro Vancouver to continue its leadership in reducing corporate GHG emissions and adapting corporate assets and services to the impacts of climate change, and to share best practices with its member jurisdictions. Metro Vancouver's new *Clean Air*

Plan will contain goals, strategies, and actions for the next five to ten years that will address existing and new opportunities for reduction of air contaminant emissions, including greenhouse gases.

As a signatory to the Climate Action Charter, Metro Vancouver will continue to prepare an annual CARIP report to the Province. While the CARIP report provides a summary of climate actions, it is prepared according to a format established by the Province. Metro Vancouver plans to develop its own *Climate 2050 Annual Report* which will serve as a key reporting mechanism to track progress towards the *Climate 2050* vision and goals, in a format which is accessible to a broad audience and promotes awareness and engagement in *Climate 2050*.

METRO VANCOUVER'S CLIMATE ACTION LEADERSHIP

Metro Vancouver has initiated projects to show climate leadership by addressing emissions from its own operations, preparing corporate assets and operations for the impacts of climate change, and developing policies that will enable future action. The 2018 CARIP report lists over 90 actions completed in 2018, and a similar number of projects underway or planned in 2019.

Examples of corporate projects are listed below. A number of these projects have been supported by the Sustainability Innovation Fund (SIF), and several have been reported to the Climate Action Committee this year, as indicated in brackets below:

- a study of the impacts of climate change on precipitation and stormwater management (April 2019);
- the development of a regional carbon storage dataset, which will be used to support actions in the Ecological Health Framework and the *Climate 2050 Nature and Ecosystems Roadmap* (June 2019);
- development of a corporate Low Emission Vehicle Standard to guide fleet procurement decisions, as part of the Fleet Planning and Acquisition Policy;
- development of a Sustainable Infrastructure and Buildings Design Guide to support the delivery of high-performance, sustainable infrastructure and building projects, supported by SIF (February 2019);
- approval of a demonstration project on hydrothermal processing to convert wastewater biomass to a biocrude oil, supported by SIF (May 2019); and
- design of a new Iona Island Wastewater Treatment Plant that will integrate climate change considerations.

REDUCING COMMUNITY GREENHOUSE GAS EMISSIONS

About half of Metro Vancouver's climate actions described in the report support residents and businesses in reducing their own emissions. A number of innovative projects have been made possible by the Metro Vancouver SIF program.

Examples of community projects include:

- the Strata Energy Advisor Pilot Program, which provides professional energy advisor services to strata councils and property managers undertaking major building renewal and building maintenance projects (supported by SIF, and is the subject of report 5.5 in this agenda);
- effluent heat recovery at the North Shore Wastewater Treatment Plant to use waste heat to displace natural gas use in Lonsdale Energy Corporation's district energy system; and

- Emotive: the electric vehicle experience outreach campaign, and several related programs that support and enhance electric vehicle charging networks.

Implementation of *Climate 2050* includes the development of *Roadmaps* for ten issue areas, which will include GHG reduction and climate change adaptation goals, strategies, and actions.

METRO VANCOUVER'S CORPORATE CARBON FOOTPRINT

Metro Vancouver reports its emissions in accordance with reporting guidance provided by the joint Provincial-UBCM Green Communities Committee's Workbooks and Guidebook. The reportable emissions are limited to a defined set of "traditional services", which includes the GHGs associated with energy use in local government buildings, fleet, facilities, and any contracted services that are new/renewed after June 2012. GHG emissions associated with the final disposal of solid waste (i.e., landfills and waste-to-energy) are outside of the scope designated by the Provincial government.

Metro Vancouver's energy-related GHG emissions inventory (before application of carbon credits) was 14,857 tonnes CO₂ equivalent (CO₂e) in 2018. This total is made up of the core emissions from energy purchased (natural gas, fleet fuels, and electricity) plus emissions from contracted services (mostly hauling of solid waste and biosolids). Metro Vancouver's core emissions, from fuel directly purchased and used in its facilities and vehicles, increased by 7% compared with the previous year due to increased fuel and electricity use, as well as improved reporting of fuel consumption. Reported emissions from contracted services increased from 5,426 tonnes CO₂e in 2017 to 8,228 tonnes CO₂e in 2018. This increase is mainly due to Metro Vancouver's contractors improving their tracking and reporting of fuel consumption data, though there was also an increase in hauling activity.

For Metro Vancouver, emissions from contracted services are primarily related to the hauling of municipal solid waste, and biosolids and other residuals from Metro Vancouver facilities to final disposal sites, such as landfills and beneficial use sites. Metro Vancouver's waste management approach is to reduce the generation of waste and pursue opportunities for resource recovery and the beneficial reuse of waste. Efforts to reduce waste and maximize recycling reduce both direct and embodied GHG emissions. Metro Vancouver will continue to pursue approaches and technologies to reduce GHG emissions and promote opportunities for the replacement of fossil fuels.

GHG REDUCTIONS CREDITS AND CARBON NEUTRAL PROGRESS

Metro Vancouver can balance its corporate GHG emissions with projects that reduce community emissions (including GHGs related to solid waste management). In the past, Metro Vancouver, along with member jurisdictions, has been able to use GHG reduction credits (the non-market equivalent of "carbon offsets") to achieve carbon neutrality. For 2018, GHG reduction credits were from one landfill gas capture optimization project and two "avoided forest conversion" projects:

- improvements to the methane capture and destruction system at the closed Coquitlam Landfill resulted in 298 tonnes CO₂e of GHG reduction credits in 2018; and
- the protection of two unimproved, forested properties adjacent to Kanaka Creek Regional Park in Maple Ridge resulted in a total of 336 tonnes CO₂e of GHG reduction credits in 2018.

Metro Vancouver balanced approximately 4% of its GHG emissions with these GHG reduction credits, resulting in a net carbon footprint of 14,223 tonnes CO₂e. Metro Vancouver is actively pursuing new

projects to generate additional GHG reduction credits to balance its carbon footprint in future years. Corporate actions will also be included in the *Climate 2050 Roadmaps*.

In recognition of its climate actions, Metro Vancouver has been identified as achieving the CARIP recognition level "Accelerating Progress on Charter Commitments" for 2018. In addition to projects that balance Metro Vancouver's own corporate footprint, Metro Vancouver staff have also been working with member jurisdictions to calculate and report GHG reduction credits associated with their organics diversion programs (48,000 tonnes of GHG reduction credits in 2018).

ALTERNATIVES

This is an information report. No alternatives are presented.

FINANCIAL IMPLICATIONS

Metro Vancouver and its member jurisdictions are eligible for a rebate of all carbon taxes paid directly, provided they have signed the BC Climate Action Charter and fulfill their reporting obligations each year. The annual carbon tax rebate received by Metro Vancouver is included as a revenue in climate change program budgets and is used to directly support Metro Vancouver's corporate and regional climate action projects and programs. The 2018 carbon tax rebate for Metro Vancouver was approximately \$217,000. The provincial carbon tax rate will be increasing by \$5 per tonne until it reaches \$50 per tonne in 2021, which could increase the total carbon tax paid directly by Metro Vancouver. However, increases in future carbon taxes paid (and refunded), is expected to be partly counterbalanced by a reduction in fuel consumption from energy efficiency projects, and use of lower carbon fuels. Resources to carry out climate action work will be proposed for inclusion in the 2020 budgets and five year financial plans for the Committee's consideration in the fall.

SUMMARY / CONCLUSION

The Metro Vancouver Climate Actions 2018 report fulfills Metro Vancouver's commitment to publicly report its annual corporate greenhouse gas emissions and its corporate and regional climate actions for 2018, as part of the Climate Action Revenue Incentive Program (CARIP). It includes a comprehensive list of actions we have been taking to reduce GHG emissions and adapt to the changing climate in our region, and shows Metro Vancouver's carbon neutral progress.

For 2018, Metro Vancouver balanced approximately 4% of its energy-related GHG emissions with two GHG reduction projects, and reported a net carbon footprint of 14,223 tonnes CO₂e. The pursuit of carbon neutrality by Metro Vancouver and member jurisdictions is expected to continue, as local governments aim to show their leadership in the context of *Climate 2050* regional targets. In addition to climate action within its corporate operations, Metro Vancouver and its member jurisdictions are undertaking a wide range of actions to support residents and businesses in their communities to reduce emissions and prepare for climate impacts.

Attachment (30097707)

"Metro Vancouver Climate Actions 2018: Climate Action Revenue Incentive Program (CARIP) Public Report", dated May 31, 2019.



Metro Vancouver Climate Actions 2018

Climate Action Revenue Incentive Program (CARIP)

Public Report

May 31, 2019



General Information

Regional District:	Metro Vancouver (Metro Vancouver Regional District)
Population:	2,648,493 (2018)
Regional Growth Strategy:	“Metro Vancouver 2040 – Shaping our Future” (adopted July 2011)

Report Preparation and Contact Information

As a signatory to the BC Climate Action Charter and in accordance with the requirements of the Climate Action Revenue Incentive Program (CARIP), the *Metro Vancouver Climate Actions 2018* report meets Metro Vancouver’s commitment to publicly report its annual corporate greenhouse gas emissions and its corporate and regional climate actions for 2018. This public report is available to stakeholders and residents to help them understand the full range of climate actions Metro Vancouver is undertaking.

Recognizing the magnitude of the climate challenge, the urgency for action, and the evolving science and data, Metro Vancouver has developed *Climate 2050*, Metro Vancouver’s regional climate action strategy. *Climate 2050* applies a “climate lens” to Metro Vancouver’s policies and initiatives both corporately and throughout the region. In September 2018, the Metro Vancouver Board adopted the *Climate 2050 Strategic Framework*, the first component of *Climate 2050*. The *Climate 2050 Strategic Framework* sets out the vision and guiding principles for the strategy, and identifies ten issue areas that will each require its own implementation approach.

Over 2019-2020, Metro Vancouver is developing a series of *Climate 2050 Roadmaps* which will describe the goals, strategies, and actions within each issue area that are necessary to transition the region to a low carbon, resilient future while increasing the health, well-being, and prosperity of Metro Vancouver residents. In parallel to the implementation of *Climate 2050*, Metro Vancouver continues to undertake a range of climate actions directed by its existing management plans, which are reported here in the *Metro Vancouver Climate Actions 2018* report. In future years, a *Climate 2050 Annual Report* will serve as a key reporting mechanism to track progress towards the *Climate 2050* vision and goals.

This report was prepared by the staff of the Air Quality and Climate Change Division of Metro Vancouver, with input from across the organization. Questions on the report should be directed to AQInfo@metrovancover.org or the Metro Vancouver Information Centre at 604-432-6200.

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BROAD PLANNING

Broad Planning refers to high level planning that sets the stage for greenhouse gas (GHG) emissions reductions, including plans such as Official Community Plans, Integrated Community Sustainability Plans, Climate Action Plans or Community Energy Emissions Plans. Land use planning that focuses on Smart Growth principles (compact, complete, connected, and centred) plays an especially important role in energy and GHG reduction.

Regional Growth Strategy

Metro Vancouver 2040: Shaping our Future (Metro 2040), the regional growth strategy, was adopted by the Metro Vancouver Board on July 29, 2011, after being unanimously accepted by all local governments in the region. *Metro 2040* contains targets, policies, and actions to reduce GHG emissions, as per the requirements under the *Local Government (Green Communities) Statutes Amendment Act*. Strategy 3.3 is to “Encourage land use and transportation infrastructure that reduces energy consumption and GHG emissions, and improves air quality”. Metro Vancouver’s role is both to implement the strategies and actions in *Metro 2040*, as well as to support municipalities in their efforts to reduce GHG emissions by 33 percent below 2007 levels by 2020 and 80 percent below 2007 levels by 2050.

Examples of strategies and actions contained in *Metro 2040* to address climate change include: efficient goods movement; green infrastructure; protected and managed natural areas; mixed use, transit-oriented communities; low-impact development; work and play close to home; protected farmland; increasing share of trips by transit, cycling, and walking; green buildings; and focusing growth in urban centres and along transit corridors. *Metro 2040* is available here: www.metrovancouver.org/services/regional-planning/metro-vancouver-2040.

A “performance monitoring dashboard” tracks progress toward the five goals set out in *Metro 2040*, and is updated on an ongoing basis as data becomes available. The dashboard is available here: <http://www.metrovancouver.org/metro2040>.

Metro Vancouver is planning to update *Metro 2040* over the next few years (2019-2022). A key driver for the update is increasing the strength of strategies and actions related to climate change. The work will be closely coordinated with both TransLink’s new regional transportation strategy, *Transport 2050*, and with Metro Vancouver’s *Climate 2050* roadmaps for land use and transportation.

Metro Vancouver Board Strategic Plan

In 2015, Metro Vancouver’s Board adopted its 2015-2018 *Board Strategic Plan*. Under the Regional Federation section, the Board directed staff to “Incorporate strategies and actions into all Metro Vancouver functions to mitigate and adapt to climate change” and to “incorporate climate change messaging into public communications”. Under the Air Quality and Climate Action section the direction was more specific, stating that Metro Vancouver will “Develop, adopt and implement a regional climate action strategy for reducing regional GHG emissions and adapting to climate change”, and identified specific elements of this new strategy. The strategy is now known as *Climate 2050*, as described in the section below. The *Board Strategic Plan* also confirmed the importance of collaboration, education and engagement, decision-making based on triple bottom line analysis, fiscal responsibility, and the alignment of regional and member objectives. Metro Vancouver’s Board is in the process of finalizing their next *Board Strategic Plan* for 2019-2022. The 2015-2018 *Board Strategic Plan* is available at: <http://www.metrovancouver.org/about/strategic-directions/Pages/default.aspx>.

Climate 2050 Strategy

Recognizing the magnitude of the climate challenge, the urgency for action, and the evolving science and data, Metro Vancouver has developed *Climate 2050*, Metro Vancouver's regional climate action strategy. *Climate 2050* applies a "climate lens" to Metro Vancouver's policies and initiatives both corporately and throughout the region. In September 2018, the Metro Vancouver Board adopted the *Climate 2050 Strategic Framework*, the first component of *Climate 2050*. The *Climate 2050 Strategic Framework* sets out the vision and guiding principles for the strategy, and identifies ten issues areas that will each require its own implementation approach. In March 2019, the Metro Vancouver Board directed staff to align the *Climate 2050 Strategic Framework* with the Intergovernmental Panel on Climate Change's Special Report on *Global Warming of 1.5°C*. Over 2019-2020, Metro Vancouver is developing a series of *Climate 2050 Roadmaps* which will describe the goals, strategies, and actions within each issue area that are necessary to transition the region to a low carbon, resilient future while increasing the health, well-being, and prosperity of Metro Vancouver residents. Metro Vancouver's *Climate 2050 Strategy* is described here: <http://www.metrovancouver.org/climate2050>.

Integrated Air Quality and Greenhouse Gas Management Plan

Metro Vancouver adopted the *Integrated Air Quality and Greenhouse Gas Management Plan* in 2011 which set out more than 90 actions related to air quality and climate change. Specific to climate change, the Plan includes five strategies comprising 37 actions to reduce GHG emissions. These actions include: strategies to reduce short-lived climate forcers such as methane and black carbon; establishment of a regional climate action fund; support for small and medium enterprises to reduce their emissions; support for low carbon vehicle infrastructure; exploration of carbon sequestration opportunities; and raising public awareness of low carbon building and transportation options. Metro Vancouver's *Integrated Air Quality and Greenhouse Gas Management Plan* is available here: www.metrovancouver.org/services/air-quality/plans-reports/iaqggmp.

Clean Air Plan

Metro Vancouver has initiated development of its next regional air quality and greenhouse gas management plan, the *Clean Air Plan*, which will be the key air quality and GHG management planning document for Metro Vancouver. It will be aligned with *Climate 2050*, and will set Metro Vancouver's direction for air quality and GHG management for the next five to ten years. The *Clean Air Plan* will be informed by and build on the *Integrated Air Quality and Greenhouse Gas Management Plan* (described above), existing Metro Vancouver air quality and GHG management programs and policies, the new *Board Strategic Plan*, and initiatives by member jurisdictions and partner agencies (e.g., the provincial *CleanBC* plan and member jurisdictions' sustainability, environment, climate and energy plans). The development of the *Clean Air Plan* will align with the *Climate 2050 Strategic Framework* and the *Climate 2050 Roadmaps*. The *Clean Air Plan* development process will consider the emissions pathways and scenarios needed to meet air quality and GHG targets in the next five to ten years, as well as longer term GHG targets within the *Climate 2050 Roadmaps*. Metro Vancouver will be conducting stakeholder engagement on the *Clean Air Plan* in 2019 and 2020.

Broad Planning Survey Questions	Responses
What are your current GHG reduction targets?	Metro Vancouver's Regional Growth Strategy includes regional targets to reduce GHG emissions by 33 percent below 2007 levels by 2020 and 80 percent below 2007 levels by 2050.
Are you familiar with your local government's community energy and emissions inventory (e.g. CEEI or another inventory)?	Yes; Metro Vancouver conducts and verifies its own detailed region-wide emissions inventory every 5 years, but also uses the CEEI for specific purposes such as comparing to interim years, comparing to other regions and communities in BC, and cross-checking methods used in our own inventory.
What plans, policies or guidelines govern the implementation of climate mitigation in your community?	
Community Energy and Emissions Plan (CEEP)	N/A
Integrated Community Sustainability Plan (ICSP)	N/A
Community-Wide Climate Action Plan	Yes (see below)
Official Community Plan (OCP)	N/A
Regional Growth Strategy (RGS)	Yes
Others:	Yes; the <i>Integrated Air Quality and Greenhouse Gas Management Plan</i> , <i>Metro 2040</i> regional growth strategy, and other management plans have elements of the CEEP, Community-Wide Climate Action Plan, and ICSP.
Does your local government have a corporate GHG reduction plan?	Yes; Metro Vancouver's <i>Corporate Climate Action Plan</i> provides strategic direction to staff working on climate change issues. The plan's vision for Metro Vancouver is: "a carbon neutral corporation resilient to the impacts of climate change".

Broad Planning: Corporate Actions

Actions taken in 2018	Actions underway/planned for 2019
<p>Carbon Price Policy</p> <p>The Carbon Price Policy is being implemented in phases, and coordinated with the implementation of other complementary policies. The policy is being incorporated into life cycle cost assessments during Metro Vancouver's capital planning processes, and in particular, into financial business casing tools used for options analyses that concern energy decisions.</p>	<p>Carbon Price Policy</p> <p>Continue to implement the Carbon Price Policy and incorporate life-cycle cost assessments in business decisions.</p>
<p>Fleet Planning and Acquisition Policy</p> <p>As part of the policy implementation, staff developed a corporate Low Emission Vehicle Standard to guide fleet procurement decisions. Six dual head level 2 electric vehicle charging stations were installed in Metro Vancouver's Head Office fleet parking area; one dual head replacement station at regional parks sites at Pacific Spirit Park, Capilano, and Boundary Bay; and four single head level 2 and one Direct Current Fast Charging (DCFC) station in the publicly-accessible parking area at Head Office. Purchased six Mitsubishi Plug-In Hybrid vehicles. Worked with user groups to reduce vehicle sizes.</p>	<p>Fleet Planning and Acquisition Policy</p> <p>The Low Vehicle Emission Vehicle Standard will be updated annually. Planning is underway to install level 2 electric vehicle charging stations at each of Parks West, Parks East, Bone Yard, Coquitlam Water Treatment Plant, Lake City Operations Centre, Seymour/Capilano Filtration Plant, and Head Office. Planning to purchase 17 electric vehicles.</p>
<p>Regional Parks Land Acquisition</p> <p>The <i>Regional Parks Land Acquisition 2050</i> strategy was adopted by the Metro Vancouver Regional District (MVRD) Board in 2018. Climate change is identified as one of the top four challenges that shape the strategy. When considering the acquisition and protection of land, ecological resilience to climate change and the potential to protect stored carbon will both be examined, along with many other criteria.</p> <p>Metro Vancouver also purchased 11 hectares of land for regional parks. Land considered for acquisition was evaluated using the conservation and planning criteria, which includes opportunities to increase resilience to climate change and protect stored carbon.</p>	<p>Regional Parks Land Acquisition</p> <p>The <i>Regional Parks Land Acquisition 2050</i> strategy is being implemented through the purchase of target properties. The strategy will protect sensitive ecosystems, increase ecological resilience, and protect stored carbon.</p>

Actions taken in 2018**Actions underway/planned for 2019**

30 Year Financial Framework <p>Commenced Metro Vancouver's first 30 year financial planning process which incorporates climate change initiatives departments are undertaking. This includes projects, initiatives, and actions to adapt to climate change and mitigate impacts of climate change.</p>	30 Year Financial Framework <p>Complete Metro Vancouver's first 30 Year Financial Framework that will incorporate climate change initiatives departments will be undertaking as part of their long-range plans.</p>
Sustainable Infrastructure and Buildings Policy <p>The Sustainable Infrastructure and Buildings Policy was approved by the Board in October 2018. The policy identifies minimum sustainable design and construction requirements for a wide range of building and infrastructure projects.</p>	Sustainable Infrastructure and Buildings Policy <p>The implementation of the policy will be supported by a Sustainable Design Guide. The Guide will map out the technical requirements for projects to meet the requirements of the policy. Creation of the Guide will be informed by input from internal groups and our member jurisdictions.</p>
Corporate Energy Management Policy <p>Implementation of the Corporate Energy Management Policy is ongoing. The Liquid Waste Services department has committed to setting energy and greenhouse gas emissions targets in 2019.</p>	Corporate Energy Management Policy <p>Establish energy and greenhouse gas emissions targets for Liquid Waste Services.</p>
Sustainability Innovation Funds <p>2018 was the fourth intake of Sustainability Innovation Fund (SIF) projects. A number of the projects approved are related to climate change mitigation and adaptation, and energy. Additionally, a website to showcase and share lessons learned from the projects was launched.</p>	Sustainability Innovation Funds <p>The fifth intake of projects was approved in 2019. The program now has 41 projects, within the Liquid Waste, Regional District, and Water functions of Metro Vancouver. 25 of the projects are active.</p>
Energy and Greenhouse Gas Tracking System <p>Continued to develop and implement departmental energy and greenhouse gas emissions reporting. Initiated software upgrade to prorate BC Hydro and FortisBC billing data. A report for Liquid Waste Services and Water Services energy and greenhouse gas emissions was delivered to the Utilities Committee in fall 2018.</p>	Energy and Greenhouse Gas Tracking System <p>Continue to develop and implement departmental energy and greenhouse gas emissions reporting. Departmental and committee level reporting structures have been developed and will be proposed to senior management and implementation of those reports will begin in 2019.</p>
Wastewater Treatment Process Optimization <p>Completed lighting upgrade and influent pump station wet well level setpoint adjustment at Iona Island Wastewater Treatment Plant, and strain</p>	Wastewater Treatment Process Optimization <p>Continue to identify and develop process optimization opportunities in water treatment, wastewater treatment, water transmission, and</p>

Actions taken in 2018

Actions underway/planned for 2019

press optimization and heating, ventilation, and air conditioning (HVAC) control improvements, and replacement of diffusers in one of four solids contact tanks at Lulu Island Wastewater Treatment Plant.	wastewater collection. Continue Lulu Island Wastewater Treatment Plant solids contact process optimization.
Water Services Operating Strategies Water Services Management reviewed the draft operating strategy for Capilano Raw Water Pump Station.	Water Services Operating Strategies Implement Capilano Raw Water Pump Station operating strategy. Formalize operating strategy for Capilano Energy Recovery Facility.
Pumping System Performance Testing Completed performance testing at several water and wastewater pump stations.	Pumping System Performance Testing Implement viable recommendations from 2018 performance testing. Continue pumping system performance testing at water and wastewater facilities. Develop plans to implement recommendations of the studies.
Regional Parks Studies A Mechanical Systems Inventory & Condition Assessment was conducted for mechanical systems at regional parks.	Regional Parks Studies
Solid Waste Facility Design Energy efficiency considerations are being incorporated into the designs of the Coquitlam Transfer Station and Surrey Recycling and Waste Drop-off Facility.	Solid Waste Facility Design Construction of the Coquitlam Transfer Station is underway, and design of the Surrey Recycling and Waste Drop-off Facility is complete, both incorporating energy efficiency features.
	Clean Air Plan Metro Vancouver is developing the <i>Clean Air Plan</i> , which will guide air quality and greenhouse gas management in the region for the next five to ten years. Corporate actions will be included in this plan. This plan will be integrated with <i>Climate 2050</i> and will replace the current <i>Integrated Air Quality and Greenhouse Gas Management Plan</i> . Stakeholder engagement on the <i>Clean Air Plan</i> will begin in 2019.

Broad Planning: Community Wide Actions

Actions taken in 2018

Urban Centres and Frequent Transit Development Areas (FTDA)

Ordered 2016 custom census data and designed the Urban Centre and FTDA Dashboard website, which will display land use and transportation performance data for each Urban Centre and FTDA.

Four Knowledge Sharing Walking Tours took place (Brentwood, Burquitlam, 22nd Ave, and Surrey Centre). Planners around the region learned new approaches to build transit-oriented walkable centres.

A Growth Framework Background Paper was developed and presented to the Regional Planning Advisory Committee. The Paper covered regional growth frameworks generally including Urban Centres and FTDA's.

Corridor Study

The Lougheed Corridor Study took place between September 2018 and February 2019. This study was a multi-stakeholder partnership to foster dialogue about how growth and transportation could be coordinated along this corridor to complement the implementation of the new B-Line frequent bus service. Directing new residential and employment growth to frequent transit corridors supports the reduction of GHG emissions by making it possible for more trips to be served by transit. Generally, coordinating transit and land use planning supports climate action by reducing the need for private vehicles, reducing single-occupancy vehicle trips, and reducing vehicle kilometres travelled.

Actions underway/planned for 2019

Urban Centres and Frequent Transit Development Areas (FTDA)

Receive and analyze 2016 census data and upload to new dashboard.

A final walking tour will take place in 2019.

Completed stakeholder workshops with TransLink staff and Regional Planning Advisory Committee staff to support the Urban Centre and FTDA Policy Review. Workshops focused on identifying opportunities to enhance Urban Centre and FTDA policies.

Corridor Study

Complete and report on Lougheed Corridor Study.

Actions taken in 2018

Actions underway/planned for 2019

Lower Fraser Valley Air Emissions Inventory and Forecast Metro Vancouver prepares a region-wide emissions inventory and forecast every five years, including GHG emissions from all sources. In 2018, the 2015 emissions inventory was enhanced to include forecasts of GHG emissions to 2035.	Lower Fraser Valley Air Emissions Inventory and Forecast Develop an online portal for emissions inventory data, so users will have enhanced access to emissions data for their sources or areas of interest.
Climate Related Monitoring Program Continued to participate in the Climate Related Monitoring Program work group, which works to ensure that climate related weather monitoring data is collected and archived for the Province.	Climate Related Monitoring Program Continue to participate in the Climate Related Monitoring Program work group.
Climate Policy Evaluation Tools Completed a final report on policy evaluation tools and processes including incorporating equity into climate plans that will inform the development of <i>Climate 2050</i> and the new <i>Clean Air Plan</i> .	Climate Policy Evaluation Tools Final report was completed in 2018.
Climate 2050 Completed public engagement on the <i>Climate 2050 Discussion Paper</i> and the Metro Vancouver Board adopted the <i>Climate 2050 Strategic Framework</i> . Started the planning for the <i>Climate 2050 Roadmaps</i> .	Climate 2050 Develop the <i>Climate 2050 Roadmaps</i> which include the goals, strategies, actions, and targets for the ten issue areas identified in the <i>Climate 2050 Strategic Framework</i> . The <i>Climate 2050</i> website will be launched in 2019.
	Regional Greenway Plan Begin updating the Regional Greenway Plan.

BUILDINGS AND LIGHTING

Low carbon buildings use the minimum amount of energy needed to provide comfort and safety for their inhabitants, and tap into renewable energy sources for heating, cooling and power. These buildings can save money, especially viewed over the long term. This category also includes reductions realized from energy efficient street lights and lights in parks or other public spaces.

Buildings are the second largest source of greenhouse gas emissions in the region. The *Climate 2050 Buildings Roadmap* will identify the goals, strategies, and actions necessary to reduce greenhouse gas emissions from the buildings sector and make buildings resilient to the impacts of climate change.

Buildings and Lighting Survey Questions	Responses
Is your local government aware of the BC Energy Step Code?	Yes
Is your local government implementing the BC Energy Step Code?	Yes: Metro Vancouver is implementing the BC Energy Step Code at a corporate level as part of the Sustainable Infrastructure and Buildings Policy.

Buildings and Lighting: Corporate Actions

Actions taken in 2018	Actions underway/planned for 2019
Metro Vancouver Housing Corporation Goals Natural gas space heating equipment was upgraded to more energy efficient equipment at two Housing sites. Natural gas domestic hot water heating equipment was upgraded to more energy efficient equipment at three Housing sites. Upgraded exterior lighting to LED fixtures at three Housing sites. Upgraded interior lighting with LED fixtures at two Housing sites.	Metro Vancouver Housing Corporation Goals Space heating: Replace two large boilers with high efficiency condensing units. Water heating: Replace four mid efficiency domestic hot water boilers with high efficiency models. Make up air unit: Replace one mid efficiency make up air unit with a high efficiency model. Conduct energy study/modelling on three sites in preparation for building envelope upgrades. Lighting: Replace exterior lighting at six Housing sites with LED fixtures. Building Envelope Upgrade: Three Housing sites listed to kick off for building envelope replacement (insulation, air tightness and window improvements).

Actions taken in 2018

Actions underway/planned for 2019

Head Office Building

Implemented energy conservation measures:

Reset lighting controls to unoccupied mode in vacant spaces (estimated saving of 7,000 kWh/year).

Cleaned the cooling tower to increase equipment efficiency and changed the chiller sequencing (estimated saving of 30,000 kWh/year).

Retrofitted parkade lighting from fluorescent to LED (received \$9,260 BC Hydro incentive, for an estimated saving of 115,000 kWh/year).

Improved water treatment/chemical feed system to increase water and equipment efficiency.

Head Office Building

Undertake energy conservation measures:

Retrofit main lobby and loading bay lighting from fluorescent to LED (expect a \$20-30k BC Hydro incentive and a saving of approximately 160,000 kWh/year).

Reduce lighting control times in parkade, tenant floors and common areas (expect 25% reduction in kWh/year used).

Install foam soap and dispensers in all washrooms to lower water consumption.

Service exterior water feature to improve efficiency and equipment optimization.

Investigate power harmonics and potential implementation to optimize building efficiency.

Electric Vehicle Charging Stations

Installed electric vehicle charging stations at five Metro Vancouver locations for fleet and public charging.

A DCFC station was installed in the parkade of Metrotown Mall at Metro Vancouver's Head Office.

Installed level 2 electric vehicle charging stations at Metro Vancouver's Head Office with the intention of using the stations for staff charging.

Electric Vehicle Charging Stations

Continue installation and expansion of charging stations to support fleet electrification.

Establish and test innovative pricing and access rules for the DCFC per the scope of the project funded by the Sustainability Innovation Fund.

Commission stations and establish pricing and access rules for a workplace charging pilot program at Metro Vancouver's Head Office.

Lighting Upgrades

Completed lighting upgrade at Iona Island Wastewater Treatment Plant. Budget request was approved for roadway lighting upgrade at Annacis Island Wastewater Treatment Plant in 2019.

Completed Maple Ridge Transfer Station lighting upgrade.

Construction budget approved for indoor lighting upgrade at Seymour/Capilano Filtration Plant for 2019.

Lighting Upgrades

Complete roadway lighting upgrade at Annacis Island Wastewater Treatment Plant.

Complete lighting upgrade at Seymour/Capilano Filtration Plant.

Buildings and Lighting: Community Wide Actions

Actions taken in 2018	Actions underway/planned for 2019
<p>RateOurHome.ca Program</p> <p>Hired a consultant to conduct an evaluation of the RateOurHome.ca pilot project.</p> <p>Continued to be an observing member of the Federal Labelling and Disclosure Working Group (LADWG). The LADWG is working with all levels of government to develop requirements for home energy labelling in Part 3 and Part 9 buildings by 2019. Metro Vancouver is working with local governments to learn from and contribute to the LADWG, and support the development of research and policy to require labelling and disclosure.</p>	<p>RateOurHome.ca Program</p> <p>The RateOurHome.ca evaluation report was completed in early 2019 and will support next steps for program design and delivery, and support the policy options considered as part of the <i>Climate 2050 Buildings Roadmap</i> process.</p> <p>The LADWG plans to launch a public-facing EnerGuide label portal where users will be able to access any V15 EnerGuide label in Canada at a 3-digit postal code (Forward Sorting Area) level. NRCan is also developing an application programming interface (API) for other organizations to easily collect and utilize EnerGuide data. Metro Vancouver will consider the utility of this API as part of its considerations for continuing program delivery of RateOurHome.ca</p>
<p>Strata Energy Advisor Pilot Program</p> <p>Recruited 70 strata corporations for the Strata Energy Advisor (SEA) Program and completed approximately 50 energy assessments and business cases.</p>	<p>Strata Energy Advisor Pilot Program</p> <p>Recruit an additional 18 strata corporations and finalize the energy assessments and business cases for all participants. Provide implementation support to the SEA participants. Begin program evaluation and planning for next steps for the SEA program.</p>
<p>Heather Place Building A Redevelopment</p> <p>Started construction of 67 below market housing units in Vancouver. The building follows Leadership in Energy and Environmental Design (LEED) standards, with neighbourhood car and bike share facilities.</p>	<p>Heather Place Building A Redevelopment</p> <p>Substantial completion of redevelopment for tenant move-in in 2020.</p>
<p>Kingston Gardens Building A Redevelopment</p> <p>Started design of 85 below market housing units in Surrey. The building is a BC Energy Step Code 4 construction.</p>	<p>Kingston Gardens Building A Redevelopment</p> <p>Continued design and rezoning process for 85 below market housing units in Surrey. The building is a BC Energy Step Code 4 construction.</p>

Welcher Avenue Redevelopment

Started design for 50 below market housing units in Surrey. The building is a BC Energy Step Code 4 construction.

Emissions Regulation for Indoor Residential Wood Burning

Seek Board adoption of an emission regulation for indoor residential wood burning to reduce emissions of black carbon from incomplete combustion of biomass.

ENERGY GENERATION

A transition to renewable or low-emission energy sources for heating, cooling and power supports large, long-term GHG emissions reductions. Renewable energy including waste heat recovery (e.g. from biogas and biomass), geo-exchange, micro hydroelectric, solar thermal and solar photovoltaic, heat pumps, tidal, wave, and wind energy can be implemented at different scales, e.g. in individual homes, or integrated across neighbourhoods through district energy or co-generation systems.

Residents and businesses use energy to heat buildings and water, fuel vehicles, and power industrial processes. The *Climate 2050 Energy Roadmap* will identify the goals, strategies, and actions necessary to reduce greenhouse gas emissions from the energy sector.

Energy Generation Survey Questions	Responses
Is your local government developing, or constructing a district energy system?	No
Is your local government developing or constructing a renewable energy system?	Yes
Is your local government operating a district energy system?	No
Is your local government operating a renewable energy system?	Yes
Is your local government connected to a district energy system that is operated by another energy provider?	No
Are you familiar with the 2018 “List of Funding Opportunities for Clean Energy Projects Led by First Nations and Local Governments?”	Yes

Energy Generation: Corporate Actions

Actions taken in 2018	Actions underway/planned for 2019
Annacis Island Wastewater Treatment Plant Cogeneration Upgrade Construction phase of the cogeneration upgrade project continued in 2018.	Annacis Island Wastewater Treatment Plant Cogeneration Upgrade Project completion expected in 2019.
Electricity Generation Proposed electricity generation projects within the drinking water transmission system are on hold since BC Hydro stopped accepting applications to the Standing Offer Program in August 2017.	Electricity Generation Proposed electricity generation projects within the drinking water transmission system will not be pursued further, due to BC Hydro indefinitely suspending the Standing Offer Program in February 2019.
Effluent Heat Recovery Continued to coordinate with the Design-Build-Finance contractor and Lonsdale Energy	Effluent Heat Recovery

Actions taken in 2018

Corporation (LEC) on integrating the effluent heat recovery system at the North Shore Wastewater Treatment Plant with LEC's district energy system.

Regional Park Solar-Powered Conversion Project

Contracted work for the project was completed in March 2018. Components of the project that were funded by the Sustainability Innovation Fund include a containerized hybrid solar-power system, pole-mounted solar panel arrays, and electrical infrastructure to receive power within the operations facility.

Actions underway/planned for 2019

Continue to coordinate integrating the effluent heat recovery system at North Shore Wastewater Treatment Plant with LEC's district energy system.

Regional Park Solar-Powered Conversion Project

Staff will be evaluating system efficacy, after which project results and learnings will be summarized.

Energy Generation: Community Wide Actions

Actions taken in 2018

Sewer Heat Recovery

Continued to explore potential opportunities for sewage heat recovery with municipal partners.

Continued to support City of New Westminster's (CNW) analysis in 2018. Due to an unfavourable updated business case, project was put on hold pending completion of CNW strategic planning in early 2019 and options re-evaluation by CNW.

Continued to support City of Vancouver sewage sourcing options analysis in 2018 by providing data, drawings, and feedback on reports.

The Northwest Langley Wastewater Treatment Plant design team investigated effluent heat recovery for in-plant use (to reduce the need for using natural gas for heat) at the new Northwest Langley Wastewater Treatment plant, and investigated effluent heat recovery for off-site use.

The Northwest Langley Wastewater Treatment Plant design team investigated excess biogas use options, including co-generation of electricity, sale as biomethane (RNG) to

Actions underway/planned for 2019

Sewer Heat Recovery

Continue to support municipal partners with data and other inputs as necessary for the sewage heat recovery options.

Continue to support City of New Westminster's analysis and provide input as necessary if project is re-opened.

Final decision by City of Vancouver on sewage sourcing is expected in spring 2019. If Metro Vancouver sewage is selected, Metro Vancouver will coordinate with City of Vancouver to finalize design and develop sewage heat access and use contract.

On-site use of recovered effluent heat will be included in the recommended conceptual design. Off-site use of recovered effluent heat does not appear to be feasible, as no viable users are nearby, so this concept was not included in the recommended conceptual design.

Actions taken in 2018

Actions underway/planned for 2019

FortisBC, and use for drying biosolids at the plant site. Biosolids drying was the recommended use, which will avoid the use of natural gas for this purpose.

Further exploration of the cost and feasibility of biosolids drying at the site will take place, and approvals may be sought.

GREENSPACE/NATURAL RESOURCE PROTECTION

Greenspace/Natural Resource Protection refers to the creation of parks and greenways, boulevards, community forests, urban agriculture, riparian areas, gardens, recreation/school sites, and other green spaces, such as remediated brownfield/contaminated sites as well as the protection of wetlands, waterways and other naturally occurring features.

The *Climate 2050 Nature and Ecosystems Roadmap* will identify the goals, strategies, and actions necessary to make the region's ecosystems and natural area resilient to the impacts of climate change.

Greenspace/Natural Resource Protection Survey Questions	Responses
Does your local government have urban forest policies, plans or programs?	Yes
Does your local government have policies, plans or programs to support local food production?	Yes

Greenspace/Natural Resource Protection: Corporate Actions

Actions taken in 2018	Actions underway/planned for 2019
Ecological Health Framework In October 2018, Metro Vancouver adopted a new Ecological Health Framework that encapsulates Metro Vancouver's collective efforts around ecological health and provides guiding principles, goals, and strategies to help achieve the vision of a beautiful, healthy, and resilient environment for current and future generations. One of the Framework's guiding principles is to "Build resilience and adapt to a changing climate" and most strategies will have climate adaptation benefits.	Ecological Health Framework Begin compiling an inventory of projects in 2019 for the annual report (to be completed in 2020) summarizing the implementation of the Ecological Health Framework in its first full year.
Regional Ecological Health Indicators As part of the Ecological Health Framework, a set of "Regional Ecological Health Indicators" were developed which will help to measure and track aspects of the region's environmental health and form the basis for a regional "state of the environment" assessment every six years.	Regional Ecological Health Indicators Methodologies for several of the new Regional Ecological Health Indicators will be established and values calculated. Indicators targeted for development in 2019 are percentage of tree canopy cover, percentage of impervious surfaces, and a green space connectivity index.

Greenspace/Natural Resource Protection: Community Wide Actions

Actions taken in 2018

Ecological Restoration Program

Continued to restore degraded sites and enhance biodiversity. Restoration projects focused on Iona Beach, Pacific Spirit, Tynehead, Burnaby Lake, Colony Farm, Brae Island, Aldergrove, Campbell Valley, and Kanaka Creek Regional Parks.

Partners completed phase 3 of a wetland restoration project at Aldergrove Regional Park.

Completed phase 1 of a restoration project on a newly acquired property in Kanaka Creek Regional Park. Thornvale pond improvements: removed invasive plants and replanted with native species.

Grasslands Management Program

Continued program to improve old-field habitat values identified in Park Management Plans, especially areas identified as being of conservation concern.

Removed encroaching blackberry from a number of areas within Aldergrove Regional Park; re-seeded, mowed and tilled a field in Campbell Valley to reduce wild chervil and at Boundary Bay to reduce reed canary grass, mowed blackberry at Tynehead Regional Park.

Widgeon Marsh Park Reserve Management Plan

Developed the draft management plan based on public input, including consideration of climate impacts.

Invasive Species Management

Inventory and control of various species of concern (knotweed, Lamiastrum, Scotch broom, English ivy, English holly, Himalayan blackberry, Himalayan balsam, reed canary grass, white

Actions underway/planned for 2019

Ecological Restoration Program

Continue to restore degraded sites and enhance biodiversity. Restoration projects focused on Iona Beach, Pacific Spirit amphibian habitat restoration and beach restoration, Aldergrove raspberry field restoration, Boundary Bay beach dune restoration, Campbell Valley turtle nesting beach, Camosun Bog hydrology restoration.

Continue to support partner driven monitoring and modifications to the wetland habitat.

Complete phase 2 of the Thornvale Pond project to replace collapsing culvert on Thornvale Creek and create fish access to Thornvale Ponds.

Construct new wetland complex at Aldergrove Regional Park as part of the Nature Discovery Trail and area.

Grasslands Management Program

Continued program to improve old-field habitat values identified in Park Management Plans, especially areas identified as being of conservation concern.

Continue to improve grassland habitats within Regional Parks. Re-seed large field in Campbell Valley, mow and till in Boundary Bay to reduce reed canary grass, remove encroaching blackberry from areas within Aldergrove Regional Park.

Widgeon Marsh Park Reserve Management Plan

Complete the Widgeon Marsh Regional Park Management Plan.

Invasive Species Management

Inventory and control of various species of concern (knotweed, Lamiastrum, Scotch broom, English ivy, English holly, Himalayan blackberry, Himalayan balsam, reed canary grass, white

Actions taken in 2018

poplar, butternut, and giant hogweed) within selected parks and areas.

Invasive Species Best Management Practices

Completed Best Management Practices (BMP) for knotweed, giant hogweed, European fire ant, European chafer beetle, scotch broom and Himalayan blackberry. Member jurisdictions selected five additional invasive species for the next set of BMPs. Invasive species are non-native flora or fauna that out-compete native species and can be highly destructive and difficult to control. Climate change will likely support climatic conditions that allow existing invasive species to flourish and new invasive species to establish within the region.

Grow Green Guide

The second “Growing Green in Metro Vancouver” forum was held in February 2018 and focused on exploring how the horticulture industry is adapting to climate change. Throughout 2018, additional articles were added to the “Green Thumb News” section of the website. Topics included climate change related issues such as invasive plants and alternatives, supporting birds in your backyard in Metro Vancouver, and lawn alternatives.

Ecosystem Valuation

Completed the regional carbon storage dataset. This resource quantifies stores of carbon and can be used to support planning and incorporate ecosystem services considerations into decision-making.

The results of the initial regional greenspace connectivity analysis were reviewed with staff from other departments and member jurisdictions. A user guide was created to support use of the data by planners and others.

Actions underway/planned for 2019

poplar, butternut, and giant hogweed) within selected parks and areas.

Invasive Species Best Management Practices

Complete Best Management Practices for yellow archangel, English and Irish ivy, English holly, policeman's helmet and parrot's feather. In late 2019, member jurisdictions will select additional invasive species for the next set of BMPs to be completed in 2020.

Grow Green Guide

Additional plants will be added to the Grow Green plant database, and content relating to supporting biodiversity will be expanded based on advice from a local expert. Plants will be assessed for their water use and this information will be added to Grow Green in order to provide gardeners with information to help them reduce their water use where possible. Articles with more in-depth content will be produced throughout the year on a variety of topics including soil health, invasive species, supporting biodiversity, and waterwise gardening. Opportunities to increase marketing and outreach of the Grow Green website will continue to be explored.

Ecosystem Valuation

Analyze the regional carbon storage datasets to provide regional and sub-regional summaries.

Connectivity networks for additional species will be completed in 2019 followed by a prioritization exercise using the multiple networks.

Actions taken in 2018

Actions underway/planned for 2019

	<p>Forest Health Study</p> <p>Conduct a Forest Health Study of all regional parks, including an aerial flyover to assess broad level tree health, create a baseline that may help understand future impacts of climate change on forest health, and to aid in forest management planning, partly to adapt to climate change.</p>
	<p>Campbell Valley Management Plan</p> <p>Begin updating the Campbell Valley Management Plan, which will include consideration of climate change impacts.</p>
	<p>Review of Metro Vancouver 2040</p> <p>Initiate a review of the environment-related policies in <i>Metro Vancouver 2040: Shaping Our Future</i>, the regional growth strategy. This review will focus on the policies for Metro Vancouver and municipalities in Strategies 3.1 (Protect Conservation and Recreation lands, and 3.2 (Protect and enhance natural features and their connectivity). New policy options will be developed for consideration while updating the regional growth strategy in 2021.</p>

SOLID WASTE

Reducing, reusing, recycling, recovering and managing the disposal of residual solid waste minimizes environmental impacts and supports sustainable environmental management, GHG reductions, and improved air and water quality.

Metro Vancouver plays a significant role in the management of solid waste in the region. The *Climate 2050 Waste Roadmap* will identify the goals, strategies, and actions necessary to reduce greenhouse gas emissions from the waste sector.

Solid Waste Survey Questions	Responses
Does your local government have construction and demolition waste reduction policies, plans or programs?	Yes
Does your local government have organics reduction/diversion policies, plans or programs?	Yes

Solid Waste: Corporate Actions

Actions taken in 2018	Actions underway/planned for 2019
District Energy Project at Metro Vancouver Waste-to-Energy Facility Researched opportunities for district heating from the Waste-to-Energy Facility.	District Energy Project at Metro Vancouver Waste-to-Energy Facility Undertake a business case for district heating for the Waste-to-Energy Facility.
Coquitlam Landfill Gas Collection System Expansion Construction contract for the Coquitlam Transfer Station (that included the landfill gas collection system) was awarded in December.	Coquitlam Landfill Gas Collection System Expansion Construction ongoing. Completion scheduled for summer 2020.
Material Recycling and Reuse Metro Vancouver is using bottom ash (Waste-to-Energy Facility residuals) beneficially at the Coquitlam Transfer Station construction project. Biosolids will also be used in the top soil. An estimate of reuse for the region was calculated for the 2017 annual solid waste summary report (~80kt). A new non-ferrous metal recovery system began operation that recovers an additional 10% or 50	Material Recycling and Reuse Use of bottom ash in the construction footprint is ongoing. A business case will be developed for a materials recovery facility that could produce fuel for cement kilns, reducing GHG emissions. Both the new Coquitlam Transfer Station and Surrey Recycling and Waste Drop-Off Facilities will have extensive recycling depots.

Actions taken in 2018

Actions underway/planned for 2019

tonnes per month of ferrous metal and 50 tonnes per month of non-ferrous metal. Non-ferrous metal recycling reduces GHG emissions substantially compared to using mined materials.

Waste Management Plans for Parks

Completed the implementation of the solid waste management plan in regional parks.

Waste Management Plans for Parks

Project complete.

Solid Waste: Community Wide Actions

Actions taken in 2018

Actions underway/planned for 2019

Food Scraps Recycling

Food scraps recycling campaign continued with an emphasis on food-soiled paper in 2018.

Food Scraps Recycling

The 2019 campaign will continue to leverage the “food face” characters. The items of focus to be determined.

Organics Diversion GHG Reduction Credits

Calculated Organics Diversion Credits on behalf of local governments, in support of their carbon neutral goals.

Organics Diversion GHG Reduction Credits

Continue to support local governments by calculating their Organics Diversion Credits for additional organics diversion activities.

Material Recycling and Reuse

Started regional consultation planning on actions to reduce single-use items and textiles waste.

Began enforcement of the disposal ban on clean, non-food expanded polystyrene packaging.

Material Recycling and Reuse

Regional consultation events planned for summer of 2019.

Continue enforcement of the disposal ban on clean, non-food expanded polystyrene packaging.

Create Memories Not Garbage

The “Create Memories Not Garbage” (CMNG) campaign was revised to start earlier than in previous years to capture early shoppers. It included more interactive online and in-person opportunities to engage residents as they planned their Christmas shopping.

Create Memories Not Garbage

The 2019 campaign will continue to use the CMNG platform. The media strategy will target the audience when they are most receptive to the CMNG message, including early shoppers. Outreach and collaboration with Metro Vancouver members continues.

Love Food Hate Waste Canada

In 2018 Metro Vancouver joined the National Love Food Hate Waste Canada campaign, no longer running an in-region only campaign. In addition to participating in the national

Love Food Hate Waste Canada

Metro Vancouver continues partner in the Love Food Hate Waste Canada campaign. Regionally, staff will run 13 outreach event days over the spring and summer, including farmers’ markets

Actions taken in 2018**Actions underway/planned for 2019**

campaign, staff continue to do in-region outreach and promotions.

and the Pacific National Exhibition. The campaign is amplified regionally through a geo-targeted media strategy.

More Than Meets The Eye

More Than Meets the Eye encourages residents to recycle unused electronics and batteries by bringing them to their local depot. Residents are directed to MVRecycles to find out where to recycle their items free of charge, whether they have a battery or a plug.

More Than Meets The Eye

The More Than Meets the Eye electronics recycling promotion will continue in 2019, taking advantage of waste-related milestones including National Battery Recycling day. A single-day internal staff drop-off promotion collected 60 kg of recyclable plug-in or battery operated household goods and 50 kg of batteries and informed hundreds of employees on this issue.

Waste In Its Place

The Waste In Its Place campaign addresses the issue of abandoned waste across the region. The campaign encourages residents to properly dispose of their bulky items, such as furniture and large electronics or appliances. An interactive webpage provides information on disposal options for residents specific to their municipality.

Waste In Its Place

The 2019 Waste In Its Place campaign launched in April with advertising and social media, and in-language materials. The campaign provides member municipalities with Metro Vancouver's creative to develop localized posters and imagery that will be easily recognizable for residents in their respective communities.

National Industrial Symbiosis Program (NISP) - Metro Vancouver Pilot

Lighthouse Sustainable Building Centre delivered four workshops across the region to identify circular economy synergies (potential resource matches). Almost 800 synergies emerged from the workshops. NISP practitioners worked to prioritize and advance high potential synergies.

National Industrial Symbiosis Program (NISP) - Metro Vancouver Pilot

Lighthouse will complete the last of the NISP workshops, continue to advance synergies, and evaluate the performance of the pilot program.

Think Thrice About Your Clothes

A regional clothing waste reduction campaign called "Think Thrice About Your Clothes" was launched. The campaign targeted both men and women via traditional and digital media and outreach events. The website (www.clothesarentgarbage.ca) provides simple tips, grouped into three categories: Reduce, Repair, and Re-Use.

TRANSPORTATION

Transportation actions that increase transportation system efficiency, emphasize the movement of people and goods, and give priority to more efficient modes, e.g. walking, cycling, ridesharing, and public transit, can contribute to reductions in GHG emissions and more livable communities.

Transportation is the largest source of greenhouse gas emissions in the region. The *Climate 2050 Transportation Roadmap* will identify the goals, strategies, and actions necessary to reduce greenhouse gas emissions from the transportation sector and how the transportation system can be resilient to the impacts of climate change.

Transportation Survey Questions	Responses
Does your local government have policies, plans or programs to support: <ul style="list-style-type: none"> • Walking • Cycling • Transit Use • Electric Vehicle Use • Other (please specify) 	No No No Yes: Emotive – The Electric Vehicle Experience Corporate actions: The Employer Transit Commuter Program offers staff who take transit a partial reimbursement of fares, and Metro Vancouver’s Head Office has end-of-trip facilities for cyclists (showers and secure bicycle parking)
Does your local government have a transportation demand management (TDM) strategy (e.g. to reduce single-vehicle occupancy trips, increase travel options, provide incentives to encourage individuals to modify travel behavior)?	No
Does your local government integrate its transportation and land use planning?	Yes

Transportation: Corporate Actions

Actions taken in 2018	Actions underway/planned for 2019
Employer Transit Commuter Program Metro Vancouver continues to operate its reimbursement program.	Employer Transit Commuter Program Metro Vancouver will continue to operate its reimbursement program.

Actions taken in 2018

Fleet Planning and Acquisition Policy

As part of the policy implementation, staff developed a corporate Low Emission Vehicle Standard to guide fleet procurement decisions. Six dual head level 2 electric vehicle charging stations were installed in Metro Vancouver's Head Office fleet parking area; one dual head replacement station at regional parks sites at Pacific Spirit Park, Capilano, and Boundary Bay; and four single head level 2 and one Direct Current Fast Charging (DCFC) station in the publicly-accessible parking area at Head Office. Purchased six Mitsubishi Plug-In Hybrid vehicles. Worked with user groups to reduce vehicle sizes.

Actions underway/planned for 2019

Fleet Planning and Acquisition Policy

The Low Vehicle Emission Vehicle Standard will be updated annually. Planning is underway to install level 2 electric vehicle charging stations at each of Parks West, Parks East, Bone Yard, Coquitlam Water Treatment Plant, Lake City Operations Centre, Seymour/Capilano Filtration Plant, and Head Office. Planning to purchase 17 electric vehicles.

Transportation: Community Wide Actions

Actions taken in 2018

Amendments to the Non-Road Diesel Engine Emissions Regulation

The MVRD Board approved changes to the MVRD Non-Road Diesel Engine Emission Regulation, which has an impact on regional emissions of black carbon, a short-lived climate forcer. The amendments focused on the registration requirements for low-use diesel engines in order to accurately reflect the amount of time the engines are used each year and the associated emissions, and take effect January 1, 2019.

Greater Vancouver Regional Fund

In March 2018, the MVRD Board approved a scope change to TransLink's 2017 application for Federal Gas Tax funding from the Greater Vancouver Regional Fund (GVRF), replacing seven 40-foot hybrid buses to be purchased in 2019 with five 60-foot hybrid buses.

In April 2018, the MVRD Board received for information TransLink's 2017 GVRF Semi-Annual Reports, which contain cumulative information on

Actions underway/planned for 2019

Amendments to the Non-Road Diesel Engine Emissions Regulation

The bylaw currently focuses on Tier 0 and Tier 1 engines, which are older, higher polluting engine models compared to new, higher tiered engines. Staff will launch an education and outreach campaign to inform program registrants about the deadline for registering Tier 1 engines. After January 31, 2020, no new Tier 1 engines that were not previously registered can operate in the Metro Vancouver region.

Greater Vancouver Regional Fund

Staff will initiate the review of the MVRD Board's Federal Gas Tax Fund Policy in 2019.

It is anticipated that the review will be completed in 2019. The findings and recommendations will be presented to the Board for consideration.

Actions taken in 2018

Actions underway/planned for 2019

active projects funded through the GVRF as of June 30, 2017 and December 31, 2017.

In October 2018, the MVRD Board approved TransLink's application for \$142.1 million through the GVRF. The application contained a mix of transit vehicle fleet expansion and replacement projects.

The MVRD Board also directed staff to undertake a review of the Federal Gas Tax Fund Expenditures Policy in 2019.

In October 2018, the MVRD Board received for information TransLink's 2018 GVRF Semi-Annual Report on active projects funded through the GVRF as of June 30, 2018.

Transit-Oriented Affordable Housing Study

Staff worked with study partners to develop a scope of work and retained consultant support. The two research elements are business framework development for a regional transit-oriented affordable housing fund and evaluation of policy tools to address the barrier of high land cost.

Transit-Oriented Affordable Housing Study

In April 2019, the MVRD Board received for information the Transit-Oriented Affordable Housing Study Phase 2 key findings. The Board also directed staff to continue to explore options to collaborate with interested partners on a regional revolving loan fund, including identifying potential champions, and to report back to the Regional Planning Committee.

In February 2019, the MVRD Board approved an allocation of \$100,000 towards Phase 3 of the Transit-Oriented Affordable Housing Study. Phase 3 will include the development of an online interactive affordable housing calculator to enable practitioners and policymakers to learn about policy and financial tools, and their effectiveness to make affordable rental housing financially viable.

Scoping will take place in Q2. Consultant support will be retained in 2019. The project will likely be completed in 2020.

George Massey Tunnel Replacement Project

The Ministry of Transportation and Infrastructure released the independent technical report in December 2018. [Section 3.9.2](#) of the report referenced Metro Vancouver's previously stated

George Massey Tunnel Replacement Project

A summary of the technical review was provided as information to the Finance and Intergovernment Committee and MVRD Board in February 2019. The Province has proposed a three-phase plan for the initial portion of the

Actions taken in 2018

concerns that the project did not sufficiently consider climate change and air quality.

“Emotive” Electric Vehicle Outreach Campaign

Delivered the fifth year of outreach on electric vehicles (EVs) at 45 events in 17 member jurisdictions with the help of Emotive staff and volunteers. Staff logged 9,800 conversations about EVs with the public, a 10% increase over 2017, and conducted over 2,300 test drives, an increase in the total number of test drives from the 2017 season.

EVCondo.ca

Continued to deliver EVCondo.ca outreach at events and through social media. Staff also continue to manage the EV-friendly registry, with 50 buildings registered on the map. In 2018, questions about charging in multi-unit buildings remains one of the most popular topics from the members of the public seeking advice.

Workplace Electric Vehicle Charging Program

Staff delivered nine workplace EV sessions in 2018. Outreach for EVWorkplace.ca continues to be focused on in-person events at workplaces, providing EV 101 sessions, and more focused information on charging technologies, charging rules and cost-recovery options.

Actions underway/planned for 2019

project, designed to culminate in a business case for a preferred option by fall 2020. Metro Vancouver, along with TransLink, staff will provide the Ministry of Transportation and Infrastructure with input on various aspects of the proposed project, including climate change and air quality, in a coordinated manner through a staff working group. In addition, a George Massey Crossing Task Force has been established to provide input on the project that consists of MVRD Board Directors who represent communities anticipated to experience either a direct or an indirect impact from the project.

“Emotive” Electric Vehicle Outreach Campaign

Staff are planning EV outreach events for 2019, including 51 event days in the 2019 operating season, bringing events to at least 14 member jurisdictions. Staff will bring the Emotive exhibit to regional events such as the BCTECH Summit, the Vancouver International Auto Show, ElectraFest 2019, and the UBCM Summit. Emotive will also attend a number of well-known community events such as Hats Off Day, Car Free days, and Party for the Planet.

EVCondo.ca

Delivery of EVCondo.ca will continue at Emotive events and lunch and learns at workplaces, and by providing guidance to the general public. Staff are also refreshing content for the EVCondo.ca website to provide updated information on charging technologies, key legislation and strata practices for installing EV charging.

Workplace Electric Vehicle Charging Program

Continue delivery of EVWorkplace.ca, focusing on in-person workplace presentations.

Actions taken in 2018	Actions underway/planned for 2019
<p>Electric Vehicle Registration Tracking</p> <p>Tracked registration information on plug-in electric and hybrid vehicles as per previous year, using data from ICBC.</p>	<p>Electric Vehicle Registration Tracking</p> <p>Continue to track registration information on plug-in electric and hybrid vehicles as per previous year, when data from ICBC is received.</p>
<p>Light Duty Vehicle Policy Options</p> <p>Metro Vancouver hired a consultant in 2017 to evaluate and prioritize an initial list of policy options developed in 2016 for reducing emissions from light duty vehicles. The project was conducted to support the potential development of programs or regulations for light duty vehicles.</p>	
<p>Electric Vehicle Peer Network</p> <p>The EV Peer Network was established in early 2018 and met quarterly with representation from staff at municipalities across BC. The Network provided key feedback to the Province during the development of legislation for a zero emission vehicle standard, and also covered topics such as electric car sharing, EV fleet planning, charging infrastructure and rates, implications of EV charging for the Low Carbon Fuel Standard, market research on technology and consumers, and EV outreach campaigns.</p>	<p>Electric Vehicle Peer Network</p> <p>The EV Peer Network will continue to meet in 2019 on a quarterly basis, covering topics including understanding the implications of the newly introduced provincial Zero Emissions Vehicle Standard for local governments, the future of EVs and charging technologies, upcoming incentive programs, and the outcomes of the second phase of the BC Utilities Commission Inquiry into Electric Vehicle Charging.</p>
<p>Electric Vehicle Charging Stations at Housing Sites</p> <p>Identified locations at Housing sites to install electric vehicle charging stations.</p>	<p>Electric Vehicle Charging Stations at Housing Sites</p> <p>Install level 2 electric vehicle charging stations at three test properties. A total of five plug-in electric vehicle charging spots will be available.</p>
<p>Regional Parking Study</p> <p>The Regional Parking Study is an update to the 2012 Apartment Parking Study. The 2018 Study is undertaken in collaboration with TransLink.</p>	<p>Regional Parking Study</p> <p>In March 2019, the MVRD Board received for information the Regional Parking Study key findings.</p>

WATER AND WASTEWATER

Managing and reducing water consumption and wastewater is an important aspect of developing a sustainable built environment that supports healthy communities, protects ecological integrity, and reduces GHG emissions.

Metro Vancouver plays a significant role in the management of liquid waste in the region. The *Climate 2050 Waste Roadmap* will identify the goals, strategies, and actions necessary to reduce greenhouse gas emissions from the waste sector.

Water and Wastewater Survey Questions	Responses
Does your local government have water conservation policies, plans or programs?	Yes

Water and Wastewater: Corporate Actions

Actions taken in 2018	Actions underway/planned for 2019
Comprehensive Regional Water System Plan The study significantly progressed through 2018, and its technical findings were used to develop a plan with recommendations aligning with other regional actions.	Comprehensive Regional Water System Plan A report to the Water Committee and Board on study findings and plan recommendations is scheduled for 2019. It will outline a strategy to improve the resilience of the regional water system to climate change.
Drinking Water Conservation Plan (formerly the Water Shortage Response Plan) The Drinking Water Conservation Plan was implemented for the summer demand period, and a guide was developed to support member municipalities in enforcement. Collaborated with local governments to share information on communications and enforcement of the Drinking Water Conservation Plan.	Drinking Water Conservation Plan Coordinate the promotion of region-wide watering regulations within the region in order to maximize conservation benefits, through advertising and communications materials. Continue to collaborate with local governments to share information on communications and enforcement of the Drinking Water Conservation Plan every year.
	Drinking Water Management Plan A new/updated Drinking Water Management Plan is being developed that will include actions and commitments related to climate change.
Central Park Pump Station Efficiency Detailed design continued in 2018.	Central Park Pump Station Efficiency Pre-purchase Variable Frequency Drives for the pumps, with construction expected in 2020.

Actions taken in 2018**Actions underway/planned for 2019**

Seymour/Capilano Filtration Plant Process Optimization Completed lime blower decommissioning and HVAC control improvements.	Seymour/Capilano Filtration Plant Process Optimization
Hydrothermal Processing Pilot Project The aim of this pilot project is to design, fabricate, commission, and evaluate an advanced biofuel production pilot facility at the Annacis Island Wastewater Treatment Plant. The technology being explored is hydrothermal processing (HTP), which converts wastewater biomass to a biocrude oil. It has the potential to displace digesters, the current approach to managing solids at treatment plants. This emerging technology, founded on U.S. Department of Energy patents, has the potential for Metro Vancouver's future facilities to be zero-net energy, produce zero biosolids, reduce GHG emissions, and yield net cost savings. In 2018, the project received \$750,000 from the Province of BC (Innovative Clean Energy Fund) and \$2.475 million from Parkland Fuel Corporation. The project also received full funding and approval to proceed with the demonstration project from the Greater Vancouver Sewerage and Drainage District Board.	Hydrothermal Processing Pilot Project Secure technology license, retain Owner's Engineer, retain HTP fabricator.
Biogas Upgrading Project at Lulu Island Wastewater Treatment Plant Biomethane in excess biogas at the Lulu Island Wastewater Treatment Plant will be extracted and sold to FortisBC for use as renewable natural gas. Preliminary and detailed design work was completed for the new Lulu Island biomethane facility in 2017 and 2018.	Biogas Upgrading Project at Lulu Island Wastewater Treatment Plant Construction is expected to take place in 2019.
Genomics Approach to Anaerobic Digestion Optimization The team has completed sampling of existing anaerobic digesters at the Lulu Island Wastewater Treatment Plant for baselining and grant proposal submissions.	Genomics Approach to Anaerobic Digestion Optimization Future ongoing work involves execution of agreements, student recruitment, laboratory set-up, and bench testing to identify the key constraints to methane production. Insights to alleviate the constraints are informing prototype

Actions taken in 2018**Actions underway/planned for 2019**

	design of a potentially patentable Renewable Natural Gas Optimizer.
High Efficiency Aeration Demonstration Metro Vancouver has retained Perlemax as the technology provider who has provided their conceptual design and secured the Water Research Foundation as a third party independent evaluator.	High Efficiency Aeration Demonstration Staff are in the process of formalizing collaborative work with the District of Columbia Water and Sewer Authority at their large wastewater treatment plant.
New Iona Island Wastewater Treatment Plant Design The Iona Island Wastewater Treatment Plant will be replaced with a new facility by December 31, 2030, to comply with the requirements of the federal Wastewater Systems Effluent Regulations. Project Definition phase of the work is underway. Significant consideration is being given to climate change adaptation and mitigation as part of the Project Definition process. Climate change considerations were a critical part of the decision making process that led to setting key objectives, principles and targeted outcomes for the project.	New Iona Island Wastewater Treatment Plant Design As part of the project definition phase the project team will continue to refine concepts and integrate climate change considerations into evaluation of ecological impacts, options/technologies, conceptual design and cost estimates.
Feasibility Study for Biosolids Drying Using Waste Heat Completed the feasibility study to evaluate the potential for biosolids drying using waste heat and a complementary Dried Biosolids Market Study.	Feasibility Study for Biosolids Drying Using Waste Heat Finalize biosolids management strategy, including options for drying biosolids for energy and fertilizer markets.
Campbell Mountain Landfill Biocover The biocover trial was completed in spring 2018 with findings reported to the Ministry of Environment Solid Waste Section in fall 2018. Trial results were used in the development of a draft GHG emissions reduction calculator for biocovers and biofilters constructed with biosolids.	Campbell Mountain Landfill Biocover The biocover trial results are currently under review by the Ministry of Environment to determine whether a biocover at the Campbell Mountain Landfill would be an acceptable alternative to active landfill gas capture for methane emissions reduction. No further actions are planned by Metro Vancouver on this project for 2019.

Water and Wastewater: Community Wide Actions

Actions taken in 2018	Actions underway/planned for 2019
<p>Reclaimed Water Demonstration System</p> <p>Developed a predesign basis report for a reclaimed water demonstration system at Lulu Island Wastewater Treatment Plant for which City of Richmond has demonstrated interest.</p>	<p>Reclaimed Water Demonstration System</p> <p>A 2020 budget request for the design and construction of the reclaimed water demonstration system has been submitted contingent on getting a formal letter of interest from City of Richmond.</p>
<p>Mountain Lake Tapping Project, 2017 Sustainability Innovation Fund</p> <p>Following the 2015 drought, this project was proposed as a way to supplement the water supply during future droughts. Enchantment Lake (and others alike) is a deep alpine lake and holds a large volume of water currently unavailable to the drinking water supply system without costly infrastructure construction. This project tested use of a large diameter siphon and instrumentation for flow monitoring with a net environmental benefit by adding to downstream aquatic habitat during naturally low flow periods. The trial successfully operated a 200 mm (8 inch) diameter siphon for 27 days and mobilized approximately 200,000 cubic meters of water downstream toward water supply infrastructure.</p>	
<p>Monitoring the Impacts of Climate Change on the Forests of Metro Vancouver's Water Supply Areas</p> <p>Climate change is expected to increase the frequency and magnitude of extreme precipitation events in the watersheds and increase the occurrence of landslides. This research uses modelling and statistical methods to correlate precipitation events with incidence of landslides. The study will be completed in early 2019.</p> <p>This study will build on the 2016 Sustainability Scholar's work to determine long-term climate change impacts on watershed forests and associated implications for water quality and supply, with an emphasis on providing monitoring and adaptation recommendations.</p>	<p>Monitoring the Impacts of Climate Change on the Forests of Metro Vancouver's Water Supply Areas</p> <p>Carry out snowpack modelling to help assess the short and long term implications of climate change on water quality, water supply, and forest health.</p> <p>Retained UBC Sustainability Scholar to work on project in 2019.</p>

Actions taken in 2018**Actions underway/planned for 2019**

The study will contribute to a long-term monitoring and adaptation strategy for the watershed forests.

Greywater Reuse and Rainwater Harvesting Demonstration

This two-year project will investigate the feasibility of promoting greywater reuse and rainwater harvesting systems in the region and provide guidance on integrating water reuse into new residential and commercial developments. The objective is to support and encourage new developments that may be considering water reuse to successfully implement and maintain greywater or rainwater systems.

Greywater Reuse and Rainwater Harvesting Demonstration

A Request for Proposals to engage consulting services is in progress. A key project deliverable for the consultant will be a guidebook that details lessons learned and offers practical recommendations.

Climate Change Impacts On Watershed Landslides

Climate change will result in a higher frequency and magnitude of extreme rainfall events, which in turn may increase landslides and debris flows. This analysis will estimate the projected number of landslides in the watersheds in future decades due to climate change. The analysis may also predict the changes in the length of the debris-flow season and the elevation range at which debris flows occur.

Climate Change Impacts On Watershed Landslides

Report scheduled to be completed in Q2.

Potential Effects of Fire Retardant On Water Quality

The risk of wildfire is expected to increase due to climate change. In the event of a forest fire in the watersheds, firefighting may include use of the fire retardant called Phos-Chek. This study investigated the potential effects of Phos-Chek application on water quality in the supply reservoirs and in the water distribution system. The study proposed a post-wildfire monitoring program to support decision-making around source water supply after Phos-Chek application.

Potential Effects of Fire Retardant On Water Quality

Project complete.

Mobilization of Organics in Watersheds

In November 2017, a large landslide in the Jamieson Creek sub-drainage deposited organic and inorganic debris directly into the Seymour River and raised turbidity levels in the Seymour

Actions taken in 2018**Actions underway/planned for 2019**

	<p>Reservoir and at the Seymour/Capilano Filtration Plant. The organic material was difficult to filter due to its unique properties and loading rate. Mapping will be conducted to identify sites where organic material may be at risk of being mobilized in future landslides, and estimate the volume of material that could enter the reservoirs. The study will evaluate whether any management options could protect reservoirs from future landslides at identified high risk sites. Plan to define project tasks and deliverables and begin project in 2019.</p>
<p>Regional We Love Water Conservation Campaign</p> <p>The 2018 We Love Water behaviour change campaign consisted of a spring “source to tap” phase, to increase residents’ awareness of the water system, and a summer “conservation” phase to encourage reduced household water use. Messaging was promoted in digital and social media and via newspaper, radio, and television advertising and features.</p>	<p>Regional We Love Water Conservation Campaign</p> <p>2019 is the fourth year of the We Love Water campaign. Residents will learn about the water system and how to conserve water through a range of advertising featuring updated creative materials. All promotions will continue to lead to welovewater.ca. An increased focus for 2019 will be on water-efficient lawn care, landscaping, and gardening.</p>
<p>Water Wagon Outreach Program</p> <p>The Water Wagon outreach program visited regional events in 15 member jurisdictions, for a total of 56 event days. The outreach team educated residents on the source of their water, its quality, and the importance of conservation.</p>	<p>Water Wagon Outreach Program</p> <p>A second Water Wagon has been purchased for the 2019 event season, allowing an anticipated 70 event days. The second Water Wagon will reduce the number of conflicting dates on the event schedule, allowing the outreach team to visit a wider range of events in more member jurisdictions.</p>

CLIMATE CHANGE ADAPTATION

This section of the CARIP survey is designed to collect information related to the types of climate impacts local governments are experiencing and how they are being addressed.

Climate Change Adaptation Survey Questions	Responses
<p>Please identify the THREE climate impacts that are most relevant to your Local Government.</p> <p>Most relevant impacts:</p> <ul style="list-style-type: none"> Warmer winter temperatures reducing snowpack Changes to temperature and precipitation causing seasonal drought Extreme weather events contributing to urban and overland flooding <p>Other impacts:</p> <ul style="list-style-type: none"> Heatwaves impacting population health Increased temperatures increasing wildfire activity Increased temperatures affecting air quality Changing temperatures influencing species migration and ecosystem shifts Sea level rise and storms causing coastal flooding and/or erosion 	
<p>In 2018 has your local government addressed the impacts of a changing climate using any of the following?</p> <p>Risk and Vulnerability Assessments</p> <p>Risk Reduction Strategies</p> <p>Emergency response planning</p> <p>Asset management</p> <p>Natural/Eco asset management strategies</p> <p>Infrastructure upgrades (e.g. storm water system upgrades)</p> <p>Beach Nourishment projects</p> <p>Economic diversification initiatives</p> <p>Strategic and financial planning</p> <p>Cross-department working groups</p> <p>OCP policy changes</p> <p>Changes to zoning and other bylaws and regulations</p> <p>Incentives for property owner (e.g. reducing storm water run-off)</p> <p>Public education and awareness</p> <p>Research</p> <p>Mapping</p> <p>Partnerships</p>	<p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>No</p> <p>Yes</p> <p>No</p> <p>No</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>No</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p>

The following are key resources that may be helpful to your local government in identifying climate impacts, as well as, strategies, actions and funding to deal with them. For those resources that you have used, please indicate whether they were useful in advancing your work in climate change adaptation?

[Indicators of Climate Change for British Columbia](#)
[Plan2Adapt](#)
[Climate Projections for Metro Vancouver](#)
[Climate Projections for the Capital Region](#)
[Climate Projections for the Cowichan Valley Regional District](#)
[Province of BC's BC Adapts Video Series](#)
[Preparing for Climate Change: Implementation Guide for Local Governments](#)
[Public Infrastructure and Engineering Vulnerability Committee's \(PIEVC\)](#)
[Sea Level Rise Adaptation Primer](#)
[BC Regional Adaptation Collaborative Webinars](#)
[Retooling for Climate Change](#)
[Water Balance Model](#)
[Water Conservation Calculator](#)

Funding:

[National Disaster Mitigation Program \(NDMP\)](#)
[Community Emergency Preparedness Fund \(CEPF\)](#)
[Municipalities for Climate Innovation Program \(MCIP\)](#)
[Climate Adaptation Partner Grants \(FCM\)](#)
[Infrastructure Planning Grants \(MAH\)](#)
[Federal Gas Tax Fund](#)

Haven't Used /Useful/Not Useful

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Climate Change Adaptation: Corporate Actions

Actions taken in 2018

Climate Change Impacts and Adaptation for Regional Water System

The findings from this work were incorporated into the Comprehensive Regional Water System Study and Plan.

Actions underway/planned for 2019

Climate Change Impacts and Adaptation for Regional Water System

The Comprehensive Regional Water System Plan, to be reported to the Water Committee and Board in 2019, will include recommendations related to climate change impacts and adaptation, including a schedule for periodically revisiting the key climate data reflecting the latest scientific understanding.

Outdoor Fire Program for Regional Parks Updated design standard for fire pits. Fire pits have been changed to updated standard at several locations.	Outdoor Fire Program for Regional Parks Fire pits to be upgraded on remaining sites as budget allows.
Climate Projections Impacts on Precipitation and Stormwater Completed study of climate change impacts on precipitation and stormwater management. The new future climate intensity-duration-frequency (IDF) curves are being adopted by Metro Vancouver for planning and design and have been shared with member jurisdictions.	Climate Projections Impacts on Precipitation and Stormwater Continue using the future climate IDF curves in planning and design. Share and distribute future rainfall curves and study contents within Metro Vancouver as reference for climate change planning work. Use future IDF curves as basis for discussion of climate change effects on levels of service in the region.
	Fraser Sewerage Area Integrated Resource Recovery Study This study, which will recommend a list of integrated resource recovery strategies and near-term integrated resource recovery actions at the Annacis Island Wastewater Treatment Plant, is being initiated in 2019, and will be completed in 2020.

Climate Change Adaptation: Community Wide Actions

Actions taken in 2018	Actions underway/planned for 2019
Climate 2050 Roadmaps Finalized the <i>Climate 2050 Strategic Framework</i> , which identifies ten issue area roadmaps including adaptation goals, strategies, and actions.	Climate 2050 Roadmaps In 2019 and 2020, develop several of the <i>Climate 2050 Roadmaps</i> , including adaptation goals, strategies, and actions.
Urban Forest Climate Adaptation Framework and Design Guidebook Worked with Diamondhead Consulting to expand the Tree Species Selection Database to over 300 species. Metro Vancouver staff presented and promoted the Urban Forest Climate Adaptation project through various channels, including a project video on the Metro Vancouver website, an article submission to the International Society of City and Regional Planners, and a presentation at the International Urban Forestry Congress.	Urban Forest Climate Adaptation Framework and Design Guidebook Continue to inform various audiences about the Urban Forest Climate Adaptation project through presentations at a Metro Vancouver Sustainability Breakfast and to the BC Parks and Recreation Association. Metro Vancouver also intends to engage with urban forest practitioners in 2019 through a targeted and interactive forum.

OTHER CLIMATE ACTIONS

This section provides local governments the opportunity to report other climate actions that are not captured in the categories above.

Other Climate Actions Survey Questions	Responses
Are you familiar with the Community Lifecycle Infrastructure Costing Tool (CLIC) ?	Yes
Is your local government using the CLIC tool?	No

Other Climate Actions: Community Wide Actions

Actions taken in 2018	Actions underway/planned for 2019
Caring for the Air Report The Caring for the Air report is an annual, plain-language publication introduced by Metro Vancouver in 2012. The 2018 edition was published in June 2018 and preparation of the 2019 edition began.	Caring for the Air Report Caring for the Air is published annually. The 2019 issue includes articles describing the development of roadmaps for <i>Climate 2050</i> , actions in <i>CleanBC</i> (the provincial climate strategy), successful projects created through the National Industrial Symbiosis Project, electric vehicle programs supported by Metro Vancouver, and the potential future impact of climate change on air quality due to increased wildfire activity.
Innovative Tools for Community Energy Planning Finalized the second iteration of the Community Energy Explorer (www.energyexplorer.ca).	Innovative Tools for Community Energy Planning Publicize the Community Energy Explorer as a resource.
School and Youth Leadership Program Developed and delivered Metro Vancouver School and Youth Leadership programs on regional sustainability topics, including climate change. This includes: teacher professional development workshops to introduce tools and strategies to respond to the new BC curriculum, youth leadership events to support high school students as leaders to influence sustainability and action (including climate action) at school, and	School and Youth Leadership Program Metro Vancouver will continue to collaborate with school districts and other stakeholders in sustainability and climate change education to support teacher professional development and youth leadership. This includes place-based sustainability (climate action) teacher workshops and events, Youth4Action programs such as Metro Vancouver Sustainability Toolbox: A

Actions taken in 2018

Actions underway/planned for 2019

the Youth Forum on Metro Vancouver *Climate 2050* Consultation.

Regional Leadership Course, and Regional Youth Leadership Events (Clinics).

Climate Literacy Learning Modules

Metro Vancouver will develop climate literacy learning modules, to be hosted on the Metro Vancouver *Climate 2050* website. Target audiences includes municipal staff and elected officials, youth, professionals, and engaged residents.

Emission Regulation for Open-Air Burning

Seek Board direction to initiate consultation on an emission regulation for open-air burning to reduce emissions of black carbon from incomplete combustion of biomass.

INNOVATION AND PEER-TO-PEER LEARNING

This section provides the opportunity to showcase an innovative corporate and/or community-wide GHG reduction and/or climate change adaptation activity that your local government has undertaken and that has had, or has the potential to have, a significant impact. You are welcome to highlight an action that has already been listed.

Projects included here may be featured as success stories on the [B.C. Climate Action Toolkit](#) and/or shared with other local governments to inspire further climate action. Please add links to additional information where possible.

Communities that have conducted innovative initiatives may want to consider making applications to [CEA's Climate and Energy Action Awards](#), [FCM Sustainable Communities Awards](#) or to [FCM's National Measures Report](#).

Innovation and Peer-to-Peer Learning: Corporate Actions

Actions taken in 2018	Actions underway/planned for 2019
<p>Carbon Price Policy</p> <p>The Carbon Price Policy is being implemented in phases, and coordinated with the implementation of other complementary policies. The policy is being incorporated into life cycle cost assessments during Metro Vancouver's capital planning processes, and in particular, into financial business casing tools used for options analyses that concern energy decisions.</p>	<p>Carbon Price Policy</p> <p>Continue to implement the Carbon Price Policy and incorporate life cycle cost assessments in business decisions.</p>
<p>Sustainability Innovation Program Website</p> <p>In May 2018, the Metro Vancouver Sustainability Innovation Program website was launched detailing projects or initiatives undertaken by the Regional District, Liquid Waste or Water functions that contribute to the region's sustainability.</p> <p>2018 was the fourth intake of Sustainability Innovation Fund projects.</p>	<p>Sustainability Innovation Program Website</p> <p>Project updates will continue to be reported through the site.</p> <p>The fifth intake of projects was approved in 2019. The program now has 41 projects, within the Liquid Waste, Regional District, and Water functions of Metro Vancouver. 25 of the projects are active.</p>
<p>Sustainable Infrastructure and Buildings Policy</p> <p>The Sustainable Infrastructure and Buildings Policy was approved by the Board in October 2018. The policy identifies minimum sustainable design and construction requirements for a wide range of building and infrastructure projects.</p>	<p>Sustainable Infrastructure and Buildings Policy</p> <p>The implementation of the policy will be supported by a Sustainable Design Guide. The Guide will map out the technical requirements for projects to meet the requirements of the policy. Creation of the Guide will be informed by input from internal groups and our member jurisdictions.</p>

PROGRAMS, PARTNERSHIPS AND FUNDING OPPORTUNITIES

Local governments often rely on programs, partnerships and funding opportunities to achieve their climate action goals. Please share the names of programs and organizations that have supported your local government's climate actions by listing each entry in the box below separated by a forward slash (e.g. program1/program2).

Programs and Funding
<p>Metro Vancouver's climate action initiatives has been fortunate to rely on a number of partnerships and funders to successfully implement projects and programs, including but not limited to:</p> <p>Mitigation</p> <p>BC Home Safety and Standards Branch BC Hydro BC Ministry of Energy, Mines & Petroleum Resources BC Ministry of Municipal Affairs and Housing Climate Action Secretariat, BC Ministry of Environment City Green Solutions Collaborative for Advanced Landscape Planning (CALP) at UBC Condominium Homeowners Associations (CHOA) BC Housing FortisBC Fraser Basin Council Fraser Valley Real Estate Board Greater Vancouver Home Builders' Association Institute for Resources, Environment and Sustainability, UBC Pacific Institute for Climate Solutions (PICS) Parkland Fuel Corporation Province of BC Innovative Clean Energy Fund Quality Urban Energy Systems for Tomorrow (QUEST) Real Estate Board of Greater Vancouver School of Community and Regional Planning, UBC University of British Columbia Various local governments Vancouver Electric Vehicle Association Real Estate Foundation Community Energy Association</p> <p>Adaptation</p> <p>Fraser Basin Council Climate Action Secretariat, BC Ministry of Environment Engineers and Geoscientists BC Natural Resources Canada Pacific Climate Impacts Consortium (PCIC) BC Ministry of Municipal Affairs and Housing School of Community and Regional Planning, UBC University of British Columbia Collaborative for Advanced Landscape Planning (CALP) at UBC Various local governments</p>

2018 CARBON NEUTRAL REPORTING

Reporting Emissions

Did you measure your local government's corporate GHG emissions in 2018?	Yes
Corporate GHG emissions (in tonnes of carbon dioxide equivalent) from services delivered <u>directly</u> by your local government:	6,629
Corporate GHG emissions (in tonnes of carbon dioxide equivalent) from <u>contracted</u> services:	8,228 ¹
TOTAL A: CORPORATE GHG EMISSIONS FOR 2018	14,857 tCO₂e

Reporting Reductions and Offsets

To be carbon neutral, a local government must balance their TOTAL corporate GHG emissions generated in 2018 by one or a combination of the following actions:

- undertake GCC-supported Option 1 Project(s)
- undertake GCC-supported Option 2 Project(s)
- purchase carbon offsets from a credible offset provider

For more information about options to balance or offset corporate GHG emissions please refer to [Becoming Carbon Neutral: A Guidebook for Local Governments in British Columbia](#).

If applicable, please report the 2018 GHG emissions reductions (in tonnes of carbon dioxide equivalent (tCO₂e)) being claimed from Option 1 GHG Reduction Projects:

OPTION 1 PROJECTS	REDUCTIONS
Grant Hill (Kanaka Creek Regional Park) Avoided Forest Conversion Project ²	255
Lane Property (Kanaka Creek Regional Park)	81
TOTAL B: REDUCTIONS FROM OPTION 1 PROJECTS FOR 2018	336 tCO₂e

¹ Metro Vancouver's corporate GHG emissions from contracted services are primarily related to hauling of waste and residuals material from corporate facilities to final disposal or use sites, such as landfills or biofuel facilities. Provincial guidance to local governments is to report emissions from new contracts and upon renewal of existing contracts. More detail is provided in Appendix 1: Contracted Emissions Report for Metro Vancouver.

² For more information about the Grant Hill and Lane Property Avoided Forest Conversion Projects, please refer to the Project Reports, available at: <http://www.metrovancouver.org/services/air-quality/climate-action/our-operations/corporate-action-plan/Pages/default.aspx>

If applicable, please report the names and 2018 GHG emissions reductions (in tonnes of carbon dioxide equivalent (tCO₂e)) being claimed from Option 2 GHG Reduction Projects:

OPTION 2 PROJECT NAME	REDUCTIONS
Coquitlam Landfill Gas Collection System Upgrade Project ³	298
TOTAL C: REDUCTIONS FROM OPTION 2 PROJECTS FOR 2018	298 tCO₂e

If applicable, please report the number of offsets purchased (in tonnes of carbon dioxide equivalent (tCO₂e)) from an offset provider for the 2018 reporting year:

(NOTE: DO NOT INCLUDE ANY FUNDS THAT MAY BE SET ASIDE IN A CLIMATE ACTION RESERVE FUND)

OFFSET PROVIDER	REDUCTIONS
Not applicable	N/A
TOTAL D: OFFSETS PURCHASED FOR 2018	0 tCO₂e

TOTAL REDUCTION AND OFFSETS FOR 2018 (Total B+C+D) = 634 tCO₂e

Corporate GHG Emissions Balance for 2018

Your local government's Corporate GHG Emissions Balance is the difference between total corporate GHG emissions (direct + contracted emissions) and the GHG emissions reduced through GCC Option 1 and Option 2 projects and/or the purchase of offsets.

CORPORATE GHG EMISSIONS BALANCE FOR 2018 = (A – (B+C+D)) = 14,223 tCO₂e

Carbon Neutral Reporting	
Does your local government set aside funds in a climate reserve fund or similar?	Yes; Metro Vancouver has held part of its GST rebate in reserve since 2005. This has been used to create the Sustainability Innovation Funds (SIF) for internal Metro Vancouver Projects. To date, 41 projects have been approved for funding within the Liquid Waste, Regional District, and Water functions of Metro Vancouver. More information on SIF projects completed in 2018 or underway/planned for 2019 is provided within this report.

³ For more information about the Coquitlam Landfill Gas Collection System Upgrade Project, please refer to the validated Project Plan and the 2018 Project Report, available at: <http://www.metrovancouver.org/services/air-quality/climate-action/our-operations/capturing-landfill-gas/Pages/default.aspx>

GCC CLIMATE ACTION RECOGNITION PROGRAM

Green Communities Committee (GCC) Climate Action Recognition Program

The joint Provincial-UBCM Green Communities Committee (GCC) is pleased to be continuing the Climate Action Recognition Program again this year. This multi-level program provides the GCC with an opportunity to review and publicly recognize the progress and achievements of each Climate Action Charter (Charter) signatory.

Recognition is provided on an annual basis to local governments who demonstrate progress on their Charter commitments, according to the following:

Level 1 – Demonstrating Progress on Charter Commitments: for local governments who demonstrate progress on fulfilling one or more of their Charter commitments

Level 2 – Measuring GHG Emissions: for local governments that achieve level 1, and who have measured their Corporate GHG Emissions for the reporting year and demonstrate that they are familiar with the Community Energy and Emissions Inventory (CEEI)

Level 3 – Accelerating Progress on Charter Commitments: for those local governments who have achieved level 1 and 2 and have demonstrated undertaking significant action (corporately or community wide) to reduce GHG emissions in the reporting year (i.e., through undertaking a GHG reduction project, purchasing offsets, establishing a reserve fund).

Level 4 – Achievement of Carbon Neutrality: for local governments who achieve carbon neutrality in the reporting year.

Based on your local government's 2018 CARIP Climate Action/Carbon Neutral Progress Survey, please check the GCC Climate Action Recognition Program level that best applies:

	Level 1 – Demonstrating Progress on Charter Commitments	
	Level 2 – Measuring GHG Emissions	
X	Level 3 – Accelerating Progress on Charter Commitments	
	Level 4 – Achievement of Carbon Neutrality	

For purposes of Level 3 recognition, if applicable, please identify any new or ongoing corporate or community wide GHG reduction projects (other than an Option 1 or Option 2 project) undertaken by your local government that reflects a significant investment of time and/or financial resources and is intended to result in significant GHG reductions:

PROJECT NAME:
Metro Vancouver has made significant investment of time and financial resources in a wide range of projects and has taken a leadership position in reducing both corporate and regional emissions. Below is a sample of actions described in this report that have required significant resources and/or time,

and which have either resulted in significant GHG reductions or have set the conditions for future expansion of climate action.

OPTION 1 AND OPTION 2 GHG EMISSION REDUCTION PROJECTS

Coquitlam Landfill Gas Collection System Expansion

Grant Hill (Kanaka Creek Regional Park) Avoided Forest Conversion Project

Lane Property (Kanaka Creek Regional Park) Avoided Forest Conversion Project

Effluent Heat Recovery at the new North Shore Wastewater Treatment Plant (approved future project)

POLICY PROJECTS

Climate 2050 Strategic Framework

Liquid Waste Heat Recovery Policy

Sustainable Infrastructure and Buildings Policy

Comprehensive Regional Water System Plan

RESEARCH AND DEVELOPMENT

Study of the Impacts of Climate Change on Precipitation and Stormwater Management

Transit-Oriented Affordable Housing Study

Burns Bog Restoration Study

OUTREACH AND EDUCATION

Emotive: the electric vehicle experience

EV Condo

EV Workplace

Strata Energy Advisor

APPENDIX 1: Contracted Emissions Report for Metro Vancouver

Reporting Metro Vancouver's Contracted Emissions

Metro Vancouver's corporate GHG emissions from contracted services are primarily related to hauling of solid waste, biosolids, and residual material from corporate facilities to final disposal or use sites, such as landfills, beneficial use sites, or biofuel facilities.

Metro Vancouver reports its contracted emissions in accordance with reporting guidance provided by the joint Provincial-UBCM Green Communities Committee's Workbooks and Guidebook. The *"Guidance on Including Contracted Emissions in Local Government Corporate Inventories"* describes what contracts should be included in corporate inventories, what emissions data needs to be collected, and the steps that a local government can undertake to achieve this. It directs local governments to report emissions from new contracts and upon renewal of existing contracts.

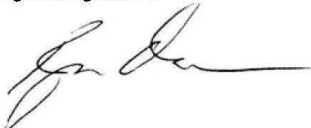
Metro Vancouver's waste management approach is to reduce the generation of waste, and to pursue opportunities for resource recovery and the beneficial reuse of waste. Programs supported or implemented by Metro Vancouver and its partners to reduce, reuse, and recycle waste (including organics diversion from households and businesses) marks a shift from thinking about the waste as an end product toward seeing waste as a potential resource. Metro Vancouver will continue to pursue approaches and technologies to reduce GHG emissions and promote opportunities for the replacement of fossil fuels.

In 2018, Metro Vancouver continued to improve tracking and reporting accuracy for contracted emissions. The increase of total reported contracted emissions in 2018 is due to improved tracking and reporting of fuel consumption data by Metro Vancouver's contractors, as well as an increase in hauling activity (in particular related to biosolids management).

Contracted Emissions Reporting Form for Metro Vancouver

Reporting Year: 2018

Local Government Information			
Name of Local Government	Metro Vancouver		
Designate Appointed to Sign Off on Estimation Template	Name: Roger Quan Title: Director, Air Quality and Climate Change Phone: 604-436-6770 Email: roger.quan@metrovancover.org		
Estimation Methodology Information			
Rationale for Applying an Estimation Methodology	For contracts in the 2018 reporting year, fuel use was reported directly from contractors ("Estimation Option 1"). Contract name = activity.		
Contracted Emissions			
Drinking, Storm and Wastewater	CONTRACT NAME	ESTIMATION OPTION USED	ESTIMATED ANNUAL GHGS (t CO ₂ e)
	Biosolids/Residuals Hauling	1	2571.7
	SUBTOTAL ANNUAL CONTRACTED EMISSIONS FOR TRADITIONAL SERVICE		2571.7
Solid Waste Collection, Transportation and Diversion	CONTRACT NAME	ESTIMATION OPTION USED	ESTIMATED ANNUAL GHGS (t CO ₂ e)
	Solid Waste Hauling	1	3884.3
	SUBTOTAL ANNUAL CONTRACTED EMISSIONS FOR TRADITIONAL SERVICE		3884.3
Misc	CONTRACT NAME	ESTIMATION OPTION USED	ESTIMATED ANNUAL GHGS (t CO ₂ e)
	Other Off-Road Equipment	1	1167.8
	Other Mobile Sources	1	604.2
	SUBTOTAL ANNUAL CONTRACTED EMISSIONS FOR TRADITIONAL SERVICE		1772.0
TOTAL ESTIMATED CONTRACTED EMISSIONS FOR 2018 (tonnes CO₂e)			8228.0

Estimated Contracted Emissions: Authorization and Sign Off
<p>The information provided in this Contracted Emissions Reporting Form for the 2018 reporting year is to the best of my knowledge correct and complete.</p> <p>Designate Signature:</p>  <p>Roger Quan, Director, Air Quality and Climate Change Date: May 31, 2019</p>

To: Climate Action Committee

From: Jason Emmert, Senior Planner
Erik Blair, Air Quality Planner
Planning and Environment Department

Date: June 18, 2019 Meeting Date: July 12, 2019

Subject: **Strata Energy Advisor Pilot Program Update**

RECOMMENDATION

That the Climate Action Committee receive for information the report dated June 18, 2019, titled, "Strata Energy Advisor Pilot Program Update".

PURPOSE

To provide the Climate Action Committee with an update on the Strata Energy Advisor Pilot Program.

BACKGROUND

In July 2015, the Metro Vancouver Board approved funding from the Sustainability Innovation Fund for several projects, including the Strata Energy Advisor Pilot Program:

That the GVRD Board approve the allocation of funding from the GVRD Sustainability Innovation Fund to the following projects:

d) Strata Energy Advisor: \$50,000 in 2015; \$50,000 in 2016 and \$100,000 in 2017;

In October 2017, the Metro Vancouver Board passed the following resolution:

That the MVRD Board:

- a) direct staff to proceed with the Strata Energy Advisor Program under a revised scope, as outlined in the report dated August 28, 2017, titled "Strata Energy Advisor Program - Additional Information Regarding Air Quality Reserve Request"; and*
- b) authorize a contribution from the Air Quality Reserve, in the amount of \$192,500, to support delivery of the revised Strata Energy Advisor Program in 2017-2019.*

This report responds to an action in the 2019 Climate Action Committee work plan to provide an interim report on progress of the Strata Energy Advisor Pilot Program.

STRATA ENERGY ADVISOR PILOT PROGRAM

Large buildings are a major source of greenhouse gas (GHG) emissions in the region, and are the subject of significant GHG reduction efforts under the *Climate 2050* Roadmap for buildings. The Strata Energy Advisor Pilot Program is a Sustainability Innovation Fund supported project that aims to address key barriers to reducing greenhouse gas emissions from strata buildings by providing professional energy advisor services to strata councils and property managers undertaking major building renewal and building maintenance projects. The Strata Energy Advisor Pilot Program is jointly

funded through contributions from Metro Vancouver and the program funding partners (City of New Westminster, City of North Vancouver, City of Richmond, City of Surrey, City of Vancouver, and UBC). The funding partners' contributions are used to support the program design and delivery as well as grants available to strata participants in their jurisdictions. A Steering Committee is made up of staff from the funding partners, Condominium Homeowners Association (CHOA), BC Hydro, FortisBC, and BC Housing; it provides strategic advice and direction for the pilot program.

In 2016, Metro Vancouver and the Strata Energy Advisor program partners completed an in-depth background study and stakeholder engagement process to inform the design of a Strata Energy Advisor Pilot Program. This analysis included information on GHG reduction opportunities from strata buildings, barriers to implementing reduction projects, and key considerations to ensure program uptake by participants. Additional background information is provided in Attachment 1.

In 2017, the MVRD Board approved additional funding for the program, under an expanded scope, recognizing the strong interest and support from member jurisdictions and other partners.

In 2018, SES Consulting was hired through a competitive procurement process to complete detailed program design and deliver the pilot program, which runs from April 22, 2018 to November 20, 2019.

PROGRAM TARGETS

The Strata Energy Advisor Pilot Program targets are as follows:

- 300 registered strata buildings
- 88 walk-through energy assessments and business case reports (i.e., energy audits)
- 62 completed building tune-ups or smart building upgrades
- 13 planned or completed mechanical projects
- 6 planned or completed building envelope projects
- 5 presentations and/or booths at educational events

These targets were set based on the expected outcomes originally identified at the outset of the pilot program and presented to the MVRD Board in 2017 (see Attachment 1). They were updated to reflect the specific program design and budget allocation recommendations from the consultant and Steering Committee, and for the most part exceed the initial expected outcomes.

RESULTS TO DATE

Program Registrations

Program registration opened April 22, 2018, and any residential strata corporation or housing cooperative in the region was eligible to apply. The program was promoted through the Strata Energy Advisor website (Reference 1), CHOA events and publications, municipal and Metro Vancouver websites, and social media. The consultant presented or had a booth at seven promotional events.

Registration was initially open until September 30, 2018 on a first come, first served basis. Due to high demand, registration closed 14 weeks early (on June 22, 2018), after the program met its target of qualifying 70 buildings to participate in the program from a total of 211 registered participants. In response to the high demand, the Steering Committee and funding partners directed Metro

Vancouver to reallocate a portion of the partner funding to allow an additional 18 registered buildings from the waitlist to participate in the program, for a total of 88 qualified buildings.

Screening for Qualified Buildings

Upon registration, each building completed a three-stage online and phone screening process, to confirm that they were located in Metro Vancouver, had potential energy efficiency and emissions reduction opportunities, and had a readiness and interest to act. Buildings that did not qualify for the program were provided information on energy conservation and emission reduction measures that they might consider on their own. The majority of candidates who were determined to be ineligible at the phone stage were only interested in lighting upgrades, which are highly cost effective and did not require support from the program to overcome informational and financial barriers.

Walk-Through Energy Assessments and Business Case Reports

As of May 17, 2019, 87 strata corporations have completed walk-through energy assessments and received businesses case reports. The remaining energy assessment and report is scheduled.

Energy Conservation Project Implementation

The table below summarizes the status of the identified implementation projects as of June 18, 2019. Of all the projects that were included in the business case reports provided by the Strata Energy Advisors, 118 projects were identified by the strata councils as being candidates for implementation. An individual strata council may have identified more than one project. 64 of those projects have been approved by strata councils and/or owners to proceed with more in-depth feasibility study or to solicit quotes from contractors. 43 projects are pending approval by strata councils and/or owners to proceed. 18 projects have already been completed and seven projects were abandoned after further consideration by the strata councils.

	Target	Total Projects	Approved; In Process	Pending Approval	Completed
Building Tune-Up and/or Smart Building Upgrades	62	75	45	29	14
Mechanical Projects	13	31	14	10	4
Building Enclosure Projects	6	12	5	4	0
Total	81	118	64	43	18

Grants

Funding for grants has been provided by member jurisdictions. As of June 10, 2019, 32 strata participants have submitted grant applications for pre-approval. The applicants must submit documentation confirming approval and completion of the project (i.e., strata council resolution and receipts) to receive grant funding. Four participants have received grant funding. The grant applications are summarized by municipality in the table below. Attachment 1 includes a description of the type of projects eligible for grants.

Grant Applications	Vancouver	Richmond	Surrey	New West	City of North Van.	UBC
Tune-ups / Smart Upgrades	16	0	3	6	1	0
Feasibility Study	2	1	0	2	0	1

NEXT STEPS

The Strata Energy Advisors will provide implementation support to the participating strata buildings until the end of the pilot program on November 30, 2019. In the beginning of 2020, staff will bring a final report to the Climate Action Committee. The final report will summarize the projects implemented to date, the estimated greenhouse gas reductions, cost effectiveness of the program, a survey of the participants and other measure of the impact of the program. Based on these pilot program results, Metro Vancouver will work with the Steering Committee to prepare recommendations for the future of the program for consideration by the Climate Action Committee.

ALTERNATIVES

This is an information report. No alternatives are presented.

FINANCIAL IMPLICATIONS

The overall budget for the Strata Energy Advisor pilot program was \$759,000, including \$100,000 for a background study, the Program Design and Delivery budget at \$549,500, and the grant allocation budget of \$109,500.

Metro Vancouver contributions included \$200,000 from SIF and an additional \$192,500 from air quality reserves, as approved by the Board to support a revised scope of work. Contributions from project partners within the respective municipalities totaled \$366,500. In response to demand for the program, the funding partners requested that a portion of their funding (that was originally earmarked for grants) be shifted to Program Design and Delivery to allow an additional 18 strata corporations to participate. This increased the Program Design and Delivery budget to \$549,500.

At time of writing, the bulk of the Program Design and Delivery has been expended, and the pilot program is shifting to the grant allocation phase.

Depending on the final results of the Strata Energy Advisory Pilot Program, an ongoing program in the region may be recommended by staff and the Steering Committee, with associated program costs. This will be the subject of a final report on this pilot program, which will inform future budgets for the consideration of the Committee and Board.

SUMMARY / CONCLUSION

This report summarizes the results to date of the Strata Energy Advisor Pilot Program. The program was originally funded under the Sustainability Innovation Fund, but received significant interest and funding from a number of member jurisdictions. Due to demand for the program, the scope was expanded and the Board approved additional funding from Air Quality reserves in 2017. The Pilot Program is on track to achieve the implementation targets, which include 300 registered strata buildings, 88 energy audits, and over 60 building tune-ups or smart building upgrades. The pilot has demonstrated the interest in and potential GHG reduction benefits of such a program, and how it would fit within the *Climate 2050 Roadmap* for buildings. The program will run until November 30, 2019 and staff intend to bring a final report to the Climate Action Committee in early 2020 with recommendations on any future iterations of the program.

Attachment (30105834)

Strata Energy Advisor Program Backgrounder

Reference

[Strata Energy Advisor Program website](#)

30035517

Strata Energy Advisor Pilot Program – Background Information

GREENHOUSE GAS EMISSION REDUCTION OPPORTUNITIES FROM STRATA BUILDINGS

There are more than 7,200 residential strata buildings throughout Metro Vancouver, which are occupied by more than 300,000 households. Strata buildings currently emit an estimated 600,000-800,000 tonnes of greenhouse gas emissions per year, predominantly from energy use for space and water heating (common areas and unit heating).

Every year, 4-11% of strata corporations identify necessary major building renewal projects including refurbishment or replacement of heating, mechanical and electrical systems, or building envelope upgrades. These projects present important opportunities to improve energy efficiency and reduce greenhouse gas emissions. For an individual building, choosing the more energy efficient option when undertaking major upgrades may be an incremental additional cost relative to the project budget, but can lead to long term energy savings and greenhouse gas reductions, cost savings and other benefits (e.g., more comfort, less noise, better indoor air quality). Many buildings also have lower cost opportunities to reduce energy use during regular maintenance activities, such as adjusting temperature set points of the heating and cooling systems, installing more sophisticated temperature control systems, and regularly checking mechanical systems to ensure they are operating as designed. These simpler measures can reduce energy use by 10-15%.

Actions during major renewals and regular maintenance could result in greenhouse gas reductions of more than 25,000 tonnes/year by 2020 and more than 280,000 tonnes/year by 2045. Improved energy requirements in renovation building codes, increased incentives for strata buildings from the energy utilities, and building energy benchmarking would all be complementary tools to a Strata Energy Advisor Pilot Program.

BARRIERS TO REDUCING GREENHOUSE GAS EMISSIONS FROM STRATA BUILDINGS

As part of the background research that informed the program design, a series of workshops and interviews were conducted with strata owners, managers, and contractors who provide services to strata corporations. The stakeholders provided information on the opportunities, as well as the barriers that are preventing strata councils from choosing more energy efficient/low emission options when undertaking regular maintenance and major building renewal projects.

The key issues raised through interviews and workshops are summarized below.

COMPLEXITY OF STRATA CORPORATION DECISION-MAKING

Strata councils, property managers, and individual owners all play a role in decision making about major building renewal projects and regular maintenance, which creates a complex communication and decision-making challenge for projects that are different from the status quo.

Trusted Information: As non-experts, the evaluation of options on a complex topic can be difficult for strata councils and owners. Often contractors know more about technical systems in buildings than strata councils when it comes to identifying opportunities and what will be most effective. Unless trust has been built over time, strata councils and owners often take a skeptical view of advice

from consultants and contractors that deviates from the status quo. Furthermore, as non-experts, they often have difficulty evaluating the validity of purported costs and benefits of one technical option over another leading to real or perceived disadvantages for strata councils and owners.

Split Incentives: Most strata building mechanical, electrical, and envelope systems are owned by all the members and the costs for maintaining and replacing these systems are paid through strata fees and special levies. Since the cost is spread among current and future owners this reduces the incentive for current owners to take on additional upfront costs when that individual may not receive the full benefit over time. For most projects (e.g., an upgrade to a higher efficiency heating system for common areas), the cost is paid directly by owners (e.g., by special levy), but savings accrue to the strata corporation (through lower common area energy bills) and not to individual owners. This “hidden” benefit can sometimes inhibit upfront capital investment.

Financial Constraints: Strata owners, like many property owners in Metro Vancouver, are often on tight budgets in today’s real estate market. Increased strata fees or the use of special levies can put additional burdens on strata owners. Thus, strata councils are under pressure to minimize costs in the short-term, sometimes at the expense of long-term savings.

Timelines: The time needed to navigate decision-making and bring the level of knowledge necessary to make an informed decision can often negate the incentive for a private sector contractor to actively work with strata buildings on projects beyond the status quo. These factors mean that the decision-making process typically takes 6-18 months for major projects.

Together these factors reinforce a tendency to avoid options that deviate from the status quo and select familiar options, even when the life-cycle business case is not as strong.

Strata Energy Advisors Supporting Strata Decision-making

The complexity of the decision-making process makes education, communication, and trust important factors in choosing options that are different from the status quo.

The Strata Energy Advisor Pilot Program provides independent, third party professional expertise to help strata councils:

- refine the options;
- define a clear business case in terms that can resonate with strata owners, illustrating the direct benefits to live-in owners, rental owners, tenants, and investment owners in a 2-7 year timeline;
- provide tools they can use to evaluate information from consultants and contractors; and
- access incentive funding to reducing upfront costs.

STRATA ENERGY ADVISOR SERVICES

The Strata Energy Advisors provide the following services to qualified strata buildings:

1) Walk Through Energy Assessments

Identify opportunities to reduce energy use and greenhouse gas emissions for major renewal or regular maintenance projects and present opportunities to strata council members.

2) High Level Energy and Emission Conservation Business Case Reports

Evaluate energy savings, emissions reductions, costs and other benefits of different technological options that the strata building could choose for the opportunities identified in the walk through energy assessment.

3) Implementation Support

In support of completing energy and emissions projects, provide checklists and answer questions as strata councils hire contractors to carry out the projects identified in the energy conservation business cases. Identify and support access to financial and other incentives that may be available from other agencies such as Fortis and BC Hydro.

4) Grants (rebates)

Participating strata corporations located in the funding partner jurisdictions (City of North Vancouver, City of Vancouver, City of New Westminster, Richmond, Surrey and University of British Columbia) have access to grant funding for building tune-ups or smart building upgrades identified in the business case reports, or for a feasibility study for a more complex mechanical or building envelope projects. Strata corporations can apply for maximum of \$1,500 for a building tune-up or smart building upgrade project and/or a feasibility study.

In addition to services to specific buildings the Strata Energy Advisors have presented at events and forums in partnership with the Condominium Homeowners Association (CHOA) and local governments in the Metro Vancouver region. A website has been launched with information for strata councils, managers, and owners on how to consider energy saving and greenhouse gas reductions (www.strataenergyadvisor.ca).

EXPECTED OUTCOMES OF THE STRATA ENERGY ADVISOR PILOT PROGRAM

The following were the expected outcomes of the Strata Energy Advisor Pilot Program included in the revised scope approved by the MVRD Board in October 2017.

- Registration of 300 strata buildings in the program via the Strata Energy Advisor Program website.
- Providing screening level walk-through assessments to 50-70 strata councils and owner groups.
- Recruitment of 30-50 strata corporations to implement a “building tune-up”.
- Support for 5-10 strata corporations to undertake an energy audit (Level 1 or higher).
- Support for 5-10 strata buildings to plan or complete a mechanical replacement project (e.g., high efficiency boilers, heat pump make air units, etc.).
- Support for 3-5 strata buildings to plan or complete a building envelope project (e.g.; high efficiency windows, increased exterior insulation/cladding, etc.).
- Presentations at 3-5 educational events related to strata energy efficiency (total of up to 200 attendees).

To: Climate Action Committee

From: Larina Lopez, Division Manager, Corporate Communications
External Relations Department

Date: June 7, 2019 Meeting Date: July 12, 2019

Subject: **Update on Metro Vancouver's Grow Green Website**

RECOMMENDATION

That the Climate Action Committee receive for information the report dated June 7, 2019, titled "Update on Metro Vancouver's Grow Green Website".

PURPOSE

To provide the Climate Action Committee with an update on Metro Vancouver's Grow Green Website (www.growgreenguide.ca).

BACKGROUND

Grow Green is an ongoing program that was initially funded by the Sustainability Innovation Fund in 2015 and was launched in May 2016. Staff have made ongoing updates to the website in 2018, with additional enhancements planned for 2019.

This report provides an update on the Grow Green website, which is included in the Climate Action Committee's 2019 work plan.

METRO VANCOUVER'S GROW GREEN WEBSITE

The Grow Green website was designed in collaboration with UBC Botanical Garden to provide residents throughout the region with guidance on how to grow an eco-friendly lawn or garden, regardless of gardening skill or space constraints. All plants used on the website are suitable for this region, readily available, non-invasive, low maintenance and waterwise, and the designs have been planned to provide food and habitat to birds and pollinators throughout the year.

The website is suitable for a range of households, including single-family units with yards, town houses with small individual yards or common spaces, and condos and apartments that are equipped with patios. Users can take a quiz to determine the best plants and designs for their growing conditions, search a database of over 350 plants for ideas, access and print a selection of 110 designs to take to their local nursery, and review gardening advice to improve the success of their garden and its contribution to regional sustainability.

The information provided through Grow Green aims to increase public awareness of the potential for private green spaces to provide ecosystem services (the essential benefits that nature provides for free, such as habitat, shade, food, etc.), and to promote ecological health and biodiversity within urban areas. As a result, the website advances a number of Metro Vancouver sustainability objectives, including those that promote water conservation (e.g., lawn watering regulations), the

capture and retention of rainwater on site, the use of compost, and practices that increase biodiversity in urban areas.

Tracking Performance

Website data is analyzed to track the performance of the Grow Green website, to understand how users are engaging with content, and to assess the effectiveness of social media and other promotional channels.

In 2018, the Grow Green website received 17,993 visits, a 58% increase from the 11,396 total website visits in 2017. Of the visits in 2018, the majority (85%) were new visitors, indicating that Grow Green is continuing to grow in popularity.

The average visitor in 2018 spent 2.5 minutes on the website and clicked through to 4 different pages, which indicates Grow Green is providing engaging information that users are interested in and want to read more about. The most commonly generated quiz result for 2018 was an edible food garden bed, and lawn alternatives were among the top four most viewed designs.

Social media continues to be an effective tool to promote Grow Green and drive traffic to the website. In 2018, social media activity generated over 20% of all website traffic, with posts receiving over 1,000 engagements (i.e. reactions, shares, comments).

Content Updates and Community Events

In 2017, a new section of the website called "Green Thumb News" was developed to fulfill requests from residents to provide practical, simple gardening advice. In 2018, the look, feel and functionality of this section was improved by switching to a pressboard layout. This improved functionality allows residents to easily subscribe, share articles, comment, and reply directly to others' comments, providing an online forum for further discussion and inquiry on gardening topics. Topics covered in articles in 2018 include invasive plants and species, backyard birds, spring gardening tips, and lawn alternatives. In early 2019, the "Green Thumb News" published an article on creating a pollinator friendly garden. This article complemented a 2018 review of Grow Green's plant database, conducted by a local bee expert, to ensure accurate information is being shared on which plants support native bee species.

In 2019, the Grow Green website is being further enhanced to ensure stronger links and connections are made to the 'We Love Water' campaign and water conservation messaging.

In 2018, Grow Green information was featured alongside UBC Botanical Garden displays at a variety of community events, including the UHill Elementary School Earth Day BBQ, and the 'Agriculture in the City' event at the PNE which receives thousands of visitors annually over the duration of the 14-day event. In addition, Grow Green had an outreach presence at both the Vancouver Tree Sale and Applefest at UBC events, where they engaged with over 500 residents.

UBC Botanical Garden also features five of the most popular Grow Green designs in a Grow Green exhibit. In 2018, over 50,000 people visited UBC Botanical Garden with access to the exhibit, and approximately 5,500 people went on an educational tour which typically includes an introduction to

the Grow Green display garden. Staff will continue to look for opportunities to promote Grow Green at various events across the region, with at least five outreach events already confirmed for the 2019 summer season.

ALTERNATIVES

This is an information report. No alternatives are presented.

FINANCIAL IMPLICATIONS

The Grow Green budget of \$16,000 is funded through the External Relations Department and is used for promotion of Grow Green through digital/social media promotion, and community outreach.

SUMMARY / CONCLUSION

The Grow Green website, launched in 2016, was designed in collaboration with UBC Botanical Garden to provide residents throughout the region with guidance on how to grow an eco-friendly lawn or garden, regardless of gardening skill or space constraints.

Web-traffic data collected in 2018 indicates Grow Green is growing in popularity (58% increase in web traffic in 2018 compared to 2017; 85% new visitors), with high levels of engagement on social media. In 2018, enhancements were made to the 'Green Thumb News' section of the website to improve the look and functionality.

Grow Green information was featured alongside UBC Botanical Garden displays at a variety of community events in Metro Vancouver in addition to the UBC Botanical Garden Grow Green exhibit.

For the 2019 season, additional community outreach events have been scheduled, and website enhancements include stronger integration and connection to 'We Love Water' campaign and water conservation messaging.

References

1. [Grow Green Website](#)

30101695

To: Climate Action Committee

From: Roger Quan, Director, Air Quality and Climate Change
Planning and Environment Department

Date: June 27, 2019 Meeting Date: July 12, 2019

Subject: **Manager's Report**

RECOMMENDATION

That the Climate Action Committee receive for information the report dated June 27, 2019, titled "Manager's Report".

Climate Action Committee 2019 Work Plan

Attachment 1 to this report sets out the Committee's Work Plan for 2019. The status of work program elements is indicated as pending, in progress, or complete. The listing is updated as needed to include new issues that arise, items requested by the Committee or Board, and changes to the schedule.

BC Lung Association State of the Air 2019 Report

In June 2019, the BC Lung Association released the "State of the Air 2019" report for British Columbia. The BC Lung Association report is similar in scope and complementary to Metro Vancouver's annual "Caring for the Air" report, which was received by the Climate Action Committee at its May meeting.

While the "Caring for the Air" report focuses on the Lower Fraser Valley airshed, the BC Lung Association report provides information for the province as a whole. The report provides a snapshot of air quality readings across BC and updates on air quality issues of concern, as well as corrective actions that are underway. This year's edition focusses on a number of issues related to air quality and health, and includes articles on:

- Volatile organic compounds (VOC) – demystifying what VOCs are, how they are measured, and their sources and health effects;
- Small sensors – a summary of how these low-cost air pollution sensors are being evaluated and used in BC;
- Air Quality Health Index (AQHI) for biomass smoke – a description of how the AQHI has been updated to better reflect the effects of biomass smoke on air quality in BC;
- Clean Air Champion – awarded to a deserving recipient who has made a significant contribution to the field of air quality;
- 2018 wildfires – a summary of the air quality effects of the 2018 wildfire season;
- BC Lung Association Air Quality and Health Workshop – highlights from the 16th annual workshop, "Wildfire Smoke: A Growing Threat to Air Quality and Public Health"; and
- Updates from other agencies on recent air quality and health actions underway in BC.

The report is included as Attachment 2 to the Manager's Report.

Air Quality Advisory Program

Following the significant wildfire smoke air quality impacts in Metro Vancouver during the summers of 2017 and 2018, there has been growing media interest in understanding regional air quality, wildfire smoke health risks, and how the public can prepare for these risks. On June 18, 2019, Metro Vancouver staff held a media event to address these areas of interest, and to help the media better understand Metro Vancouver's role in regional air quality management and the services provided with respect to advisories. Staff from Vancouver Coastal Health were also on hand to address questions specifically related to air quality health risks. The event included a presentation, question and answer period, and tour of Metro Vancouver's Mobile Air Monitoring Unit (MAMU). Media attendees included CBC, CKNW, CTV, Fairchild, Global, News1130, The Tyee, Vancouver Sun and The Weather Network. The event was well received, and resulted in a number of media stories that emphasized the importance of public preparedness for wildfire smoke impacts. Staff will continue to work with media organizations during any upcoming air quality advisory periods to ensure clear public communication of air quality risks and appropriate approaches for mitigating impacts.

The Metro Vancouver region experienced its first significant wildfire of 2019 on Sunday, June 23, when the Strip Creek fire broke out near the Sea to Sky Highway between Horseshoe Bay and Lions Bay. Firefighters from the BC Wildfire Service and Lions Bay Fire Rescue attacked the fire from the ground, while helicopters and fixed wing water bombers provided air support. Staff from Metro Vancouver's Watershed Protection group monitored the fire through the nights of June 23 and 24. Smoke impacts from the fire were initially limited to higher altitudes on the North Shore, with heavy smoke observed by Metro Vancouver staff in Grouse Mountain Regional Park. On Tuesday, June 25 a plume of smoke moved through Metro Vancouver from west to east, resulting in visual impacts, odours, and briefly elevated fine particulate matter readings at a number of air quality monitoring stations. This smoke plume may have originated from the Strip Creek fire, but was likely also influenced by smoke originating from the Cecil Hill fire burning near Pender Harbour on the Sunshine Coast. Significant rainfall on June 26 and 27 reduced wildfire risk across southern BC, and helped suppress smoke production from existing wildfires. Staff will continue to closely monitor wildfire activity and air quality readings throughout the summer wildfire season.

Update on Climate Change Organizations

UC3, the University Climate Change Coalition, is a coalition of North American universities, formed as a prototype of a collaborative model to help local communities achieve their climate goals and accelerate the transition to a low-carbon future. The initial cohort of UC3 includes 18 universities from Canada, the United States and Mexico.

In 2018, UBC joined UC3, and with the other participants, is seeking to act as an agent for collective action by convening community and business leaders to accelerate the implementation of research-driven climate policies and solutions. Like other universities in UC3, UBC convened a climate change forum in 2018 (UBC President's Roundtable on Climate Action) with leaders in their respective regions to develop and sustain momentum in climate action and inform best practices, policies and recommendations. Metro Vancouver staff participated in the roundtable and continue to work with UBC to identify opportunities to collaborate on climate action.

The **Climate Caucus** is a non-partisan network of elected local government leaders in Canada who began organizing in January 2019. The mission of the Climate Caucus is to work collectively to create policy which aligns with the IPCC targets of holding global warming to 1.5°C. The Caucus serves as: a meeting place for elected representatives to connect; a centralized location for municipal climate action and policy throughout Canada; and provides for a collective mechanism to lobby provincial and federal government. The Climate Caucus is actively inviting elected officials to join its network.

Odour Complaints Update

Emissions of odorous air contaminants contribute to air quality concerns in the Metro Vancouver region. Common sources of odour complaints include organic waste management facilities, food and animal processing facilities, restaurants, petroleum refineries, and agricultural activities. Emissions of odorous air contaminants can travel long distances, where weather conditions can affect the frequency and duration of odour detection.

Since the beginning of 2019, Metro Vancouver has received just over 1000 odour complaints, compared to around 4,000 complaints throughout 2018. Between January 1 and June 1, 2019, organic waste management facilities have been the subject of the highest number of odour complaints, with a total of 320 complaints, which is trending below the approximately 2,400 complaints received between January 1 and December 31, 2018. Metro Vancouver has received 160 complaints about cannabis productions operations between January 1 and June 1, 2019, compared to approximately 250 complaints throughout 2018. In early 2019, there have been 78 complaints about emissions from the food production and processing industry, including restaurants, compared to around 200 complaints in 2018.

When possible, Metro Vancouver officers respond to odour complaints by trying to identify the probable source of emissions based on the complainant's description, meteorological data and on-site observations when appropriate. Officers work with the facilities determined as being the probable source to identify and address the cause of impacts on the surrounding community.

Changes to Federal Cannabis Production, Processing, and Distribution Licensing Process

As of May 8, 2019, Health Canada has replaced its two-stage cannabis licensing process with a single-stage process for new applicants. In the former two-stage licensing process, Health Canada conducted a detailed, paper-based initial review of an application and issued written confirmation of readiness prior to construction if the proposal met the requirements of the Cannabis Regulations. Health Canada now requires new applicants to have a fully built site that meets all the requirements of the *Cannabis Regulations* before applying for a licence to cultivate or process cannabis or to sell cannabis for medical purposes. This change may pose new challenges for municipalities and Metro Vancouver in ensuring that the proposed facility will operate as expected.

Municipalities that required confirmation of Health Canada's review as part of their rezoning, development, or building permit application processes for proposed cannabis production, processing, or distribution facilities must now establish other ways to confirm that the proposed facility is likely to obtain a licence from Health Canada and proceed with operations in accordance with federal requirements. Furthermore, new licence applicants may not seek Metro Vancouver's authorization

of emissions until their site is fully built and their Health Canada licence applications is ready, which would limit opportunities for early influence on facility design and choice of emission controls.

The changes made to Health Canada's Cannabis Licensing Application Guide to support the new single-stage licensing process did not clarify expectations regarding the design and performance of air filtration systems beyond the continuing requirements in the Cannabis Regulations that "the building or part of the building where cannabis is produced, packaged, labelled and stored must be equipped with a system that filters air to prevent the escape of odours". Health Canada's licensing criteria have not changed. Applicants must continue to provide visual evidence and a description of the air filtration system with floor plans as part of the licence application.

Attachments (30342093)

1. Climate Action Committee 2019 Work Plan
2. BC Lung Association State of the Air Report

30125129

Climate Action Committee 2019 Work Plan

Report Date: June 27, 2019

Priorities

1 st Quarter	Status
Climate 2050 - work plans and engagement strategy for roadmaps	Complete
SIF (Sustainability Innovation Fund) - 2019 proposals	Complete
Electric vehicle outreach program - schedule for 2019	Complete
Air Quality - cannabis production - discussion paper for potential regulations	Complete
Air Quality - proposed amendments to ticketing bylaws	Complete
Air Quality - odour management - community outreach for enhanced management options	Complete
Metro 2040 - environment policy review scoping	Complete
Participate in environmental assessment processes as required	Complete
2 nd Quarter	
Climate 2050 - strategy and roadmap update	In Progress
Air Quality Management Plan - discussion paper	In Progress
Ambient Air Quality - intentions paper on new objectives for nitrogen dioxide	Complete
Ambient Air Quality - intentions paper on new objectives for ground level ozone	Complete
Air Quality - 8 th annual Caring for the Air report	Complete
Air Quality - automotive refinishing emissions regulation - outcomes of consultation	In Progress
Air Quality - indoor residential wood burning - proposed bylaw	In Progress
Air Quality - outdoor burning - discussion paper for potential bylaw	In Progress
SIF - progress report on Strata Energy Advisor Program	In Progress
Metro Vancouver's Carbon Price Policy implementation Update	Complete
SIF - status report on previously approved Sustainability Innovation Fund Projects	Complete
Air Quality - discussion paper on odour management framework	In Progress
Air Quality – outreach program on updated non-road diesel engine bylaw	Complete
Ecological Health - invasive species - best management practices	Complete
Ecological Health - Sensitive Ecosystem Inventory - update and implications	Complete
Ecological Health - regional ecosystem carbon storage	Complete
30 year financial Plan - Air Quality function	In Progress
Participate in environmental assessment processes as required	Complete
3 rd Quarter	
Climate 2050 - strategy and roadmap update	Pending
Metro Vancouver's climate actions and carbon neutral progress for 2018	In Progress
SIF - prototype design for public display of air quality monitoring data	In Progress
SIF - outcomes of National Industrial Symbiosis Program pilot	In Progress
SIF - results of DC fast charger project at Metro Tower III	In Progress
Review of user fees related to air quality permits and regulations	In Progress
Air Quality - proposed amendments to automotive refinishing emissions regulation	Pending
Metro 2040 - environment policy forum results	Pending

Ecological Health - tree canopy and landscape imperviousness monitoring	Pending
Ecological Health - regional ecosystem connectivity index	Pending
Participate in environmental assessment processes as required	Pending
4th Quarter	
Climate 2050 - strategy and first set of draft Climate 2050 roadmaps	Pending
Annual budget and 5 year financial plan	Pending
Draft Air Quality Management Plan and phase 2 engagement strategy	Pending
Ambient Air Quality - proposed objectives for nitrogen dioxide	Pending
Ambient Air Quality - proposed objectives for ground level ozone	Pending
SIF - Strata Energy Advisor pilot program preliminary outcomes	Pending
SIF - results of Air Aware citizen science air quality monitoring	Pending
Ambient Air Quality - review of monitoring network	Pending
Electric vehicle outreach program outcomes for 2019	Pending
Air Quality - indoor residential wood burning – public outreach plan	Pending
Metro 2040 - environment policy review - update	Pending
Ecological Health Framework - update	Pending
Participate in environmental assessment processes as required	Pending

state of 2019 the air

BC LUNG ASSOCIATION CELEBRATING THE CLEAN AIR MONTH OF JUNE

This year's State of the Air Report is once again packed with articles on some of the most important issues affecting air quality in BC.

Volatile Organic Compounds (VOCs) are a broad class of air pollutants, with thousands of different species. In this Report, we demystify VOCs: their sources, characteristics, and human health and air quality impacts. We also look at initiatives to curb VOC emissions from motor vehicles, the petroleum sector, and everyday commercial and consumer products.

We have a follow-up article on small air quality sensors, which continue to create a huge interest due to their low cost and ease of use. Though not without limitations, these sensors enable "citizen science" activities, and can support government monitoring, reporting, and forecasting efforts, especially during adverse air quality events like wildfires.

The wildfires of 2018 proved to be even worse than the previous year's, burning a much larger area and raising particulate matter (PM_{2.5}) concentrations across BC for most of August. Metro Vancouver was under air quality advisories for 18 days, while some areas in the central and southern interior and southeastern BC were under Smoky Skies Bulletins for over 40 days.

Fittingly, the 16th Annual BC Lung Association Air Quality & Health Workshop focused on the growing threat of wildfire smoke to air quality and public health. Leading authorities gathered to discuss the impacts of – and the efficacy of programs designed to address – wildfire smoke. This year's Clean Air Champion, Glen Okrainetz, was also recognized at the event.

Before retiring from government service, Glen served in various capacities and helped develop the BC Air Action Plan, which spawned several air quality programs in our province, including the Provincial Wood Stove Exchange Program. We have feature stories on both Glen and our workshop in this report.

In closing, I wish to thank all the individuals and agencies who shared their time, energy, and expertise to make this year's Report happen. Until the next edition!



CHRISTOPHER LAM
President and CEO, BC Lung Association

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Demystifying VOCs

What are VOCs?

Volatile Organic Compounds (VOCs) are a broad class of air pollutants that (1) contain at least one carbon atom and (2) readily evaporate under normal atmospheric pressure. There are thousands of different VOCs that vary by chemical composition, structure, and behaviour. Most air quality programs focus on the most abundant compounds, which typically have 2-12 carbon atoms.

Where do VOCs come from?



Both natural sources and human activities contribute to the VOCs found in the air. In rural or forested areas, natural sources contribute more VOCs to outdoor air than human activities. In urban areas, emissions from

vehicles and the chemical products sectors account for a greater proportion of outdoor VOCs (Figure 1). Indoor sources of VOCs include building materials, consumer products, and cigarette smoke. Typically, VOC concentrations are higher indoors than outdoor.¹



How are VOCs measured in BC?

VOCs are sampled in BC as part of the National Air Pollution Surveillance (NAPS) Program. Gas samples are collected in specially prepared canisters over a 24-hour period every 6 or 12 days by provincial or Metro Vancouver staff. The filled canisters are then shipped to a federal laboratory in Ottawa for analysis by Environment and Climate Change Canada, where up to 175 different VOC species can be detected. VOCs are currently sampled at several sites in Metro Vancouver as well as in Abbotsford, Chilliwack, Prince George, and Saturna Island. To view historical VOC data, see: <http://maps-cartes.ec.gc.ca/rnsps-naps/data.aspx?lang=en>.

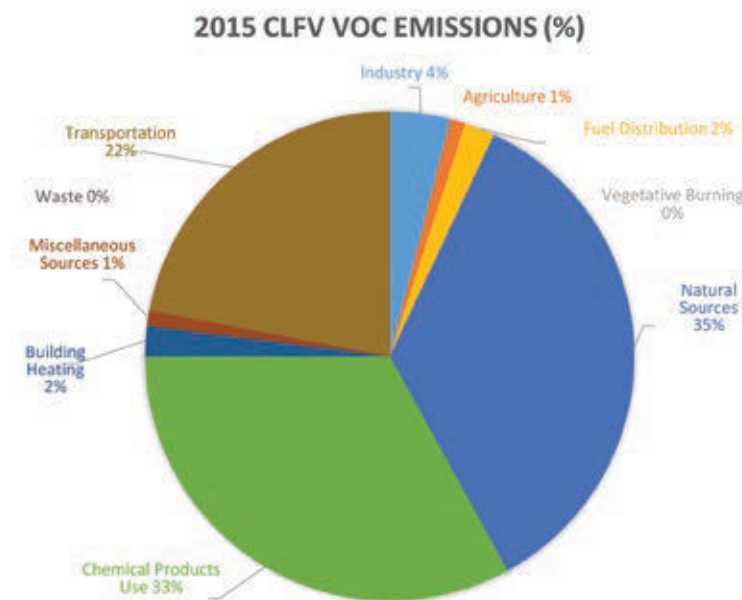


Figure 1: VOC emissions in the Canadian Lower Fraser Valley (CLFV), 2015. Total VOC emissions: 65,408 tonnes. Retrieved from: <http://www.metrovancouver.org/services/air-quality/AirQualityPublications/2015LowerFraserValleyAirEmissionsInventory.pdf>

Why are VOCs a concern?

Some types of VOCs have direct effects on human health and some types contribute to smog formation that in turn may affect human health and the environment. Additionally, some VOCs are associated with a pungent odour that may range from pleasant-smelling to offensive. The health effects of VOCs depend on the specific VOC and the level and duration of exposure. Short-term exposure to moderate levels of many VOCs may cause acute irritation of the eyes, nose and throat, and headaches. Short-term exposure to higher levels may cause more severe effects, such as nausea or loss of consciousness. Long-term exposure to VOCs in the workplace may cause neurological effects, liver damage, and cancer. For example, the International Agency for Research on Cancer (IARC) has identified benzene and formaldehyde as human carcinogens.² For more information, see: <https://toxtown.nlm.nih.gov/chemicals-and-contaminants/volatile-organic-compounds-vocs>.

¹ For more information on VOCs and indoor air quality, see: <https://www.healthlinkbc.ca/healthlinkbc-files/air-quality-VOCs>
² <https://www.iarc.fr>

Are VOC odours a health concern?

VOC-related odours range from pleasant (e.g. the scent of pine trees) to offensive (e.g. the smell of composting materials). Some people are very sensitive to odours, and find the smell distressing. Although concentrations of VOCs at these odour thresholds are generally not harmful to health, stress is a known risk factor for cardiovascular diseases.

How do VOCs contribute to smog & haze?

VOCs can be very reactive in sunlight, contributing to reactions that result in the formation of fine particulate matter (PM_{2.5}) and ground-level ozone. These pollutants have both direct and indirect effects on human health and the environment. The blue haze commonly associated with forests (e.g. the Blue Ridge Mountains) is due to the formation of PM_{2.5} resulting from reactions involving naturally occurring VOCs in the presence of sunlight.³ Particles of this size are especially efficient at scattering blue light.⁴

What do we know about the types of VOCs emitted by industry in BC?

Under the Canadian Environmental Protection Act of 1999, all industries are required to submit annual emission reports to the National Pollutant Release Inventory (NPRI). Based on data from the 2017 NPRI, a total of 18,120 tonnes of VOCs were released from over 200 industrial facilities in BC.⁵



The largest VOC emissions were associated with oriented strandboard (OSB) production, pulp and paper, and upstream oil and gas.

What is being done to manage VOC emissions?

Transportation is the largest single source of VOCs in BC. New vehicle emissions standards are being phased in by the federal government and will be fully implemented by 2025. These new standards are 80% more stringent than the previous standards. In addition, new national requirements for VOC emissions from the oil and gas sector are expected to significantly reduce VOC emissions between 2017 and 2035.⁶

Finally, the federal government is working to reduce the VOCs emitted by use of solvents in consumer and commercial products such as household cleaning agents, personal care products, paints, and printing inks.⁷



³ Went FW (1960) Blue hazes in the atmosphere. *Nature* 187: 641.
⁴ Ferman M.A., Wolff G.T. and N.A. Kelly (1981) The nature and sources of haze in the Shenandoah Valley/Blue Ridge Mountains Area. *JAPCA* 31: 10, pp. 1074-1082. Retrieved from: <https://www.tandfonline.com/doi/abs/10.1080/00022470.1981.10465329>
⁵ For more information, see: <https://www.canada.ca/en/services/environment/pollution-waste-management/national-pollutant-release-inventory.html>
⁶ For more information, see: <https://www.canada.ca/en/news/archive/2015/07/cleaner-vehicles-fuels-canadians-final-tier-3-vehicle-fuel-standards.html>
⁷ For more information, see: <https://www.canada.ca/en/environment-climate-change/services/managing-pollution/sources-industry/volatile-organic-compounds-consumer-commercial.html>



Big Interest in Small Sensors

The proliferation of small, low-cost, air quality sensors has made collection of air quality data accessible to almost anyone. These sensors have some advantages over standard air monitoring equipment used by government agencies: low-cost sensors are easy to use and readily available to the public. As such, these sensors can support “citizen science” projects, in which the public deploy sensors to understand their local air quality. A large network of these sensors can also increase the spatial resolution and coverage of air quality data. However, low-cost sensors also have limitations: their reliability and accuracy can vary, as there are no performance criteria to meet in order to be sold. Furthermore, unlike reference instruments which are audited and calibrated regularly, many small sensors cannot be calibrated and their performance will degrade, in some cases, in one to two years.

Several government agencies and academic organizations in BC have been exploring the use and performance of these sensors.

Metro Vancouver

Metro Vancouver’s “Air Aware” project aims to learn about the strengths and limitations of low-cost sensors, how they might play a role in Metro Vancouver’s air monitoring network, and how and why the public are using them.

Metro Vancouver selected



several different low-cost sensors and co-located them at their air monitoring stations for approximately two months alongside reference instruments. When the low-cost sensor data was compared to data collected by reference instruments, preliminary analysis showed that sensor performance and operability varied widely.

An important part of Air Aware involves working with the public to help understand differences between low-cost sensors and the reference instruments at Metro Vancouver’s air monitoring stations. Metro Vancouver chose sensors that performed well, were easy to set up, and had a user-friendly interface, and are lending them to volunteers during the spring and summer of 2019. This will provide insight about a user’s experience with air quality sensors and data, and will help Metro Vancouver understand how to best respond to their air quality needs and questions.

Metro Vancouver will use the results from the co-location and feedback from volunteers to create resources that will include information on strengths and limitations of low-cost sensors, guidance on choosing and setting up a sensor suitable for the user’s needs, and challenges that a user might encounter when using low-cost air sensors.

University of Northern BC

The PurpleAir PAII is a low-cost fine particulate matter (PM_{2.5}) monitor. Thousands have been installed world-wide, with over 150 across BC. Researchers at the University of Northern British Columbia (UNBC) in Prince George tested six of these sensors and

found that readings correlated very well with government instruments. The average correlation – a measure of how well the sensor responds to changes in PM_{2.5} levels – was 0.97 (1.00 is perfect), for 24-hour averages from the six sensors over 450 days. The average difference between the low-cost sensor and ‘gold standard’ instruments was 9.3 µg/m³, but when sensor PM_{2.5} readings are corrected by UNBC researchers to better match the ‘gold standard’, the average error is reduced to 2.5 µg/m³.

A map of all ‘gold standard’ PM_{2.5} readings in BC alongside calibrated sensor readings is available at weather.unbc.ca/aqmap. Anyone wishing to have their PurpleAir monitor reading corrected and included on this map can contact UNBC through the web page.

Environment and Climate Change Canada (ECCC)

ECCC is currently testing low-cost air quality sensors from several manufacturers to assess their performance and limitations over a broad range of meteorological and air quality conditions. The most extensive evaluation thus far has been of the PurpleAir. Testing has been underway for nearly one year and an initial assessment of its accuracy in reporting PM_{2.5} concentrations and the AQHI, including



Above: Self-contained tripod deployed SW of Edmonton containing PurpleAir sensors, Aeroqual AQ+, 2B OEM-106L and Vaisala WXT with solar/battery power.

during wildfire smoke events, has been completed. Next, ECCC is planning to deploy a large number of PurpleAir units in the Prince George area in the summer of 2019, as a pilot study to assess their effectiveness for enhancing wildfire smoke reporting and forecasting. Other activi-

ties include developing a rapidly deployable small sensor measurement platform, which could enhance monitoring during high impact air quality events.

In addition, a national working group has been formed to share information and coordinate ef-

forts related to understanding low-cost air quality sensors. The working group consists of representatives of federal departments, provincial and territorial governments, regional air quality agencies and organizations, and university groups.

Updates to the Provincial Air Quality Health Index (AQHI) for Biomass Smoke

The Air Quality Health Index (AQHI) is a tool designed to help people understand what air quality means to their health. It was developed by the federal government, based on the observed relationship between health effects and concentrations of nitrogen dioxide (NO₂), ground-level ozone (O₃), and fine particulate matter (PM_{2.5}) in Canadian cities. Of these pollutants, PM_{2.5} has the smallest effect on the overall AQHI equation. In contrast, PM_{2.5} is the most prominent pollutant in the biomass smoke emitted by wildfires, residential wood stoves, wood-fired boilers, and open burning. These are all important sources of air pollution in British Columbia (BC), and they were not being captured very well in the three-pollutant AQHI.

In May 2018 the AQHI for BC was updated to better reflect the effects of biomass smoke on air quality and health across the province. Each hour, two different values are calculated:

1. A three-pollutant index based on the 3-hour running averages of O₃, NO₂, and PM_{2.5} as described <https://www.tandfonline.com/doi/abs/10.3155/1047-3289.58.3.435>.
2. A one-pollutant index based on the 1-hour average of PM_{2.5} alone (Figure 2).

The higher of these two values is taken as the AQHI for that hour, then reported on provincial and national websites and through the national AQHI and WeatherCAN smartphone apps (both available for Android and iOS). This update to the BC AQHI was based on the observed relationship between PM_{2.5} and respiratory health effects during smoky periods.

Current 1-hour PM _{2.5} (µg/m ³)	Index Value	AQHI Risk Category	Health Message for People at Higher Risk	Health Message for General Population
0 – 10	1	Low	Enjoy your usual outdoor activities.	Ideal air quality for outdoor activities.
11 – 20	2			
21 – 30	3			
31 – 40	4	Moderate	Consider reducing or rescheduling strenuous activities outdoors if you are experiencing symptoms.	No need to modify your usual outdoor activities unless you experience symptoms.
41 – 50	5			
51 – 60	6			
61 – 70	7	High	Reduce or reschedule strenuous activity outdoors.	Consider reducing or rescheduling strenuous activities outdoors if you experience symptoms.
71 – 80	8			
81 – 90	9			
91 – 100	10	Very High	Avoid strenuous activities outdoors.	Reduce or reschedule strenuous activity outdoors, especially if you experience symptoms.
101+	10+			

Figure 2: Values of the updated British Columbia Air Quality Health Index (AQHI) for different 1-hour average concentrations of fine particulate matter (PM_{2.5}). When the index value based on PM_{2.5} alone is higher than the index value for the 3-pollutant AQHI model, the higher value will be reported.

The updated AQHI has now been running for an entire year. It performed well during the unprecedented 2018 wildfire smoke season, and during many winter woodsmoke episodes in coastal and mountain communities (Figure 3). From July through September of 2018 the one-pollutant index based on PM_{2.5} alone was higher than the three-pollutant index for 33% of recorded hours across the province. From November 2018 through February 2019 the same was true for 40% of recorded hours in communities known to be most affected by residential woodsmoke. These results confirm the need for an updated AQHI to better protect the health of the BC population.

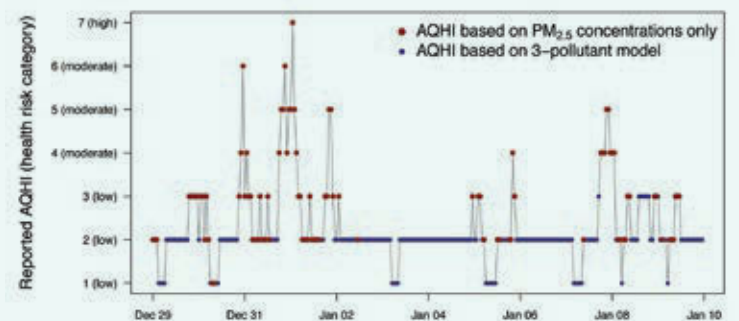


Figure 3: The reported Air Quality Health Index (AQHI) values for a community affected by residential woodsmoke in late 2018 and early 2019.

POLLUTION LEVELS

How Does BC Measure Up?



The summer of 2018 was the worst wildfire season on record in BC. A total of 2,092 wildfires burned over 1.35 million hectares of land, surpassing the record of 1.22 million hectares set the previous year. On August 8, 2018 there were 460 wildfires burning in the province. Wildfires are a large source of smoke. Smoky Skies Bulletins – used to warn the public of rapidly changing air quality conditions due to wildfire smoke – were issued for at least a few days in most areas of the province. Hardest hit were the Central and Southern Interior and the Kootenays in southeastern BC, with some forecast areas under a Smoky Skies Bulletin for at least 40 days last summer. Within Metro Vancouver, wildfire smoke transported from outside the region triggered 18 days of air quality advisories.

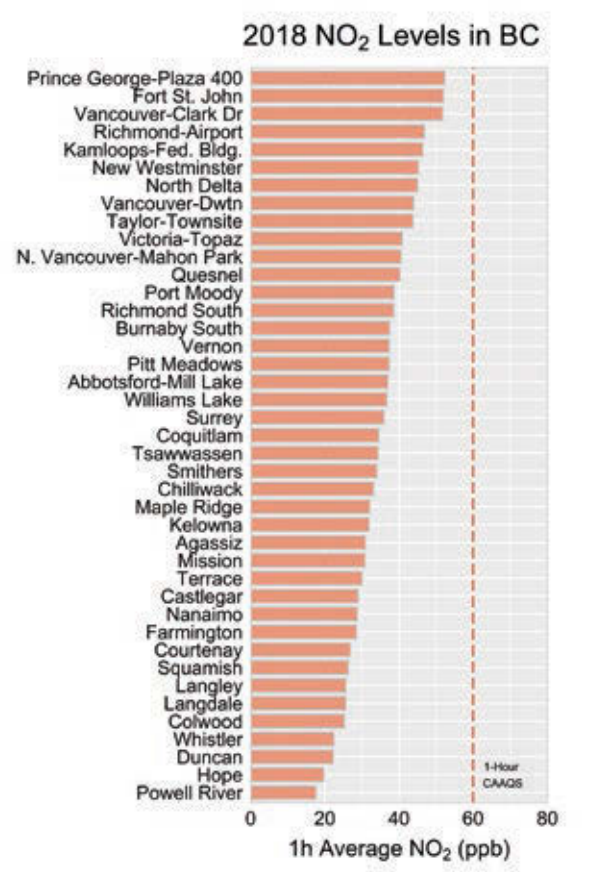
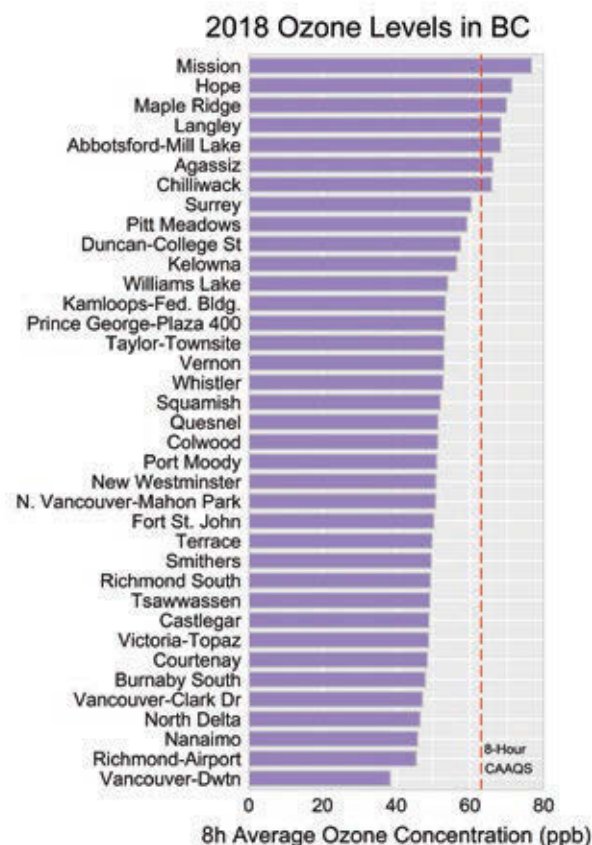
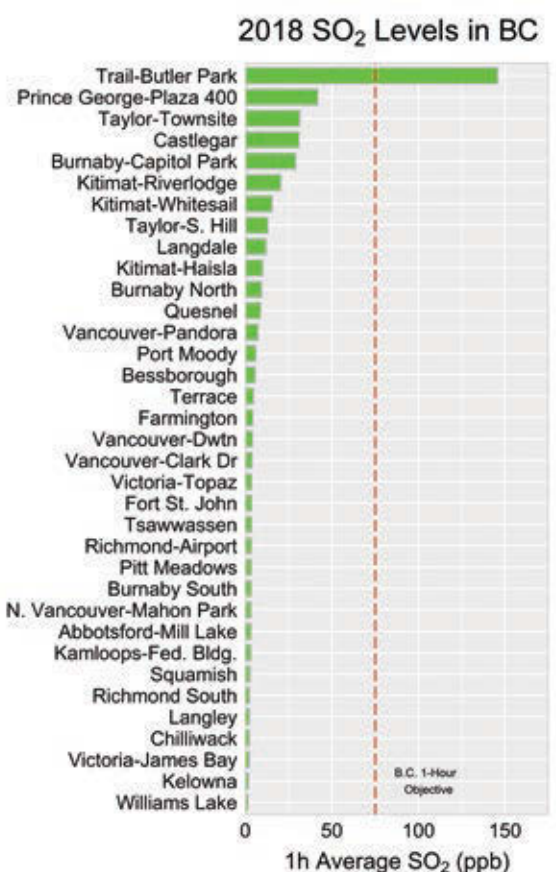
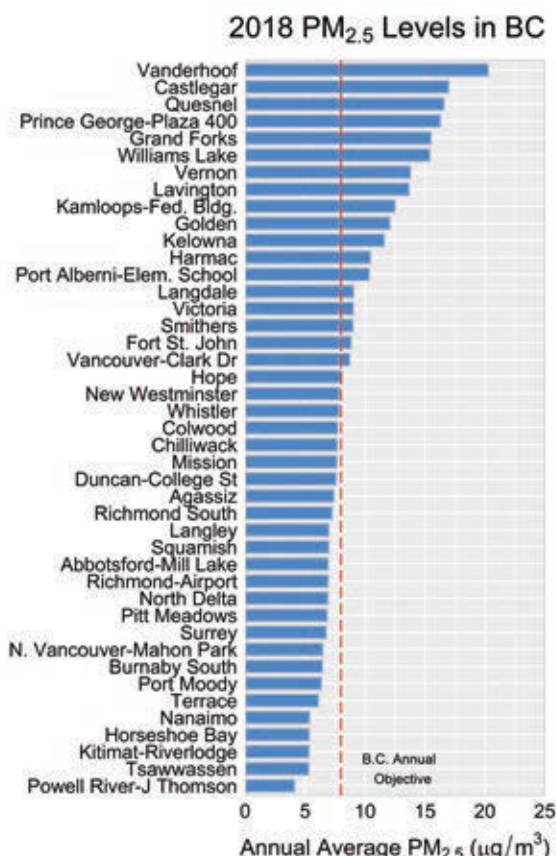
In the following sections, air quality data collected in 2018 are summarized and compared against provincial or national objectives. Data from all routine monitoring sites are summarized in the Technical Appendix.

PM_{2.5} Fine Particulate Matter

Fine particulate matter (PM_{2.5}) refers to microscopic particles that are 2.5 micrometres or smaller in diameter. Major sources in BC include residential wood combustion, prescribed burning, marine vessels, heavy-duty diesel vehicles, the pulp and paper sector and the mining sector. Inhaled PM_{2.5} can travel deep into the lungs and cause irritation and inflammation. In places with higher baseline concentrations of PM_{2.5}, this inflammation further causes higher rates of chronic disease, including heart disease.

In 2018, PM_{2.5} was monitored continuously in more than 60 sites across the province for at least a portion of the year. Annual average concentrations ranged from 4.1 µg/m³ in Powell River to 20.3 µg/m³ in Vanderhoof. A total of 19 sites exceeded the provincial annual objective of 8 µg/m³. Furthermore, a staggering 46 of 51 sites with sufficient data exceeded the provincial 24-hour objective of 25 µg/m³ due to wildfire smoke (data summarized in Technical Appendix). In more normal years, the highest PM_{2.5} levels occur in the winter, during periods of stagnant weather conditions.¹ The elevated PM_{2.5} levels observed in 2018 reflect the extreme conditions that much of the province experienced over parts of the summer. The “Trends” section on page 8 provides a comparison of PM_{2.5} in 2018 with the past nine years.

¹ Based on the annual 98th percentile of daily average



SO₂ Sulphur Dioxide

Sulphur dioxide (SO₂) is a colourless gas with a pungent odour at higher concentrations. Major sources of SO₂ include the upstream oil and gas sector, metal smelting facilities, the pulp and paper sector and marine vessels. Short-term exposures to SO₂ can aggravate asthma and increase respiratory symptoms.

In 2018, SO₂ was monitored at 45 sites, excluding mobile and industrial fenceline sites. One-hour SO₂ levels ranged from 1 ppb in Williams Lake to 146 ppb at Trail-Butler Park.² The majority of monitoring sites recorded 1-hour levels less than 10 ppb. Trail-area sites were the only locations to observe exceedances of the provincial objective of 75 ppb in 2018.

O₃ Ground-level Ozone

Ground-level ozone (O₃) is a reactive gas that forms in the atmosphere from reactions involving nitrogen oxides (NO_x) and hydrocarbons in the presence of sunlight. A major source of both NO_x and hydrocarbons in BC is the transportation sector, including motor vehicles. Short-term exposures can cause breathing difficulties, an aggravation of asthma symptoms and other lung diseases, and premature death. There is growing evidence that long-term exposures may be associated with the development of respiratory effects, especially in the young and the elderly.

In 2018, O₃ was monitored at 46 monitoring sites. Eight-hour concentrations ranged from 38 ppb in Downtown Vancouver to 77 ppb in Mission.³ A total of seven monitoring sites exceeded the level of the national standard of 63 ppb.⁴ These included five sites in the Fraser Valley Regional District (FVRD) (Mission, Hope, Abbotsford, Agassiz and Chilliwack) and two sites in Metro Vancouver (Maple Ridge and Langley). Similar to 2017, it is anticipated that the high O₃ levels in the FVRD were a function of sunny, warm conditions and periodic wildfire smoke.

NO₂ Nitrogen Dioxide

Nitrogen dioxide (NO₂) is a reddish-brown gas that is associated with emissions from high-temperature combustion. NO₂ is mostly formed in the atmosphere from reactions involving nitrogen oxide (NO) and ground-level ozone. The largest sources of NO in BC include the transportation sector and industry. Short-term exposures to NO₂ are linked to respiratory illness, and there is growing evidence of effects from long-term exposure, including cardiovascular mortality, cancer and reproductive effects.

In 2018, NO₂ levels were monitored at more than 50 sites. One-hour concentrations ranged from 18 ppb in Powell River to 52 ppb at Prince George, Fort St. John and Vancouver-Clark Drive.⁵ All sites were below the provincial objective of 100 ppb and the national standard of 60 ppb over one year.⁶ Although the peak 1-hour concentrations of NO₂ were similar in Prince George, Fort St. John and Vancouver, on average, NO₂ concentrations were highest in Vancouver (19.2 ppb) and other sites in Metro Vancouver located in proximity to major transportation routes. In contrast, annual NO₂ levels in Prince George (10.4 ppb) and Fort St. John (7.0 ppb) were significantly lower. See the Technical Appendix for annual concentrations at other BC sites.

² Based on the annual 97.5th percentile of daily one-hour maximum concentrations. The provincial objective of 75 ppb is based on similar statistical form as presented, but averaged over three years. Elevated SO₂ levels were also recorded at Trail-Warfield; however, this data is under review and not included in this report.

³ Based on the annual 4th highest daily 8-hour maximum concentration over one year.

⁴ Achievement of the national standard is based on a similar statistical form as presented, but averaged over three years.

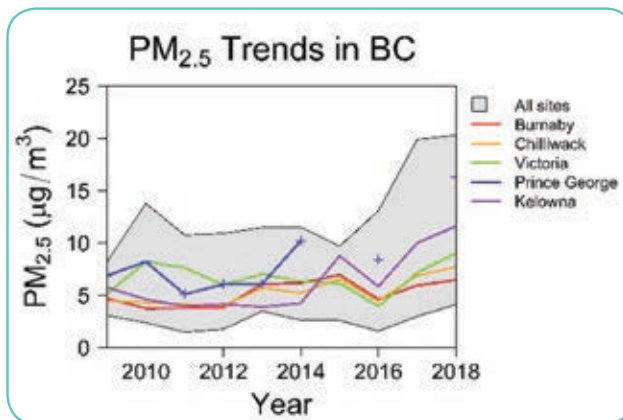
⁵ Based on annual 98th percentile of daily one-hour maximum concentration.

⁶ The Canadian Ambient Air Quality Standard (CAAQS) of 60 ppb is based on a three-year average.

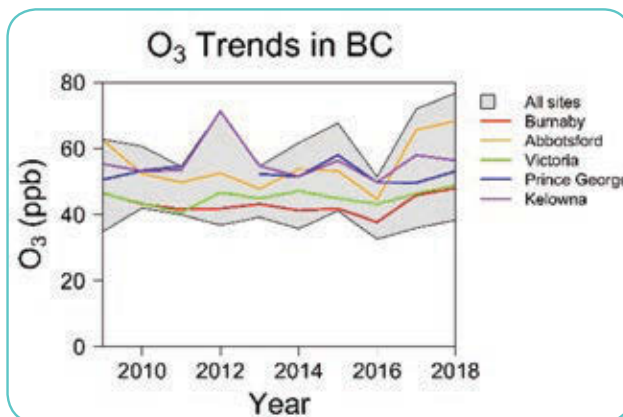
TRENDS Air Pollution Through the Years

We look at trends in air pollution to assess the effectiveness of actions to improve air quality and to determine the need for additional work. The following figures provide 10-year trends in annual concentrations in the most heavily populated areas of the province, and the minimum and maximum concentrations across all BC sites.

PM_{2.5} levels (shown as annual average) have been increasingly influenced by wildfire smoke over the past decade. In 2014 and 2015, wildfire impacts on PM_{2.5} levels were observed in parts of the province (e.g. Prince George and Kelowna). In 2017 and 2018 especially, wildfire smoke was widespread. Several sites, including Prince George, Kelowna, Chilliwack and Victoria, observed their highest average concentrations over the past decade in 2018.

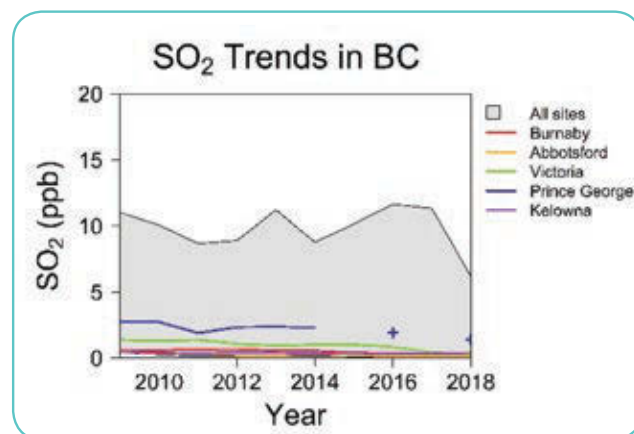


Ozone levels (shown as 4th highest daily 8-hour maxima) are also known to be influenced by wildfire smoke. Siberian wildfire smoke in 2012 and BC wildfires in 2015, 2017 and 2018 are believed to have contributed to higher ozone levels in these years.^{6,7}

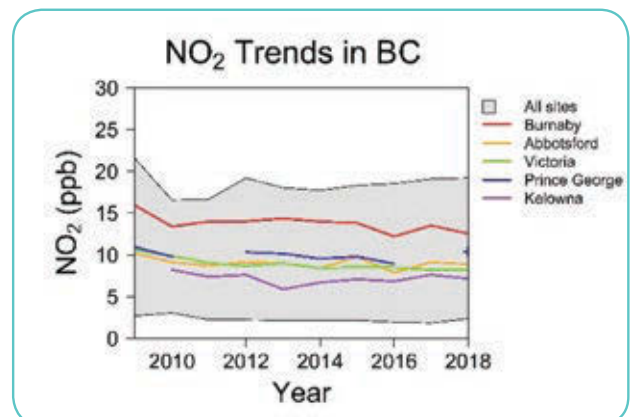


⁶ Teakles, A.D., So, R., Ainslie, B. et al. (2017) Impacts of the July 2012 Siberian fire plume on air quality in the Pacific Northwest. Atmos. Chem. Phys. 17, pp. 2593-2611.
⁷ Influence of 2015 and 2017 wildfire smoke on ozone levels in the Lower Fraser Valley are discussed further in: Lower Fraser Valley Air Zone Report (2015-2017) at: <https://www2.gov.bc.ca/gov/content/environment/air-land-water/air/reports/latest-air-zone-reports>.

SO₂ levels (shown as annual average) in urban areas remain low – less than 3 ppb throughout the last decade. This reflects efforts to reduce sulphur content in motor vehicle and marine fuels and a reduction of emissions from the petroleum refining and cement industries.



NO₂ levels (shown as annual average) have generally declined in urban areas over the past decade, largely due to more stringent vehicle emission standards and other local actions. There is evidence that trends have bottomed out or have begun to increase. The introduction of new vehicle emission standards, beginning in 2017, is expected to result in improved air quality over the next decade as the new technology penetrates the vehicle fleet.



Glen Okrainetz– 2019 Clean Air Champion

The BC Lung Association's Air Quality/Health Steering Committee annually awards the title of "Clean Air Champion" to a deserving recipient who has made a significant contribution to the field of air quality. The contribution may have been in any aspect of air quality, including basic science, epidemiology, public health, advocacy, education, and innovations. Nominees may be an individual or an organization, including public interest groups, academics, local governments, private companies and others.



This year's recipient of the award is Mr. Glen Okrainetz.

In recognition of his numerous contributions over the past decade to protect air quality in BC, Glen Okrainetz is recognized as this year's Clean Air Champion. "Glen has been a tireless supporter of air quality in the province

and has led the BC Lung Air Quality/Health Steering Committee for 15 years. He is well-respected among his colleagues and this report would not have been possible without his support," says Dr. Menn Biagtan, VP, Health Initiatives and Programs of the BC Lung Association.

Until his retirement in December 2018, Glen was the Director of the Clean Air, Integrated Pest Management and Industry Section of the Ministry of Environment and Climate Change Strategy. He worked on a wide range of issues that spanned local and regional activities (e.g. AirCare review, support of airshed planning efforts), provincial activities (e.g. BC Scrap-It Program), national efforts (e.g. Air Quality Management System, Canadian Ambient Air Quality Standards) and international collaborations (e.g. International Airshed Strategy).

Glen was instrumental in the development of the BC Air Action Plan in response to the government's

commitment that British Columbia would have the best air quality, bar none. The Air Action Plan, over time, yielded a number of important programs to improve air quality in BC that included:

- The Provincial Wood Stove Exchange program to promote the shift to cleaner forms of residential heating;
- Tighter emission standards for wood-burning appliances;
- Strategies to reduce emissions from pile burning and new tools to improve our ability to forecast smoke impacts;
- Incentives to encourage the transition to cleaner vehicles;
- Promotion of anti-idling efforts and the clean-up of diesel emissions from school buses;
- Collaboration with the Fraser Basin Council to green commercial and public sector vehicle fleets;
- Work with the federal government, ports and the shipping industry to support green ports and marine vessels

"Glen was the chair of the BC Lung Association Air Quality/Health Steering Committee. He brought to the table his leadership skills, his ability to 'connect the dots,' his support for collaborative solutions, and boundless humour," says Michael Brauer, Professor, School of Population and Public Health UBC.

"Some people who have seen us interact probably think I am enjoying Glen's retirement as much as he is. But I have a tremendous respect and admiration for the work he did on ensuring clean, healthy air throughout BC, and working with local airsheds such as Metro Vancouver. Thanks Glen!" says Roger Quan, Director of Air Quality and Climate Change, Metro Vancouver.

Although Glen has retired from his work with the Ministry, he remains active in the environmental field. Glen continues to sit on the Board of Directors of the Scrap-It Program, and to ride his bicycle around the streets of Victoria.



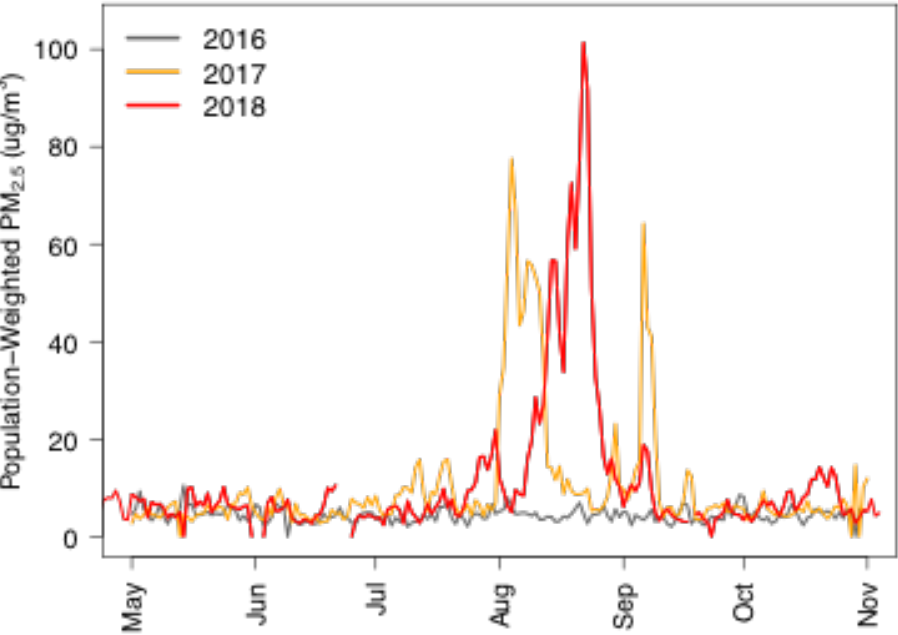
2018 Even Worse than 2017 for Wildfire Smoke

After the unprecedented 2017 wildfire season, no one expected that the 2018 season would be even worse for wildfires and smoke in BC. Although the 2018 wildfires were not as disruptive or destructive as those in 2017, the area they burned was even larger and their air quality impacts were more extreme. Concentrations of fine particulate matter (PM_{2.5}) were elevated across the province for most of August (Figure 4), with the highest measurements in the central and southern interior where the

fires were most intense. Even still, weather conditions transported heavy smoke to coastal areas, and Metro Vancouver was under air quality advisory for a record 22 days, of which 18 days were related to wildfire smoke. Exposure to wildfire smoke has been associated with a wide range of acute health effects, especially for people with respiratory conditions such as asthma and chronic obstructive pulmonary disease (COPD). Evidence also suggests that people with

heart conditions are at higher risk. Given that wildfire seasons are getting longer and more intense across North America, Europe, and Australia, there will be many new research on the short- and long-term health effects of wildfire smoke in the coming years. We cannot predict what the 2019 wildfire season will bring for BC, but we should now approach every summer prepared for another record-setting year. The best way to reduce any health risks from wildfire smoke is to reduce your smoke exposure by (1) keeping the indoors as smoke-free as possible and (2) limiting exercise outdoors when it is smoky. New fact sheets from the BC Centre for Disease Control (BCCDC) can help you to prepare and protect yourself: <http://www.bccdc.ca/health-professionals/professional-resources/wildfire-smoke-response-planning>

Figure 4: The daily population-weighted average of fine particulate matter (PM_{2.5}) concentrations across BC in the mild wildfire season of 2016 and the extreme wildfire seasons of 2017 and 2018. The population-weighted average takes the estimated exposure for every person in the province, and then averages all 4.9 million values. Some locations (e.g. Prince George) experienced much higher concentrations than those shown here, while others (e.g. Terrace) were lower.



Highlights from the Air Quality and Health Workshop

On February 6, 2019 the BC Lung Association held its 16th annual Air Quality and Health Workshop at the Pinnacle Hotel in Vancouver. The topic was Wildfire Smoke: A Growing Threat to Air Quality and Public Health, which drew considerable interest after the extreme 2017 and 2018 wildfire seasons. The objectives of the workshop were to: (1) describe the complex wildfire smoke mixture; (2) review what is already known about the health effects of wildfire smoke based on historic events; (3) summarize the expected impacts of climate change on wildfire and smoke over the coming decades; (4) discuss the effectiveness of individual and community interventions for wildfire smoke protection; and (5) identify critical gaps in the current toxicological, epidemiological, and intervention evidence.

Dr. Sarah Henderson from the BC Centre for Disease Control (BCCDC) gave an overview of wildfire smoke and health in BC and elsewhere over the past 20 years and some insight into the next 20 years. Dr. Michael Flannigan from the University of Alberta followed with a talk about the changing wildfire regime in western Canada, and the spectre of even longer and more extreme seasons in BC and Alberta.

Dr. Ian Gilmour from the Environmental Protection Agency (EPA) described the constituents of smoke, which is an extremely complex mixture of organic and inorganic gases and particles. He then went on to present exciting work from his lab on the toxicology of wildfire smoke, especially the effects of smoke from different fuels and different fire temperatures. The overall findings were that smoke had significant respiratory and cardiovascular effects in animals. Dr. Colleen Reid from the University of Colorado then reviewed what is known about the health effects of wildfire smoke in humans. While there is clear and growing evidence of acute respiratory and cardiovascular effects, more research is needed on infants exposed *in utero*, other acute outcomes such as mental health impacts, and the long-term effects of extreme and repeated exposures.

The afternoon started with Dr. Bonne Ford from Colorado State University discussing all the different tools

that are available for assessing exposure to wildfire smoke, including low-cost sensors. This was followed

by Angela Yao from the BCCDC, who described different tools for public health surveillance, including assessment of population susceptibility to current and future smoke events. Sarah Coefield, an air quality specialist with the Missoula County Health Department, shared her experience thru her work in public health. As a front-line public health professional, Sarah managed periods of extreme and prolonged smoke exposure in a rural area, and she shared many lessons learned.

Dr. Robert Brook from the University of Michigan discussed the health protection offered by portable air cleaners and face masks, including some new evidence from studies conducted in highly polluted cities. Dr. John Balmes from the Berkeley School of Public Health then discussed his own experiences during recent wildfire seasons in California, and the limited evidence for community-based interventions to protect people from smoke exposures. Prior to the final talk, Roger Quan from Metro Vancouver spoke in recognition of the extensive contributions of Glen Okrainetz, who retired from the BC Ministry of Environment and Climate Change Strategy in December 2018. Finally, Glen took the stage to reiterate the importance of wildfire smoke as an air quality and public health issue in the changing climate.

The workshop was attended by more than 200 participants from government agencies, universities, non-governmental organizations, and the private sector. For the first time, the workshop was also made available via live stream, and more than 50 people participated remotely. So far many of the participants said that this conference was the best. Although there were some problems with sound quality, we hope to offer the online option again in future. Planning for the 17th annual workshop has already begun!



All slides from the workshop are available online at <https://bc.lung.ca/health-professionals/air-quality-health-workshop>



Updates from Partner Agencies



Ministry of
Environment and
Climate Change Strategy

Regulatory Updates

The Ministry of Environment and Climate Change Strategy (ENV) is finalizing proposed revisions to



the Open Burning Smoke Control Regulation. Information on the proposed changes can be found at <https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/laws-policies-standards-guidance/legislation-regulation/environmental-protection-regulatory-review/open-burning-smoke-control-regulation>. If the proposal is adopted before summer, new burning rules will be in effect for the fall burning season.

Provincial Wood Stove Exchange Program

The province increased its funding of the Provincial Wood Stove Exchange Program from \$200,000 in 2017 to \$300,000 in 2018. This funding will support wood stove exchange programs in 15 BC communities, and will include incentives of \$250 for changing to a cleaner-burning wood stove, and \$400 for changing to a qualifying electric heat pump, gas or propane stove, or pellet-fuelled stove. Individual communities may provide



additional incentives to residents, over and above those provided by the province. For more information on the Provincial Wood Stove Exchange Program, see: <https://www2.gov.bc.ca/gov/content/environment/air-land-water/air/air-pollution/smoke-burning/exchange>.

Air Quality Monitoring Network

In 2018, ENV installed a new and fully-equipped air quality monitoring station at the Muriel Baxter School in Cranbrook. ENV also supported work by Dr. Peter Jackson of the University of Northern BC to compare the performance of low-cost PM_{2.5} sensors with government reference instruments. For more information on this work, see page 4.

The Province and the Prince Rupert Port Authority have agreed to share information collected by the Port Authority in the Fairview area. This has given the Province access to data from a coastal site in an area of the Province where little air quality data is available. In turn, the Prince Rupert Port Authority's data is freely available on all regular Ministry reporting channels and the site is operationally audited by an external party.

On January 1, 2018, ENV began a pilot program in Kitimat to issue public alerts when sulphur dioxide (SO₂) levels exceed pre-defined thresholds. When triggered, alerts are automatically posted to ENV's website and sent out to the AQ-advisories.ca website operated by the Bulkley Valley Lakes District Air Manage-

ment Society, for immediate forwarding to a subscription list. The pilot continues to run at this time. For more information on the pilot, see: <https://www2.gov.bc.ca/gov/content/environment/air-land-water/air/air-quality/measuring/kitimat-so2-alert-pilot-project>.

AQHI Update

The AQHI is a tool developed by Canadian health researchers to communicate short-term health risks to the public. Originally based on data from the largest Canadian cities, the AQHI has been shown to periodically under-report health risks during smoky conditions. In 2018, ENV has directly supported the work by the BCCDC to develop an AQHI-Plus to better characterize health risks due to wildfire smoke (for more info, see: page 5).



Air Quality and Climate Change Planning

Metro Vancouver is beginning development of its next regional air quality and greenhouse gas management plan, the *Clean Air Plan*. The plan will identify opportunities for emissions reductions to protect human health and the environment, minimize the region's contribution to climate change and improve visual air quality.

Metro Vancouver is also implementing *Climate 2050*,



a new regional climate action strategy, to support transitioning our region to a resilient and low carbon future, and increasing the health, well-being and prosperity of Metro Vancouver residents. The first component of the strategy - the *Climate 2050 Strategic Framework* - was approved by the Board in 2018.

The *Clean Air Plan* will be developed in 2019-2020 and will be the key air quality and greenhouse gas planning document for Metro Vancouver. Integrated with *Climate 2050*, it will set the direction for air quality and greenhouse gas management in the region for the next five to ten years.

Regional Air Quality Objectives

Metro Vancouver is initiating consultation to update regional air quality objectives for nitrogen dioxide and ozone, following adoption of new Canadian Ambient Air Quality Standards. The new regional objectives are intended to provide greater human health and environmental protection, and enable air quality management activities and emission reductions in the region.

Reducing Vehicle Emissions



Metro Vancouver has been working to increase the uptake of electric vehicles (EVs) in the region, to support regional emission reductions goals. Programs such as Emotive: The Electric Vehicle Experience (www.emotivebc.ca), EVCondo.ca, and EVWorkplace.ca engage with residents, strata corporations and businesses to lower the barriers to owning and charging an EV.

In 2018, Metro Vancouver celebrated its busiest season ever for Emotive, a community outreach campaign founded by Metro Vancouver, the cities of Surrey and Vancouver, Fraser Basin Council and the Province of BC, which aims to raise awareness of plug-in electric vehicles in BC. In Metro Vancouver, Emotive was at 45 community events in 2018, and the 2019 schedule includes 50 events.

Regulatory Updates

Metro Vancouver is taking measures to address residential wood smoke, which is responsible for more than a quarter of PM_{2.5} emissions in the region and can cause respiratory and cardiac health effects. Following consultation with residents, businesses, and health agencies, a new bylaw is being developed, which, if adopted, would complement a variety of educational and incentive programs currently in place to reduce wood smoke from indoor wood-burning stoves and fireplaces across the region. The new bylaw is expected to include a phased approach to regulate the emissions, with seasonal restrictions, registration requirements, and limits on the operation of older, more polluting wood-burning devices.

Metro Vancouver is seeking ways to reduce odour emissions across the region, following increasing public complaints about odours from a variety of sources, which could include compost and food processing facilities.

Odorous air contaminants have the potential to cause effects ranging from nui-



sance when present at low levels to health effects when frequently present at elevated levels. Metro Vancouver will be engaging with local communities, businesses, and municipalities over the summer and fall to share



information about enhancing odour management in the region. Diesel engine exhaust is a leading air quality threat to human health in Metro Vancouver, containing a complex mixture of air contaminants. Non-road engines, such as loaders, tractors and other equipment, are a primary source of diesel emissions. To reduce emissions from older, higher emitting non-road diesel engines, Metro Vancouver has implemented its Non-Road Diesel Engine Bylaw. Since 2015, the Bylaw has prohibited registration of Tier 0 engines, the oldest, highest-emitting engines. Beginning in 2020, similar measures for Tier 1 engines will apply in the region. An outreach campaign will be launched in June about the Tier 1 engine registration deadline and prohibition against introducing previously unregistered Tier 1 engines into the region.

For updates on consultation activities, visit www.metrovancouver.org/services/air-quality/consultation.

Air Quality Monitoring and Preparing for Wildfires

Metro Vancouver is enhancing the way it responds to air quality impacts from wildfires, following unprecedented levels of smoke during the past four years and anticipated changes in the frequency, duration and severity of

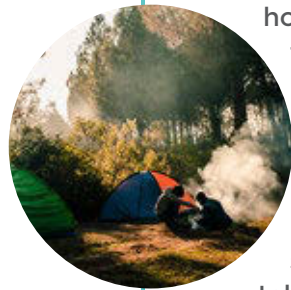
wildfires in the future as a result of climate change.

Metro Vancouver operates a network of 31 air quality monitoring stations from Horseshoe Bay to Hope and issues air quality advisories whenever air quality is expected to reach unhealthy levels. During the summers of 2015, 2017 and 2018, Metro Vancouver experienced significantly increased wildfire smoke impacts. The 14-day advisory in August 2018 was the longest continuous advisory period in the history of Metro Vancouver's air quality program.

Since late 2017, Metro Vancouver has been working with local health authorities, BC Centre for Disease Control, Health Canada, the BC Ministry of Environment and Climate Change Strategy, and the Fraser Valley Regional District to develop more effective information for residents on wildfire smoke health impacts and interventions for reducing them. Opportunities for early outreach and messaging before air quality degrades to levels that warrant an advisory are also being investigated.

Caring for the Air

Metro Vancouver's annual Caring for the Air Report has more air quality and climate change stories at www.metrovancouver.org/air.



Wildfire Smoke Communications

In the summer time, FVRD residents are often exposed to hazardous smoke, both from local wildfires and from burning forests far away. These episodes have become longer and more frequent in recent years. Our part of the airshed is prone to accumulating higher levels of toxic air pollutants from smoke than the rest of the region and it is important that our residents know how to protect themselves and their families. The FVRD collaborates with the regional health agencies and neighbouring jurisdictions to develop meaningful and timely messages about how smoke affects air quality and health and how to prepare and protect oneself from those effects.

"Love Our Air" for Schools

FVRD outreach efforts have been greatly enhanced through the 2017 launch of a well-received school program called "Love our Air", a portfolio of lessons and custom workshops designed for Grades 5 and 10 Science classrooms. The program focuses on developing students' respect for the environment and understanding how to reduce pollution through their everyday actions. Students learn to identify types of air pollutants, their sources and impacts, as well as possible actions and solutions that they can take as individuals, or with their community. The program

has been offered in every part of the region, including small communities. It will continue in the 2019/2020 school year.

Electric Vehicles

The FVRD continues to partner with Emotive: The Electric Vehicle Experience campaign in the region. This campaign brings electric vehicles to events throughout the region to show residents how great electric vehicles are to drive. An Emotive booth was set up at key events in the region, such as the Abbotsford Airshow and the Agassiz Fall Fair and Corn Festival.

Radon Awareness

New radon data indicates that some areas in the FVRD have radon levels that are of concern. Long-term exposure to indoor radon buildup results in an increased risk of developing lung cancer. Due to the potential health concerns associated with it, the FVRD is working with health agencies to support their initiatives on improving radon awareness throughout the region and protect residents from potentially unsafe exposure.



Environment and Climate Change Canada
Environnement et Changement climatique

Environment and Climate Change Canada (ECCC) has a mandate to provide Canadians with a clean, safe and sustainable environment. With respect to air quality, this is achieved through its Air Pollution and Weather and Environmental Observations, Forecasts and Warnings programs and mechanisms such as the Air

Quality Management System and the Canada-US Air Quality Accord. In British Columbia, the regional ECCC office has shifted its focus in recent years towards science activities in support of air quality prediction and services.

Small Sensors in Support of Air Quality Monitoring and Prediction

ECCC is currently investigating small low-cost sensors to assess their potential for communicating risk of exposure to air pollution, improving air quality forecasting and enhancing community engagement with respect to air quality issues. Several initiatives are underway and are described in further detail on page 4.

Air Quality Modelling and Wildfire Smoke Forecasting

ECCC is currently working on an evaluation study of its smoke forecast model FireWork (www.weather.gc.ca/firework) in order to improve its ability to forecast PM_{2.5} concentrations during wildfire smoke events. The study is using ground- and satellite-based observations to examine how different model configurations and different fire emission models can be used to give Canadians better guidance on wildfire impacts in their communities. Part of the study included a survey on how the FireWork model guidance is used by air quality meteorologists, air quality scientists and public health workers and how they would like the model to be improved. The survey results will help guide model development as well as improve the suite of forecast products delivered to the various user communities. In addition, a pilot project is underway to study how the upgrades to ECCC's weather radar network can



be used to detect wildfire plumes. The radar upgrades should allow for better discrimination between clouds, rain and smoke particles and could ultimately be used to improve air quality forecasts.



Health Canada
Santé Canada

The International Society of Exposure Science and the International Society for Environmental Epidemiology returned to Canada in 2018 for a joint annual meeting for the first time since the 2002 meeting in Vancouver. Health Canada staff were major contributors to the organization of the 2018 meeting in Ottawa and 25 Health Canada attendees presented their research on air quality and toxic chemicals to the conference. A highlight of the conference was a symposium honouring the career of Health Canada research scientist Dr. Richard Burnett, who has done much to shape Canadian and global knowledge of the health impacts of air pollution. At the conference, Dr. Burnett presented a new Global Exposure Mortality Model which used data from 41 cohort studies in 16 countries to develop new predictions of the relationship

between ambient air PM_{2.5} concentrations and mortality.

Health Canada air quality research published in 2018 reported on investigations of air pollution exposure and impacts on vulnerable populations including prenatal exposure, diabetes and older Canadians. Research ranged from large scale epidemiological studies like the Canadian Census and Environmental Health Cohort (CanCHEC), to small panel studies. Papers were published

on the impact of traffic, steel mills and refineries. New projects have begun on aeroallergens, ultrafine particles, and biomass burning.

Work continues in support of the Canadian Ambient Air Quality Standards with a risk assessment on ozone nearing completion and a new review of PM_{2.5} beginning. A risk assessment of traffic related air pollution is also underway. A guidance document on *Ventilation and the Indoor Environment* was recently published as well as several fact sheets on a variety of subjects related to indoor and outdoor.

Recently, Health Canada supported and contributed its research results to the Canadian Partnership for Children's Health and the Environment's Healthy Schools Day on April 4, 2019, which was focused on reducing the impacts of diesel school buses.

Health Canada provided financial support to the BC Centre for Disease Control (BCCDC) to develop a series of one-page fact sheets on wildfire smoke, air quality and health. These documents were developed for all organizations in BC that need to provide information to the public on wildfire smoke and health. They are intended to provide a consistent set of messages based on the most up-to-date evidence. As part of this work, BCCDC is also completing an updated evidence review on the use of masks during smoke events and a new evidence review on the impact of exposure to wildfire smoke on infants and babies *in utero*. Some of the one-pager documents are available on-line on the BCCDC website and the remaining documents will be posted soon.





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BC MINISTRY OF ENVIRONMENT
AND CLIMATE CHANGE STRATEGY
www.gov.bc.ca/bcairquality
Environmental Standards Branch
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HEALTH CANADA ENVIRONMENTAL
HEALTH PROGRAM-BC REGION
[www.hc-sc.gc.ca/ewh-semt/air/
index-eng.php](http://www.hc-sc.gc.ca/ewh-semt/air/index-eng.php)
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ministries/health](http://www2.gov.bc.ca/gov/content/governments/organizational-structure/ministries-organizations/ministries/health)
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ISLAND HEALTH AUTHORITY
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We welcome your feedback via this
link: [https://form.jotform.com/lun-
gassociation/SOTA](https://form.jotform.com/lung-gassociation/SOTA)

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