

## METRO VANCOUVER REGIONAL DISTRICT CLIMATE ACTION COMMITTEE

### REGULAR MEETING

Friday, April 8, 2022

1:00 p.m.

Meeting conducted electronically pursuant to the Procedure Bylaw  
28<sup>th</sup> Floor Boardroom, 4515 Central Boulevard, Burnaby, British Columbia

Webstream available at <http://www.metrovanancouver.org>

### REVISED AGENDA<sup>1</sup>

#### 1. ADOPTION OF THE AGENDA

##### 1.1 April 8, 2022 Regular Meeting Agenda

That the Climate Action Committee adopt the agenda for its regular meeting scheduled for April 8, 2022 as circulated.

#### 2. ADOPTION OF THE MINUTES

##### 2.1 March 11, 2022 Regular Meeting Minutes

That the Climate Action Committee adopt the minutes of its regular meeting held March 11, 2022 as circulated.

#### 3. DELEGATIONS

##### 3.1 Eoin Finn and Peter van der Velden, Friends of Tilbury

Subject: LNG production and storage at the Tilbury facility in Delta

**Added**

##### 3.2 Matthew Christensen, Ducks Unlimited Canada

Subject: Conservation Funds

#### 4. INVITED PRESENTATIONS

#### 5. REPORTS FROM COMMITTEE OR STAFF

**Corrected**

##### 5.1 Draft Climate 2050 Energy Roadmap

That the MVRD Board direct staff to proceed with engagement on the draft *Climate 2050 Energy Roadmap*, as presented in the report dated March 16, 2022, titled "Draft *Climate 2050 Energy Roadmap*".

<sup>1</sup> Note: Recommendation is shown under each item, where applicable.

- 5.2 Draft Climate 2050 Nature and Ecosystems Roadmap** pg. 50  
That the MVRD Board direct staff to proceed with engagement on the draft *Climate 2050 Nature and Ecosystems Roadmap*, as presented in the report dated March 9, 2022, titled "Draft *Climate 2050 Nature and Ecosystems Roadmap*".
- 5.3 Proposed Roadmap for Climate Action Engagement to 2025 and Work Plan for 2022** pg. 100  
That the MVRD Board receive for information the report dated March 10, 2022 "Proposed Roadmap for Climate Action Engagement to 2025 and Work Plan for 2022".
- 5.4 Appointment of District Director and Enforcement Officers** pg. 109  
That the MVRD Board:  
a) pursuant to the *Greater Vancouver Regional District Air Quality Management Bylaw 1082, 2008* and the *Environmental Management Act*:  
i. rescind the appointments of Ray Robb as district director, and of Kathy Preston as assistant district director;  
ii. appoint Metro Vancouver employee Kathy Preston as district director;  
iii. rescind the appointments of Toby Gritten, and Dan Saunders as officers; and  
iv. appoint Metro Vancouver employee Muhammad Ali as an officer.  
b) pursuant to section 28 of the *Offence Act* for the purpose of serving summons for alleged violations under the *Greater Vancouver Regional District Air Quality Management Bylaw 1082, 2008*:  
i. rescind the appointments of Toby Gritten, and Dan Saunders; and  
ii. appoint Metro Vancouver employee Muhammad Ali.
- 5.5 Manager's Report** pg. 111  
That the Climate Action Committee receive for information the report dated March 30, 2022 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 April 8, 2022.

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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

McCutcheon, Jen – Electoral Area A

McIlroy, Jessica – North Vancouver City

McLaughlin, Ron – Lions Bay

Patton, Allison – Surrey

Royer, Zoë – Port Moody

Steves, Harold – Richmond

Wilson, Chris – Coquitlam

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, March 11, 2022 in the 28<sup>th</sup> Floor Boardroom, 4515 Central Boulevard, Burnaby, British Columbia.

**MEMBERS PRESENT:**

Chair, Councillor Adriane Carr, Vancouver  
 Vice Chair, Councillor Sav Dhaliwal, Burnaby  
 Councillor Petrina Arnason\*, Langley Township  
 Chief Ken Baird\*, Tsawwassen (arrived at 1:11 p.m.)  
 Councillor Laura Dupont\*, Port Coquitlam  
 Councillor David Hocking, Bowen Island  
 Councillor Dylan Kruger\*, Delta (arrived at 1:04 p.m.)  
 Director Jen McCutcheon\*, Electoral Area A  
 Councillor Jessica McIlroy\*, North Vancouver City  
 Mayor Ron McLaughlin\*, Lions Bay  
 Councillor Allison Patton\*, Surrey  
 Councillor Zoë Royer\*, Port Moody  
 Councillor Harold Steves\*, Richmond  
 Councillor Chris Wilson\*, Coquitlam  
 Councillor Ahmed Yousef\*, Maple Ridge

**MEMBERS ABSENT:**

None.

**STAFF PRESENT:**

Roger Quan, Director, Air Quality and Climate Change, Parks and Environment  
 Amelia White, Legislative Services Supervisor, Board and Information Services

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



**1. ADOPTION OF THE AGENDA**

**1.1 March 11, 2022 Regular Meeting Agenda**

**It was MOVED and SECONDED**

That the Climate Action Committee:

- a) amend the agenda for its regular meeting scheduled for March 11, 2022 by varying the order of the agenda to consider Item 6.1 Metro 2050 Next Steps: Addressing Member Jurisdiction Comments and Climate Policy before Item 5.1 Draft Climate 2050 Industry and Business Roadmap; and
- b) adopt the agenda as amended.

**CARRIED**

**2. ADOPTION OF THE MINUTES**

**2.1 February 11, 2022 Regular Meeting Minutes**

**It was MOVED and SECONDED**

That the Climate Action Committee adopt the minutes of its regular meeting held February 11, 2022 as circulated.

**CARRIED**

1:04 p.m. Councillor Kruger arrived at the meeting.

**3. DELEGATIONS**

No items presented.

**4. INVITED PRESENTATIONS**

No items presented.

**Agenda Order Varied**

Pursuant to Item 1.1 of the agenda, the order of the agenda was varied to consider Item 6.1 at this point.

**6. INFORMATION ITEMS**

**6.1 Metro 2050 Next Steps: Addressing Member Jurisdiction Comments and Climate Policy**

Report dated February 24, 2022, from Heather McNell, General Manager, Regional Planning and Housing Services, together with the report dated February 4, 2022, from Heather McNell, General Manager, Regional Planning and Housing Services, providing the Climate Action Committee with a copy of the report for information as the report was passed by the MVRD Board at the February 25, 2022 meeting.

1:11 p.m. Chief Baird arrived at the meeting

Members were provided with a presentation on *Metro 2050* highlighting the implementation of the Regional Growth Strategy, the climate policy in *Metro 2050* and aligning *Metro 2050*, *Climate 2050* and *Transport 2050*.

Discussions ensued regarding the review of the structural framework of *Metro 2040*, the importance of incorporating climate action policy into *Metro 2050*, and the coordination between the Regional Planning Committee and the Climate Action Committee.

Presentation material titled “*Metro 2050* Next Steps: Addressing Member Jurisdiction Comments and Climate Policy” is retained with the March 11, 2022 Climate Action Committee agenda.

### **Agenda Order Resumed**

The order of the agenda resumed with Item 5.1 being before the Committee.

## **5. REPORTS FROM COMMITTEE OR STAFF**

### **5.1 Draft Climate 2050 Industry and Business Roadmap**

Report dated February 17, 2022, from Sheryl Cumming, Project Engineer, Air Quality and Climate Change and Jason Emmert, Program Manager, Climate Policy, Parks and Environment Department, providing Climate Action Committee and MVRD Board with direction to proceed with engagement on the draft *Climate 2050 Industry and Business Roadmap*.

Members were provided with a presentation on the Draft *Climate 2050* Industry and Business Roadmap highlighting the strategies and big moves, estimated emissions impact, climate resilience strategies and engagement.

Members discussed how to capture emerging technologies and ideas, ways to reduce urban freight in the region, measuring the successfulness of plans and policies and carbon capture technology.

Presentation material titled “*Climate 2050* Draft Industry and Business Roadmap: A Pathway to a Carbon Neutral and Climate Resilient Region” is retained with the March 11, 2022 Climate Action Committee agenda.

### **It was MOVED and SECONDED**

That the MVRD Board direct staff to proceed with engagement on the draft *Climate 2050 Industry and Business Roadmap*, as presented in the report dated February 17, 2022, titled “Draft *Climate 2050 Industry and Business Roadmap*”.

**CARRIED**

## **5.2 Mobile Air Quality Monitoring Using Drone-Based Sensors**

Report dated February 8, 2022, from Julie Saxton, Air Quality Planner and Fatima Ansari, Project Engineer Parks and Environment Department, providing the Climate Action Committee with information about the first phase of a Sustainability Innovation Fund (SIF) project to evaluate the feasibility of using a drone-mounted 'flying laboratory' for monitoring of air emissions and seeking MVRD Board's authorization to evaluate additional mobile monitoring platforms using the remaining budget for this project.

Members were provided with a presentation on mobile air quality monitoring using drones highlighting the drone flying restrictions, test flight sites, flight results and next steps.

Presentation material titled "Mobile Air Quality Monitoring Using Drone-Based Sensors: A Sustainability Innovation Fund Project" is retained with the March 11, 2022 Climate Action Committee agenda.

### **It was MOVED and SECONDED**

That the MVRD Board authorize staff to use the allocation from the Regional District Sustainability Innovation Fund for the project "Mobile Monitoring of Fugitive and Other Industrial Air Emissions with 'Flying Labs'" to evaluate the feasibility of using other mobile monitoring platforms for air emissions assessment.

**CARRIED**

## **5.3 Addressing the Use of Heavy Fuel Oil and Exhaust Gas Cleaning Systems in Marine Vessels in the Region**

Report dated February 11, 2022, from Shelina Sidi, Senior Project Engineer, Air Quality and Climate Change and Derek Jennejohn, Lead Senior Engineer, Parks and Environment Department, providing the Climate Action Committee with options for addressing the use of heavy fuel oil (HFO) and exhaust gas cleaning systems in marine vessels in the region in response to a delegation received at its September 10, 2021 meeting.

Discussion ensued regarding the boundaries of the Vancouver Fraser Port Authority and the possibility of encouraging other port authorities to prohibit the discharge of scrubber washwater.

### **It was MOVED and SECONDED**

That the MVRD Board authorize the Board Chair to write the port authorities of Seattle, Tacoma and Prince Rupert to call for prohibition on the discharge of scrubber washwater, similar to the actions of the Vancouver Fraser Port Authority.

**CARRIED**

**It was MOVED and SECONDED**

That the MVRD Board authorize the Board Chair to:

- a) write to the federal ministers of Environment and Climate Change Canada and Transport Canada to request the prohibition of scrubbers and require the use of cleaner, lower sulphur fuels that meet sulphur content limits without the use of scrubbers, in the North American Emission Control Area (ECA), and prioritize the use of shore power; and
- b) write to the Vancouver Fraser Port Authority to express support for their actions to prohibit the discharge of scrubber washwater while a vessel is at berth or anchor and further encourage this action to apply to vessels transiting all the waters within the Port, as well as support their air emissions program that incentivizes the use of cleaner fuels and shore power.

**CARRIED**

**5.4 Manager's Report**

Report dated February 25, 2022, from Roger Quan, Director, Air Quality and Climate Change, Parks and Environment Department, providing the Climate Action Committee with updates on the 2022 Work Plan, the *Climate 2050* Engagement, climate action highlights from the 2022 BC Budget announcement, and the Trans Mountain Pipeline Construction.

**It was MOVED and SECONDED**

That the Climate Action Committee receive for information the report dated February 25, 2022 titled "Manager's Report".

**CARRIED**

**6. INFORMATION ITEMS**

**6.2 Correspondence dated February 22, 2022 from Clarissa Huffman re City of Port Coquitlam Climate Action Plan - Phase 2 Workshop**

**7. OTHER BUSINESS**

No items presented.

**8. BUSINESS ARISING FROM DELEGATIONS**

No items presented.

**9. RESOLUTION TO CLOSE MEETING**

**It was MOVED and SECONDED**

That the Climate Action Committee close its regular meeting scheduled for March 11, 2022 pursuant to the *Community Charter* provisions, Section 90 (1) (i) and 90 (2) (b) as follows:

- "90 (1) A part of a board meeting may be closed to the public if the subject matter being considered relates to or is one or more of the following:

- (i) the receipt of advice that is subject to solicitor-client privilege, including communications necessary for that purpose;
- 90 (2) A part of a meeting must be closed to the public if the subject matter being considered relates to one or more of the following:
  - (b) the consideration of information received and held in confidence relating to negotiations between the regional district and a provincial government or the federal government or both, or between a provincial government or the federal government or both and a third party.”

**CARRIED**

## **10. ADJOURNMENT/CONCLUSION**

### **It was MOVED and SECONDED**

That the Climate Action Committee adjourn its regular meeting of March 11, 2022.

**CARRIED**

(Time: 3:24 p.m.)

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Amelia White,  
Legislative Services Supervisor

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Adriane Carr, Chair

51377997 FINAL

We would like to make a presentation to the Board meeting for the MVRD as well as to the Climate action committee. We are a loosely formed group of individuals and groups called the “Friends of Tilbury”. We are concerned about the development of the LNG industry in BC. Particularly how that development impacts the environment of the Fraser River and the environment and well being of our Metro communities.

Specifically, our presentation is about the proposed development of a marine jetty and the vast increase of LNG production and storage at the Tilbury facility in Delta; and the dangers this represents to much of the Greater Vancouver area.

However, there are many issues one of which should seriously concern the Board for Metro Vancouver: How does BC propose to meet our GHG emission targets.

The proposed export of BC LNG through this facility will not allow BC or Canada to live up to our Paris accord agreements. Recent science is clear; our Methane emissions are far greater than previously admitted. Our GHG emissions have not decreased, but only increased. We know that the fossil fuel industry is the second largest emitter of GHG. What isn't commonly known is that the LNG industry is one of the largest emitters of Methane gas. The increase in planned production, use or export will only set us back in our efforts to become carbon neutral.

<https://www.env.gov.bc.ca/soe/indicators/sustainability/ghg-emissions.html>

<https://www.theenergymix.com/2022/02/23/breaking-fossils-emit-70-more-methane-than-governments-report-iea-tracker/>

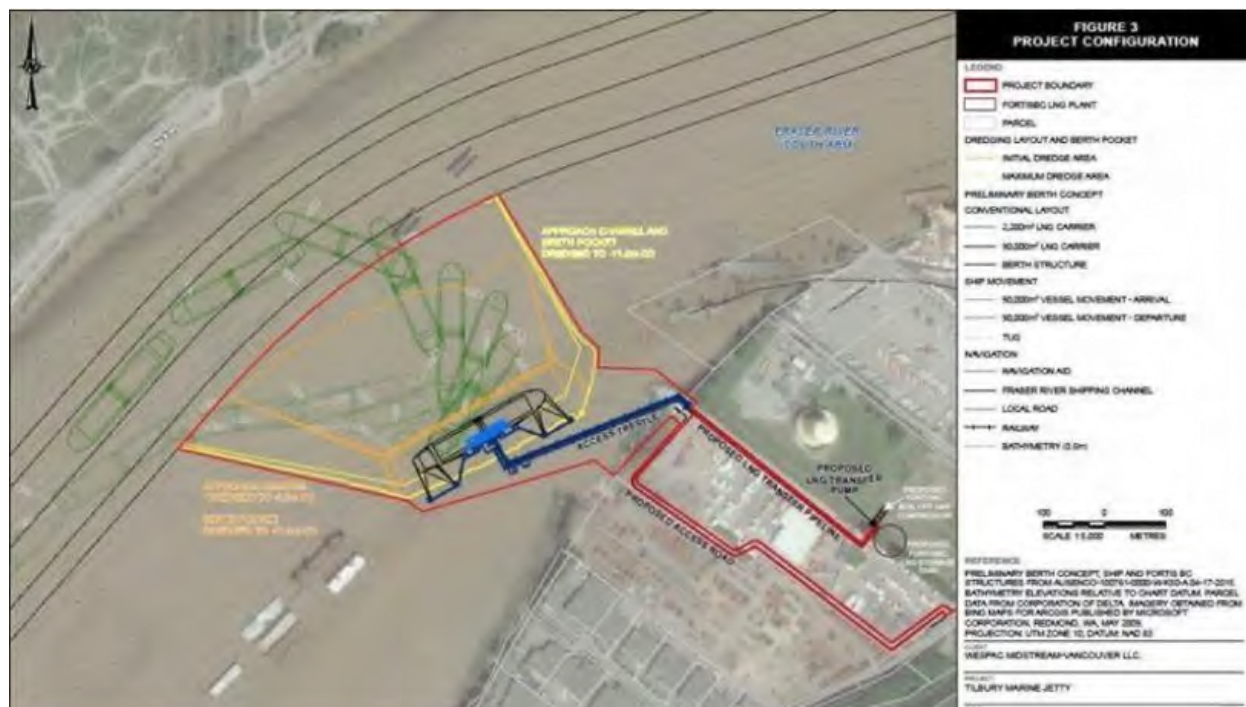
The facility is located directly across the Fraser River from the 85,000 liters Jet fuel tank farm. A small mistake, accident or natural occurrence could put the Jet fuel facility at risk. The link below is of the explosion that rocked Beirut in 2020.

<https://www.youtube.com/watch?v=93tV6-0Ugwk>

Fortis may argue that the likelihood of such an accident here is slim. However, it is a distinct possibility.

<https://www.youtube.com/watch?v=uBAgvXPw1aI>

Loading and maneuvering large LNG carriers add an untenable element of danger to the current facility and the Fraser River. A danger far too great for our communities. A ship loaded with LNG combined with 85,000 litres of jet fuel has more (possible) explosive power by \*\*\* than the explosion in Beirut.



Environmentally the Tilbury proposals are not in line with any provincial, national or international targets or movements. BC has been economically strong and capable of moving forward economically without the development of our LNG industry. If we allow the Tilbury proposals, we will be endangering our environment and our communities. As community leaders you have been elected to maintain or improve our quality of life.

If we are at all to achieve this the Tilbury proposals need to be opposed. A number of you have done so already and we ask that the Board of Metro Vancouver unite in opposition to the two Fortis proposals for Tilbury island.

Speakers: Eoin Finn, Peter van der Velden

We would like to make this presentation to the Climate action Committee on April 8, 2020

## Conservation Funds for Nature-based Solutions to Climate Change



Amongst the many concerning highlights of the 2019 version of Canada's Changing Climate Report (CCCR)<sup>1</sup> issued by the Federal government was the statement that "the effects of widespread warming are evident in many parts of Canada and are projected to intensify in the future. In Canada, these effects include more extreme heat, less extreme cold, longer growing seasons, shorter snow and ice cover seasons, earlier spring peak streamflow, thinning glaciers, thawing permafrost, and rising sea level." The report also suggests that while summer precipitation levels may decline, winter and overall annual precipitation will continue to increase. The report also adds that "coastal flooding is expected to increase in many areas of Canada due to local sea level rise." Over the course of this decade, the average cost of severe weather claims is expected to grow by 138% to \$5 billion per year according to the Insurance Institute of Canada's (IIC) 2020 report<sup>2</sup>. MetroVancouver is already experiencing the impacts of climate change and can expect climate change events to increase in frequency and intensity,

<sup>1</sup> Bush, E. and Lemmen, D.S., editors (2019): Canada's Changing Climate Report; Government of Canada, Ottawa, ON. 444 p. Available From: [https://changingclimate.ca/site/assets/uploads/sites/2/2020/06/CCCR\\_FULLREPORT-EN-FINAL.pdf](https://changingclimate.ca/site/assets/uploads/sites/2/2020/06/CCCR_FULLREPORT-EN-FINAL.pdf) Accessed Date: 07-April-2022

<sup>2</sup> Climate Risks: Implications for the Insurance Industry in Canada, The Insurance Institute of Canada, 2020. Available From: <https://www.insuranceinstitute.ca/en/resources/insights-research/Climate-risks-report>. Accessed Date: 07-April-2022



however there is potential to mitigate and adapt with nature-based solutions. The International Union for the Conservation of Nature (IUCN) defines **nature-based solutions as “actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits.”** These solutions can be an important part of climate action planning since the co-benefits extend beyond storing carbon and adapting to climate change impacts. **We must prioritize investments in climate change adaptation and mitigation to protect our communities.** The economic value and societal benefits of conserving wetlands, forests, agricultural lands, and related natural habitats are well documented. This includes climate regulation (carbon capture and storage), water purification, regulation of water flows, erosion prevention, waste and nutrient filtration, urban cooling, biodiversity and wildlife habitat, pollination, and food security. **Metro Vancouver can help advance nature-based solutions by integrating them into regional projects and plans, encouraging and supporting their uptake at the local level, and exploring new and innovative opportunities for this emerging area of practice – such as conservation funds.**

Conservation funds are a local government service that is funded through a dedicated tax or fee, held, and overseen by local government, and earmarked for the specific purpose of undertaking projects that support environmental conservation and community sustainability. The costs incurred by local governments through climate change are increasing due to the loss of nature. Conservation funds are a huge opportunity to support the delivery of nature-based solutions for climate change in Metro Vancouver and climate change events (i.e. heat domes, flood protection etc...) are of concern for local citizens. The rising popularity of conservation funds is clear from the recent adoption and consideration in the municipalities of West Vancouver<sup>3</sup> and City of Courtenay<sup>4</sup>, respectively. Furthermore, successful models in BC include the South Okanagan Conservation Fund<sup>5</sup> and the Columbia Valley Local Conservation Fund<sup>6</sup>. MetroVan’s draft Climate 2050 Nature & Ecosystems Roadmap includes: Strategy 3: “Integrate Natural Assets into Conventional Asset Management and Decision-Making Processes” and several Actions to better incorporate natural assets into local government decision-making; and Strategy 5: Advance Nature-based solution to climate change Action 5.1. “Explore Innovative Funding and Incentive Programs”. For consideration of the CAC, we present some background and examples on Conservation Funds and how they may be used in climate adaptation and mitigation including the implementation of the draft Climate 2050 Nature and Ecosystems Roadmap report.

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<sup>3</sup> City of West Vancouver. 2022. 2022 Budget Engagement Summary Report. Available From: <https://westvancouver.ca/sites/default/files/dwv/council-agendas/2022/feb/14/22feb14-6.1.pdf> Accessed Date: 07-April-2022

<sup>4</sup> City of Courtenay. 2022. Draft Official Community Plan. Available From: <https://www.courtenay.ca/assets/Departments/Development~Services/OCP~Update/OCP%20Draft%20-Mar18%202022-reduced-TOCLinks.pdf> Accessed Date 07-April-2022.

<sup>5</sup> <https://soconservationfund.ca>

<sup>6</sup> <https://kootenayconservation.ca/columbia-valley-local-conservation-fund/>

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To: Climate Action Committee

From: Nicole Chan, Project Engineer  
Jason Emmert, Program Manager, Climate Policy  
Parks and Environment Department

Date: March 16, 2022 Meeting Date: April 8, 2022

Subject: **Draft Climate 2050 Energy Roadmap**

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### RECOMMENDATION

That the MVRD Board direct staff to proceed with engagement on the draft *Climate 2050 Energy Roadmap*, as presented in the report dated March 16, 2022, titled “Draft *Climate 2050 Energy Roadmap*”.

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### EXECUTIVE SUMMARY

The draft *Climate 2050 Energy Roadmap* is one of the series of ten *Roadmaps* that will guide the region’s policies and collective actions to transition to a carbon neutral, resilient region by 2050. It lays out the goals, targets, strategies and actions for increasing use of clean, renewable, and resilient energy. Actions in the draft *Energy Roadmap* include accelerating electrification, increasing sustainable production of low carbon biofuels and hydrogen, increasing resiliency of energy systems, and protecting existing and future energy infrastructure from current and future climate impacts.

Like the other *Climate 2050 Roadmaps*, the *Energy Roadmap* is intended to be dynamic, and over time, more work will be necessary to identify and undertake additional actions to reach the 2030 and 2050 regional climate targets. The draft roadmap will inform an engagement process, with the intent of bringing an updated *Climate 2050 Energy Roadmap* for endorsement by the MVRD Board in 2022.

### PURPOSE

To seek MVRD Board direction to proceed with engagement on the draft *Climate 2050 Energy Roadmap*.

### BACKGROUND

The MVRD Board adopted the *Climate 2050 Strategic Framework* and directed staff to begin the development process of ten *Climate 2050 Roadmaps*. In 2019, the Board authorized an integrated engagement process for *Climate 2050* and the *Clean Air Plan*, using a series of discussion papers related to the roadmaps, including an energy discussion paper received in February 2021. With the completion of engagement on the discussion paper, this report presents the draft *Climate 2050 Energy Roadmap* (see Attachment), and provides information on the approach for the next phase of engagement to gather feedback on this draft, leading to a finalized roadmap later in the year.

### CLIMATE 2050

*Climate 2050* is an overarching long-term strategy that will guide our region's policies and collective actions to transition to a carbon neutral and resilient region over the next 30 years. *Climate 2050* is

being implemented through ten issue area Roadmaps, which will describe long-term goals, targets, strategies and actions to reduce regional greenhouse gases and ensure that this region is resilient to climate change impacts. Implementation of the Roadmaps will be driven by Metro Vancouver's management plans and other policies, including the *Clean Air Plan*, adopted in 2021.

The Roadmaps, including the *Climate 2050 Energy Roadmap*, are intended to be “living, breathing” documents that chart the path to achieving the region’s climate goals and targets. The strategic areas and actions will be updated dynamically, responding to changes in policy, technology, science, opportunities and innovations, and performance measures and indicators. Staff will continue to work with other governments, energy regulators and energy utilities to implement and expand these actions to accelerate the transition to a climate resilient and carbon neutral region.

### **DRAFT CLIMATE 2050 ENERGY ROADMAP**

The *Climate 2050 Energy Roadmap* supports the vision and presents a policy action plan that will contribute to a carbon neutral and climate resilient region. In addition to outlining the challenges and benefits of transition to clean, renewable, and resilient energy, the draft *Climate 2050 Energy Roadmap* lays out 33 actions for increasing use of clean, renewable energy and increasing climate resilience, organized under the following 6 strategic areas:

1. Plan for the Transition to Clean, Renewable, and Resilient Energy
2. Accelerate Electrification
3. Increase Sustainable Production of Low Carbon Biofuels and Hydrogen
4. Limit Expansion of Fossil Fuel Production
5. Protect Existing Energy Systems from Current and Future Climate Impacts
6. Build New Energy Systems that are Climate Resilient

The *Energy Roadmap* proposes an implementation timeline to encourage early action on key issues. With short timelines and ambitious targets, staff continue to work with all orders of government and other partners to maintain an action focus while planning and developing the *Roadmap*.

### **Clean, Renewable Energy**

The first four strategic areas in the Roadmap are focused on clean, renewable energy. Use of energy is associated with ~90% of the greenhouse gas emissions in the region, including from sectors such as buildings, transportation, industry, agriculture, and waste. In addition to the goals and 2030 targets approved in the *Clean Air Plan* and 2050 targets in the *Climate 2050 Buildings and Transportation Roadmaps*, the draft *Energy Roadmap* includes the following 2030 and 2050 goal and targets for use of clean, renewable energy:

**Long-term Goal:** All of the energy used in Metro Vancouver is derived from clean, renewable sources by 2050.

**Targets:**

- By 2030, 60% of the energy used in the region is derived from clean, renewable sources.
- By 2050, 100% of the energy used in the region is derived from clean, renewable sources.

Reaching the 2030 targets and transitioning to 100% clean, renewable energy by 2050 will depend on planning for the transition to clean, renewable energy, accelerating electrification, and increasing sustainable production of low carbon biofuels and hydrogen, as set out in the first three strategic areas. The fourth strategy, 'Limit Expansion of Fossil Fuel Production', aligns with direction provided by the Climate Action Committee at the February 12, 2021 meeting, where a motion was adopted advising the Board to endorse the call for a Fossil Fuel Non-Proliferation Treaty, and to urge the Canadian and BC governments to do the same, in response to a delegation that had presented on this subject. At the Board meeting on February 26, 2021, this matter was referred back to the Committee. Staff have further assessed the treaty, and with consideration of the feedback from the Board, have addressed the intent of the treaty within the actions in Strategy 4.

Initial modelling of actions in the Roadmaps indicate that the actions in the draft roadmap could achieve significant emissions reductions but a gap still remains between the modelled results and the targets. More work is needed to understand how to maximize the effectiveness of the actions and identify additional actions to reach the region's 2030 and 2050 climate targets.

### **Climate Resilience for Energy Systems**

The remaining two strategies address the resilience of energy systems. Metro Vancouver's network of communities, residents, and businesses are already experiencing climate-influenced events, including extreme heat events, forest fires, and extensive flooding. To increase climate resilience of the energy system in the region, governments and energy utilities need to understand how the projected climate changes will impact the entire energy system. The draft *Energy Roadmap* includes the following goal and targets for climate resilience:

**Long-term Goal:** All regional energy infrastructure is reliable and resilient to the current and future impacts of climate change.

**Targets:**

- By 2030, all new energy infrastructure is protected from known, unmitigated climate risk.
- By 2030, all energy providers have identified known, unmitigated natural hazards that could impact energy infrastructure.
- By 2050, the energy system is protected from the current and future impacts of climate change.

The *Climate 2050 Energy Roadmap* includes climate resilience strategies and actions aimed at protecting and increasing the resiliency of existing energy infrastructure, setting design standards, minimizing risk exposure for new energy infrastructure, and preparing for extreme events so that the region is better able to respond to climatic events that can disrupt and impact the energy system.

### **ENGAGEMENT PROCESS**

The goals, strategies and actions in the draft *Energy Roadmap* incorporate public and stakeholder feedback received through engagement processes for the *Climate 2050* Discussion Paper on Energy in early 2021 (see Reference) and feedback received during development of the *Climate 2050 Strategic Framework* (previously summarized in a report on engagement for *Climate 2050* received by the Climate Action Committee on September 19, 2018).

Staff will seek feedback and recommendations for revisions on this draft Roadmap from those most likely to be impacted or have a role in implementation. This includes but is not limited to; other governments, First Nations, energy regulators, energy utilities, and organizations with a responsibility for implementation. Information and opportunities to provide feedback are also shared with the broader public. The engagement will reflect the Board Policy on Public Engagement and an ongoing commitment to engagement throughout the development of *Climate 2050*. Feedback on the draft *Climate 2050 Energy Roadmap* will inform the final Roadmap, which will be presented to the Committee and Board for consideration later in 2022.

### **ALTERNATIVES**

1. That the MVRD Board direct staff to proceed with engagement on the draft *Climate 2050 Energy Roadmap*, as presented in the report dated March 16, 2022, titled “Draft *Climate 2050 Energy Roadmap*”.
2. That the MVRD Board receive for information the report dated March 16, 2022, titled “Draft *Climate 2050 Energy Roadmap*”, and provide alternate direction to staff.

### **FINANCIAL IMPLICATIONS**

Under Alternative 1, the overall resources required to develop and engage on *Climate 2050 Roadmaps* have been approved in program budgets for 2022, including staff time and consulting expenditures. Funding for enhanced engagement on *Climate 2050* from the Sustainability Innovation Fund has been approved by the MVRD Board and will be used to support engagement activities on the development and implementation of the *Climate 2050 Roadmaps*. Continued alignment of engagement activities and deliverables for the *Climate 2050 Roadmaps* with the implementation of the *Clean Air Plan* and development of other management plans is intended to make the best use of resources available, as well as minimize time commitments for interested parties providing feedback.

### **CONCLUSION**

Metro Vancouver’s draft *Energy Roadmap* lays out strategies and actions to transition to 100% clean, renewable, and resilient energy by 2050. If authorized by the Board, Metro Vancouver intends to seek feedback on the draft *Energy Roadmap* from other governments, First Nations, energy regulators, energy utilities, organizations with a responsibility in implementation, as well as the broader public.

Staff recommend Alternative 1: for the Board to authorize staff to proceed with public engagement on the draft *Climate 2050 Energy Roadmap*. Engagement is intended to provide sufficient opportunity to interested parties to learn about the draft strategies and actions in the *Energy Roadmap* and provide feedback. Feedback from engagement will inform the development of a final *Energy Roadmap* for Committee and Board consideration, planned for 2022.

### **Attachment**

*Climate 2050 Energy Roadmap*, draft dated April 2022 (51629536)

### **Reference**

[Climate 2050 Discussion Paper on Energy](#), report dated January 20, 2021

49386474



## CLIMATE 2050 Roadmap

# Energy

A pathway to clean, renewable, and resilient energy in Metro Vancouver

April 2022

DRAFT





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March 2022

**Metro Vancouver acknowledges that the region's residents live, work and learn on the shared territories of many Indigenous peoples, including 10 local First Nations: Katzie, Kwantlen, Kwikwetlem, Matsqui, Musqueam, Qayqayt, Semiahmoo, Squamish, Tsawwassen, and Tsleil-Waututh.**

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



## **Your input is valued.**

This Roadmap was drafted in late 2021/early 2022, based on feedback received from a broad range of individuals, organizations, and stakeholder groups between 2020 and 2021. Engagement was centred around the Metro Vancouver *Energy Discussion Paper* to support *Climate 2050*, introduced for public and stakeholder comment in summer 2021.

Feedback is valued and project teams will continue to seek input on this draft Roadmap through 2022. This current phase of engagement will include opportunities to provide both feedback online and through interactive discussions. We will continue to ensure feedback is reflected as we begin to implement these actions. Feedback to the project team will be posted to the Metro Vancouver website, [metrovanancouver.org](https://metrovanancouver.org), search “Climate 2050 Energy Roadmap.”

The goals and targets in Metro Vancouver’s climate-related plans are based in science. The interim target, set in Metro Vancouver’s *Clean Air Plan*, of reducing greenhouse gas emissions in the region by 45% below 2010 levels by 2030, now has a time horizon of less than ten years. But taking bold action now is essential if the region is to attain carbon neutrality by 2050.

The actions in this Roadmap reflect both current policies and new directions that reflect the best ideas, approaches, and available technologies. As with all good planning, this Roadmap must be viewed as an iterative, dynamic path forward. The goals will remain clear but the Roadmap will be updated as new policies, ideas, approaches, and technologies emerge.

## Metro Vancouver

Metro Vancouver is a federation of 21 municipalities, one electoral area, and one treaty First Nation that collaboratively plans for and delivers regional-scale services. 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.

### Mission

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

#### 1. Serve as a Regional Federation

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

#### 2. Deliver Core Services

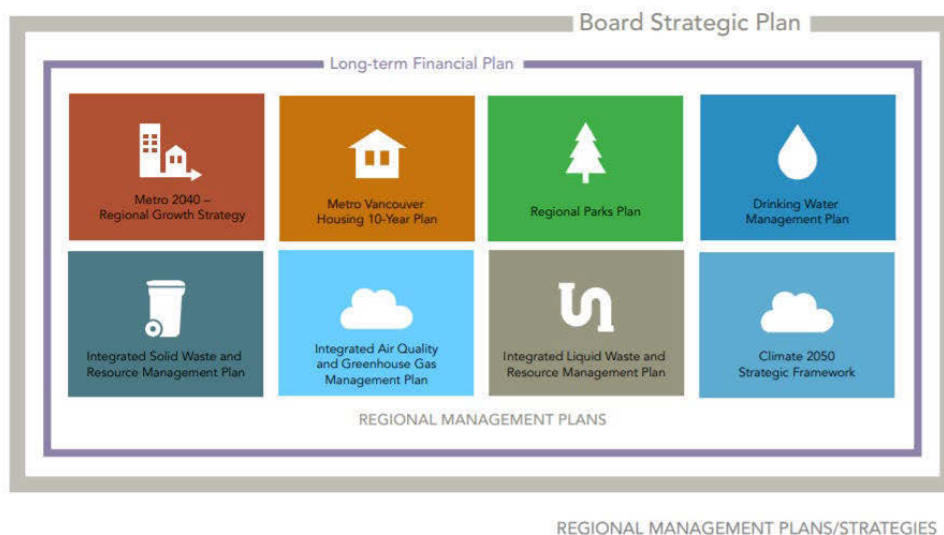
Provide regional utility services related to drinking water, liquid waste and solid waste to members. Provide regional services, including parks and affordable housing, directly to residents, and act as the local government for Electoral Area A.

#### 3. Plan for the Region

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

## Building a Resilient Region

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



### Metro Vancouver's Roles and Responsibilities for Climate Action

The actions to achieve carbon neutrality and building a more resilient region will depend on the collaborative efforts of many players in the region as well as the federal and provincial government. However, Metro Vancouver has some unique and important roles and responsibilities for advancing climate action.

- 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 gases.
- Through the regional growth strategy, Metro Vancouver, with its members, plans for compact, complete communities that are foundational to enabling a carbon neutral, resilient region.
- As part of delivering its core services, Metro Vancouver also generates and uses clean, renewable energy from its facilities and is working to ensure core regional services and infrastructure are prepared for and resilient to climate change.
- Invest Vancouver is Metro Vancouver's economic development leadership service with the vision of a dynamic and resilient regional economy that delivers prosperity for all. It aims to foster greater regional collaboration on economic development issues, to advise leaders on sound economic policy and strategy, and to brand the region and its key industries to a global audience with the intention of attracting strategic investment. Invest Vancouver focuses on key export oriented industries in which the region has a productive advantage. This includes many aspects of the green economy, including clean technology, renewable energy, and clean transportation.

- In its role as a regional forum, Metro Vancouver builds and facilitates collaborative processes which engage the public and build partnerships to address significant regional issues like climate change. As part of this role, Metro Vancouver coordinates with and advocates on behalf of its member jurisdictions to other governments and partners on greenhouse gas management and climate change adaptation initiatives.

These roles are necessary but not sufficient to achieve our goals of a climate neutral, resilient region. Metro Vancouver will be looking to other orders of government, First Nations, and other regional partners to lead and collaborate in the implementation of a number of key actions in the *Climate 2050 Roadmaps*.

## The Roadmap at a Glance

Energy is essential to our daily lives. We rely on energy every day to work, study, play, and so much more. However, use of fossil fuels as an energy source is associated with 90% of greenhouse gas emissions in our region; fossil fuels are used to heat our homes, move people and goods, and power industrial processes.

Transitioning to clean, renewable energy will be essential to meeting emission reduction targets and reaching a carbon neutral region by 2050. Reducing energy use and increasing energy efficiency are the first steps to reducing emissions from energy and increasing resiliency. In British Columbia (BC), 98% of electricity generated is low or zero carbon, derived from renewable sources such as hydro, biomass, or wind power. Many technologies that can replace fossil fuels with electricity are already commercially available, such as electric vehicles and heat pumps for home heating. In addition to reducing greenhouse gas emissions, switching to clean, renewable electricity can improve air quality, contributing to the health of residents in the region.

As we transition to clean, renewable energy, it is critical that we develop an energy system that is resilient to the impacts of a changing climate. We are already seeing the impacts from climate change, such as extreme heat and severe storms, which threatens the reliability of our energy supply. We must protect existing energy infrastructure, and build resilient energy systems moving forward, to ensure that energy supply continues to be reliable.

Metro Vancouver, together with its member jurisdictions, has been taking action on climate change for decades. But it has not been enough to achieve the deep reductions in greenhouse gas emissions required and we need to do more to prepare for the impacts climate change is already having on the region. Coordination and collaboration with other orders of government, First Nations, energy regulators, energy utilities, and other regional partners will be essential to transitioning to 100% clean, renewable, and resilient energy.

The *Energy Roadmap* lays out 33 actions for transitioning to clean, renewable energy, and increasing resiliency, organized under the following six strategic areas:

1. Plan for the Transition to Clean, Renewable, and Resilient Energy
2. Accelerate Electrification
3. Increase Sustainable Production of Low Carbon Biofuels and Hydrogen
4. Limit Expansion of Fossil Fuel Production
5. Protect Existing Energy Systems from Current and Future Climate Impacts
6. Build New Energy Systems that are Climate Resilient

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# Climate 2050 Energy Roadmap

A pathway to clean, renewable, resilient energy in Metro Vancouver

## Visioning Clean, Renewable, Resilient Energy in 2050

In 2050, the Metro Vancouver region has transitioned away from fossil fuels such as gasoline, diesel, and fossil natural gas to 100% clean, renewable energy. Society has substantially reduced its energy use through development of walkable urban centres and reliable public transport; buildings that use very little energy; a circular economy which reduces the need for energy-intensive resource extraction, manufacturing, and distribution of goods; and use of energy-efficient equipment and processes. The remaining energy use is 100% clean, renewable. Energy supply is integrated and diverse – for example, energy is distributed through a smart electricity grid and renewable gas distribution system, but also from local, independent systems such as microgrids. Most buildings and vehicles are electrified, while some buildings, large trucks, industrial processes, marine, air, and rail applications rely on a combination of district energy systems, low carbon hydrogen, and biofuels. Use of energy has resulted in improved regional air quality. Energy infrastructure is resilient and reliable – energy outages are infrequent, despite increased extreme weather due to climate change, and essential services all have backup power systems in place.

## The Challenge

Energy is critical to our daily lives – energy heats and cools our homes, fuels our vehicles, and powers our society. However, the majority of the energy we use today is derived from fossil fuels, a major source of greenhouse gases and health-harming air contaminants (such as fine particulate matter). Fossil fuels, primarily gasoline, diesel, and natural gas, are responsible for 90% of the region’s greenhouse gas emissions. Transitioning to clean, renewable energy is critical to reaching climate targets for both 2030 and 2050. However, this will require a large-scale transformation in how we generate, distribute, and use energy. We need to plan for what a future energy system will look like, and take the first critical steps towards 100% clean, renewable, and resilient energy.

A carbon neutral region is the best option for future generations to maintain a good quality of life beyond 2050. We have to make some difficult decisions and investments today to avoid passing them on to future generations at higher cost and consequence. Metro Vancouver and many of its member jurisdictions have committed to ambitious, science-based targets and bold leadership to respond to the climate crisis. This plan responds to the global challenge to come together, think big, and act now.

### **Call out Box: What is a Carbon Neutral Region?**

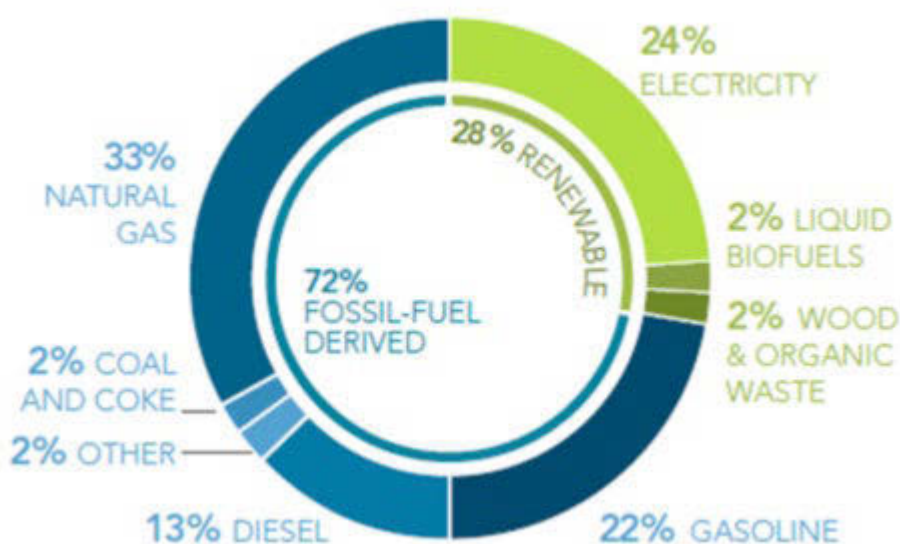
A carbon neutral region means that we have achieved the deepest greenhouse gas emission reductions possible across all economic sectors, and any emissions left are balanced out by the carbon dioxide removed from the atmosphere by the plants, trees, and soil in the region, as well as by potential carbon capture technologies that are currently under development.

## Emissions from Energy in Metro Vancouver

Energy plays a vital role in powering the region’s economy and our daily lives. Clean, renewable energy is energy derived from sources with low or zero emissions, and is replenished over days and years. In Metro Vancouver, 28% of the energy we use is clean, renewable energy (Figure 2). The major energy sources used within each regional sector are as follows:

- **Buildings** – fossil natural gas, electricity, and district energy systems are used to heat and cool our homes, and electricity is used to power appliances and other devices.
- **Transportation** – diesel and gasoline fuel the movement of people, goods, and services, whether by car, truck, train, plane, or boat – electricity and biofuels power a small but increasing part of this sector.
- **Industry** – many different sources of energy are used in industrial processes including fossil natural gas, electricity, biomass, coal, and petroleum coke.
- **Non-road engines** – diesel and gasoline fuel non-road equipment such as backhoes and excavators.
- **Agriculture** – fossil natural gas provides most of the energy for greenhouses and diesel fuels farm vehicles and equipment.

Figure 2: Sources of Energy within Metro Vancouver (2015)



Fossil fuels make up approximately three-quarters of the energy used in the Metro Vancouver region, but are associated with 90% of the region's greenhouse gas emissions<sup>1</sup>. Non-energy emissions are primarily related to greenhouse gases produced during natural and industrial chemical processes. Reducing the use of fossil fuels while increasing the use of clean, renewable energy is a key emission reduction opportunity.

**Call out Box: Is Natural Gas a Fossil Fuel?**

Natural gas, sometimes called fossil natural gas, is a fossil fuel. Natural gas was formed millions of years ago from the pressurized and heated remains of organic material and is mostly composed of methane, about 95% by volume. Methane is a potent greenhouse gas, with a global warming potential of approximately 25 times that of carbon dioxide over a 100-year timeframe or 85 times over a 25-year timeframe. In BC, natural gas is primarily produced through hydraulic fracturing, a process which uses significant amounts of water to fracture rock and extract natural gas. Natural gas production is also associated with fugitive methane (released to the atmosphere from accidental release or leaks) and vented methane. Within the Metro Vancouver region, combustion of natural gas is responsible for 32% of regional greenhouse gas emissions.

<sup>1</sup> Electricity does not produce appreciable emissions within our region. As BC's electricity is primarily produced from clean, renewable sources, there is a small amount of emissions related to out-of-region electricity generation.



In addition to greenhouse gases directly emitted during end-use, energy used in the region is also associated with greenhouse gases during production and transport, which are collectively termed lifecycle greenhouse gas emissions. The lifecycle greenhouse gas emissions produced per unit of energy, or carbon intensity, include emissions associated with all stages of energy production and use, from extraction, processing, distribution, through to end-use. This could also include fugitive emissions generated in its lifecycle, such as methane. Electricity typically has much lower lifecycle greenhouse gas emissions than fossil fuels. While Metro Vancouver and its member jurisdictions have limited authority over emissions that occur outside of the region, Metro Vancouver can take action to increase use of energy sources that have lower lifecycle greenhouse gas emissions.

Some infrastructure associated with fossil fuel production and transport is located within the region. Large amounts of solid and liquid fossil fuels are exported through port terminals overseen by the Vancouver Fraser Port Authority (Port of Vancouver). These terminals export thermal and metallurgical coal, crude oil, and liquefied natural gas. Some companies have plans to expand fossil fuel exports. While Metro Vancouver and its member jurisdictions have minimal jurisdiction over energy exports, it is important to recognize that the region is home to a sizeable fossil fuel export network, which contributes to the lifecycle emissions of many fossil fuels used outside of the region.

### **Call out Box: The Connection between Climate and Air Quality**

The *Clean Air Plan* is Metro Vancouver's air quality and greenhouse gas management plan. Actions in the Plan will reduce air contaminant emissions and impacts, including greenhouse gases, in our region over the next 8 years. This will support the 2030 target of reducing greenhouse gas emissions by 45% compared to 2010 levels, and establish the foundation for the 30-year goal of a carbon neutral region by 2050. This management plan also addresses air quality targets for the region.

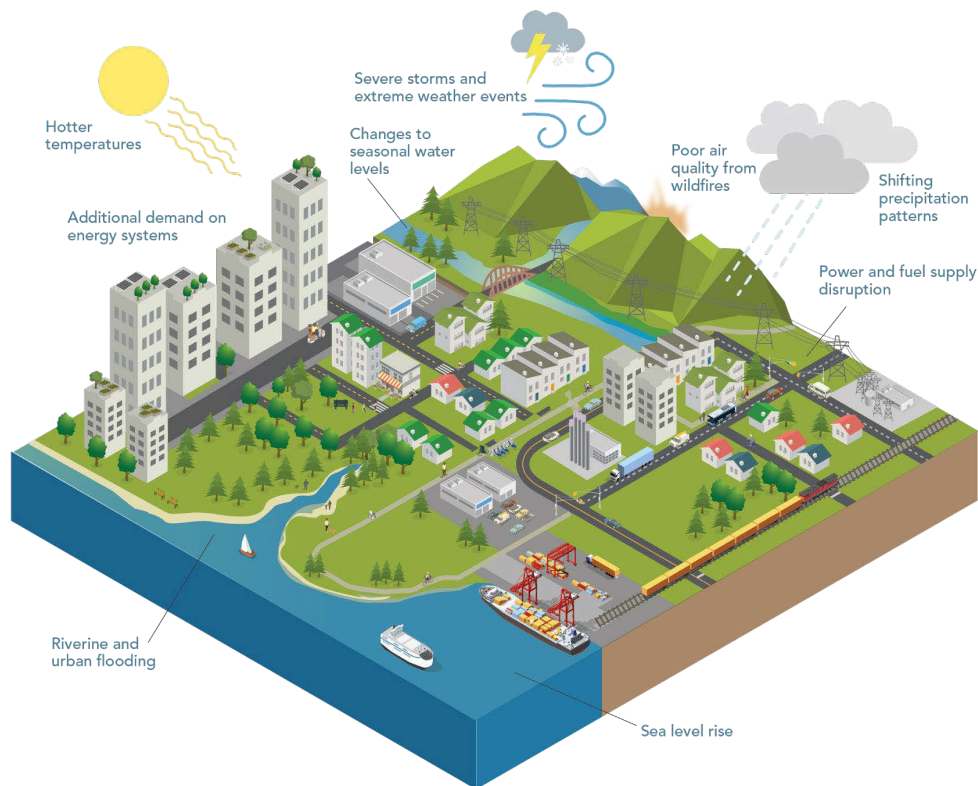
Combustion of fossil fuels, such as gasoline, diesel, and natural gas, also produces health-harming air contaminants, such as fine particulate matter and nitrogen dioxide. While residents in the region generally experience good air quality, health researchers have demonstrated that there are no known safe levels for some health-harming air contaminants.

Actions in this Roadmap and the *Clean Air Plan* will help reduce all of these emissions to protect human health, while supporting the transition to clean, renewable energy.

## Climate Change Impacts on Energy

The energy system that serves Metro Vancouver must reliably meet the region's energy needs. Energy infrastructure encompasses all the infrastructure in Metro Vancouver required to meet the region's energy needs including but not limited to oil and gas pipelines, power lines, electrical substations, transformers, and compressor stations. Energy infrastructure lasts for decades and has not always been designed to accommodate the impacts of climate change. Protecting energy infrastructure from the current and future impacts of climate change will be essential to building a resilient region.

### EXPECTED CLIMATE CHANGE IMPACTS



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

#### Climate Changes:

- **Hotter temperatures overall**, with higher daytime and nighttime temperatures and more hot summer days. This will lead to increased frequency and severity of heatwaves, wildfires, and droughts.
- **Shifting precipitation patterns**, including more rainfall in every season except the summer, and less precipitation falling as snow.
- **Severe storms and extreme weather events**, including high winds and heavy rainfall, which can lead to overland flooding and landslides.
- **Sea level rise**, with 0.5 metres expected by 2050, will impact coastal communities in the region.

#### Impacts Felt:

- **Power and fuel supply disruption** due to shock events that can cause damage to energy infrastructure (i.e., extreme rainfall, landslides, ice storms, windstorms, and wildfire), or due to increased strain on the energy system from extreme weather. This is especially a high risk to service continuity of essential services, such as hospitals and community centers.

- **Riverine and urban flooding**, from periods of extreme rainfall and sea level rise, which can cause near-term and long-term damage to critical energy infrastructure at low elevations or in floodplains, such as electrical substations, underground infrastructure, or district energy systems.
- **Changes to seasonal water levels**, as a result of reduced snowpack and hotter, drier summers, can impact hydroelectric generation and electricity supply to the region.

## Clean, Renewable, and Resilient Energy

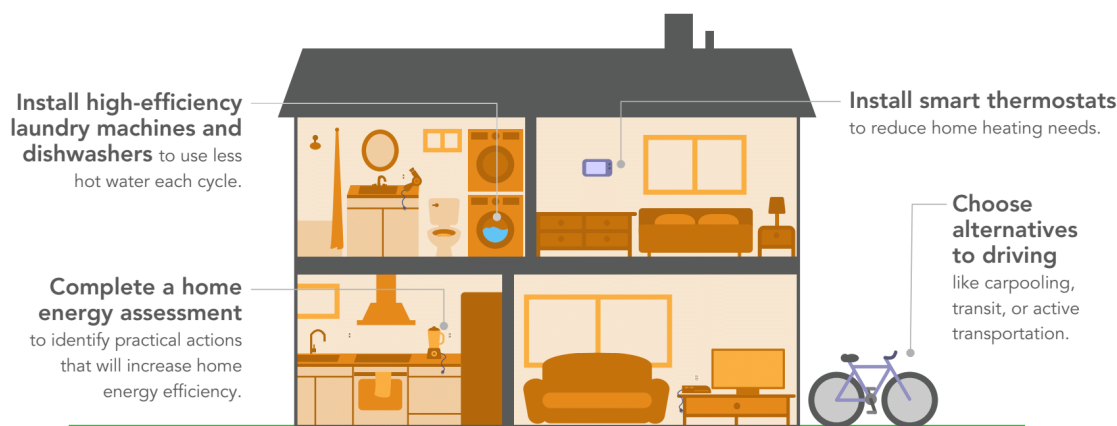
Reducing the amount of energy used in the region and transitioning to clean, renewable energy is crucial to achieving deep emission reductions. However, this will require massive shifts in the way energy is used and supplied. At the community scale, residents and businesses need to take steps to reduce energy use, as well as switch to technologies that use clean, renewable energy. At the system scale, sufficient clean, renewable energy needs to be available to meet societal demand, while ensuring that energy costs remain affordable.

As the region transitions to using clean, renewable energy, there is also an opportunity to address climate adaptation. New infrastructure associated with the supply of clean, renewable energy presents an opportunity to build back better, specifically to build new infrastructure that is resilient to the impacts of climate change and to upgrade existing infrastructure. Ultimately, the transition to clean, renewable, and resilient energy needs to be designed to ensure that it reduces regional emissions, improves the health of residents, distributes costs in an equitable manner, and increases resiliency of the energy system.

## Reducing Energy Use

One of the first steps to reducing greenhouse gas emissions and other environmental impacts (i.e., land and water impacts) associated with energy production is to reduce the total amount of energy used. There are many ways that residents and businesses can directly reduce energy usage. In buildings, this could mean using a programmable thermostat or taking shorter showers to reduce fossil natural gas and electricity use. For personal transportation, this could mean shifting modes of transportation to walking, rolling, cycling, taking transit, or carpooling to reduce use of gasoline and diesel.

Another way to reduce energy use is by improving energy efficiency, which in this context, means using less energy to accomplish the same task. Technology is getting progressively more energy efficient and investing in new technology could reduce the amount of energy used. For example, hybrid vehicles are more fuel efficient than gasoline-powered cars and electric vehicles are even more efficient than hybrid vehicles. Reducing energy loss will also improve the energy efficiency of buildings, technologies and processes. For example, improving the envelope (i.e., walls, windows, foundation, and roof) of a building to keep warm or cool inside, improved insulation and windows, and heat recovery systems will all help reduce energy use. In industrial settings, using advanced control systems to optimize equipment operation or insulating pipes to reduce heat loss can also improve energy efficiency. Reducing how much energy is used can also help increase energy resilience by reducing energy reliance, which will result in less disruption to residents and businesses during interruptions to energy supply, such as power outages.



Reducing energy usage is instrumental to reducing emissions associated with energy use and can help improve resiliency in events where energy supply is interrupted. Actions specifically related to reducing energy use in the buildings, transportation, and industry sectors can be found in the [Buildings Roadmap](#), [Transportation Roadmap](#), and [Industry and Business Roadmap](#).

## Types of Clean, Renewable Energy

Low and zero emission energy sources are critical to transitioning to clean, renewable energy. Major types of clean, renewable energy that will be important in reaching our emission reduction targets include electricity, hydrogen, and biofuels.

### Electricity

In BC, 98% of the electricity generated is from renewable sources, such as hydro, biomass, or wind power. The generation, transmission, and use of electricity in BC is associated with very low emissions over its lifecycle, in comparison to the production, transport, and combustion of fossil fuels. However, there can be other land and water impacts associated with electricity generation, which need to be minimized as new clean, renewable generation is added to the electrical grid. Electricity also does not generate air contaminants at point of use, which eliminates emissions of health-harming contaminants that are produced when fuels are combusted (e.g., fine particulate matter and nitrogen oxides), thereby improving air quality and health of residents.

Many electric emission solutions, such as electric vehicles and heat pumps for home heating and cooling, are already commercially available. Within each sector, there are multiple co-benefits to using clean, renewable electricity.

- **Buildings** – Electric heat pumps provide both heating during the winter and cooling during the summer, making buildings more resilient to the longer, hotter, drier summers that are predicted for the region as a result of climate change. Heat pumps can also help filter indoor air, a feature that is especially important during wildfire smoke events that are becoming increasingly common during the summer months.
- **Vehicles and Non-Road Engines** –The use of electric vehicles and non-road engines (e.g., construction equipment, generators) in the urban environment can reduce the impact of health-harming air

contaminants on nearby populations because they produce no tailpipe emissions. Another added benefit is a reduction in noise pollution.

Transitioning to use of electricity is an essential strategy to reducing emissions and reaching the region's 2030 target of 45% reduction in emissions from 2010 levels. Strategies and actions related to electrification in major sectors can be found in the [Buildings, Transportation, Industry and Business, and Agriculture Roadmaps](#).

### Hydrogen

Most of the hydrogen produced world-wide today is from fossil natural gas and hydrogen is mostly used as a feedstock in emission-intensive industrial sectors, such as oil refining. However, hydrogen produced from electricity can be clean and renewable, and depending on how it is used, can be zero emissions.

Though hydrogen is an emerging energy source, hydrogen could be a viable solution to decarbonize hard-to-electrify sectors, such as heavy-duty transportation and industrial applications. When powering fuel cells, hydrogen can be a zero emission energy source for the transportation sector when produced using clean, renewable energy. Strategies and actions supporting uptake of zero emission vehicles can be found in the [Transportation Roadmap](#).

Hydrogen can also be blended into the gas grid, which can support decarbonization of the buildings and industrial sectors. Depending on the point of injection and pipeline capacity, hydrogen by volume between 5% and 15% can be blended into the existing natural gas distribution system, with minimal impact on boilers and similar appliances. However, hydrogen combined with methane gas at mixes greater than 15% by volume would require substantial changes to gas infrastructure as well as to end use equipment. Also, all combustion processes produce health-harming air contaminant emissions; even combustion of pure hydrogen produces nitrogen oxides.

The BC Government has developed the [BC Hydrogen Strategy](#), which helps guide the transition to hydrogen as a clean, renewable energy source and highlights key policy actions that the BC Government will take to overcome barriers in hydrogen production, transportation, and end-use. One of the key actions in this strategy is to establish regional hydrogen hubs, which would co-locate low carbon hydrogen production and end-use applications to spur and grow hydrogen supply and demand. A Metro Vancouver hydrogen hub could remove bottlenecks for growth of this sector based on the competitive advantage created by the collective talent of firms in the region working on hydrogen production, storage, transportation, membranes, fuel cells, testing, and consulting. The Government of Canada has developed the [Hydrogen Strategy for Canada](#) which lays out a framework to position Canada as a world-leading producer, user, and exporter of clean hydrogen and associated technologies. Hydrogen will be an important energy source for enabling the region to reach carbon neutrality by 2050.

#### Call out Box: Hydrogen: A Source of Low Carbon Energy?

Hydrogen can be produced in several ways, and each is associated with different levels of greenhouse gas emissions. The most prominent methods have been denoted by the industry using different colours, and are outlined below, though there are other production pathways that are rapidly developing.

- “Green hydrogen” is produced using electricity, and can be a zero emission and zero carbon energy source if the electricity used is generated from clean, renewable sources.
- “Waste hydrogen” is produced by a commercial process in which the primary purpose is not the production of hydrogen and is considered a clean, renewable source.
- “Blue hydrogen” is produced using fossil natural gas, but the emissions created during production are captured and stored. Blue hydrogen is not renewable.
- “Grey hydrogen” is also produced using fossil natural gas, creating significant greenhouse emissions and a reliance on fossil fuels.

The Government of Canada has recommended a threshold for the carbon intensity of low carbon hydrogen. Based on that threshold, green hydrogen, waste hydrogen, and blue hydrogen with at least 90% carbon capture are considered low carbon.

### Low Carbon Biofuels

Biofuels are produced using organic matter derived from biomass such as plants. Biofuels are considered low carbon because the plants used to make biofuels absorb carbon dioxide as they grow, offsetting the carbon dioxide emitted during combustion. Biofuels have been associated with higher lifecycle emissions than other types of renewable energy due to greenhouse gas emissions associated with changes to land use, use of fossil fuel-based fertilizers, and distribution of fuel. The feedstock for most biofuel production today is edible crops, such as soy and corn, which can impact food prices as well as having adverse land-use impacts, such as deforestation. Sustainability of feedstock must be prioritized if biofuel consumption increases in the region. The upcoming federal *Clean Fuel Standard* aims to establish sustainability criteria for biofuels and their feedstock, which are designed to exclude feedstock with high indirect land-use change risk, feedstock from land with a high biodiversity value or high carbon value, and forest biomass feedstock that is not managed sustainably. Also, while biofuels can have lower lifecycle carbon emissions compared to traditional fossil fuels, they still produce health-harming air contaminants when combusted, which can have negative impacts for public health and the environment.

Some common liquid biofuels are listed below:

- **Biodiesel** is made from vegetable oils (such as canola) and waste animal fats. It can be blended in fossil diesel in amounts up to 20% and used in conventional diesel engines.
- **Renewable diesel** is also made from vegetable oils and animal fats, but using a different process that makes the end fuel identical to regular diesel. It can be used directly in conventional diesel engines without requiring engine modifications.
- **Ethanol** is the most common renewable alternative to gasoline. Made from plants such as corn or sugar cane, it can be blended up to 10% in regular gasoline used in conventional gasoline engines. Flex fuel vehicles that can accommodate gasoline blends with up to 85% ethanol have become increasingly common in North America.
- There are specialized types of liquid biofuels for aircraft and marine vessels, such as sustainable aviation fuel, to support decarbonization of those sectors.

Other types of non-liquid biofuels include the following:

- **Renewable natural gas** is a gaseous biofuel that is mostly composed of methane. It is produced primarily from anaerobic digestion of organic feedstock (such as food, agricultural, and forestry waste). Since it is primarily composed of methane, it can be substituted directly in natural gas-burning equipment as a renewable, low carbon alternative to fossil natural gas.
- **Firewood** and **wood pellets** are another common biofuel used in the region. Combustion of solid biofuels can emit significant amounts of fine particulate matter and other health-harming air contaminants when combusted, which can impact air quality and public health. Several regulations exist in the region to minimize the air quality impacts of solid biofuels, such as the *Metro Vancouver Regional District Residential Indoor Wood Burning Emission Regulation Bylaw 1303* and *Greater Vancouver Regional District Boilers and Process Heaters Emission Regulation Bylaw 1087*.

If used strategically, biofuels have the potential to displace the use of fossil fuels in difficult to decarbonize sectors such as difficult-to-electrify buildings, heavy duty vehicles, and marine, air, rail and industrial processes, especially in the short term while new zero emission technologies are developed.

### Call out Box: Industrial Processes and Clean, Renewable Energy

Switching to clean, renewable energy is also an important strategy for reducing greenhouse gas emissions from industrial processes, such as cement manufacturing, chemical and wood products processing, and many others. In

cases where electrification is not feasible due to technological challenges or high thermal process needs, (e.g., cement production), switching to low carbon, renewable energy sources other than electricity provides an alternative solution in reducing greenhouse gas emissions. Examples include switching from high carbon fuels, such as coal and coke, to biofuels such as wood or renewable natural gas.

If used strategically, biofuels have the potential to displace some of the fossil fuels used in light and heavy-industrial operations. Fuel switching can be a viable strategy for decarbonization, while also acknowledging the need for industries in the region to remain competitive.

## Transitioning to Clean, Renewable and Resilient Energy

### Strengthen Climate Policy

Accelerating adoption of technologies that use clean, renewable energy will require strong climate policy, ranging from comprehensive regulation to deep financial incentives for residents and businesses. While some policies already exist to enable residents and businesses to switch to clean, renewable energy, stronger policies are required from all levels of government to accelerate the transition to 100% clean, renewable energy by 2050.

#### Call out Box: Key Climate Policies

Strong climate policy is essential to driving the transition to 100% clean, renewable energy by 2050. In the absence of strong policy, emissions reductions are often incremental and insufficient to achieve goals and targets. Recent climate policy announcements have set the direction for stronger action on climate, but it will be the implementation of these policies that drive deep emission reductions. Some of the key existing and upcoming climate policies that will drive adoption of clean, renewable energy in the region are listed below.

#### **Province-wide:**

- Carbon tax increasing to \$170/tonne carbon dioxide by 2030 ([A Healthy Environment and a Healthy Economy](#))
- Cap of 6 million tonnes/year on carbon emissions from natural gas utilities ([CleanBC Roadmap to 2030](#))

#### **Buildings:**

- Greenhouse gas performance requirements for new construction (province-wide implementation by 2030 as per *CleanBC Roadmap to 2030*; also, some member jurisdictions have implemented low carbon energy system requirements complementary to the BC Energy Step Code)
- Requirements for all new space and water heating equipment sold in BC to have a rated efficiency equal or greater than 100% by 2030 (*CleanBC Roadmap to 2030*)
- Greenhouse gas performance requirements for existing homes and buildings (*Climate 2050 Buildings Roadmap*)

#### **Transportation:**

- 100% sales target for zero emission light duty vehicles by 2035 (*CleanBC Roadmap to 2030*)
- Sales targets for zero emission medium and heavy duty vehicles (*CleanBC Roadmap to 2030*)
- Federal vehicle efficiency standards (*Passenger Automobile and Light Truck Greenhouse Gas Emission Regulations, and Heavy-duty Vehicle and Engine Greenhouse Gas Emission Regulations*)
- Reduction in average carbon intensity for gasoline and diesel of 30% by 2030, inclusive of aviation and marine fuels (*Renewable & Low Carbon Fuel Requirements Regulation, CleanBC Roadmap to 2030*)

#### **Industry:**

- New industrial facilities must have a plan to be net-zero (carbon neutral) by 2050 (*CleanBC Roadmap to 2030*)
- Integrate greenhouse gas reduction requirements into emission regulations and permits (Metro Vancouver *Clean Air Plan*)



## Transform the Electrical Grid

Electricity will play a major role in the transition to clean, renewable energy. A number of organizations, including Metro Vancouver, are directly working on actions to accelerate electrification. BC Hydro has developed an [Electrification Plan](#) that will accelerate the transition from fossil fuels to electricity through new programs and incentives. To accommodate the higher demand for electricity, the way electricity is generated and distributed will need to grow and transform to support a carbon neutral region. The key challenge will be to ensure that there is sufficient clean, renewable energy to meet demand. Within their [2021 Integrated Resource Plan](#), BC Hydro has developed a plan to continue meeting the electricity needs of BC for the next 20 years, including a range of enhanced demand-side measures such as demand response programs and time-of-use rates, transmission upgrades, and development of wind power on the generation side.

To ensure that the electrical grid is responsive to future needs, such as integrating new sources of clean, renewable energy and increasing resiliency, there is a need to invest now in modernizing the grid to allow integration of new technologies. For example, investments in smart-charging technology will enable electric vehicles to be charged during periods of low electrical demand, which will support BC Hydro in managing electrical demand. Emerging energy storage technologies such as batteries and hydrogen energy storage (when hydrogen production is strategically added onto parts of the electrical grid as a form of energy storage), can help increase the penetration of renewables, such as wind and solar energy, which will help support increased demand from electrification of buildings and some industrial processes. Energy storage can also help to increase resiliency by enabling power to be stored.

As more electricity generation, transmission, and distribution infrastructure is built, there is a need to ensure that this infrastructure, along with existing infrastructure, is resilient to the impacts of climate change. Key abatement activities that BC Hydro is pursuing are siting new infrastructure in areas that are less susceptible to climate impacts such as wildfires or riverine flooding, updating design standards and codes to ensure that they reflect future climate projections, selecting resilient material for transmission infrastructure, and ensuring existing infrastructure is regularly maintained.

However, there is still some risk posed by reliance on centralized energy systems as a catastrophic event, like a major earthquake, could cause these systems to fail. Currently, much of the region relies on diesel generators to supply backup power in case of power outages, but diesel supply could also be impacted in the situation of a catastrophic extreme weather event (e.g., flooding and landslides that damage road and rail infrastructure). One way to increase resilience is to explore local, independent energy systems, such as microgrids. A microgrid is a system composed of electrical loads, such as electric buildings and electric vehicle chargers, and distributed energy generation resources, such as solar or wind generation, that are interconnected through an electrical grid. Most importantly, microgrids have the ability to operate independently from the central electrical grid, so can remain operating during regional power outages. While still an emerging approach, microgrids could help increase the resiliency of the electrical grid.

## Decarbonize the Gas System

Decarbonization of the gas system will be critical to achieving carbon neutrality by 2050. Currently, the region relies heavily on the gas distribution system, which transports primarily fossil natural gas for use in heating and hot water within homes, as well as heating in some industrial processes and greenhouses. Some renewable gases, such as renewable natural gas, are drop-in replacements for fossil natural gas (since both are primarily composed of methane); the existing gas distribution network can therefore be leveraged to distribute clean, renewable energy.

As part of *CleanBC*, the BC Government has announced a greenhouse gas emissions cap for natural gas utility customers of 6 million tonnes carbon emissions for 2030, which is approximately 47% lower than 2007 emission levels, province-wide, and a minimum of 15% of gas to come from renewable gas, including primarily green hydrogen, waste hydrogen, and renewable natural gas. While renewable natural gas currently makes up less than



1% of FortisBC's total gas supply, FortisBC has developed a [10-year forecast](#) for sourcing sufficient renewable gas to meet the province-wide 15% renewable gas target by 2030, primarily through renewable natural gas and green and waste hydrogen.

As there are limited amounts of renewable gas available to achieve the 2030 targets within *CleanBC* and the *Climate 2050 Roadmaps*, use of renewable gas should be prioritized in difficult-to-electrify sectors, such as industrial applications with high temperatures or requiring combustion for process requirements. Electrification should be prioritized in sectors where electric technologies are commercially available, such as buildings and passenger vehicles, to maximize the use of available clean, renewable energy between now and 2030. Production of renewable gas will also need to scale up significantly to fully decarbonize the gas system by 2050.

As the gas system decarbonizes, new infrastructure as well as existing gas infrastructure needs to be resilient to the impacts of climate change. Upgrading existing infrastructure and ensuring that new infrastructure is designed to withstand the impacts of future climate projections, such as flooding and landslides, will be essential to increasing resiliency of the gas system. Currently, most of the natural gas supplied to Metro Vancouver is supplied from Northeastern BC through one major pipeline. Failure of this pipeline will result in severe restrictions to gas supply to the region. Diversifying gas supply, such as integrating different sources of renewable gas into the system, could increase resiliency of the gas system.

### **Increase Sustainable Liquid Biofuel Production**

While provincial legislation is driving a transition to zero emission vehicles, liquid biofuels will be an important near-term strategy to decarbonize the transportation sector, as well as a longer-term solution for hard-to-decarbonize sectors such as marine, air, and rail. The BC *Low Carbon Fuel Standard* and upcoming federal *Clean Fuel Standard* provide a strong policy framework for increasing biofuel production and ensuring sustainability of feedstock. Within the *CleanBC Roadmap to 2030*, the BC Government has committed to doubling the target for renewable fuels produced in BC annually to 1.3 billion litres by 2030. For comparison, approximately 7.4 billion litres of gasoline and diesel was consumed in BC in 2020. Notably, there are opportunities to directly produce liquid biofuels in the Metro Vancouver region. Metro Vancouver is currently engaged in a hydrothermal processing pilot that will convert wastewater biomass into biocrude that can be refined into low carbon biofuels. If the challenges of scale-up can be overcome to achieve robust operations, hydrothermal processing could produce over 2 million litres of biocrude annually by 2035. Supporting sustainable liquid biofuel production will be crucial to ensuring that there is sufficient biofuel to achieve the region's emission reduction goals.

### **Limit Expansion of Fossil Fuel Production**

In addition to accelerating the transition to clean, renewable energy, expansion of fossil fuel production must be simultaneously limited on a global scale. Both the International Energy Agency and the United Nations Environment Programme have noted that new production of fossil fuels is incompatible with limiting global warming to 1.5 degrees Celsius. New fossil fuel infrastructure will likely be used to produce fossil fuels over its lifetime, which in some cases could be upwards of 30 years. A related risk is that fossil fuel infrastructure may become stranded assets as the global demand for fossil fuel decreases. Thus, to ensure that global warming can be limited to 1.5 degrees Celsius and to minimize the risk of stranded assets, we need to limit expansion of fossil fuel production and explore how to repurpose existing infrastructure for supply of clean, renewable energy. Within the region, this means working with the British Columbia Oil and Gas Commission (BCOGC), which regulates oil and gas operations, refineries, and geothermal development in BC, to limit expansion of fossil fuel production. Existing infrastructure also needs to be repurposed as much as possible; renewable natural gas should be distributed within the existing gas distribution system and renewable diesel should be distributed through existing diesel distribution networks.

Transitioning to clean, renewable energy will also impact workers and communities currently relying on the fossil fuel industry. Governments, businesses, and industry must understand how the shifts in the global, national, and

local economy will impact the workers and communities that the region currently relies upon, and take the appropriate steps to minimize these impacts.

### Plan for the Transition to 100% Clean, Renewable, and Resilient Energy

Given the complexities and interconnectedness of the energy system, transitioning to 100% clean, renewable, and resilient energy by 2050 will require careful planning today. Electricity and fossil natural gas make up more than 50% of the energy use within Metro Vancouver. Electricity and natural gas are mostly supplied by provincially regulated utilities, BC Hydro and FortisBC. It will be essential to work with the energy utilities and their regulator, the British Columbia Utilities Commission (BCUC), to plan for the transition to 100% clean, renewable, and resilient energy.

Under the *Utilities Commission Act*, the BCUC and energy utilities are required to consider [BC's energy objectives](#), which include BC's greenhouse gas emission reduction targets. While the BCUC is required to consider BC's energy objectives when approving utility rates, programs and projects, the *Utilities Commission Act* is not explicit on how greenhouse gas objectives are considered and balanced with other objectives, such as affordability and reliability. It is critical that BC's energy objectives align with the targets outlined in this Roadmap and the *CleanBC Roadmap to 2030*, while explicitly outlining how greenhouse gas reduction is considered and balanced with other government priorities.

It will be important to conduct similar planning exercises to ensure that supply of other emerging sources of clean, renewable energy can be scaled up to match the demand needed to achieve BC's greenhouse gas reduction targets and the goals and targets within this Roadmap. The *BC Hydrogen Strategy* outlines a pathway to accelerate the production and use of renewable and low-carbon hydrogen. Scaling up of emerging sources of clean, renewable energy will require coordinated action from multiple stakeholders, including Metro Vancouver.

### Social Equity

Equity is the promotion of fairness, justice, and the removal of structural barriers that may cause or aggravate disparities experienced by different groups of people. Metro Vancouver's efforts to move towards clean, renewable, and resilient energy will continue to incorporate the voices and needs of a range of communities to ensure that fairness and equity are of the highest priority, and that no one is left behind in this transition. Organizations responsible for energy-related climate policies must consider whether inequity is created or magnified, and address these inequities to ensure a just transition. Actions that reduce emissions must also support an equitable distribution of benefits, such as improved air quality and jobs related to clean, renewable energy, and avoid an inequitable distribution of costs, such as unaffordable energy costs for homes and businesses.

Integrating equity into Metro Vancouver's climate change programs is a work in progress. Metro Vancouver is developing a strategic approach to assessing equity during implementation of the *Clean Air Plan* and the *Climate 2050 Roadmaps*. This will include community input, health impact assessments, and other equity evaluation tools.

### The Journey to Clean, Renewable, and Resilient Energy

Transformation of the energy system will not only require strategies and dedicated actions within this Roadmap, but also within the other *Climate 2050 Roadmaps*.

#### Call out Box: Linkages to other *Climate 2050 Roadmaps*

There are many linkages between energy and other *Climate 2050* issue areas.

**Buildings** – conserve energy, install more efficient equipment, and switch to heating and cooling systems that use clean, renewable energy.

**Transportation** – switch to low energy modes of personal transportation (e.g., walking, biking, public transit), improve efficiency of engines, switch to more efficient freight transportation methods, switch to zero emission vehicles, increase zero emission refueling infrastructure, and increase use of low carbon renewable biofuels.

**Industry and Business** – increase energy efficiency of industrial processes and explore equipment that can use clean, renewable energy.

**Infrastructure** – improve process efficiencies to reduce energy use and utilize water and wastewater infrastructure to generate clean, renewable energy.

**Waste** – reduce energy use and emissions associated with waste collection and disposal and consider circular economy principles within energy generation, including how waste can be used to generate clean, renewable energy.

**Agriculture** – increase energy efficiency of agricultural processes, explore equipment that can use clean, renewable energy, and explore viability of using agricultural waste to generate clean, renewable energy.

**Land Use and Growth Management** – direct higher density forms of residential and commercial growth to urban centres and locations with good transit to encourage walking, biking and transit, and to allow people to live without a car; facilitate more multi-unit residential housing which uses fewer resources and less energy per unit.

**Nature and Ecosystems** – nature and ecosystems cool urban areas, reducing the need for air conditioning and decreasing overall energy use.

## Goals and Targets

Metro Vancouver's *Climate 2050 Strategic Framework* has set the following regional vision to guide the region's response to climate change:

- Metro Vancouver is a carbon neutral region by 2050
- Infrastructure, ecosystems, and communities are resilient to the impacts of climate change

Metro Vancouver has also set an interim target of 45% reduction in greenhouse gas emissions from 2010 levels, by 2030.

Achieving this vision means setting goals in each of the *Climate 2050 Roadmaps*, organized by sectors in the region, and contributing towards getting to a carbon neutral, resilient region.

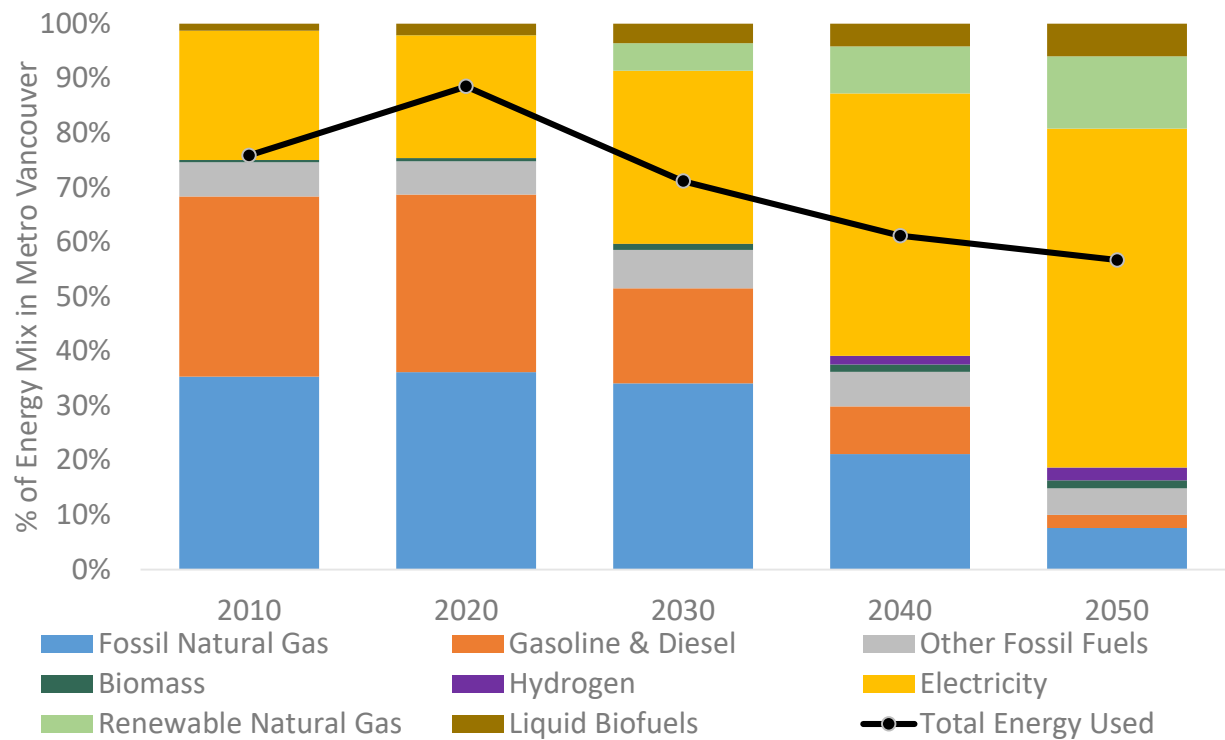
Metro Vancouver has set the following climate goals for energy, to help visualize the region we will live in and to track progress out to 2030 and 2050.

<p><b>GOAL:</b> All of the energy used in Metro Vancouver is derived from clean, renewable sources</p>	<p><u>Targets</u></p> <p>By 2030:</p> <ul style="list-style-type: none"> <li>- 60% of the energy used in Metro Vancouver is derived from clean, renewable sources</li> </ul> <p>By 2050:</p> <ul style="list-style-type: none"> <li>- 100% of the energy used in the region is derived from clean, renewable sources</li> </ul>
<p><b>GOAL:</b> All regional energy infrastructure is reliable and resilient to the current and future impacts of climate change.</p>	<p><u>Targets</u></p> <p>By 2030:</p> <ul style="list-style-type: none"> <li>- All energy providers have identified known, unmitigated climate hazards that could impact energy infrastructure.</li> </ul>

	<div>- All new energy infrastructure is protected from known, unmitigated climate hazards.</div> <div>By 2050:</div> <div>- The energy system is protected from the current and future impacts of climate change.</div>
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The diagram below shows the possible impacts of the strategies and actions described in this Roadmap and the other *Climate 2050 Roadmaps* on reducing total energy use and increasing the use of clean, renewable energy.

POTENTIAL IMPACT OF THE STRATEGIES AND ACTIONS DESCRIBED IN THE CLIMATE 2050 ROADMAPS



Reaching these ambitious goals will require extensive collaboration between Metro Vancouver and key partners. Many of the actions identified in this Roadmap will be led by other governments and agencies (e.g., national, provincial, local), First Nations, energy utilities, and industry. Fortunately, many of the organizations needed to make this transition are already actively working toward similar goals, beginning with Metro Vancouver member jurisdictions and their community and corporate plans, the Government of BC and its *CleanBC Roadmap to 2030 plan*, the Government of Canada and its *A Healthy Environment and a Healthy Economy* plan, as well as First Nations, energy utilities, and, increasingly, industry associations.

Clean, Renewable Energy Strategies

Strategy 1: Plan for the Transition to Clean, Renewable, and Resilient Energy

Achieving a carbon neutral region by 2050 will require that the region transitions to clean, renewable, and resilient sources of energy. Having a comprehensive plan will help ensure that the transition is successful, fair, and equitable. As energy regulators, the BC Utilities Commission and the BC Oil and Gas Commission can ensure that energy utilities are planning to meet *CleanBC* and *Climate 2050* objectives. The BC Government will also play an

instrumental role in developing the regulatory framework that enables the utilities to plan for the energy transition.

**5.1 Align British Columbia's Energy Objectives with Strong Climate Action. (BIG MOVE)**

Work with the BC Government, member jurisdictions, First Nations, and the BCUC, on updating BC's energy objectives within the *Clean Energy Act* to reflect strong action on climate change, in alignment with the goals and targets outlined in this Roadmap and the *CleanBC Roadmap to 2030*. This could include: greenhouse gas reduction requirements for all utilities, such as the natural gas utilities emission cap announced in the *CleanBC Roadmap to 2030*; targets for energy efficiency and conservation for all utilities; increases to the amount of electricity in BC sourced from clean or renewable resources; changes to the definition of affordable rates; and changes to how utilities can recover costs.

**5.2 Strong Climate Mandate for Energy Utilities. (BIG MOVE)** Advocate to the BC Government to update the *Utilities Commission Act* to ensure that the BCUC regulates public utilities in a manner that ensures their compliance with, and appropriate contribution to achieving, the updated energy objectives in the *Clean Energy Act*, as per Action 1.1.

**5.3 Revise Utility Regulation to Align with Strong Climate Action.** Advocate to the BC Government to revise and in some cases, repeal, outstanding regulations and directions applying to public utilities and regulators, to ensure that they align clearly and directly with the updated energy objectives as per Action 1.1.

**5.4 Develop Long-term Planning Scenarios for the Transition to 100% Clean, Renewable Energy.** Advocate to the BC Government to develop long-term planning scenarios aligned with the updated energy objectives as per Action 1.1. These planning scenarios will forecast demand and supply for all energy sources and will support regional energy planning and policy formation.

**5.5 Regional Climate Action in Energy Utility Regulatory Processes.** Work with member jurisdictions to provide input to relevant BCUC and BCOGC proceedings related to regional and/or municipal climate policy. Input would focus on evaluating the impact of projects, programs, and rates proposed by regulated entities and assess whether they align with regional climate and municipal climate policy and the updated energy objectives as per Action 1.1.

## Strategy 2: Accelerate Electrification

Electrification is a key decarbonization strategy to meet emission reduction targets. Technologies that use electricity have critical co-benefits such as improved air quality and reduced noise pollution – making it a priority pathway for achieving significant greenhouse gas reductions. While electricity is currently widely used, there may be infrastructure constraints for electricity supply that need to be resolved as large parts of the region electrify. To address these constraints, BC Hydro is exploring a number of programs that will support electrification and reduce demand on the electrical grid, such as time-of-use electricity rates and related demand response programs. Success of these programs will require adoption of smart technologies by BC Hydro, residents, and businesses.

**2.1 Electrification Rates. (BIG MOVE)** Advocate to BC Hydro and the BC Government to expand upon rate structures that support electrification in alignment with BC Hydro's Electrification Plan, including discounted rates for customers who adopt heat pumps and discounted rates for households that struggle with meeting home energy needs. These rates should be combined with additional funding to promote electrification, as outlined in Action 2.1 in the *Climate 2050 Buildings Roadmap* and Actions 2.3, 2.6, 3.5 and 3.8 in the *Climate 2050 Transportation Roadmap*.

**2.2 Time-of-Use Rates, Demand Response Programs, and Electric Vehicle Peak Reduction Programs. (BIG MOVE)** Advocate to BC Hydro and the BC Government to implement time-of-use rates, demand response programs, and electric vehicle peak reduction programs, as outlined in BC Hydro's *2021 Integrated Resource Plan*. This will help reduce the amount of new electrical generation required in BC and help some customers save on

their energy bills. This would be supported by increasing public awareness of these programs, as outlined in Action 2.7 in the *Climate 2050 Buildings Roadmap* and Action 2.7 in the *Climate 2050 Transportation Roadmap*.

- 2.3 Smart Technology Standards.** Advocate to the Government of Canada and BC Government to explore smart technology standards, which would require that new equipment, such as thermostats, control systems, and HVAC equipment, be capable of two-way, automated communication with energy utilities. This could support adoption of time-of-use rates and demand response programs by residents and businesses.
- 2.4 Regional Grid Constraints.** Work with BC Hydro and member jurisdictions to complete a regional grid constraints study that will identify areas of the electrical grid in Metro Vancouver where grid capacity would limit current and future electrification. This study will identify actions that could alleviate capacity issues in regional electricity distribution.
- 2.5 High Performance Heating and Cooling Equipment Import and Sale Standards (CAP).** Advocate to the Government of Canada and the BC Government to establish energy efficiency standards for new and imported heating and cooling equipment that has a rated energy performance of 100% or more and minimum greenhouse gas requirements for refrigerants, by 2030. This would ensure that buildings are conserving energy while reducing emissions.
- 2.6 Minimize Land and Water Impacts.** Advocate to the BC Government to ensure that land and water impacts are minimized in new clean, renewable electricity generation. This would include impacts on biodiversity and agriculture.

### Strategy 3: Increase Sustainable Production of Low Carbon Biofuels and Hydrogen

Biofuels and hydrogen can help decarbonize difficult-to-electrify sectors, such as industrial processes and goods movement. However, there is currently a limited supply of sustainable biofuels and hydrogen, and thus a need to increase production. There are opportunities within the region to sustainably produce biofuels from organic waste feedstock (i.e., liquid waste, solid waste, and agricultural waste). Increasing biofuel production from these sustainable sources will greatly support the transition to clean, renewable energy.

- 3.1 More Stringent Low Carbon Fuel Standards (CAP). (BIG MOVE)** Advocate to the BC Government to further increase the stringency of the BC *Low Carbon Fuel Standard* to reduce the carbon intensity of transportation fuels, primarily through increasing use of renewable diesel and ethanol. Advocate to the Government of Canada to further tighten the federal *Clean Fuel Standard* to include more stringent carbon intensity targets for all transportation fuels.
- 3.2 Prioritize Sustainability in Biofuel Feedstock. (BIG MOVE)** Work with the BC Government and the Government of Canada to ensure that feedstock for biofuel production is sourced sustainably and responsibly. This would include impacts on biodiversity and agriculture.
- 3.3 Regional Hydrogen Hub.** Work with the BC Government, Canadian Hydrogen Fuel Cell Association, member jurisdictions, and other regional partners to explore the development of a regional hydrogen hub in Metro Vancouver through Invest Vancouver, in alignment with the *BC Hydrogen Strategy*. A regional hydrogen hub would co-locate low carbon hydrogen production and end-use applications, such as industrial users, to spur and grow hydrogen supply and demand.
- 3.4 Regional Sources of Liquid Biofuels.** Explore opportunities and air quality impacts for regional production of liquid biofuels, such as renewable diesel, from organic feedstock.

- 3.5 Develop Local Sources of Sustainable Aviation Fuel (CAP).** Support airlines at the Vancouver International Airport and other regional partners in increasing local availability of sustainable aviation fuel.
- 3.6 Streamline Emission Requirements for Anaerobic Digestion Facilities (CAP).** Develop an emission regulation for anaerobic digestion of manure, other agricultural waste, and commercial food waste. The regulation would maintain equivalent protections for regional air quality and human health as the existing permit process, and would provide a simpler path to regulatory compliance.
- 3.7 Expand Anaerobic Digestion of Agricultural Waste (CAP).** Advocate to the BC Government, the Government of Canada, energy utilities, and member jurisdictions to expand development of anaerobic digestion facilities to process manure, other agricultural waste, and commercial food waste. This could include funding (e.g., incentives, tax credits, loans) and removal of barriers in existing regulations. Any expansion should avoid the loss of agricultural land in Metro Vancouver.
- 3.8 Phase Down Use of Thermal Coal and Petroleum Coke.** Develop regulatory requirements for industrial facilities to phase down the usage of thermal coal and petroleum coke in the region by 2030. This could support industrial facilities in transitioning to low carbon energy sources, such as biofuels, to meet greenhouse gas reduction requirements, as outlined in Action 3.1.2 within the *Clean Air Plan*.
- 3.9 Metro Vancouver as a Regional Clean, Renewable Energy Provider. (Corporate Leadership)** Increase provision of clean, renewable energy, such as waste heat, electricity, biofuels, and hydrogen, to the region. Metro Vancouver manages various waste streams, such as liquid waste, organic food waste, and construction and demolition waste, that can be used to produce clean, renewable energy.
- 3.10 Innovative Research on Optimizing Energy Recovery from Waste Streams. (Corporate Leadership)** Conduct innovative research on optimizing energy recovery from waste streams to advance technical knowledge and commercial availability of potentially industry-changing technologies.

## Strategy 4: Limit Expansion of Fossil Fuel Production

To limit global warming to 1.5 degrees Celsius, the world will need to limit expansion of fossil fuels as well as accelerate the transition to clean, renewable energy. Limiting expansion of fossil fuel production will support global climate action as well as reduce the potential of stranded assets in a carbon neutral future.

- 4.1 Account for the Full Climate Impact of Fossil Fuel Production and Export Projects. (BIG MOVE)** Advocate to the BC Government and the Government of Canada to acknowledge through a policy statement that any new fossil fuel production and export projects (coal, oil, natural gas, liquefied natural gas), or expansions to fossil fuel production and export sites are likely to cause unacceptable environmental effects, such as climate change. This policy statement will help inform provincial and federal ministers in determining whether these types of projects are in the public interest and whether they hinder or contribute to BC's and Canada's ability to meet its commitments in respect of climate change, as required under the federal *Impact Assessment Act* and BC *Environmental Assessment Act*. This will also support Metro Vancouver in assessing the full climate impact of projects located within the region, which can include impact on regional and global emissions.
- 4.2 Eliminate Subsidies and Public Financing for Fossil Fuels.** Advocate to the Government of Canada to eliminate fossil fuel subsidies by 2023, develop a plan to phase out public financing of the fossil fuel sector, and eliminate flow-through shares for oil, gas and coal projects, as announced in the Deputy Prime Minister and Minister of Finance's [2022 Mandate Letter](#).
- 4.3 Just Transition Plan for Workers and Communities Engaged in the Fossil Fuel Industry.** Advocate to the BC Government to develop a Just Transition Plan with extensive stakeholder input, that will complement the *CleanBC Roadmap to 2030* and *Climate 2050 Roadmaps* to develop actionable recommendations that ensure



that workers and communities engaged in the fossil fuel industry are not left behind in the transition to clean, renewable energy.

## Resilient Energy Strategies

### Strategy 5: Protect Existing Energy Systems from Current and Future Climate Impacts

While reducing regional emissions will contribute to the global effort against climate change, some impacts from a changing climate are locked in and are likely to occur even with deep emission reductions. Rising sea levels, increased frequency and severity of riverine flooding, and more frequent and intense heatwaves, wildfires, and droughts are already impacting our energy system, and are likely to continue to impact regional energy networks within the next 100 years. Much of our critical energy infrastructure will remain standing for decades, but has not been designed to withstand impacts from changing climate hazards. Identifying current and future climate impacts, and protecting and upgrading existing energy infrastructure from the hazards posed by these impacts, is essential to maintaining a resilient energy system. Reducing vulnerability of critical regional infrastructure, such as improving backup power systems, can limit impacts caused by disruption to the energy system.

- 5.1 Comprehensive Climate Risk and Vulnerability Assessment. (BIG MOVE)** Work with the BC Government, member jurisdictions, and energy utilities in the region to complete a comprehensive regional climate risk and vulnerability assessment that would support a more coordinated approach to climate adaptation in the region. This could complement or include other regional vulnerability assessments, such as those outlined in Action 6.4 in the *Climate 2050 Buildings Roadmap* and Action 6.5 in the *Climate 2050 Transportation Roadmap*.
- 5.2 Prepare for Regional Disruption due to Extreme Weather Events.** Work with the BC Government, energy utilities, and other regional partners responsible for emergency management and response, to develop and maintain climate change adaptation plans that establish protocols to respond to, and rapidly recover from, disruption to the regional energy system due to severe climate-related weather events.
- 5.3 Protect and Increase Resilience of Existing Regional Energy Generation Infrastructure.** Work with member jurisdictions, local businesses, and energy utilities to increase the resilience of generation infrastructure, such as cogeneration facilities and district energy systems, and ensure they are protected from current and future climate impacts.
- 5.4 Protect and Increase Resilience of Existing Energy Distribution Infrastructure.** Work with the BC Government, member jurisdictions, and energy utilities to ensure that regional energy distribution infrastructure, such as electrical substations, power lines and pipelines, are protected from current and future climate impacts.
- 5.5 Ensure Critical Regional Infrastructure has Backup Power.** Work with member jurisdictions and energy utilities to ensure that critical regional infrastructure have access to backup power to minimize interruptions to essential services during climate-related weather events.

### Strategy 6: Build New Energy Systems that are Climate Resilient

In addition to protecting critical energy infrastructure and networks, steps must also be taken proactively to build a more resilient energy system. Climate change adaptation needs to be considered during the location, construction, maintenance, and operation of new energy infrastructure to avoid creating vulnerabilities that make adaptation more difficult and expensive in the future. Design standards with updated climate projections should be employed to ensure resiliency is integrated into the design of new energy infrastructure. Proactive work should be undertaken to foster innovation and develop technologies that support a climate resilient energy system.



- 6.1 Minimize Risk Exposure for New Energy Infrastructure.** Work with member jurisdictions and energy utilities to make use of future-shifted, location-specific climate risk and vulnerability information, to ensure new energy infrastructure is not constructed in locations with known and unmitigated climate hazards.
- 6.2 Design for Climate Resilient Energy Infrastructure.** Work with the BC Government, member jurisdictions, and energy utilities and their regulatory bodies to ensure that all newly constructed and retrofitted energy infrastructure including generation, transmission, and distribution infrastructure, are designed to be resilient to current and future impacts of climate change.
- 6.3 Pilot Innovative Energy Storage Technology to Improve Resiliency.** Work with member jurisdictions and energy utilities in piloting innovative energy storage technology to improve resiliency, such as batteries or hydrogen energy storage.
- 6.4 Vehicle-to-Grid Technologies. (Corporate Leadership)** Work with BC Hydro and other interested electric vehicle infrastructure owners to pilot test the viability and utility of bi-directional vehicle chargers with zero-emission vehicles. Using electric vehicles as decentralized batteries could help reduce the need for new electricity generation and increase resiliency in the electrical grid during periods of increased demand or system disruption.

## Setting the Path Ahead

The “Setting the Path Ahead” section will eventually be found on Metro Vancouver’s Climate 2050 webpages under “Energy,” and will serve as a companion to the *Energy Roadmap*. This will allow Metro Vancouver to track progress towards targets, and add and adjust strategies and actions in response to performance measurement.

Electricity is one of the most important sources of clean, renewable energy for significant early reductions of greenhouse gases in the region, particularly for buildings and personal transportation. Electric air-source heat pumps and electric vehicles are becoming readily available and deployable on a large scale. It is critical that the actions identified in this Roadmap support both faster uptake of electric technologies and support BC Hydro in scaling up electricity supply and modernizing the grid. Taking early action to reduce emissions can also help improve air quality and enhance resilience in energy systems, which will ensure that energy supply is resilient to changing climate conditions and increased prevalence of extreme weather events.

As large parts of the economy electrify, there will be some sectors that will be difficult to electrify, such as some existing buildings, industrial processes, and goods movement. Action that supports rapid development and scale-up of zero emission and low carbon options for these sectors is needed to ensure that the energy system can transition to 100% clean, renewable energy by 2050.

The timeline below includes all of the actions included in this Roadmap. Although there is much work to be done, there are some critical actions that, if started over the next few years, will make a major difference to accelerating the region’s transition to clean, renewable, and resilient energy.

Climate 2050 Energy Roadmap Action Timeline			
Strategy	2022-2024	2025-2029	2030-Beyond
Plan for the Transition to Clean, Renewable, and Resilient Energy	Align British Columbia’s Energy Objectives with Strong Climate Action		
	Strong Climate Mandate for Energy Utilities		
	Revise Utility Regulation to Align with Strong Climate Action		
	Develop Long-term Planning Scenarios for the Transition to 100% Clean, Renewable Energy		
	Regional Climate Action in Energy Utility Regulatory Processes		
Accelerate Electrification	Electrification Rates		
	Time-of-use Rates, Demand Response, and Electric Vehicle Peak Reduction Programs		
		Smart Technology Standards	
	Regional Grid Constraints Study		
	High Performance Heating and Cooling Equipment Import/Sale Standards		
	Minimize Land and Water Impacts		
Increase Sustainable Production of Low Carbon Biofuels and Hydrogen		More Stringent Low Carbon Fuel Standards	
	Prioritize Sustainability in Biofuel Feedstock		
	Regional Hydrogen Hub		
		Regional Sources of Liquid Biofuels	
	Develop Local Sources of Sustainable Aviation Fuel		
		Streamline Emission Requirements for Anaerobic Digestion Facilities	
	Expand Anaerobic Digestion of Agricultural Waste		
	Phase Down Use of Thermal Coke and Petroleum Coke		
	Metro Vancouver as a Regional Clean, Renewable Energy Provider		
	Innovative Research on Maximizing Energy Recovery from Waste Streams		
Limit Expansion of Fossil Fuel Production	Account for the Full Climate Impact of New Fossil Fuel Production and Export Projects		
	Eliminate Subsidies and Public Financing for Fossil Fuels		
	Just Transition Plan for Workers and Communities Engaged in the Fossil Fuel Industry		

Protect Existing Energy Systems from Current and Future Climate Impacts	Comprehensive Climate Risk and Vulnerability Assessment	
	Prepare for Regional Disruption due to Extreme Weather Events	
	Protect and Increase Resilience of Existing Regional Energy Generation Infrastructure	
	Protect and Increase Resilience of Existing Energy Distribution Infrastructure	
	Ensure Critical Regional Infrastructure has Backup Power	
Build New Energy Systems that are Climate Resilient	Minimize Risk Exposure for New Energy Infrastructure	
	Design for Climate Resilient Energy Infrastructure	
		Pilot Innovative Energy Storage Technology to Improve Resiliency
		Vehicle-to-grid Technologies

## Measuring our Progress

The table below lists examples of some of the performance indicators that could be used to help Metro Vancouver measure regional progress towards meeting the targets set out for this purpose. The performance indicators used will depend, to some extent, on the availability of this information from other organizations.

Because the *Energy Roadmap* is calling for actions from many different partners and stakeholders, data sharing will be foundational to understanding the pace of progress towards our common goals, and will help governments to continue to shape equitable and cost-effective pathways to a carbon neutral future. While much of the data needed to measure progress in on-road transportation are already collected, there are significant data gaps for rail, marine, and air transportation. Additional work is underway to understand what key performance indicators and data effectively measure progress towards regional resilience (noted in the table below as “TBD”).

Roadmap Element	Key Performance Indicator	Data Source	Data is Currently Collected
<b>Regional Clean, Renewable Energy Use</b>	Percentage of clean, renewable energy used	Regional GHG inventory	Yes
	tCO <sub>2</sub> e from regional energy use	Regional GHG inventory	Yes
	Energy use by type (GJ)	Metro Vancouver BC Hydro FortisBC BC Government	Partial
<b>Plan for the Transition</b>	tCO <sub>2</sub> e from regional electricity use	BC Hydro Local & BC Governments	Partial
	tCO <sub>2</sub> e from regional gas use	FortisBC	Yes
	Thermal coal and petroleum coke use in industrial processes (GJ)	Regional GHG Inventory	Yes
	Renewable energy supplied by MV	Metro Vancouver	Yes
<b>Accelerate Electrification</b>	Number of high-efficiency electric equipment installed	Shelf/Industry surveys	No
	Number of new buildings with low carbon energy systems	Local government building permits	Yes
	Regional vehicle fleet make up by engine type: internal combustion, electric, hybrid, hydrogen (number of vehicles, % of total regional vehicle stock)	ICBC Metro Vancouver TransLink	Yes

	Number of electric vehicle chargers	Municipalities BC Government Charging service providers	Yes
	Regional equipment registration by model year, engine tier and fuel type (GJ)	Metro Vancouver – Non Road Diesel Engine Emission Regulation Port of Vancouver	Partial
<b>Increase Biofuel Use and Sustainable Production</b>	Biofuels used in-region (GJ)	Regional GHG Inventory	Partial
	Sustainable feedstock used, associated with biofuel consumption in region (tonnes)	BC Government Government of Canada Market research firms	No
	Kilometres travelled by aircraft using zero or low emission fuels (km, % of total km travelled)	Transport Canada Regional airports Airlines	No
	Number of in-region anaerobic digestion facilities	Metro Vancouver	Yes
	Biofuel production from Metro Vancouver facilities (GJ)	Metro Vancouver	Yes
<b>Limit Fossil Fuel Supply Infrastructure Expansion</b>	Number of new, in-region, completed projects related to new or expanded fossil fuel production and export	Metro Vancouver Industry Surveys	Partial
<b>Protect Existing Energy Systems</b>	TBD	TBD	TBD
	TBD	TBD	TBD
	TBD	TBD	TBD
<b>Build New Climate Resilient Energy Systems</b>	TBD	TBD	TBD
	TBD	TBD	TBD

## Glossary

**Biodiesel** is made from vegetable oils (such as canola) and waste animal fats. It can be blended in fossil diesel in amounts up to 20% and used in conventional diesel engines.

**Biofuels** are produced using organic matter derived from biomass such as plants. Biofuels can be gaseous, liquid, or solid. Common biofuels include biodiesel, renewable diesel, ethanol, renewable natural gas, firewood, and wood pellets.

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

**Clean, renewable energy** is derived from sources with low or zero emissions or from sources that can be replenished over days or years.

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

**Climate resilience** describes the capacity of ecosystems, economies, infrastructure, and communities to absorb the impacts of climate change while maintaining essential services and functions needed to support health and well-being. In some cases, climate resilience involves changing services and functions so they are more sustainable.

**Combustion** refers to the process of burning a fuel to make energy.

**Common air contaminants** are air contaminants that can harm public health and reduce residents' quality of life and life expectancy by causing heart and lung diseases, cancer, asthma, and other impacts. Common air contaminants include fine and coarse particulate matter, ground-level ozone, nitrogen dioxide, and sulphur dioxide.

**Electrical grid** is the network through which electricity is generated, transmitted, and distributed to the end user. The electrical grid includes electrical generation infrastructure, such as hydroelectric dams, and transmission and distribution infrastructure, such as transformers, substations, and power lines.

**Ethanol** is the most common renewable alternative to gasoline. Made from plants such as corn or sugar cane, it can be blended up to 10% in regular gasoline used in conventional gasoline engines.

**Equity** is the promotion of fairness, justice, and the removal of structural barriers that may cause or aggravate disparities experienced by different groups of people.

**Fine particulate matter (PM<sub>2.5</sub>)** is made up of tiny solid or liquid particles that float in the air and can penetrate deep into the lungs and even into the bloodstream. Fine particulate matter can damage people's health by aggravating existing lung and heart diseases, increasing the risk of cancer and reducing life expectancy.

**Fossil natural gas**, sometimes called natural gas, is a fossil fuel composed of mostly methane, about 95% by volume. Combustion of fossil natural gas generates greenhouse gas emissions.

**Fugitive emissions** are unintended discharges to the atmosphere resulting from accidental release or leaks.

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

**Ground-level ozone** (O<sub>3</sub>) can have harmful impacts on everyone, especially children, seniors, and people with lung and heart conditions. It is primarily formed when nitrogen oxides and volatile organic compounds react in the air on hot and sunny days.

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

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

**Lifecycle greenhouse gas emissions** refers to all greenhouse emissions associated with the production, distribution, and use of a particular energy source, from feedstock extraction, processing, transportation, to end-use. For example, lifecycle emissions of gasoline would span all associated emissions, from extraction of oil from the ground until combustion in a vehicle.

**Microgrids** refers to systems composed of electrical loads and distributed energy generation resources, that are interconnected through an electrical grid. Microgrids have the ability to operate independently from the central electrical grid, so can remain operating during regional power outages.

**Natural gas**, sometimes called fossil natural gas, is a fossil fuel composed of mostly methane, about 95% by volume. Combustion of natural gas generates greenhouse gas emissions.

**Nitrogen dioxide** (NO<sub>2</sub>) can damage people's health by aggravating existing lung diseases like asthma and bronchitis and reducing immunity to lung infections. It is formed during high-temperature fuel combustion.

**Renewable diesel** is also made from vegetable oils and animal fats, but using a different process that makes the end fuel identical to regular diesel. It can be used directly in conventional diesel engines without requiring engine modifications.

**Renewable gas** is gas produced from renewable resources. This primarily includes green hydrogen, waste hydrogen, and renewable natural gas.

**Renewable natural gas** is a gaseous biofuel that is mostly composed of methane; it is produced primarily from anaerobic digestion of organic feedstock (such as food, agricultural, and forestry waste).

**Stranded assets** are assets that have suffered from unanticipated or premature write-downs, devaluation, or conversion to liabilities.

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

**Vulnerability assessments** identify areas or populations most likely to be impacted by projected changes in climate and build an understanding of why these areas are vulnerable, including the interaction between climate change, non-climatic stressors, and cumulative impacts. Assessments evaluate the effectiveness of previous coping strategies and target potential adaptation measures.

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To: Climate Action Committee

From: Edward Nichol, Regional Planner, Regional Planning and Housing Services  
Josephine Clark, Natural Resource Management Planner, Parks and Environment  
Jason Emmert, Program Manager, Climate Policy, Parks and Environment

Date: March 9, 2022 Meeting Date: April 8, 2022

Subject: **Draft Climate 2050 Nature and Ecosystems Roadmap**

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### RECOMMENDATION

That the MVRD Board direct staff to proceed with engagement on the draft *Climate 2050 Nature and Ecosystems Roadmap*, as presented in the report dated March 9, 2022, titled "Draft *Climate 2050 Nature and Ecosystems Roadmap*".

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### EXECUTIVE SUMMARY

This report presents the draft *Climate 2050 Nature and Ecosystems Roadmap*, one of the series of ten *Climate 2050 Roadmaps* that will guide our region's policies and collective actions to transition to a carbon neutral, resilient region by 2050. The draft *Climate 2050 Nature and Ecosystems Roadmap* lays out strategies and actions to maintain healthy and resilient ecosystems that store carbon, moderate the impacts of a changing climate, and provide a range of other co-benefits. Action items in the draft *Nature and Ecosystems Roadmap* include protecting, restoring and connecting ecosystems, and advancing nature-based solutions to climate change.

Like the other *Climate 2050 Roadmaps*, the *Nature and Ecosystems Roadmap* is intended to be dynamic, and over time, more work will be necessary to identify and undertake additional actions to reach the 2030 and 2050 climate targets established for the region. The draft will inform an engagement process, with the intent of bringing an updated *Climate 2050 Nature and Ecosystems Roadmap* for endorsement by the MVRD Board in 2022.

### PURPOSE

To seek MVRD Board direction to proceed with engagement on the draft *Climate 2050 Nature and Ecosystems Roadmap*.

### BACKGROUND

In September 2018, the MVRD Board adopted the *Climate 2050 Strategic Framework* and directed staff to initiate development of the *Climate 2050 Roadmaps*. The Board subsequently authorized staff to begin an integrated engagement process for *Climate 2050* and the *Clean Air Plan*, using a series of issue area discussion papers related to the ten Roadmaps. The Climate Action Committee received the *Climate 2050 Discussion Paper on Nature and Ecosystems* at its May 2020 meeting (see Reference).

This report presents the draft *Climate 2050 Nature and Ecosystems Roadmap* (see Attachment), and provides information on associated engagement activities planned with the public, stakeholders and other governments, including First Nations.



## **CLIMATE 2050**

*Climate 2050* is an overarching long-term strategy that will guide our region's policies and collective actions to transition to a carbon neutral and resilient region over the next 30 years. *Climate 2050* is being implemented through ten issue area Roadmaps, which will describe long-term goals, targets, strategies and actions to reduce regional greenhouse gases and ensure that this region is resilient to climate change impacts. Implementation of the Roadmaps will be driven by Metro Vancouver's management plans and other policies including the *Clean Air Plan*, as well as forthcoming updates to the regional growth strategy (draft *Metro 2050*) and the *Regional Parks Plan*.

## **DRAFT CLIMATE 2050 NATURE AND ECOSYSTEMS ROADMAP**

The *Climate 2050 Nature and Ecosystems Roadmap* supports the vision to achieve a carbon neutral and resilient region through healthy and biodiverse ecosystems. In addition to outlining challenges and benefits, the draft *Climate 2050 Nature and Ecosystems Roadmap* lays out 30 actions for storing carbon and building resilience, organized under the following five strategic areas:

1. Protect, Restore, and Enhance the Region's Ecosystems
2. Connect Green Infrastructure
3. Integrate Natural Assets into Conventional Asset Management and Decision-Making Processes
4. Support a Resilient, Robust, and Healthy Urban Forest
5. Advance Nature-based Solutions to Climate Change

The draft *Climate 2050 Nature and Ecosystems Roadmap* proposes an implementation timeline to encourage swift early action on key issues. Given the timelines and ambitious targets and goals, staff have continued to advance relevant work plan items across departments and collaborate with other governments and partners while planning and developing the draft *Climate 2050 Nature and Ecosystems Roadmap*.

## **Potential Impact on Greenhouse Gas Emissions**

A conservative estimate of the carbon stored in the vegetation and soils of the region's ecosystems (such as wetlands, forests, and riparian areas) is 65 million tonnes. Every year, an estimated one million tonnes of additional carbon is sequestered from the atmosphere and added to the carbon stores held by the region's ecosystems. Protection of ecosystems helps ensure stored carbon remains locked away and ongoing sequestration of carbon continues. Restoration and enhancement of ecosystems improves the region's long-term carbon storage potential.

Carbon sequestration and storage is one of the many benefits achieved through ecosystem protection and restoration. However, significantly increasing the amount of carbon taken out of the atmosphere and stored in ecosystems requires large areas and long timeframes. The contribution of nature and ecosystems to reducing the region's greenhouse gas emissions is therefore a supplemental solution to the actions outlined in other *Climate 2050 Roadmaps*.

## **Potential Impact on Regional Resiliency**

Nature and ecosystems are integrated climate solutions in that they both store carbon and increase resiliency. Resiliency is increased through a broad range of 'ecosystem services' including cooling and

shading urban areas, capturing and cleaning stormwater, moderating floods, and reducing impacts of coastal storms. To provide these services, ecosystems must be healthy, biodiverse, and able to withstand the impacts of climate change. Protecting, restoring and enhancing nature and ecosystems maximizes their ability to provide climate resiliency benefits to the region.

***Climate 2050 Nature and Ecosystems Roadmap, Regional Parks Plan and Metro 2050***

There are important connections between the draft *Climate 2050 Nature and Ecosystems Roadmap* and the regional growth strategy (draft *Metro 2050*), which is currently in the approvals phase. Metro Vancouver, in partnership with its member jurisdictions, will collectively manage growth coming to the region, and the protection of important lands for conservation through the regional growth strategy (draft *Metro 2050*). The draft *Climate 2050 Nature and Ecosystems Roadmap* builds on the regional growth strategy (draft *Metro 2050*) with further actions to protect natural stores of carbon and build resiliency with nature and ecosystems.

In addition to incorporating actions from the regional growth strategy (draft *Metro 2050*), important connections also exist between the draft *Climate 2050 Nature and Ecosystems Roadmap* and the *Regional Parks Plan*, which is currently being updated. Metro Vancouver manages regional parks to protect important natural areas across the region and provide opportunities for people to connect with nature. The *Regional Parks Plan* is being updated to more fully address climate change and incorporates many actions from the draft *Climate 2050 Nature and Ecosystems Roadmap*.

**NEXT STEPS**

Each of the *Climate 2050 Roadmaps*, including the *Climate 2050 Nature and Ecosystems Roadmap*, is intended to serve as a “living, breathing” document that charts the path to achieving the region’s climate action goals and targets. It is expected that the strategic areas and actions will be updated dynamically, responding to changes in policy, technology, science, opportunities and innovations, and performance measures and indicators. In coming years, staff will continue to work with the public, stakeholders, and other governments including First Nations, to amplify these actions and add new ones to store carbon and build resiliency with nature and ecosystems. Of note, the staff project team are working to expand local and Indigenous perspective in the Nature and Ecosystems Roadmap and associated actions. This will, as an example, help to meet the statement in the draft vision that ‘Indigenous ways of knowing about the natural world are showcased and more widely understood and embraced by all’. The draft Roadmap acknowledges local and Indigenous perspective as a historical and future priority.

**ENGAGEMENT PROCESS**

Staff will seek feedback and recommendations for revisions on this draft *Roadmap* from those most likely to comment, be impacted, or have a role in implementation. This includes but is not limited to member jurisdictions and other governments, including First Nations. Information and opportunities to provide feedback will also be shared to the broader public. Feedback might include for example; support, concerns about implementation or impacts, and ideas for innovation and collaboration.

The proposed engagement process will align with the Board Policy on Public Engagement. The goals, strategies, and actions in the draft *Climate 2050 Nature and Ecosystems Roadmap* incorporate public and stakeholder feedback received during development of the *Climate 2050 Strategic Framework* (previously summarized in a report on engagement for *Climate 2050* received by the Climate Action

Committee on September 19, 2018), as well as feedback from the *Nature and Ecosystems Discussion Paper*. Given the strong connections to the regional growth strategy (draft *Metro 2050*) and the draft *Regional Parks Plan*, feedback received through each engagement process has informed development of the draft *Climate 2050 Nature and Ecosystems Roadmap*.

Feedback on the draft *Climate 2050 Nature and Ecosystems Roadmap* will inform the final Roadmap, which will be presented to the Committee and Board for consideration later in 2022.

## **ALTERNATIVES**

1. That the MVRD Board direct staff to proceed with engagement on the draft *Climate 2050 Nature and Ecosystems Roadmap*, as presented in the report dated March 9, 2022, titled "Draft *Climate 2050 Nature and Ecosystems Roadmap*".
2. That the MVRD Board receive for information, the report dated March 9, 2022, titled "Draft *Climate 2050 Nature and Ecosystems Roadmap*" and provide alternate direction to staff.

## **FINANCIAL IMPLICATIONS**

Under Alternative 1, the overall resources required to develop and engage on *Climate 2050 Roadmaps* have been approved in program budgets for 2021, including staff time and consulting expenditures. Funding for enhanced engagement on *Climate 2050* from the Sustainability Innovation Fund has been approved by the MVRD Board and will be used to support engagement activities on the development and implementation of the *Climate 2050 Roadmaps*. Continued alignment between *Climate 2050 Roadmaps* and regional management plans is intended to make the best use of resources available, as well as minimize time commitments for interested parties providing feedback.

## **CONCLUSION**

Metro Vancouver's draft *Climate 2050 Nature and Ecosystems Roadmap* lays out strategies and actions to maintain healthy and resilient ecosystems that store carbon, moderate the impacts of a changing climate, and provide a range of other co-benefits. If authorized by the Board, Metro Vancouver intends to seek feedback on the draft roadmap from the public, stakeholders and other governments, including First Nations.

Staff recommend Alternative 1, that the Board direct staff to proceed with engagement on the draft *Climate 2050 Nature and Ecosystems Roadmap*. Engagement is intended to provide sufficient opportunity to interested parties to learn about the draft strategies and actions in the *Nature and Ecosystems Roadmap* and provide feedback. Feedback from engagement will inform the development of a final *Nature and Ecosystems Roadmap* for Committee and Board consideration, planned for 2022.

## **Attachment**

*Climate 2050 Nature and Ecosystems Roadmap*, draft dated April 2022 (50888637)

## **Reference**

[Climate 2050 and Clean Air Plan Discussion Paper on Nature and Ecosystems](#), report dated April 17, 2020



# CLIMATE 2050 ROADMAP

## Nature and Ecosystems

A pathway to storing carbon and building a resilient future with Nature and Ecosystems

April 2022

*DRAFT*

Metro Vancouver acknowledges that the region's residents live, work and learn on the shared territories of many Indigenous peoples, including 10 local First Nations: Katzie, Kwantlen, Kwikwetlem, Matsqui, Musqueam, Qayqayt, Semiahmoo, Squamish, Tsawwassen, and Tsleil-Waututh.

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

### **Your input is valued.**

This Roadmap was drafted in the winter of 2021-2022 based on feedback received from a broad range of individuals, organizations and stakeholder groups between 2020-2021. Engagement was centred around the Metro Vancouver *Nature and Ecosystems Discussion Paper* to support *Climate 2050*, introduced for public and stakeholder comment in May 2020.

Public feedback is valued and project teams will continue to seek input on this draft Roadmap through the spring and summer of 2022. We will create online feedback opportunities, and will continue to ensure feedback is reflected as we move forward with implementing these actions. Documents, feedback forms, and direct email links to the project team are all posted to the Metro Vancouver website, [metrovanancouver.org](https://metrovanancouver.org), search "Climate 2050 Nature and Ecosystems Roadmap".

COVID-19 has had an impact on our traditional engagement methods. Metro Vancouver assesses work plans on a case by case basis to determine if the COVID-19 pandemic response requires an adjustment to any work plans, including engagement components. For climate change programs and initiatives, this means continuing with work plans that protect human health and the environment, but adjusting how we approach engagement.

Goals and targets in Metro Vancouver's climate-related plans are science-based and remain a priority. The interim target of a 45% reduction in greenhouse gas emissions below 2010 levels by 2030 has a time horizon of less than ten years. Pursuing a carbon neutral region by 2050 requires taking bold action now. Across the globe, the pandemic response has had an unexpected benefit of significant environmental improvements in terms of greenhouse gas emissions. This provides a glimpse of what is possible and what we can achieve with coordinated efforts and common goals in a time of crisis.

## Metro Vancouver

Metro Vancouver is a federation of 21 municipalities, one Electoral Area, and one Treaty First Nation, working collaboratively in planning and providing vital utility and local government services to 2.75 million people. Essential services include drinking water, sewage treatment, and solid waste disposal, along with regional services like regional parks, housing, land use planning and air quality management that help keep the region one of the most livable in the world. Metro Vancouver's mission is framed around three broad roles.

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

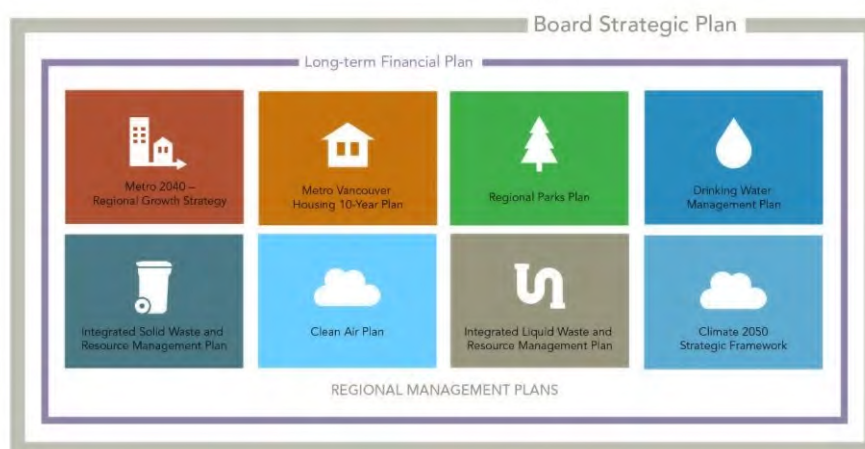
**2. Deliver Core Services** Provide regional utility services related to drinking water, liquid waste and solid waste to members. Provide regional services, including parks and affordable housing, directly to residents and act as the local government for Electoral Area A.

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



## BUILDING A RESILIENT REGION

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



Adopted by the Metro Vancouver Board in 2018, the [Ecological Health Framework](#) 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”. To help guide corporate actions, the *Framework* set three high-level goals: 1) build ecological resilience and minimize impacts; 2) protect natural areas and conserve ecosystem services; 3) and nurture nature within communities. The *Climate 2050 Nature and Ecosystems Roadmap* complements and builds on the *Ecological Health Framework* by identifying additional corporate and regional actions to maximize carbon storage, resilience, and other critical ecosystem services provided by nature and ecosystems.

### Metro Vancouver’s Roles and Responsibilities for Climate Action

The actions to achieve carbon neutrality and building a more resilient region will depend on the collaborative efforts of many players in the region as well as the federal and provincial government. However, Metro Vancouver has some unique and important roles and responsibilities for advancing climate action.

- 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 gases.
- Through the regional growth strategy, Metro Vancouver, with its members, plans for compact, complete communities that are foundational to enabling a carbon neutral, resilient region.
- As part of delivering its core services, Metro Vancouver also generates and uses clean, renewable energy from its facilities and is working to ensure core regional services and infrastructure are prepared for and resilient to climate change.
- Invest Vancouver is Metro Vancouver’s economic development leadership service with the vision of a dynamic and resilient regional economy that delivers prosperity for all. It aims to foster greater regional collaboration on economic development issues, to advise leaders on sound economic policy and strategy, and to brand the region and its key industries to a global audience with the intention of attracting strategic

investment. Invest Vancouver focuses on key export oriented industries in which the region has a productive advantage. This includes many aspects of the green economy, including clean technology, renewable energy and clean transportation.

- In its role as a regional forum, Metro Vancouver builds and facilitates collaborative processes which engage the public and build partnerships to address significant regional issues like climate change. As part of this role, Metro Vancouver coordinates with and advocates on behalf of its member jurisdictions to other governments and partners on greenhouse gas management and climate change adaptation initiatives.

These roles are necessary but not sufficient to achieve our goals of a climate neutral, resilient region. Metro Vancouver will be looking to other orders of government, First Nations and other regional partners to lead and collaborate in the implementation of a number of key actions in the Climate 2050 Roadmaps.



## The Roadmap At a Glance

Metro Vancouver's ecosystems are vital to the people and wildlife who live here. In both urban and natural areas, these ecosystems have tremendous cultural and spiritual importance, contribute to the region's livability, provide a sense of place, and foster biodiversity. Nature and ecosystems help us address climate change by sequestering carbon annually and storing it over the long-term, while also bolstering our resilience to climate change impacts such as extreme heat and flooding. Nature and ecosystems are themselves at risk of a changing climate, exacerbated by other stressors such as land development and invasive species.

Despite the challenges faced, the region is well-positioned to take action and maintain a healthy environment. By protecting, restoring, and enhancing ecosystems, and connecting them together across the region through a robust green infrastructure network, we can support productive and resilient ecosystems that help us address climate change. Natural asset management — a concept that involves accounting for the benefits nature provides — continues to gain traction across the region. Improving the health and extent of the region's urban forest is another opportunity to take climate action close to where people live and work. Lastly, our collective efforts to address climate change can include nature-based solutions that help address multiple problems, such as biodiversity loss and climate change, simultaneously.

**The Nature and Ecosystems Roadmap lays out 30 actions for storing carbon and increasing resiliency, organized under the following five strategic areas:**

- 1) Protect, Restore, and Enhance the Region's Ecosystems*
- 2) Connect Green Infrastructure*
- 3) Integrate Natural Assets into Conventional Asset Management and Decision-Making Processes*
- 4) Support a Resilient, Robust, and Healthy Urban Forest*
- 5) Advance Nature-based Solutions to Climate Change*

Although there is much work to be done, there are some important actions that can be implemented now to supplement the efforts in other sectors to reach a carbon neutral and resilient region by 2050. It is critical that the actions identified in this Roadmap are implemented rapidly to prevent future ecosystem loss and degradation, and to maximize long term carbon storage, resilience, and other co-benefits. We are not alone in this challenge. The actions in this Roadmap demonstrate the importance of working collectively to reach climate objectives, and will complement other regional plans that support healthy and biodiverse ecosystems. Working closely with First Nations, the federal and BC governments, member jurisdictions, and other key partners will be critical to effectively implement the actions in this Roadmap. Together, we can ensure that nature and ecosystems are an integral part of creating a carbon neutral and resilient region.

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## Visioning Healthy and Resilient Nature and Ecosystems in 2050

Our vision is that in 2050, Metro Vancouver is a place where the natural environment provides benefits to humans and other species alike, and the relationship between people and nature is more intrinsically known and understood by residents across the region. Indigenous ways of knowing about the natural world are showcased and more widely understood and embraced by all. Nature and ecosystems are recognized for their inherent value as irreplaceable systems, but also for their ability to foster biodiversity, store carbon, and moderate the impacts of climate change. The way we “do business” has undergone a paradigm shift, such that these benefits are recognized and accounted for in decision-making processes. Ecosystems are healthy in undisturbed, natural areas, but also within the communities where people live, work and play. Our region is known globally as a leader in fostering relationships and partnerships - working together to enable the protection, enhancement, restoration, and connection of ecosystems, and implementing nature-based solutions to support biodiversity, moderate the impacts of climate change, and store carbon over the long-term.

# Climate 2050 Nature and Ecosystems Roadmap

A pathway to storing carbon and building a resilient future with Nature and Ecosystems in Metro Vancouver

## The Challenge

This Roadmap is about ambitious and necessary protection, enhancement and restoration of our natural environment. It presents a robust plan for this region to maintain a healthy environment that is supported by productive and resilient ecosystems. Nature and ecosystems have the capacity to store carbon and help moderate the impacts of a changing climate, and they provide numerous other benefits; however, these natural systems are themselves at risk due to a changing climate, land development, invasive species, pollution, and other factors. Decisions we make now to protect, restore, enhance, and connect nature and ecosystems across the region will have a lasting impact on the state of the natural environment in the future.

A carbon neutral and resilient region, supported by healthy ecosystems, is the best option for future generations to maintain a good quality of life, beyond 2050. We have to make some significant decisions and investments today or pass them on to future generations at higher cost and consequence. Metro Vancouver and many of its member jurisdictions have committed to ambitious targets and bold leadership to respond to the climate crisis. This plan responds to the global challenge to come together, think big, and act now in this region.

### ***The Connection between Climate and Air Quality***

The *Clean Air Plan* is Metro Vancouver's air quality and greenhouse gas management plan. Actions in the Plan will reduce air contaminant emissions and impacts in our region, including greenhouse gases, over the next 10 years. These actions will support the interim target of a 45% reduction in greenhouse gas emissions by 2030, and establish the foundation for the 30-year goal of a carbon neutral region by 2050. The *Clean Air Plan* also addresses air quality targets for the region.

Residents in the region generally experience good air quality, but additional emission reduction actions are needed to continue protecting human health and the environment. Some air contaminants, such as ground-level ozone, can damage plants and reduce vegetation growth, adding to the stress on nature and ecosystems imposed by climate change. As temperatures rise and droughts become more frequent, forests in the Pacific Northwest are at increased risk to wildfires. Wildfires create significant amounts of fine particulate matter, the air contaminant with the greatest air quality-related health impacts in our region. While this topic area is touched on in the *Nature and Ecosystems Roadmap*, response to the air quality impacts of wildfires will be addressed in more detail in the *Human Health and Well-being Roadmap*, as well as the *Clean Air Plan*.

## Climate Change Impacts on Nature and Ecosystems

While nature and ecosystems store carbon and help us adapt to climate change impacts, many natural areas and the services they provide are themselves at risk from a changing climate. For example, trees store carbon, cool our streets, and capture and regulate floodwater, but they are less able to provide these benefits if they are suffering from drought and extreme heat.

Many species and ecosystems in the region are being impacted by climate change because they cannot adapt fast enough – for instance, Pacific salmon are affected by warming stream temperatures, stressing fish and increasing vulnerability to disease (see Species Case Study on page 17). Climate change adaptation must be considered when managing ecosystems in urban and natural areas, including the development of best practices supported by current climate science. While specifics are likely to change when new climate change projections are completed and more data becomes available, high-level trends are likely to remain consistent over time.

We can contribute to the region's collective climate resilience by monitoring the extent and health of urban and natural ecosystems, providing space in our communities for nature to adapt and flourish, and considering the natural environment as a critical part of climate action.

The region's nature and ecosystems are, and will continue to be, affected by climate change and associated hazards – these hazards could cause impacts in numerous ways. However, nature and ecosystems can also minimize the impacts of climate change. These relationships are outlined in Table 1 below.

*Table 1: Climatic Changes and Hazards and Their Potential Impacts on Nature and Ecosystems.*

<b><i>Climatic Changes and Hazards</i></b>	<b><i>Anticipated Impacts to Nature and Ecosystems</i></b>	<b><i>How Nature and Ecosystems Can Minimize Impacts</i></b>
Sea level rise and flooding (coastal and riverine)		
Rising water levels	<ul style="list-style-type: none"> <li>• Shoreline ecosystems will be lost as they are caught between rising waters and hardened shoreline infrastructure (known as coastal squeeze).</li> <li>• Extreme flooding causes structural changes to rivers and shorelines, shifting ecosystems and impacting fish and wildlife.</li> <li>• Flood waters deposit excess sediment over fish habitat, including spawning areas, impacting fish health and populations.</li> <li>• During a flood, toxic substances from low-lying areas (e.g. urban and industrial sites) can be released, damaging ecosystems.</li> </ul>	<ul style="list-style-type: none"> <li>• Natural shorelines reduce the impacts of riverine and coastal flooding by absorbing water and wave energy. They also provide space for ecosystems to adapt and move as water levels rise.</li> </ul>

Changing salinity in rivers	<ul style="list-style-type: none"> <li>• Salt water will move further upstream during lower river flows, affecting freshwater aquatic ecosystems</li> </ul>	
Combined impact of sea level rise, storm surge and coastal flooding	<ul style="list-style-type: none"> <li>• The ecological impacts of coastal storms and flooding are exacerbated by sea level rise.</li> </ul>	<ul style="list-style-type: none"> <li>• Coastal and intertidal ecosystems (such as mudflats and seagrass beds) protect at-risk communities by reducing the impacts of waves and extreme tides, absorbing excess water, and buffering the impacts of coastal storms.</li> </ul>
Changing precipitation patterns		
More intense rainfall events	<ul style="list-style-type: none"> <li>• Increased pollutant run-off, turbidity, and erosion, leading to poor water quality and impacts to freshwater and marine ecosystems.</li> <li>• Increased risk of landslides, disrupting wildlife habitat and movement.</li> </ul>	<ul style="list-style-type: none"> <li>• Wetlands, riparian ecosystems and other vegetated areas reduce the impacts of flooding, prevent erosion, and absorb and filter rainwater, reducing the strain on stormwater infrastructure – but in extreme events, natural systems can be overwhelmed.</li> </ul>
Longer dry spells in the summer	<ul style="list-style-type: none"> <li>• Drought conditions, combined with higher temperatures, reduce annual tree growth and increase mortality rates.</li> <li>• Warmer waters and less flow during the dry season, combined with an earlier freshet, will stress and limit migration of salmon and other aquatic species.</li> <li>• Drought can stress newly planted restoration areas, increase the risk of fire and disease, and increase the likelihood that trees are blown over during high winds.</li> <li>• Longer and more intense wildfire season, driven by both heat and drought.</li> <li>• Long periods of drought will dry out wetlands by lowering watertables</li> </ul>	<ul style="list-style-type: none"> <li>• Trees and other vegetation help to retain the little water available during drought conditions by reducing the loss of water from the soil, which also cools the air.</li> <li>• Intact forest and riparian vegetation alongside streams and waterbodies provide shade, keeping waters cooler and reducing evaporation.</li> </ul>

Increased precipitation in winter, spring and fall	<ul style="list-style-type: none"> <li>Forests can be damaged and soils lost by heavy rain storms, resulting in flooding, slope instability and tree failure.</li> </ul>	<ul style="list-style-type: none"> <li>Healthy, intact forests are better able to stabilize slopes and resist change.</li> <li>Vegetated areas capture and regulate rainwater, reducing the strain on stormwater infrastructure.</li> </ul>
Changing temperatures		
Extreme heat	<ul style="list-style-type: none"> <li>Heat sensitive ecosystems (e.g. wetlands) and species (e.g. salmon, bats, western red cedar) become stressed at higher temperatures. Impacts are compounded by drought conditions.</li> <li>Ecosystems and species can be driven to move as conditions become less suitable; however, finding new locations that support their needs may not be possible. For example, cold climate, high-elevation alpine ecosystems are restricted in their ability to move.</li> <li>Higher outdoor temperatures increase the formation of ground-level ozone, which can damage plants</li> </ul>	<ul style="list-style-type: none"> <li>Healthy trees and other vegetation help protect people from extreme heat, by reducing the urban heat island effect.</li> <li>Trees adjacent to riparian and wetland areas support fish and other wildlife by keeping water cool.</li> </ul>
Warmer winters	<ul style="list-style-type: none"> <li>Increased spread of pathogens, pests and invasive species that are controlled by low winter temperatures.</li> </ul>	<ul style="list-style-type: none"> <li>Healthy, biodiverse ecosystems are more resilient and better able to resist pathogens, pests and invasive species.</li> </ul>
Seasonal shifts	<ul style="list-style-type: none"> <li>Shifts in seasonal temperatures (e.g. early spring/late fall) can cause disconnects between species and their habitats or food sources. For example, migratory pollinators may return to their home habitat after flowers have already bloomed.</li> </ul>	<ul style="list-style-type: none"> <li>Resilient, large, and connected ecosystems across the landscape help native species adapt to changing conditions.</li> </ul>
Ocean warming and acidification	<ul style="list-style-type: none"> <li>Impacts to marine and intertidal ecosystems (e.g. die-offs during heatwaves), stress on native species due</li> </ul>	<ul style="list-style-type: none"> <li>Impacts can be reduced by lessening human-caused stressors such as over-fishing</li> </ul>

	to changing conditions, and new incidences of invasive aquatic species.	and pollution, and ensuring healthy biodiverse coastal ecosystems. <ul style="list-style-type: none"> <li>• Seagrasses may help to reduce salinity and buffer the impacts of ocean acidification</li> </ul>
Wind storms		
High winds exacerbate other hazards	<ul style="list-style-type: none"> <li>• Wind storms, in conjunction with sea level rise, can lead to greater storm surge.</li> </ul>	<ul style="list-style-type: none"> <li>• Natural breakwaters such as reefs can reduce wave action.</li> <li>• Contiguous areas of forest are more resilient to wind damage. Buffer trees can also protect infrastructure and crops from wind.</li> </ul>

*Note:* These climatic hazards can cause cascading impacts – for example, flooding tends to be more severe following a wildfire, landslides tend to occur following heavy rainfall, and severe storms may cause more damage in coastal areas as the sea level rises. Cascading events were experienced in British Columbia during November 2021 when intense precipitation (an “atmospheric river”) resulted in severe flooding and landslides. Non-climatic hazards can also exacerbate climatic ones; for instance, subsidence can increase the risk of coastal flooding and exacerbate sea level rise, and earthquakes can disrupt flood protection infrastructure. Climate change impacts will magnify existing stressors on ecosystems from other human activities. Our understanding of how ecosystems will be affected by cumulative impacts is incomplete, but we do know that large, healthy, connected, and biodiverse ecosystems are more resilient to climate change impacts.





*Western Red Cedar in a State of Decline in West Vancouver (District of West Vancouver)*

## Carbon Storage and Sequestration from Nature and Ecosystems in Metro Vancouver

Carbon stored in nature and ecosystems, including forests, wetlands and intertidal areas, takes thousands of years to accumulate. A conservative estimate of the total carbon stored in the vegetation and soils of the region's nature and ecosystems is 65 million tonnes<sup>1</sup>. Every year, these areas sequester additional carbon, removing carbon dioxide from the atmosphere and storing it away long-term. The ecosystems that Metro Vancouver protects in the drinking water supply areas, along with the regional parks system, store 22 million tonnes of carbon. Although carbon storage is not the primary function of these areas, ongoing protection of these significant carbon stores is critical to the region's efforts to reduce greenhouse gas emissions. Figure 2 shows the key natural carbon stores in the region.

### **Carbon Sequestration and Storage**

Carbon sequestration is the removal of carbon dioxide from the air on an annual basis. The measure of annual sequestration would be considered as part of the region's efforts to measure carbon neutrality by 2050.

Carbon storage refers to the total amount of carbon stored in the vegetation and soils of ecosystems such as forests, wetlands and intertidal areas, which often takes thousands of years to accumulate.

Carbon is released from ecosystems when trees are cut down, soils are disturbed, and water cycles are altered (e.g., draining wetlands). Becoming a carbon neutral region by 2050 will require protection of regional ecosystems to ensure the carbon they store remains in place and they are able to continue to remove carbon from the atmosphere, year after year. Restoring, connecting and enhancing these ecosystems in locations that can sustain them can also improve the region's long-term carbon storage potential.

<sup>1</sup> Figures derived from Metro Vancouver's regional carbon storage dataset. The estimate provided applies to the full extents of Metro Vancouver's drinking water supply areas, along with estuarine and intertidal areas.

Carbon sequestration and storage is one of many benefits achieved through ecosystem protection and restoration, but it is not a silver bullet solution – it is a supplemental solution to directly reducing our greenhouse gas emissions through actions explored in other *Climate 2050* Roadmaps. Tangible increases in carbon storage levels in natural systems requires ample space for ecosystems to grow and shift, and long timeframes.

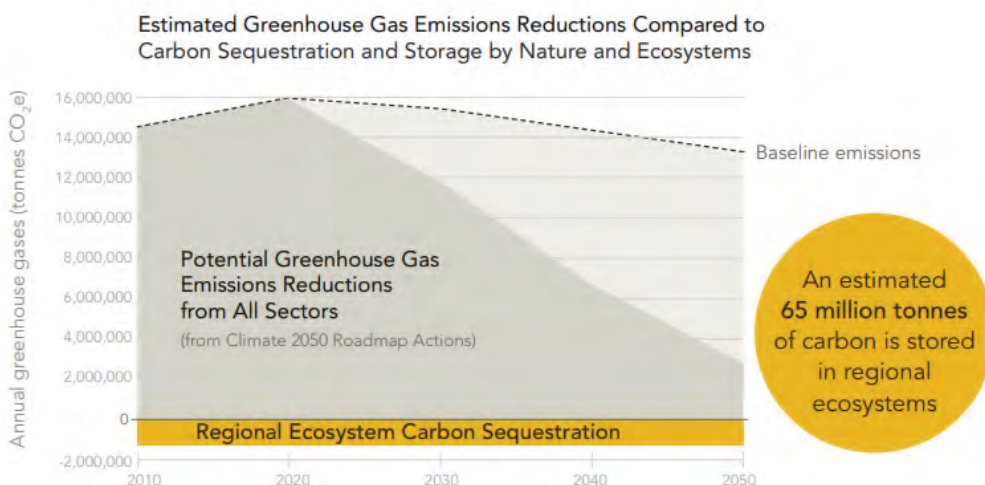


Figure 1: Estimated Greenhouse Gas Emissions Reductions Compared to Carbon Sequestration and Storage by Nature and Ecosystems

## Millions of tonnes of carbon are stored in vegetation and soil in the Metro Vancouver region



Figure 2: Key Natural Carbon Stores in the Region and their Impacts on Regional Climate Resilience

## Storing Carbon and Building Resilience Through Nature and Ecosystems

The following section outlines several key concepts that underpin the strategies and actions in this Roadmap. These key concepts are foundational for understanding how nature and ecosystems can become incorporated into the region's climate action strategy.

For nature and ecosystems to be effective as part of climate action planning, **biodiversity** must be considered and prioritized throughout all actions to ensure ecosystem health, and to avoid unintended consequences (e.g. planting of vegetation that maximizes carbon storage, but negatively affects wildlife and habitat for species). Ecosystems that are biodiverse are able to provide more **ecosystem services**, or co-benefits. Many ecosystem services are climate change related; for instance, trees and forests can store carbon but also provide shading, cooling, and other benefits associated with climate change adaptation. **Green infrastructure** refers to the types of natural, enhanced and engineered assets that provide ecosystem services. Linking different types of green infrastructure together into a functional network is best practice to maximize ecosystem services. **Nature-based solutions** are a type of green infrastructure that helps address both biodiversity loss and climate change simultaneously. Nature-based solutions are increasingly being integrated into climate action plans to supplement other technological and engineered solutions, such as those identified in other *Climate 2050* Roadmaps.

### Biodiversity

The Metro Vancouver region's rich and diverse natural environment is vital to the people and wildlife who live here. The region's natural areas have tremendous cultural and spiritual importance, contribute to the region's livability, provide a sense of place, and foster biodiversity, which can be broadly defined as the variety of life. The region is home to the Fraser River Estuary, an important and productive marine ecosystem that forms the mouth of one of the largest salmon-bearing rivers in the world, and supports one of the highest concentrations of migratory birds in Canada. The Fraser River Estuary is one of four Important Bird Areas (IBA) being assessed as Key Biodiversity Areas – internationally recognized sites defined by a global standard – within Metro Vancouver. Large, contiguous ecosystems such as these have benefits for biodiversity, but the smaller, “stepping stone” habitats are important as well. For example, while the north shore mountains contain some of the highest quality habitat in the region, habitats at lower elevations are used by birds migrating back to the region in early spring while habitats in the north shore forests are still frozen. Collectively, the region's ecosystems - from the forests, wetlands, and watercourses to the urban trees and parks - form a mosaic of habitats that support biodiversity.

*“Biodiversity enables Nature to be productive, resilient and adaptable. Just as diversity within a portfolio of financial assets reduces risk and uncertainty, so diversity within a portfolio of natural assets increases Nature's resilience to shocks, reducing the risks to Nature's services.”*

[The Economics of Biodiversity: The Dasgupta Review](#)

Climate change and biodiversity loss are two interlinked challenges occurring simultaneously, both globally and locally. Metro Vancouver's ecosystems are affected by a changing climate (see Table 1), and the lower mainland of southwestern British Columbia where they are situated has been identified as an ecoregion at significant risk to biodiversity loss. As climate change places stress on ecosystems, they become less resilient and less capable of storing carbon. In order for nature and ecosystems to provide benefits and ecosystem services, they must be resilient to the impacts of human activities, including climate change. Resilient ecosystems are both healthy and biodiverse. For example, a healthy forest that supports a wide variety of tree species will store more carbon and recover faster from disturbances, such as fire or pests, because not all species will be impacted to the same degree

and some will rebound more easily. Protecting and enhancing biodiversity in nature and ecosystems maximizes their ability to provide climate change benefits.

### Species Case Study: Pacific Salmon

In the Pacific Northwest, salmon are a keystone species, supporting people, ecosystems and wildlife. Salmon have cultural, spiritual and food source significance in our region, particularly to First Nation communities. The Fraser River is one of North America's greatest salmon-producing rivers. The river and its main tributaries within Metro Vancouver – Kanaka Creek, Pitt River (Alouette River, Widgeon Creek), Coquitlam River and Brunette River – weave through the region, providing important habitats for salmon and other species.

Eagles, bears, and orcas all rely on salmon as a food source. As migrating salmon return to rivers and are eaten by other species, essential nutrients from their carcasses are transferred to forests and other ecosystems.

Salmon, and the habitats they thrive in, are at risk from climate change impacts. In the Metro Vancouver region, we are projected to experience warmer and wetter winters, hotter and drier summers, reduced snowpack, and more precipitation falling as rain and less as snow. These impacts may decrease the amount of water available in streams during dry periods, raising stream temperatures. Salmon are sensitive to warming temperatures – they may not enter streams until the water has cooled to a specific temperature, and warmer temperatures can affect both survival and reproductive success. The Fraser River summer water temperature has warmed by, on average, 1.5°C since the 1950s, and this trend is projected to continue. We can take action to help salmon adapt to climate change impacts. Restoring riparian corridors with native vegetation can cool stream temperatures. Integrating fish passage into the design of flood control infrastructure will ensure salmon can continue to reach their spawning grounds.

We can also identify and protect critical salmon spawning habitat – often this habitat provides other ecosystem services. For example, eelgrass serves as nursery habitat for salmon, but also reduces wave impacts from coastal storms, and stores carbon.





## Ecosystem Services

The importance of nature and ecosystems in the Metro Vancouver region is intrinsic, invaluable and unmeasurable, and these environments have significant cultural and spiritual importance for all communities. The concept of ‘ecosystem services’ (see Figure 3) has emerged as a tool to allow us to more fully understand the breadth of benefits that nature provides, including cultural ones. Many of these benefits also relate to climate change – for instance, nature and ecosystems store carbon, cool city streets, clean stormwater, and moderate floods. The concept of ecosystem services can help underscore the fact that we live in reciprocity with nature; while ecosystems provide benefits to humans, we also co-exist in concert with the natural world.

Ecosystem services are not typically accounted for in decision-making, and this lack of understanding results in a devaluation of nature, contributing to its ongoing loss and degradation. As technology and methods that allow for measurement of ecosystem services improve, it will become easier to incorporate ecosystem services into broader decision-making, resulting in better outcomes for both people and nature.

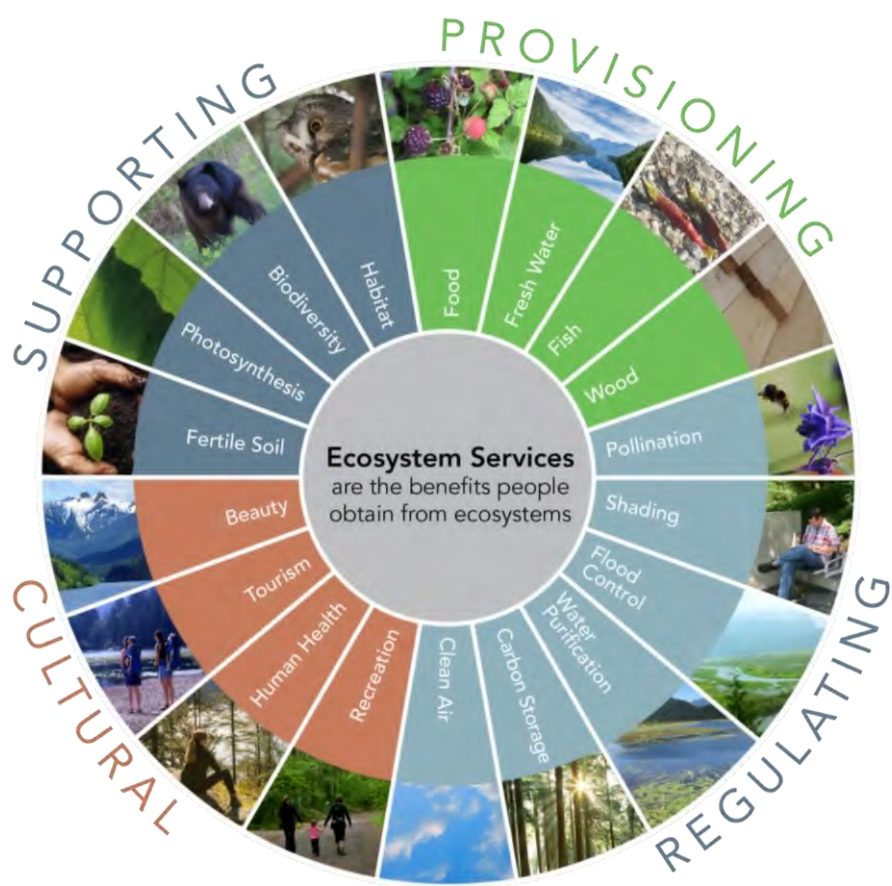


Figure 3: Ecosystem Services Provided by Healthy Ecosystems

## Green Infrastructure

The term Green Infrastructure refers to the natural, enhanced and engineered systems (shown in Figure 4) that collectively store carbon, help communities adapt to climate change, and provide society with a range of other ecosystem services. This Roadmap considers green infrastructure across all landscapes and land use types, from urban street trees and green roofs to natural ecosystems such as wetlands, forests, and watercourses.



Figure 4: Types of Green Infrastructure

Stormwater management is a key driver for the implementation of enhanced and engineered green infrastructure solutions, and demand for this ecosystem service is likely to increase due to climate change. However, a major benefit of green infrastructure is that it provides a wide range of ecosystem services beyond stormwater management, including support for biodiversity and human health and well-being. In order to maximize benefits, green infrastructure needs to be planned and implemented with multiple ecosystem services in mind.

Metro Vancouver member jurisdictions have considerable experience planning and implementing green infrastructure projects; however, there is a need to move beyond individual projects and pilots to broad implementation across the region, with consideration given to ‘networking’ the individual elements of green infrastructure into a functioning system.

### ***Green Infrastructure – a Cross-Cutting Climate Action***

Green infrastructure will need to be integrated across different land uses and involve a range of sectors. This Roadmap focuses on the importance of creating a network of green infrastructure and planning for co-benefits, including support for biodiversity. Connections between other *Climate 2050* issue areas and green infrastructure are outlined below:

**Land Use and Growth Management** – the land use planning framework supports green infrastructure planning and implementation through the protection of lands important for conservation, recreation, and agriculture, as well as the integration of green infrastructure into the design of new or redeveloped urban areas, reducing the loss of trees and greenspace, and creating better places for people and nature.

**Agriculture** – agricultural land, including remnant natural vegetation such as wetlands and riparian areas, and other permanent vegetation (e.g. hedgerows), provide opportunities for wildlife, pollinator and bird habitat and connectivity across the landscape. Supporting long-term farm health and resiliency through the expansion of regenerative agriculture practices (e.g. cover cropping) also enhances biodiversity and ecosystems services.

**Transportation** – opportunities exist to reduce climate change impacts on the transportation network by integrating green infrastructure into transportation networks (e.g. through planting trees and other vegetation along road and railway verges and recreational greenways). Siting of infrastructure to avoid fragmentation of green infrastructure networks also supports a regional green infrastructure network.

**Water and Wastewater Infrastructure** – green infrastructure in urban areas tends to be heavily focused on stormwater management benefits. Green infrastructure can supplement grey infrastructure by filtering stormwater and reducing the amount of stormwater overflow during smaller rain events. Considering other benefits from green infrastructure (such as support for biodiversity and human health) increases the range of potential benefits achieved in urban areas.

**Buildings** – buildings dominate the urban landscape, so there is significant potential to leverage the climate-related benefits of green infrastructure (e.g. providing shade and capturing rainwater) by incorporating green infrastructure elements onto and around built structures.

**Energy** - trees can reduce the amount of energy needed to cool buildings and people by providing shade and reducing air temperatures.

**Human health** - green infrastructure provides a range of health benefits to people through connection to nature, as well as by providing services that support adaptation, including providing shade and capturing flood waters.

## Nature-Based Solutions

Green infrastructure, if designed and implemented with biodiversity outcomes as a priority (e.g. a green roof that creates habitat for pollinators), is an example of a nature-based solution to climate change.

Locally and internationally, there has been a growing understanding and recognition of the climate change and biodiversity co-benefits that ecosystems provide, and this has led to the emergence of nature-based solutions as a focus for climate action. Nature-based solutions are holistic actions that protect, sustainably manage, and restore ecosystems, while simultaneously addressing societal challenges such as climate change. These solutions provide benefits for humans and wildlife alike, and ideally, these solutions recognize that humans and nature are interconnected and mutually dependent. For example, seagrass meadows store carbon, reduce impacts of coastal storms on shorelines, and provide essential habitat for fish and other species.

While climate change actions have historically been focused on technological and engineered solutions – which continue to be important – nature-based solutions can supplement these actions and become an integral part of climate action planning. Nature-based solutions are relatively new in terms of research, policy, and practice; however, awareness, protocols and standards for these types of interventions continue to be developed and improved.

## Nature-based Solutions for Addressing Climate Change



Figure 5: Nature-based Solutions for Addressing Climate Change



## Barriers and Opportunities

The Metro Vancouver region is growing by approximately 35,000 people per year, and the impacts from human activities, including urban development, logging, and climate change have resulted in ecosystem change and loss. Nature and ecosystems offer important benefits, but if they are lost, it will require substantial time and available space for them to regenerate into mature, functioning systems. Additional barriers, and opportunities to overcome them, are included in Table 2 below:

*Table 2: Barriers and opportunities associated with storing carbon and building resilience with nature and ecosystems*

<b>Barrier</b>	<b>Opportunity</b>
The region is facing a dual challenge of climate change and biodiversity loss, the impacts of which are interrelated.	Taking action on both biodiversity loss and climate change together is the key to success. There is an opportunity to implement nature-based solutions that help to address both challenges. Healthy, resilient, and biodiverse ecosystems are needed to support biodiversity and climate action.
Species and ecosystems are experiencing increasingly challenging environments that will continue to change in the future.	It is important to consider future climate conditions in planning processes; for instance, considering how future climate conditions might impact the urban forest, invasive species, natural resource management, and restoration work.
This region has a constrained land base, high costs and competition for land, and a steadily increasing population – all of which present challenges when trying to conserve space for nature and ecosystems. To achieve substantial gains in carbon storage, for instance, would require significant space for tree planting and ecosystem restoration.	Space for nature must be considered and integrated throughout different land uses. This prioritization requires innovation and collaboration; for instance, collaboration between multiple departments to maximize both housing density and tree canopy in urban areas. Multi-functional ecosystems across land uses support more habitats, which improves overall biodiversity.
Informed decision-making requires regionally-specific data (e.g. vulnerability of ecosystems to climate change, susceptibility to new invasive species), and this data is not always available or current.	Some regional datasets have been developed to inform decision-making. These datasets were generated, and will be updated, using a consistent methodology across the region, and trend reporting can occur at regular intervals. As technology improves and costs decrease, some data will become increasingly more accessible. Partnerships with agencies and organizations that produce relevant data can also help overcome this barrier.
There is a lack of knowledge and training on newer approaches, such as the implementation of green infrastructure and nature-based solutions. Uncertainty and lack of knowledge leads to perceived risks around the performance, cost and maintenance of using new and innovative solutions. In addition, the results from case studies and pilot studies in other locations are not always transferable to this region.	There is an opportunity to develop knowledge in a range of sectors through professional training. Providing a regional forum to share technical knowledge, as well as the development of standards and guidelines, can help to dispel some of the uncertainties and instill confidence in new practices. Embedding new approaches as shared objectives across organizations avoids the risk of siloed initiatives within one department or discipline.
The inherent value of nature and the benefits it provides society are not fully recognized, leading to a lack of priority given to protection and restoration efforts.	Integrating natural assets and the ecosystem services they provide into decision-making will improve overall understanding and support efforts to prioritize protection and restoration.

<p>The coastal and marine environment in the Metro Vancouver region is uniquely impacted by climate change. Ecosystems in these environments are affected by coastal squeeze, warmer temperatures, changing hydrology, and ocean acidification. These environments are governed by multiple agencies with differing levels of legislative authority, making it difficult to collaborate on solutions to these challenges.</p>	<p>There is an opportunity to monitor and share information related to the coastal marine environment among regional partners, and to connect with governments, agencies and organizations that have more direct influence in coastal and marine environments, including member jurisdictions, and the federal and BC governments.</p>
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## Equity Considerations

The impacts of climate change will affect everyone, but they pose a greater threat to people who are already vulnerable due to overlapping factors such as income and health. For example, vulnerable populations with lower incomes have fewer resources and less adaptive capacity to respond to climate change impacts; these challenges can be magnified by poor health. Typically, those who are the most at-risk to climate change impacts have contributed the least to greenhouse gas emissions. Given the interlinkage between vulnerable populations and climate change impacts, incorporating equity considerations into climate change policy is imperative.

As climate action is planned and implemented, it will be important to consider how different groups are affected by climate impacts, and who may be at a greater risk. Including these considerations throughout the process may mean targeting or timing action to assist those who are most vulnerable. A relevant example would be identifying vulnerable communities living in areas with low levels of tree canopy, parks and other green space.

Green infrastructure enhancements can have unintended social consequences; for instance, researchers are investigating whether ‘green gentrification’ is contributing to the displacement of marginalized communities. If green infrastructure is to provide benefits to those most in need, it is essential to consider the potential for these kinds of unintended consequences and involve the community early in the planning process.

## The Journey - Storing Carbon and Building Resilience through Nature and Ecosystems

### Climate 2050 Roadmap Connections

*There are many links between nature and ecosystems and other issue areas. Metro Vancouver is exploring which linkages must be considered when developing climate policies and actions.*

**Land-use and growth management** – policies that support more compact, complete communities, and protect ecologically important areas from development lead to increased resilience and carbon storage.

**Infrastructure** – green infrastructure such as green roofs and rain gardens improve building energy efficiency, and absorb rainfall and stormwater, which reduces the loading on built infrastructure during smaller rain events and restores urban biodiversity. Separation of combined sewers into separate sanitary and storm systems allows for partial restoration of original drainage courses (e.g. daylighting streams).

**Energy** – nature and ecosystems cool urban areas, reducing the need for air conditioning and decreasing overall energy use.

**Human health and well-being** – nature-based climate change solutions (such as planting trees in urban areas) improve mental and physical health.

**Agriculture** – agricultural lands can be managed to protect natural areas, and enhance ecosystem services that build resilience to climate impacts and store carbon.

**Buildings** – nature and ecosystems can help reduce greenhouse gas emissions from buildings and increase resilience by protecting from flooding and heat.

**Waste** – biosolids and compost are soil amendments that improve soil health, improve water retention, promote vegetation growth, and restore disturbed ecosystems.

## Climate Goals and Targets for Nature and Ecosystems

Metro Vancouver's *Climate 2050 Strategic Framework* has set the following regional vision to guide the region's response to climate change:

- Metro Vancouver is a carbon neutral region by 2050
- Infrastructure, ecosystems, and communities are resilient to the impacts of climate change

Metro Vancouver has also set an interim target of 45% reduction in greenhouse gas emissions from 2010 levels, by 2030.

### ***What is a Carbon Neutral Region?***

A carbon neutral region means that we have achieved the deepest greenhouse gas emission reductions possible across all economic sectors, and any emissions left are balanced out by the carbon dioxide removed from the atmosphere by the plants, trees, and soil in the region, as well as by potential carbon capture technologies that are under development.

Achieving this vision means setting goals in each of the *Climate 2050* Roadmaps, in order to ensure that each sector in the region plays as strong a role as possible in getting to a carbon neutral, resilient region.

Metro Vancouver has set the following goals for nature and ecosystems in this region:

<p><b>GOAL:</b> Nature and ecosystems are resilient, protected, maintained, enhanced, restored and connected, to maximize ecosystem services across the region.</p>	<p><u>Targets</u></p> <p>By 2050:</p> <ul style="list-style-type: none"> <li>• Protect 50% of the region for nature</li> <li>• Achieve 40% tree canopy cover within the Urban Containment Boundary</li> </ul>
<p><b>GOAL:</b> Nature-based solutions that support biodiversity are included in the region's response to climate change.</p>	<p><b>MEASURABLE OUTCOMES:</b></p> <p>Measurable outcomes for nature-based solutions are still to be determined based on additional review and discussion.</p>

Many of the actions identified in this Roadmap will need to be participated in or led by other governments (e.g., national, provincial, local, and First Nations) as well as other regional partners. Metro Vancouver has a long history of working with other governments towards common goals. Fortunately, many of the organizations needed to make this transition are already actively working toward similar goals, including: the Provincial Government and its CleanBC Plan, CleanBC Roadmap to 2030, and draft Climate Preparedness and Adaptation Strategy; the Federal Government's recently strengthened climate plan called A Healthy Environment and a Healthy Economy; and First Nations climate-related goals and initiatives. Metro Vancouver's member jurisdiction's own community and corporate climate plans; utilities; and, increasingly, industry associations.

## Best Practices to Guide Success

The next section outlines 5 strategies and 30 actions; these measures set a pathway forward for nature and ecosystems to support the vision of a carbon neutral and resilient region by 2050. The following principles should be considered as best practices when implementing the actions throughout this Roadmap:

1. Prioritize biodiversity, equity, and conservation objectives when implementing nature-based climate solutions.
2. Prioritize planting native species in natural areas. Prioritize planting native species in urban areas where possible, but use non-native species to augment in challenging sites where native species will not thrive.
3. Choose solutions that support multiple ecosystem services, rather than focusing on only one ecosystem service.
4. Prioritize protection of mature trees and ecosystems.
5. Integrate environmental objectives so they are shared priorities across whole organizations and everyone is working to achieve them.
6. Offsetting the loss of ecosystems (e.g. through habitat compensation) should be done on a net-gain basis, but only considered after options for avoiding and reducing impacts have been explored.
7. Ensure long term maintenance and ecosystem health is considered and prioritized after planting.

### Strategy 1: Protect, Restore, and Enhance the Region's Ecosystems

To become a carbon neutral and resilient region by 2050, we need to make substantial commitments to protect, restore, and enhance nature and ecosystems, and at a larger scale than ever before. Currently, about 40% of the region's land base is protected by government and other organizations in the form of parks and other publically-owned lands, for the purposes of conservation or recreation. Large, healthy, connected, and biodiverse ecosystems are more resilient to climate change impacts and therefore better able to store carbon and support climate change adaptation. Scientific reviews of how much of the Earth should be protected vary, but 50% - also known as 'Nature Needs Half' - is considered a mid-point of estimates and is supported by a range of scientific studies (see callout box - Why Protect 50% of the region?). Increasing the amount of parkland in the region also provides additional space for the region's growing population to access nature and recreate, contributing to community and individual health and well-being. Given that this region faces significant land use constraints, meeting this target will involve making trade-offs between competing priorities, reducing the amount of land available for urban development and other uses.

#### *Why Protect 50% of the region?*

There have been growing efforts globally to set ambitious area-based targets for protection. For example, the High Ambition Coalition for Nature and People, an intergovernmental group of 70 countries including Canada, committed to protecting 30% of land and seas by 2030 (known as 30 x 30). This is intended as an interim goal, with another 20% needed as 'climate stabilization areas' to keep climate change below 1.5 degrees.

Studies estimating the percentage of the Earth that should be protected provide values from 30% to 70%, or even higher. **The call for 50% - known as Nature Needs Half - is a mid-point of these values and is supported by a range of scientific studies.**

#### *Ecosystem Loss in the Metro Vancouver Region*

Metro Vancouver maintains the Sensitive Ecosystem Inventory (SEI) of the region's most important ecological areas and monitors it for change. Between 2009 and 2014, 1,600 hectares of sensitive ecosystem loss was documented, including 1,000 hectares of forest, 120 hectares of wetland, and 100 hectares of riparian areas. Primary drivers of ecosystem loss were urban development (as planned within local official community plans) and logging (as permitted by the BC government).

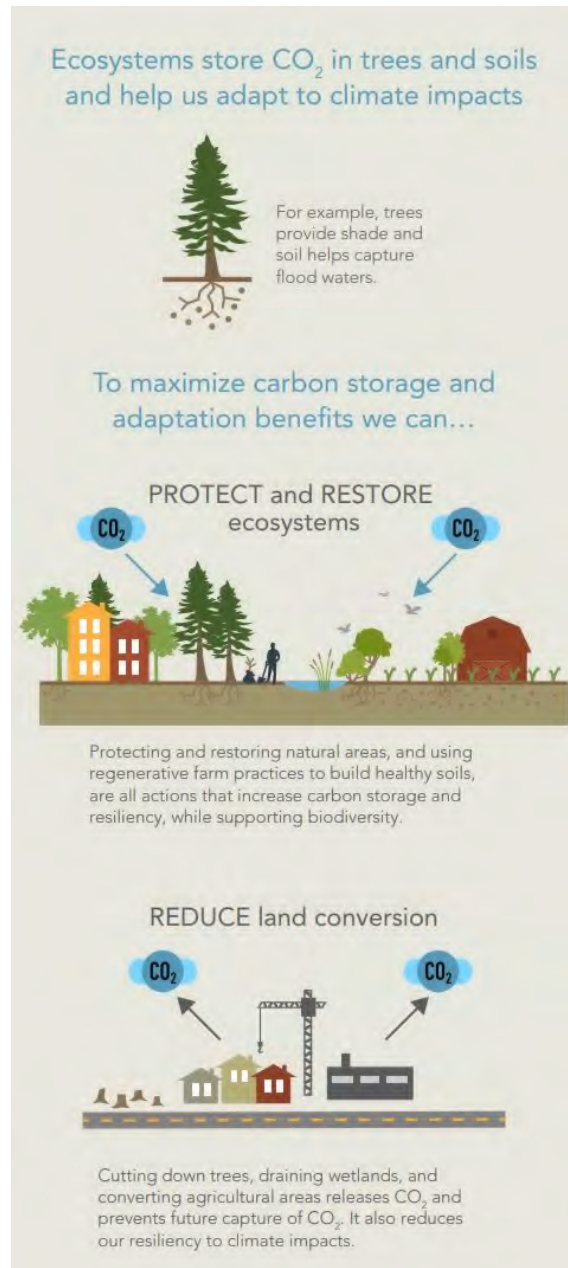


Figure 6: The Climate Change Benefits of Protecting and Restoring Ecosystems

Prioritizing the protection of the region's remaining mature ecosystems will focus effort on the highest functioning, most biodiverse areas. Once mature ecosystems are degraded or lost, it will take many years (and potentially extensive effort and resources) to return them to a similar well-functioning state.

Indigenous Peoples have lived on these lands since time immemorial, and continue to steward the land and species as part of a reciprocal relationship with nature. The protection of lands in this region needs to take place with the full participation and leadership of Indigenous Peoples, while respecting their land and resource rights.

Restoration provides us an opportunity to gain back ecosystems and the services they provide. Examples of how restoration efforts could support climate action include:

- increasing ecosystem connectivity between major protected areas to allow species to move in response to climate change;
- improving the health of ecosystems to keep large carbon stores locked away;
- replacing hard shoreline infrastructure with gently sloped vegetated shorelines to reduce the impacts of sea level rise and wave action; and
- restoring or enhancing wetlands to protect against flooding and daylighting streams to improve hydrological function.

Restoration planning will need to take into account the impacts of climate change in selecting plant species and choosing native species that can cope with the new and changing conditions.

By protecting and restoring a range of ecosystem types in different situations across the landscape (e.g. both high and low elevation forests), we provide for a diversity of ecosystems, species, and conditions. Diverse ecosystems are more resilient and have a greater capacity to recover from disturbances.

Strategy 1	Potential Impacts of Strategy	Key Partners
	<ul style="list-style-type: none"> <li>• Sets a collective regional vision for ecosystem protection</li> <li>• Expands the amount of land protected for nature</li> <li>• Increases collaboration and knowledge-sharing on ecosystem protection, restoration, and enhancement in the region</li> </ul>	<ul style="list-style-type: none"> <li>• Member jurisdictions</li> <li>• First Nations</li> <li>• BC government</li> <li>• Federal government</li> <li>• NGOs</li> </ul>

### ***BIG MOVE 1.1 Protect an Additional 10% of the Region for Nature.***

All member jurisdictions, through implementation of the regional growth strategy, will identify local ecosystem protection targets and demonstrate how these targets will contribute to the regional target of protecting 50% of the region for nature. In addition to directly contributing to protection efforts (action 1.2), Metro Vancouver will support this process by providing data, information resources, and a forum for discussion.

### ***1.2 Protect, Restore, and Enhance Natural Areas at the Regional Scale.***

Continue to implement the *Regional Parks Land Acquisition 2050* strategy to increase the amount of important natural areas protected in the Regional Parks system. In regional parks and the drinking water supply areas, continue to restore and enhance degraded sites, enhance biodiversity, and promote ecosystem resilience. Advocate to the federal and BC governments, and other partners to protect, or fund the protection of, additional natural areas in the region, taking into consideration the importance of connecting existing protected areas.

### ***1.3 Protect, Restore, and Enhance Nature at the Local Scale.***

All member jurisdictions, through implementation of the regional growth strategy, support the protection, enhancement and restoration of ecosystems through measures such as land acquisition, density bonusing, development permit requirements, subdivision design, conservation covenants, land trusts, and tax exemptions.

### ***1.4 Incorporate Climate Change Planning into Protected Area Management.***

Develop a Regional Parks Climate Action Strategy. Continue work to improve understanding of climate impacts on the ecosystems and infrastructure in regional parks and the drinking water supply areas. Work with knowledge holders including First Nations, and other agencies with a role in protected area management, to improve understanding of climate impacts on the region's protected areas and develop best practice approaches to managing these areas in the context of a changing climate.

### ***1.5 Prioritize the Conservation of Ecosystem Health and Biodiversity in BC Forest Management.***

Advocate to the BC Government to make ecosystem health and biodiversity conservation the overarching priority of forest management and implement the recommendations of the strategic review of old forest management<sup>2</sup>.

### ***1.6 Support Ecosystem Protection, Restoration, and Enhancement.***

Provide data, guidance materials and best practices to inform the protection, restoration, and enhancement of ecosystems in the region. Convene a forum to provide opportunities for cross-regional collaboration.

### ***1.7: Reverse the Loss of the Region's Ecosystems.***

Advocate to the federal government, the BC government, member jurisdictions and other agencies to commit to ecosystem restoration and enhancement at a significant scale. Collaborate with others and identify opportunities to make significant gains through restoration and look for partnerships and funding opportunities to magnify efforts.

<sup>2</sup> [A New Future For Old Forests: A Strategic Review of How British Columbia Manages for Old Forests Within its Ancient Ecosystems](#)

### ***1.8 Manage Invasive Species.***

Support regional invasive species management by developing and promoting best practices, and work with researchers to improve our understanding of the potential spread of invasive species as our climate continues to change. Employ best practices to prevent the introduction and spread of invasive species on lands managed by Metro Vancouver.

#### ***Old Growth Forests***

Old growth forests of coastal BC are those with dominant trees older than 250 years, although they will have a diversity of aged trees present as the oldest trees die, creating space for younger trees to grow. The diversity of tree sizes and ages creates a wide variety of habitats, which supports many different species. As well as having high biodiversity values, old growth forests store large amounts of carbon, approximately 1,000 tonnes of carbon per hectare. Mature and young forests are also critical for carbon sequestration (ongoing uptake of carbon as trees continue to grow) and they provide ecosystem connectivity so wildlife species can move across the landscape. Protecting mature and young forests, in addition to old growth, will increase the total amount of old growth in this region over the long term.

#### **Old Growth Forests in Metro Vancouver**

Metro Vancouver secures land for regional parks to protect the region's natural areas and to connect people with nature. Metro Vancouver is also responsible for developing long range plans for managing our region's drinking water sources, including 60,000 hectares of restricted access, protected water supply lands. These lands include the most intact old-growth forest ecosystems in south-western BC. Metro Vancouver tracks old growth and other rare, fragile, or at-risk ecosystems using the [Sensitive Ecosystem Inventory](#). Within the region, including the full extent of Metro Vancouver's drinking water supply areas that extend north of the MVRD boundary, there are 49,853 ha of old growth. Of this amount, 34,805 (70%) is on Metro Vancouver owned or managed lands: 33,011 ha (66%) within watersheds and 1,794 ha (4%) in Regional Parks.



### ***Metro Vancouver Corporate Leadership in Ecosystem Protection and Restoration***

The regional parks system currently includes over 13,800 hectares of land which protect natural areas and provide opportunities for people to connect with nature. Metro Vancouver is also responsible for protecting the region's drinking water supply areas from development, pollution, and human-caused disturbances. By protecting these watersheds for drinking water we are also protecting about 60,000 hectares of mostly forested land.

**Ecological Health Framework** – Adopted by the Board in 2018, this framework 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. Specifically, the *Ecological Health Framework*:

- Identifies Metro Vancouver's role in protecting and enhancing ecological health as it relates to its services and functions;
- Provides a foundation for integrating ecological health into Metro Vancouver's corporate decision making;
- Identifies how Metro Vancouver will report on ecological health-related initiatives across the organization; and
- Supports regional efforts to protect and enhance ecological health.

**Regional Parks Land Acquisition 2050 Strategy** – *Regional Parks Land Acquisition 2050* took a systematic, evidence-based approach to identifying land suitable for protection as a regional park. The result identifies the most regionally important unprotected natural areas that could be acquired for future new and expanded parks. It envisions growing the regional parks system into a connected network of resilient regional parks and greenways that protect regionally important natural areas and connects people to them.

**Invasive Species Resources** – Metro Vancouver provides a suite of resources to support invasive species management, including an online course, locally-tested best management guidance for practitioners, and fact sheets for residents.

**Ecosystem Restoration in Regional Parks** - Guided by the [Natural Resource Management Framework](#), Regional Parks has an ongoing program to restore degraded sites, enhance biodiversity, and promote ecosystem resilience in the Regional Parks System. Every year through this program, thousands of trees and other native vegetation are planted, thousands of kilograms of invasive plants are removed, ecosystem health is monitored, and habitat improvements are made to support native biodiversity.

**Ecohydrological Restoration of Burns Bog** - Metro Vancouver works with other stakeholders to restore the bog and prevent the drying out of peat, which releases greenhouse gases.

## Strategy 2: Connect Green Infrastructure

Green infrastructure includes both natural and urban elements (see Figures 4 and 7). From street trees, hedgerows and green roofs to forests, wetlands, and rivers, they provide a range of climate change, biodiversity, and health benefits. These benefits are magnified when individual green infrastructure elements are connected together into a network across jurisdictional boundaries, increasing resilience to climate impacts and supporting the movement of species across the landscape. A regional green infrastructure network would maximize ecosystem services by linking together natural and urban ecosystems.

Developing a regional green infrastructure network would necessitate creating a collaborative and cross-jurisdictional process, building on existing local networks, and identifying opportunities to maximize associated climate change adaptation, ecosystem connectivity, and human health benefits.

Strategy 2	Potential Impacts of Strategy	Key Partners
	<ul style="list-style-type: none"> <li>Creates a process to work together to connect a cross-regional network</li> <li>Integrates ecosystem connectivity into green infrastructure planning and implementation</li> </ul>	<ul style="list-style-type: none"> <li>Member jurisdictions</li> <li>First Nations</li> <li>BC government</li> <li>Federal government</li> <li>NGOs</li> <li>Academic institutions</li> <li>Agricultural land owners</li> </ul>

### ***BIG MOVE 2.1 Develop a Regional Green Infrastructure Network.***

Through implementation of the regional growth strategy, collaborate with member jurisdictions, First Nations, and other agencies to identify a Regional Green Infrastructure Network that connects ecosystems and builds on existing local ecological networks, while maximizing resilience, biodiversity, and human health benefits. Collaboratively prepare Implementation Guidelines to support a Regional Green Infrastructure Network.

### ***2.2 Green Urban Areas.***

Support the greening of urban areas by developing best practices and guidelines to incorporate green infrastructure into new developments and redeveloped areas. Work collaboratively with member jurisdictions and other partners to identify barriers and opportunities to integrating green infrastructure in urban areas.

### ***2.3 Green the Regional Greenways Network.***

Increase natural vegetation alongside the Regional Greenways Network through restoration, including tree planting and widening vegetated trail buffers to enhance ecosystem connectivity and provide shading and other benefits to trail users. Advocate to other agencies who own or manage parts of the Regional Greenways Network to do the same.

### ***2.4 Minimize Ecosystem Fragmentation.***

Avoid ecosystem loss and fragmentation when developing and operating infrastructure within the regional growth strategy Conservation and Recreation regional land use designation, but where unavoidable, mitigate the impacts, and advocate to other agencies to do the same. All member jurisdictions, through the implementation of the regional growth strategy, will discourage or minimize the fragmentation of ecosystems through low impact development practices that enable ecosystem connectivity.

## 2.5 Develop Data and Resources to Support Ecosystem Connectivity.

Continue to work with others to develop and share data and resources related to ecosystem connectivity, including resources that identify the impacts of climate change on connectivity.



### Components of a Regional Green Infrastructure Network



**Habitat hubs** are larger, intact core habitat areas and are a critical feature of any green infrastructure network. They provide areas of refuge for a diverse range of species, including those less tolerant of human disturbance. Smaller sites also provide habitat and can act as 'stepping stones' between hubs.



**Recreational greenways and blueways** provide opportunities for people to recreate on land and water, but these areas are also used by wildlife to move through the region. Wildlife can be supported by enhancing natural vegetation alongside green and blueways, as well as increasing the width of vegetated buffers.



**Corridors** are linear areas of habitat that support movement of birds, fish and mammals between hubs and other areas of habitat. They can span short or long distances. As land is developed, these remaining pathways become even more critical. Also known as wildlife, habitat, or green corridors, these areas also include riparian corridors that follow the path of a stream or river.



**Natural coastlines** provide important habitat for several species, while supporting connections between marine and terrestrial habitats and along the foreshore.



**Urban green infrastructure** includes a wide variety of features that support nature in the city and provide habitat for wildlife that is tolerant of human disturbance. Features include yards and gardens, green roofs and walls, and street trees.



**Hedgerows** and areas of natural vegetation within agricultural areas provide habitat and support connectivity.

Figure 7: Components of a Green Infrastructure Network

### Strategy 3: Integrate Natural Assets into Conventional Asset Management and Decision-Making Processes

While ecosystems should not be considered solely as “assets” from which humans derive value, the concept of “natural assets” has emerged as a mechanism to highlight that ecosystems (e.g. a wetland) can be formally acknowledged as a fundamental asset that benefits the community - in the same way that engineered assets (e.g. a wastewater treatment plant) are recognized.

Natural assets provide an extensive range of ecosystem services which are not officially recognized in traditional asset management, financial planning, or decision-making processes. Integrating natural assets into asset management processes supports improved understanding of the services they provide, and this information supports efforts to maintain and manage natural assets for their long term health and resiliency. Ensuring these natural assets are protected and monitored over the long term is crucial in the context of a changing climate, since many of the services ecosystems provide help communities respond to climate change.

While the concept of natural asset management is gaining considerable traction at the local level, Metro Vancouver can also play a key role in managing regional assets, supporting regional partners, convening key groups, providing a discussion forum, and developing and sharing data. Collectively, the region can elevate natural asset management from an optional process to an integral one. While there is no way to place a true economic valuation on nature itself (nor should nature be valued this way), a more robust understanding of the location of natural assets and the level of services they provide helps to demonstrate their critical importance to our communities, and an additional tool to help protect, restore, and enhance them.

Strategy 3	Potential Impacts of Strategy	Key Partners
	<ul style="list-style-type: none"> <li>Elevates natural asset management as standard practice rather than the exception</li> <li>Provides an additional mechanism to help protect nature and ecosystems long-term</li> <li>Enables consistent funding opportunities</li> </ul>	<ul style="list-style-type: none"> <li>Member jurisdictions</li> <li>First Nations</li> <li>NGOs</li> <li>BC government</li> <li>Public Sector Accounting Board</li> <li>Agricultural land owners</li> </ul>

#### 3.1 BIG MOVE: Incorporate Natural Assets into Asset Management and Financial Planning.

Through implementation of the regional growth strategy, incorporate natural assets and ecosystem services into Metro Vancouver’s corporate planning, asset management systems and investments, and provide regionally appropriate guidance on methodologies, tools and decision-making frameworks. This Big Move will require multiple departments at Metro Vancouver to shift their standard practice, and collaborate across silos.

#### BIG MOVE 3.2: Integrate Ecosystems and their Services into the Design of Major Infrastructure.

Demonstrate leadership and innovation by integrating nature-based solutions into the siting and design of major infrastructure where appropriate (or “where it makes sense”), and consider nature-based complements to hard (or “grey”) infrastructure. Also require full carbon cost accounting and ecosystem service valuation during construction and operation of Metro Vancouver’s water and wastewater infrastructure.

#### 3.3 Consider Ecosystems and their Services in Major Development Decisions.

Work with member jurisdictions to understand and consider ecosystems and their services, including carbon storage and flood protection, in major development decisions, such as regional growth strategy amendment decisions. Using appropriate data, consider how potential new developments may inhibit the capacity for nature to provide ecosystem services and explore alternatives.

### 3.4 Support Natural Asset Management at the Local Level.

Develop guidance materials to support natural asset management at the local level, and provide a forum to share and advance best practices. Regional datasets can be used to inform local natural asset inventories including trans-boundary areas. Forums are a vital space to connect and empower local champions of natural asset management, build a regional network, and develop internal natural asset knowledge within organizations.

#### **Municipal Natural Assets Initiative (MNAI)**

The [Municipal Natural Assets Initiative](#) provides scientific, economic and municipal expertise to support and guide local governments in identifying, valuing and accounting for natural assets in their financial planning and asset management programs, and in developing leading-edge, sustainable and climate resilient infrastructure. Local communities in the Metro Vancouver region have taken the lead in working with the MNAI to understand and advance natural asset management.

#### **District of West Vancouver's Natural Asset Inventory**

The District of West Vancouver is one of the first Canadian municipalities to estimate the value of their natural assets in terms of the services they provide annually and into the future – a first step toward integrating natural assets into the District's financial and asset management plans. Metro Vancouver provided its Sensitive Ecosystem Inventory data to support this process.

### 3.5: Explore Opportunities to Overcome Barriers to Natural Asset Management.

Explore the legal landscape and other barriers that may inhibit natural asset management in the Metro Vancouver region. Results from this research may reveal opportunities to further reduce barriers or enable strategic frameworks and norms that support natural asset management in the region and across BC.

### Strategy 4: Support a Resilient, Robust, and Healthy Urban Forest

The urban forest includes all of the trees in the public and privately owned lands of the built environment – including the trees in backyards, streets, and parks. A healthy and resilient urban forest provides essential ecosystem services such as habitat for local wildlife, shading and cooling hotter areas, capturing rainfall and stormwater, and storing carbon (the region's urban forest currently stores approximately 8 million tonnes of carbon<sup>3</sup>). To implement this strategy, Metro Vancouver can establish a regional urban tree canopy cover target, improve tree canopy cover in Metro Vancouver-owned lands such as Regional Parks and Watersheds, and support member jurisdictions, stewardship groups, and other regional partners by developing and sharing relevant data and resources.

Strategy 4	Potential Impacts of Strategy	Key Partners
	<ul style="list-style-type: none"> <li>Increases tree canopy cover to improve ecosystem services, including those that are climate change-related</li> <li>Improves the health and resiliency of the urban forest</li> <li>Provides a forum for knowledge sharing and partnerships</li> </ul>	<ul style="list-style-type: none"> <li>Member jurisdictions</li> <li>Academic institutions</li> <li>Health authorities</li> <li>Urban forestry practitioners</li> <li>First Nations</li> <li>BC government</li> <li>Federal government</li> <li>Professional associations</li> <li>Local residents</li> </ul>

<sup>3</sup> Figure obtained from Metro Vancouver's Carbon Storage Dataset ([metrovancover.org/data](http://metrovancover.org/data)).

#### 4.1 BIG MOVE: Achieve 40% Tree Canopy Cover Within the Region's Urban Areas.

All member jurisdictions, through implementation of the regional growth strategy, will identify local tree canopy cover targets, and demonstrate how these targets will contribute to the regional target of 40% canopy cover within the region's Urban Containment Boundary. Metro Vancouver will contribute to this target by increasing tree canopy on Metro Vancouver-owned lands (where applicable), measuring and reporting on regional tree canopy cover trends, and advocating to the federal and BC governments to provide suitable funding opportunities for tree planting in urban areas. Meeting the 40% target will require collaboration and commitment throughout the region, and a major shift in the way tree protection and planting efforts are prioritized.



Figure 8: Tree Canopy Cover in Metro Vancouver

#### **Tree Canopy Cover and the 40% Target**

Tree canopy cover refers to the leaves and branches that form a visible layer, and the extent to which they cover the ground if one is viewing from the air. Given the ecosystem services that trees provide, we often use canopy cover as a proxy for these services. The region's canopy cover within the [Urban Containment Boundary](#) is currently 32%, and this number is expected to fall to 28% in the next 20-30 years based on projected development patterns. A canopy cover target of 40% is commonly adopted at the local level in cities around the world, and this number represents both an aspirational and achievable goal for the Metro Vancouver region. Local variation in geography, environmental conditions and historical development patterns will need to be considered, given that a 40% target is a regional average that will not be feasible for every individual member jurisdiction to meet at the local level.

#### 4.2: Provide Data and Resources to Support Urban Forest Management.

Continue to develop materials that support member jurisdictions and other partners in achieving a healthy and resilient urban forest. These materials can help support local and regional urban forestry objectives.

#### 4.3: Improve Local Regulations and Management Practices.

All member jurisdictions, through implementation of the regional growth strategy, will enable the retention and expansion of urban forests using various tools, such as local tree canopy cover targets, urban forest management strategies, tree regulations, development permit requirements, land acquisition, street tree planting, and reforestation or restoration policies, with consideration of climate resiliency. Through best practices and new or updated regulations, member jurisdictions have an opportunity to support a healthy urban forest by protecting and retaining existing trees, and supplementing those actions with the planting of new trees.

### ***Metro Vancouver Corporate Leadership in Urban Forestry***

[Urban Forest Climate Adaptation Initiative](#) - Metro Vancouver developed the Urban Forest Adaptation Initiative to assess the risks and predicted changes to the region's urban forest. The initiative provides guidance to help practitioners manage urban forests in a changing climate today and to prepare for the future.

[Regional Tree Canopy Cover and Impervious Surfaces Report](#) - This report contains an analysis of tree canopy cover and impervious surfaces in Metro Vancouver, and is accompanied by two publically-available GIS datasets.

[Metro Vancouver Tree Regulations Toolkit](#) - The Metro Vancouver Tree Regulations Toolkit identifies the available approaches to regulate trees in British Columbia, highlights considerations for selecting appropriate tools based on the local community context, and details the higher-level plans and local-scale regulatory tools that can help to preserve trees and increase tree canopy cover.

#### ***4.4: Convene Partners on Urban Forestry Issues.***

Continue to provide a forum for a diverse range of urban forestry practitioners to discuss and collaborate on issues of regional concern. These forums allow regional partners to learn from each other, share relevant information and updates, overcome barriers, and build a community of practice.

#### ***4.5: Consider Equity and Human Health Considerations.***

Work with health authorities, academic institutions, member jurisdictions, and other partners to further understand the connections between urban trees, human health, and equity, and consider these factors in urban forestry planning. These connections are particularly important to understand in the context of a changing climate.

### ***Encouraging Tree Planting and Green Infrastructure on Residential Properties***

Metro Vancouver's 2019 Regional Tree Canopy Cover and Impervious Surfaces Report identified that approximately 37% of potential planting area within the Urban Containment Boundary – land that could *theoretically* be used to increase tree canopy cover – is located in residential areas. This means that local residents can play a significant role in improving residential tree canopy cover within communities. Local governments can encourage environmental stewardship, partnership, and tree planting and protection on private properties through programs and initiatives, and communicate the benefits of trees.

While trees provide significant levels of ecosystem services, other types of green infrastructure provide benefits close to where people live as well. Metro Vancouver's [Grow Green](#) platform is a helpful guide to creating and maintaining a sustainable garden or lawn space on private property - utilizing non-invasive, waterwise plants that are readily available in Metro Vancouver.



### Strategy 5: Advance Nature-based Solutions to Climate Change

Nature-based solutions are actions that protect, sustainably manage, and restore ecosystems, as well as address societal challenges such as climate change, providing both human well-being and biodiversity benefits. These solutions can be an important part of climate action planning since the co-benefits extend beyond storing carbon and adapting to climate change impacts. Metro Vancouver can help advance nature-based solutions by integrating them into regional projects and plans, encouraging and supporting their uptake at the local level, and exploring new and innovative opportunities for this emerging area of practice.

Strategy 5	Potential Impacts of Strategy	Key Partners
	<ul style="list-style-type: none"> <li>• Supports the research, uptake, and mainstreaming of nature-based solutions in climate action planning</li> <li>• Provides human health and biodiversity co-benefits</li> </ul>	<ul style="list-style-type: none"> <li>• Member jurisdictions</li> <li>• First Nations</li> <li>• Academic institutions</li> <li>• BC government</li> <li>• Federal government</li> <li>• NGOs</li> <li>• Agricultural land owners</li> </ul>

#### 5.1 BIG MOVE: Explore Innovative Funding and Incentive Programs.

Explore the viability of regional-scale, innovative financial and incentive mechanisms (such as nature-based carbon offsets and credits, conservation levies, green bonds, and payment for ecosystem services) to advance and support nature-based solutions. This Big Move could also include advocating that the federal and BC governments enable and incentivize (e.g. through reliable and sustainable funding sources) nature-based solutions at the regional and local scales, including offset programs for multiple ecosystem types and services.

#### 5.2 BIG MOVE: Plan for Climate Change Impacts on Ecosystems.

Work with other partners to conduct a vulnerability assessment of the region's ecosystems and update the Metro Vancouver Sensitive Ecosystem Inventory with climate change vulnerability information. This Big Move would create information that can be used across the region to inform planning efforts. It could also involve understanding how climate change impacts may affect carbon sequestration potential in the region's ecosystems.

#### 5.3: Include Nature-Based Solutions in Climate Action Plans.

Advocate that member jurisdictions include nature-based solutions in climate action plans. Work with the federal and BC governments to identify opportunities to fund and implement nature-based solutions for climate change adaptation and carbon storage at the local level. Metro Vancouver will also provide data and a forum to share experiences and best practices.



## ***Nature-based Carbon Offsets and Credits***

A carbon offset is a reduction in carbon (or an increase in carbon storage, e.g. through tree planting) that is used to compensate for greenhouse gas emissions that occur elsewhere. A carbon offset credit is a transferrable instrument certified by governments or other entities. These offsets and credits are transferred through markets – these markets exist under both **mandatory** (compliance) and **voluntary** programs, both of which require some form of verification.

- **Mandatory markets** are created and regulated by mandatory national, regional, or international carbon reduction programs.
- **Voluntary markets** function outside of compliance markets and enable the purchase of offsets on a voluntary basis.

### **Key Considerations for Carbon Offsets**

- **Framing and Use:** Offsetting should be framed as an additional action to supplement deep reductions in greenhouse gases, rather than a compensating action that enables greenhouse gas emitting activities to continue business as usual.
- **Additionality:** Ecosystem protection/restoration to create the carbon offset must be an activity that would not have occurred without the offset – for instance, a forest that is already legally protected should not be counted in the offset process.
- **Permanence:** Ecosystems protected through offsets should be protected permanently. This can be difficult to ensure for some ecosystem types (e.g. salt marshes affected by sea level rise, and forests disturbed by pests and wildfire).
- **Leakage:** Preventing a harmful activity in one location may simply transfer that same activity to a new location – i.e. protecting a forest from logging may simply shift the activity to a new area, resulting in no net climate benefit.
- **Verification and quantification:** Given the complexity of carbon fluxes in natural systems, a project's greenhouse gas reductions must be quantified accurately and then verified by an accredited third party. Guidelines for quantification, verification, monitoring, and reporting are needed to ensure projects deliver the estimated carbon reductions. Verification methods for forest ecosystems are the most well-developed to date.

### **Future Work**

Metro Vancouver will continue to monitor and explore the role and validity of nature-based carbon credits and offsets in the region, in addition to other innovative financial and incentive mechanisms that support nature-based solutions. Future work could also explore the role of alternative ecosystems (e.g. salt marshes) and ecosystem services (e.g. habitat, flood protection) in offset mechanisms, through mandatory, voluntary and regional scale markets.

## ***5.4 Support the Implementation of Nature-based Solutions.***

Work with academic institutions and other regional partners to explore and promote best practices for advancing innovative nature-based solutions, while ensuring risks are minimized. This action could also involve testing newer technologies that measure ecological function to assess the effectiveness of nature-based solutions in a variety of land-use situations across the region. Providing a forum for collaboration and knowledge-sharing will contribute to overcoming barriers and advancing nature-based solutions in the region.

## ***5.5: Manage Forests in the Context of a Changing Climate.***

Advocate to the BC government to continue implementing measures that adapt forests to a changing climate (e.g. assisted migration research), enhance carbon storage (e.g. reforestation), and reduce greenhouse gas emissions associated with forest management (e.g. reduce slash pile burning). Continue to work with the BC government and local authorities in early detection and suppression of wildfire in the region's drinking water supply areas and adjacent forested areas, as well as fuel management practices in areas with high ignition risk.

### ***Forest Fires and the Wildland Urban Interface (WUI)***

*Interventions to protect communities from wildfire risks will be explored further in the Land Use and Growth Management Roadmap.*

**5.6: Advance Nature-Based Solutions to Address Flood Hazards.**

Work with partner organizations to advance nature-based options for flood management, through processes such as the Lower Mainland Flood Management Strategy and the BC government's Flood Strategy.

**5.7: Develop our Understanding of Coastal Ecosystems and Blue Carbon Potential.**

Work with academic institutions and other regional partners to better understand the long-term health and carbon storage potential in the region's coastal and marine ecosystems. Researchers in the region are studying these ecosystems and filling data gaps, and Metro Vancouver will collaborate on next steps.

***Climate Change and Marine and Coastal 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 runoff 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. For instance, the BC government has committed to developing an Ocean Acidification Plan and Coastal Strategy, which could provide new collaboration opportunities across governments.

## Setting the Path Ahead

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

Nature and ecosystems are already providing critical ecosystem services that support climate action; locking away millions of tonnes of carbon in vegetation and soils, and moderating the impacts of a changing climate by reducing flooding, protecting shorelines, and cooling temperatures. However, natural systems are themselves at risk from climate change, land development, pollution, invasive species and other factors; these impacts reduce the ability of nature to provide important climate-related services.

In order to maintain the existing services provided by nature and prevent further losses, actions to protect nature and ecosystems need to be implemented without delay. This involves protecting the region's ecosystems,

including the urban forest, and ecosystem connectivity across the region. These measures are supported by actions that seek to change how we do business by integrating nature into decision-making and managing natural assets for their long term health and resiliency. Actions to advance the understanding and mainstreaming of nature-based solutions are important to ensuring the region's responses to climate change leverage the benefits provided by nature, while also supporting biodiversity and human health and well-being. Actions that support restoration and enhancement of ecosystems offer an opportunity to gain back lost ground in terms of ecosystem function and climate-related benefits.

The timeline below contains all of the actions included in this Roadmap. Although there is much work to be done, there are some critical actions that, if started over the next two years, will support the regional vision of a carbon neutral and resilient region by 2050. Many actions contained in the Nature and Ecosystems Roadmap will be initiated in the short-term, but benefits and outcomes will be accrued slowly over time as ecosystems mature.

Strategy	2021-2023	2024-2029	2030-Beyond
Protect, Restore, and Enhance the Region’s Ecosystems	BIG MOVE 1.1 Protect an Additional 10% of the Region for Nature		
	1.2 Protect, Restore, and Enhance Natural Areas at the Regional Scale		
	1.3 Protect, Restore, and Enhance Nature at the Local Scale		
		1.4 Incorporate Climate Change Planning into Protected Area Management	
	1.5 Prioritize the Conservation of Ecosystem Health and Biodiversity in BC Forest Management		
	1.6 Support Ecosystem Protection, Enhancement, and Restoration		
		1.7: Reverse the Loss of the Region's Ecosystems through Restoration.	
	1.8 Manage invasive species		
Connect Green Infrastructure		BIG MOVE 2.1 Develop a Regional Green Infrastructure Network	
	2.2 Green Urban Areas		
	2.3 Green the Regional Greenways Network		
	2.4 Minimize Ecosystem Fragmentation		
		2.5 Develop Data and Resources to Support Ecosystem Connectivity	
Integrate Natural Assets into Conventional Asset	3.1 BIG MOVE: Incorporate Natural Assets into Asset Management and Financial Planning		

<b>Management and Decision-Making Processes</b>	BIG MOVE 3.2: Integrate Ecosystems and their Services into the Design of Major Infrastructure	
	3.3 Consider Ecosystems and their Services in Major Development Decisions	
	3.4 Support Natural Asset Management at the Local Level	
		3.5: Explore Opportunities to Overcome Barriers to natural asset management
<b>Support a Resilient, Robust, and Healthy Urban Forest</b>	4.1 BIG MOVE: Achieve 40% Tree Canopy Cover Within the Region's Urban Areas	
	4.2: Provide Data and Resources to Support Urban Forest Management	
	4.3: Improve Local Regulations and Management Practices	
	4.4: Convene Partners on Urban Forestry Issues	
		4.5 Consider Equity and Human Health Considerations
<b>Advance Nature-based Solutions to Climate Change</b>		5.1 BIG MOVE: Explore Innovative Funding and Incentive Programs
		5.2 BIG MOVE: Plan for Climate Change Impacts on Ecosystems
	5.3: Include Nature-Based Solutions in Climate Action Plans	
	5.4 Support the Implementation of Nature-based Solutions	
	5.5: Manage Forests in the Context of a Changing Climate	
	5.6: Advance Nature-Based Solutions to Address Flood Hazards	
		5.7: Develop our Understanding of Coastal Ecosystems and Blue Carbon Potential

## Measuring our Progress

The table below lists examples of some of the performance indicators that could be used to help Metro Vancouver measure regional progress towards meeting the objectives of this Roadmap. Indicators in the table below may apply to more than one strategy, even if not listed. The performance indicators used will depend, to some extent, on the availability of this information from other organizations and agencies. Because this Roadmap allocates some actions to other partners, data sharing will be critical for measuring the pace of our collective progress towards common goals.

Roadmap Element	Key Performance Indicator	Data Source	Data is Currently Collected
<b><i>Protect, Restore, and Enhance the Region's Ecosystems</i></b>	Hectares of unprotected Sensitive or Modified Ecosystems	Metro Vancouver	Yes
	Hectares of protected lands and waters	Metro Vancouver	Yes
	Hectares of Sensitive or Modified Ecosystems	Metro Vancouver	Yes
	Percent of inventoried Sensitive or Modified Ecosystems rated high quality	Metro Vancouver	Yes
	Hectares of ecological restoration areas	Metro Vancouver Member jurisdictions NGOs BC government Other agencies	Yes – regional parks No – rest of region
	Number of new invasive non-native species recorded and/or considered established	BC government Federal government	Yes
	Watershed and stream health index	Metro Vancouver	No
<b><i>Connect Green Infrastructure</i></b>	Ecosystem connectivity index	Metro Vancouver	No
	Percent impervious surfaces (e.g. paved roads, buildings)	Metro Vancouver	Yes
<b><i>Integrate Natural Assets into Conventional Asset Management and Decision-making Processes</i></b>	Carbon stored in vegetation and soils	Metro Vancouver	Yes
	Measurement of ecosystem services (T.B.D.)	T.B.D.	No
	Number of member jurisdictions with natural asset inventories	Member jurisdictions	No
<b><i>Support a Resilient, Robust, and Healthy Urban Forest</i></b>	Percent tree canopy cover (for the region and the urban containment boundary)	Metro Vancouver	Yes
	Urban forest health assessment	T.B.D.	No
	Number of member jurisdictions with current (<=5yrs) tree bylaws and/or urban forest management strategies	Member jurisdictions	Yes

	Number of member jurisdictions with tree canopy cover targets	Member jurisdictions	Yes
<b>Advance Nature-based Solutions to Climate Change</b>	Number of member jurisdictions' climate plans that incorporate nature-based solutions	Member jurisdictions	No
	Extent of coastal ecosystems	BC government NGOs Academic institutions	No
	Ecosystem vulnerability indicators (T.B.D.)	T.B.D.	No

Metro Vancouver will continue to develop indicators as new information becomes available, and technological advances are made.

## Feedback and Engagement Process

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

This *Roadmap* reflects current policies and the best ideas, approaches and technologies available at time of writing. As with all climate planning, it must be viewed as an iterative, dynamic path forward. The goals remain clear, and new policies, ideas, approaches and technologies must be anticipated and reflected in the *Roadmap*.

The project team continues to be open to feedback, at any time, in this Nature and Ecosystems Roadmap and any other aspect of the climate action initiatives led or coordinated through Metro Vancouver. Send any comments direct to the Project Team through [Climate2050@metrovancover.org](mailto:Climate2050@metrovancover.org) or phone 604-432-6200.

## Glossary

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

**Biodiversity** is the variety of species and ecosystems, and the ecological processes that they are part of.

**Blue carbon** refers to the carbon stored in coastal and marine ecosystems.

**Blueway** refers to a network of water bodies (such as rivers, creeks and lakes), often used for recreation.

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

**Carbon sequestration** is the removal of carbon dioxide from the air on an annual basis.

**Carbon storage** refers to the total amount of carbon stored in the vegetation and soils of ecosystems such as forests, wetlands and intertidal areas, which often takes thousands of years to accumulate.

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

**Climate resilience** describes the capacity of ecosystems, economies, infrastructure, and communities to absorb the impacts of climate change while maintaining essential services and functions needed to support health and well-being. In some cases, climate resilience involves changing services and functions so they are more sustainable.

**Coastal squeeze** occurs when rising sea levels push coastal habitats landward. Coastal habitats are often diminished in both size and function when caught between rising sea levels and fixed infrastructure (such as a sea wall) or high ground.

**Ecological health** captures the connection among healthy functioning ecosystems, the valuable services they provide, and human well-being.

**Ecosystems** are all the plants and animals that live in a particular area together with the relationships between them and their environment.

**Ecosystem connectivity** is the physical and functional links between ecosystems that support biodiversity by allowing movement of species across the region.

**Ecosystem services** are the benefits people obtain from ecosystems, including food, fresh water, shading, and human health and well-being. These services can be grouped into four main types: supporting, provisioning, cultural, and regulating.

**Equity** is the promotion of fairness, justice, and the removal of systemic barriers that may cause or aggravate disparities experienced by different groups of people.

**Fine particulate matter** (PM<sub>2.5</sub>) is made up of tiny solid or liquid particles that float in the air and can penetrate deep into the lungs and even into the bloodstream. Fine particulate matter can damage people's health by aggravating existing lung and heart diseases, increasing the risk of cancer and reducing life expectancy.

**Green gentrification** occurs when improvements to urban green space trigger a flow of wealth into an area, increasing the cost of living and forcing economically marginalized residents to relocate.

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

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

**Ground-level ozone** (O<sub>3</sub>) can have harmful impacts on everyone, especially children, seniors, and people with lung and heart conditions. It is primarily formed when nitrogen oxides and volatile organic compounds react in the air on hot and sunny days.

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

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

**Keystone species** have a disproportionately large effect on the ecosystems in which they occur. Keystone species help to maintain local biodiversity within a community either by controlling populations of other species that would otherwise dominate the community, or by providing critical resources for a wide range of species.

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

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

**Recreational Greenway** refers to a linear corridor often used for recreation.



**Regional Greenways Network** is the region's network of recreational greenways which support recreational walking, cycling, and, where appropriate, horseback riding.

**Riparian** refers to areas close to or on river banks.

**Sensitive Ecosystem** are ecosystems mapped by the Metro Vancouver Sensitive Ecosystem Inventory. Sensitive Ecosystems are ecologically significant and relatively unmodified, and include wetlands, older forests and riparian areas. Some younger and more human modified ecosystems still have ecological value and importance to biodiversity (e.g., young forests), and are also included in the Sensitive Ecosystem Inventory.

**Stormwater** is the water from rain or melting snow that is not absorbed into the ground. In urban areas, stormwater goes into storm sewers (the grated drains found on streets), which empty directly into rivers, creeks or the ocean. Managing stormwater and drainage is key to preserving the health of urban streams and rivers.

**Subsidence** is the sudden sinking or gradual downward settling of the ground's surface. Subsidence is common in river deltas.

**Tree canopy cover** refers to the leaves and branches that form a visible layer if one is viewing the region from the air, and the extent to which they cover the ground.

**Urban forest** refers to the trees within the public and private lands of a city, including the trees in parks, around buildings, along streets and in backyards.

**Urban heat island** effect refers to a phenomenon where built-up areas are hotter than nearby non-urban areas. The average air temperature of a city can be several degrees warmer than the surrounding landscape.

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

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To: Climate Action Committee

From: Lucy Duso, Policy Coordinator, Collaboration and Engagement  
Ann Rowan, Division Manager, Collaboration and Engagement  
External Relations Department

Date: March 10, 2022 Meeting Date: April 8, 2022

Subject: **Proposed Roadmap for Climate Action Engagement to 2025 and Work Plan for 2022**

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**RECOMMENDATION**

That the MVRD Board receive for information the report dated March 10, 2022, "Proposed Roadmap for Climate Action Engagement to 2025 and Work Plan for 2022".

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**EXECUTIVE SUMMARY**

Metro Vancouver is committed to bold leadership in responding to climate change and becoming a carbon neutral and climate resilient region by 2050. Achievement of this goal will require the implementation of not only incremental actions, but also transformational changes that are dependent on strong public and other support. Garnering this support relies in part on effectively communicating how objectives reflect shared values as well as a common sense of purpose. Also key to success is enhanced collaboration within the region and across jurisdictions.

Metro Vancouver is now at a pivotal point as it accelerates action on climate and shifts from planning to implementation. While Climate 2050 Roadmaps are being developed for the ten issue areas, there is also a critical role for effective engagement, and a roadmap to guide climate action engagement is also needed. Providing an overarching framework, the roadmap will identify the considerations for engaging a broad public audience on climate action in addition to continuing engagement with stakeholders and other governments. The roadmap will establish the foundations for effective and meaningful engagement, including public opinion research; consistent messaging for public-facing communications; working with influencers; creating meaningful engagement opportunities; strengthening dialogue with First Nations; and a commitment to reporting on progress.

**PURPOSE**

To provide the Climate Action Committee and Board with information on a proposed roadmap for climate action engagement for Metro Vancouver and a work plan for 2022 through to 2025.

**BACKGROUND**

Metro Vancouver is accelerating action on climate, both to reduce emissions and prepare our communities to be resilient in the face of a changing climate. This shift from planning to implementation requires obtaining strong public and other support for those actions. This support is built on shared values and a sense that we're all in this together, and that actions are enhanced through collaboration.

The Climate Action Committee has received and supported individual engagement plans for climate initiatives and will continue to see these plans as more issue area roadmaps are developed and proposals for implementing actions come forward.

This report provides a proposed approach, referred to as a roadmap, to guide and provide an overarching framework for engagement plans and activities on climate action for Metro Vancouver into 2025. The proposed outline for this roadmap is in Attachment 1.

## **CLIMATE ACTION ENGAGEMENT**

### **Engagement Highlights: 2017 to 2022**

Metro Vancouver engagement on the topic of climate action has grown significantly over the past four years resulting in a more focused approach in response to the climate emergency. This focused engagement began in 2018 with intensive effort to secure feedback on the *Climate 2050 Strategic Framework* and a similarly intensive engagement program to develop the *Clean Air Plan* in 2021. In between these milestone documents, staff have also sought input on Climate 2050 discussion papers, draft roadmaps and other climate initiatives, including Sustainability Innovation Fund (SIF) projects. Some examples of the outcomes of this outreach are;

- 20,000 unique visits to the *Climate 2050* web portal in 2021;
- 10,000 downloads of the *Climate 2050 Strategic Framework* documents;
- 2,000 registered for a webinar series on climate action in 2021;
- 80 participants, largely representing industry sector or professional associations, non-governmental organizations (NGOs), and staff from member jurisdictions participated in stakeholder forums that informed the development of the *Clean Air Plan*; and
- Over 50 feedback forms plus correspondence from 45 individuals/organizations, largely from First Nations, industry and NGOs were received regarding the contents and actions in the draft *Clean Air Plan*.

This engagement has focused on plan development, with an emphasis on mitigation actions (reducing emissions) and some focus on adaptation actions (preparing for climate change impacts). Staff have reported the feedback and input from the public and stakeholders to the Climate Action Committee.

### **Carbon Neutrality and Climate Resilient Communities**

The transition to carbon neutrality and climate resilient communities will be transformational – residents will experience changes, including related benefits, in their communities, workplaces and lives. These changes require broad public support and the active engagement of key stakeholders and other governments. Messaging needs to be developed that conveys the scope of the challenge in plain language, the tangible benefits for people’s lives and their communities, and the pathways for transformational changes through tangible and feasible actions. **Good messaging supports good engagement.**

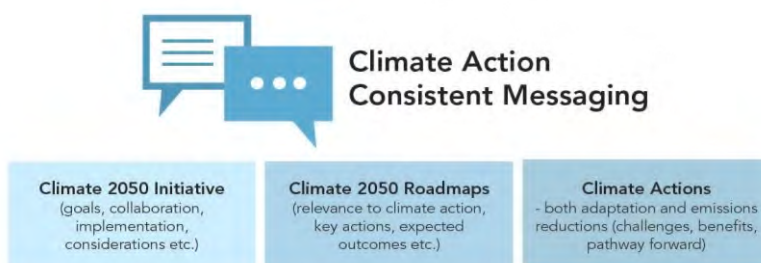
Effectively communicating the environmental, social and economic challenges associated with climate change is an evolving field. The implications of climate change are complex and new

understandings emerge constantly, but the call from the scientific community for the need to take effective action has been clear and has become increasingly urgent.

In British Columbia the impact of climate change has become more real and tangible and research indicates that the extreme weather events in 2021 did increase awareness of the risks and urgency for climate action. At the same time, it is well established in climate communications research that fear is not an effective motivator for making changes such as those envisioned in the *Climate 2050 Strategic Framework*. A solid engagement strategy, supported by research-based accessible messaging garners a positive public response to climate actions.

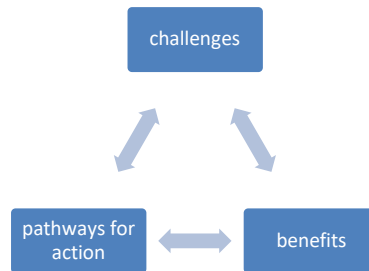
Staff have identified three tiers of messaging to support further development of the *Climate 2050 Strategic Framework* and implementation of the most substantial actions in the roadmaps;

- A revised narrative introducing the imperative, status and expected impact of the *Climate 2050 Strategic Framework* that serves as a baseline, or introduction, to any climate action dialogue. The previous narrative was generated in 2018 to support the development of the *Climate 2050 Strategic Framework* and a revision will shift the emphasis towards implementation.
- Messaging to support the development of the *Climate 2050 Roadmaps* for specific issue areas that provides a clear, plain language description of how the activities related to each issue area contribute to regional greenhouse gas emissions and climate resilience, the specific challenges and opportunities, and then identifies key actions as well as describes the broad path to implementation.
- Messaging to support implementation of specific climate actions. This messaging is unique to each action, and describes in plain language how for example the proposed action (e.g., collaboration, new regulation, policy change, program development); how it contributes to regional climate goals, identifies challenges and benefits, and the path forward.



Staff are working with leading climate engagement researchers and advisors to develop a strong narrative and effective climate messaging for this region. One recommendation developed through research and specifically for Canadian audiences, focuses on developing a messaging “triangle” that

speaks to the challenge, the tangible opportunities and benefits, and the pathway for actions. This research indicates that effective messaging includes each of the three elements of the triangle.



The clear plain language described above describes to a range of audiences Metro Vancouver's approach to climate action as well as issues raised in previous engagements, such as; urgency, implementation, costs, collaboration, and solutions. The development of a clear narrative and messaging on climate action will become an organizational resource that will support consistent messaging for generating a range of materials, including speaking notes, reports, documents, website pages. Together, a clear climate action narrative and consistent messaging will support a range of engagement work to build the broad-based support for incremental actions and the transformational changes envisioned for the Metro Vancouver region.

### **PROPOSED ROADMAP FOR CLIMATE ACTION ENGAGEMENT FOR METRO VANCOUVER**

This roadmap on climate action engagement applies the narrative and consistent messaging discussed above and this messaging directly supports engagement on climate action, described below. Note that the use of the small 'r' in the engagement roadmap is because it is an internal tool for staff involved in communications and engagement, and not intended as an additional issue area roadmap (e.g. Buildings Roadmap, Infrastructure Roadmap etc.) associated with the *Climate 2050 Strategic Framework*.

#### **Audiences for engagement**

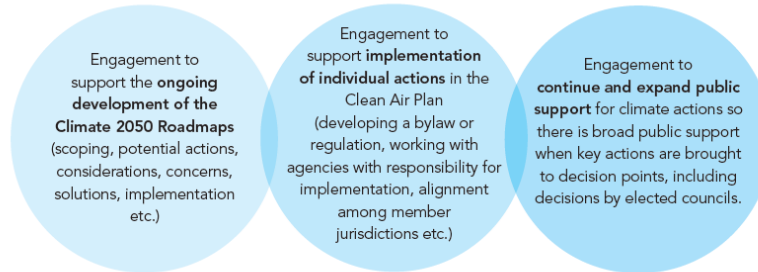
The audiences for engagement will include the public and stakeholders. In addition, ongoing collaboration is needed with decision-makers, influencers and amplifiers from business, academia, creative sectors, NGOs, media, First Nations, and other orders of government to realize the changes in behaviour as well as broader systemic change necessary to create a carbon neutral and climate resilient region.

#### **Introducing spheres for engagement**

Over the next three years, the focus of climate action engagement will assess and build support in three spheres:

1. engagement to develop the next Climate 2050 Roadmaps;
2. engagement to implement specific climate actions (e.g. a regulation); and
3. engagement directed to garner broad public support. Engagement in all three spheres is necessary to expand and deepen support for effective action on climate change.

### Climate Action – Effective and Meaningful Engagement, 3 spheres



### Outlook to 2025

This outreach and engagement strategy will set up foundational processes to engage strategically with a range of audiences across the Metro Vancouver region. Example of activities include: an approach to engaging youth, convening member jurisdictions, NGOs and others to align climate action messaging, publicizing the new climate literacy platform, testing messaging through public opinion research, using influencers and amplifiers to extend our outreach and engagement, creating new venues for dialogues with First Nations, and convening decision-makers, influencers, stakeholders and the public interested in climate action. Attachment 2 provides a detailed work plan for 2022.

As climate action will be a priority for Metro Vancouver in the years to come, this roadmap provides a foundation for the next three years that will need to be reviewed, assessed and extended into the future.

### ALTERNATIVES

This is an information report. No alternatives are presented.

### FINANCIAL IMPLICATIONS

There are no additional implications for financing beyond the 2022 budgets already approved for Air Quality and Climate Change services, including the communications program managed by External Relations, and funding received through the SIF process.

### CONCLUSION

Metro Vancouver is accelerating action on climate change, both to reduce emissions and prepare our communities to be resilient in the face of a changing climate. This shift from planning to implementation requires obtaining strong public support for those actions. This support is built on shared values and a sense that we're all in this together, and enhanced through collaboration.

A roadmap for engagement on climate action for Metro Vancouver will provide an overarching framework of the considerations for engaging a broad audience on climate action and establish the foundations for effective and meaningful engagement for Metro Vancouver over the next few years. Together, a clear climate action narrative and consistent messaging will support a range of

engagement work to build the broad-based support for the changes envisioned for the Metro Vancouver region.

Over the next three years, the focus of climate action engagement will assess and build support in three spheres: engagement to develop the next Climate 2050 Roadmaps; engagement to implement specific climate actions (e.g. a regulation); and, engagement directed to garner broad public support. Engagement in all three spheres is necessary to expand and deepen support for effective action on climate change. This outreach and engagement strategy will set up foundational processes to engage strategically with a range of audiences across the Metro Vancouver region. As climate action will be a priority for Metro Vancouver in the years to come, this roadmap for the next three years will provide a foundation that will need to be reviewed, assessed and extended into the future.

### **Attachments**

1. Proposed outline for the roadmap for engagement on climate action for Metro Vancouver to 2025
2. Climate action engagement for Metro Vancouver 2022 Work Plan

### **References**

1. [\*Climate 2050 Strategic Framework\*](#)
2. [\*Clean Air Plan\*](#)
3. *Climate 2050 Roadmaps* <http://www.metrovancouver.org/services/air-quality/climate-action/climate2050/regional-priorities/discussion-papers/Pages/default.aspx>

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## **Proposed outline for the roadmap for engagement on climate action for Metro Vancouver to 2025**

*(note that as this roadmap further develops there will be adjustments to this outline)*

### **Introduction**

- *Metro Vancouver is developing, implementing and supporting a range of climate action and preparedness strategies over the coming years. This roadmap for engagement on climate action for Metro Vancouver describes the considerations and approach for engagement on these initiatives.*

### **Messaging**

- *Climate 2050 narrative*
- *Climate 2050 Roadmaps*
- *Unique climate actions*

### **Three spheres of engagement**

- *Engagement to support the ongoing development of the Climate 2050 Roadmaps*
- *Engagement to support the ongoing implementation of actions in the Clean Air Plan*
- *Engagement to continue and expand public support for climate actions so there is broad public support when key actions are brought to decision points, including decisions by elected officials*

### **Collaboration and convening**

- *Approach to including local and Indigenous perspectives*
- *Youth involvement*
- *Opportunities for public input*
- *Community of practice – working with members*
- *Networks and amplifiers – working with other organizations*
- *Alignment with other governments*

### **Engagement**

- *Engagement planning tool*
- *Audience mapping*
- *Connecting engagement to the big moves in the Clean Air Plan*
- *Engagement for adaptation strategies*

### **Public education**

- *Exploring the niche role for Metro Vancouver in the public education landscape*
- *Leveraging community networks*
- *Delivering public messaging that emphasizes the big moves in the Clean Air Plan*

### **Work plan and deliverables for 2022 (details in Attachment 2)**

- *Describe the work plan for 2022*

### **Looking ahead to 2025**

- *Describe the approach to engagement looking out to 2025*



### Climate Action Engagement for Metro Vancouver: 2022 Work Plan

The currently identified deliverables for 2022 include:

- Launch and promotion of the climate literacy platform. Funded in 2019 through the Sustainability Innovation Fund (SIF), this is an online learning tool designed for residents who want to engage on climate action but need confidence and locally relevant information to participate. Launch April 2022.
- Update our understanding of the opinions of residents in the region on specific topics related to climate action. This will be based on benchmarking research initiated in 2018. Research outcomes will be used to inform framing and messaging in communications and engagement Expected to be in market April 2022, results available June 2022.
- Strengthen dialogue with First Nations on climate actions. This is a listening and learning opportunity and may identify the means for engaging local First Nations and including local and Indigenous perspectives in climate action planning and implementation.
- Continue with engagement to develop the individual issue area roadmaps, with a focus on stakeholders most likely to be impacted and/or provide input as well as those with a role in implementation.
  1. This is a continuation of the engagement with stakeholders to develop the issue area roadmaps. This includes inviting feedback and dialogue on challenges and opportunities, informing policy development and identifying areas for collaboration. In the near future (spring through to fall 2022) there will be targeted engagement with the agriculture and food sector on the Agriculture Climate 2050 Roadmap; establishing a dialogue with key stakeholder groups on both the Industry and Energy Climate 2050 Roadmaps; and an engagement plan for input on the draft Nature and Ecosystems Climate 2050 Roadmap.
- Develop meaningful and effective engagement for individual climate action initiatives, including regulations, policies or programs implemented by Metro Vancouver.
  1. Climate actions either implemented by, or driven by Metro Vancouver each require a unique engagement approach. This will involve organizing opportunities such as webinars, workshops and forums that provide a venue to share the research and considerations, including where available the cost/benefit analysis, that have gone into the development of the action. Then through opportunities at the event as well as through on-line feedback forms, meetings and direct correspondence the public and stakeholders can provide input and clarify the anticipated impact of an action. In addition, engagement includes working with member jurisdictions, First Nations, and other orders of government to ensure alignment.

2. The outcome of meaningful engagement is that the proposed action presents decision-makers with an option that is informed by research and supported, at some level, by the public and stakeholders.
  3. Examples of some current priority actions in early 2022 include; initial research on public attitudes to support the driving down emissions initiative, to be delivered in part as a partnership with TransLink; engagement with the building sector on a large buildings emissions regulation; engagement with air quality permit holders on incorporating greenhouse gas emissions into the air quality permit program; engagement with the building sector on a retrofit accelerator initiative, in part in partnership with the new Zero Emissions Innovation Centre.
- Develop and implement an engagement strategy to build a strong constituency for climate actions.
    1. Climate action will be a topic for outreach and engagement for the foreseeable future for Metro Vancouver. Progress on realizing the change in behaviour as well as support for the broader systemic changes required to become a carbon neutral and climate resilient region requires building a constituency in the region that will champion both the goals of the *Climate 2050 Strategic Framework* and individual climate actions. This requires a creative engagement strategy that includes innovative ways to connect with new audiences (e.g., movable but not yet engaged residents) to build a larger engaged and vocal constituency for action.
    2. In 2021, a proposal, *Responding to the Climate Emergency: Enhanced Stakeholder Engagement*, was approved for Sustainability Innovation Fund (SIF) support that would lead to the development of an outreach and engagement strategy designed to build public support for effective action. The initial contract work involved developing the roadmap for climate action engagement has been funded through this SIF project. (The proposed outline for the roadmap for engagement on climate action for Metro Vancouver is in Attachment 1).

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To: Climate Action Committee

From: Maari Hirvi Mayne, Acting AQ Regulatory Program Manager, Environmental Regulation and Enforcement, Parks and Environment

Date: March 15, 2022 Meeting Date: April 8, 2022

Subject: **Appointment of District Director and Enforcement Officers**

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**RECOMMENDATION**

That the MVRD Board:

- a) pursuant to the *Greater Vancouver Regional District Air Quality Management Bylaw 1082, 2008* and the *Environmental Management Act*:
  - i. rescind the appointments of Ray Robb as district director, and of Kathy Preston as assistant district director;
  - ii. appoint Metro Vancouver employee Kathy Preston as district director;
  - iii. rescind the appointments of Toby Gritten, and Dan Saunders as officers; and
  - iv. appoint Metro Vancouver employee Muhammad Ali as an officer.
- b) pursuant to section 28 of the *Offence Act* for the purpose of serving summons for alleged violations under the *Greater Vancouver Regional District Air Quality Management Bylaw 1082, 2008*:
  - i. rescind the appointments of Toby Gritten, and Dan Saunders; and
  - ii. appoint Metro Vancouver employee Muhammad Ali.

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**EXECUTIVE SUMMARY**

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

**PURPOSE**

To appoint one Metro Vancouver employee as the Board-designated district director and another Metro Vancouver employee as a Board-designated officer, and to rescind the appointments of three former employees.

**BACKGROUND**

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

Employment status changes for Metro Vancouver environmental regulatory staff have resulted in a need to update staff appointments to ensure appropriate authority to advance air quality management goals. Section 31 of the *Environmental Management Act* and the *Greater Vancouver Regional District Air Quality Management Bylaw No. 1082, 2008* grant authority to a Board-designated district director and officers.

### **ROLE OF THE DISTRICT DIRECTOR**

The district director has the same powers as a director under the *Environmental Management Act* and is the primary statutory decision maker in the administration of the *Greater Vancouver Regional District Air Quality Management Bylaw 1082, 2008*. The district director's powers include the ability to issue permits, approvals and orders under this bylaw.

### **ROLE OF ENFORCEMENT OFFICERS**

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

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

### **ALTERNATIVES**

1. That the MVRD Board:
  - a) pursuant to the *Greater Vancouver Regional District Air Quality Management Bylaw 1082, 2008* and the *Environmental Management Act*:
    - i. rescind the appointments of Ray Robb as district director, and of Kathy Preston as assistant district director;
    - ii. appoint Metro Vancouver employee Kathy Preston as district director;
    - iii. rescind the appointments of Toby Gritten, Dan Saunders as officers; and
    - iv. appoint Metro Vancouver employee Muhammad Ali as an officer.
  - b) pursuant to section 28 of the *Offence Act* for the purpose of serving summons for alleged violations under the *Greater Vancouver Regional District Air Quality Management Bylaw 1082, 2008*:
    - i. rescind the appointments of Toby Gritten, and Dan Saunders; and
    - ii. appoint Metro Vancouver employee Muhammad Ali.
2. That the MVRD Board receive for information the report dated March 15, 2022, titled "Appointment of District Director and Enforcement Officers" and provide alternate direction to staff.

### **FINANCIAL IMPLICATIONS**

There are no additional financial implications as the MVRD appointees are already on staff and there are no expenditures for rescindments.

### **CONCLUSION**

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

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To: Climate Action Committee

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

Date: March 30, 2022 Meeting Date: April 8, 2022

Subject: **Manager's Report**

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**RECOMMENDATION**

That the Climate Action Committee receive for information the report dated March 30, 2022 titled "Manager's Report".

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**Climate Action Committee 2022 Work Plan**

The attachment to this report sets out the Committee's Work Plan for 2022. 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, and changes to the schedule.

**IPCC Report - *Climate Change 2022: Impacts, Adaptation and Vulnerability***

The Intergovernmental Panel on Climate Change has recently released the second part of the Sixth Assessment Report titled, *Climate Change 2022: Impacts, Adaptation and Vulnerability*. Part One was the *Climate Change 2021: Physical Science Basis*. The report identifies 127 key risks that arise from the dynamic interactions among climate-related hazards, the exposure and vulnerability of affected human and ecological systems. It highlights adaptation solutions which are effective, feasible, and conform to principles of justice with a particular focus on transformation and system transitions in energy; land, ocean, coastal and freshwater ecosystems; urban, rural and infrastructure; and industry and society.

The authors recognize that human-induced climate change, including more frequent and intense extreme events, has caused widespread adverse impacts and related losses and damages to nature and people, beyond natural climate variability. The report points to progress in adaptation planning and implementation that has been observed across all sectors and regions, generating multiple benefits while also acknowledging that many initiatives prioritize immediate and near-term climate risk reduction which reduces the opportunity for transformational adaptation.

Across sectors and regions the most vulnerable people and systems are observed to be disproportionately affected. The rise in weather and climate extremes has led to some irreversible impacts as natural and human systems are pushed beyond their ability to adapt.

The report re-asserts the need for dramatic emissions reductions. Global warming, reaching 1.5°C in the near-term, would cause unavoidable increases in multiple climate hazards and present multiple risks to ecosystems and humans. The level of risk will depend on concurrent near-term trends in vulnerability, exposure, level of socio-economic development and adaptation. Near-term actions that limit global warming to close to 1.5°C would substantially reduce projected losses and damages

related to climate change in human systems and ecosystems, compared to higher warming levels, but cannot eliminate them all. The magnitude and rate of climate change and associated risks depend strongly on near-term mitigation and adaptation actions, and projected adverse impacts and related losses and damages escalate with every increment of global warming.

Reference 1 provides a link to a concise version of the results of the full report, the Summary for Policymakers.

### **Canada's 2030 Emissions Reduction Plan: Clean Air, Strong Economy**

On March 29, on the opening day of the GLOBE Forum 2022 in Vancouver, Prime Minister Justin Trudeau announced the federal government's 2030 Emissions Reduction Plan, [Canada's Next Steps for Clean Air and a Strong Economy](#). The plan emphasizes that climate action needs to be pursued in a way that improves health, creates good jobs, and maintains affordability for Canadians. This is the first federal Emissions Reduction Plan issued under the Canadian Net-Zero Emissions Accountability Act; progress reports will be produced in 2023, 2025, and 2027, and additional targets and plans will be developed for 2035 through to 2050.

A preliminary review of the plan indicates good alignment with the greenhouse gas reduction actions in Metro Vancouver's *Clean Air Plan* and *Climate 2050 Roadmaps*, as well as with the BC Government's CleanBC Roadmap to 2030. The federal plan appears to include the critical elements necessary to ensure its effectiveness, including transparent modelling, a clearly defined implementation pathway, accountability mechanisms, and a sectoral approach to emission reduction actions. Metro Vancouver staff will continue to evaluate the actions in the federal plan, including the committed levels of funding, for alignment with *Climate 2050* and the *Clean Air Plan*, in particular where partnerships across governments are required. Metro Vancouver will work with the federal government on implementation of these actions in order to achieve our shared climate goals.

Key action areas within the federal emissions reduction plan that are expected to be of relevance to the Metro Vancouver region include the following:

- Helping to **reduce energy costs for homes and buildings** (development of the \$150-million Canada Green Buildings Strategy)
- **Empowering communities** to take climate action (expanding the Low Carbon Economy Fund through a \$2.2 billion renewal)
- Making it easier for Canadians to **switch to electric vehicles** (\$400 million for zero-emission vehicles charging stations, \$500 million investment in ZEV charging and refueling infrastructure from the Canada Infrastructure Bank, \$1.7 billion to extend the Incentives for Zero Emission-Vehicles program)
- Powering the economy with **renewable electricity** (\$600 million in the Smart Renewables and Electrification Pathways Program, \$250 million for predevelopment work for large clean electricity projects)
- Helping **industries develop and adopt clean technology** in their journey to net-zero emissions (developing a carbon capture, utilization and storage strategy, introducing tax credits for this technology)

- Investing in **nature and natural climate solutions** with an additional \$780 million for the Nature Smart Climate Solutions Fund to deliver additional emission reductions from nature-based climate solutions
- **Supporting farmers as partners** in building a clean, prosperous future (\$470 million for the On-Farm Climate Action Fund, \$330 million for the Agricultural Clean Technology Program, \$100 million for transformative science)
- Maintaining Canada's approach to **pricing pollution**.

### Wood Stove Exchange Program Changes and Funding for First Nations

Metro Vancouver's wood stove exchange program is part of a provincial program funded by the BC Ministry of Environment and Climate Change Strategy and administered by the BC Lung Foundation. The Metro Vancouver program began in 2009, and since that time has received a total of approximately \$423,000 and completed over 950 exchanges, resulting in ongoing reductions of more than 16 tonnes of fine particulate matter per year, and air quality improvements in neighbourhoods across the region.

In January, the BC Ministry of Environment and Climate Change Strategy issued a media release (Reference 2) announcing updates to the provincial program. To align with the new policies outlined in the *CleanBC Roadmap to 2030*, the Province announced that 2022 will be the final year that propane and natural gas stoves will be eligible for rebates from the Wood Stove Exchange Program. Rebates will still be available for exchanges to electric heat pumps, high-efficiency gas heat pumps, and hybrid-electric heat pump gas systems, as well as emissions-certified wood and pellet stoves. Metro Vancouver will be working with the Province to determine the details of the changes and staff will inform Metro Vancouver residents and participating retailers of the updates to the program.

The Province also recently approved new incentive levels (Reference 3) for First Nations applicants living in First Nations communities (reserve, treaty lands, etc.). Metro Vancouver is currently updating its exchange program website, as well as outreach and rebate application materials, with information on the rebates related to the new First Nations incentive levels and eligibility.

### Engagement Update

- Phase 2 of engagement on **managing emissions from cannabis production and processing** facilities took place between September 2021 and February 2022. Staff are currently considering feedback identified throughout the engagement, and are continuing to meet with affected parties to discuss potential revisions that would address issues raised. A full engagement summary report, along with a proposed bylaw, are anticipated to be presented for consideration by the Committee and MVRD Board in mid-2022.
- Phase 2 of engagement on **managing emissions from open-air burning of vegetative debris** took place between July 2021 and February 2022. Staff are currently reviewing feedback received throughout the engagement, and are continuing to meet with affected parties, such as fire department staff, to discuss potential revisions that would address issues raised. Staff anticipate presenting a summary of the feedback and findings with a proposed bylaw for consideration by the Committee and MVRD Board in mid-2022.

- Staff are continuing with public opportunities to provide comment on the **Draft Climate 2050 Agriculture Roadmap**, and are initiating engagement on the **Draft Climate 2050 Industry and Business Roadmap** as directed by the Committee and MVRD Board in March 2022.
- Metro Vancouver published a new online learning tool, **Climate Literacy in Metro Vancouver**. This is a self-directed learning program created with funding from the Sustainability Innovation Fund, for residents in the Metro Vancouver region. With input from climate and education professionals, staff put together an interactive online course that will help residents, community leaders, local government staff and others explore climate science and climate action, with content specific to this region.
- Staff have had additional **dialogue with individual First Nations communities** on various initiatives in the Air Quality and Climate Change program.
  - In March 2022, staff met with Squamish Nation. The agenda included a discussion of the regulatory proposals for managing emissions from open-air burning of vegetative debris, a discussion around Metro Vancouver's Clean Air Plan and Climate 2050 Strategic Framework, and an update on the Squamish Nation's Climate Action Strategy.
  - Staff are preparing to provide an update and have a dialogue with Kwikwetlem First Nation on various Climate 2050 initiatives, via a Kwikwetlem First Nation/Metro Vancouver Technical Working Group.

## **Attachment**

Climate Action Committee 2022 Work Plan

## **References**

- 1) IPCC Report - *Climate Change 2022: Impacts, Adaptation and Vulnerability* [Summary for Policymakers](#)
- 2) Media release dated January 24, 2022: [Environment and Climate Strategy Media Release](#).
- 3) [BC Woodstove Exchange Program and First Nations Incentive Levels](#)



### Climate Action Committee 2022 Work Plan

Report Date: March 30, 2022

#### Priorities

1 <sup>st</sup> Quarter	Status
Climate Action Committee 2022 work plan and meeting schedule	Complete
Climate 2050 – draft roadmap for industry	Complete
Climate 2050 – draft roadmap for nature and ecosystems	In progress
Air quality – initiate process to update boilers and process heaters regulation	In progress
Sustainability Innovation Fund (SIF) – 2022 proposals	Complete
2 <sup>nd</sup> Quarter	
Climate 2050 – management of GHG emissions from large buildings	In progress
Climate 2050 – draft roadmap for energy	In progress
Climate 2050 – draft roadmap for land use and growth management	In progress
Climate 2050 - analysis of how land use will contribute to achieving greenhouse gas reduction targets, especially for transportation	In progress
Climate 2050 – annual report and progress tracking	In progress
Air Quality – Initiate engagement on regulation for non-road two-stroke engines	Pending
Air quality – cannabis production and processing emission regulation	In progress
Air quality – open air burning emission regulation	In progress
Annual Caring for the Air report	In progress
Update on ecological health initiatives	Pending
SIF - status report on previously approved liquid waste projects	In progress
SIF - status report on previously approved regional district projects	In progress
3 <sup>rd</sup> Quarter	
Climate 2050 final roadmap: agriculture	Pending
Climate 2050 final roadmap: industry	Pending
Climate 2050 – draft roadmap for infrastructure	Pending
Provincial replacement program for local government climate action	In progress
Air quality – amendments to air quality management fees in emission regulations	In progress
Air quality – amendments to ticketing bylaws	Pending
SIF - status report on previously approved water projects	Pending
4 <sup>th</sup> Quarter	
Climate 2050 final roadmap: energy	Pending
Climate 2050 final roadmap: nature and ecosystems	Pending
Annual budget and 5 year financial plan	Pending
Best Management Practices for invasive species	Pending