metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

METRO VANCOUVER REGIONAL DISTRICT
CLIMATE ACTION COMMITTEE

REGULAR MEETING

Friday, April 16, 2021
1:00 p.m.
28th Floor Boardroom, 4730 Kingsway, Burnaby, British Columbia

A G E N D A[1]

1. ADOPTION OF THE AGENDA

1.1 April 16, 2021 Regular Meeting Agenda

That the Climate Action Committee adopt the agenda for its regular meeting scheduled for April 16, 2021 as circulated.

2. ADOPTION OF THE MINUTES

2.1 March 3, 2021 Regular Meeting Minutes

That the Climate Action Committee adopt the minutes of its regular meeting held March 3, 2021 as circulated.

3. DELEGATIONS

4. INVITED PRESENTATIONS

5. REPORTS FROM COMMITTEE OR STAFF

5.1 Draft *Climate 2050 Transportation Roadmap*

That the MVRD Board authorize staff to proceed with engagement on the draft *Climate 2050 Transportation Roadmap*, as presented in the report dated March 24, 2021, titled "Draft *Climate 2050 Transportation Roadmap*".

5.2 Metro Vancouver Electric Vehicle Program Review and Recommendations

That the Climate Action Committee receive for information the report dated March 26, 2021, titled "Metro Vancouver Electric Vehicle Program Review and Recommendations".

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

5.3 Feasibility of Targeted Invasive Plant Grazing in Metro Vancouver

That the Climate Action Committee receive for information the report dated March 22, 2021, titled "Feasibility of Targeted Invasive Plant Grazing in Metro Vancouver".

5.4 Best Management Practices for Invasive Species: Hedge Bindweed and American Bullfrog

That the MVRD Board:

a) receive for information the report dated March 22, 2021, titled "Best Management Practices for Invasive Species: Hedge Bindweed and American Bullfrog"; and

b) direct staff to forward the Best Management Practices and suite of seventeen invasive species fact sheets to member jurisdictions for information.

5.5 Manager's Report

That the Climate Action Committee receive for information the report dated March 30, 2021, titled "Manager's Report".

6. INFORMATION ITEMS

6.1 Correspondence re Help Cities Lead Campaign dated March 4, 2021 from Mayor Mike Little, District of North Vancouver.

6.2 Correspondence re Help Cities Lead Campaign dated March 10, 2021 from Mayor Lisa Helps, City of Victoria.

6.3 Correspondence re Help Cities Lead Campaign dated March 29, 2021 from Mayor Rob Vagramov, City of Port Moody.

6.4 Staff report re Liquid Waste Heat Recovery Policy Amendments and Related Cost Apportionment Bylaw Amendments to Expand Opportunities for Sewer Heat Recovery.

6.5 Trinity Western University Media Release Article dated Mach 21, 2021 re TWU's Dr. David Clements and Team Track Climate Change-Driven Spread of Invasive Plants in Metro Vancouver, Inform Municipal Strategies.

6.6 Vancouver Province Article dated April 8, 2021 re B.C. Tops North America for 2020 Electric Vehicle Uptake.

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 16, 2021.

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, Zoe - Port Moody
Steves, Harold - Richmond
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 9:00 a.m. on Wednesday March 3, 2021 in the 28th Floor Boardroom, 4730 Kingsway, Burnaby, British Columbia.

MEMBERS PRESENT:
Chair, Councillor Adriane Carr, Vancouver
Vice Chair, Councillor Sav Dhaliwal*, Burnaby
Councillor Petrina Arnason*, Langley Township
Councillor Laura Dupont*, Port Coquitlam
Councillor David Hocking*, Bowen Island
Councillor Dylan Kruger*, Delta
Director Jen McCutcheon*, Electoral Area A
Mayor Ron McLaughlin*, Lions Bay
Councillor Allison Patton*, Surrey
Councillor Zoe Royer*, Port Moody
Councillor Harold Steves*, Richmond
Councillor Ahmed Yousef*, Maple Ridge

MEMBERS ABSENT:
Chief Ken Baird, Tsawwassen
Councillor Jessica McIlroy, North Vancouver City

STAFF PRESENT:
Roger Quan, Director, Air Quality and Climate Change, Parks and Environment
Lauren Cichon, Legislative Services Coordinator, Board and Information Services

1. ADOPTION OF THE AGENDA

1.1 March 3, 2021 Regular Meeting Agenda

It was MOVED and SECONDED
That the Climate Action Committee adopt the agenda for its regular meeting scheduled for March 3, 2021, as circulated.

CARRIED

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

2. ADOPTION OF THE MINUTES

2.1 February 12, 2021 Regular Meeting Minutes

It was MOVED and SECONDED
That the Climate Action Committee adopt the minutes for its regular meeting held February 12, 2021 as circulated.

CARRIED

3. DELEGATIONS

No items presented.

4. INVITED PRESENTATIONS

No items presented.

5. REPORTS FROM COMMITTEE OR STAFF

5.1 Draft *Clean Air Plan*

Report dated February 10, 2021, from John Lindner, Air Quality Planner, and Derek Jennejohn, Lead Senior Engineer, Parks and Environment, seeking MVRD Board authorization to proceed with engagement on the draft *Clean Air Plan*.

Members were provided a presentation regarding the draft *Clean Air Plan* highlighting the 2030 regional targets, alignment with *Climate 2050,* issue areas, strategies and actions, potential impacts on greenhouse gases and air quality, equity approach, and engagement.

Members offered the following comments regarding the draft *Clean Air Plan:*

- regulation of GHG emission levels in new buildings and equipment
- education displays in new buildings
- comparison of air quality due to a reduction in transportation before and during the novel coronavirus (COVID-19 pandemic)
- consideration of renewable energy technologies such as hydro and solar, of alternatives to cement for new buildings, and of mobility pricing
- inclusion in the plan of natural solutions and health impacts to air quality issues
- promotion of equity and its actions to address climate change and air quality reducing disproportionate impacts
- exploration of short sea shipping and regulation of marine emissions
- train the industry sector in retrofits

Presentation material titled “Draft Clean Air Plan” is retained with the March 3, 2021 Climate Action Committee agenda.

It was MOVED and SECONDED
That the MVRD Board authorize staff to proceed with engagement on the draft *Clean Air Plan*, based on the report dated February 10, 2021, titled "Draft *Clean Air Plan*".

CARRIED
Councillor Royer absent at the vote.

5.2 Draft *Climate 2050 Buildings Roadmap*

Report dated February 10, 2021, from Erik Blair, Air Quality Planner, and Jason Emmert, Senior Planner, Parks and Environment, seeking MVRD Board authorization to proceed with engagement on the draft *Climate 2050 Buildings Roadmap*.

Members were provided a presentation regarding the draft *Climate 2050 Buildings Roadmap* highlighting the issue areas, goals and targets, zero emissions and resiliency, strategies and actions, climate and resiliency impact, and engagement.

Members were informed of a typographical error in the report, and staff advised the report will be corrected prior to being forwarded to the MVRD Board for consideration.

Members offered the following comments regarding the draft *Climate 2050 Buildings Roadmap:*

- implementation of new technology in buildings
- green solutions for heating and cooling systems
- strategies to move away from natural gas
- promote lower embodied emission buildings and financing tools for low carbon updates in buildings such as the Property Assessed Clean Energy financing program through the provincial and federal government
- advocate for cooling measures and clean air centres in public buildings

Presentation material titled "Draft Climate 2050 Buildings Roadmap" is retained with the March 3, 2021 Climate Action Committee agenda.

It was MOVED and SECONDED
That the MVRD Board authorize staff to proceed with engagement on the draft *Climate 2050 Buildings Roadmap*, as presented in the report dated February 10, 2021, titled "Draft *Climate 2050 Buildings Roadmap*".

CARRIED

5.3 Manager's Report

Report dated February 16, 2021, from Roger Quan, Director, Air Quality and Climate Change, Parks and Environment Department, updating the Committee on the following:

- 2021 Work Plan
- Metro Vancouver Region LC3: Zero Emission Innovation Centre
- utility long term resource plans
- *Clean Air Plan* and *Climate 2050* engagement update
- managing emissions from cannabis production and processing facilities
- *Residential Wood Burning Bylaw* outreach update

It was MOVED and SECONDED

That the Climate Action Committee receive for information the report dated February 16, 2021, titled "Manager's Report".

CARRIED

6. INFORMATION ITEMS

6.1 Correspondence re Application GVA1197 to Increase Allowable Annual Emissions by an Industrial Operator from Jenny Kwan, Member of Parliament, Vancouver East, to Sav Dhaliwal, Chair, Metro Vancouver Regional District.

6.2 Correspondence re Application GVA1197 to Increase Allowable Annual Emissions by an Industrial Operator from Sav Dhaliwal, Chair, Metro Vancouver Regional District to Jenny Kwan, Member of Parliament, Vancouver East.

7. OTHER BUSINESS

No items presented.

8. BUSINESS ARISING FROM DELEGATIONS

No items presented.

9. RESOLUTION TO CLOSE MEETING

No items presented.

10. ADJOURNMENT/CONCLUSION

It was MOVED and SECONDED
That the Climate Action Committee conclude its regular meeting of March 3, 2021.

CARRIED
(Time: 11:37 a.m.)

_____ _____

Lauren Cichon,
Legislative Services Coordinator

Adriane Carr, Chair

44103409 FINAL

To: Climate Action Committee

From: Morgan Braglewicz, Senior Policy and Planning Analyst
Jason Emmert, Senior Planner
Parks and Environment Department

Date: March 24, 2021 Meeting Date: April 16, 2021

Subject: **Draft *Climate 2050 Transportation Roadmap***

RECOMMENDATION

That the MVRD Board authorize staff to proceed with engagement on the draft *Climate 2050 Transportation Roadmap*, as presented in the report dated March 24, 2021, titled "Draft *Climate 2050 Transportation Roadmap*".

EXECUTIVE SUMMARY

This report presents the draft *Climate 2050 Transportation Roadmap,* the second in a series of ten *Roadmaps* that will guide the region's policies and collective actions to transition to a carbon neutral, resilient region by 2050. Preliminary modelling results indicate that completing these aggressive but achievable actions will have a significant impact on greenhouse gas emissions, with emissions from all transportation sectors potentially reduced by 30% below 2010 levels by 2030, and by over 85% by 2050. Emissions from light duty vehicles could achieve a reduction of over 40% by 2030 and can be carbon neutral by 2050. The *Transportation Roadmap* is intended to be dynamic, and over time, more work will be done to identify and undertake additional actions in order to reach our 2030 and 2050 climate targets. To assess resiliency of the transportation system, further work is needed to establish methods and key data sources to quantify the impact of the resiliency actions in the *Transportation Roadmap*. The draft will inform further engagement, with the intention to bring an updated *Transportation Roadmap* for endorsement by the MVRD Board in the fall of 2021.

PURPOSE

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

BACKGROUND

On September 28, 2018, the MVRD Board adopted the *Climate 2050 Strategic Framework* and directed staff to begin the development process of the *Climate 2050 Roadmaps*. On October 4, 2019, the MVRD Board 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 roadmaps. This report responds to the above direction, and provides information on activities planned through the end of 2021. On January 15, 2021, the Climate Action Committee endorsed its 2021 work plan that directed staff to present the *Transportation Roadmap* for Board approval.

This report presents the draft *Climate 2050 Transportation Roadmap* (Attachment 1), which will be the subject of engagement activities with the public, stakeholders and other governments, including First Nations, on greenhouse gas reductions from and climate resiliency for regional transportation.

CLIMATE 2050 STRATEGIC FRAMEWORK

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. Metro Vancouver is implementing *Climate 2050* 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 (*Metro 2050*).

CLIMATE 2050 TRANSPORTATION ROADMAP

The *Climate 2050 Transportation Roadmap* presents a robust plan to shape our carbon neutral and resilient future by prioritizing zero-emission vehicles, shifting trips to transit and active transportation, reducing emissions from goods movement, and increasing system resilience. In laying out this pathway, the *Transportation Roadmap* discusses the following issues:

- **challenges** to reaching zero emission and low carbon transportation, including goals and targets for greenhouse gas emissions reductions and climate resiliency for all transportation sectors by 2030 and 2050;
- **key sources** of greenhouse gas emissions from transportation and the expected impacts to the transportation system from a changing climate; and
- **barriers** and **opportunities** to reduce emissions and increase resiliency that shape the strategies and actions in the Roadmap.

The *Transportation Roadmap* lays out 48 actions for reducing emissions and increasing resiliency, organized under the following 6 strategic areas:

1. Accelerate the Transition of the Passenger Vehicle Fleet to Electric Vehicles
2. Reduce Driving through Active Transportation and Public Transit
3. Reduce Heavy Truck Emissions and Support Early Adoption of Zero Emission Heavy Trucks
4. Reduce Marine, Rail, and Aviation Emissions
5. Protect Existing Transportation Networks from Future Climate Impacts
6. Develop Climate Resilient Transportation Networks

The *Transportation Roadmap* proposes an implementation timeline to encourage swift early action on key issues. Given the short timelines and ambitious targets, staff have continued to work with all levels of government and other partners to take action while planning and developing the *Transportation Roadmap*.

The goals, strategies and actions in the draft *Transportation Roadmap* incorporate public and stakeholder feedback received to date, as previously summarized in a report on engagement for the *Clean Air Plan* and *Climate 2050* roadmaps received by the Climate Action Committee on November 13, 2020. Prior to proceeding with engagement, the draft *Climate 2050 Transportation Roadmap* will be formatted to match the look and feel of other *Climate 2050* documents.

Staff are currently working to further integrate equity considerations into the draft *Transportation Roadmap*. Staff intend to carry out additional work with partners to conduct an equity review before presenting the *Transportation Roadmap* for Board endorsement later this year.

Potential impact on greenhouse gas emissions
Initial modelling of *Climate 2050* carbon neutral scenarios, including key actions in the draft *Transportation Roadmap*, were presented to the Climate Action Committee on November 13, 2020. This modelling indicates that greenhouse gas emissions from all transportation sectors could be reduced by 30% below the 2010 regional total by 2030, and by over 85% by 2050. Emissions from light duty vehicles, the largest source of transportation emissions, could reach a reduction of over 40% by 2030 and can be virtually eliminated by 2050. These potential emission reductions reflect aggressive but achievable actions, but do not alone achieve the 2030 or 2050 targets to reduce regional greenhouse gas emissions from this sector, set in the draft *Transportation Roadmap*.

As discussed in the *Climate 2050 Strategic Framework*, all roadmaps, including the *Transportation Roadmap* are intended to serve as "living, breathing" documents that chart the path to achievement of 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 measurement and indicators. In the coming years, staff will continue to work with residents, businesses and governments to further accelerate these actions. Additional actions to accelerate the transition to resilient, carbon neutral transportation will be identified.

Relationship between the *Transportation Roadmap, Clean Air Plan, Metro 2050 and Transport 2050*
The *Clean Air Plan* will build on the 2011 *Integrated Air Quality and Greenhouse Gas Management Plan.* The *Clean Air Plan* supports *Climate 2050's* vision of a carbon neutral region by identifying the initial actions needed to meet the region's 2030 greenhouse gas target – a 45% reduction in greenhouse gas emissions from 2010 levels by 2030. Greenhouse gas reduction actions in the *Transportation Roadmap* are also included in the draft *Clean Air Plan*.

In addition to coordinating actions with the *Clean Air Plan*, there are important connections between the *Climate 2050 Transportation Roadmap*, *Metro 2050* and TransLink's regional transportation strategy, which is currently being updated to extend to 2050 (*Transport 2050*). Metro Vancouver, in partnership with its member jurisdictions, will manage regional land use and growth through *Metro 2050*. TransLink's *Transport 2050* will complement this vision with the region's long range regional transit strategy. The *Climate 2050 Transportation Roadmap* will outline the actions necessary to achieve regional carbon neutrality. Together, *Metro 2050* and *Transport 2050* will shape the future of how we move and live. Along with the *Transportation Roadmap*, these strategies will ensure that regional growth, transit, and climate strategies are mutually supportive.

ENGAGEMENT PROCESS
Metro Vancouver is committed to engaging with the public, stakeholders and other governments, including First Nations, that could be impacted by the *Climate 2050 Transportation Roadmap*, and will incorporate feedback into the final roadmap. The engagement will be conducted in accordance with the Board Policy on Public Engagement and will build on the work completed to date to develop

the draft *Transportation Roadmap*. Many of the GHG reduction actions in the *Transportation Roadmap* parallel the *Clean Air Plan* and will be brought forward through the *Clean Air Plan* engagement and adoption processes.

The engagement is designed to reach a broad audience to convey the importance of zero emissions, low carbon, and resilient transportation. Feedback sought from specific sectors and organizations might include, for example; support, concerns about implementation or impacts, and ideas for innovation and collaboration. Due to public health regulations, engagement is expected to be conducted through virtual means, and staff are planning creative and engaging materials to encourage feedback. This feedback will be reported to the Committee, highlighting how it informed a finalized *Transportation Roadmap,* which will be presented to the Committee and Board for consideration in the fall of 2021.

ALTERNATIVES

1) That the MVRD Board authorize staff to proceed with engagement on the draft *Climate 2050 Transportation Roadmap*, as presented in the report dated March 24, 2021, titled "Draft *Climate 2050 Transportation Roadmap*".

2) That the MVRD Board receive for information the report dated March 24, 2021, titled "Draft *Climate 2050 Transportation 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 of engagement activities and deliverables for the *Climate 2050 Roadmaps* with the development of the *Clean Air Plan* and 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 *Transportation Roadmap* lays out strategies and actions to transition regional transportation to carbon neutral by 2050. If endorsed by the Board, Metro Vancouver intends to seek feedback on the draft *Transportation Roadmap* from the public, stakeholders and other governments. This engagement will be undertaken in coordination with engagement on the draft *Clean Air Plan*.

Staff recommend Alternative 1, for the Board to endorse the draft *Climate 2050 Transportation Roadmap* for the purposes of public engagement, and authorize staff to proceed with the public engagement process. Engagement is intended to provide sufficient opportunity to interested parties to learn about the draft strategies and actions in the *Transportation Roadmap* and provide feedback. Feedback from engagement will inform the development of a final *Transportation Roadmap* for Committee and Board consideration, planned for fall 2021.

Attachment

Climate 2050 Transportation Roadmap, draft dated April 2021 *(44840617)*

44479038

Climate 2050 Roadmap

Transportation

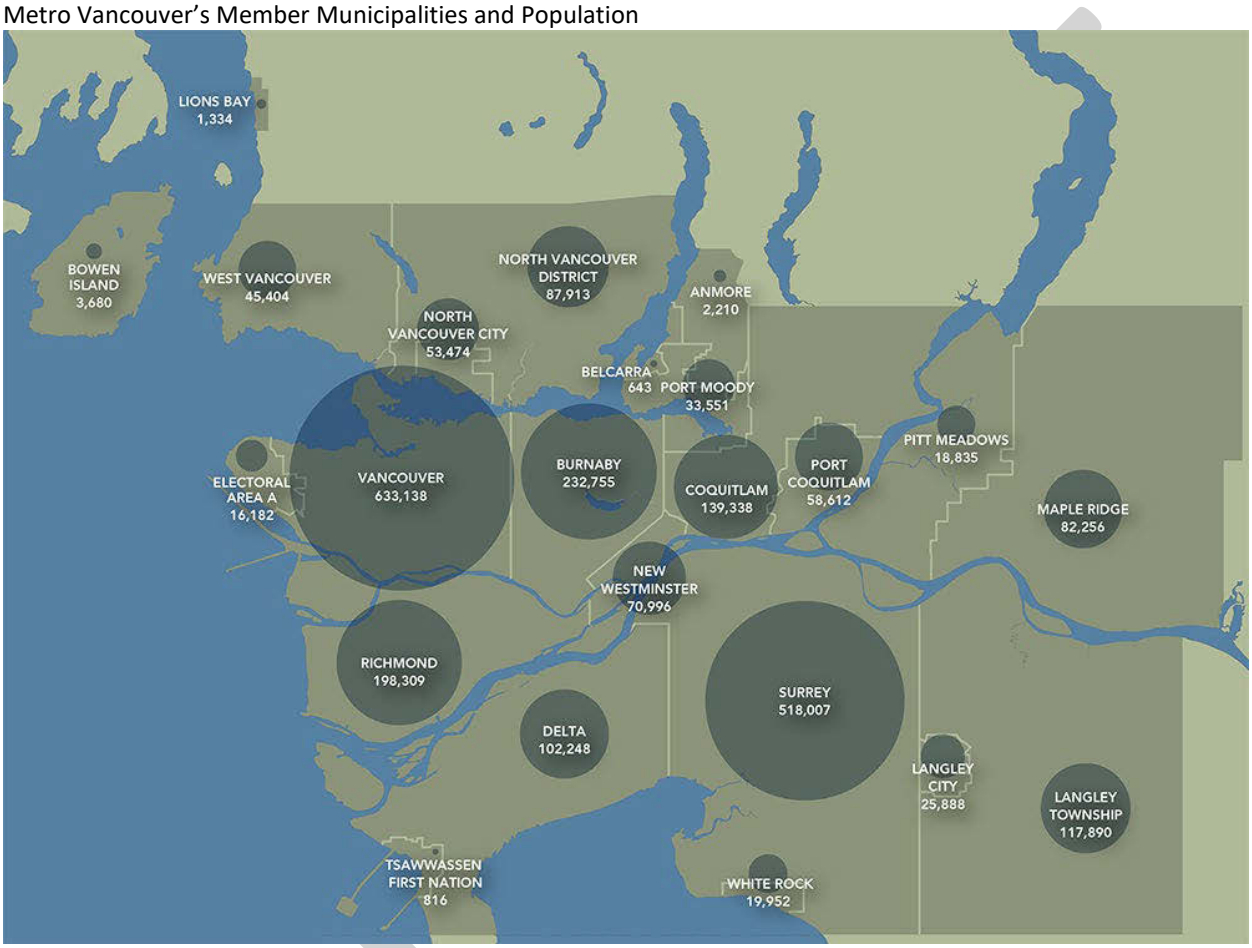
A pathway to carbon neutral transportation in Metro Vancouver

April 2021

DRAFT

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.

Metro Vancouver's Member Municipalities and Population



We heard you

The *Climate 2050 Transportation Roadmap* envisions what a carbon neutral and resilient transportation future can look like in Metro Vancouver. The focus of this *Roadmap* is on reducing greenhouse gases from all forms of transportation, and highlighting considerations to improve resiliency in our transportation networks. Metro Vancouver works with many organizations with responsibilities related to transportation planning, including TransLink.

This *Roadmap* was drafted in the winter of 2020-21, based on feedback received from a broad range of individuals, organizations and stakeholder groups between 2019 and 2020. Engagement was centred around the Metro Vancouver *Transportation Discussion Paper* to support *Climate 2050*, introduced for public and stakeholder comment in late 2019, just as BC began its response to the COVID-19 pandemic.

Public feedback is valued, and project teams will seek input on this draft Roadmap through the Spring and Summer of 2021. 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, metrovancouver.org, search "Climate 2050 Transportation 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.

The Roadmap at a Glance

We rely on our regional transportation system every day to work, study, play, and access important services. This system also ensures that goods move efficiently and reliably through our region. However, transportation is the largest source of greenhouse gas emissions in our region as a result of the fossil fuels used to power cars, trucks, trains, boats, and aircraft.

Although it is currently the largest source of regional greenhouse gas emissions, transportation is one of the best opportunities to start reducing emissions, particularly for personal transportation. The region is well positioned to continue with intentional land use planning that supports walking, cycling, transit, and other shared mobility modes. Electric vehicles are widely available and ready to be used on a regional scale.

As personal transportation transitions to being zero emission, medium and heavy trucks, marine vessels, aviation, and rail will become the largest sources of transportation greenhouse gas emissions in the region. Accelerating ongoing actions that support rapid development and scale-up of zero emission and low carbon options for these sectors, as well as new innovations in technology, will ensure that the transportation sector as a whole can transition to carbon neutrality by 2050.

Even as we reduce emissions from transportation, it is critical that we develop a transportation network that is resilient to the impacts of a changing climate. Some impacts from climate change are locked in, and will create vulnerabilities in our existing system. We must protect existing networks and infrastructure, and develop a resilient transportation system moving forward to ensure that regional transportation continues to be safe, reliable, and comfortable.

The *Transportation Roadmap* lays out 48 actions for reducing emissions and increasing resiliency, organized under the following six strategic areas:

1. Accelerate the Transition of the Passenger Vehicle Fleet to Electric Vehicles
2. Reduce Driving through Active Transportation and Public Transit
3. Reduce Heavy Truck Emissions and Support Early Adoption of Zero Emission Heavy Trucks
4. Reduce Marine, Rail, and Aviation Emissions
5. Protect Existing Transportation Networks from Future Climate Impacts
6. Develop Climate Resilient Transportation Networks

Although there is much work to be done, there are some important actions that need to be started soon in order to make a major difference in accelerating the region's drive to carbon neutral and resilient transportation. It is critical that the actions to reduce emissions identified in this *Roadmap* are implemented rapidly to set this transition in motion as soon as possible. Taking early action to reduce emissions can also help improve air quality, support health and well-being through exercise, and enhance low carbon resilience sooner rather than later.

We are not alone in this challenge. Many of Metro Vancouver's member jurisdictions, as well as the provincial and federal governments, have committed to ambitious targets and bold leadership to respond to the global climate crisis. The actions in this *Roadmap* demonstrate the importance of working collectively to reach these objectives, and will complement other plans guiding regional transportation. Together, we can create a carbon neutral and resilient regional transportation system.

Contents

Climate 2050 Transportation Roadmap

A pathway to carbon neutral transportation in Metro Vancouver

Visioning Carbon Neutral Transportation in 2050

In 2050, everyday movement of people around the region in cars and trucks has transitioned from being the largest source of greenhouse gas emissions in the region to being completely emissions free. More Metro Vancouver residents live in walkable urban centres, can comfortably walk or bike for many of their day-to-day trips, and access convenient, reliable public transit to key destinations. Cars and trucks are powered by electricity and are zero emission, creating almost no air pollution and less noise. The regional transportation system integrates different modes and vehicle charging networks, creating a diverse range of clean, affordable transportation options for residents.

Local goods movement and transit produce no greenhouse gas emissions, with almost all vehicles powered by electricity or hydrogen. Large trucks, trains, marine vessels, and aircraft moving goods and people in and out of the region use biofuels and low or zero emission engines. The Metro Vancouver region is a leader in the use of innovative technologies for trains, marine vessels, and aircraft, and is a hub for low emission goods movement. Transportation networks are located and designed to be resilient to the impacts of a changing climate, ensuring safe and reliable transportation of people and goods in the region.

The Challenge

Transportation is the largest source of emissions in the region, but also has great potential to drastically reduce those emissions in the next 30 years. The majority of transportation emissions in our region come from fossil fuels used to power cars and trucks. Once a car or truck is purchased, it usually stays on the road for at least 10 years; most vehicles bought today will be in use in 2030. Trains, marine vessels, and aircraft also produce greenhouse gas emissions. The larger engines used in these modes of transportation pose an even greater challenge, as they are designed to last even longer and are very costly to replace.

Making it comfortable and easy to get around the region by walking, cycling, or using transit, and transitioning to zero emission engines and biofuels as soon as possible is critical in order for transportation to go from being the largest source of emissions to one of the smallest.

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 under development.

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 our children and grandchildren at higher cost and consequence. Metro Vancouver and many of its member municipalities 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.

Goals

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

It also sets an interim target of 45% reduction in greenhouse gas emissions from 2010 levels, by 2030.

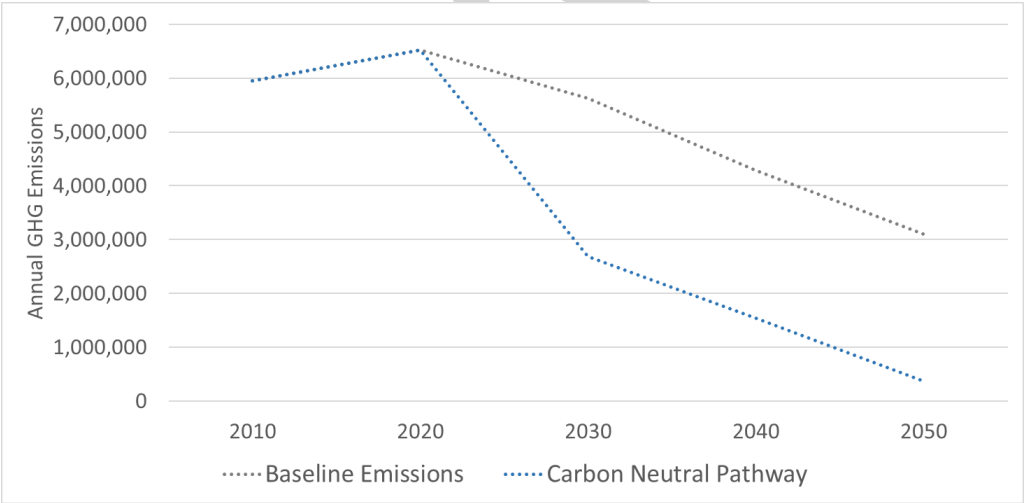
Achieving this vision means setting goals in each of the *Climate 2050 Roadmaps*, in order to ensure that each sector in the region plays as strong a role as possible in getting to a carbon neutral, resilient region.

Metro Vancouver has set these goals for transportation in this region, out to 2030 and 2050.

GOAL: All personal travel within the region is made by active transportation or using zero emission technologies powered by clean, renewable energy.	Targets By 2030: - 65% reduction in greenhouse gas emissions, from 2010 levels By 2050: - 100% reduction in greenhouse gas emissions - All passenger vehicles on the road are zero emission, powered by clean, renewable electricity or hydrogen
GOAL: All medium and heavy duty trucks and rail locomotives operating within the region use zero emission technologies powered by clean, renewable energy.	Targets By 2030: - 35% reduction in greenhouse gas emissions, from 2010 levels By 2050: - 100% reduction in greenhouse gas emissions - All medium duty trucks are zero emission, powered by clean, renewable electricity or hydrogen - All heavy duty trucks and rail locomotives use either zero emission technologies or biofuels
GOAL: All aircraft and marine vessels operating in the region use low emission and zero carbon technologies powered by clean, renewable energy.	Targets By 2030: - 35% reduction in greenhouse gas emissions, from 2010 levels

	By 2050: - 75% reduction in greenhouse gas emissions, from 2010 levels
Goal: the regional transportation system is safe, reliable, and resilient to the current and future impacts of climate change.	<u>Targets</u> By 2030: - All major transportation infrastructure projects are located outside of areas with known, unmitigated climate hazards By 2050: - All transportation networks and infrastructure are protected from current and future impacts of climate hazards

The diagram below compares a baseline scenario – the pathway we are on now – with the pathway needed to reach a carbon neutral future, in line with the targets described above.



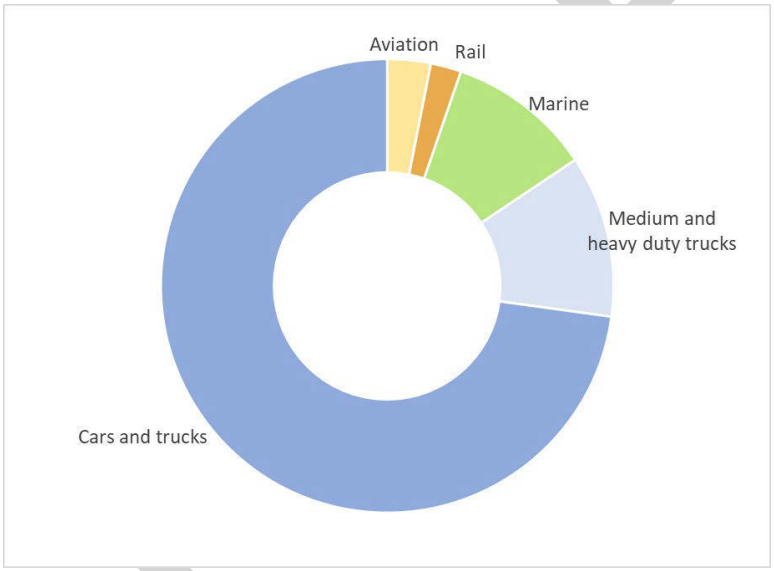
Emissions trajectory comparison for regional transportation emissions (all subsectors), comparing our baseline pathway to a potential pathway to regional carbon neutrality.

Reaching these ambitious goals will require extensive collaboration with key partners. Many of the actions identified in this Roadmap will be led by other governments (e.g., national, provincial, local, First Nations), TransLink, and industry. Metro Vancouver has a long history of working with all levels of government 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, the Federal Government's climate plan called *A Healthy Environment and a Healthy Economy*, Metro Vancouver's member jurisdictions, community and corporate climate plans, TransLink, utilities, First Nations, and, increasingly, industry associations.

Emissions from Transportation in Metro Vancouver

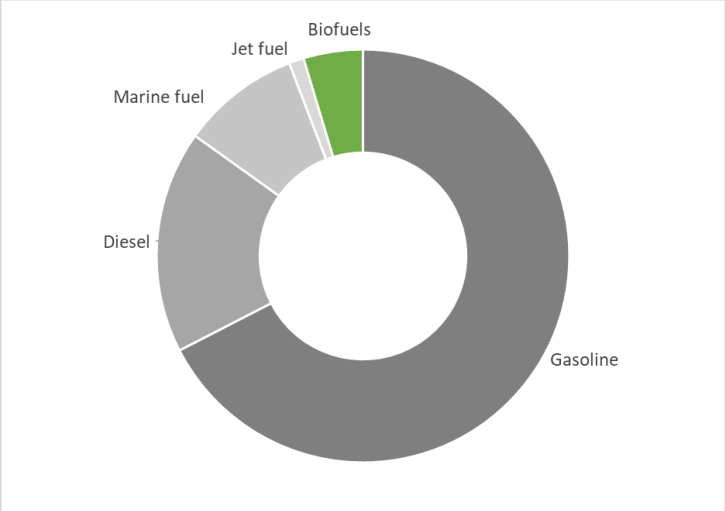
The movement of people and goods – whether by car, truck, train, aircraft or boat – is the largest source of greenhouse gas emissions in Metro Vancouver, accounting for over 40% of total annual regional greenhouse gas emissions. The 1.5 million passenger cars and trucks registered in the region make up most of those emissions, accounting for almost 75% of transportation emissions. 40,000 medium and heavy duty trucks registered in the region (plus the trucks registered elsewhere that travel in and out of the region) generate over 10% of regional transportation emissions.

Around 150 million tonnes of cargo are handled at port terminals in the region every year, supporting the regional economy. This cargo movement is the main driver of marine vessel emissions in the region, though passenger ferries, cruise ships, harbour vessels, and pleasure craft are also sources of emissions. Together, marine transportation causes about 10% of transportation emissions. Trains used for goods movement accounts for most rail emissions in the region. Along with a small amount of passenger rail travel, this contributes about 2% of transportation emissions. Airports in the region handle 25 million passengers per year, which generate about 3% of regional transportation emissions. While aviation and marine emissions account for a relatively small amount of local greenhouse gas emissions, they are a significant source of emissions globally.



Breakdown of Metro Vancouver transportation greenhouse gas emissions

Virtually all of the energy used to power transportation is fossil fuel based, the majority of which is gasoline and diesel used in cars and trucks. A small amount of natural gas is used as a fuel for compressed natural gas vehicles, such as transit buses. Marine vessels and aircraft use specialized fossil fuels. Most of the trains in the region use diesel, though the SkyTrain network runs on electricity. In recent years, the advent of electric vehicles and biofuels have introduced the use of some zero emission vehicles and low carbon biofuels, but these still account for a very small proportion of overall energy use in transportation.



Breakdown of transportation energy use. Compressed natural gas not shown as it accounts for less 1% of total energy use. Electricity is not shown; currently, electricity use for transportation is estimated to be small relative to other fuel types.

Call out Box: The Connection between Climate and Air Quality

In addition to being the region's largest source of greenhouse gas emissions, the transportation sector has a significant impact on regional air quality. It generates about half of diesel particulate matter, over half of nitrogen oxides, and roughly a third of sulphur oxides produced by all sectors in the region.

Residents in the region generally experience good air quality. However, health researchers have demonstrated that there are no known safe levels for some air contaminants that are harmful to human health. Many air quality impacts are localized and can be felt more in key transportation corridors and hubs, negatively impacting human health.

Metro Vancouver is responsible for managing and regulating air contaminants in the region, including greenhouse gases from transportation, under its authority delegated by the BC Government in *the Environmental Management Act*. The *Clean Air Plan*, Metro Vancouver's air quality and greenhouse gas management plan, will reduce health-harming air contaminant emissions and impacts in our region over the next 10 years. As many of the same actions that reduce greenhouse gases also reduce health-harming air contaminants, this supports the 30-year goal of a climate neutral region by 2050 while also working towards regional air quality targets. Actions in this Roadmap and the *Clean Air Plan* will help reduce all of these emissions to protect human health.

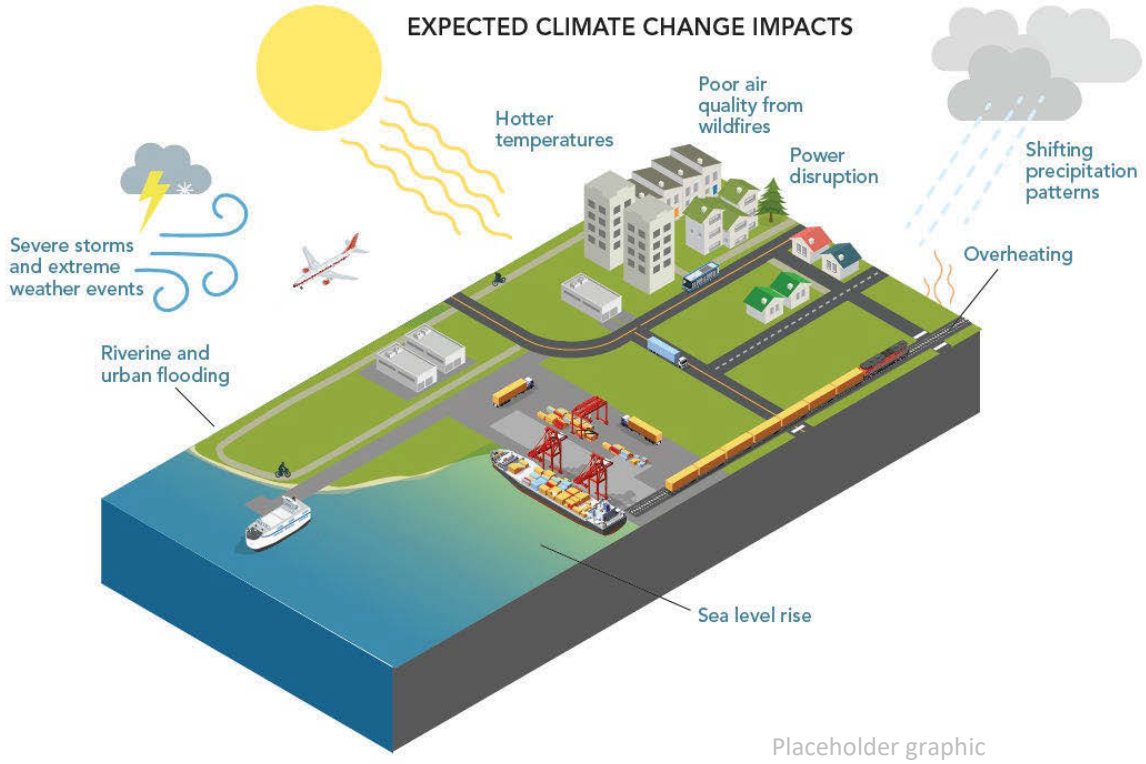
Climate Change Impacts on Transportation

We rely on our transportation system to reliably and comfortably get around the region and beyond, and for the supply of goods that we use every day. Ensuring that the transportation system is resilient to the impacts of a changing climate is essential. Transportation networks function smoothly due to infrastructure including roads, bridges, rail lines, transit, bike lanes, sidewalks, ports, ferry terminals, and airports. Most of this infrastructure lasts for decades, but has not always been designed to accommodate the anticipated impacts of climate change.

Metro Vancouver Climate Change Projections

While reducing regional greenhouse gas 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 drastic emission reductions. There are already a number of projected changes to local climate conditions in Metro Vancouver:

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



Placeholder graphic

Climate Change Impacts on Regional Transportation

Existing and new transportation infrastructure will need to adapt to increasing impacts from:

- **Riverine and urban flooding** caused by periods of heavy rainfall during extreme weather events such as storms, or as a result of major spring freshets (snow melts) linked to changing snowpack. This can lead to localized flooding, power failures, landslides, and disruptions to the transportation system.
- **Sea level rise**, which will impact coastal areas in our region, threatening low elevation parts of the transportation network with flooding. Sea level rise can also magnify the impact posed by other hazardous conditions in coastal areas such as subsidence (land sinking), king tides and storm surges, and heavy winds and precipitation caused by storms.

- **Heatwaves, wildfires, and droughts** caused by warmer temperatures and changing precipitation patterns can impact the safety and comfort of walking, cycling, and taking transit. Major wildfire events could also disrupt inter-regional travel.

These impacts could have consequences to this region's transportation networks in numerous ways, such as:

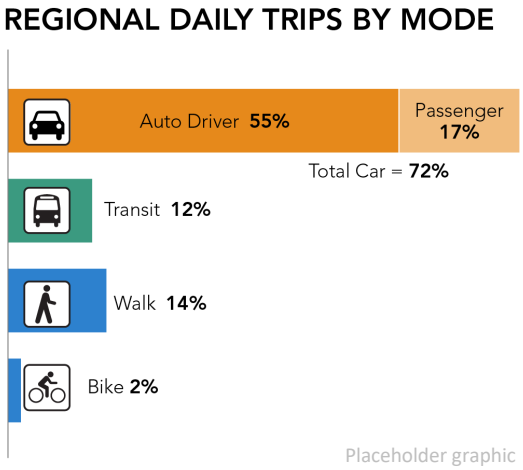
- **Provincial highways, municipal arterial roads, and local roads** around the Fraser River and Burrard Inlet may be susceptible to flooding that could disrupt emergency services, delay goods movement, and isolate residents and workers. Wildfires and landslides pose additional threats by affecting transportation access in and out of the region.
- **Public transit** across the region could be impacted by flooding through disruptions to services and infrastructure for SkyTrain, West Coast Express, SeaBus terminals, and roads used by transit buses which would prevent residents and workers from travelling for work, school, recreation, and access to other services.
- The **Vancouver International Airport** is located at sea level so its runways, terminal grounds, and access roads are vulnerable to flooding and sea level rise. Flooding could also impact smaller regional airports such as Boundary Bay Airport, Pitt Meadows Airport and Delta Heritage Air Park.
- **Truck routes** and **rail lines** servicing the Vancouver Fraser Port Authority and industrial lands in the region could be damaged or disrupted by flooding, sea level rise, storm surges and heat waves, which could have cascading effects for supply chains.
- **BC Ferries terminals** could be susceptible to sea level rise, flooding and increased delays from high winds, impacting passenger transportation as well as goods movement.
- **Bike lanes and regional greenways** could be prone to flooding if they are located near natural areas or along the Fraser River. Additionally, hotter temperatures and degraded air quality from wildfire activity may result in dangerous conditions for walking and cycling.

Zero Emission, Low Carbon Transportation

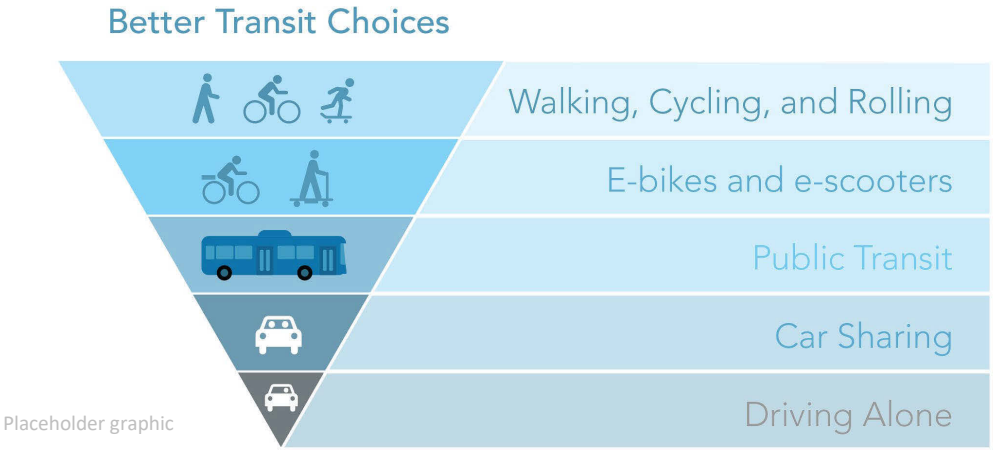
Emissions from transportation are caused by engines using fossil fuels, such as gasoline and diesel. The two key pathways to reducing emissions in transportation are to shift trips to active transportation, transit, and more energy efficient vehicles, reducing the use of fossil fuels, and to increase the use of zero emission vehicles and biofuels. Reducing the amount of driving in cars and trucks is a first step towards reducing transportation emissions, but achieving significant emission reductions in transportation will also mean switching from fossils fuels to clean, renewable energy that is zero emission or low carbon and replenished over days or years. Some modes of transportation, like cars or small trucks, are rapidly developing electric options. Other types of vehicles, such as heavy trucks used for goods movement, are more technologically challenging to electrify, and may rely more on the use of hydrogen or biofuels to reduce greenhouse gas emissions. Trains, ships, and aircraft are large, complex pieces of equipment that move between regions and countries, and face some unique challenges.

Reducing Driving

Over 70% of all trips in the region are made by car, and most of those are made by cars with a single occupant, the driver. However, there are many ways residents and visitors can make their daily trips: walking, cycling, taking transit, and driving with or without other passengers. These different modes have different impacts on greenhouse gas emissions. When people walk or cycle to their destination, they do not produce any emissions. On transit, one bus or train replaces several individual car trips. Carpooling also reduces the number of cars on the roads. New technologies and services like electric bicycles, car sharing, and ride hailing help reduce the need for people to drive or own their own car. These are all ways to reduce emissions by driving less. Driving less also means using less energy in cars, freeing up clean, renewable energy for use in other modes of transportation or sectors.



Many of the modes which produce little to no greenhouse gas emissions also have significant co-benefits. People who walk, cycle and ride transit enjoy lower transportation costs and improved health and well-being. Reduced driving can lessen road congestion. Having multiple ways to get to and from key destinations also helps create a system that is more resilient to climate impacts.



By shaping our neighbourhoods and communities with effective urban design, land use, zoning, and allocation of road space, we can create complete, compact communities that make walking, rolling and cycling well connected and comfortable for most short trips, and result in more efficient trips by car. Complete communities also support a frequent and efficient transit network that connects key destinations with comfortable, reliable service. However, even as the region continues to build towards well-connected, compact communities served by transit, many trips will be taken by vehicles. In order to eliminate greenhouse gas emissions from personal transportation, we need to find ways to make our vehicles zero emissions.

Call out Box: Working Together to Reduce Regional Transportation Emissions
Strong regional land use policies are foundational to achieving the targets in the *Climate 2050 Transportation Roadmap*. There are several organizations that manage regional land use and transportation planning:

Metro Vancouver, in partnership with its member jurisdictions, manages regional land use and growth through the *Regional Growth Strategy*, which is being updated to extend to 2050 (*Metro 2050*). The *Strategy* outlines a vision for a compact region with a network of complete communities well connected by public transit.

TransLink is responsible for regional transportation planning, managing regional road networks, and delivering transit services. TransLink is currently developing *Transport 2050*, the region's long range regional transportation strategy, which will guide investment and planning decisions for the regional transportation system over the next 30 years. Together, *Metro 2050* and *Transport 2050* will shape how we live and move.

The **BC Government** is responsible for major transportation infrastructure such as highways, provides funding for capital projects, and sets policy to meet provincial environmental and economic objectives.

The *Transportation Roadmap* links together land use, transportation planning, and emissions reducing technologies to identify a pathway to reaching a carbon neutral and resilient transportation sector. This includes actions by other organizations that affect the regional transportation system.

Zero Emission Transportation Options

Electricity is a well-known zero emission source of energy that we already encounter every day. In British Columbia, almost all of the electricity that we use is generated from hydropower, making electricity a form of clean, renewable energy. When electricity is used as a source of energy to power vehicles in Metro Vancouver, there are no emissions from the tailpipe. Electric vehicles have become an increasingly familiar sight on the road, and are the best known type of zero emission vehicles. TransLink's fleet of transit vehicles also makes use of electric trolleys with overhead wires, and they have committed to transitioning to a 100% renewably powered fleet by 2050 through the *Low Carbon Fleet Strategy*.

British Columbia has world-leading legislation in place (the *BC Zero-Emission Vehicles Act*) that requires that more new cars and small trucks sold in British Columbia are zero emission, reaching 100% of new vehicle sales by 2040. However, because most vehicles stay on the road for at least 10 years after they are purchased, it will take a long time for gasoline and diesel powered vehicles purchased over the next two decades to reach the end of their lifecycle and be replaced with new zero emission vehicles. Additionally, these sales targets allow for the use of plug-in hybrid vehicles. As these vehicles use gasoline or diesel as a fuel in addition to electricity, they are not truly zero emission, but can be a low emission alternative to conventional fossil fuel-powered vehicles.

While electric vehicles are an important technology to reduce emissions from transportation, not all modes of transportation are ready to move to fully electric technologies. Electrifying some types of medium and heavy duty trucks is more challenging due to the heavier loads they carry, specialized operating needs, long driving ranges, and lack of rapid electrical charging in dispersed, remote destinations outside of the region. Electric options for ferries and small aircraft are available, but still very much under development. Larger marine vessels and aircraft are difficult to electrify due to the long distances they travel and specific operating demands, and no fully electric options are available for the largest and most complex of these. Electric rail locomotives are used widely in other parts of the world, such as Europe. However, transitioning inter-provincial railways to these zero emission fuels is costly and requires coordination at the provincial and national level.

Hydrogen can also be a zero emission fuel. Hydrogen technologies are emerging for all transportation modes, and could play an important role in helping some modes that are challenging to electrify transition to zero emission technologies. While hydrogen engines generally produce zero tailpipe greenhouse gas emissions, hydrogen can be

produced using carbon intensive means that affect its overall carbon footprint. When produced using clean, renewable energy, hydrogen can be a zero emission and low carbon transportation fuel.

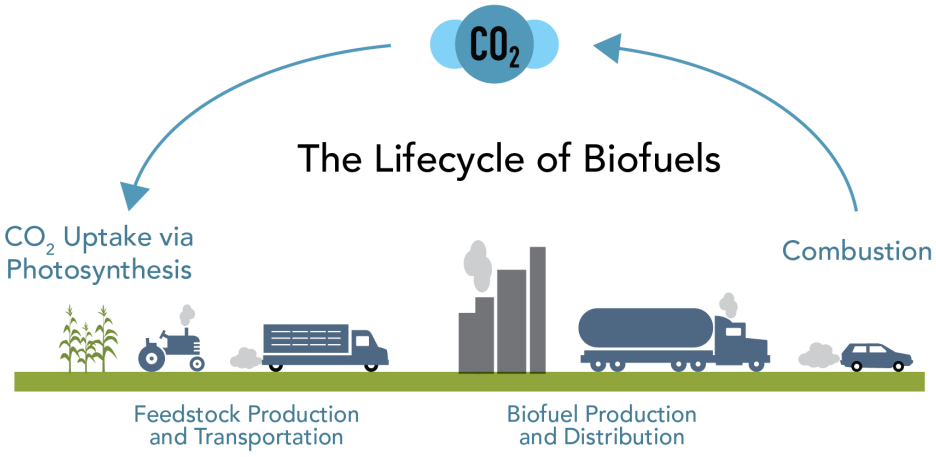
Call Out Box: Hydrogen: A Zero Emission Fuel?
There are several different means of production for hydrogen that determine how emission intensive it is:

- **Grey hydrogen** is produced using natural gas, creating significant greenhouse emissions and a reliance on fossil fuels.
- **Blue hydrogen** is also produced using natural gas, but the emissions created during production are captured and stored.
- **Green hydrogen** is produced using electricity, and can be a zero emission and zero carbon fuel if the electricity used is generated from clean, renewable sources.

In the transportation sector, hydrogen can be used to power vehicles, marine vessels, trains, and more in the form of **hydrogen fuel cells** or as **fuel for an internal combustion engine**. These technologies release water vapor from the tailpipe, and don't produce direct greenhouse gas emissions. However, hydrogen combustion engines may produce some nitrogen oxides, a health-harming air contaminant.

Strategic Use of Low Carbon Biofuels

In addition to zero emission sources of energy such as electricity and hydrogen, there are a number of fuels that have a low carbon footprint and are produced from organic matter derived from biomass such as plants. These biofuels are renewable and can be a low carbon source of energy. To use some of these fuels, specialized engines may be required, whereas others can be used directly in regular gasoline and diesel combustion engines. While not as visible as electric cars on the road, this is another example of a climate solution we already encounter every day. As a result of the BC Low Carbon Fuel Standard and federal requirements, a small proportion of biofuels are blended into the regular gasoline and diesel that we use in British Columbia.



Placeholder graphic

Though biofuels can be low carbon alternatives to gasoline and diesel, they still produce tailpipe greenhouse gas emissions as well as air contaminants that can have negative impacts for public health and the environment. Feedstocks must be carefully managed to ensure that greenhouse gas emissions are balanced with carbon uptake in order for biofuels to be truly low carbon. While biofuels are currently available and used in limited quantities, widespread use could have consequences for the way that we use agricultural land, forests, and other ecosystems. Some biofuels and renewable gas are produced in the region, including production at a number of Metro

Vancouver facilities. However, biofuels produced outside of the region will be needed to meet demand. A lifecycle view of the carbon emissions from biofuels is needed to ensure that they are a low carbon alternative to fossil fuels and do not have unintended ecological impacts.

If used strategically, biofuels have the potential to displace the use of fossil fuels in large and specialized trucks, rail locomotives, aircraft, and marine vessels that are difficult to electrify, especially in the short term while new zero emission technologies are developed. Biofuels can also lower the carbon footprint associated with hybrid technologies that are not solely powered by electricity.

Call Out Box: Low Carbon Transportation Biofuels
Low carbon diesel fuels include biodiesel and renewable diesel:

- **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. When used in higher amounts, a specialized engine is required.
- **Renewable diesel** is also made from vegetable oils and animal fats, but is produced using a different process that makes the end fuel identical to fossil diesel. Because there is no chemical difference from fossil diesel, renewable diesel can be used directly in conventional diesel engines in amounts up to 100% 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 in regular gasoline in amounts up to 10% before a different engine is required. Flex fuel vehicles that can accommodate gasoline blends with up to 85% ethanol have become increasingly common in North America.

Renewable natural gas is produced from decomposing waste, and can be used in compressed natural gas vehicles and other equipment as a renewable, low carbon alternative to fossil natural gas.

There are specialized types of renewable fuels for aircraft and marine vessels, such as **sustainable aviation fuel**.

Low Carbon Aircraft, Trains, and Ships

All modes of transportation move in and out of the region some of the time, but aircraft, trains, and ships almost exclusively travel in and out of the region. They often travel long distances that cross provincial and international borders. Marine and air movement between countries is governed by international organizations such as the International Maritime Organization and the International Civil Aviation Organization. Policies and standards adopted by these organizations, action taken by other countries, and actions by the federal government are key determinants of whether and how these sectors will reduce greenhouse gas emissions. Rail transport faces similar challenges, as rail lines coming into and out of the region are subject to federal regulations and, when they cross the American border, the United States' regulations. National and international cooperation is essential to find ways to reduce emissions in these sectors.

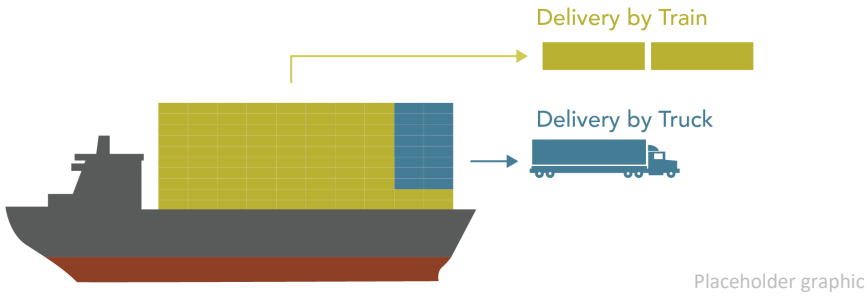
Call Out Box: Working Across Borders to Reduce Emissions

Canadian National Rail and **Canadian Pacific Rail** are the two major freight railways in Canada, both of which operate in the Metro Vancouver region. They are subject to legislation and regulation by the federal government. While Transport Canada has regulations in place to manage air contaminants from rail, there is no federal strategy in place to significantly reduce greenhouse gas emissions from rail. Some rail lines in the region also cross the American border, creating a need for international alignment.

The **International Maritime Organization (IMO)** is a United Nations agency with responsibility for the prevention of marine and atmospheric pollution by ships, as well as their safety and security. It has committed to a target of reducing total annual greenhouse gas emissions from international shipping by at least 50% by 2050 (compared to 2008). It has also introduced technical and operational emission reduction measures for new ships. Individual member nations, like Canada, are responsible for adopting, implementing, and enforcing IMO requirements within their own domestic regulations.

The **International Civil Aviation Organization (ICAO)** is a United Nations agency that facilitates regulatory alignment between 193 member nations. It has adopted the aspirational goals of carbon neutral growth for the international aviation sector from 2020 onwards, as well as 2% annual fuel efficiency improvement from 2021 to 2050. Member nations are responsible for developing their own regulatory approaches to reaching these goals.

The Metro Vancouver region is as a key hub for goods movement and air travel in Canada and the Pacific Northwest through Canada's largest port, The Port of Vancouver (operated by the Vancouver Fraser Port Authority), as well as Canada's second busiest airport, the Vancouver International Airport. The region can leverage this position and accelerate change in these sectors by creating opportunities that support the use of zero emission technologies and biofuels. Developing supply chains for biofuels, offering access to infrastructure for zero emission engines and biofuels, using zero emission technologies for smaller vessels and shorter in-region trips, and establishing requirements for trains, planes, and ships that service the region are important components of a larger national and international approach to reducing emissions in these sectors. Actions taken in the region can help reduce aviation and marine emissions well beyond Metro Vancouver's borders.



Metro Vancouver is a hub for goods movement through the largest port in Canada, the Port of Vancouver

Ferries and local airlines move passengers between Metro Vancouver and neighbouring regions. Some of these, such as BC Ferries and Harbour Air, have introduced the use of innovative zero emission technologies. BC Ferries operates a number of battery-equipped ships on shorter routes. The ships are designed for full electric operation, but are fitted with hybrid technology that bridges the gap until shore charging infrastructure becomes available. Harbour Air has demonstrated the world's first fully electric commercial aircraft in a short test flight, and is advancing this technology for use in full length commercial flights in the future.

In addition to reducing greenhouse gas emissions from air, marine, and rail sources, it is critical that key transportation corridors and facilities such as ports, airports, and rail lines are resilient to the impacts of future climate hazards to minimize disruptions to goods movement, supply chains, and personal travel. Ships and aircraft used for goods movement, as well as ferries and rail lines used for passenger travel, must be adapted to a changing climate to ensure that connections to neighbouring regions and islands are reliable and safe.

Social Equity

We must ensure no one is left behind in the transition to a carbon neutral and resilient region. Metro Vancouver's efforts to move towards zero emission and low carbon transportation will continue to incorporate the voices and needs of a full range of communities to ensure that fairness and equity are of the highest priority. Organizations responsible for transportation related climate policies must consider whether inequity is created or magnified, and address these inequities to ensure a just transition.

Metro Vancouver will develop a strategic approach to assessing equity in our climate action. This will include community input, health impact assessments and other equity evaluation tools so that all residents benefit from these changes.

Barriers and Opportunities

The transportation sector presents an important opportunity to reduce regional greenhouse gas emissions in the next ten years and beyond, leading early emission reduction efforts in the region. Member jurisdictions, such as the City of Vancouver, and the BC government are global leaders in taking action to reduce transportation emissions, and have put in to place a number of policies that provide a strong foundation. However, additional action is needed to leverage this opportunity to its full potential.

Reduce Driving through Compact Communities
Underpinning shifts in the technologies and fuels we use to move people and goods will be the continued development of a compact region. Existing compact communities along transit networks and around transit hubs bring people closer to the places they wish to go and facilitate some of the highest public transit ridership levels in North America. However, the population of Metro Vancouver is expected to grow from 2.7 million to 3.8 million, an increase of over 40%, from 2020 to 2050. It is critical that regional growth is concentrated in compact, transit serviced areas to minimize growth in car use and driving distances. Ensuring that more people live in compact communities that are well-connected to work, school, services, and amenities will enable a more affordable, resilient, and efficient transition to zero emission day-to-day trips.

Rapid Uptake of Electric Vehicles
Electric vehicle and charging technologies have advanced substantially in recent years. Costs continue to decline, driving ranges are getting longer, and charging is getting faster. More makes and models will soon be available for larger vehicles. However, there are still barriers to rapidly increasing the amount of electric vehicles on the road:

- **Lack of affordable used electric vehicles.** Electric vehicles for personal use are widely available, inexpensive to charge, and declining in up front cost, but they still cost more than their fossil fuel counterparts and there is not yet an affordable used market for them. This creates inequities for lower income groups, and slows down the uptake of electric vehicles.
- **Diverse vehicle models are needed.** A greater variety of different electric vehicle models, such as SUVs, vans, and pickup trucks, are needed to meet diverse needs. Electric options are under development and will be available in coming years, but are not yet widely available for purchase.
- **Access to charging in large buildings can be challenging**. It can be expensive and complicated to access and install charging in large commercial and residential buildings like condos, townhomes, and multi-unit rentals. Better access to charging in these types of buildings is needed to support widespread electric vehicle uptake.
- **Infrastructure to support electric vehicle charging is needed.** As more people start using electric vehicles, new public fast charging stations and networks will be needed to support longer trips. A modernized electricity grid that integrates smart grid technologies can also help to support vehicle charging as electricity demand changes as a result of widespread electric vehicle use.

- **Accelerating electric vehicle uptake.** While the *BC Zero-Emission Vehicles Act* mandates sales targets for new electric vehicles, every new gasoline or diesel car sold in 2021 is likely to remain on the road until at least 2030. Additionally, market demand in the Metro Vancouver region has already exceeded regulated sales targets for early years. Finding ways to further accelerate electric vehicle uptake beyond the Provincial minimums to get more electric vehicles on the road earlier is a critical pathway to drastically reduce greenhouse gas emissions over the next ten years and beyond.

Reducing Emissions from Medium and Heavy Duty Trucks

Medium and heavy duty trucks used commercially will be slower and more difficult to transition to zero emission technologies than smaller vehicles used for personal transportation. It is unlikely that all of these vehicles will be ready to transition to zero emission technologies by 2050, creating a need for low carbon alternatives to bridge that gap. There are a number of barriers to wider adoption of zero emission and low carbon commercial vehicles:

- **Availability of zero emission vehicles is limited**. While there are several electric and hydrogen models developed for medium and heavy duty trucks, very few are in use and they are not yet widely available in British Columbia. The market for these vehicles must be expanded to make it possible to purchase zero emission vehicles in large quantities for a variety of commercial purposes.
- **Existing technologies have high up front costs.** The up front cost of zero emission vehicles is considerably higher than their conventional fossil fuel counterparts. As the market develops and production scales up, these costs are likely to follow trends in passenger vehicles and drop quickly. However, action is needed to accelerate market demand. Financial support will be needed to facilitate this transition.
- **Biofuel supply and availability is not yet developed**. Though some biofuels are already in use in gasoline and diesel used in the Metro Vancouver region, a significant ramp up of supply, production, and distribution of these fuels is needed before they can be deployed on a wider scale. As these supply chains develop, carbon intensity requirements are needed to ensure that biofuels have a lifecycle climate benefit.
- **Access to recharging and refueling outside the region may lag behind.** Recharging and refueling options for zero emission and low carbon vehicles will be more difficult to access for commercial vehicles that travel in and out of the region to far or remote destinations where access to fast electric charging, hydrogen refueling, and biofuels may not develop at the same pace as regional infrastructure.

Zero Emission and Low Carbon Technologies for Marine Vessels, Rail Locomotives, and Aircraft

As on-road vehicles transition to zero emission technologies and biofuels, marine vessels, rail locomotives, and aircraft will become the largest remaining sources of regional transportation greenhouse gas emissions. Additionally, as our economy grows, goods movement within and through the region will continue to grow, compounding the need to reduce emissions from marine and rail while maintaining a competitive local economy. However, reducing emissions from these sources is challenging for a number of reasons:

- **Innovative zero emission and low carbon technologies are still under development.** While there are some electric and hydrogen options developed for rail locomotives and small ferries, zero emission options for aircraft, harbour tugs, and large marine vessels are virtually non-existent. Rapid innovation in these modes is needed to develop and scale up production of viable zero emission technologies, especially as many of these engines last for decades and will still be in use in 2050.
- **Global demand for biofuels requires complex supply chains and large quantities of feedstocks.** Widespread use of biofuels for global marine and air movement will require huge amounts of these fuels and a high degree of coordination at production and refueling facilities around the world. A better understanding of global supply and production constraints is needed to effectively build a role for biofuels in sectors with significant international connections.
- **National and international cooperation is needed to effectively reduce emissions.** Cooperating with research institutions, industry partners, international agencies such as the IMO and ICAO, and other governments – locally, provincially, federally and internationally – will be key to developing new

technologies and building reliable refueling and recharging networks. A shared vision for emission reductions is needed to ensure these sectors are on a pathway to carbon neutrality.

The Journey to Carbon Neutral, Resilient Transportation

Call out Box: Linkages to Other *Climate 2050 Roadmaps*
There are many linkages between transportation and other *Climate 2050* issue areas. Some of the related issue areas for transportation include:

Land use and growth management – policies that support more compact, complete communities influence the form and location of the transportation network, how people move and how goods are transported;

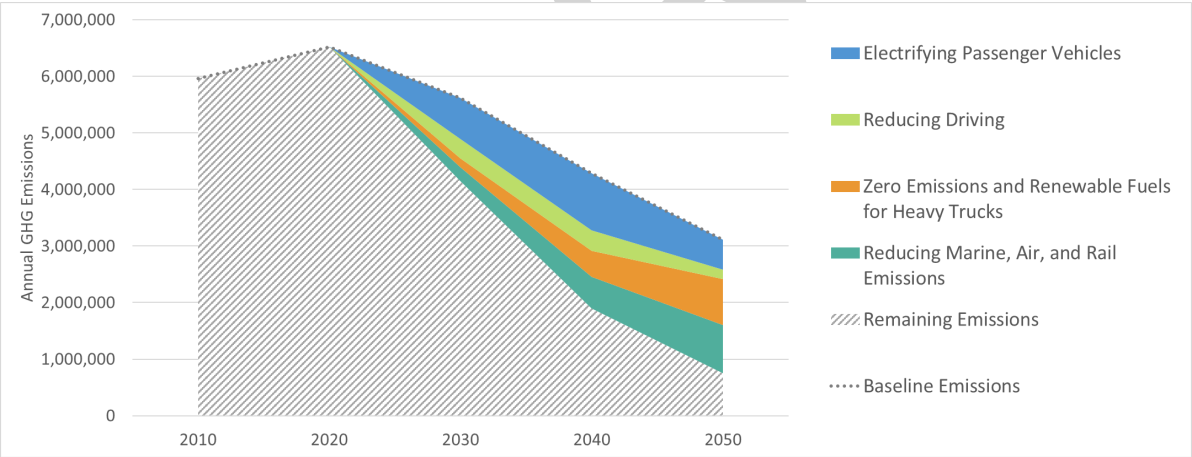
Infrastructure – the regional transportation network includes infrastructure such as roads, rail lines, bridges, and bike paths;

Energy – availability of clean, renewable energy to power regional transportation;

Human health and well-being – active transportation modes improve public health;

Buildings – home and workplace charging for electric vehicles will become more common, and;

Industry – delivery of goods and provision of services impact the amount and types of transportation that take place in the region.

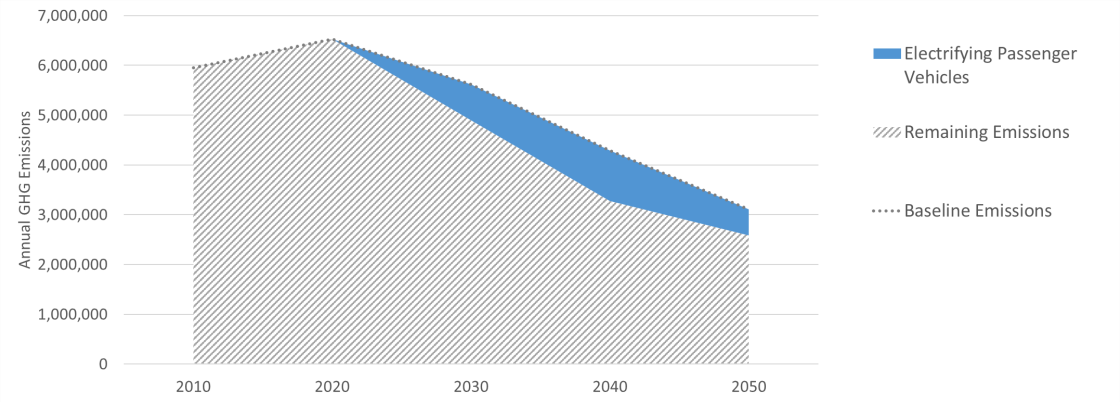


Potential impacts of the strategies and actions described in the Roadmap

Strategy 1: Accelerate the Transition of the Passenger Vehicle Fleet to Electric Vehicles

The 1.5 million passenger vehicles registered in the region are our largest source of greenhouse gases, contributing almost a third of all regional emissions. Electrifying passenger vehicles is the fastest way to significantly reduce these emissions, though work is needed to ensure that electric vehicles and charging infrastructure are reasonably accessible to everyone, including lower income households. The *BC Zero-Emission Vehicles Act* provides a pathway to 100% zero emission vehicle sales by 2040, but this timeline should be accelerated to get more electric vehicles on the road faster.

Potential Impacts of Strategy	*Key Partners*
Reduce annual greenhouse gases by up to **710,000** tonnes by 2030 Reduce annual greenhouse gases by up to **520,000** tonnes by 2050	- Member jurisdictions - BC Government - BC Hydro



Potential greenhouse gas emissions reductions associated with Strategy 1, Accelerate the Transition of the Passenger Vehicle Fleet to Electric Vehicles

1.1 Accelerate Sales Targets for New Electric Vehicles. (BIG MOVE) Advocate to the BC Government to accelerate the sales targets in the *BC Zero-Emission Vehicles Act* to reach 100% zero emission vehicle sales by 2030 (instead of current 2040 target). The BC Government should also modify the *Act* to prioritize 100% electric vehicles.

1.2 Develop Regional Emission Requirements for Passenger Vehicles. (BIG MOVE) Develop regulatory emission requirements for existing passenger vehicles, to be implemented by the BC Government or Metro Vancouver. Requirements could include low or zero emission zones, or a vehicle emission levy with rebates for replacing older vehicles. Any regulatory program must consider equity and be coordinated with member jurisdictions. Any program could also support actions focused on reducing total driving distances, including Action 2.3 on regional mobility pricing.

1.3 Make Electric Vehicles More Affordable. (BIG MOVE) Advocate to BC Government, Government of Canada and other regional partners to continue providing funding (e.g., incentives, loans and tax credits) for the purchase of new and used electric vehicles. Funding should be available for personal and business purchases and should prioritize groups who generally cannot afford these vehicles without funding programs, such as low and middle income residents.

1.4 Regional Electric Vehicle Charging Strategy. Develop a long-term regional strategy for electric vehicle charging infrastructure, coordinating with member jurisdictions, energy utilities, TransLink, and other regional partners. A strategy would identify where additional publicly accessible electric vehicle chargers are needed to ensure equitable access, as well as provide guidance on user fees, design and siting. The strategy should align with similar actions for medium and heavy duty trucks (Action 3.6).

1.5 Make New Passenger Vehicles Cleaner. Advocate to the Government of Canada to adopt more stringent fuel economy and emission standards for new passenger vehicles.

1.6 Expand Electric Vehicle Charging in Buildings. Work with member jurisdictions, BC Government, BC Hydro and Government of Canada to expand access to electric vehicle charging in buildings. This should include adoption of provincial "Right-to-Charge" legislation as well as code requirements that new or substantially renovated

buildings are wired for electric vehicle chargers. Expanding access should also include increased support and funding (e.g., incentives, loans, tax credits) for electric vehicle charging in existing buildings. Funding should prioritize groups who generally would not have access to chargers, such as residents living in rental buildings, strata buildings, non-market housing or secondary suites.

1.7 Electric Vehicle Outreach Programs. Enhance existing and deliver new public outreach programs about the benefits of electric vehicles and how to install electric vehicle chargers at workplaces and multi-family buildings, working with member jurisdictions and other regional partners.

1.8 Accelerated Electrification Targets for Ride-Hailing Services. Advocate to BC Government to establish vehicle electrification targets for ride-hailing and taxi fleets.

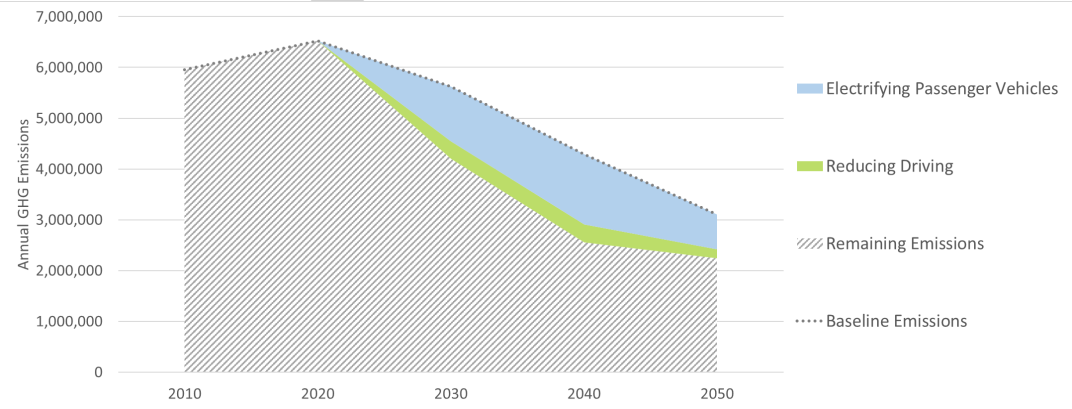
1.9 Transition the Corporate Fleet to Zero Emissions. (CORPORATE LEADERSHIP) Transition Metro Vancouver's corporate on-road fleet to zero carbon emission between 2035 and 2040, and zero emission by 2050. The transition would include both passenger and medium and heavy duty vehicles.

Strategy 2: Reduce Driving through Active Transportation and Public Transit

Transportation emissions at the community scale are driven by where people live, work, study and play. The Metro Vancouver *Regional Growth Strategy* and the *Regional Transportation Strategy* both outline policies to help create communities that are complete, compact, and transit oriented. When people live closer to where they work, study and play, more trips can be made by walking and cycling and on public transit. Emerging technologies and services such as electric bicycles and car sharing can also support a wider range of transportation options.

Reducing the amount of driving in the region contributes to many different goals, such as improving air quality and health impacts and managing traffic congestion as regional population grows. Active transportation in particular has important co-benefits such as improved health. However, helping residents and businesses to drive less is a long-term transition, and significant funding is needed to expand public transit and active transportation options.

Potential Impacts of Strategy	*Key Partners*
Reduce annual greenhouse gases by up to **280,000** tonnes by 2030 Reduce annual greenhouse gases by up to **170,000** tonnes by 2050	- Member jurisdictions - TransLink - BC Government - Government of Canada



Potential greenhouse gas emission reductions associated with Strategy 2, Reduce Driving through Active Transportation and Public Transit. Strategies 1 and 2 together show emission reductions in personal transportation, which are completely eliminated by 2050.

2.1 More Stable Funding for Regional Transit. Advocate to BC Government and Government of Canada to expand stable funding for the regional transit system to cover both operations and capital investments, including investments to transition to zero emission technologies.

2.2 Enhance and Improve Regional Transit. (BIG MOVE) Advocate to TransLink to increase public transit in the region. TransLink should increase transit frequency in key areas, transition to using clean, renewable energy, and implement other related air quality and climate actions outlined in the *Regional Transportation Strategy*. Regional emission reductions should be prioritized in transit expansion and service decisions, while ensuring that all residents have access to transportation options in a connected region.

2.3 Support Mobility Pricing. Support the development of mobility pricing in coordination with BC Government, TransLink and member jurisdictions. Any mobility pricing program for the region should prioritize reducing total driving distances and emissions, promoting fairness and equity, and should align with any low or zero emission zones in the region (see Actions 1.2 and 3.3).

2.4 More Stable Infrastructure Funding for Regional Active Transportation Networks. Advocate to BC Government and Government of Canada to expand stable funding for comprehensive regional and local active transportation networks. The networks should be well-connected, comfortable for most, and integrated with public transit. Network expansion should prioritize under-served areas to ensure all residents have access to active transportation options in a connected region. Network elements should include walking and cycling paths, regional greenways, separated bike lanes, and end-of-trip facilities suitable for all bike and mobility types, including charging for electric mobility devices.

2.5 Regional Parking Strategy to Reduce Driving. Develop a Regional Parking Strategy to prioritize active transportation and other low emission transportation options, coordinating with member jurisdictions and TransLink. The strategy could include replacing building parking minimums with maximums, establishing parking minimums for bicycles, implementing dynamic parking pricing and reducing free parking spaces. The strategy could also support uptake of electric and car-share vehicles by establishing electric vehicle charging requirements for parkades, and enhancing preferential parking rates and spaces for electric and car-share vehicles.

2.6 Support Residents and Businesses in Active Transportation. Advocate to the BC Government and Government of Canada to provide incentives (including tax credits) to residents and businesses to support active transportation, including for buying, renting or sharing all bike and mobility types. Incentive availability should prioritize groups who generally cannot access these transportation options, such as low-income residents.

2.7 Communicate the Benefits of Walking, Cycling and Public Transit. Support outreach campaigns led by TransLink, member jurisdictions and health authorities that show the benefits of walking, cycling (including electric bikes) and public transit, including the associated improvements to regional air quality and greenhouse gas emissions.

2.8 Implement Trip Reduction Programs. Advocate to BC Government to require large employers and major trip generators (e.g., shopping malls) to implement trip reduction programs. Such programs could require large employers and other major trip generators to measure staff or customer driving habits and take action to reduce driving. These programs should consider availability of lower emission alternatives and opportunities for remote and flexible work options.

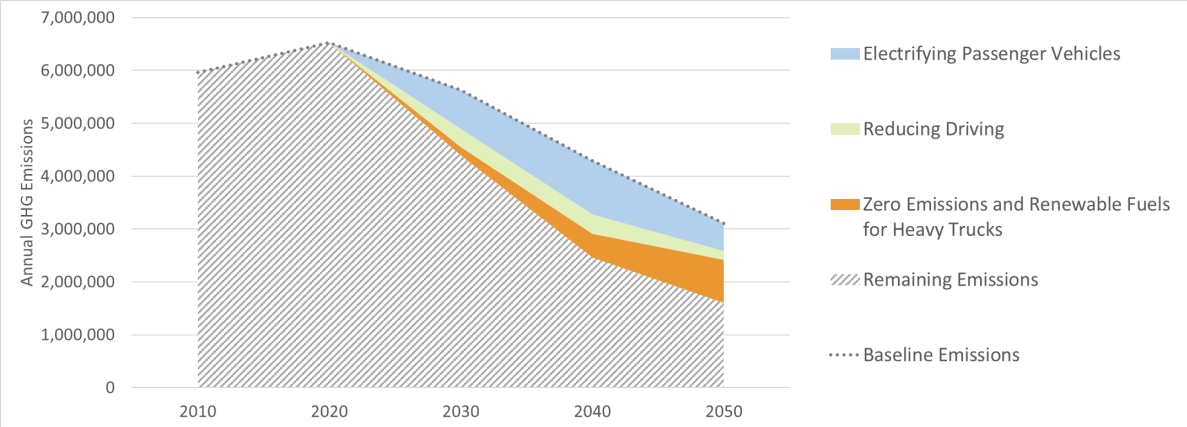
2.9 Support the Use of Bike- and Car-Sharing Services. Develop a regional strategy to support the increased use of bike- and car-sharing services, coordinating with member jurisdictions, TransLink and other regional partners. These services have been shown to reduce total driving distances among users.

2.10 Support Low Emissions Commuting by Staff. (CORPORATE LEADERSHIP) Develop and implement a Metro Vancouver corporate commuting strategy to reduce driving emissions. The strategy would encourage more commuting by active transportation, public transit and car-pooling. The strategy could also review parking policies, explore distributed and remote work options where operationally feasible, and recommend additional electric vehicle chargers at work sites.

Strategy 3: Reduce Heavy Truck Emissions and Support Early Adoption of Zero Emission Heavy Trucks

As our economy grows, goods movement in the region will continue to grow. Federal emission standards ensure new trucks use fuel more efficiently, and provincial clean fuel standards have reduced the carbon intensity of diesel, the primary fuel for medium and heavy duty trucks. Sales targets, incentives and a regional refueling strategy will accelerate the long term transition to zero emission medium and heavy duty trucks, reducing greenhouse gases and improving regional and local air quality while supporting a competitive local economy. Other medium and heavy duty vehicles used in the region, such as transit vehicles, must also shift towards zero emission technologies and low carbon fuels.

Potential Impacts of Strategy	*Key Partners*
Reduce annual greenhouse gases by up to **170,000** tonnes by 2030 Reduce annual greenhouse gases by up to **810,000** tonnes by 2050	- BC Government - TransLink - Trucking industry - Vancouver Fraser Port Authority - Member jurisdictions



Potential greenhouse gas emission reductions associated with Strategy 3, Reduce Heavy Truck Emissions and Support Early Adoption of Zero Emission Heavy Trucks

3.1 Regulate Existing Medium and Heavy Trucks. Develop regulatory requirements for existing medium and heavy duty trucks, implemented by the BC Government or Metro Vancouver. Regulatory approaches to reduce emissions could include an inspection and maintenance program that requires repairs on higher emitting trucks, registration requirements targeting older vehicles, and low or zero emission zones (aligned with Action

1.2). Requirements should be developed in coordination with member jurisdictions, Vancouver Fraser Port Authority, TransLink and other regional partners.

3.2 Require Zero Emission Sales Targets for New Medium and Heavy Trucks. (BIG MOVE) Advocate to the BC Government to set mandatory zero emission vehicle sales targets for new medium and heavy duty trucks. For medium duty trucks, the zero emission sales target should reach 100% by 2050. For heavy duty trucks, the zero emission sales target should reach 100% before 2060.

3.3 More Stringent Low Carbon Fuel Standards. (BIG MOVE) Advocate to the BC Government to increase the stringency of the BC *Low Carbon Fuel Standard* to reduce the carbon intensity of transportation fuels. Advocate to the Government of Canada to adopt a *Clean Fuel Standard* that includes stringent carbon intensity targets for all transportation fuels.

3.4 Make Low and Zero Emission Heavy Trucks More Affordable. Advocate to BC Government, Government of Canada and other regional partners to enhance incentives (including loans, tax credits) for the purchase of low and zero emission medium and heavy duty trucks. Any funding program should consider whether incentives should be targeted to groups less able to afford low and zero emission medium and heavy duty trucks.

3.5 Regulate Fuel Economy and Emissions for Medium and Heavy Trucks. Advocate to the Government of Canada to adopt more stringent fuel economy and emission standards for medium and heavy duty trucks. Cleaner trucks will improve regional air quality in the short term and support the long term transition to zero emission vehicles.

3.6 Zero Carbon Refueling Strategy for Medium and Heavy Trucks. Develop a long-term regional zero carbon refueling strategy for medium and heavy duty trucks, coordinating with member jurisdictions, energy utilities, Vancouver Fraser Port Authority, TransLink and other regional partners. The strategy would identify where refueling stations are needed for different fuels including electricity, hydrogen, renewable diesel and others. The strategy could identify pilot projects and should also consider opportunities to leverage public investment in electric bus charging infrastructure for commercial vehicle use. This strategy should align with similar strategies for passenger vehicles (Action 1.4).

3.7 Funding for Zero Carbon Refueling Infrastructure for Medium and Heavy Trucks. Advocate to the BC Government, Government of Canada and energy utilities to increase funding (e.g., incentives, loans, tax credits) for zero carbon refueling infrastructure for medium and heavy duty trucks. This infrastructure would support early adoption of low and zero emission medium and heavy trucks, prior to wider commercialization.

3.8 Large Fleets to Adopt "ZEV-First" Procurement. Develop and support implementation of "ZEV-first" fleet procurement policies, coordinating with member jurisdictions and large fleet operators in the region, to transition fleets to zero emission vehicles by the late 2040s. The policies would be supported by regularly updated information on the availability of zero emission passenger vehicles and medium and heavy duty trucks. The policies could also include guidance on right-sizing fleets, and potential regional coordination of purchases of zero emission vehicles for fleets.

3.9 Efficient Goods Movement to Reduce Emissions. Work with member jurisdictions, large fleet operators, Vancouver Fraser Port Authority and other regional partners to support fleets in reducing emissions. This could include enhancing sustainable fleet management programs (currently funded by BC Government and Government of Canada) to improve fleet logistics, regional coordination of HOV lane use for zero emission heavy duty trucks, shifting deliveries to off-peak hours, small urban consolidation centres ("microHubs"), and cargo bike delivery pilot projects.

3.10 Support Innovation in Zero Emission Technology for Medium and Heavy Trucks. Advocate to industry, academic institutions and other governments to accelerate innovation in low and zero emission technologies for medium and heavy duty trucks, including supporting pilot projects.

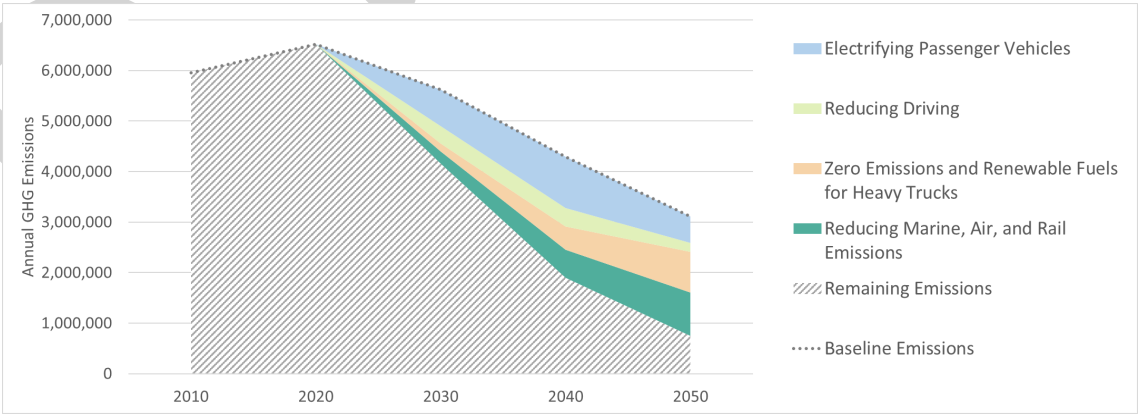
3.11 Use Business Licences to Support Emission Reductions. Work with member jurisdictions to explore whether business licences can be used to accelerate adoption of low and zero emission medium and heavy duty trucks.

Strategy 4: Reduce Marine, Rail, and Aviation Emissions

Marine, rail, and aviation are significant sources of greenhouse gas emissions globally. While they account for a relatively small amount of regional greenhouse gas emissions, regional rail lines, ports, and airports are important hubs in larger networks that must decarbonize to meet global climate targets. Achieving significant emission reductions in the marine and rail sectors depend on efforts by the Government of Canada and the BC Government to develop and implement strategies to advance cleaner fuels and engine technologies. The Government of Canada also needs to advocate to international organizations such as the International Maritime Organization to accelerate the implementation of more stringent emission standards. Locally, the Vancouver Fraser Port Authority is working to reduce greenhouse gas and health-harming air contaminant emissions associated with shipping in the region.

International standards have improved fuel economy from aircraft and the Vancouver International Airport Authority is electrifying airport operations. While electrification of small aircraft is progressing, achieving significant emission reductions for large aircraft is challenging. In the short term, increasing the availability of sustainable aviation fuel will reduce greenhouse gases from aviation. In the long term, the Government of Canada needs to develop a national strategy to transition to a carbon neutral aviation sector. This likely would include advocacy to international organizations such as the International Civil Aviation Organization.

Potential Impacts of Strategy	*Key Partners*
Reduce annual greenhouse gases by up to **250,000** tonnes by 2030 Reduce annual greenhouse gases by up to **860,000** tonnes by 2050	- Vancouver Fraser Port Authority - Government of Canada - BC Government - Airlines - Vancouver International Airport Authority - BC Ferries



Potential greenhouse emission reductions associated with Strategy 4, Reduce Marine, Rail, and Aviation Emissions. Most remaining emissions in 2050 are from these modes of transportation.

4.1 Accelerate Emission Reductions from Marine Vessels. (BIG MOVE) Advocate to the Government of Canada and BC Government to develop and implement a long-term strategy to accelerate emission reductions from ocean-going marine vessels, harbour vessels and passenger ferries in the region. In the short term, the strategy should prioritize cleaner engines, more renewable fuels and more shore power, particularly for vessels operating in areas that are most impacted by marine emissions. In the long term, the strategy should establish more stringent greenhouse gas emission targets, standards and regulations, to achieve a carbon neutral marine sector by 2050. The strategy should also consider efficiency improvements and the design and supportive funding for regional refueling infrastructure for zero carbon marine vessels.

4.2 Carbon Neutral Aviation Sector. Advocate to Government of Canada to develop and implement a long-term strategy to accelerate greenhouse gas emission reductions from the aviation sector. The strategy should include more stringent fuel economy and emission standards for aircraft, to achieve a carbon neutral aviation sector by 2050. The strategy should also increase the availability of sustainable aviation fuel, and could include mandatory carbon offsets or carbon taxes for air travel.

4.3 Accelerate Emission Reductions from Rail Locomotives. Advocate to the Government of Canada and BC Government to develop and implement a long-term strategy to accelerate emission reductions from rail locomotives in the region. In the short term, the strategy should prioritize cleaner locomotives, particularly those operating near neighbourhoods most exposed to rail emissions, as well as fugitive emissions from rail cars. In the long term, the strategy should establish more stringent greenhouse gas emission targets, standards and regulations for line-haul and switch locomotives, to achieve a carbon neutral rail sector by 2050. The strategy should also consider efficiency improvements and the design and supportive funding for regional refueling infrastructure for zero carbon locomotives.

4.4 Support Emission Reduction Actions at Vancouver Fraser Port Authority. Advocate to the Vancouver Fraser Port Authority to enhance actions that reduce greenhouse gas emissions and minimize air quality impacts on neighbourhoods most exposed to marine and port-related emissions. Actions under the *Northwest Ports Clean Air Strategy* should include expanding emission incentive programs for marine vessels and harbour tugs, tightening emission requirements for the Port's Truck Licensing System, consideration of short-sea shipping, and expanding shore power capacity at container and cruise terminals.

4.5 Develop Local Sources of Sustainable Aviation Fuel. Support airlines at Vancouver International Airport and other regional partners in increasing local availability of sustainable aviation fuel.

4.6 Support Innovation in Low and Zero Emission Marine and Rail Technologies. Advocate to BC Government and Government of Canada to help accelerate innovation in low and zero emission technologies for marine vessels, harbour tugs, passenger ferries and rail locomotives, including supporting pilot projects. Emerging engine technologies include hybrid, battery-electric and hydrogen fuel cells. This should include coordination with Vancouver Fraser Port Authority, BC Ferries, rail companies, governments and other regional partners.

4.7 Technologies for Zero Emission Aircraft. Advocate to Government of Canada and BC Government to support development of zero emission aircraft, including electrification of small aircraft.

4.8 Support Low Carbon Corporate Business Travel. (CORPORATE LEADERSHIP) Update and adapt corporate business travel policies to reduce emissions, including air travel considerations, corporate carbon offsets, and remote attendance.

Resilient Transportation Strategies

Strategy 5: Protect Existing Transportation Networks from 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 drastic emission reductions. Rising sea levels, increased frequency and severity of riverine flooding, and more frequent and intense heatwaves, wildfires, and droughts are already recognized as potential climate hazards that are likely to impact regional transportation networks within the next 100 years. Many existing transportation networks and infrastructure will remain standing for decades, but have not been designed to withstand impacts from changing climate hazards. Identifying current and future climate impacts and protecting existing transportation infrastructure from the hazards posed by these impacts is essential in order to create a resilient transportation system that is adapted to a changing climate.

5.1 **Support Regional Emergency Management Planning. (BIG MOVE)** Work with member jurisdictions, TransLink, neighbouring regions, and the BC government through convening groups such as the Integrated Partnership for Regional Emergency Management (IPREM) to collaborate on data sharing and policy development, and consider critical regional infrastructure interdependencies that could result in cascading effects in the event of regional climate disruption.

5.2 **Protect Road Networks.** Work with the BC government and member jurisdictions to ensure that existing road networks are protected from future climate impacts (such as flooding and sea level rise) through projects such as dikes and drainage systems that mitigate potential climate impacts in known risk areas.

5.3 **Protect Key Transportation Hubs**. Advocate to the Vancouver Fraser Port Authority, Vancouver International Airport Authority, and Federal government to protect key transportation hubs in low-lying coastal areas from hazards such as sea level rise and riverine flooding.

5.4 **Adapt Active Transportation and Transit Networks.** Work with member jurisdictions and TransLink to make sidewalks, bike paths, regional greenways, and transit networks comfortable and safe to use even when impacted by climate hazards such as hotter temperatures, degraded air quality due to wildfires, and heavy precipitation.

5.5 **Prepare for Regional Disruption.** Advocate to TransLink, Vancouver Fraser Port Authority, BC Ferries, and local airports to develop and maintain climate change adaptation plans that establish “safe-to-fail protocols” in the event of severe climate shocks that cause regional disruption, as well as post-event intervention and review procedures.

Strategy 6: Develop Climate Resilient Transportation Networks

Defining and assessing future climate risk must look beyond past trends in order to successfully create a transportation network that is resilient to future climate conditions. Climate change adaptation needs to be considered during the location, construction, maintenance, and operation of transportation infrastructure to avoid creating vulnerabilities that make adaptation more difficult and expensive in the future. Long range transportation planning must include hazard, risk, and vulnerability assessments to ensure that all new infrastructure is located in areas without known, unmitigated hazard risks. Land use and development can be coordinated with transportation networks to create robust regional transit, walking, and cycling options that provide a multitude of ways to get to and from key destinations, enhancing low carbon resilience.

6.1 Minimize Risk Exposure for New Transportation Infrastructure. (BIG MOVE) Work with the BC government, member jurisdictions, and TransLink to ensure that new transportation infrastructure is located outside of areas with known, unmitigated hazards, such as flooding and sea level rise.

6.2 Create Flexible Transportation Networks. (BIG MOVE) Work with member municipalities and TransLink to develop flexible transportation systems through low-cost, low-emission travel options such as active transportation and transit options that minimize reliance on vulnerable transportation networks, and create multiple travel options in the event of a disruption.

6.3 Build Climate Resilient Transportation Infrastructure. Advocate to the BC government and Federal governments to strengthen climate change resilience requirements for new transportation infrastructure projects.

6.4 Identify Regional Climate Hazards, Risks, and Vulnerabilities Impacting Transportation Networks. Work with the BC governent, member jurisdictions, TransLink, Vancouver Fraser Port Authority, BC Ferries, and local airports to collect data for baseline, trend, and monitoring purposes, and integrate forward-looking hazard, risk and vulnerability analysis into long-range transportation planning.

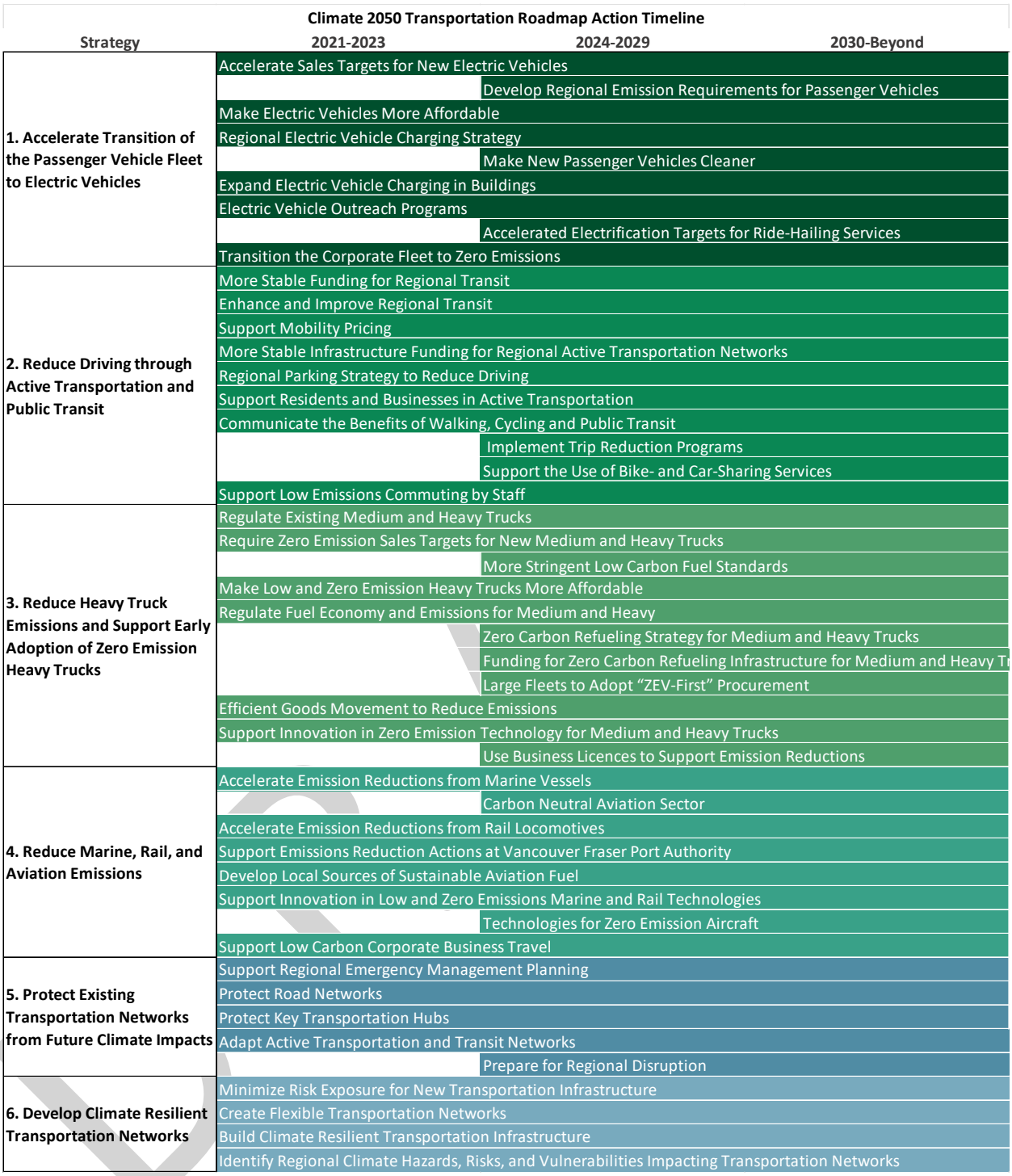
Setting the Path Ahead

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

Transportation is one of the best opportunities for significant early reductions of greenhouse gases in the region, particularly for personal transportation. The region is well positioned to continue with intentional land use planning that supports walking, cycling, transit, and other shared mobility modes. Electric vehicles are readily available and ready to be deployed on a large scale. It's critical that the actions identified in this Roadmap to support faster uptake of electric vehicles are implemented without delay to set this transition in motion as soon as possible. Taking early action to reduce emissions can also help improve air quality, support health and well-being through exercise, and enhance low carbon resilience sooner rather than later. Taking action to improve the resilience of regional transportation networks should also begin right away to adapt to changing climate conditions.

As personal transportation transitions to zero emissions, medium and heavy trucks, marine vessels, aviation, and rail will become the largest sources of transportation greenhouse gas emissions in the region. Action that supports rapid development and scale-up of zero emission and low carbon options for these sectors is needed to ensure that the transportation sector as a whole can transition to carbon neutrality 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 two years, will make a major difference to accelerating the region's drive to zero emission and resilient transportation.



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 *Transportation 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 is already collected, there are significant data gaps for rail, marine, and air transportation. Additional work is needed to understand what key performance indicators and data effectively measure progress towards regional resilience.

Roadmap Element	Key Performance Indicator	Data Source	Data is Currently Collected
Accelerate Transition of the Passenger Vehicle Fleet to Electric Vehicles	Proportion of new vehicles sales that are electric, hybrid, hydrogen (number of new vehicle sales, % of total sales)	BC Government ICBC Market research firms Vehicle manufacturers	Yes
	Regional vehicle registration by engine type: internal combustion, electric, hybrid, hydrogen (number of new vehicle registrations, % of total registrations)	ICBC	Yes
	Kilometers travelled by vehicle model year, vehicle size, engine type (vehicle kilometers travelled, VKT)	ICBC TransLink Metro Vancouver	Partial
	Fuel use by type: fossil diesel, fossil gas, biofuels, electricity, hydrogen (Gigajoules, GJ)	Metro Vancouver BC Hydro BC Government	Partial
	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
Reduce Driving through Active Transportation and Public Transit	Mode share by trip (number of trips, % of total trips)	TransLink Statistics Canada Municipalities	Yes
	Kilometers travelled by mode type: walking, cycling, transit, single occupant vehicle, multiple occupant vehicle (Person kilometers travelled, PKM)	TransLink Municipalities	Yes
	Kilometers of bike lanes, paths, and greenways	Metro Vancouver Municipalities	Yes
	Proportion of household and employment growth concentrated in urban centres and frequent transit development areas (FTDAs) (% of households, % of jobs in urban centres and FTDAs)	Metro Vancouver	Yes
Reduce Heavy Truck Emissions and Support Early Adoption of Zero Emission Heavy Trucks	New vehicle sales by engine type: internal combustion, electric, hybrid, hydrogen, compressed natural gas (number of new vehicle sales, % of total sales)	Vehicle manufacturers ICBC Market research firms Industry associations	Yes
	Regional vehicle registration by engine type (number of new vehicle registrations, % of total registrations)	ICBC	Yes
	Kilometers travelled by vehicle model year, vehicle class, engine type (VKT)	TransLink Metro Vancouver ICBC	Partial

Roadmap Element	Key Performance Indicator	Data Source	Data is Currently Collected
	Fuel use by type: fossil diesel, fossil gas, compressed natural gas, renewable natural gas, biofuels, electricity, hydrogen (Gigajoules, GJ)	Metro Vancouver TransLink BC Hydro BC Government Market research firms Industry associations	Partial
Reduce Marine, Rail, and Aviation Emissions	Marine vessels with access to shore power by vessel type: cruise, container, tanker, ferry other (number of shore power terminals, % of marine vessels with access to shore power)	Vancouver Fraser Port Authority BC Ferries and other ferry operators	Yes
	Kilometers travelled by marine vessels using zero or low emission fuels (kilometers, % of total kilometers travelled)	Vancouver Fraser Port Authority International Maritime Organization Metro Vancouver Transport Canada BC Ferries BC Government	No
	Marine vessel fuel use by type: fossil fuels, liquefied natural gas, renewable natural gas, biofuels, electricity, hydrogen (GJ)	Vancouver Fraser Port Authority International Maritime Organization Transport Canada BC Ferries Metro Vancouver BC Hydro	No
	Kilometers travelled by rail locomotives using zero or low emission fuels (kilometers, % of total kilometers travelled)	Canadian National Rail Canadian Pacific Rail TransLink Other rail companies Metro Vancouver Transport Canada	No
	Locomotive and switch operations fuel use by type: fossil fuels, biofuels, electricity, hydrogen (GJ)	Canadian National Rail Canadian Pacific Rail TransLink Other rail companies Metro Vancouver Vancouver Fraser Port Authority Transport Canada	No
	Kilometers travelled by aircraft using zero or low emission fuels (kilometers, % of total kilometers travelled)	Transport Canada Regional airports Airlines	No
	Aircraft fuel use by type: fossil fuels, biofuels, electricity, hydrogen(GJ)	Transport Canada Regional airports Airlines	No
Protect Existing Transportation Networks from Future Climate Impacts	TBD	TBD	TBC

Roadmap Element	Key Performance Indicator	Data Source	Data is Currently Collected
Develop Climate Resilient Transportation Networks	TBD	TBD	TBC

Feedback and Engagement Process

This *Roadmap* was generated with input from many organizations, including other levels of government, 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 *Transportation Roadmap* and any other aspect of the climate action initiatives led or coordinated through Metro Vancouver. Send any comments direct to the Project Team through Climate2050@metrovancouver.org or phone 604-432-6200.

Glossary

Active transportation includes self-powered modes of transportation such as walking, biking, skateboarding, in-line skating/rollerblading, jogging and running, wheel chairing, snowshoeing and cross-country skiing. Electric technologies such as bikes or scooters may be used to support electric mobility on active modes.

Air contaminants means 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.

Biofuels are renewable transportation fuels that have a low carbon (see below) footprint and are produced from organic matter derived from biomass such as plants.

Carbon dioxide (CO_2) is the primary driver of climate change, and is produced primarily by burning fossil fuels.

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

Carbon sequestration is the removal of carbon dioxide from the air and the long-term storage of carbon to mitigate climate change.

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

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.

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.

Greenhouse gases are air contaminants that trap heat and are the cause of climate change. Greenhouse gases include carbon dioxide, methane, nitrous oxide, 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").

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

Large fleet operators are organizations that purchase, operate, and maintain a significant amount of vehicles for public sector or commercial use.

Low carbon fuels produce direct greenhouse gas emissions, but have no net greenhouse gas emissions when the fuel lifecycle is taken in to account.

Low emission technologies produce some greenhouse gas emissions or air contaminants, but significantly less than conventional fossil fuel counterparts. This may include high efficiency vehicles or plug in hybrid technologies.

Marine vessels include ocean-going marine vessels (e.g., container, bulk, tanker, fishing, cruise and other specialty vessels), harbour vessels, and passenger ferries.

Medium and heavy duty trucks are mostly freight vehicles such as long-haul trucks and cube vans used for commercial purposes, but also includes buses and refuse trucks.

Mobility pricing refers to fees for transportation services. Some types of mobility pricing (e.g., decongestion charging, low emission zones) are used to manage demand for roads and reduce emissions.

Passenger vehicles include motorcycles, cars, SUV, minivans and light trucks. Buses are included as part of medium and heavy duty trucks.

"Right-to-charge" legislation provides residents of multi-unit residential buildings with the right to install and use a charging station for their electric vehicle.

Right-sizing fleets means aligning the type and number of fleet vehicles to the true needs of the fleet. Right-sizing fleets reduces costs and emissions.

"Safe-to-fail" protocols anticipate possible system failures so that they can be contained and minimized.

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.

Zero emission means no greenhouse gases or other air contaminants are generated at the point of use, and also eliminates emissions of health-harming air contaminants (e.g., fine particulate matter and nitrogen oxides).

Zero emission vehicles (ZEVs) release no air contaminants from their tailpipes. Electric vehicles are the most common type of zero emission vehicle; others include hydrogen fuel cell vehicles.

ZEV-first is a procurement policy where priority is given to purchasing zero emission vehicles, if they are available.

metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

To: Climate Action Committee

From: Brendon James, Special and Community Events Coordinator
Erik Blair, Air Quality Planner
Parks and Environment Department

Date: March 26, 2021 Meeting Date: April 16, 2021

Subject: **Metro Vancouver Electric Vehicle Program Review and Recommendations**

RECOMMENDATION
That the Climate Action Committee receive for information the report dated March 26, 2021, titled "Metro Vancouver Electric Vehicle Program Review and Recommendations".

EXECUTIVE SUMMARY
Accelerated electric vehicle (EV) adoption is a key greenhouse gas (GHG) reduction opportunity in the region's transportation sector, and Metro Vancouver's EV Programs aim to increase EV uptake by educating residents and businesses to support implementation of the *Climate 2050 Transportation Roadmap*. These programs include public outreach campaigns, online resources, and workplace info-sessions to promote public knowledge and use of EVs. At the end of 2020, staff completed a review of Metro Vancouver's EV programs supported by a consultant evaluation. Short-term recommendations from this evaluation will be integrated in the 2021 work plan, with longer-term recommendations targeted for 2022 and future years. Due to COVID-19, regular programming has been impacted and staff are developing alternative program delivery strategies, as well as enhancements for ongoing program delivery in future years.

PURPOSE
To provide an update on Metro Vancouver's Electric Vehicle Programs and present program enhancements for 2021 and 2022.

BACKGROUND
Metro Vancouver has targets to reduce GHG emissions by 45% from 2010 levels by 2030, and to become a carbon neutral region by 2050. Passenger cars and trucks are the largest source of regional GHG emissions, at 35% of the total.

Metro Vancouver's *Climate 2050 Strategic Framework*, adopted in 2019, and the draft *Clean Air Plan* also provide overarching direction for regional climate and air quality policy. *Climate 2050* will include a series of implementation roadmaps structured around ten different issue areas. The draft *Transportation Roadmap* (item 5.1 in the April 16, 2021 Climate Action Committee agenda) identifies a range of strategies and actions to reduce GHG emissions in the regional transportation sector, including increased efforts to deliver public outreach and education on the benefits of electric passenger cars and trucks.

ELECTRIC VEHICLE PUBLIC OUTREACH

Since 2012, Metro Vancouver staff have been delivering a variety of EV outreach and education programs that address the most significant barriers to EV ownership in the region. Metro Vancouver currently delivers three EV outreach programs:

1. **Emotive** is a public outreach campaign designed to promote stronger awareness of the availability and benefits of EVs within our region. Prior to COVID-19, Emotive brought EVs to public events to provide direct experience as the primary outreach method, and will do so again in the future. This is Metro Vancouver's flagship EV outreach program delivered in coordination with partner agencies.
2. **EV Condo** is an online resource designed to assist condo-dwelling EV owners and strata councils to install EV charging in their buildings.
3. **EV Workplace** is designed to assist workplaces by providing information and resources that will help to set up EV charging stations, and engage their employees through EV 101 information sessions, test drives and informal employee transportation surveys.

COVID-19 IMPACT ON ELECTRIC VEHICLE PROGRAM DELIVERY

The outbreak of COVID-19 has had a significant impact on the delivery methods for Metro Vancouver's EV Programs. Based on current provincial health guidelines related to COVID-19, the majority of in-person events that were planned to take place during 2020 were cancelled or postponed. Continued restrictions this year are creating further uncertainty for event hosts. Staff are continuing to communicate with event hosts and to work closely with outreach partners to develop alternative outreach strategies that are responsive to ongoing changes in provincial health guidelines.

Public opinion research conducted during 2020 suggests that during the COVID-19 pandemic response, a large majority of Canadians (76%) remain seriously worried about climate change. Given this, throughout 2020 and into 2021, staff have continued to deliver outreach for these programs using more digital outreach methods. Staff hope to deliver the EV programs in person starting in August of 2021, if it is possible to do so safely and in accordance with all public health guidance.

EV PROGRAM REVIEW

At the end of 2020, staff completed a review of Metro Vancouver's EV programs supported by a consultant evaluation (Attachment 1). The review included an analysis of past program performance, current delivery gaps, and recommendations for program enhancements in 2021 and 2022. The review included the following design considerations for future EV program development:

- Consumer education remains an important activity to increase knowledge and understanding of EVs and EV charging;
- There is an opportunity to increase EV adoption by focusing additional effort on more diverse market segments, including redeveloping key messaging through an equity lens (e.g., to promote the benefits and affordability of used EVs);
- There is an opportunity to increase EV adoption by developing an additional focus on outreach for fleet owners and managers; and,
- Metro Vancouver should continue to develop a strong communications network of EV Ambassadors and EV Societies.

RECOMMENDATIONS FOR PROGRAM ENHANCEMENTS

In light of restrictions on in-person outreach associated with COVID-19, recommendations were framed for both short and long-term deployments. Short-term recommendations from the review are being incorporated into the 2021 work plan and are helping staff to frame the next steps in program development.

Strategic Communications Plan

A key short-term recommendation was to develop a strategic communications plan. Staff have drafted a plan for EV program communications in 2021 that focusses on the following activities:

- Develop co-branding digital and print collateral for Emotive with program delivery partners;
- Deliver webinars to the general public and staff at member jurisdictions;
- Increase digital promotions to targeted audiences for all programs;
- Develop video content for EVCondo to support public awareness of the web resource; and,
- Develop outreach options for in-person events in late summer of 2021 pending public health guidelines (including planned outreach at the Pacific National Exhibition and ElectraFest 2021).

Future Activities

Staff are also considering a set of longer-term recommendations from the review that are supported by actions in the draft *Transportation Roadmap*. The major activities can be summarized as follows:

- **Development of a Program Guiding Document:** Create a guiding document that maps out EV programs over the next 5 years that can contribute to an overarching objective to increase EV adoption.
- **Develop Equity-based Messaging:** Determine alternative messaging for different regional demographics.
- **Develop an EV Fleet Program:** Connect with fleet managers to promote the advantages of electric vehicles in corporate fleets.
- **Expand Target Audiences for EV Condo:** Expand the EV Condo target audience to include management firms, landlords, developers, etc. This is important in continuing to prepare stakeholders for the fast pace of technology and policy changes in commercial and residential EV charging.
- **Redevelop EV Workplace:** Redesign the EV Workplace Program material and provide revised targets and key outcomes.

While the current program review focuses on passenger cars and trucks, a number of the activities being developed will be transferable to future programs for medium- and heavy-duty vehicles, consistent with strategies and actions in the *Climate 2050 Transportation Roadmap*.

ALTERNATIVES

This is an information report. No alternatives are presented.

FINANCIAL IMPLICATIONS

Metro Vancouver's 2021 EV Outreach programs include staff resources as well as a budget of $27,000 for events, materials and digital outreach. The consultant report was completed in 2020 using approved budget, at a cost of $15,000.

CONCLUSION

COVID-19 has had a significant impact on the delivery of Metro Vancouver's EV outreach programs. In order to achieve the regional GHG emissions reductions targets outlined in the draft *Climate 2050 Transportation Roadmap*, an EV-ready region requires a robust portfolio of EV programs with a multi-faceted approach to information delivery. Staff have used the recommendations from a program review to augment work already underway, and are also working on incorporating long term objectives.

Attachment

"Metro Vancouver Electric Program Review Final Report", dated December 2020 *(44832646)*

References

Abacus Data Report "Is climate change 'an emergency' and do Canadians support a made-in Canada Green New Deal?"

43961487

Metro Vancouver Electric Vehicle Program Review

December 2020

Community Energy Association

TABLE OF CONTENTS

Executive Summary

This report summarizes our program evaluation findings as well as our gap analysis and details how this process informed the development of recommendations – short and long term – for Metro Vancouver's future program delivery. The gaps we identified as well as our understanding of local, provincial and federal policy and legislation related to EVs, supported us in identifying the specific opportunities for Metro Vancouver to use their powers to impact change and further drive adoption of EVs in Metro communities.

The foundation of our project work was to support Metro Vancouver in thinking about the best pathway forward and how to allocate resources to support the overarching objective of increasing EV sales in Metro communities. In order to determine Metro Vancouver's optimal role in increasing EVs, this review had three phases:

1. **Review past and current programming**
   The scope of this work included a review of existing data sets. Data was evaluated in the form provided, offering us insight into program reach and where resources had been deployed.
2. **Identify and analyze program delivery gaps**
   This phase included an evaluation of many other programs being implemented domestically and aboard, and included interviews with diverse stakeholders.
3. **Develop recommendations**
   In light of restrictions associated with COVID-19, recommendations were framed for short- and long-term deployments. Over the short-term, seven recommendations were made and three for -long term consideration.

Recommendations

The recommendations for Metro Vancouver's EV programs are:

Short Term Recommendations	Long Term Recommendations
EV Loan Program	Fleet Transition
School Curriculum	EV Condo
Webinar Series	Workplace Charging
EV Saving Calculator	
Program Guiding Document	
Strategic Communications Plan	
Equity Evaluation	

Limitations

We have undertaken an evaluation to the greatest degree possible based on all information available and in the short time period and budget allotted for this scope of work. We recognize that in designing recommendations we do not have granular data that would support the formulation of projects for specific market segments and the unique barriers they face. Recommendations were therefore designed by scrutinizing research and interview responses and amalgamating Community Energy Association's knowledge and expertise in the levers and roles available to local governments to facilitate outreach and education, as well as trends in policy and regulation around EVs provincially and federally.

Disclaimer

This report has been reviewed by representatives of Metro Vancouver, who commissioned the study, but the interpretation of the results of this study, as expressed in the report, is entirely the responsibility of the consultant authors and does not imply endorsement of specific points of view by Metro Vancouver. The findings and conclusions expressed in the report are the opinion of the authors of the study and may not necessarily be supported by Metro Vancouver.

Any use by a third party of the information presented in this report, or any reliance on or decisions made based on such information, is solely the responsibility of such third party.

1 – Program Evaluation

Evaluation of Programs to Date

Community Energy Association (CEA) conducted an evaluation of Metro Vancouver's electric vehicle programs using available data and documentation. Initial tasks included consolidating recorded data from each program and internal costs associated with the delivery of the program to date. This was followed by identifying and summarizing trends in the data and results. Finally, gaps in the recorded data were identified and summarized and potential improvements were recommended. The following is a summary of the evaluation, an in-depth analysis can be found in Appendix A.

Summary of Program Evaluation

Emotive

Emotive: The Electric Vehicle Experience is a public outreach campaign designed to promote the use of electric vehicles within the region. This is Metro Vancouver's flagship outreach program delivered in coordination with other partner agencies. The campaign team was established to provide public outreach by attending public events with an electric vehicle display, answering questions and distributing information and materials. The campaign also facilitates numerous electric vehicle test drive events throughout the event year.

Metro Vancouver is a founding partner of Emotive along with City of Vancouver, City of Surrey, Fraser Basin Council and Province of BC. The campaign is delivered province-wide, online (through social media and website) and in-person at community events. It is supported by a network of delivery partners that includes municipalities, non-profit organizations and individual electric vehicle owners. Metro Vancouver is the lead organization for delivering Emotive at community events within the Metro Vancouver Regional District.

The objectives of the Emotive outreach program are to:

- Introduce members of the public to electric vehicles (EV) by providing static displays and, wherever possible, test drives;
- Engage in meaningful conversations with members of the public, answer their questions and address their concerns about EVs;
- Connect future electric vehicle owners with current EV owners, to lend an authentic voice to the campaign;
- Inform about related programs offered by Metro Vancouver or other government entities which they could access; and
- Convey to the public that electric vehicles are fun to drive, practical and sustainable.

The current program Key Performance Indicators (KPIs) used by staff are:

- Number of events attended
- Number of total event days attended
- Number of face-to-face engagements
- Number of test drives facilitated
- Number of test rides facilitated

The following table is a summary of Emotive events held between 2014 and 2020.

Emotive				
Year	**Number of Events**	**Number of Event Days**	**Number of Engagements**	**Number of Test Drives[1]**
2014	12	16	2,972	0
2015	21	27	4,125	0
2016	37	41	7,737	1,147
2017	48	48[2]	7,297	1,655
2018	36	45	10,796	1924
2019	31	45	12,712	2414
2020	2	3	300	109
Total	**187**	**225**	**45,939**	**7249**

A review of the data indicates there isn't a clear correlation between the number of event days, the number of engagements and number of test drives. We can infer that certain events are particularly effective for facilitating large numbers of test drives such as the Vancouver International Auto Show and ElectraFest.

EV Condo

EV Condo is an online resource, designed to assist EV owners, strata councils and property managers with installing electric vehicle charging in Multi -Unit Residential Buildings (MURB).

The objectives of the EV Condo program are to:

- Provide passive outreach and education: Provide information to employers through passive channels such as website content and other publications.
- Provide a comprehensive online resource for Condo Dwellers and Strata Councils to learn about installing electric vehicle charging infrastructure in their building.
- Provide summaries of current and important information related to electric vehicles and electric vehicle charging.

[1] Whilst number of test drives facilitated and number of test rides facilitated are listed as separate KPI's, the data provided was separated into three categories; '3rd party ride and drive'. 'Ride 'n Drive' and 'Ride Along'. For simplification and clarity, the data presented here is the sum of all three. From herein, the report shall use 'test drive' to describe all of the above.

[2] Number of event days was not fully recorded for Emotive, EV Condo and EV Workplace in 2017. It was assumed that there was one event day per event unless noted otherwise.

- Provide current and applicable tools and resources to help owners and strata corporations with their installation.

The current Key Performance Indicators used by staff are:

- Web Page Traffic
- Social media reach, follows and likes
- Social media engagement
- Number of Inquiries through email
- Number of Inquiries through phone

The following table contains all the data relevant to EV Condo.

	EV Condo					
Year	**# Events**	**# Engagements**	**Web page visits**	**Facebook referrals**	**Inquiries via email**	**Inquiries via phone**
2016	2	515	9,717	139	3	0
2017	5	2,092	31,448	1,928	14	1
2018	3	3,105	22,835	51	24	1
2019	2	4,500	40,271	64	15	0
2020	0	0	16,719	39	9	0
Total	**12**	**10,212**	**120,990**	**2,221**	**65**	**2**

The primary outreach mechanism for EV Condo is the corresponding website. Website visits are tracked and as can be seen in Appendix A, there are spikes in website traffic on certain dates. The information source, activity or initiative that drove traffic to the website for said dates is unknown given there is not an accompanying communications plan/calendar of events to draw parallels to. Social media reach, follows and likes and social media engagement data were not tracked consistently from 2016 to 2020. We do know, however, that some promotion of EV Condo took place from April to December 2017 via social media. The 14 Facebook posts and 7 Twitter posts had a reach of 41,100, recorded 505 reactions, 95 share/retweets and 1,178 link clicks. Furthermore, advertisements set up through Google AdWords during 2017 generated 4,205 clicks through to EVCondo.ca. Enhanced tracking of social media reach, follows, likes and engagement could assist in understanding social media's role in 'cause and effect' (reach leading to engagement leading to satisfaction (I.e., follows and likes leading to web page visits).

EV Workplace

Patterned after a successful US workplace EV charging program, Metro Vancouver developed the EV Workplace program. EV Workplace is designed to assist workplaces with the set-up of Electric Vehicle charging stations, and engage their employees through EV 101 information sessions, test drives and informal employee transportation surveys.

The objectives of the EV Workplace program are to:

- Provide Passive Outreach and Education: provide information to employers through passive channels such as website content and other publications.
- Active Outreach and Education: provide information to employers through channels such as webinars, workshops and seminars. Content addresses the benefits, process and technical aspects of providing electric vehicle charging.
- Active Marketing: strategically target employers potentially interested in this program through a variety of channels and existing networks.

The current Key Performance Indicators used by staff are:

- Number of events attended
- Total number of event days attended
- Web Page Traffic
- Social Media reach, follows and likes
- Social media engagement
- Number of Inquiries through email
- Number of Inquiries through phone

The following table contains all the data relevant to EV Workplace.

	EV Workplace						
Year	Number of Events	Number of Engagements	Number of Test Drives	Web page visits	Facebook referrals	Inquiries via email	Inquiries via phone
2016	3	185	164	0	0	0	0
2017	7	250	0	0	0	0	0
2018	8	249	156	991	0	1	0
2019	11	685	525	731	26	2	0
2020	0	0	0	288	0	0	0
Total	**29**	**1,369**	**845**	**2,010**	**26**	**3**	**0**

No trends can be identified from the data in the table, and as can be seen in Appendix A, there have been some spikes in webpage traffic on certain dates but the website receives very few total visits. The information source, activity or initiative that drove traffic to the website for said dates is unknown given there is no accompanying communications plan/calendar of events to draw parallels to.

Conversations with Metro Vancouver staff indicated that less time is allocated to EV Workplace in comparison to other programs.

Collective Program Impact

The following table is a summary of the collective impact of Emotive, EV Condo and EV Workplace, with the addition of the corresponding level of staff effort. Conversations with Metro Vancouver staff early in the project indicated that the level of staff effort was more meaningful than cost, and data was provided to CEA as such. The level of staff effort includes hours spent on EV campaign delivery, EV campaign admin and planning, external relations, web development, and social media. Available data from Metro Vancouver breaks down the level of staff effort for planning, external relations and web development by program, while level of staff effort for EV campaign delivery and EV campaign admin were not broken down.

Year	Number of Events	Number of Event Days	Number of Engagements	Number of Test Drives	All Programs Level of Effort/hours
2014	12	16	2,972	0	**715 - 765**
2015	21	27	4,125	0	**1435 - 1450**
2016	42	46	8,437	1,311	**2975 – 3070**
2017	60	60	9,639	1,655	**3375 – 3405**
2018	47	56	14,150	2,080	**3335 - 3365**
2019	44	58	17,897	2,939	**3335 - 3365**
2020	2	3	300	109	**1930 - 1980**
Total	**228**	**266**	**57,520**	**8,094**	**17,100 – 17,400**

2 – Gap Analysis

Metro Vancouver's role in EV awareness has to date centred on consumer experience – helping consumers better understand electric vehicles and the benefits of an EV. To the extent that workplaces were engaged the intent was to support large employers to act as a messenger to their employees regarding the benefits of EVs and consider their role in supporting employees to adopt an EV.

Interview Methodology

Through interviews with key stakeholders, we conducted an evaluation of Metro Vancouver's EV programs to identify existing successes, challenges, and opportunities. In addition, interviewees were selected to inform our understanding of how stakeholders in varying jurisdictions are engaging the public in EV awareness, both to meet objectives as well as adapt to COVID-19 restrictions. To get a full picture we interviewed non-profit managers in other urban centres such as Portland and Toronto as well as smaller areas like Nova Scotia.

The interview objectives for each sub group of interviews are detailed in Appendix B.

Interviews

Current Program Delivery Strengths/Weaknesses/Opportunities/Threats		**Policy** What's Coming / Emerging Opportunities		**Other Programs** Near-term Opportunities	
Brendon James Michael Stanyer	Metro Vancouver Fraser Basin Council	John Stonier Suzanne Goldberg Ryan Gilmore Ian Neville	VEVA ChargePoint City of Surrey City of Vancouver	Anonymous Jeremie Bernardin Dav Cvitkovic Thor Hinckley	National EV Society/Kia Canada Next Ride (Nova Scotia) Plug N' Drive FORTH

Supplementary Research

For a complete list of online resources used during the gap analysis, see Appendix D. Many online sources were identified that allowed us to further understand other urban approaches to EV engagement. A key insight from online research was that market research has been employed at length to get a clear understanding of who has adopted EVs and the demographic markers of target audiences.

In addition, research was conducted to understand best practices, rationale and methodology of incorporating an equity lens into all program design.

Metro Vancouver's Role

We know that the barriers to EV adoption are, in general, lack of awareness and understanding, limited technology options (including cost) and low access to charging. Some of these barriers are relevant to Metro Vancouver, and some are not.

Within Metro Vancouver Control:	Beyond Metro Vancouver Control:

• Resident Awareness of:
  ○ EV technology and benefits
  ○ Public charging infrastructure
  ○ Relevant policies/ bylaws
  ○ Incentives
• Municipal Awareness of:
  ○ MV programs
  ○ Policy trends (local, provincial, federal)
• Municipal Readiness for increase in EV adoption
  ○ Fleet transitions
	• Cost of EVs
	• Resident access to charging
	• Product performance
	• EV production/availability
	• Dealership support
	• Purchase incentives
	• Cost of charging equipment
	• Cost of charging (to consumers)
	• Municipal legislation (e.g., right to charge, building codes)

- **Dealership & Business Awareness**
- **Access to information and technology by marginalized communities (Equity)**

Of the elements within Metro Vancouver's sphere of control, it is important to understand areas where partners and organizations are currently working.

Resident Awareness				Municipal Awareness		Municipal Readiness	Dealership & Businesses	Equity
EV technology	Charging	Policies/ bylaws	Incentives	MV Programs	Policy trends	Fleet transition		
Emotive Utilities Provincial Gov. Federal Gov. EV Associations NGOs	Emotive Utilities Municipalities Provincial Gov. Federal Gov. EV Associations NGOs	Emotive EV Associations	Emotive EV Associations	Metro Van. Municipalities	Various	Various	Municipalities Metro Van.	Municipalities

Gaps in EV Outreach and Engagement

Building general awareness of EVs is indeed a key factor in increasing adoption and there are many stakeholders working in this area, including Metro Vancouver. Staff expertise and capacity within Metro Vancouver has led to an increase in, and the effectiveness of events. Focus group data and interviews revealed that the EV Condo website is a key resource used by consumers as well as municipal leaders to increase awareness of EVs and charging opportunities.

Given the number of stakeholders working to address the awareness barrier, it is prudent to explore whether general awareness of EVs remains the best opportunity for Metro Vancouver resources, especially in light of research and interviews suggesting the landscape of EV adoption in Metro Vancouver is evolving. This is in comparison to a province such as Nova Scotia where adoption is still low, so general awareness, driving experiences and media remain essential. As the light duty EV market evolves and shifts so too do the barriers to adoption. Further, EV adoption is evolving at different speeds for different segments of the population.

While the scope of this report precludes the opportunity to use data and statistics to know for certain where different market segments are in the adoption curve, we have made assumptions based on research and our general knowledge of EV adoption in BC.

This assumption is that EV adoption is accelerating for some market segments, but not for all. Low-income residents and fleets likely lag behind early adopters and even the general public in the transition to ZEVs. These key market segments, along with their respective evolving barriers, represent an opportunity for outreach and engagement by Metro Vancouver. Since current programming does not address the unique barriers to EV adoption by different market segments, Metro Vancouver could become to be a leader in providing education and outreach for various market segments, thereby nudging them along the adoption curve.

Outreach and Engagement Within the Broader EV Strategy

During the research and interview phase of this work, policy and infrastructure opportunities arose as key factors to increase EV adoption. These are two of the three tools at the disposal of local governments to enable residents and businesses to reduce emissions, and they are important pieces of an EV strategy (Figure 1). Exploring emerging policy influences and charging infrastructure deployment is not part of the scope of this project and further research may be required to refine opportunities in these spaces.

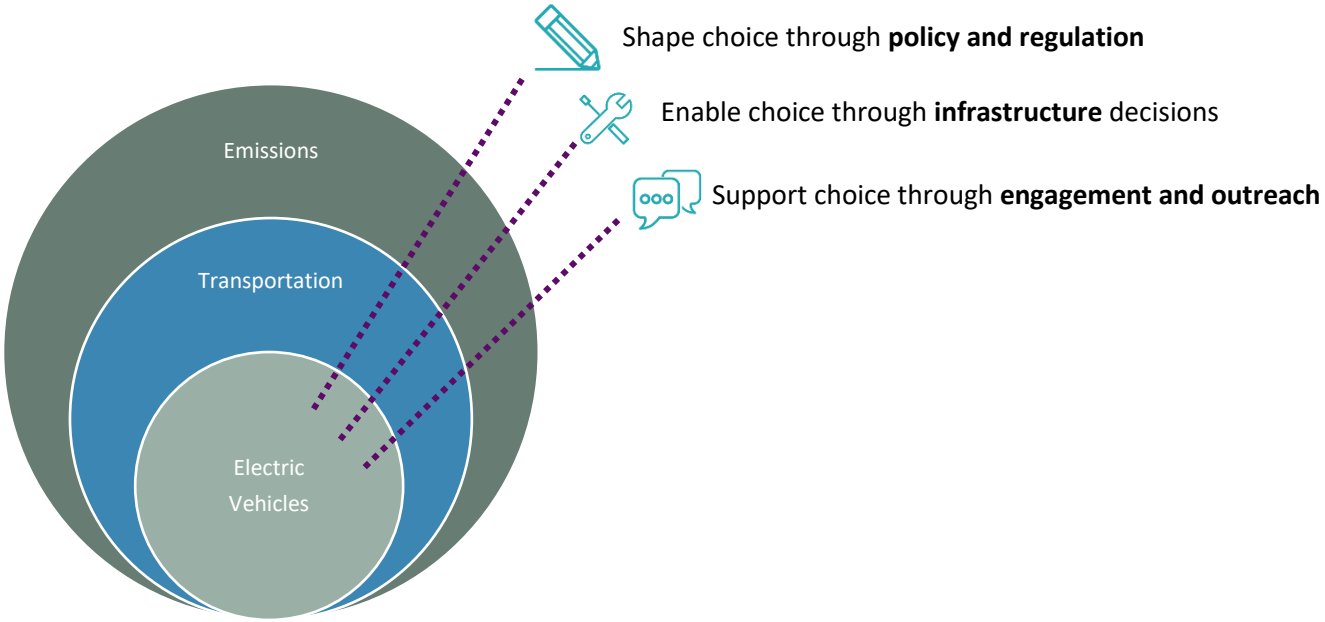


Figure 1 - Local government tools to support strategic priorities.
Source: Adapted from BC Climate Leaders Playbook

The policy considerations that emerged during gap analysis are:

1. Multi-unit Residential Building (MURB) Charging Bylaws (new developments)
2. Zero-Emission Vehicles Act
3. Right-to-charge legislation

The infrastructure considerations that emerged during gap analysis are:

1. Public Level 2 charging (for example, neighbourhood 'hubs')
2. Curbside charging
3. Fleet charging (for example taxi, ride-hailing and car share services)

In designing recommendations, we therefore explored and considered how Metro Vancouver's engagement and outreach efforts can bolster emerging policy and infrastructure advancements of partner municipalities as well as within the Regional District, especially within the context of the overarching strategic priorities.

Equity

The gap analysis phase of this work identified a gap in programming related to equity. Program evaluation and interviews lead us to understand low-income and marginalized communities in Metro Vancouver still have low awareness of EV technology and relative low adoption. There are of course market conditions that contribute to this – high purchase price, lack of charging infrastructure, etc. As you will see in recommendation 3, investing in EV awareness and education programing in low-income communities ensures equitable access to economic benefits as well as prepares the population at large for widespread adoption as policy and legislation evolves (e.g., rebates for used EVs).

Bringing it All Together

While consumer education remains an important component to increase knowledge and understanding of BEV technology, this program review identified opportunities for Metro Vancouver to use its resources to increase EV adoption by more diverse market segments.

The following table identifies themes that emerged from the Program Review and Gap Analysis. Our goal is to show the engagement and outreach roles that can work in tandem with emerging policy and infrastructure, as well as highlight the opportunity to link programs with KPIs that support a stated outcome.

Enablers of EV Adoption	Potential Metro Vancouver Roles	Metrics	Outcomes
Policy that increases access to charging	• Continue to promote and update EVCondo and extend audience to management firms/building managers	• # of Condos with EV charging • Follow up after an event or interaction	• More condos with charging • Increase in EVs registered urban centres
Policy that increases access to used/low cost EVs	• Educational materials about buying used EVs, available incentives, etc. • Outreach programs in diverse communities, partnerships with community organizations	• # of used EV sold at dealerships • Follow up/check ins with used dealerships to determine increase in demand	• Increased demand for used EVs • Diverse demographics are adopting EVs

Strong communications network of EV Ambassadors and EV Societies	• Enable connections between consumers and EV advocacy groups • Educational material for EV owners	• # of EV Ambassadors • Follow up with EV ambassadors – number of friends/family who bought an EV – anecdotal evidence	• Increase in EVs sold • More EV ambassadors
Local Government leadership	• Loan EV fleet • Communicate and promote fleet transition • Grow MV EV fleet	• # EVs in MV fleet • # EVs in member municipalities increases	• EVs are the vehicle of choice for staff • Support for fleet strategy

3 – Recommendations

Strategy – Background

We recognize that this scope of work is one small piece of an important EV Strategy. To that end, our recommendations are centred around the premise of identifying programs and a pathway forward for Metro Vancouver that are focused on contributing to an overall outcome of increasing EV sales in Metro Vancouver. The recommendations focus on just one of Metro Vancouver's levers to impact EV sales – Outreach and Engagement.

The recommendations acknowledge that there is a multitude of other stakeholders working concurrently to impact EV adoption. Therefore, effort has been made to ensure that, while there are many things that need to be done, there is an optimal role for Metro Vancouver to play to impact change in the area of EVs.

Methodology

As Figure 3 below shows, we began developing recommendations by first articulating the core objective of the programs and envisioning what success looks like – to increase the number of EVs in Metro Vancouver. We then weighed the key learnings from the first two phases of this project – what has worked in the past? What barriers to EV adoption remain? What is working in other jurisdictions? What Metro Vancouver's optimal role and what are they uniquely positioned to address? The trends in policy and infrastructure noted during the gap analysis guided our understanding of what types of programming would put Metro Vancouver's outreach and engagement efforts on a pathway that supports policy and infrastructure efforts by other stakeholders.

In order to remain connected to the original, measurable objective, we created two categories of short-term recommendations – projects that would create a strong baseline to measure impact and outcomes, and outreach programs that would do the work of achieving the objective.

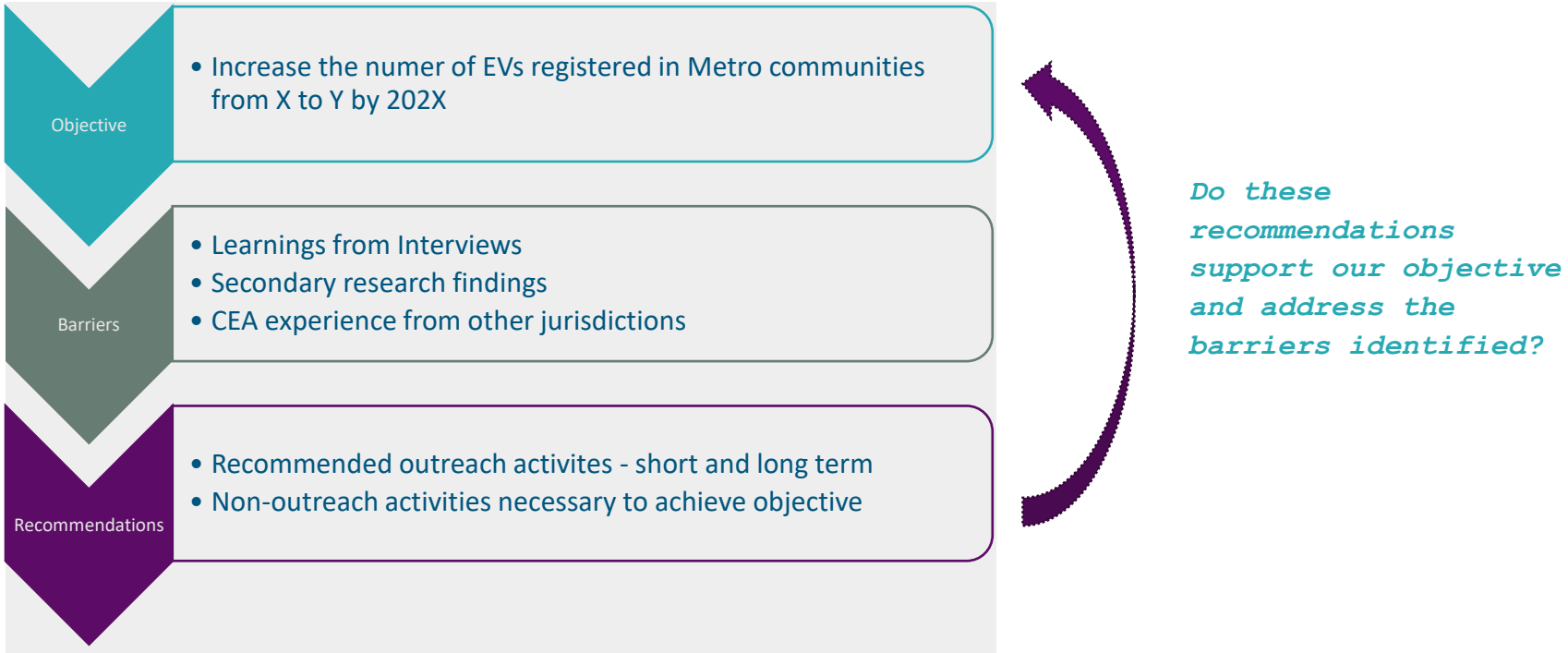


Figure 2 - Methodology Linking Recommendations to Objectives

Short-Term Recommendations

The next year, 2021, will be both a challenge and an opportunity.

Challenge: Continue engaging with your established audience and stay relevant throughout COVID-19 restrictions.

Opportunity: Take time and resources to establish an outcome-oriented foundation that will allow you to be nimble in light of the expected technology and policy changes on the horizon.

A priority for short-term recommendations is to leverage existing assets like Metro Vancouver's EV fleet vehicles, staff expertise and relationships developed to date, and continue to deliver EV programming. In tandem with this is an opportunity, reflected in recommendations 1-3, to develop the guiding documents that will articulate a theory of change, identify priority market segments and clarify measurable outcomes. Our recommendation is to work through guiding documents first, before refining existing KPIs.

Recommended Strategic Programs	Recommeded Delivery Programs
1. **Program Guiding Document**	4. **EV Loan Program**
2. **Strategic Communications Plan**	5. **School Curriculum**
3. **Equity Evaluation**	6. **Webinar Series – Ask an EV Owner**
	5. **EV Savings Calculator**

Recommended Short-Term Strategic Programs

1. Program Guiding Documents

In the early part of 2021, a strategic plan should be created to methodically amalgamate each EV program into an overarching strategy with related outcomes and goals. This document would then guide investment in various EV programs and activities in terms of their effectiveness at contributing to stated outcomes.

- Gather benchmarking data, which will allow you to understand the impact of the three EV programs. This includes the creation of new KPIs:
    - Emotive: Survey dealerships and EV owners to determine if Emotive content contributed to purchasing an EV[3]. Related KPI would be the number of dealerships and/or consumers who report Emotive contributed to their purchase.

[3] Stakeholder or User Satisfaction Surveys - Well thought out, concise online or user surveys could be an excellent resource to inform further websites, guides and webinar development, and, to the extent possible, on-site events. Also, for example, truncated versions of the interviews that took place as part of this gap analysis (Appendix B) could be systematically incorporated into annual or biennial end-of-year reporting.

    - EV Condo: Follow up with contacts to determine the number of condos that Metro Vancouver was in contact with that installed EV chargers
    - EV Workplace: Follow up with workplace event hosts to determine the number of EV chargers that were installed
- A component of this process would be to update and refine KPIs and create a plan to record data systematically as well as receive analytic reports in a timely manner:
    - Refine program KPI's to align with individual program objectives: Both "social media reach, follows & likes" and "social media engagement" were identified by Metro Vancouver as Key Performance Indicators. Unless the data provided for this review – number of web page visits and Facebook referrals – were considered parts of these metrics, the data for these KPIs were either not gathered or not provided. While the nature of Metro Vancouver staff efforts to reach social media and to engage its users are unclear, the extent of the 'reach' and 'engagement' with social media viewers, the level of viewer 'satisfaction' (follows and likes) as well as the number of resulting EV 'web page visits' could also assist in understanding social media's role 'cause and effect': reach > engagement > satisfaction (i.e., 'follows and likes') > web page visits.
    - Develop a tool and approach to monitor and track KPI's on a consistent basis
- As a result of program evaluation, and without clear outcomes identified, it may be necessary to limit staff effort into the EV Workplace program. Instead, this content could be incorporated into Emotive resources (i.e., Resources for employers).
- Complete a survey and/or focus groups, designed to be statistically representative across Metro to better understand awareness and barriers by segment
- Develop annual work plans for each program with specific targets
- Integrate ICBC and Stats Canada data to understand the percentage of EVs sales in each municipality as well as the EV make and model

2. Strategic Communications Plan

In support of outcomes identified in guiding documents and the short-term programs Metro Vancouver elects to do, a strategic communications plan will allow you to strategically direct resources and effort. It would include:

- Benchmark web analytics with associated KPIs

Stakeholders would include both partners as well as prospective EV owners and/or EV charging station users. The repeatability of such surveys enable trend analysis year-over-year. It may be important for Metro Vancouver to gather data supporting the level of public awareness of EVs, knowledge of available MV and partner resources, resident preferences and attitudes, as well as drawing out outstanding questions that stakeholders and MV residents alike have regarding MV's EV programs. Contingent on the level of privacy required, Survey Monkey could provide for a relatively straightforward and affordable approach.

As the earlier-referenced Simon Fraser University report concluded: "The successful deployment of ZEVs – in Metro Vancouver and beyond – depends on the awareness, understanding and preferences of the consumer market."

    - In particular, it is important to keep tracking page views, referral source (where do visitors come from?), time spent on pages, most popular pages,
- Strategic collaboration with municipalities to encourage web traffic to EV Condo
- Promote Metro Vancouver's internal efforts to transition to low carbon transportation (e.g., Metro Van has a strong fleet replacement strategy, leverage this and create awareness materials around the EVs as they become integrated.)
- Identifying stakeholders who can further transmit program information
- Key messages for each program as necessary
- Work plan for 2021-2023

3. Equity Evaluation

"Transportation equity is a prerequisite to building just, sustainable and resilient communities," Dr. Robert Bullard

Engagement has not typically occurred in underserved communities, which may lead to missed understanding of different types of opportunities for those demographics. Engage marginalized communities to identify mobility needs, better understand specific barriers to EVs, and identify community priorities related to decarbonizing transportation. While engaging these communities to identify barriers and needs, it is possible to include education on the basic principles of mobility equity and transportation burdens and benefits. This educational component informs community members about the costs and benefits of various transportation modes, including new forms of mobility such as bike share, car share, ride-hailing, and micro transit.

In this way Metro Vancouver would ensure that all communities in the region have the opportunity to benefit from the e-mobility revolution (including understanding workforce trends and opportunities, entrepreneurial opportunities, technology trends).

Recommended Short-Term Delivery Programs

4. EV Loan Program

Through 2021, it is unlikely that public EV test drive events will be feasible. A short-term opportunity to ensure Metro Vancouver's fleet EVs remain active would be to initiate a program that loans Emotive EVs to member municipalities as a way to test EVs and support their business case.

5. School Curriculum (reference here)

Explore creating a STEM-based middle and high school open-source curriculum in collaboration with Metro Vancouver School Districts. The curricula would be available to all teachers and would incorporate learning about clean energy vehicles as well as sample activities and

projects. Depending on the grade level, content could also have learning outcomes related to charging infrastructure, mass transit, micro transit, etc.

Potential partners: BC Hydro, Translink

6. Webinar Series

In the near term, in order to maintain relationship with a variety of stakeholders – EV Ambassadors, Dealerships, Workplaces, etc. - a webinar series would allow Metro Vancouver to curate thematic content and advertise via Emotive channels. Each webinar could have EV drivers to answer specific questions as well as content experts to deliver keynote content.

Potential partners: EV Ambassadors, VEVA, Emotive/Fraser Basin Council

7. EV Savings Calculator

Gap analysis work related to this project revealed that while many early adopters were motivated by environmental factors, the economic factor is critical to penetrate into the early majority market. Many jurisdictions have created online interactive calculators to allow individuals to input their existing internal combustion engine (ICE) vehicle, commute distance, recreational trip distance per year, etc., to generate the estimated cost savings of owning and operating an EV.

This project would help address the challenge of not meeting individuals face-to-face at live events to discuss specific lifestyle factors that do or do not make owning an EV more lucrative than ICE vehicles. In addition, it would help consumers feel more confident in their ability to compare different battery electric vehicle options.

This tool could be hosted on the emotive web page or on Metro Vancouver's EV page, with hyperlinks from EV Condo and EV Workplace. However, we recommend a final hosting decision be identified as an outcome of recommendation 1 and/or 2 so the tool exists within the broader communications strategy.

Potential partners: Emotive, BC Hydro, FortisBC, municipalities

Program	Level of Effort	Level of Impact	Recommendation
EV Loan Program	Low expense, medium staff effort	Medium	
School Curriculum	Low expense, high staff effort	High	This is an impactful initiative as it creates messengers into households and prepares Metro Van youth. This program as potential for partnerships to alleviate burden on staff.
Webinar Series	Low expense, low staff effort	High	Administrative effort by staff results in relationship building/maintaining with EV Ambassadors and other stakeholders.
EV Saving Calculator	High Expense, high staff effort	Medium – high depending on communication plan	The cost-saving benefit is one that is hardest to communicate through videos, etc., yet it is a big opportunity to engage more residents
Program Guiding Document	Low expense, low staff effort	High	A critical step to creating programs over the next 5 years that can contribute to an overarching objective to increase EV adoption
Strategic Communications Plan	Low expense, medium staff effort	High	A consultant could create a comprehensive plan, with staff supporting the plan's implementation
Equity Evaluation	Medium expense, medium staff effort	High	

Long-Term Recommedations

The following long-term recommendations leverage the gaps identified in section 2 and they align with the trajectory of complimentary policy and infrastructure developments related to supporting EV adoption. They have been developed with the understanding that in three years the market will look different than it does now – there will be a wider variety of vehicles available and local governments will have tested and developed models for workplace, condos and neighbourhood charging.

Recommendations

1. **Fleet Transition Support**
2. **EV Condo**
3. **Workplace Charging**

1. Fleet Transition Support

Fleet transition and procurement is a big opportunity to get more EVs on Metro Vancouver roads. Metro Vancouver can thus create resources to support diverse organizations to make informed, timely decisions about electric fleet vehicles. An example of information that local government fleet managers could use, for example, is here. In three years, there will be several more models of EVs available, allowing for greater transformation of light and heavy-duty fleet vehicles.

2. EV Condo

Policy and regulation trajectory indicate that a key opportunity is supporting knowledge and awareness of both resident groups and land owner/management firms about the benefits of EV charging as well as constructive “how to” information. Given that charging availability at MURBS has been identified as a barrier to widespread EV adoption across Metro Vancouver, more support to link awareness with emerging bylaws and legislation is critical.

With more EV models on the market, it is expected that EV adoption will be significantly higher, and local governments will be exploring options to ensure charging options for a variety of residents. Metro Vancouver can play an important role in facilitating this transition.

3. Workplace Charging

In many urban centres, workplace charging presents an opportunity to increase the adoption of those without access to home charging. To that end, employers *may* be a critical audience for awareness campaigns. Workplace charging also presents an opportunity to support those with lower-cost, used EVs with less range, an important equity consideration.

Metro Van will benefit from the impending Non-Residential EV Charging Bulletin and Toolkit that is currently in development by Brendan McEwan with AES Engineering. Preliminary output suggests targeting 40% stalls be EV Ready at workplaces.

A program that is framed around supporting big employers to understand the role and importance of workplace charging, as well as an understanding of how to plan now to prepare for implementing charging when it's feasible. An added opportunity is to increase understanding of fleet replacement policies to show leadership.

Program	Level of Effort	Level of Impact	Recommendation
Fleet Transition	High	High	
EV Condo	Medium	High	Target audience expands to management firms, landlords, developers, etc. Policy changes will occur, so preparing the industry and increasing their capacity to adapt is key
Workplace Charging	High	Uncertain	Level of impact will depend on the number of large employers that are identified

4 - Conclusion

These recommendations put Metro Vancouver on a pathway that aligns with policy trends and leverages their unique position as a regional government. By anchoring the EV programing to a specific outcome and by identifying the gaps in EV outreach and awareness, Metro Vancouver will be better positioned to be nimble and productive when aligning municipal and provincial priorities. Furthermore, these recommendations set Metro Vancouver up to be a leader in the region, not only supporting Metro community programs but also creating resources that can be adapted to local contexts.

metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

To: Climate Action Committee

From: Laurie Bates-Frymel, Senior Planner, Regional Planning and Housing Services
Janice Jarvis, Natural Resource Management Specialist, Regional Parks, Parks and Environment

Date: March 22, 2021 Meeting Date: April 16, 2021

Subject: **Feasibility of Targeted Invasive Plant Grazing in Metro Vancouver**

RECOMMENDATION
That the Climate Action Committee receive for information the report dated March 22, 2021, titled "Feasibility of Targeted Invasive Plant Grazing in Metro Vancouver".

EXECUTIVE SUMMARY
With funding from the Regional District Sustainability Innovation Fund, Metro Vancouver initiated Phase 1 of the "Targeted Invasive Plant Grazing" project by retaining a consultant to conduct a feasibility assessment of grazing as an herbicide-free invasive plant control option. The consultant concluded that targeted grazing could be as effective as hand pulling or mowing, with repeated treatments needed for long term control.

However, grazing would be logistically complex, 2-4 times costlier than mowing, and 2-5 times more carbon-intensive in this region, due to the need to transport herds from other areas of BC or Alberta. The original intent of Phase 2 was to conduct a pilot in Aldergrove Regional Park in 2021, but given the results of Phase 1, staff will further assess feasibility by exploring whether: a) a suitable trained local herd can be found, and b) the complex logistical requirements can be met on-site before initiating a pilot project.

PURPOSE
This report provides the results from Phase 1 of the Targeted Invasive Plant Grazing project.

BACKGROUND
In February 2020, the MVRD Board approved the allocation of $150,000 from the Regional District Sustainability Innovation Fund for a three-year, phased project titled "Targeted Invasive Plant Grazing in Metro Vancouver". The project was proposed as three distinct phases, with phases 2 and 3 to proceed contingent on the results of Phase 1, which comprised a feasibility assessment. The Phase 1 findings are summarized in this report.

TARGETED GRAZING FEASIBILITY ASSESSMENT
Metro Vancouver retained a consulting team with expertise in invasive plant management, ecological restoration, and targeted grazing. Through literature reviews and practitioner interviews, they investigated suitable target plant species, livestock species, cost effectiveness, and greenhouse gas emissions compared to other control methods, as well as logistical and legal considerations specific to the Metro Vancouver region. A summary report provides additional details (Attached).

Suitable Target Plants
The consultant first assessed the toxicity, palatability, and control efficacy of targeted grazing for the 13 invasive plants featured in Metro Vancouver's suite of regional best management practices. They concluded that high to moderate control effectiveness could be achieved by grazing English and Irish ivies, giant hogweed, Himalayan balsam, Himalayan blackberry, purple loosestrife, Scotch broom, and wild chervil.

Suitable Livestock and Herd Availability
Four livestock species – pigs, cattle, sheep, and goats – were compared for targeted grazing suitability. Goats were deemed most suitable because they find a large range of plants palatable, they are the least susceptible to toxicity issues, and they have a higher digestive efficiency (greater levels of chewing) than other livestock species. However, goats will also consume off-target plants and girdle trees, and they are not fond of wet conditions so require dry, sheltered areas.

After interviewing 12 practitioners from across BC and Alberta, and two from the US, the consultant concluded that there is a shortage of targeted grazing practitioners in Western Canada, and none currently operating in the Lower Mainland. Five practitioners from other areas of BC and Alberta expressed a willingness to transport their herds if assured work was available. The consultant estimated that contracts of $40,000/year at minimum could attract a practitioner to accept work in the region.

Efficacy and Costs
Targeted grazing can be as effective as manual and mechanical control (e.g. hand pulling or mowing), but repeated treatments are also required for long term control. The cost of grazing in Metro Vancouver will be site- and plant-specific, but higher than manual or mechanical control due to the need for additional legal and logistical considerations such as permits, a site assessment, a grazing plan, base camp requirements for shelter, fencing, water, power, 24-hour access, additional forage, contract management, partnership building, public/neighbour engagement, site preparation, and post-treatment restoration. The consultant developed a logistics checklist and they recommended hiring a part time coordinator (estimated at $30,000/year).

CONSIDERING A PILOT IN ALDERGROVE REGIONAL PARK
A site assessment was conducted for Aldergrove Regional Park, which is uniquely suited for targeted grazing. The park has the necessary infrastructure (a barn, power, and water) and is within the Agricultural Land Reserve where grazing is a permitted land use. Staff had originally anticipated a one-year pilot, but the consultant recommended and developed a 3 to 5-year operational grazing plan, as well as field testing and monitoring protocols to address the park's Himalayan blackberry infestation.

Estimated Pilot Costs
The consultant reported that the estimated range of potential costs to implement a pilot in Aldergrove Regional Park by contracting an out-of-town herder, assuming logistics can be met, are as outlined in Table 1. Although staff concluded that the barn may require significant upgrades for

longer term use (up to $400,000), temporary fencing and shelter could be assembled for approximately $25,000, if appropriate.

Table 1. Cost range to implement a targeted grazing pilot at Aldergrove Regional Park

Item	Estimated overall cost	
	Low end	High end
Practitioner/Herder (minimum 3 years @ $40,000 to $56,000/year)	$120,000	$168,000
Shelter - Temporary fencing/shelter or possible barn safety upgrades	$25,000	$400,000
Part time coordinator ($30,000/year for 3 to 5 years)	$90,000	$150,000
Unanticipated logistical and/or legal costs	?	?
Total	$235,000+	$718,000+

For comparison, Regional Parks staff estimate the cost of flail mowing the same area for 3 to 5 years at $117,900 to $196,500.

Greenhouse Gas Emissions

The greenhouse gas emissions associated with targeted grazing treatments were compared to other control options for Aldergrove Regional Park. Metro Vancouver Air Quality and Climate Change staff reviewed and validated the consultant's calculations. Transporting herds to and from the region (average of 1,425 km) would emit 784 kg of CO_2, two to five times the emissions of mowing. If a local herd was available, grazing would become a lower greenhouse gas emission option.

Transferability Elsewhere in Metro Vancouver

Aldergrove Regional Park appears well suited for grazing but the park's unique conditions also mean the learnings from a pilot may not be transferable to other regional or municipal park settings. A permit and/or bylaw changes would likely be needed to accommodate grazing in urban parks. Staff presented the report's conclusions to members of the Regional Planning Advisory Committee – Invasive Species Subcommittee (invasive species staff from member jurisdictions) and they expressed little interest in trying this technique given the logistical complexities and higher costs compared to other control methods.

NEXT STEPS

At this time, staff will continue to explore whether: a) a suitable herd can be found within the Lower Mainland, and b) the logistics and animal welfare requirements can be satisfied at Aldergrove Regional Park prior to initiating a pilot project. It should be noted that the estimated costs to proceed with a 3-5 year pilot ($235,000 to $718,000) would exceed the remaining budget ($123,000), so additional funding may be needed if a suitable herd is located.

ALTERNATIVES

This is an information report. No alternatives are presented.

FINANCIAL IMPLICATIONS

In February 2020, the MVRD Board approved the allocation of $150,000 from the Regional District Sustainability Innovation Fund for a three-phase study on targeted invasive plant grazing. Phases 2 and 3 were contingent on successful outcomes from the first phase, which comprised a feasibility

assessment. Phase 1 was completed in 2020 at a cost of $27,000. The balance of the approved funding was earmarked for a pilot (Phase 2, which was expected for 2021) and development of best management practices (Phase 3, which was expected for 2022).

No research agreements or contracts were executed with member jurisdictions or other partners noted in the Reference.

CONCLUSION

With funding from the Regional District Sustainability Innovation Fund, Metro Vancouver initiated Phase 1 of the "Targeted Invasive Plant Grazing" project by retaining a consultant to assess the feasibility of grazing as an herbicide-free invasive plant control option. A literature review and interviews with practitioners from across Western Canada and the US, informed the consultant's conclusion that the efficacy of targeted grazing is likely similar to hand pulling or mowing, with repeated treatments required for long term control. However, grazing is logistically complex, 2-4 times costlier, and 2-5 times more carbon-intensive in Metro Vancouver at this time, due to the need to transport herds from other areas of BC or Alberta. Hence, staff will undertake further exploration to determine whether: a) a suitable trained local herd can be found, and b) the complex logistical requirements can be met prior to conducting a pilot project at Aldergrove Regional Park.

Attachment

Summary Report: Feasibility of Targeted Invasive Plant Grazing in Metro Vancouver *(43841096)*

Reference

Regional District Sustainability Innovation Fund Targeted Invasive Plant Grazing Project Executive Summary

43837873

SUMMARY REPORT

Feasibility of Targeted Invasive Plant Grazing In Metro Vancouver

ACKNOWLEDGMENTS

This report was prepared for Metro Vancouver by Professional Agrologists (BCIA): Dr. Catherine Tarasoff of Agrowest Consulting Scientists and Amanda J. Miller of Palouse Rangeland Consulting, with advisory support from Tammy Salmon (Grazing Practitioner). Peer review was provided by Janice Jarvis, RPBio, Natural Resource Management Specialist, Regional Parks (East Area), Metro Vancouver and Laurie Bates-Frymel, RPP, MCIP, Senior Regional Planner (Environment), Regional Planning, Metro Vancouver. Funding for this project was provided through Metro Vancouver's Sustainability Innovation Fund.

DISCLAIMER AND COPYRIGHT

Questions regarding this report should be directed to Laurie Bates-Frymel, Senior Regional Planner at laurie.bates-frymel@metrovancouver.org

metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

Agrowest
Consulting Scientists

PALOUSE RANGELAND CONSULTING

Contents

EXECUTIVE SUMMARY

This report assesses the feasibility of targeted invasive plant grazing in Metro Vancouver, reviewing the efficacy, challenges, and considerations of targeted grazing treatments for control of invasive plants. Fourteen targeted grazing practitioners were interviewed to assess the operational feasibility of targeted grazing treatments. Seven suitable species were selected, and a review of available literature and data enabled detailed assessments of targeted grazing versus other control treatments, comparing efficacy and costs. Recommended approaches were provided for effective control of each suitable invasive plant species. Generally, control treatments must be repeated and used in combination with other complimentary methods. Additionally, monitoring and follow-up action plans are needed to prevent recolonization, in conjunction with effective restoration/revegetation plans to re-establish competitive native communities.

The efficacy of targeted grazing was determined for seven target species:

Invasive Species	Control Efficacy
Giant Hogweed	High
English and Irish Ivies	High
Himalayan Balsam	High
Wild Chervil	Moderate-High
Himalayan Blackberry	Moderate
Scotch Broom	Moderate
Purple Loosestrife	Low-Moderate

Targeted grazing treatment application costs were found to be comparable to mowing and manual control efforts; however, additional costs may be associated with logistical requirements necessary to enable targeted grazing. These costs are difficult to quantify, highly variable, and site specific.

Significant logistical considerations must be addressed prior to implementing targeted grazing treatments, ranging from addressing legal requirements, public communication, partnerships with bylaw enforcement agencies and police, animal husbandry requirements, biosecurity considerations, provision of pre-grazing data, post-grazing monitoring, and effective restoration. Adequate funding and staff resources must be in place to support all the logistical considerations. If treatments are applied ad-hoc and do not meet the recommended timing, frequency, and duration, control will be ineffective.

Goats are suggested as the most suitable livestock (versus sheep, pigs, or cows) to perform targeted grazing based on efficacy, ease of handling, public perception, and availability of herds. There is a shortage of targeted grazing practitioners in Western Canada and none in the Lower Mainland, but five practitioners expressed interest and willingness to work in the Metro Vancouver Region.

Potential carbon implications were reviewed as part of a case study for targeted grazing of Himalayan blackberry at Metro Vancouver's Aldergrove Regional Park finding that emissions from targeted grazing would be lower than burning, but higher than mowing or manual control.

A 3-5 year operational grazing plan, field testing recommendations, and monitoring protocols were provided. Specific cost estimates for targeted grazing at Aldergrove Regional Park range from $12,000-$56,000 per year based on a combination of practitioner interviews and recommended frequency and duration requirements from literature review. Subsequent interviews with 'willing to travel' practitioners and the need for a part-time coordinator conclude that a realistic annual budget should be $40,000 for a grazing practitioner and $30,000/year for a part-time coordinator.

Targeted grazing treatments in Metro Vancouver are only feasible if logistical considerations can be met, and funding and staff resources have been allocated to support the long-term partnerships necessary for effective control. If treatments are applied ad-hoc and do not meet the recommended timing, frequency, and duration, control will be ineffective.

If Metro Vancouver decides to proceed with field testing, Aldergrove Regional Park could be a suitable location, with the caveat that logistical considerations must be adequately addressed, and long-term funding must be secured prior to initiating treatments. Success requires implementing long-term treatments focused on consistency in application, monitoring, regrowth management, and restoration.

Goats are suggested as the most suitable livestock (versus sheep, pigs, or cows) to perform targeted grazing based on efficacy, ease of handling, public perception, and availability of herds.

INTRODUCTION

Invasive plants represent a suite of threats to biodiversity, agricultural systems, infrastructure, human health and safety, and recreational values. Targeted grazing could be explored in Metro Vancouver as a potential control treatment, but does include challenges in application and management, and may result in negative unintended consequences if not properly scoped and applied.

Targeted grazing uses the timing, frequency, intensity, and selectivity of grazing/browsing to apply herbivory pressure on specified plant species or sections of the landscape.

Effective targeted grazing treatments requires a knowledge of plant ecology, livestock nutrition, livestock foraging behaviour, livestock handling/management, and site specific ecological attributes.

Targeted grazing is defined as: '…the application of a specific kind of livestock at a determined season, duration, and intensity to accomplish defined vegetation or landscape goals.'

METHODOLOGY AND SUITABLE TARGET PLANT SPECIES

A preliminary assessment was undertaken of Metro Vancouver's 13 priority invasive plant species to determine suitability for control by targeted grazing. Based on a literature review evaluating control efficacy, toxicity, and palatability, the following seven species were deemed as potentially suitable for control by targeted grazing:

Giant Hogweed
English and Irish Ivies
Himalayan Balsam
Himalayan Blackberry
Purple Loosestrife
Scotch Broom
Wild Chervil

Each suitable plant species was further assessed for digestive efficiency, grazing timing and frequency, treatment duration, and suitable livestock, as summarized in Table 1.

COST AND EFFICACY COMPARISONS

Estimated treatment cost and efficacy comparisons for target plant species were compiled through a literature review, practitioner interviews, and cost data provided by Metro Vancouver. These values are presented in Table 2. Recommendations are based on review of target plant species characteristics, control method efficacy, and estimated costs. Please refer to the recommendation section of the Technical Report for details rationale on treatment recommendations.

Costs of targeted grazing are comparable to most other treatments for the majority of target species.

However, overall costs for targeted grazing in Metro Vancouver may be higher due to additional legal and logistical considerations.

TABLE 1. Summary of suitable target plant species assessment.

Target Invasive Plant Species	Efficacy[a]	Palatability	Toxicity	Digestive Efficiency	Grazing Timing and Frequency	Duration (Years)[c]	Livestock Recomm.
Giant Hogweed	**High**	**High**	Mild glycosides and flavinoids	Assumed **high** due to delicate seeds [b]NSSA	2 treatments per growing season: spring and late summer	7	Sheep and goats
English and Irish Ivies	**High**	**High**	Mild Contains hederin	Assumed **moderate** due to hard-coated seeds [b]NSSA	1 treatment per growing season: applied during active growth under dry soil conditions	2	Goats
Himalayan Balsam	**High**	**High**	Non-toxic	Assumed **high** due to delicate seeds [b]NSSA	2 treatments per growing season: spring and late summer	2	Sheep and goats
Himalayan Blackberry	Moderate	**High**	Non-toxic	Assumed **moderate** due to hard-coated seeds [b]NSSA	2 treatments per growing season: spring and summer	3-5	Goats
Purple Loosestrife	**Low-Moderate**	**Low Moderately** palatable to goats	Non-toxic	Assumed **high** due to delicate seeds [b]NSSA	1 or more treatments per growing season: applied during active growth	3+	Goats
Scotch Broom	**Moderate**	**Low** Palatable to goats	Mild Contains quinolizidine alkaloids, toxicity not reported in goats	**Moderate** 8% of seeds viable following digestion by goats	1 continuous treatment applied during active growth	4 - 30	Goats
Wild Chervil	**Moderate-High**	**Moderate-High** Palatability declines with age	Non-toxic	Assumed **high** due to delicate seeds [b]NSSA	1 or more treatments per growing season: starting in early spring	2	Goats

[a] Efficacy estimates are based on application of recommended grazing timing, frequency, and duration, in combination with ongoing monitoring.

[b] NSSA – No Specific Studies Available

[c] Duration of active eradication treatments. All treatments require ongoing monitoring past this window and follow-up control efforts when necessary to address any regrowth

TABLE 2. Cost[a] per m^2 and efficacy[b] comparisons of treatments on target species. Costs represent a single application and are estimated using best available data from literature, practitioner interviews, and Metro Vancouver.

Target Species	Targeted Grazing[c]	Chemical[d]	Mechanical[e]/Manual[f]	Biological Control	Cultural Control	Treatment Recomm.
Giant Hogweed	$0.15-$8.20	$0.30-$2	Taproot Cutting $0.36–$50 Hand Pulling $0.90-$50 Mowing $0.90-$13	$ N/A	Fire $ N/A	Grazing, Chemical, Taproot Cutting, or Hand Pulling
English and Irish Ivies	$0.15-$2	$0.30-$2	Hand Pulling/ Cutting $0.65-$16	$ N/A	Fire $ N/A Heat Treatment $ N/A Mulch Application $N/A	Grazing, Hand Pulling/Cutting, or Mulch Application
Himalayan Balsam	$0.15-$2	$0.30-$18	Mowing $0.90-$18 Hand Pulling $0.90-$18	$ N/A	Fire $ N/A	Grazing, Chemical, Mowing, or Hand Pulling
Himalayan Blackberry	$0.15-$2	$0.30-$2	Hand Pulling $0.30-$12 Mowing $0.13-$0.50 Bulldozing $0.30-$1.22	$ N/A	Fire $ N/A	Hand Pulling, Grazing, Chemical, Mowing, or Bulldozing
Purple Loosestrife	$0.15-$2	$0.30-$2	Hand Pulling $0.30-$12 Mowing $0.13-$0.50 Hand Cutting $0.30-$12	*Neogalerucella* beetles $ N/A	Fire $ N/A Flooding $ N/A	Biocontrol, Hand Pulling, or Chemical
Scotch Broom	$0.15-$2	$0.03-$2	Hand Pulling/Cutting $0.65 Mowing $0.50-$2 Mulching $0.07 Tilling $0.10-$2	$ N/A	Fire $ N/A	Hand Pulling/ Cutting, Chemical, or Grazing
Wild Chervil	$0.15-$2	$4.62	Hand Pulling $0.30-$12 Tilling $0.30-$12 Mowing $0.25-$1 Seed Head Clipping $0.30-$12	$ N/A	Fire $ N/A Smothering $ N/A	Grazing, Hand Pulling, Tilling, Mowing, and Smothering

[a] Estimated costs solely reflect treatment costs and do not include other costs that may be necessary to enable treatment application (e.g. logistical and legal considerations).

[b] Efficacy estimates based on treatment applied as recommended, in combination with ongoing monitoring and follow up treatments.

[c] Grazing treatments may be limited by significant logistical considerations and are not suitable for riparian or wetland ecosystems

[d] Chemical treatment is not permitted in riparian and wetland ecosystems

[e] Mowing treatment options may not be possible in remote areas and steep slopes

[f] Manual removal would be labour intensive for large infestations, but costs may be considerably less if using volunteers

EFFICACY:

High

Moderate-High

Moderate

Low-Moderate

Low

LIVESTOCK SUITABILITY

It is important to match the livestock species with the target plant by taking into consideration grazing preferences, toxicity, and palatability (Olson & Launchbaugh, 2006). For Metro Vancouver, goats are suggested as the most suitable livestock based on efficacy, ease of handling, public perception, and availability of herds.

TABLE 3. Livestock suitability summary.

Livestock Type	Advantages	Disadvantages
Cattle	• Capacity to ingest large amounts of forage	• Select for grasses, avoid shrubs and forbs (invasive plants) • More susceptible to toxicity issues
Sheep	• Adapt feeding habits to available plants	• Consume less shrubs and forbs than goats • More susceptible to toxicity issues • More susceptible to bloat and choke from changes in feed • At higher risk for injury and predation
Goats	• Select for browse and shrubs (invasive plants) • Larger range of palatable plants than other livestock • Less susceptible to toxicity issues • Reduced risk of seed spread due to greater levels of chewing and higher digestive efficiency	• Curious and must be monitored closely • May girdle off-target trees
Pigs	• Highly adaptable and will feed on any available forage • Will root out plant roots and crowns	• Difficult to contain, more likely to escape and become feral • Issues with odour and public relations

There is a general shortage of targeted grazing practitioners in Western Canada, and none located in the Lower Mainland. If long-term contract work was available in this region, there may be an opportunity for an emerging local agricultural business.

LEGAL REQUIREMENTS AND LOGISTICAL CONSIDERATIONS

Prior to initiating any targeted grazing projects or engaging in any substantive planning on targeted grazing projects, the parties should ensure that all necessary legal and logistical components (as outlined in Table 4 below) are addressed.

TABLE 4. Logistics checklist for those considering targeted grazing at sites in Metro Vancouver.

Factor	Logistical Consideration(s)	Action(s)
Legal Requirements	Must ensure grazing use is enabled by municipal bylaw(s), obtain business licence, necessary permits	1. Contact municipality 2. Review municipal bylaw 3. Obtain business licence(s) 4. Obtain permit(s)
Grazing Contract	Roles and responsibilities	Determining which party is responsible for which logistical component, including funding
Coordinator	Coordination of various moving parts of treatment is needed to ensure success	Ensure that there is a coordinator available to for contract management, communications, and coordination with partners[c]
Partnership(s)	Proactive communication and partnership building ensures success	Engage with: • Police • Bylaw • Community Associations • Adjacent neighbours • BC Society for the Protection of Animals
Communication	Public Education	Encourage support through public engagement efforts such as education days, school visits, citizen science, restoration planting etc.
Base Camp	Must have a base camp area for practitioners to stay on site and monitor livestock 24/7	Ensure that potential targeted grazing treatment sites have areas suitable for base camps Power/water/sewer is not necessary for self-contained units, however spaces must be flat and located relatively near to treatment areas
Animal Husbandry	Shelter	Barns or treed areas must be available to provide a secure bedding area
	Fencing	Portable fencing panels or electric fencing used for night penning and to concentrate use in target areas
	Additional Forage Resources	Allow hay or grazing of non-target plants Ensure hay is weed free to avoid introduction of invasive species
	Poisonous Plants	Obtain permission to scout and remove poisonous plants prior to grazing
	Water	Provide access to on-site water or haul water to site
	Livestock Guardian Dogs	Allow guardian dogs off-leash
	Access	Provide suitable access for long vehicles hauling livestock 24/7 access for practitioners Access to power/water/sewer is not necessary for self-contained units. Restrict public access to grazing sites
	Livestock Management Dogs	Ensure that off leash working dogs are permitted

Factor	Logistical Consideration(s)	Action(s)
Treatment Efficacy	Review efficacy of all treatment options	Ensure funding will support targeted grazing to meet timing, frequency, and duration needs May require a longer-term service contract and resources to write/oversee contract
Pre-Grazing Data	Pre-grazing data is necessary to develop the grazing plan	Provide: • Map of target areas, target invasive species, and infestation density • access information • infrastructure information
Site Assessment	Determine site suitability by reviewing criteria	Review site suitability for targeted grazing treatments based on: 1. Environmental Suitability 2. Access Suitability 3. Available Infrastructure
Grazing Plan	A grazing plan is needed to implement the grazing treatment	Develop a grazing plan using the variables outlined in Appendix 4
Field Testing	Test grazing efficacy on invasive species	Implement grazing plan and follow-up monitoring to assess success
Biosecurity	Reduce risk of disease	• Implement a 'no-touch' policy • Ensure herds are vaccinated and healthy • Use fencing to reduce contact with other livestock • Select for closed herds
Weed Spread	Reduce risk of weed spread	Pen livestock for 3-4 days prior to moving off site
Manure Management	Address manure build up	• Develop onsite manure management protocols • Investigate options for offsite manure disposal
Liability Insurance	Practitioners must carry liability insurance	Ensure practitioners carry liability insurance at a rate acceptable to the client
Herd Availability	Limited practitioners	Contact practitioners who have expressed interest
Transportation	No practitioners in the lower mainland	Transportation costs will need to be addressed in the grazing contract
Restoration	Plan for restoration and revegetation plans following weed control	Ensure control does not overwhelm organizational restoration capacity

Costs to address each logistical component in Table 4 may be additional to the estimated treatment costs outlined in Table 2. Identification of roles and responsibilities in the grazing contract, including which party is responsible for funding each logistical component, will be necessary to ensure success.

POTENTIAL CARBON IMPLICATIONS

To investigate the potential carbon implications of targeted grazing treatments relative to chemical, mechanical, and manual control options, Aldergrove Regional Park was used at the control site. Please refer to the Technical Report for more details on the carbon dioxide equivalent emission calculations.

EMISSIONS:
Lowest
Moderate
Highest

TABLE 5. Potential carbon dioxide emission comparisons for each control method for Himalayan blackberry in Aldergrove Regional Park.

Control Method	Emission source	Estimated kg CO2 Emissions (treatment of 4.7 ha)
Targeted Grazing	Transportation	784
	Manure	0
	Generator	0
	Water hauling	0
		784
Chemical	Herbicide use	228
	Transportation	14
		242
Mechanical + Disposal	Mower Equipment	103
	Transportation	14
	Disposal	Landfill = 28 Composting = 22 - 282 Burning = 885
		Landfill = 145 **Composting = 139 - 399** **Burning = 1,002**
Manual + Disposal	Transportation	140
	Disposal	Landfill = 28 Burning = 885 Composting = 22 - 282
		Landfill = 168 **Composting = 162 - 422** **Burning = 1,025**

Carbon dioxide emissions associated with targeted grazing at Aldergrove Regional Park would be lower than burning, but higher than emissions from mowing and manual control, which include some emissions from disposal of invasive plant material at a landfill or industrial composting facility. Emissions from grazing would be considerably lower if a local herd was available, although this estimate assumes manure would be managed onsite and not transported to a disposal facility.

CONCLUSIONS

Managers are often seeking predictability the results of control efforts and plant community responses, but the nature of invasive species management control tools, including target grazing, is influenced by many complex factors. No single treatment will work as a 'silver bullet' for any of the target invasive plant species reviewed in this report. All treatments have efficacy limitations, with efficacy directly correlated with funding and commitments to control efforts. Successful control requires long-term integrated weed management, focused on consistency in treatment application, long-term monitoring, regrowth management, and effective restoration efforts.

Targeted grazing treatments in Metro Vancouver will only be feasible if the logistical considerations outlined in Table 4 can be met, and funding and staff resources have been allocated to support the long-term partnerships necessary for effective control. If treatments are applied ad-hoc and do not meet the recommended timing, frequency, and duration, then control will be ineffective and represent a poor use of financial resources.

Successful control requires long-term integrated weed management, focused on consistency in treatment application, long-term monitoring, regrowth management, and effective restoration efforts.

The red barn at Aldergrove Regional Park provides excellent animal housing

RECOMMENDATIONS FOR A POTENTIAL PILOT STUDY

A site assessment was undertaken for Aldergrove Regional Park as a potential targeted grazing pilot study location. Aldergrove Regional Park is well suited for targeted grazing as it includes favourable infrastructure that could easily support a resident goat herd for Himalayan blackberry control. A 3-5 year operational grazing plan, field testing recommendations, and monitoring protocols were provided. Specific cost estimates for targeted grazing at Aldergrove Regional Park range from $12,000-$56,000 per year based on a combination of practitioner interviews and recommended frequency and duration requirements from literature review. Subsequent interviews with 'willing to travel' practitioners and the need for a part-time coordinator conclude that a realistic annual budget should be $40,000 for a grazing practitioner and $30,000/year for a part-time coordinator.

A realistic annual budget should be $40,000 for a grazing practitioner and $30,000/ year for a part-time coordinator.

If Metro Vancouver decides to proceed with a targeted invasive plant grazing pilot study, the following steps should be considered:

- Ensure all steps in Table 4 have been addressed prior to implementation;
- Secure 3+ (preferably 5) years of funding to fully realize potential benefits of targeted grazing;
- Consider hiring a part-time coordinator to ensure contract details are clearly outlined, pre-treatment and post-treatment data is collected, and practitioner activity and deliverables are being met as outlined in the contract;
- Develop an agricultural business support policy; and
- Reach a long-term service agreement with a practitioner.

If logistical considerations cannot be met, and funding and staff resources are not available to properly support the long-term partnerships necessary for effective targeted grazing treatments, a pilot study is not recommended. It should be noted that Aldergrove Regional Park is unique and the learnings from such a pilot study may not be transferable to other park settings across Metro Vancouver.

The Red Barn and fenced pastures in Aldergrove Regional Park

metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

To: Climate Action Committee

From: Laurie Bates-Frymel, Senior Planner, Regional Planning and Housing Services Department

Date: March 22, 2021 Meeting Date: April 16, 2021

Subject: **Best Management Practices for Invasive Species: Hedge Bindweed and American Bullfrog**

RECOMMENDATION

That the MVRD Board:

a) receive for information the report dated March 22, 2021, titled "Best Management Practices for Invasive Species: Hedge Bindweed and American Bullfrog"; and
b) direct staff to forward the Best Management Practices and suite of seventeen invasive species fact sheets to member jurisdictions for information.

EXECUTIVE SUMMARY

Building on an existing library of technical guidance for fifteen priority invasive species, Metro Vancouver has again worked with the Invasive Species Council of Metro Vancouver, member jurisdictions and other local experts to produce a new set of best management practices – this time for hedge bindweed (also known as morning glory) and American bullfrog. These documents provide information for practitioners about how to identify, track, report, dispose, prevent further spread, and effectively control these species, as well as regulatory requirements, monitoring and restoration tips, references and additional resources. Each guide also describes how these invasive species may adapt as our climate changes.

In addition, seventeen new fact sheets (one for each priority invasive species) have been created in collaboration with staff from the Invasive Species Council of Metro Vancouver, UBC Botanical Garden, and member jurisdictions. These public-friendly fact sheets provide general information on each species.

PURPOSE

To provide the Climate Action Committee and the MVRD Board with two new invasive species best management practices documents and a suite of seventeen new fact sheets for information.

BACKGROUND

In 2018, 2019, and 2020, the Climate Action Committee received reports regarding best management practices for 15 invasive species: knotweed species, giant hogweed, European fire ant, European chafer beetle, Himalayan blackberry, Scotch broom, English holly, English and Irish ivies, yellow archangel, Himalayan balsam, parrot's feather, purple loosestrife, reed canarygrass, wild chervil, and yellow flag iris. This report presents best management practices for two additional priority invasive species identified by the Regional Planning Advisory Committee (RPAC) – Invasive Species Subcommittee.

THE NEED FOR AND DEVELOPMENT OF REGIONAL BEST MANAGEMENT PRACTICES

Invasive species are non-native flora or fauna that out-compete native species and can be highly destructive and difficult to control. They can threaten property and recreational values, infrastructure, agriculture, public health and safety, as well as ecological health.

In 2016, the RPAC-Invasive Species Subcommittee requested the development of regionally-appropriate best management practices for priority invasive species. In October 2018, the MVRD Board adopted the *Ecological Health Framework*, which illustrates Metro Vancouver's role in protecting and enhancing ecological health as it relates to its services and functions, and supporting regional efforts. The *Framework* commits Metro Vancouver to "develop and employ best practices in the management of invasive species on Metro Vancouver lands and promote their use region-wide".

Metro Vancouver retained the Invasive Species Council of Metro Vancouver (ISCMV) to create the best management practice documents. The target audiences are local government staff, crews, project managers, contractors, consultants, developers, stewardship groups, and others who have a role in invasive species management. The best management practices include technical guidance about identification, tracking, reporting, effective prevention and control strategies, regulatory requirements, disposal, monitoring and restoration, as well as references and additional resources. The recommendations were informed by the best available scientific expertise and local experience.

OVERVIEW OF LATEST BEST MANAGEMENT PRACTICES

The best management practices for hedge bindweed (Reference 1) and American bullfrog (Reference 2) have been reviewed by members of the RPAC-Invasive Species Subcommittee and additional local experts. An overview of each document is provided below.

Hedge Bindweed

Also known as morning glory, hedge bindweed is a persistent plant that spreads by underground stems and roots that can re-sprout from fragments left in the soil. It can twist around other plants and structures, often forming a tangled mass that overwhelms gardens, weighing down branches or stems of other plants, and sometimes causing breakage.

Manual control is recommended, carefully removing new seedlings by hand from other plants and structures, while also digging up all underground stems and roots. Effective hedge bindweed control will likely involve several years of ongoing monitoring and removal.

American Bullfrog

Native to eastern North America, the robust American bullfrog was first introduced as a delicacy for human consumption, but they escaped or were released, and subsequently spread, including into several wetlands across Metro Vancouver. Bullfrogs are voracious predators that consume a variety of prey, including smaller native and some endangered frog species. They can also spread deadly viruses and funguses to other amphibians, and damage wetland habitats and water supply infrastructure.

Control methods include egg mass removal (late May to early September), or capturing tadpoles or adults with dip nets or by hand with subsequent humane euthanasia. The elimination of American

bullfrogs from this region is likely impossible, so efforts should be focused on preventing further spread and improving habitat for native species.

Climate Adaptation

This set of best management practice documents features a section on 'Climate Adaptation' that describes how these species may adapt as our climate changes based on their ability to withstand warmer temperatures, summer drought, warmer wetter winters, and an extended growing season. All of the existing best management practices will be updated to include a Climate Adaptation section over the coming months.

FACT SHEETS AND NEXT STEPS

In 2020, the RPAC-Invasive Species Subcommittee requested the creation of one-page plain language fact sheets to help share the best practice guidance beyond practitioners. Seventeen fact sheets - featuring information on impacts, identification, prevention, recommended control options, and tips for how residents can help - have been produced, one for each of the 15 previous priority species (References 5-19), as well as the two latest that are the subject of this report (References 3 and 4). These resources have been posted on Metro Vancouver's Invasive Species webpage. To increase awareness of the new best practices and suite of fact sheets, staff recommends circulation to member jurisdictions, as per Alternative 1.

ALTERNATIVES

1. That the MVRD Board:
   a) receive for information the report dated March 22, 2021, titled "Best Management Practices for Invasive Species: Hedge Bindweed and American Bullfrog"; and
   b) direct staff to forward the Best Management Practices and suite of seventeen invasive species fact sheets to member jurisdictions for information.

2. That the Climate Action Committee receive for information the report dated March 22, 2021, titled "Best Management Practices for Invasive Species: Hedge Bindweed and American Bullfrog", and provide alternate direction to staff.

FINANCIAL IMPLICATIONS

The 2020 MVRD Board-approved Regional Planning budget included $10,000 for best management practices presented in this report.

CONCLUSION

Best management practices have been compiled for two additional invasive species found within the Metro Vancouver region: Hedge bindweed and American bullfrog. These documents provide locally-tested technical guidance about identification, tracking, reporting, climate adaptation, effective prevention and control strategies, regulatory requirements, disposal, monitoring and restoration, as well as references and additional resources. A set of one-page fact sheets has also been created to increase public awareness of the seventeen priority invasive species. Staff recommend Alternative 1, that the Board receive these documents for information, and direct staff to forward them to member jurisdictions.

References

1. Best Management Practices for American Bullfrog in the Metro Vancouver Region - March 2021
2. Best Management Practices for Hedge Bindweed in the Metro Vancouver Region - March 2021
3. American Bullfrog Fact Sheet - March 2021
4. Hedge Bindweed Fact Sheet - March 2021
5. English and Irish Ivies Fact Sheet - December 2020
6. English Holly Fact Sheet - December 2020
7. European Chafer Beetle Fact Sheet - December 2020
8. European Fire Ants Fact Sheet - December 2020
9. Giant Hogweed Fact Sheet - December 2020
10. Himalayan Balsam Fact Sheet - December 2020
11. Himalayan Blackberry Fact Sheet - December 2020
12. Knotweeds Fact Sheet - December 2020
13. Parrots Feather Fact Sheet - December 2020
14. Purple Loosestrife Fact Sheet - December 2020
15. Reed Canarygrass Fact Sheet - December 2020
16. Scotch Broom Fact Sheet - December 2020
17. Wild Chervil Fact Sheet - December 2020
18. Yellow Archangel - December 2020
19. Yellow Flag Iris Fact Sheet - December 2020

44585003

To: Climate Action Committee

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

Date: March 30, 2021 Meeting Date: April 16, 2021

Subject: **Manager's Report**

RECOMMENDATION

That the Climate Action Committee receive for information the report dated March 30, 2021, titled "Manager's Report".

CLIMATE ACTION COMMITTEE 2021 WORK PLAN

The attachment to this report sets out the Committee's Work Plan for 2021. 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.

BC ANNOUNCES SECTORAL GREENHOUSE GAS EMISSIONS REDUCTIONS TARGETS

In 2018, BC released the Provincial climate action plan *CleanBC*. The plan outlines actions that the BC government will take to reach the Provincial climate target of reducing greenhouse gas emissions by 40% by 2030 (relative to 2007). As part of *CleanBC*, the BC government has announced sector-specific targets to identify the relative contribution of different sectors to the 2030 emissions reductions target (Reference 1). These are expressed as a five-point range for the following sectors:

- Transportation: 27 to 32%;
- Industry: 38 to 43%;
- Oil and gas: 33 to 38%; and
- Buildings and communities: 59 to 64%.

There are some notable differences between the Provincial *CleanBC* sectors and those proposed by Metro Vancouver in the *Clean Air Plan* and the *Climate 2050 Roadmaps*, in particular related to the emissions sources that are included in each sector:

- In the *Clean Air Plan* and *Climate 2050 Transportation Roadmap,* Metro Vancouver's proposed targets for transportation are split into subsectors, with targets identified for personal transportation, medium and heavy trucks/rail, and air/marine. Provincially, emissions from sources such as medium and heavy trucks account for more transportation emissions than they do regionally. Emissions from non-road equipment have a separate target in the *Clean Air Plan* as well, and will be included in the *Industry Roadmap*.
- Emissions from upstream oil and gas activities are not significant in the region, so there is no regional target proposed specifically for oil and gas. Emissions from activities such as refining are included under the 2030 industry emissions target proposed in the *Clean Air Plan*.
- The Province's target for buildings and communities includes sources other than buildings, which are not included in the buildings targets in the *Clean Air Plan* and *Climate 2050 Buildings Roadmap*.

It should be noted that there are significant differences in regional and provincial emissions profiles. While Metro Vancouver accounts for roughly half of the provincial population, it accounts for about one quarter of province wide GHG emissions. This is due to a variety of factors including the comparative lack of heavy industrial sources and upstream oil and gas facilities in Metro Vancouver compared to other parts of BC, milder weather in Metro Vancouver, and differences in transportation systems and building types.

More information is needed to determine whether or not the stringency of the Provincial sectoral targets is in alignment with Metro Vancouver's draft sector specific targets outlined in the *Clean Air Plan* and *Climate 2050 Roadmaps*, and to determine whether the targets add up to the Province's overall target of 40% emissions reductions by 2030. While the BC government has announced an intention to update their overall 2050 target to carbon neutrality, this will not change the 2030 target, which is slightly less stringent than Metro Vancouver's target of 45% reductions by the same year. Staff are undertaking additional analysis and will report back to a future Committee meeting.

HEALTH CANADA STUDY ON THE HEALTH BURDEN OF AIR POLLUTION

Health Canada has released a report that estimates the health burden of air pollutants to be $120 billion per year, from a national perspective. The report, "Health Impacts of Air Pollution in Canada: Estimates of morbidity and premature mortality outcomes", published on March 15 (Reference 2), quantifies the cost of air pollution from a variety of sources, including industrial and human activities such as oil and gas extraction, mining, manufacturing, construction, and transportation, as well as events like forest fires. These emissions are cited as contributing to 15,300 premature deaths in Canada, for the year 2016, which is the most recent data available. In addition to deaths, the study found that air pollution was tied to 35 million acute respiratory symptom days, 2.7 million asthma symptom days, and 8,100 emergency room visits in Canada during the period it studied, all of which led to the estimate of the health cost burden.

The Health Canada study relies on measurements of air pollution at ground level, combined with satellite and other technical data, in order to estimate the level of exposure to air contaminants for the Canadian population. Computer models are then applied to estimate the health outcomes – such as respiratory problems, lung cancer, heart disease or stroke, the risk of premature death, lost workplace productivity, or medical costs - with changes in levels of a variety of air contaminants.

The draft *Clean Air Plan*, which was presented to the Climate Action Committee at its March meeting, estimated that regional emissions of common air contaminants could be reduced by over 7,000 tonnes, with potential health benefits of up to $1 billion. These health benefits were quantified using a model developed by Health Canada.

Staff will continue to work with Health Canada and other agencies to maintain current data on air quality and health, including the analysis of the benefits of regional air quality and climate action programs and policies.

ENGAGEMENT UPDATE

Clean Air Plan and *Climate 2050*

Following approval to engage on the draft *Clean Air Plan* and *Buildings Roadmap* at the March Climate Action Committee and Board meetings, staff are preparing to launch the engagement period, which will be open from April 1 to June 15.

The opportunity to provide comments on the draft *Clean Air Plan* will be promoted through social media, corporate newsletters, and online advertising. Electronic notification will be sent to: other governments, including First Nations; member jurisdictions; issue-specific stakeholders; and residents in the *Clean Air Plan* database. Staff are working to include youth voices in the feedback.

The project website includes: an introductory video; the draft *Clean Air Plan* and a 6-page summary; a feedback form; and a direct email link to the project team. It also features some of the feedback staff heard in the drafting phase.

Staff are also preparing a three-part stakeholder virtual forum, as well as two public forums. Public forums are being offered on April 27 and May 20. The by-invitation stakeholder forums (one each to focus on buildings, transportation and industry) are April 28, May 5 and May 19, respectively. Feedback will be collated, and considered in the revisions to generate the final *Clean Air Plan*.

Proposed Amendments to Air Quality Permit and Regulatory Fees

Public and stakeholder webinars have concluded for potential amendments to the *Greater Vancouver Regional District Air Quality Management Fees Regulation Bylaw No. 1083, 2008* (Bylaw 1083). Following a public opinion survey late last year, staff held three well-attended public webinars throughout February and early March. The first two webinars covered all potential Bylaw amendments and the final webinar was focused on odorous air contaminants and the Measured Discharge Program. Staff also presented the proposed amendments at a meeting of regional, provincial and federal air quality and health organizations.

Engagement is still open, as staff will be presenting to small stakeholder groups, and receiving feedback in the form of completed feedback forms, letters and emails. Feedback on the proposals is being sought from businesses that are currently permitted or regulated and other interested stakeholders. Staff will also be responding to affected stakeholders who request estimates of how fees may increase for specific businesses. All of the materials, including the discussion paper, are available on the project website.

Managing Emissions from Cannabis Production and Processing Facilities

Following the public webinar and meetings with federal and provincial government staff in January, Metro Vancouver staff met with several cannabis producers throughout February and March. The purpose of these activities was to reach a common understanding of key issues, better align with Provincial initiatives, and explore industry-based solutions to managing emissions from cannabis production facilities. An additional public webinar was hosted in February. These engagement activities have been well-attended by residents, government staff and the cannabis sector.

Staff also had discussions with the Ministry of Environment and Climate Change Strategy and the Ministry of Agriculture, Food and Fisheries about alignment of potential policies and initiatives.

AIR QUALITY MONITORING ON MUSQUEAM RESERVE LANDS IN VANCOUVER

On April 8, 2021, Metro Vancouver's mobile air monitoring unit (MAMU) will finish the monitoring portion of an air quality monitoring study at Musqueam's Indian Reserve No. 2 lands in Vancouver. In cooperation with Musqueam's public works department, MAMU was located beside the Musqueam Cultural Pavilion, near the shore of the north arm of the Fraser River, for the year-long monitoring study that began in March 2020. The monitoring provided information on air quality in the Musqueam community, and supported Metro Vancouver's Iona Island Wastewater Treatment Plant Biosolids Dewatering Facility project. The collected data will next go through a validation process to produce a final dataset and a data summary will be prepared to compare the measurements against Metro Vancouver's established ambient air quality objectives. A full report will also be prepared, which will include a comparison to other stations operated in the regional air quality monitoring network.

Attachment

Climate Action Committee 2021 Work Plan

References

1. https://archive.news.gov.bc.ca/releases/news_releases_2020-2024/2021ENV0022-000561.htm
2. https://www.canada.ca/en/health-canada/services/publications/healthy-living/2021-health-effects-indoor-air-pollution.html

44249102

Climate Action Committee 2021 Work Plan
Report Date: March 30, 2021

Priorities

1st Quarter	**Status**
Climate Action Committee 2021 work plan and priorities	Complete
Climate 2050 – FCM Low Carbon Cities Canada initiative	In progress
Climate 2050 – carbon neutral modelling	In progress
Climate 2050 – electric vehicle programs review and recommendations	In progress
Sustainability Innovation Fund (SIF) – 2021 proposals	Complete
2nd Quarter	
Climate 2050 – draft Roadmap: Buildings	Complete
Climate 2050 – draft Roadmap: Transportation	In progress
Climate 2050 – draft Roadmap: Industry	In progress
Climate 2050 – Energy Roadmap discussion paper	Complete
Air quality – draft Clean Air Plan	Complete
Air quality – second phase of consultation on open air burning emission regulation	In progress
Air quality – monitoring network review and upgrades	In progress
10th annual Caring for the Air report	In progress
SIF – status report on previously approved liquid waste projects	In progress
3rd Quarter	
Climate 2050 – draft roadmaps: Agriculture, Nature and Ecosystems	Pending
Climate 2050 – Land Use and Growth Management Roadmap discussion paper	Pending
Climate 2050 – Metro Vancouver's climate actions and carbon neutral progress	In progress
Climate 2050 – initiate consultation on proposed buildings regulatory initiative	Pending
Air quality – amendments to air quality permit and regulatory fees	In progress
Air quality – amendments to non-road diesel engine emission regulation	In progress
Air quality – update on regulatory initiative for cannabis processing	In progress
SIF – status report on previously approved regional district projects	In progress
SIF – status report on previously approved water projects	Pending
Ecological Health Framework – annual report	Pending
4th Quarter	
Climate 2050 – annual report and progress tracking	Pending
Climate 2050 – Human Health and Well-being Roadmap discussion paper	Pending
Climate 2050 – final roadmaps: Buildings, Industry, Transportation	Pending
Climate 2050 – managing Metro Vancouver's corporate GHG emissions and energy	Pending
Air quality – Clean Air Plan for Board approval	Pending
Air quality - initiate process to update boilers and process heaters regulation	Pending
Annual budget and 5 year financial plan	Pending

355 West Queens Road
North Vancouver BC
V7N 4N5

www.dnv.org

NORTH VANCOUVER DISTRICT

Mayor Mike Little
Phone: 604 990 2208
Cell/Text: 604 209 3971
mayor@dnv.org

March 4, 2021
File:

Dear Chair Dhaliwal and Board:

Re: Help Cities Lead (HCL) Campaign

The District of North Vancouver is sending this letter to you requesting support of the Help Cities Lead (HCL) campaign.

At its regular meeting of February 22, 2021, the District of North Vancouver Council passed the following resolution:

> *THAT Council support the Help Cities Lead initiative by writing letters to Ministers Heyman (Minister of Environment and Climate Change Strategy), Osborne (Minister of Municipal Affairs), Ralston (Ministry of Energy, Mines, and Low Carbon Innovation), Eby (Attorney General and Minister Responsible for Housing), and Robinson (Minister of Finance) requesting five policy actions which would empower the District of North Vancouver to help align building policy with Intergovernmental Panel on Climate Change (IPCC) science to achieve our climate targets;*
>
> *AND THAT Council send a letter Metro Vancouver Regional District asking Metro Vancouver to also support the initiative;*
>
> *AND THAT Council send a letter to all BC Local Governments asking them to support the initiative.*

Please find a copy of the letter sent to the ministers attached for your information and consideration.

Sincerely,

Mike Little
Mayor

Enclosure

CHAIR ☑ CAO ☑ JD MAR 23 2021 38
Action:
Need - Board?
Info Copy:
File No.:
Doc. No.: 44585584
CAO Tracker No:

355 West Queens Road
North Vancouver BC
V7N 4N5

www.dnv.org

NORTH VANCOUVER
DISTRICT

Mayor Mike Little
Phone: 604 990 2208
Cell/Text: 604 209 3971
mayor@dnv.org

March 3, 2021
File:

The Honourable Minister George Heyman
Minister of Environment and Climate Change Strategy

The Honourable Josie Osborne
Minister of Municipal Affairs

The Honourable Bruce Ralston
Minister of Energy, Mines, and Low Carbon Innovation

The Honourable David Eby
Attorney General and Minister responsible for Housing

The Honourable Selina Robinson
Minister of Finance

Dear Ministers:

Re: Help Cities Lead (HCL) Campaign

The District of North Vancouver is sending this letter to you as an endorsement of the Help Cities Lead (HCL) campaign.

As you are aware, municipalities are on the front lines of climate change dealing with the impacts of floods, droughts, forest fires, heat waves, etc. We directly influence about half of Canada's energy use and emissions. The success of the province in achieving deep emissions reductions from the building sector is directly connected to the success of local governments in achieving their own targets. While municipalities have shown strong climate leadership, expanded regulatory authority is needed for taking bolder steps to achieving our climate targets.

HCL is an education and awareness campaign focused on accelerating building decarbonization through collaboration between the Province of British Columbia and local governments. The group is led by Climate Caucus and supported by local governments and environmental NGO's.

Why buildings? Emissions from buildings account for about 11% of the province's greenhouse gas (GHG) emissions and for municipalities, GHG emissions from existing buildings account for 40-60% of community emissions. A number of BC local governments have made climate emergency declarations and set ambitious targets to significantly reduce GHG emissions from buildings over the next 10 years. However, local governments are largely limited to information

campaigns and incentives for pursuing these ambitious reduction targets. Recent climate policy modelling shows that on their own, these policy tools are insufficient to achieve broad and deep energy and GHG reductions given limited budgets.

HCL campaign recommends a suite of expanded authorities for local governments that will enable communities to take bolder action on reducing GHG emissions from new and existing buildings:

- Property assessed clean energy (PACE) financing
- Mandatory home energy labelling
- Regulating GHG emissions for new buildings
- Regulating GHG emissions for existing buildings
- Mandatory building energy benchmarking and reporting

We are pleased to see that the November 2020 mandate letters to the Ministers of Municipal Affairs and Energy, Mines and Low Carbon Infrastructure support the implementation of PACE financing. We also note that the mandate letter for the Minister of Finance supports home energy labelling. Finally we pleased to see that the mandate letter to the Attorney-General and Minister Responsible for Housing includes support for regulation of GHG emission of new buildings.

We support the directions set out in these new mandate letters regarding PACE financing, home energy labelling, and GHG requirements for new buildings and request that the province empower local governments to opt to take action, if they so choose, on the two remaining items of the Help Cities Lead's campaign, namely GHG requirements for existing buildings and building energy benchmarking. Additional information about each of the initiatives can be found at https://www.helpcitieslead.ca/

It is our hope that you would consider meeting with a delegation from Help Cities Lead for further discussion on these initiatives.

Sincerely,

Mike Little
Mayor

THE CITY OF VICTORIA OFFICE OF THE MAYOR

March 10, 2021

Dear Colleagues,

On behalf of Victoria City Council, I am writing today to inform you that Council has voted to endorse the Help Cities Lead campaign and to request that your city consider doing the same. Emissions from buildings account for about 11% of the province's GHG emissions. This is the third highest source of GHG emissions in BC after road transportation (27.1%) and the oil and gas sector (17.6%). For municipalities, GHG emissions from existing buildings account for 40-60% of community emissions. In Victoria, this number is around 50% of our community GHG inventory.

In British Columbia, the regulation of buildings typically occurs at the provincial level. For the past two decades British Columbia has been at the forefront of action and policies taken in Canada to reduce energy use and GHG emissions from buildings. The 2018 CleanBC Plan moved the province further in this direction with key commitments for the building sector such as a net-zero energy building standard by 2032, a building upgrade standard by 2024, and exploring building energy labelling options.

A number of local governments, including Victoria, are keen to take even bolder action, and have set ambitious targets of our own to significantly reduce GHG emissions from buildings over the next 10 years in alignment with climate emergency declarations. The success of the Province in achieving deep emissions reductions from the building sector are directly connected to the success of local governments to achieve their own targets because most buildings are situated within these communities. However, tools currently available to local governments to pursue these ambitious reduction targets are largely limited to information campaigns and incentives. Although helpful, on their own these tools are insufficient to achieve broad and deep energy and GHG reductions given limited budgets.

Help Cities Lead (helpcitieslead.ca) is an education and awareness campaign working to build support for more focused collaboration between the Province of British Columbia and local governments on building climate policy.

The campaign project team identifies five regulatory measures where additional authority would be instrumental for municipalities in accelerating climate action:

1. Regulating GHG emissions for new buildings – the BC Energy Step Code only regulates energy efficiency in new buildings. Leading local governments would also like the ability to regulate GHG emissions from new buildings.

2. Mandatory home energy labelling - In Canada and British Columbia, legislation requires energy labelling for a broad range of consumer products including motor vehicles, furnaces, windows, lightbulbs, and kitchen appliances. However, there are no labeling requirements for the single largest purchase a given Canadian is likely to make—their home.

1 Centennial Square Victoria British Columbia Canada V8W 1P6
Telephone (250) 361-0200 Fax (250) 361-0348 Email mayor@victoria.ca
www.victoria.ca

.../2

3. Property assessed clean energy (PACE) financing - programs allow property owners to finance the up-front cost of building energy efficiency upgrades—such as more efficient heating systems, or windows—by paying the costs back over time via a voluntary property tax assessment. The assessment is attached to the property, not an individual; if, and when, the property is sold, the financing carries on with the new owner.

4. Regulating GHG emissions for existing buildings – this would include the development of a new regulation that would set greenhouse gas emissions targets from existing buildings.

5. Mandatory building energy benchmarking and reporting - Energy benchmarking is the process of collecting and monitoring energy data from a large number of buildings over time so that governments and the private sector can compare the performance of any one participating building against similar properties.

Direction to implement the first three of these measures – enabling local governments to regulate GHG emissions for new buildings, home energy labelling, and PACE financing – were included in the ministerial mandate letters issued in November 2020. Help Cities Lead encourages the Province to move as quickly as possible and in close consultation with local governments to develop and implement these measures.

Help Cities Lead would also like the Province to enable local governments to choose, when ready, to opt into the remaining two measures not addressed by the mandate letters -- namely, regulating GHG emissions for existing buildings and building energy benchmarking and reporting.

The suite of initiatives is intended to compliment what the provincial government and utilities are already doing in this area and help to lay the groundwork for eventual province-wide adoption of these measures.

These actions would let municipalities, ready to take bolder action on climate, lead the way in regulating emissions in buildings. This would provide a template for action for other jurisdictions and even for provincial regulation in the future.
As such, we are requesting that your city consider endorsing the Help Cities Lead campaign and that you communicate this support directly to the Province by writing to the below Ministers:

- Minister of Environment and Climate Change Strategy, ENV.Minister@gov.bc.ca
- Minister of Municipal Affairs, MAH.Minister@gov.bc.ca
- Minister of Energy, Mines, and Low-Carbon Innovation, EMPR.Minister@gov.bc.ca
- Minister of Finance, FIN.Minister@gov.bc.ca
- Attorney General and Minister responsible for Housing, AG.Minister@gov.bc.ca

Thank you for your time and consideration. Please do not hesitate to reach out should you have any questions regarding this letter.

Sincerely,

Lisa Helps
Victoria Mayor

The City of Victoria recognizes the Songhees and Esquimalt Nations in whose traditional territories we live and work "Hay swx qa"

PORT MOODY
CITY OF THE ARTS

100 Newport Drive, Port Moody, B.C., V3H 5C3, Canada
Tel 604.469.4500 Fax 604.469.4550
www.portmoody.ca

March 29, 2021

Metro Vancouver Board Members
4730 Kingsway
Burnaby, BC V5H 0C6

To Metro Vancouver Board Members,

On March 2, 2021 Port Moody City Council passed the attached resolution.

I am writing to you today on behalf of Port Moody City Council requesting regional endorsement from Metro Vancouver for the Help Cities Lead Campaign. Endorsing the Help Cities Lead Campaign is an opportunity to support an advocacy campaign related to building greenhouse gas emissions reductions in British Columbia. Supporting this campaign will result in completing an action related to advocacy under the Buildings focus area in the 2020 Climate Action Plan.

The Help Cities Lead campaign presents a suite of climate policy initiatives that support emissions reductions from new and existing buildings in BC. I have included a copy of the Council report dated January 25, 2021 from the Community Development Department – Policy Planning Division regarding Endorsement of Advocacy Campaign Help Cities Lead to provide further information on this topic.

Metro Vancouver covers 2,883 km² of British Columbia and has an estimated population of 2.46 million people. This is a big portion of our province, and getting on board with such an important initiative would show the leadership that is required in order to make the changes we need when it comes to the reduction of greenhouse gas emissions. It takes a team to make a difference and it is so important to have all levels of government on board, including regional districts.

City Council hopes that Metro Vancouver will endorse this campaign, showing support for a very important legislative change to expand climate action powers in order to meet very important targets in reducing greenhouse gas emissions in British Columbia.

Sincerely,

Mayor Rob Vagramov
City of Port Moody

Attachment:
1. Resolution from the City of Port Moody – Helping Cities Lead Campaign

City of Port Moody

Council Resolution

March 2, 2021

CW21/020
Moved, seconded, and CARRIED
THAT Council formally endorse the Help Cities Lead campaign as recommended in the report dated January 25, 2021 from the Community Development Department – Policy Planning Division regarding Endorsement of Advocacy Campaign "Help Cities Lead", and take the following actions:

a) *write a letter to the following provincial ministers to voice support for the five policies detailed in this report:*
   - *Minister of Environment and Climate Change Strategy;*
   - *Minister of Municipal Affairs;*
   - *Minister of Energy, Mines, and Low-Carbon Innovation;*
   - *Minister of Finance; and*
   - *Attorney General and Minister responsible for Housing;*

b) *request a meeting with the Ministers listed above;*
c) *write a letter to Metro Vancouver requesting regional endorsement of the campaign; and*
d) *write letters to all BC local governments asking them to endorse the campaign;*

AND THAT Council authorize staff to participate in activities supporting the Help Cities Lead campaign, including information sharing presentations to other municipal Councils.

metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

To: Climate Action Committee

From: Jeff Carmichael, Division Manager, Business Development, Liquid Waste Services
Conor Reynolds, Division Manager, Air Quality and Climate Change Policy, Parks and Environment

Date: March 31, 2021 Meeting Date: April 16, 2021

Subject: **Liquid Waste Heat Recovery Policy Amendments and Related Cost Apportionment Bylaw Amendments to Expand Opportunities for Sewer Heat Recovery**

The attached reports titled "Tier III Cost Apportionment Bylaw Amendments" and "Liquid Waste Heat Recovery Policy Amendments to Expand Opportunities for Sewer Heat Recovery" were considered by the Finance and Intergovernment Committee at its meeting on March 10, 2021, and Liquid Waste Committee at its meeting on March 11, 2021, respectively.

At its meeting on March 26, 2021, the GVS&DD Board considered both reports. The motion for the report titled "Tier III Cost Apportionment Bylaw Amendments" was passed without amendment. The following motion for the report titled "Liquid Waste Heat Recovery Policy Amendments to Expand Opportunities for Sewer Heat Recovery" was adopted:

That the GVS&DD Board:

a) approve the revised Liquid Waste Heat Recovery Policy, as presented in the report dated March 2, 2021, titled "Liquid Waste Heat Recovery Policy Amendments to Expand Opportunities for Sewer Heat Recovery", and

In addition, the GVS&DD Board considered an amendment to add a part(b) to the motion. While the specific wording of the amendment was not available at time of writing, the intent was to direct staff to work with staff of member jurisdictions to assess the options available for carbon accounting for liquid waste heat recovery projects, and if appropriate, develop a framework for the allocation of carbon offset credits among the GVS&DD members. Staff were directed to report back on this by the end of 2021.

Accordingly, staff are assessing the range of options available for carbon accounting for liquid waste heat recovery projects, and will consider a framework for allocation of carbon credits, as directed.

These reports are presented to the Climate Action Committee for its information only.

Attachments

1. "Tier III Cost Apportionment Bylaw Amendments", report dated March 11, 2021
2. "Liquid Waste Heat Recovery Policy Amendments to Expand Opportunities for Sewer Heat Recovery", report dated March 2, 2021

metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

To: GVS&DD Board of Directors

From: Finance and Intergovernment Committee

Date: March 11, 2021 Meeting Date: March 26, 2021

Subject: **Tier III Cost Apportionment Bylaw Amendments**

FINANCE AND INTERGOVERNMENT COMMITTEE RECOMMENDATION

That the GVS&DD Board:

a) approve the amendments to the *Greater Vancouver Sewerage and Drainage District Cost Apportionment Bylaw No. 283, 2014* as presented in Attachment 1 to the report dated March 2, 2021 titled "Tier III Cost Apportionment Bylaw Amendments", which will allocate all future sewer heat project costs as 100 percent regional allocation;

b) give first, second and third reading to *Greater Vancouver Sewerage and Drainage District Cost Apportionment Amending Bylaw No. 342, 2021*; and

c) pass and finally adopt *Greater Vancouver Sewerage and Drainage District Cost Apportionment Amending Bylaw No. 342, 2021*.

At its March 10, 2021 meeting, the Finance and Intergovernment Committee considered the attached report titled "Tier III Cost Apportionment Bylaw Amendments", dated March 2, 2021.

The Committee considered Alternative #2 outlined in the report. The Committee voted on part a) by distinct propositions passing part a) i) and defeating part a) ii), as shown below with strikethrough text. Parts b) and c) were also passed.

That the GVS&DD Board:

a) i) approve the amendments to the Greater Vancouver Sewerage and Drainage District Cost Apportionment Bylaw No. 283, 2014 as presented in Attachment 2 to the report dated March 2, 2021 titled "Tier III Cost Apportionment Bylaw Amendments", which will allocate all future sewer heat project costs as 100 percent regional allocation;
~~ii) and will reallocate past incurred costs for the North Shore Wastewater Treatment Plant effluent heat recovery project as well;~~"

b) give first, second and third reading to Greater Vancouver Sewerage and Drainage District Cost Apportionment Amending Bylaw No. 342, 2021; and

c) pass and finally adopt Greater Vancouver Sewerage and Drainage District Cost Apportionment Amending Bylaw No. 342, 2021.

By defeating part a) ii), the Committee passed the original staff recommendation, as presented above. The reference to the Attachment has been updated accordingly. The matter is now before the Board for its consideration.

Attachment

"Tier III Cost Apportionment Bylaw Amendments", dated March 2, 2021

44220538

metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

ATTACHMENT

To: Finance and Intergovernment Committee

From: Jeff Carmichael, Division Manager, Business Development, Liquid Waste Services
Sonu Kailley, Division Manager, Finance and Capital Planning, Finance

Date: March 2, 2021 Meeting Date: March 10, 2021

Subject: **Tier III Cost Apportionment Bylaw Amendments**

RECOMMENDATION

That the GVS&DD Board:

a) approve the amendments to the Greater Vancouver Sewerage and Drainage District Cost Apportionment Bylaw No. 283, 2014 as presented in Attachment 1 to the report dated March 2, 2021 titled "Tier III Cost Apportionment Bylaw Amendments", which will allocate all future sewer heat project costs as 100 percent regional allocation;
b) give first, second and third reading to Greater Vancouver Sewerage and Drainage District Cost Apportionment Amending Bylaw No. 342, 2021; and
c) pass and finally adopt Greater Vancouver Sewerage and Drainage District Cost Apportionment Amending Bylaw No. 342, 2021.

EXECUTIVE SUMMARY

Metro Vancouver has the opportunity to reduce greenhouse gas emissions by enabling the provision of capital funding for new facilities that will provide renewable, fossil fuel-free heat extracted from sewage to residents and businesses in the region. There is enough excess heat in the liquid waste collection system to heat 700 high rises throughout the region. These clean energy projects become viable when the value of carbon is reflected in the initial capital investment. Staff propose an amendment to the *Cost Apportionment Bylaw – 283 (GVS&DD)* (the bylaw) that would apply Tier III Project cost apportionment – 100% regional allocation – to regional wastewater resource recovery projects to reflect the regional and global benefits these investments provide.

Four projects, including the District Energy project at the North Shore Treatment Plant, are under development and further potential exists. If these changes are approved, all current and future costs associated with the capital investments made by Metro Vancouver will be applied as Tier III costs.

If the Board selects Alternative 2, all previously levied costs, totaling $550k for the North Shore Treatment Plant will also be redistributed based on Tier III allocation.

In addition, a bylaw amendment is proposed to clarify how the existing definition of Tier III tertiary treatment projects should be applied for a growth-driven project. These costs should be eligible for Development Cost Charge applications and be allocated to member municipalities consistently with existing growth component apportionment.

PURPOSE

To present to the Finance and Intergovernment Committee and to the GVS&DD Board for consideration proposed amendments to Bylaw 283 to add wastewater resource recovery projects to those eligible for Tier III apportioning, and to clarify how existing Tier III apportioning should handle growth-driven tertiary treatment costs.

BACKGROUND

To support wastewater resource recovery within the liquid waste management system, in alignment with the Board-approved *Climate 2050* strategy and objectives in the *Integrated Liquid Waste and Resource Management Plan*, staff have identified the need for revisions to the *Cost Apportionment Bylaw – 283 (GVS&DD)* (the bylaw) and the *Liquid Waste Heat Recovery Policy*. An additional bylaw amendment is proposed regarding tertiary treatment related to growth. The bylaw establishes how costs of liquid waste capital projects are apportioned among Metro Vancouver members, categorizing projects as Tier I, Tier II, or Tier III projects.

GVS&DD is seeking new wastewater resource recovery projects, some of which may be undertaken with participation of member jurisdictions or other public or private entities. The changes proposed in this report will apply Tier III cost apportionment - 100% regional allocation – to Board-approved regional wastewater resource recovery projects, because of the regional and global benefits these projects provide.

The revisions to Bylaw 283 presented in this report as well as other proposed changes were considered by the Regional Engineers Advisory Committee (REAC) at the February 5, 2021 meeting and by the Regional Administrators Advisory Committee (RAAC) at the February 18, 2021 meeting. Both committees indicated support for the proposed approach.

SUPPORTING CORPORATE AND REGIONAL CLIMATE ACTION

Metro Vancouver's *Climate 2050* strategy has the vision that Metro Vancouver demonstrates bold leadership in responding to climate change – it commits to achieving a carbon-neutral region by 2050, with an interim target of reducing greenhouse gas emissions by 45% from 2010 levels by 2030. GVS&DD is capable of contributing to both regional and corporate greenhouse gas emission reduction targets by capturing unused heat from sewage and making it available to municipalities and private parties for use, replacing fossil fuel combustion.

Four clean energy projects are already under development. There is enough excess heat in the liquid waste collection system to heat 700 high rises throughout the region, so future opportunities exist for providing energy to additional district energy systems. Opportunities will be evaluated on a case-by-case basis using established life-cycle cost analysis methods, and would be guided in part by the *Carbon Price Policy*, which sets the value of carbon emissions at $150 per tonne of CO_2e. In many situations, sewer heat-sourced energy is competitive with other clean energy sources, and is a more reliable long-term energy source than some (like biomass). These clean energy projects become viable when the value of carbon is reflected in the initial capital investment.

Proposed Bylaw and Policy Changes to Address Climate

Proposed changes to the *Cost Apportionment Bylaw – 283 (GVS&DD)* and to the *Liquid Waste Heat Recovery Policy* for such capital projects will accelerate action toward meeting the Climate 2050 targets. Proposed amendments to the Bylaw are presented below. Related proposed amendments to the *Liquid Waste Heat Recovery Policy*, which will be considered by the Liquid Waste Committee, will expand the scope of projects for capital investments in collaborative district energy projects, in coordination with municipal partners.

Proposed Bylaw Amendment to Tier III Project Definition for Wastewater Resource Recovery

Staff propose an amendment to the bylaw that would apply Tier III Project cost apportionment – 100% regional allocation – to all regional wastewater resource recovery projects, including costs for the North Shore Wastewater Treatment Plant's effluent heat recovery project. Such projects are currently assigned Tier I or Tier II Project cost apportionment under the existing bylaw. Tier definitions are provided in Attachment 3.

Under the current bylaw, a regional greenhouse gas reduction project at a wastewater treatment plant would fall within the definition of a Tier II project and a regional greenhouse gas reduction project outside of the wastewater treatment plants would fall within the definition of a Tier I Project. Tier I or Tier II Project cost allocation means that most costs are borne by the municipalities within the sewerage area in which the project takes place. The benefits of such projects, however, are regional and global, because emission reductions benefit the entire region as part of its efforts to address global climate change. Applying Tier III project cost apportioning to such projects would more appropriately balance costs across the region.

The proposed inclusion of regional greenhouse gas reduction projects also includes amending the cost apportionment bylaw to allocate future costs associated with the North Shore Wastewater Treatment Plant's effluent heat recovery project, previously allocated as Tier II, to now be Tier III.

As an alternative to the staff recommendation, the bylaw could be written to also re-allocate costs already incurred for the provision of District Energy at the North Shore Treatment Plant. The bylaw amendment (Attachment 2) include credits and charges totaling $550k to member municipalities of actual costs previously incurred by some members for the project so that they align with the proposed Tier III allocation for regional wastewater resource recovery projects. It is possible to exclude reallocation of costs already incurred.

Proposed Bylaw Amendment to Tier III Project Definition for Growth-related Tertiary Treatment

The Board has provided direction to staff to ensure growth pays for growth, and as such, the definition of Tier III projects is also proposed to expand to include growth-driven needs for tertiary treatment capacity. The current definition does not allow for growth projects under Tier III definition, however, there are instances where there could be a requirement to include tertiary treatment that would be related to growth and, as such, be apportioned to member municipalities in accordance with the existing cost allocations related to growth, and also be eligible to be funded through Development Cost Charges.

Both possible versions of an amending bylaw that includes both proposals are included as Attachments 1 and 2. The first alternative contemplates all future costs. The second alternative also reallocates all costs already incurred as part of the North Shore Wastewater Treatment Plant project.

ALTERNATIVES

1. That the GVS&DD Board:
   a) approve the amendments to the Greater Vancouver Sewerage and Drainage District Cost Apportionment Bylaw No. 283, 2014 as presented in Attachment 1 to the report dated March 2, 2021 titled "Tier III Cost Apportionment Bylaw Amendments", which will allocate all future sewer heat project costs as 100 percent regional allocation;
   b) give first, second and third reading to Greater Vancouver Sewerage and Drainage District Cost Apportionment Amending Bylaw No. 342, 2021; and
   c) pass and finally adopt Greater Vancouver Sewerage and Drainage District Cost Apportionment Amending Bylaw No. 342, 2021.

2. That the GVS&DD Board:
   a) approve the amendments to the Greater Vancouver Sewerage and Drainage District Cost Apportionment Bylaw No. 283, 2014 as presented in Attachment 2 to the report dated March 2, 2021 titled "Tier III Cost Apportionment Bylaw Amendments", which will allocate all future sewer heat project costs as 100 percent regional allocation and will reallocate past incurred costs for the North Shore Wastewater Treatment Plant effluent heat recovery project as well;
   b) give first, second and third reading to Greater Vancouver Sewerage and Drainage District Cost Apportionment Amending Bylaw No. 342, 2021; and
   c) pass and finally adopt Greater Vancouver Sewerage and Drainage District Cost Apportionment Amending Bylaw No. 342, 2021.

3. That the GVS&DD Board receive for information the report dated March 2, 2021 titled "Tier III Cost Apportionment Bylaw Amendments" and provide alternate direction to staff.

FINANCIAL IMPLICATIONS

If the Board approves Alternative 1, (a) future Board-approved funding commitments for the cost of capital projects that contribute to regional greenhouse gas emission reductions will be 100% regionally shared, and (b) Board-approved growth-related tertiary treatment costs would be allocated under the revised Tier III cost apportionment and will be funded as growth projects through Development Cost Charges. Funding for future projects will continue to require Board approval.

If the Board approves Alternative 2, costs already incurred, totaling $550k for the North Shore Wastewater Treatment Plant's effluent heat recovery project will also be re-allocated to be shared as a Tier III cost, in addition to the changes above.

CONCLUSION

Metro Vancouver has committed to be a carbon neutral region by 2050. Metro Vancouver has the potential and opportunity to take action on climate change to reduce greenhouse gas emissions by

enabling the provision of capital funding for new facilities that will provide renewable, fossil fuel-free heat extracted from sewage to residents and businesses in the region. Changes to the *Cost Apportionment Bylaw – 283 (GVS&DD)* are necessary to fairly apportion costs across the region to accelerate action toward meeting the *Climate 2050* target.

An amendment to the bylaw is proposed so that sewer heat recovery projects may be apportioned as 100 percent regional funding under Tier III, because of the regional and global benefits these projects provide. A related proposal is under consideration by the Liquid Waste Committee to amend the Liquid Waste Heat Recovery Policy to expand the scope of allowed investments in such projects. Four projects are currently under development and further potential exists. Pending endorsement by the GVS&DD Board, cost-effective capital investments in sewer heat recovery projects, with participation of municipalities, will be brought to the Board for consideration. Staff also propose clarifying how the existing Tier III definition should handle growth-driven tertiary treatment costs. Staff recommend Alternative 1.

Attachments

1. Greater Vancouver Sewerage and Drainage District Cost Apportionment Amending Bylaw No. 342, 2021
2. Alternative Version of Greater Vancouver Sewerage and Drainage District Cost Apportionment Amending Bylaw No. 342, 2021
3. Excerpts from existing text of Bylaw 283

40259337

40259337

GREATER VANCOUVER SEWERAGE AND DRAINAGE DISTRICT BYLAW NO. 342, 2021
A Bylaw to Amend Greater Vancouver Sewerage and Drainage District Cost Apportionment Bylaw No. 283, 2014

WHEREAS:

A. the Board of Directors of the Greater Vancouver Sewerage and Drainage District adopted "Greater Vancouver Sewerage and Drainage District Cost Apportionment Bylaw No. 283, 2014" on March 28, 2014;

B. "Greater Vancouver Sewerage and Drainage District Cost Apportionment Bylaw No. 283, 2014" sets out the method of apportioning annual sewerage and drainage expenditures among the member municipalities, as permitted by section 55(4) of the *Greater Vancouver Sewerage and Drainage District Act*; and

C. the Board of Directors of the Greater Vancouver Sewerage and Drainage District wishes to amend the "Greater Vancouver Sewerage and Drainage District Cost Apportionment Bylaw No. 283, 2014".

NOW THEREFORE the Board of the Greater Vancouver Sewerage and Drainage District enacts as follows:

Citation

1. This bylaw may be cited as the "Greater Vancouver Sewerage and Drainage District Cost Apportionment Amending Bylaw No. 342, 2021".

Amendment of Bylaw

2. "Greater Vancouver Sewerage and Drainage District Cost Apportionment Bylaw No. 283, 2014" (the "Bylaw") is hereby amended as follows:

   (a) the definition "**Regional Wastewater Resource Recovery Project**" is added to the definitions in section 1 of the Bylaw in alphabetic order as follows:

   "**Regional Wastewater Resource Recovery Project**" for the purposes of this bylaw only, means a project that:
   (i) is undertaken to use wastewater as a resource,
   (ii) provides renewable energy drawn from the Corporation's liquid waste collection and treatment system for this purpose, including but not limited to use for heating and cooling, and creation and uses of biogas,
   (iii) reduces greenhouse gas emissions, and
   (iv) requires participation of a municipality or other person, either as a co-funder or as a user of energy sourced from the liquid waste system.

(b) the definition "**Tier III Component**" in section 1 of the Bylaw is deleted;

(c) the definition "**Tier III Growth Component**" is added to the definitions in section 1 of the Bylaw in alphabetic order as follows:

"**Tier III Growth Component**" for any 12-month period, means all of the capital expenditures, net of revenue, incurred by the Corporation for Tier III Projects that are primarily "growth" projects, as provided for in the applicable annual budgets of the Corporation or in the supporting documentation to such annual budgets;

(d) the definition "**Tier III Non-Growth Component**" is added to the definitions in section 1 of the Bylaw in alphabetic order as follows:

"**Tier III Non-Growth Component**" for any 12-month period, means the aggregate of those capital expenditures, net of revenue, for Tier III Projects not constituting the Tier III Growth Component;

(e) the definition "**Regional Share**" in section 1 of the Bylaw is deleted and replaced as follows:

"**Regional Share**" means 70% of Tier II Non-Growth Component and 100% of Tier III Non-Growth Component;

(f) the definition "Tier III Project" in section 1 of the Bylaw is deleted and replaced as follows:

"**Tier III Project**" means a capital infrastructure project at any of the Corporation's wastewater treatment plants that upgrades the plant or to accommodate growth expands the plant, to Tertiary Treatment; or a capital infrastructure project connected with or to any wastewater infrastructure of the Corporation that supports a Regional Wastewater Resource Recovery Project;

(g) section 4.3 of the Bylaw is deleted and replaced as follows:

4.3 The Corporation will apportion among the Sewerage Areas the total costs incurred in respect of 70% of Tier II Growth Component and 100% of Tier III Growth Component on the basis of the following formula:

$$\frac{\text{Sewerage Area Population Growth}}{\text{District Population Growth}} \times \text{The total costs incurred in respect of 70\% of Tier II Growth Component and 100\% of Tier III Growth Component}$$

(h) section 4.4 of the Bylaw is deleted and replaced as follows:

4.4 The Corporation will apply the development cost charge monies (the "**DCC Monies**") received under Greater Vancouver Sewerage and Drainage District Development Cost Charge Bylaw No. 254, 2010 (as amended or replaced from time to time) in any year and apportioned to a particular Sewerage Area to pay up to 99% of the sum of the Tier 1 Growth Component, Tier II Growth Component and Tier III Growth Component apportioned to that Sewerage Area pursuant to sections 4.2 and 4.3.

Read a first, second and third time this _____ day of _____, _____.

Passed and finally adopted this _____ day of _____, _____.

_____
Sav Dhaliwal, Chair

_____
Chris Plagnol, Corporate Officer

GREATER VANCOUVER SEWERAGE AND DRAINAGE DISTRICT BYLAW NO. 342, 2021
A Bylaw to Amend Greater Vancouver Sewerage and Drainage District Cost Apportionment Bylaw No. 283, 2014

WHEREAS:

A. the Board of Directors of the Greater Vancouver Sewerage and Drainage District adopted "Greater Vancouver Sewerage and Drainage District Cost Apportionment Bylaw No. 283, 2014" on March 28, 2014;

B. "Greater Vancouver Sewerage and Drainage District Cost Apportionment Bylaw No. 283, 2014" sets out the method of apportioning annual sewerage and drainage expenditures among the member municipalities, as permitted by section 55(4) of the *Greater Vancouver Sewerage and Drainage District Act*; and

C. the Board of Directors of the Greater Vancouver Sewerage and Drainage District wishes to amend the "Greater Vancouver Sewerage and Drainage District Cost Apportionment Bylaw No. 283, 2014".

NOW THEREFORE the Board of the Greater Vancouver Sewerage and Drainage District enacts as follows:

Citation

1. This bylaw may be cited as the "Greater Vancouver Sewerage and Drainage District Cost Apportionment Amending Bylaw No. 342, 2021".

Amendment of Bylaw

2. "Greater Vancouver Sewerage and Drainage District Cost Apportionment Bylaw No. 283, 2014" (the "Bylaw") is hereby amended as follows:

   (a) the definition "**Regional Wastewater Resource Recovery Project**" is added to the definitions in section 1 of the Bylaw in alphabetic order as follows:

   "**Regional Wastewater Resource Recovery Project**" for the purposes of this bylaw only, means a project that:
   (i) is undertaken to use wastewater as a resource,
   (ii) provides renewable energy drawn from the Corporation's liquid waste collection and treatment system for this purpose, including but not limited to use for heating and cooling, and creation and uses of biogas,
   (iii) reduces greenhouse gas emissions, and
   (iv) requires participation of a municipality or other person, either as a co-funder or as a user of energy sourced from the liquid waste system.

(b) the definition "**Tier III Component**" in section 1 of the Bylaw is deleted;

(c) the definition "**Tier III Growth Component**" is added to the definitions in section 1 of the Bylaw in alphabetic order as follows:

"**Tier III Growth Component**" for any 12-month period, means all of the capital expenditures, net of revenue, incurred by the Corporation for Tier III Projects that are primarily "growth" projects, as provided for in the applicable annual budgets of the Corporation or in the supporting documentation to such annual budgets;

(d) the definition "**Tier III Non-Growth Component**" is added to the definitions in section 1 of the Bylaw in alphabetic order as follows:

"**Tier III Non-Growth Component**" for any 12-month period, means the aggregate of those capital expenditures, net of revenue, for Tier III Projects not constituting the Tier III Growth Component;

(e) the definition "**Regional Share**" in section 1 of the Bylaw is deleted and replaced as follows:

"**Regional Share**" means 70% of Tier II Non-Growth Component and 100% of Tier III Non-Growth Component;

(f) the definition "Tier III Project" in section 1 of the Bylaw is deleted and replaced as follows:

"**Tier III Project**" means a capital infrastructure project at any of the Corporation's wastewater treatment plants that upgrades the plant or to accommodate growth expands the plant, to Tertiary Treatment; or a capital infrastructure project connected with or to any wastewater infrastructure of the Corporation that supports a Regional Wastewater Resource Recovery Project;

(g) section 4.3 of the Bylaw is deleted and replaced as follows:

4.3 The Corporation will apportion among the Sewerage Areas the total costs incurred in respect of 70% of Tier II Growth Component and 100% of Tier III Growth Component on the basis of the following formula:

$$\frac{\text{Sewerage Area Population Growth}}{\text{District Population Growth}} \times \text{The total costs incurred in respect of 70\% of Tier II Growth Component and 100\% of Tier III Growth Component}$$

(h) section 4.4 of the Bylaw is deleted and replaced as follows:

4.4 The Corporation will apply the development cost charge monies (the "**DCC Monies**") received under Greater Vancouver Sewerage and Drainage District Development Cost Charge Bylaw No. 254, 2010 (as amended or replaced from time to time) in any year and apportioned to a particular Sewerage Area to pay up to 99% of the sum of the Tier 1 Growth Component, Tier II Growth Component and Tier III Growth Component apportioned to that Sewerage Area pursuant to sections 4.2 and 4.3.

(i) the heading "**10A. Adjustment of Past Investment**" is added, after section 10.1.

(j) section 10A.1 is added under heading 10A, as follows:

10A.1 The Corporation will adjust the apportionments of costs made to member municipalities under sections 6, 7 and 8.1 of the Bylaw respectively for the year 2018 and paid by certain member municipalities between January 1, 2018 and December 31, 2018 on account of investments in the North Shore Wastewater Treatment Plant's District Heat System, to now recognize such costs and investments in the North Shore Wastewater Treatment Plant's District Heat System as Tier III Non-Growth Component capital expenditures, and for the year 2021 will re-apportion to member municipalities that were members in 2018, and to the University of British Columbia, such 2018 costs as Regional Share under sections 6, 7 and 8.1 of the Bylaw, and on account of this, such member municipalities and the University of British Columbia will either be credited or charged the applicable amounts set out below for the year 2021:

Municipality	**Credit ($)**	**Charge ($)**
City of Burnaby		$58,667
City of Coquitlam		26,594
City of Delta		18,724
Langley City		4,730
Langley Township		15,491
City of Maple Ridge		15,690
City of New Westminster		19,173
City of North Vancouver	137,205	
District of North Vancouver	246,969	
City of Pitt Meadows		3,341
City of Port Coquitlam		12,175
City of Port Moody		5,122
City of Richmond		45,078
City of Surrey		90,287
University Endowment Lands (UEL)		1,666
University of British Columbia (non-member)		4,916
City of Vancouver		223,361

District of West Vancouver	164,646	
City of White Rock		3,805

Read a first, second and third time this _____ day of _____, _____.

Passed and finally adopted this _____ day of _____, _____.

_____
Sav Dhaliwal, Chair

_____
Chris Plagnol, Corporate Officer

Excerpts from existing text of *Greater Vancouver Sewerage and Drainage District Cost Apportionment Bylaw No. 283, 2014*

A Tier II project is defined in the Bylaw as follows:

> "**Tier II Project**" means a capital infrastructure project at any of the Corporation's wastewater treatments plants, other than:
>
> *i. any portion of the project that is a Community Benefit; or*
>
> *ii. any portion of the upgraded Lions Gate wastewater treatment plant and the upgraded Iona wastewater treatment plant that is primary treatment infrastructure equivalent to primary treatment infrastructure that was in place at Annacis wastewater treatment plant and Lulu Island wastewater treatment plant prior to those plants being upgraded to secondary treatment, namely the primary treatment tanks; or*
>
> *iii. any portion of the project that is a Tier III project;*
>
> "**Tier III Project**" means a capital infrastructure project at any of the Corporation's wastewater treatment plants that upgrades the plant to Tertiary Treatment.

To: Liquid Waste Committee

From: Jeff Carmichael, Division Manager, Business Development, Liquid Waste Services
Conor Reynolds, Division Manager, Air Quality and Climate Change Policy, Parks and Environment

Date: March 2, 2021 Meeting Date: March 11, 2021

Subject: **Liquid Waste Heat Recovery Policy Amendments to Expand Opportunities for Sewer Heat Recovery**

RECOMMENDATION

That the GVS&DD Board approve the revised *Liquid Waste Heat Recovery Policy*, as presented in the report dated March 2, 2021, titled "Liquid Waste Heat Recovery Policy Amendments to Expand Opportunities for Sewer Heat Recovery".

EXECUTIVE SUMMARY

Metro Vancouver has the opportunity to reduce greenhouse gas emissions by enabling the provision of capital funding for new facilities that will provide renewable, fossil fuel-free heat extracted from sewage to residents and businesses in the region. Staff propose an amendment to the *Liquid Waste Heat Recovery Policy* to expand the scope of allowed investments in such projects.

Four clean energy projects are under development. There is enough excess heat in the liquid waste collection system to heat 700 high rises throughout the region, so future opportunities exist for providing energy to additional district energy systems. If this change is approved, cost-effective capital investments in collection system-based heat recovery projects with participation of municipalities will be brought to the Greater Vancouver Sewerage & Drainage District (GVS&DD) Board for consideration.

A related proposal is under consideration by the Finance and Intergovernment Committee to amend the *Cost Apportionment Bylaw – 283* (GVS&DD) to apply Tier III Project cost apportionment – 100% regional allocation – to regional wastewater resource recovery projects, because of the regional and global benefits these projects provide.

PURPOSE

To present to the Liquid Waste Committee and to the GVS&DD Board for consideration an amendment to the *Liquid Waste Heat Recovery Policy* that allows investment in collection systems (sewer) projects. The current policy allows GVS&DD investment only in treatment plant and outfall heat recovery projects.

BACKGROUND

To support wastewater resource recovery within the liquid waste management system, in alignment with the Board-approved *Climate 2050* strategy and objectives in the *Integrated Liquid Waste and*

Resource Management Plan, staff have identified the need for revisions to the *Liquid Waste Heat Recovery Policy* and the *Cost Apportionment Bylaw – 283* (GVS&DD).

The *Liquid Waste Heat Recovery Policy* enables waste heat from the liquid waste system to be used by municipalities and other external parties, with support from other policies including the *Carbon Price Policy*. It also provides guidelines for GVS&DD financial contributions to such projects, which require capital funding by municipalities and potentially by Metro Vancouver.

GVS&DD is seeking new wastewater resource recovery projects, some of which may be undertaken with participation of member jurisdictions or other public or private entities. The changes proposed in this report will allow the Board to consider approving capital contributions to collaborative district energy projects.

The revisions to the *Liquid Waste Heat Recovery Policy* presented in this report as well as other proposed changes were considered by the Regional Engineers Advisory Committee (REAC) at its February 5, 2021 meeting and by the Regional Administrators Advisory Committee (RAAC) at its February 18, 2021 meeting. Both committees indicated support for the proposed approach. Committee guidance regarding greenhouse gas credit allocations and risk assessment will be taken into account as projects are developed and considered.

SUPPORTING CORPORATE AND REGIONAL CLIMATE ACTION

Metro Vancouver's *Climate 2050* strategy has the vision that Metro Vancouver demonstrates bold leadership in responding to climate change – it commits to achieving a carbon-neutral region by 2050, with an interim target of reducing greenhouse gas emissions by 45% from 2010 levels by 2030.

GVS&DD is capable of contributing to both regional and corporate greenhouse gas emission reduction targets by capturing unused heat from sewage and making it available to municipalities and private parties for use, replacing fossil fuel combustion. Staff anticipate that the majority of Metro Vancouver's future greenhouse gas reduction projects will be within the functions of GVS&DD (liquid waste and solid waste management) and MVRD (in particular, Regional Parks).

Proposed Policy and Bylaw Changes to Address Climate

Proposed changes to the *Liquid Waste Heat Recovery Policy* and to the *Cost Apportionment Bylaw – 283* (GVS&DD) for such capital projects will accelerate action toward meeting the *Climate 2050* targets. Proposed amendments to the *Liquid Waste Heat Recovery Policy* are presented below. Proposed amendments to the Bylaw will cost apportion sewer heat projects as 100% regional funding under Tier III, because such projects provide regional and global benefits. The Bylaw amendments will be considered by the Finance and Intergovernment Committee at its March 10, 2021 meeting.

Proposed Amendments to Liquid Waste Heat Recovery Policy

Staff propose amendments to the *Liquid Waste Heat Recovery Policy* (Attachment) to allow the GVS&DD Board to consider authorizing capital investments for such projects. The proposed amendments to the *Liquid Waste Heat Recovery Policy* establish consistent rights and responsibilities for GVS&DD to participate in the development of heat recovery projects, by allowing for potential

cost-effective investments in projects connecting with or to all GVS&DD infrastructure, including collection systems (sewers). The current policy allows GVS&DD investment only in treatment plant and outfall heat recovery projects. Metro Vancouver participation and investment would accelerate regional and municipal action on reducing greenhouse gas emissions.

The proposed policy change will allow for, but not require that, such opportunities be assessed and potentially implemented with participation of local jurisdictions. Four clean energy projects are already under development. There is enough excess heat in the liquid waste collection system to heat 700 high rises throughout the region, so future opportunities exist for providing energy to additional district energy systems. Opportunities will be evaluated on a case-by-case basis using established life-cycle cost analysis methods, and would be guided in part by the *Carbon Price Policy*, which sets the value of carbon emissions at $150 per tonne of CO_2e. In many situations, sewer heat-sourced energy is competitive with other clean energy sources, and is a more reliable long-term energy source than some (like biomass). These clean energy projects become viable when the value of carbon is reflected in the initial capital investment.

Under the proposed policy revisions, Metro Vancouver will have additional means of striving toward achieving carbon neutrality. Member jurisdictions would benefit through the acceleration of clean energy / low greenhouse gas projects that will reduce greenhouse gas emissions in their jurisdictions while also serving the energy needs of local businesses and residents.

ALTERNATIVES

1. That the GVS&DD Board approve the revised *Liquid Waste Heat Recovery Policy*, as presented in the report dated March 2, 2021, titled "Liquid Waste Heat Recovery Policy Amendments to Expand Opportunities for Sewer Heat Recovery".

2. That the GVS&DD Board receive for information the report dated March 2, 2021, titled "Liquid Waste Heat Recovery Policy Amendments to Expand Opportunities for Sewer Heat Recovery" and provide alternate direction to staff.

FINANCIAL IMPLICATIONS

If the Board approves Alternative 1, GVS&DD will be authorized to consider capital investments in regional district energy systems that will beneficially use wastewater resources from collection system projects, in addition to the existing authorization for such investments concerning treatment plant and outfall projects. Funding for each new project will continue to require Board approval under the *Liquid Waste Heat Recovery Policy*. Only cost-effective projects will be brought forward for consideration.

CONCLUSION

In its *Climate 2050* strategy, Metro Vancouver has committed to be a carbon neutral region by 2050. Metro Vancouver has the potential and opportunity to take action on climate change to reduce greenhouse gas emissions by enabling the provision of capital funding for new facilities that will provide renewable, fossil fuel-free heat extracted from sewage to residents and businesses in the region. Changes to the *Liquid Waste Heat Recovery Policy* are necessary to allow such funding to be

approved. These changes are accompanied by proposed changes to *Cost Apportionment Bylaw – 283* (GVS&DD) to fairly apportion costs across the region, which is under consideration by Finance and Intergovernment Committee. Both are necessary to accelerate action toward meeting the *Climate 2050* target.

Four projects are currently under development and further potential exists. Pending endorsement by the GVS&DD Board, cost-effective capital investments in sewer heat recovery projects, with participation of municipalities, will be brought to the Board for consideration.

Staff recommend Alternative 1.

Attachment
Redline version of Revised Liquid Waste Heat Recovery Policy (44029441)

40363574

metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

ATTACHMENT

BOARD POLICY

LIQUID WASTE HEAT RECOVERY

Effective Date: June 23, 2017 – (board meeting date)

Approved By: GVS&DD Board

Policy No. UT-008

PURPOSE

To enable beneficial use of waste heat and associated greenhouse gas emission reductions from Metro Vancouver's liquid waste system by external parties.

DEFINITIONS

"Waste heat" is excess heat that is available from GVS&DD operations, including but not limited to heat from untreated sewage, treated effluent, equipment or processes.

"Heat user" is a third party interested in accessing excess heat from GVS&DD's liquid waste system. A heat user may be a member municipality or other entity.

POLICY

Metro Vancouver is committed to pursuing strategies and actions that mitigate climate change. Waste heat recovery projects that displace the use of fossil fuels result in a reduction in regional greenhouse gas emissions. Recovering waste heat from the liquid waste system contributes to GVS&DD's *Integrated Liquid Waste and Resource Management Plan* goal of using waste as a resource.

This policy enables expedient access to waste heat where technically and financially feasible while ensuring that GVS&DD is able to convey and treat wastewater and meet all service objectives. This policy applies to situations where external parties request waste heat from GVS&DD's liquid waste system and to situations where GVS&DD offers waste heat to interested external parties.

COLLECTION SYSTEM PROJECTS

Allocation of Waste Heat

GVS&DD will allocate access to untreated sewage for heat recovery on a first-come first-served basis in response to requests by interested heat users, provided the proposed heat recovery project will not adversely impact GVS&DD services or other established heat recovery projects, as determined by GVS&DD review. If an established heat recovery project that is already in place or approved for development by GVS&DD could be impacted by a proposed new heat recovery project, the established project's heating and/or cooling requirements will have priority. Private entities requesting access to waste heat must provide a letter of support from the host municipality demonstrating support and cooperation including allowance for works within municipal rights of way. Projects that access heat from municipal sewers do not require GVS&DD approval.

Ownership and Responsibilities

GVS&DD owns a sewerage system and is responsible for sewage in its liquid waste system, including any associated resources such as heat. The boundaries of responsibility for heat recovery equipment and infrastructure are primarily tied to property ownership and will be defined in a contract between

GVS&DD and the heat user. GVS&DD will own and be responsible for the portion of the tie-in up to and including a shut-off valve on both the diversion and return lines. GVS&DD will consider an in-line heat recovery system built directly in a GVS&DD sewer if the system will not impair GVS&DD operations.

Cost Recovery

GVS&DD will charge the heat user for all costs incurred to establish and maintain access to sewage. The value of sewage will be assessed using business case processes, including consideration of nominal value of sewage, and incorporated into sewage access contracts. GVS&DD may consider capital investment in heat recovery projects accessing sewage from GVS&DD infrastructure. GVS&DD staff will evaluate heat recovery projects using established life cycle cost analysis and options analysis frameworks and will consider each project on a case-by-case basis. Benefits will include the value of avoided greenhouse gas emissions. GVS&DD does not seek to profit from the provision of heat. A contract with the heat user will be established for each project that assigns the costs and benefits between GVS&DD, the heat user and other funding sources. All maintenance and operating costs borne by GVS&DD from GVS&DD infrastructure will be recovered from energy purchasers.

~~**Environmental Attributes**~~

~~Benefits associated with greenhouse gas reductions (such as carbon offset credits) and the costs of administering those benefits will be allocated on a case-by-case basis, in accordance with the costs and risks incurred by the parties involved in developing the heat recovery project.~~

TREATMENT PLANT AND OUTFALL PROJECTS

Allocation of Waste Heat

When GVS&DD identifies waste heat opportunities in wastewater treatment plants and effluent outfalls, GVS&DD will follow competitive processes in offering available waste heat to potential heat users, to ensure fairness and transparency.

Ownership and Responsibilities

The boundaries of responsibility for heat recovery equipment and infrastructure are primarily tied to property ownership and will be defined in a contract between GVS&DD and the heat user. GVS&DD will own and be responsible for waste heat recovery equipment and related infrastructure installed within its wastewater treatment plants and effluent outfalls, except in cases where ownership by an external party is deemed preferable to the GVS&DD.

Cost Recovery

Heat recovery projects within wastewater treatment plants and effluent outfalls will require capital investment by GVS&DD and will require ongoing operations and maintenance by GVS&DD. GVS&DD will recover the costs incurred in providing waste heat to external parties over the life of the project. GVS&DD does not seek to profit from the provision of heat. GVS&DD staff will evaluate heat recovery projects using established life cycle cost analysis and options analysis frameworks and will consider each project on a case-by-case basis. Benefits will include the value of avoided greenhouse gas emissions. A contract with the heat user will be established for each project that assigns the costs and benefits between GVS&DD, the heat user and other funding sources.

ALL PROJECTS

Environmental Attributes

Benefits associated with greenhouse gas reductions (such as carbon offset credits) and the costs of administering those benefits will be allocated on a case-by-case basis, in accordance with the costs and risks incurred by the parties involved in developing the heat recovery project.

Carbon credits will be allocated to the host jurisdiction as a project proponent for contributions to the project that can be financially valued (other than Tier 1 and 2 cost apportionments). In recognition of the important role of the host and of impacts that cannot be valued financially, the host jurisdiction will receive 5% of the credits allocated to GVS&DD, for the initial term of the agreement for the sale of heat.

Carbon credits from GVS&DD emissions reduction projects that have been allocated to GVS&DD as a project proponent will be retained by GVS&DD, up to the amount needed for GVS&DD to be carbon neutral in a given year. If GVS&DD achieves carbon neutrality in a given year, excess carbon credits will be transferred to member jurisdictions. The distribution of excess carbon credits among member jurisdictions will be calculated based on capital contribution to the portfolio of GVS&DD liquid waste heat recovery emissions reduction projects. Calculated excess carbon credit distributions less than one tonne will not be transferred, but will instead be redistributed among the other member jurisdictions.

TWU'S DR. DAVID CLEMENTS AND TEAM TRACK CLIMATE CHANGE-DRIVEN SPREAD OF INVASIVE PLANTS IN METRO VANCOUVER, INFORM MUNICIPAL STRATEGIES

Helping governments develop tools and best practices for detecting, prioritizing, and managing outbreaks of invasive species

MAR 21, 2021 - 8:00AM

Yellow starthistle, an invasive species found in nearby Washington State. Photo by Dr. David Clements.

"As the pandemic has taught us, the more prepared we are for biological threats and the earlier we act on them, the better! There is little doubt that some of the plants we are studying will invade our area in the near future, and that climate change will play a role. Our research will help Metro Vancouver and our other partners to be better prepared."

— Dr. David Clements, Professor of Biology, Assistant Dean, Faculty of Natural and Applied Sciences (Research)

A team of researchers led by Trinity Western University's Dr. David Clements is undertaking a two-year study to better understand how new invasive plants may spread into Metro Vancouver and beyond, thanks to grant funding from the Natural Sciences and Engineering Research Council of Canada (NSERC) and financial support from the Metro Vancouver Regional District.

The study aims to model how invasive plants such as Brazilian elodea, European common reed, Dyer's woad, shiny geranium, mouse ear hawkweed or water hyacinth may take advantage of climate change to establish and spread across the region, and will help governments develop tools and best practices for detecting, prioritizing, and managing outbreaks of invasive species.

The Metro Vancouver area is vulnerable to invasive plants due to its favourable climate and diverse landscapes. Climate change is expected to make it easier for invasive plant species to spread, particularly northward into Canada. As a major port of entry into Canada, Metro Vancouver provides numerous pathways for invasive species to enter via land crossings and from overseas.

Dr. David Clements and his team are working to develop the methodology for modelling habitat suitability under climate change for Metro Vancouver, incorporating the unique features of the region's diverse landscape.

His team's project, "*Habitat Suitability and Climate Modelling for Predicting the Risk of New Invasive Plants in Metro Vancouver*," has received generous funding from an NSERC grant in February. The Alliance Grant from NSERC required a non-university funding ally to apply the results of the scientific research, and Dr. Clements had previously teamed up with Metro Vancouver, which is contributing $15,000 per year to the project over two years. Two other partners will also help shape the approach: the B.C. Ministry of Agriculture and the Invasive Species Council of Metro Vancouver, represented by executive director, Tasha Murray.

"The ability of these organizations to both understand the issues and take action make them ideal partners," said Dr. Clements.

In total, $87,000 has been awarded to Dr. Clements and his team by Metro Vancouver and NSERC for the duration of the project, which will last approximately two years.

The B.C. Government has already developed provincial-scale risk assessments for invasive plant species, which Dr. Clements's team will build upon by examining priority species for Metro Vancouver through the lens of climate change.

Shauna-Lee Chai, representing the project's B.C. Ministry of Agriculture partner, previously completed a similar project for the Province of Alberta. The research will be carried out by master's student and TWU alumna, Emma Nikkel, and co-supervised by Dr. Clements at Trinity Western University and Dr. Jennifer Williams at the University of British Columbia. Undergrad research students will complete the team. This diverse partnership will provide the trainees with both scientific training and mentoring in equity, diversity and inclusiveness. For more information on invasive species in the Metro Vancouver region, please visit their website.

About Trinity Western University

Founded in 1962, Trinity Western University is Canada's premier Christian liberal arts university dedicated to equipping students to establish meaningful connections between career, life, and the needs of the world. It is a fully accredited research institution offering liberal arts and sciences, as well as professional schools in business, nursing, education, human kinetics, graduate studies, and arts, media, and culture. It has five campuses and locations: Langley, Richmond-Lansdowne, Richmond-Minoru, Ottawa, and Bellingham, WA. TWU emphasizes academic excellence, research, and student engagement in a vital faith community committed to forming leaders to have a transformational impact on culture. Learn more at www.twu.ca or follow us on Twitter @TrinityWestern, on Facebook and LinkedIn.

For media inquiries, please contact: media@twu.ca

B.C. tops North America for 2020 electric vehicle uptake

Vancouver Province (Print Edition) · David Carrigg

CA | April 08, 2021 · 07:25am

Edition: Final · Section: News · Page: A10

Sales of zero-emission cars accounted for almost 10 per cent of all car sales in B.C. in 2020 - the highest electric vehicle uptake in North America - according to Bruce Ralston, minister of Energy, Mines and Low Carbon Innovation.

The Zero Emission Vehicle Update 2020, released on Tuesday, showed there were 54,469 licensed zero emission vehicles on the road as of the end of 2020 (40,013 battery electric vehicles, 14,402 plug-in hybrids and 54 hydrogen cars).

In 2018, electric vehicle car sales made up just over four per cent of all car sales in B.C.

In 2020, that figure was 9.2 per cent.

"With the highest reported uptake rates of EVs in North America, B.C. is quickly becoming a leader in the EV industry," Ralston said.

B.C.'s Zero Emission Vehicles Act states 100 per cent of light-duty vehicles sold in the province must be EVs by 2040. This act can be repealed by another government.

The provincial government offers a $3,000 rebate to anyone buying a non-luxury allelectric vehicle.

The ZEV report showed the most rebates were given to Tesla 3 base-model owners, followed by Hyundai Kona, Toyota Prius Prime, Mitsubishi Outlander and Chevy Bolt.

Ralston said B.C. has more than 2,500 public charging stations, including 205 public DC superchargers. Tesla has its own network of 16 supercharging stations in B.C. available only to Tesla owners. Tesla sells a range of adapters that allow owners to use all public stations (free and for-pay).

There are generally three levels of charging available for EV owners: Standard 120-volt most common in homes that takes a day to charge, second-tier chargers that offer a full charge in several hours, and superchargers that can recharge an EV in less than an hour.

In B.C., the common second-level charging stations are operated by ChargePoint, Flo and B.C. Hydro.

Some ChargePoint and Flo locations are free - like in Pacific Spirit Regional Park in Vancouver - while others are located in parkades where a ticket must be bought to use the charger. B.C. Hydro has been offering its chargers for free, but as of May 1 the utility will bill between 12 and 27 cents a minute for use - as permitted by the B.C. Utilities Commission. B.C. Hydro's 2021 rebate scheme offering up to $700 to pay for a homeowner to install a level-two charger was capped on Feb. 28 due to demand. dcarrigg@postmedia.com