metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

METRO VANCOUVER REGIONAL DISTRICT
CLIMATE ACTION COMMITTEE

REGULAR MEETING

Friday, January 14, 2022
1:00 p.m.
Meeting conducted electronically pursuant to the Procedure Bylaw
28th Floor Boardroom, 4515 Central Boulevard, Burnaby, British Columbia
Webstream available at http://www.metrovancouver.org

REVISED AGENDA[1]

OPENING REMARKS
Director Sav Dhaliwal, Board Chair

1. ADOPTION OF THE AGENDA

1.1 January 14, 2022 Regular Meeting Agenda
That the Climate Action Committee adopt the agenda for its regular meeting scheduled for January 14, 2022 as circulated.

2. ADOPTION OF THE MINUTES

2.1 November 5, 2021 Regular Meeting Minutes
That the Climate Action Committee adopt the minutes of its regular meeting held November 5, 2021 as circulated.

3. DELEGATIONS

Added **3.1 Alex Boston, ED Renewable Cities & Fellow, SFU Morris J Wosk Centre for Dialogue**
Subject: Making Metro 2050 Matter: Climate, Congestion, Affordability & Prosperity

Added **3.2 Christy Juteau, National Conservation Science Director, A Rocha Canada Environmental Stewardship**
Subject: Metro Vancouver 2040: Shaping Our Future Land Use Designation Amendment Request from City of Surrey – South Campbell Heights

4. INVITED PRESENTATIONS

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

4.1 David Black, President and Norman Gludovatz, Director of Communications, MoveUP: the Movement of United Professionals
Subject: Capitalizing on Retrofitting Opportunities for GHG Emission Reductions and Job Creation

5. REPORTS FROM COMMITTEE OR STAFF

5.1 2022 Climate Action Committee Meeting Schedule and Work Plan
That the Climate Action Committee:

a) receive for information the Climate Action Committee Terms of Reference and the 2022 Annual Meeting Schedule, as presented in the report dated January 4, 2022, titled "2022 Climate Action Committee Meeting Schedule and Work Plan"; and
b) endorse the 2022 work plan, as presented in the report dated January 4, 2022, titled "2022 Climate Action Committee Meeting Schedule and Work Plan".

5.2 Update on Metro Vancouver Zero Emissions Innovation Centre
That the MVRD Board receive for information the report dated January 4, 2022, titled "Update on Metro Vancouver Zero Emissions Innovation Centre".

5.3 MVRD Non-Road Diesel Engine Emission Regulation Amending Bylaw No. 1337, 2021
That the MVRD Board:
a) give first, second and third reading to *Metro Vancouver Regional District Non-Road Diesel Engine Emission Regulation Amending Bylaw No. 1337, 2021*; and
b) pass and finally adopt *Metro Vancouver Regional District Non-Road Diesel Engine Emission Regulation Amending Bylaw No. 1337, 2021*.

5.4 Metro Vancouver Regional Consumption-Based Emissions Inventory
That the Climate Action Committee receive for information the report dated December 16, 2021, titled "Metro Vancouver Regional Consumption-Based Emissions Inventory".

5.5 Manager's Report
That the Climate Action Committee receive for information the report dated January 4, 2022, titled "Manager's Report".

6. INFORMATION ITEMS

6.1 Report from Gregory Freeman, Senior Economist and Megan Gerryts, Senior Policy Advisory, Invest Vancouver re Clean Transportation: Findings and Actions to Strengthen the Sector in the Metro Vancouver Region dated November 1, 2021.

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 January 14, 2022.

Membership:

Carr, Adriane (C) – Vancouver
Dhaliwal, Sav (VC) – Burnaby
Arnason, Petrina – Langley Township
Baird, Ken – Tsawwassen First Nation
Dupont, Laura – Port Coquitlam
Hocking, David – Bowen Island
Kruger, Dylan – Delta
McCutcheon, Jen – Electoral Area A
McIlroy, Jessica – North Vancouver City
McLaughlin, Ron – Lions Bay
Patton, Allison – Surrey
Royer, Zoë – Port Moody
Steves, Harold – Richmond
Wilson, Chris – Coquitlam
Yousef, Ahmed – Maple Ridge

METRO VANCOUVER REGIONAL DISTRICT
CLIMATE ACTION COMMITTEE

Minutes of the Regular Meeting of the Metro Vancouver Regional District (MVRD) Climate Action Committee held at 1:02 p.m. on Friday, November 5, 2021 in the 28th Floor Boardroom, 4515 Central Boulevard, Burnaby, British Columbia.

MEMBERS PRESENT:
Chair, Councillor Adriane Carr, Vancouver
Vice Chair, Councillor Sav Dhaliwal, Burnaby (departed at 3:23 p.m.)
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
Councillor Jessica McIlroy*, North Vancouver City
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

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

1. ADOPTION OF THE AGENDA

1.1 November 5, 2021 Regular Meeting Agenda

It was MOVED and SECONDED
That the Climate Action Committee adopt the agenda for its regular meeting scheduled for November 5, 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 October 15, 2021 Regular Meeting Minutes

It was MOVED and SECONDED
That the Climate Action Committee adopt the minutes of its regular meeting held October 15, 2021 as circulated.

CARRIED

3. DELEGATIONS

No items presented.

4. INVITED PRESENTATIONS

4.1 Roberto Pecora, Director, Zero Emissions Building Exchange (ZEBx)

Roberto Pecora, Director, Zero Emissions Building Exchange (ZEBx), provided members with a presentation highlighting the organization's mission to deliver information on developing zero emission buildings in British Columbia through video publishing, podcasts, and case studies, and the future of their sustainability innovation programs.

Presentation material titled "An Introduction to ZEBx and its Evolving Mission" is retained with the November 5, 2021 Climate Action Committee agenda.

5. REPORTS FROM COMMITTEE OR STAFF

5.1 Metro Vancouver's Climate 2050 Buildings Roadmap

Report dated October 8, 2021 from Erik Blair, Regional Planner, Parks and Environment Department, presenting the Climate Action Committee with the *Climate 2050 Buildings Roadmap* and seeking endorsement by the MVRD Board.

Members were provided a presentation highlighting the alignment between the *Climate 2050* strategy and the *Clean Air Plan*, goals and targets, feedback regarding emissions reductions and climate resilience, the urgency for action, and an implementation roadmap.

Members discussed the need for reliable and accurate reporting on the steps being taken each year to reach emissions targets and the possibility of regulating greenhouse gas emission levels to incentivize low carbon or retrofit building projects.

Presentation material titled "*Metro Vancouver's Climate 2050 Building Roadmap*", is retained with in the November 5, 2021 agenda.

It was MOVED and SECONDED

That the MVRD Board:

a) endorse the *Climate 2050 Buildings Roadmap* as attached to the report dated October 8, 2021, titled "Metro Vancouver's *Climate 2050 Buildings Roadmap*" as the initial Roadmap towards achievement of the *Climate 2050* vision, goals, and targets for greenhouse gas reduction and resilience in the buildings sector;

b) direct staff to continue working with member jurisdictions and other partners to implement the actions in the *Climate 2050 Buildings Roadmap*; and

c) direct staff to update the Roadmap, as needed, in response to changes in science, technology and policy.

CARRIED

5.2 Metro Vancouver's Climate 2050 Transportation Roadmap

Report dated October 8, 2021 from Morgan Braglewicz, Air Quality Planner, Parks and Environment Department, presenting the Climate Action Committee with the *Climate 2050 Transportation Roadmap* and seeking the MVRD Board's endorsement.

Members were provided a presentation highlighting the key changes, incorporated feedback, and emissions reductions and climate resiliency as it aligns to the *Climate 2050 Transportation Roadmap*.

Members discussed amending the *Climate 2050 Transportation Roadmap* to include all forms of e-mobility in the strategies related to active transportation and fleet electrification and the impacts on high volume active transportation routes in order to address the *Climate 2050* goals.

Presentation material titled "Metro Vancouver's *Climate 2050 Transportation Roadmap*" is retained with in the November 5, 2021 agenda.

It was MOVED and SECONDED

That the MVRD Board:

a) endorse the Climate 2050 Transportation Roadmap as attached to the report dated October 8, 2021, titled "Metro Vancouver's Climate 2050 Transportation Roadmap" as the initial Roadmap towards achievement of the Climate 2050 vision, goals, and targets for greenhouse gas reduction and resilience in the transportation sector, with the amendments proposed by the Climate Action Committee, including amending:
    i) Section 1.10 and Section 2.4 to explicitly include various types of e-mobility;
    ii) Section 4.2 to include the impacts on high volume active transportation routes;

b) direct staff to continue working with member jurisdictions and other partners to implement the actions in the Climate 2050 Transportation Roadmap; and

c) direct staff to update the Roadmap, as needed, in response to changes in science, technology and policy.

CARRIED

5.3 Draft Climate 2050 Agriculture Roadmap

Report dated October 13, 2021 from Carla Stewart, Senior Planner, Regional Planning and Housing Department and Jason Emmert, Program Manager, Climate Policy, Parks and Environment Department, seeking the MVRD Board's authorization to proceed with engagement on the draft *Climate 2050 Agriculture Roadmap.*

Members were provided a presentation highlighting the vision, goals and strategies of the *Climate 2050 Agriculture Roadmap*.

Committee members discussed the need to implement a regional market approach to localizing food supply in order to provide better food security to the region.

Presentation material titled "Draft Climate 2050 Agriculture Roadmap is retained within the November 5, 2021 agenda.

It was MOVED and SECONDED

That the MVRD Board authorize staff to proceed with engagement on the draft *Climate 2050 Agriculture Roadmap*, as presented in the report dated October 13, 2021, titled "Draft *Climate 2050 Agriculture Roadmap*".

CARRIED

3:23 p.m. Vice Chair Dhaliwal left the meeting.

5.4 Managing Metro Vancouver's Corporate Energy and Greenhouse Gas Emissions (2016 to 2020)

Report dated October 13, 2021 from George Friedrich, Senior Project Engineer, Liquid Waste Services and Nicole Chan, Project Engineer, Parks and Environment, updating the Climate Action Committee on trends in Metro Vancouver's corporate energy use, energy costs, and greenhouse gas (GHG) emissions from 2016 through 2020 and providing an update on energy management and greenhouse gas emissions management actions by service area.

Members were provided a presentation highlighting initiatives for managing energy and greenhouse gas emissions, emissions trends for Metro Vancouver, and the current actions underway to reduce greenhouse gas emissions.

Presentation material "Managing Metro Vancouver's Corporate Energy and Greenhouse Gas Emissions (2016 to 2020)" is retained with in the November 5, 2021 agenda.

It was MOVED and SECONDED

That the Climate Action Committee receive for information the report dated October 13, 2021, titled "Managing Metro Vancouver's Corporate Energy and Greenhouse Gas Emissions (2016 to 2020)".

CARRIED

5.5 MVRD Notice of Bylaw Violation Enforcement and Dispute Adjudication Amending Bylaw No. 1332, 2021

Report dated October 13, 2021 from Cindy Onyejekwe, Senior Policy Analyst and Esther Berube, Division Manager, Bylaw and Regulation Development, Parks and Environment Department, seeking MVRD Board's endorsement of the amendments to the *Greater Vancouver Regional District Notice of Bylaw Violation Enforcement and Dispute Adjudication Bylaw No. 1117, 2010, (Bylaw 1117*) that introduce new bylaw violations and penalties to support the new Bylaw 1329.

It was MOVED and SECONDED

That the MVRD Board:

a) give first, second and third reading to *Metro Vancouver Regional District Notice of Bylaw Violation Enforcement and Dispute Adjudication Amending Bylaw No. 1332, 2021*; and

b) pass and finally adopt *Metro Vancouver Regional District Notice of Bylaw Violation Enforcement and Dispute Adjudication Amending Bylaw No. 1332, 2021*.

CARRIED

5.6 MVRD Ticket Information Utilization Amending Bylaw No. 1333, 2021

Report dated October 13, 2021 from Cindy Onyejekwe, Senior Policy Analyst and Esther Berube, Division Manager, Bylaw and Regulation Development, Parks and Environment Department, seeking MVRD Board's endorsement of the amendments to *Greater Vancouver Regional District Ticket Information Utilization Bylaw No. 1050, 2006*, (Bylaw 1050) that introduce new offences and fines to support the new Bylaw 1329.

It was MOVED and SECONDED

That the MVRD Board:

a) give first, second and third reading to *Metro Vancouver Regional District Ticket Information Utilization Amending Bylaw No. 1333, 2021*; and

b) pass and finally adopt *Metro Vancouver Regional District Ticket Information Utilization Amending Bylaw No. 1333, 2021*.

CARRIED

5.7 Air Quality Advisories During the Summer of 2021

Report dated October 13, 2021 from Geoff Doerksen, Air Quality Planner and Ken Reid, Superintendent, Environmental Sampling and Monitoring Parks and Environment Department, providing the Climate Action Committee with information about air quality advisories issued by Metro Vancouver during the summer of 2021, historical trends, and implications for future air quality.

Members were provided a presentation highlighting air quality advisory preparation, specific air quality advisories in 2021, and the implications of those advisories.

Presentation material titled "Air Quality Advisories During the Summer of 2021" is retained with in the November 5, 2021 agenda.

It was MOVED and SECONDED
That the Climate Action Committee receive for information the report dated October 13, 2021, titled "Air Quality Advisories During the Summer of 2021".

CARRIED

5.8 Board Appointment of Enforcement Officers

Report dated October 19, 2021 from Kathy Preston, Program Manager, Environmental Regulation and Enforcement, Parks and Environment Department, seeking MVRD Board's approval to appoint two Metro Vancouver employees as Board-designated officers and to rescind the appointments of three former employees.

It was MOVED and SECONDED
That the MVRD Board:

a) pursuant to the *Greater Vancouver Regional District Air Quality Management Bylaw 1082, 2008* and the *Environmental Management Act*:
   i. appoint Metro Vancouver employees Matt Brinkworth and Toby Gritten as officers; and
   ii. rescind the appointments of Rick Laird, Robert Kemp and Corey Pinder as officers; and
b) pursuant to section 28 of the *Offence Act*:
   i. appoint Metro Vancouver employees Matt Brinkworth and Toby Gritten for the purpose of serving summons under section 28 of the *Offence Act* for alleged violations under the *Greater Vancouver Regional District Air Quality Management Bylaw 1082, 2008*; and
   ii. rescind the appointments for the purpose of serving summons of Rick Laird, Robert Kemp and Corey Pinder.

CARRIED

5.9 Manager's Report

Report dated October 26, 2021 from Roger Quan, Director, Air Quality and Climate Change, Parks and Environment Department, updating the Climate Action Committee on upcoming initiatives and ongoing projects.

It was MOVED and SECONDED
That the Climate Action Committee receive for information the report dated October 26, 2021, titled "Manager's Report".

CARRIED

6. INFORMATION ITEMS

6.1 Media Release from Environment and Climate Change Canada, October 25, 2021 re UK COP26 Presidency Releases Climate Finance Delivery Plan, led by German State Secretary Flasbarth and Canada's Minister Wilkinson ahead of COP26

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 November 5, 2021.

CARRIED

(Time: 4:05p.m.)

_____ _____

Manveer Atwal,
Legislative Services Coordinator

Adriane Carr, Chair

48900875 FINAL

DELEGATION EXECUTIVE SUMMARY

Name or Organization: Alex Boston, ED Renewable Cities & Fellow, SFU Morris J Wosk Centre for Dialogue
Subject: Making Metro 2050 Matter: Climate, Congestion, Affordability & Prosperity
Presenting to: Climate Action Committee
Date of Meeting: January 14, 2022

Metro 2050 is the product of an institution inadvertently designed to change incrementally and operate in silos. Many regional district and municipal elected officials and staff have conscientiously endeavoured to create a regional land use agenda that acknowledges some shifting priorities and meets minimum expectations. They have succeeded.

Meeting minimum expectations is no longer satisfactory. The urgent crises of affordability and climate with calamitous consequences to property, infrastructure, human life, economic activity and ecosystems behove the region to steward a coarse correction. Fortunately, this new direction also offers greater prosperity, including lower congestion and higher industrial and employment land outcomes and the lowest cost solutions to some of our highest priorities.

In its current form *Metro 2050* will sustain high transportation GHGs—the region's largest and fastest growing GHG source—increased congestion, increased unaffordability and growing vulnerability to climate change impacts. While the draft RGS includes some commendable new work to manage civic infrastructure costs, the overarching policies and trends will result in rising civic infrastructure deficits and upwards pressure on transit fares. *Metro 2050* inadvertently facilitates a high cost, high carbon, high congestion, high risk region.

Two transformative series of events thrust Metro Vancouver Directors, staff and member local governments into a unique position to steward this course correction, stemming public cynicism and meeting public expectations for leadership: 1. while challenging, unprecedented, imperfect and wildly successful, local governments' commendable COVID response, and 2. the catastrophic series of multi-billion-dollar climate impacts across B.C. communities.

Land Use Driving the Largest and Fastest Growing Emission Sector: Transportation

Transportation is the Metro's largest and fastest growing GHG source. A major driver is land use. A disproportionately large share of job and residential growth is further and further from major job hubs (the #1 determinant of household carbon and congestion). The vast majority of general urban fabric is losing density. Average commute distances and times are rising. Transit mode share is slipping. Vehicle growth rates are outstripping population growth.

The only jurisdiction to cut transportation GHGs below 1990 levels is Sweden. B.C. is starting to raise key Swedish pillars: 1. bold carbon tax, 2. strong vehicle efficiency & ZEV mandates, 3. renewable fuels. Sweden has another key pillar: 4. sustainable land use. According to the European Environmental Agency, Sweden has essentially eliminated farmland and natural area loss to commercial, industrial, residential and transportation infrastructure sprawl. Transit mode share is rapidly growing and traffic-related death and serious injury has plummeted.

While B.C.'s and Metro Vancouver's transportation GHGs have steadily risen, almost 20% since 2007, California has driven seven percent reductions. California also employs these four pillars.

The *Clean Air Plan* recently adopted by Metro Vancouver has a 65% emission reduction target for passenger transportation. Although there are no "Big Moves" for land use—questioning the Plan's defensibility—it does state:

> ***Strong regional land-use policies are foundational to achieving the targets in the Clean Air Plan. Building compact, mixed-used communities that connect homes, jobs and recreation with walking, cycling and public transit will reduce driving emissions and will support the protection of important lands such as agricultural and industrial lands, and natural areas.***

What is the magnitude of these reductions? There are likely negligible reductions attributable to the RGS. Land use is becoming less versus more sustainable. Strategically located Industrial land is being displaced by residential. Agricultural and natural areas are being displaced by sub-standard industrial sprawl, exacerbating risks to climate change. At the same time, leading U.S. cities—including competing port cities—are building state-of-the-art, multi-storey warehouses on century-old, central industrial lands, cutting freight and employee congestion, carbon and transportation costs.

Technology Innovation & Sustainable Land Use Implementation

It takes 30 years for 100% vehicle stock turnover. Of the new vehicles driven off of car lots today, the last will be scrapped just after 2050, frustrating Metro's long term carbon neutral commitments. Ninety percent of these new vehicles are fossil fueled. Moreover, due to auto-oriented urban growth, Metro Vancouver's total vehicle stock is rapidly

rising. Without sustainable land use, there will be more fossil fuel vehicles and congestion in 2030 than at any other time in history. The *Clean Air Plan*'s 65% reduction target for light duty vehicles appears illusory.

While most transportation sector GHG growth historically has been in passenger vehicles. Today, the region's fastest growth in carbon and congestion is urban freight – the "Prime" sector. Similarly, *Metro 2050* and *Transport 2050* have omitted consideration of meaningful precedents in land use and transportation to address this sector.

Land use planning is local governments' wheelhouse. If there is any planning agenda where Metro Vancouver should align its GHG reduction targets it is *Metro 2050*. The IPPC underscores the imperative for local leadership and focus.

Thousands of cities are undertaking climate action plans, but their aggregate impact on urban emissions is uncertain...
Current climate action plans focus largely on energy efficiency. Fewer climate action plans consider land use planning…
Effective mitigation strategies involve packages of mutually reinforcing policies,
including co-locating high residential with high employment densities,
achieving high diversity and integration of land uses, increasing accessibility and investing in public transport...
IPCC, Assessment Report 5, Mitigation Working Group, 2014

effective urban planning can reduce GHG emissions from urban transport between 20% and 50%
IPCC, Special Report on Global Warming of 1.5°C, 2018

Policy Alignment: Metro 2050, Climate 2050/Clean Air Plan, CleanBC

Currently RGS Goal #3 states: "Protect the Environment and Respond to Climate Change and Natural Hazards." This goal avoids addressing Metro Vancouver's climate policy imperative to reduce emissions 45% by 2030 consistent with IPCC 1.5°C conclusions regarding emission reductions and the strategic role of local government land use action. To ensure consistency with the *Clean Air Plan*'s "evidence-based" and "comprehensive & integrated" principles, it is incumbent on Metro Vancouver to lay out a more sustainable land use agenda.

Moreover, rather than simply "*responding* to Climate Change and Natural Hazards," there is an urgency to *reduce* vulnerability. Over the past year, Abbotsford, Merritt, Lytton, Princeton *responded* to climate change. Communities need proactive leadership. Sustainable land use is a key cornerstone for reducing vulnerability to climate impacts. This should be central to the *Clean Air Plan's* "preventative" principle.

CleanBC's Roadmap to 2030 has underscored the need to robustly integrate land use to meet transportation GHG targets. 2030 targets include reducing total driving distance (vehicle km travelled) 25%. Fortunately, the *Clean Air Plan* is underpinned by an "ambitious" principle. *Metro 2050* should meet this target.

With 30% renewable fuels by 2030 and a 90% ZEV mandate for new vehicle sales under *CleanBC's Roadmap to 2030*, Metro Vancouver can readily calculate the land use contribution to meet Metro's target to cut light duty vehicle GHGs 65%. It has the data. Metro's commitment to "evidence based," "continuous improvement," and "transparency" principles should drive this analysis, make it available to elected officials and the public and drive *Metro 2050* direction.

Not having defensible and quantified modal shift, transportation demand management and GHG reduction targets attributable to land use, renders *Metro 2050* and *Climate 2050* inadequate responses to rising catastrophic losses.

Land Use: Lowest Cost, Highest Benefit Strategy Wedge

Sustainable land use is the lowest cost climate action strategy wedge. As the OECD and the Global Commission on Climate and Economy have underscored, sustainable land use is a negative cost, i.e., a money maker!

Focussing growth along transit corridors and around rapid transit stations cuts congestion and puts riders and revenue into TransLink coffers. Supportive land use can extend improved traffic flow on billion-dollar bridge and highway expansions for decades, delaying (sometimes permanently) further costly expansion. Smart land use can cut transportation spending—the largest household expenditure after housing. Sustainable land use can dramatically reduce the magnitude of losses to property, infrastructure, ecosystem services and human life from climate impacts. Sustainable land use offers some of the least expensive, affordable housing solutions; some are money makers!

Metro Vancouver can protect the pocket books and prospects of people in this region. A course correction is needed.

"The cost of reducing regional and global greenhouse gas emissions as well as the costs of adaptation
will only grow, the best cost option is to take action now."
Metro Vancouver, *Clean Air Plan*

CANADA
A ROCHA
Environmental Stewardship

Jan 12, 2022

Concerns re: Metro Vancouver 2040: Shaping Our Future Land Use Designation Amendment Request from the City of Surrey – South Campbell Heights

The lands proposed for industrial development (2.3 km2) are critical for protecting the health of the Little Campbell River (TA'TALU in SENĆOŦEN) and receiving waters of Boundary Bay. As recent extreme flooding events have shown us, there is an urgent need to assess the way we manage land in a way that enhances resiliency to climate change. Industrial development of this scale could have **irreparable impacts**: flooding, erosion, aquifer contamination, and degradation of critical salmon spawning habitat. During the extreme weather events of this fall, we have already begun to see this damage: flooding of the hatchery, scouring out of recently laid salmon eggs, landslides on Semiahmoo First Nation land.

The proposed industrial lands overlay a shallow unconfined aquifer that provides drinking water and irrigation water for thousands of residents in South Surrey/Langley and supplies river flow for critical salmon spawning habitat. Additionally, **Semiahmoo First Nation has not been adequately consulted** about this proposal that directly affects the health of their territory, their home on the river and their traditional food sources.

The TATALU River supports five significant runs of Pacific Salmon as well as the endangered Salish Sucker. Productive spawning and rearing habitat exists mainly within and directly downstream of the Study Area. As one of the most endangered rivers in BC, serious consideration must be taken while reviewing the potential impact of this revised plan.

Expanding the Urban Containment Boundary for this development **will go against Climate 2050 and Metro 2040/50 goals** to: 1) ensure nature based solutions, 2) create a compact urban area, 3) protect land for agriculture, 4) protect and enhance natural features and their connectivity, reduce greenhouse gas emissions, and mitigate and prepare for climate change, 5) develop healthy and complete communities, and 6) direct growth and development to make it easier for residents to get to, from and around the region for their jobs and daily needs. Our concerns are as follows:

1. **Lack of Indigenous consultation** and free, prior, informed consent. The Semiahmoo First Nation's reserve lands reside at the estuary of the TATALU River and their traditional territory extends throughout the entire watershed. Traditionally they have relied on the TATALU for clean water and food security: abundant salmon and shellfish. Without free, prior and informed consent, this proposal should not move forward[1].

2. **Information gaps.** The revised plan was presented to Metro Vancouver before recommended studies were completed: a) groundwater review to understand groundwater/surface water interactions to inform the development of Aquifer Protection Measures, b) Integrated Stormwater Management Plan[2] – to consider environmental consequences prior to build out, and c) archaeological review - the entire area is of high archaeological potential, aside from the areas of

[1] BC Legislative Assembly. 2019. Bill 41 – 2019: Declaration on the Rights of Indigenous Peoples Act.
[2] Kerr Wood Leidal. 2011. Little Campbell River Integrated Stormwater Scoping Study. Final Report. Prepared for City of Surrey and Township of Langley.

historic gravel extraction[3]. Proximity of the river, possibility of culturally modified trees, traditional use site, and historic travel corridors would require detailed archaeological study prior to permitting development under the Heritage Canada Act[1].

3. **Water quality impacts.** Run-off of fine sediments, hydrocarbons and other contaminants are likely to enter the river during wet weather. The Study Area drains directly into a segment of critical spawning habitat within the TATALU. Spawning occurs during the fall corresponding with heavy rain events – sediments can smother eggs in spawning beds and damage gills, impeding respiration. Surrey staff, along with A Rocha, Semiahmoo First Nation and 30 other organizations and levels of government sit on a working group to improve water quality in the Little Campbell River and Boundary Bay receiving waters so that Semiahmoo First Nation might be able to return to their traditional practices of shellfish harvest[4]. Development of these lands along the river as industrial goes against Surrey's efforts to restore water quality conditions and does not support reconciliation action.

4. **Groundwater impacts.** This Study Area overlays the unconfined Brookswood aquifer, which has been identified as highly vulnerable to contamination from surface sources[5][6]. The proposed development site is also shown as one of the highest value natural recharge areas in the South Campbell Heights Special Study Area. Conversion of well-draining gravel soils to impervious or compact surfaces for industrial or commercial development would greatly impede infiltration of rainwater needed to maintain flows in this groundwater-fed river system. There are already stretches of river (up to 2km in length) that flow underground during summer months, stranding thousands of juvenile salmon, indicating existing pressure on groundwater resources in the watershed.

5. **Biodiversity value and Species at Risk.** Much of the Study Area has been designated as a high ecological value forest hubs and corridors[7]. The Hubs and Corridors support diverse forest and wetland ecosystems and wildlife including species at risk: Red-legged Frog, Western Toad, Little Brown Myotis, Olive-sided Flycatcher. Critical habitat for Western Painted Turtle and Salish Sucker has been designated over much of the Study Area and the current plan is not in compliance with Recovery Strategy requirements. Converting this land to industrial would not be considered "effective protection".

   Many trees in these hubs are over 1m diameter and approximately 100 years old[5]. The value of these hubs and corridors is in large part because they are contiguous and function as a network. Removing some of the pieces diminishes the function of all remaining pieces.

   This area is ideal for a Nature Park and should be protected to sustain biodiversity health and carbon sinks within the region.

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[3] Kremsater, L., T. Elliot, and S. Hamm. 2015. South Campbell Heights Environmental Study #1220-030-2015-008. Produced by Madrone Environmental Services Ltd. Submitted to Surrey City Hall Finance and Technology Department, Surrey BC.
[4] Shared Waters Alliance. n.d. https://sites.google.com/view/shared-waters/home
[5] Kremsater, L., T. Elliot, and S. Hamm. 2015. South Campbell Heights Environmental Study #1220-030-2015-008. Produced by Madrone Environmental Services Ltd. Submitted to Surrey City Hall Finance and Technology Department, Surrey BC.
[6] BC Government. 2018. Aquifer Description for Langley/Brookswood Aquifer (Aquifer No. 41).
[7] Surrey, City of. 2014. Biodiversity Conservation Strategy. Produced by Diamond Head Consulting, January 2014. https://www.surrey.ca/sites/default/files/media/documents/Surrey_BCS_Report.pdf

Capitalizing on Retrofitting Opportunities for GHG Emission Reductions and Job Creation

Speakers

David Black, President and Norman Gludovatz, Director of Communications, MoveUP: the Movement of United Professionals

Details

MoveUP proposes the creation of a provincial agency to coordinate retrofitting for residential, commercial, industrial and government buildings. The proposal addresses the urgent need to reduce GHG emissions emanating from existing buildings in the province, by applying a social equity lens that creates jobs and opportunities for communities with lower levels of labour market participation, and improves affordability for low-income families.

Long-standing concerns about the volume of GHG emissions from residential, commercial, industrial and public buildings have not led to consensus on an approach; however, multi-jurisdictional research highlights a number of strategies that effectively incentivize action on the shared challenge and maximize effectiveness of public investment.

MoveUP seeks a commitment from Metro Vancouver to work together to continue to develop the proposal to ensure it meets local needs and ultimately seek provincial support for the proposal to move forward on its implementation.

metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

To: Climate Action Committee

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

Date: January 4, 2022 Meeting Date: January 14, 2022

Subject: **2022 Climate Action Committee Meeting Schedule and Work Plan**

RECOMMENDATION

That the Climate Action Committee:

a) receive for information the Climate Action Committee Terms of Reference and the 2022 Annual Meeting Schedule, as presented in the report dated January 4, 2022, titled "2022 Climate Action Committee Meeting Schedule and Work Plan"; and

b) endorse the 2022 work plan, as presented in the report dated January 4, 2022, titled "2022 Climate Action Committee Meeting Schedule and Work Plan".

EXECUTIVE SUMMARY

The terms of reference for the Climate Action Committee sets out the committee responsibilities in the areas of climate action, air quality, environment, energy, and the sustainability innovation funds, which provides guidance and oversight on the implementation of the annual work plan. Work plan priorities for 2022 include implementation of key policy documents adopted by the Board in 2021, including the *Clean Air Plan*, *Climate 2050* roadmaps for buildings and transportation, and several air quality bylaws. Additional *Climate 2050* roadmaps and air quality bylaws will be developed in 2022. Extreme weather events associated with climate change and their impacts – including heat waves, flooding, and wildfire smoke – are becoming more serious in our region, and the full implementation of *Climate 2050* will significantly reduce emissions and ensure that the region is prepared for and resilient to the impacts of climate change. These priorities are consistent with the 2022 Budget endorsed by the Board. Pursuant to the terms of reference, the meeting schedule proposes nine monthly meetings through October, which unless otherwise determined, will be held virtually.

PURPOSE

To provide the Climate Action Committee with its Terms of Reference, the 2022 Work Plan, and the Annual Meeting Schedule.

BACKGROUND

Annually, following the Board Inaugural meeting in November, the Board Chair establishes the committee structure and the terms of reference for each committee, for the new year. To support the Committee in its work, this report brings forward the committee's Work Plan and the Schedule of Meetings for 2022.

2022 WORK PLAN

The Annual Work Plans for the air quality function are based on the 2022 Budget approved by the MVRD Board on October 29, 2021, which include a list of key actions that were used to develop the Climate Action Committee's Work Plan presented in this report (Attachment 1).

The work plan presented in this report is consistent with the Climate Action Committee's Terms of Reference (Attachment 2) and with the *Board Strategic Plan* and is being brought forward for the Committee's information, review and endorsement.

Metro Vancouver is already being impacted by climate change, emphasizing the urgency to take action to reduce emissions and increase resilience. Air quality in the region has been severely degraded by widespread wildfire smoke events in five of the last seven years. The heatwave in June 2021 set temperature records across BC, and according to the BC Centre for Disease Control was associated with 740 excess deaths in BC. Along with heat, ground-level ozone concentrations reached levels not recorded since the late 1980s. The atmospheric river events in fall 2021 resulted in catastrophic flooding and landslides that caused extensive damage to agricultural lands and infrastructure. Our region is expected to experience an increase in both the severity and frequency of extreme weather events in the coming decades. Metro Vancouver's *Clean Air Plan* and *Climate 2050* identify the most impactful emission reduction strategies across all sectors, and the role that Metro Vancouver must play in order to meet Board targets. The *Climate 2050 Roadmaps* are also identifying how the region can be prepared for and resilient to the impacts of climate change.

Key actions in the 2022 Work Plan for the Committee are described below and listed according to the Committee responsibilities in its Terms of Reference.

Climate Action and Energy

In 2021, the Board adopted the *Clean Air Plan* which will guide policy and action towards achievement of the 2030 climate action targets established by the Board. The Board also approved the first two *Climate 2050* roadmaps, for buildings and transportation, which will set the stage for achievement of longer term targets for a carbon neutral and climate-resilient region by 2050, aligned with the most current science from the Intergovernmental Panel on Climate Change.

Key actions in this area for 2022 include:

- Draft and final *Climate 2050* roadmaps for additional issue areas, including industry, agriculture, energy, infrastructure, and nature and ecosystems.
- An online reporting and communications tool and annual *Climate 2050* report will be developed in 2022, to track progress towards targets and engage stakeholders.
- Staff have maintained an "action while planning" focus, where key climate actions have continued to be implemented and expanded, such as electric vehicle programs, building emissions benchmarking, and the strata energy advisor program.
- Key linkages and partnerships have been formed with other local governments, organizations, TransLink, and the Sustainability Innovation Funds.
- Partnerships, collaboration, and sharing of best practices on climate action will continue to be a key focus in 2022. This includes working with member jurisdictions, as well as senior

orders of government, pursuing alignment with the federal A Healthy Environment and a Healthy Economy plan, and the provincial Clean BC Roadmap to 2030.
- Under the provincial program, Metro Vancouver has achieved carbon neutrality as an organization, and will continue to expand GHG reduction and credit projects.
- The provincial government discontinued its Climate Action Revenue Incentive Program in 2021, but staff will work with provincial staff on a replacement program.
- Corporate policies related to energy and climate change will continue to be updated, supporting corporate carbon neutrality.

Air Quality and Environment
- Implement the next regional air quality and greenhouse gas management plan, the *Clean Air Plan*, adopted by the Board in September 2021.
- Implement new and amended bylaws related to non-road diesel engines, regulatory fees for cost recovery, and residential wood burning devices.
- Develop new and amended air quality bylaws and regulations towards goals for protection of human health and the environment and continuous improvement in air quality, for Board adoption, including cannabis production and processing, open air burning, and proposals to further reduce emissions from boilers and process heaters.
- Act on recommendations of the 2021 review of the air quality monitoring network, including new and evolving technologies, to ensure provision of the evidence basis and performance measurement for the air quality program.
- Continue to provide air quality information to the public and issue air quality advisories and warnings when conditions deteriorate.
- Continue to implement the ecological health framework.

Sustainability Innovation Funds (SIF)
- Utilize SIF to advance development of new and innovative climate actions, including new policies, renewable energy, carbon capture and storage, and outreach and engagement.
- Review proposals for funding, from the Regional District, Liquid Waste, and Water SIF, and make recommendations to the Board on proposals to support in the 2022-2023 period.
- Report on the status of projects and progress on deliverables that the Committee and Board approved funding for in previous years.

The Committee will be updated on the status of the actions and projects in this Work Plan on a monthly basis per the Committee's schedule.

2022 COMMITTEE MEETING SCHEDULE
The MVRD *Procedure Bylaw* requires the Corporate Officer to provide the Committee with an Annual Meeting Schedule for the upcoming year, including the date, time and place of the meetings (Attachment 3).

Meeting Place – Electronic and In-Person Meetings
The MVRD *Procedure Bylaw* authorizes a flexible model for meeting attendance. Most meetings will be electronic meetings: essentially hybrid meetings at which a member may attend in-person or by

electronic facilities at their discretion (e.g. Zoom); however, certain meetings throughout the year may be deemed to require in-person attendance when: 1) carried by resolution of the committee; or 2) the Chair determines in-person attendance as a requirement, subject to committee members being provided with seven (7) days advance notice of the requirement to attend in person. The Committee may wish to consider if in-person attendance would benefit any of the meeting dates on the schedule.

ALTERNATIVES

1. That the Climate Action Committee:
   a) receive for information the Climate Action Committee Terms of Reference and the 2022 Annual Meeting Schedule, as presented in the report dated January 4, 2022, titled "2022 Climate Action Committee Meeting Schedule and Work Plan"; and
   b) endorse the 2022 work plan, as presented in the report dated January 4, 2022, titled "2022 Climate Action Committee Meeting Schedule and Work Plan".

2. That the Climate Action Committee:
   a) receive for information the Climate Action Committee Terms of Reference and the 2022 Annual Meeting Schedule, as presented in the report dated January 4, 2022, titled "2022 Climate Action Committee Meeting Schedule and Work Plan"; and
   b) endorse the 2022 work plan, as presented in the report dated January 4, 2022, titled "2022 Climate Action Committee Meeting Schedule and Work Plan", incorporating the requested changes from the Climate Action Committee.

FINANCIAL IMPLICATIONS

The priorities in the 2022 Work Plan of the Climate Action Committee are consistent with the 2022 Budget approved by the MVRD Board on October 29, 2021 and with key actions included in the Annual Work Plans.

Committee meeting expenses and remuneration associated with meeting attendance have been allocated in the annual budget.

CONCLUSION

The work plan presented in this report identifies the priorities for the Climate Action Committee in 2022 and is consistent with its terms of reference and the 2022 Budget approved by the MVRD Board. To assist the Committee, the 2022 Annual Meeting Schedule has been established to guide the Committee's success in completing the business of the work plan. Staff recommends that Alternative 1 be approved.

Attachments

1. Climate Action Committee 2022 Work Plan
2. Climate Action Committee Terms of Reference
3. Climate Action Committee 2022 Annual Meeting Schedule

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Climate Action Committee 2022 Work Plan
Report Date: January 4, 2022

Priorities

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

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SERVICES AND SOLUTIONS FOR A LIVABLE REGION

Climate Action Committee
Terms of Reference

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

Committee Responsibilities
Within the scope of the *Board Strategic Plan*, *Clean Air Plan*, *Climate 2050 Strategic Framework, Ecological Health Framework*, and *Metro Vancouver Financial Plan*, the Committee provides guidance and oversight to staff on the implementation of the annual work plans and business plans that govern the Air Quality and Environmental Planning areas of service. Specific Committee responsibilities include the following:

- **Air Quality & Climate Change –** guiding the implementation of the strategies and actions outlined in the *Clean Air Plan, and the Climate 2050 Strategic Framework*. The Committee monitors the progress made in achieving the *Plan's* vision that "Metro Vancouver is a carbon neutral region where residents experience healthy, clean and clear air", where air quality in the region is continually improving, protecting human health and the environment; and the *Framework's* vision of Metro Vancouver demonstrating bold leadership in responding to climate change, and pursuing a carbon neutral region by 2050. The Committee recommends to the Board changes and updates to the *Plan* and the *Framework*;
- **Energy** – overseeing and guiding the efforts of staff in working with municipalities, the private sector, not-for-profit societies and others to develop strategies and programs aimed at achieving the efficient use of energy, promoting the use of alternative energies, and reducing the region's overall carbon footprint, all in an effort to mitigate climate change;
- **Environment** – guiding and monitoring the organization's actions under the *Ecological Health Framework*. The Committee recommends to the Board changes and updates to the *Framework*;
- **Climate Change Adaptation** – developing, for recommendation to the Board, climate change adaptation policies and programs that align with the Climate 2050 vision of ensuring infrastructure, ecosystems and communities are resilient to the impacts of climate change; and
- **Sustainability Innovation Funds** – overseeing the review of proposals for funding under Metro Vancouver's Sustainability Innovation Funds, and making recommendations to the Board on proposals to support. The Committee receives case study reports on all funded projects, and monitors the overall performance of the Sustainability Innovation Fund program.

Committee Membership and Meetings

The Chair, Vice Chair and members are appointed annually by the Chair of the Metro Vancouver Board. The Committee meets monthly, except for August and December, and holds special meetings as required. A quorum of 50% plus one of the Committee membership is required to conduct Committee business.

Committee Management

The Committee Chair, or in the absence of the Chair the Vice Chair, is the chief spokesperson on matters of public interest within the Committee's purview. For high profile issues the role of spokesperson rests with the Metro Vancouver Board Chair or Vice Chair. On technical matters or in cases where an initiative is still at the staff proposal level, the Chief Administrative Officer or designate is the appropriate chief spokesperson. Where necessary and practical, the Board Chair, Committee Chair and Chief Administrative Officer will confer to determine the most appropriate representative to speak.

The Chief Administrative Officer assigns a Committee Manager for the Committee. The Committee Manager is responsible for coordinating agendas and is the principal point of contact for Committee members.

ATTACHMENT 3

Climate Action Committee 2022 Annual Meeting Schedule

- **Friday, January 14, 2022 at 1:00 pm ..... Electronic Meeting**
- **Friday, February 11, 2022 at 1:00 pm ..... Electronic Meeting**
- **Friday, March 11, 2022 at 1:00 pm ..... Electronic Meeting**
- **Friday, April 8, 2022 at 1:00 pm ..... Electronic Meeting**
- **Friday, May 13, 2022 at 1:00 pm ..... Electronic Meeting**
- **Friday, June 10, 2022 at 1:00 pm ..... Electronic Meeting**
- **Friday, July 8, 2022 at 1:00 pm ..... Electronic Meeting**
- **Friday, September 9, 2022 at 1:00 pm ..... Electronic Meeting**
- **Friday, October 14, 2022 at 1:00 pm ..... Electronic Meeting**

To: Climate Action Committee

From: Jen McCutcheon, Director, Electoral Area A

Date: January 4, 2022 Meeting Date: January 14, 2022

Subject: **Update on Metro Vancouver Zero Emissions Innovation Centre**

RECOMMENDATION

That the MVRD Board receive for information the report dated January 4, 2022, titled "Update on Metro Vancouver Zero Emissions Innovation Centre".

EXECUTIVE SUMMARY

The Metro Vancouver Zero Emissions Innovation Centre (ZEIC) is the region's new Low Carbon Cities Canada (LC3) Centre. It is one of seven LC3 centres across the country with a mandate to accelerate urban climate solutions through capacity building, policy reform, research, demonstration projects, and financial innovation related to green buildings, zero emissions transportation and renewable energy. ZEIC's work will support industry, local governments and other agencies as they advance a wide range of actions to reduce greenhouse gas emissions in line with adopted plans and targets, including Metro Vancouver's *Climate 2050*. Since the March 2021 update to the Climate Action Committee, the inaugural ZEIC Board has been established and Director McCutcheon endorsed by the MVRD Board as the Metro Vancouver representative, an Executive Director has been hired, the Federation of Canadian Municipalities has received the centre's "readiness requirements" for LC3s, and ZEIC is expecting to receive the $21.7 million federal endowment early in 2022.

This report presents an annual report on the activities of ZEIC.

PURPOSE

To provide an update on the formation of the Metro Vancouver Zero Emissions Innovation Centre as a new entity that will contribute to the reduction of greenhouse gas emissions in the region.

BACKGROUND

On January 15, 2021, the Climate Action Committee received a presentation on the process to establish a LC3 Centre in the Metro Vancouver region. On May 28, 2021, the MVRD Board of Directors endorsed Director Jen McCutcheon as the Metro Vancouver representative to the ZEIC Board of Directors for a term not to exceed eighteen months, starting June 1, 2021. Director Adriane Carr is the other local government elected representative on the ZEIC Board, representing City of Vancouver.

At its November 4, 2021, meeting, the Climate Action Committee received an update in the Manager's Report on ZEIC's inaugural Board and its new Executive Director, and noted that regular updates would be brought to the committee and Metro Vancouver Board. This report presents an annual report on the activities of ZEIC.

METRO VANCOUVER ZERO EMISSIONS INNOVATION CENTRE (ZEIC) AND LOW CARBON CITIES CANADA (LC3)

The Metro Vancouver Zero Emissions Innovation Centre (ZEIC) is an independent, not-for-profit entity and pending registered charity that will receive a $21.7 million endowment from the Government of Canada (Reference 1). The federal government, acknowledging the important role of urban areas in achieving national targets for reducing greenhouse gas emissions, announced a strategic investment of $185 million for urban areas that would be managed and distributed by the Federation of Canadian Municipalities (FCM). Low Carbon Cities Canada (LC3) is a partnership between FCM and seven metropolitan areas (Greater Toronto-Hamilton, Metro Vancouver, Calgary, Edmonton, Ottawa, Montreal Metropolitan Community, and Halifax Region) to accelerate urban climate solutions and help Canada meet its 2030 and 2050 carbon reduction targets, including those in Metro Vancouver's *Climate 2050* strategy (Reference 2).

Establishing ZEIC

The Metro Vancouver ZEIC was created through a collaborative process involving FCM, City of Vancouver and Metro Vancouver. City of Vancouver acted as "proxy host" in the establishment of ZEIC, and worked closely with Metro Vancouver to ensure the scope of the new entity would meet the needs of the region as whole. A contract to develop the new organization was awarded to a team led by the Renewable Cities program at Simon Fraser University (SFU).

Under the funding agreement between the SFU team and FCM, SFU was responsible for establishing an entity that could receive, maintain and operate an endowment; manage an investment fund; and strategically advance climate action in a way that benefits local governments across the region, as well as other organizations. A Technical Advisory Group including the City of Vancouver (2 staff), Metro Vancouver (2 staff), and the provincial Climate Action Secretariat (1 staff) was formed to advise the SFU team on the creation of the new entity that would meet the conditions of the federal funding agreement and deliver on its mission to catalyze adoption of low carbon solutions across the region.

In April 2021, the Zero Emissions Innovation Centre was incorporated as a not-for-profit organization and has applied for charitable status. The Centre submitted all of FCM's "readiness requirements" for LC3s in December 2021, in order to receive the $21.7 million federal endowment early in 2022.

READINESS REQUIREMENTS FOR ZEIC

There are a number of readiness requirements for FCM to transfer the endowment to ZEIC. A number of these requirements relate to ensuring the centre has the necessary policies and bylaws in place, as well as insurance, banking account and other administrative items. There are three key readiness requirements for FCM that are highlighted below: the establishment of a Board of Directors; hiring an Executive Director; and signing a Memorandum of Agreement/Understanding with at least one local government in the Metro Vancouver region, to establish a commitment to on-going collaboration.

Board of Directors

After a public call for submissions of interest for members of the inaugural ZEIC Board and a rigorous interview and evaluation process, a high-caliber Board was established for ZEIC in March/April 2021. The current Board membership is as follows:

- Peter Robinson (Chair), formerly David Suzuki Foundation/ Mountain Equipment Coop
- Andrew Broderick, New Market Funds
- Councillor Adriane Carr, City of Vancouver
- Colin Doylend, Nexii Building Solutions
- Kira Gerwing, Sacha Investments Ltd
- Brenda Knights, Seyem (Kwantlen First Nation economic development arm)
- Chih-Ting Lo (Vice-Chair), EELO Solutions
- Director Jen McCutcheon, Metro Vancouver
- Councillor Curtis Thomas, Tsleil-Waututh Nation
- Karen Tam Wu, Pembina Institute
- Chris Gilmore, BC Government observer / ex-officio position

Director McCutcheon and Councillor Carr were appointed to the Board by Metro Vancouver and the City of Vancouver respectively. Chris Gilmour from the Ministry of Environment and Climate Change Strategy has an ex-officio position. The rest of the board are members at large. To date, the inaugural ZEIC Board has hired an Executive Director, has begun strategic planning for the new entity, and has established several committees, including the Investment Committee, to which both Board members and other advisors are being appointed.

Executive Director
After an extensive national search, the Board hired Melina Scholefield as the Executive Director of ZEIC in September 2021. Melina is a professional engineer with over twenty years of experience leading collaborative and transformative initiatives related to integrated transportation and land use planning, sustainable mobility, green buildings, climate action, water resource management, green infrastructure and environmental protection. Through this work, both with local government and the private sector, she has demonstrated her commitment to building relationships, partnerships and collective actions in support of community co-benefits, equity and reconciliation with Indigenous Peoples. Melina was recently recognized with the Canadian Water and Wastewater Association's Water Steward of the Year Award for her leadership and impact in the Canadian water sector and Metro Vancouver's YWCA's Woman of Distinction Award in Environmental Sustainability.

Memorandums of Understanding
The Memorandum of Understanding (MOU) between ZEIC and Metro Vancouver has been executed, and a MOU between ZEIC and City of Vancouver is being finalized. The MOU with Metro Vancouver articulates the intent to ensure alignment of ZEIC with regional efforts to reduce local greenhouse gas emissions; secures regional representation by inviting MVRD to appoint a representative to have a direct role in the governance and oversight of the new entity; and optimizes collaborative arrangements between ZEIC and MVRD for mutual benefit. The MOUs are not intended to impose legally binding obligations between the parties nor do they impose any form of liability on either party. The finalization of these two MOUs will mean that ZEIC will fulfill the FCM's readiness requirements and should trigger the transfer of the federal endowment to ZEIC in early 2022.

EARLY PRIORITIES FOR ZEIC

Engaging with local governments and diverse partners across the region, ZEIC will advance policy reform, build capacity, deliver programming and catalyze innovation in green buildings, transportation and renewable energy in support of to reduce greenhouse gas emissions in line with adopted plans and targets, including *Climate 2050*.

In the coming months the Executive Director will be engaging with local governments, industry and other stakeholders as well as working with ZEIC's Board of Directors to develop strategic priorities to guide ZEIC's ambitious climate action work ahead. An official launch for ZEIC is expected in 2022, once the federal funding has been secured. One key opportunity that is being pursued is the potential to integrate the Zero Emissions Building Exchange (ZEBx) into ZEIC. ZEBx has the potential to accelerate the decarbonization of buildings, including retrofits, through delivery of its knowledge-sharing and capacity-building programs at a regional scale (Reference 3). To date, there has been a positive reception from the Board of Directors to integrating ZEBx with ZEIC and a final decision from the Board of Directors is expected in mid-January.

ALTERNATIVES

This is an information report. No alternatives are presented.

FINANCIAL IMPLICATIONS

There are no financial implications for Metro Vancouver; the signed MOU between MVRD and ZEIC contains no financial obligations or liability assignments between the two parties.

CONCLUSION

The Metro Vancouver Zero Emissions Innovation Centre (ZEIC) is an independent, not-for-profit entity that will that will contribute to the reduction of regional GHG emissions, supported by an initial $21.7 million endowment from the Government of Canada. As one of seven LC3 centres in Canada, its mandate is to support local governments to accelerate regional-scale GHG reduction solutions through capacity building, policy reform, research, demonstration projects, and financial innovation related to green buildings, zero emissions transportation and renewable energy. Director McCutcheon and Councillor Carr were appointed to the inaugural ZEIC Board by Metro Vancouver and the City of Vancouver respectively. In the coming months ZEIC's Executive Director, Melina Scholefield, will be engaging with local governments, industry and other stakeholders as well as working with ZEIC's Board of Directors to develop strategic priorities to guide ZEIC's ambitious climate action work ahead.

References

1. Metro Vancouver Zero Emissions Innovation Centre (zeic.ca)
2. Low Carbon Cities Canada (LC3)
3. Zero Emissions Building Exchange (ZEBx)

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To: Climate Action Committee

From: Cindy Onyejekwe, Senior Policy Analyst
Esther Berube, Division Manager, Air Quality Bylaw and Regulation Development
Parks and Environment Department

Date: December 13, 2021 Meeting Date: January 14, 2022

Subject: **MVRD Non-Road Diesel Engine Emission Regulation Amending Bylaw No. 1337, 2021**

RECOMMENDATION

That the MVRD Board:

a) give first, second and third reading to *Metro Vancouver Regional District Non-Road Diesel Engine Emission Regulation Amending Bylaw No. 1337, 2021*; and
b) pass and finally adopt *Metro Vancouver Regional District Non-Road Diesel Engine Emission Regulation Amending Bylaw No. 1337, 2021*.

EXECUTIVE SUMMARY

Staff propose minor amendments to *Metro Vancouver Regional District Non-Road Diesel Engine Emission Regulation Bylaw No. 1329, 2021* to provide clarity and address operational issues. The proposed amendments will clarify that the prohibition on operating Tier 0 and Tier 1 non-road diesel engines near hospitals, elementary schools and community care facilities does not apply to emergency generators. There will also be more clarity around the ability to operate Tier 0 and Tier 1 non-road diesel engines that use approved emission reduction measures (ERM). The proposed amendments will better align the minimum emission standard that will apply to ERM installed on previously prohibited engines with other bylaw provisions related to prohibited engines. The proposed amendments will address operational issues related to introducing new ERM fee reduction calculations by adjusting their effective date and ensuring accurate invoicing once the registration system is updated.

PURPOSE

To propose minor amendments to *Metro Vancouver Regional District Non-Road Diesel Engine Emission Regulation Bylaw No. 1329, 2021* (Bylaw 1329) that address operational issues and enhance clarity and alignment with the intent of the bylaw.

BACKGROUND

At its October 29, 2021 meeting, the MVRD Board adopted Bylaw 1329 (Reference 1), which repealed and replaced *MVRD Non-Road Diesel Engine Emission Regulation Bylaw No. 1161, 2012*.

This report proposes minor amendments to Bylaw 1329 for clarification, better alignment with the intent of the bylaw, and operational reasons.

OVERVIEW OF BYLAW 1329

Non-road diesel engines are used to power equipment used in applications such as construction, lifting, and power generation. Bylaw 1329 regulates harmful air emissions from all tiers of non-road diesel engines, including older higher emitting Tier 0 and Tier 1 engines, as well as Tier 2, Tier 3 and Tier 4 engines starting in 2023, 2024 and 2029 respectively. Engines in Tiers 2, 3 and 4 contribute harmful emissions, although they are cleaner than Tiers 0 and 1. The bylaw employs economic instruments such as registration fees, surcharges, deductions and rebates to promote reduction of emissions of diesel particulate matter (DPM) and nitrogen oxides (NO_x) through engine retrofits or retirements. The bylaw prohibits the operation of Tier 0 and Tier 1 engines unless they were registered before certain dates, retrofitted to reduce emissions through the use of emission reduction measures (ERM), or, as of January 1, 2023, engine owners opt to pay a surcharge on registration fees.

PROPOSED BYLAW AMENDMENTS

Staff propose the following minor amendments to Bylaw 1329 through *Metro Vancouver Regional District Non-Road Diesel Engine Emission Regulation Amending Bylaw No. 1337, 2021*, presented in Attachment 1. Attachment 2 is a blacklined version of relevant sections of Bylaw 1329 showing the proposed changes.

Operation of Emergency Generators Near Sensitive Receptors

Bylaw 1329 prohibits operation of Tier 0 and Tier 1 non-road diesel engines within 100 metres of sensitive receptors such as hospitals, elementary schools, and community care facilities. The proposed amendments clarify that the prohibition on the use of Tier 0 and Tier 1 engines near sensitive receptors is not intended to apply to emergency generators. Some sensitive receptors and neighbours rely on the infrequent use of emergency generators during emergency situations. Bylaw 1329 contains provisions to address excessive smoke from emergency generators, which are sufficient to address the potential impacts.

Operation of Engines Equipped with Emission Reduction Measures

Staff propose to adjust the minimum emission standard for emission reduction measures (ERM) installed on Tier 0 engines that have never been registered such that they achieve the equivalent emissions of a Tier 2 engine instead of a Tier 1 engine, given that Tier 1 engines that have never been registered have been prohibited since February 1, 2020. Without a Tier 2 equivalent minimum emission standard for diesel particulate matter, some older Tier 0 engines could enter the region and operate with a competitive advantage over engines already complying with the bylaw.

The proposed changes will also enhance clarity about the current authorized use of non-road diesel engines equipped with ERM. It will be clearer that non-road diesel engines equipped with ERM that achieve the equivalent emissions of a Tier 2 engine are allowed to register and operate, which is consistent with the previous Bylaw 1161. Furthermore, the proposed changes will make it clear that Tier 0 engines that were registered as engines with Tier 1 equivalent ERM for more than 90 days before February 1, 2020 can continue to register and operate with an approved ERM that improves emissions to a Tier 1 level or better.

The minor amendments will clarify that the prohibition on the operation of Tier 1 engines, as well as engines with Tier 1 equivalent ERM, that had never been registered took effect on February 1, 2020 (not January 31, 2021).

Effective Dates of Fee Reduction Calculations for Emission Reduction Measures
Under Bylaw 1329, operators may reduce emissions and pay reduced registration fees by installing approved emission reduction measures (ERM) on non-road diesel engines. Bylaw 1329 introduced new calculations for registration fee reductions for engines with ERM. However, operational issues will require more time for the registration and invoicing system to incorporate these new calculations. To address these issues, staff propose amendments such that the invoicing will be based on the previous Bylaw 1161 fee reduction calculations until January 1, 2023, and subsequent to that date, on the new calculations already in Bylaw 1329.

ALTERNATIVES
1. That the MVRD Board:
   a) give first, second and third reading to *Metro Vancouver Regional District Non-Road Diesel Engine Emission Regulation Amending Bylaw No. 1337, 2021* and
   b) pass and finally adopt *Metro Vancouver Regional District Non-Road Diesel Engine Emission Regulation Amending Bylaw No. 1337, 2021*.

2. That the MVRD Board receive for information the report dated December 13, 2021, titled "MVRD Non-Road Diesel Engine Emission Regulation Amending Bylaw No. 1337, 2021" and provide alternate direction to staff.

FINANCIAL IMPLICATIONS
There are no financial implications to the proposed amendments.

CONCLUSION
Staff propose minor amendments to Bylaw 1329 to clarify the requirements that apply to emergency generators. The proposed amendments will also improve alignment between bylaw provisions that prohibit certain engines and the minimum emission standard that would apply to emission reduction measures installed on previously prohibited Tier 0 non-road diesel engines to enable their operation. The proposed amendments also provide more clarity around the current authorized use of non-road diesel engines equipped with emission reduction measures. The proposed minor amendments will address operational issues related to the timing of the introduction of new registration fee reduction calculations for engines that use emission reduction measures.

Staff recommend Alternative 1, to adopt *MVRD Non-Road Diesel Engine Emission Regulation Amending Bylaw No. 1337, 2021*, shown in Attachment 1, which would amend Bylaw 1329.

Attachments *(Doc #50092541)*

1. *Metro Vancouver Regional District Non-Road Diesel Engine Emission Regulation Amending Bylaw No. 1337, 2021* *(Doc #49096885)*
2. Blacklined version of relevant sections of *Metro Vancouver Regional District Non-Road Diesel Engine Emission Regulation Bylaw No. 1329, 2021* *(Doc #49133162)*

References

1. Metro Vancouver Regional District Non-Road Diesel Engine Emission Regulation Bylaw No. 1329, 2021

49026783

METRO VANCOUVER REGIONAL DISTRICT
NON-ROAD DIESEL ENGINE EMISSION REGULATION AMENDING BYLAW NO. 1337, 2021

A Bylaw to Amend "Non-Road Diesel Engine Emission Regulation Bylaw No 1329, 2021"

WHEREAS:

A. the Board of the Metro Vancouver Regional District adopted the "Non-Road Diesel Engine Emission Regulation Bylaw No. 1329, 2021" (the "Emission Regulation") to regulate the discharge of air contaminants from Non-Road Diesel Engines;

B. the Board of the Metro Vancouver Regional District wishes to amend the Emission Regulation;

NOW THEREFORE the Board of the Metro Vancouver Regional District enacts as follows:

Citation

1. The official citation of this bylaw is "Metro Vancouver Regional District Non-Road Diesel Engine Emission Regulation Amending Bylaw No. 1337, 2021".

2. "Metro Vancouver Regional District Non-Road Diesel Engine Emission Regulation Bylaw No. 1329, 2021" is hereby amended as follows:

   (a) Section 11 is deleted in its entirety and replaced with the following:

   11. Emergency engines are exempt from Parts 3, 4, 5, 6, 9 and 11.

   (b) Section 46 is deleted in its entirety and replaced with the following:

   46. Notwithstanding section 45, a Tier 0 engine is not prohibited from operating:

   (a) if the engine has an emission reduction measure to reduce the diesel particulate matter emission rate to meet the emission standard of a Tier 2 non-road diesel engine or better;

   (a.1) if the engine has an emission reduction measure to reduce the diesel particulate matter emission rate to meet the emission standard of a Tier 1 non-road diesel engine or better and the engine was registered for at least 90 days prior to February 1, 2020; or

   (b) on or after January 1, 2023, if the registrant pays the registration fee for the applicable operating period plus the surcharge prescribed in section 44.

(c) Section 47 is deleted in its entirety and replaced with the following:

47. If a Tier 1 non-road diesel engine was not registered for at least 90 days prior to February 1, 2020 or has been retired, then that non-road diesel engine must not be operated.

(d) Section 48 is deleted in its entirety and replaced with the following:

48. Notwithstanding section 47, a Tier 1 engine is not prohibited from operating:

(a) if the engine has an emission reduction measure to reduce the diesel particulate matter emission rate to meet the emission standard of a Tier 2 non-road diesel engine or better; or

(b) on or after January 1, 2023, if the registrant pays the registration fee for the applicable operating period plus the surcharge prescribed in section 44.

(e) Schedule 2, section 1 is deleted in its entirety and replaced with the following:

1. Subject to sections 11 and 12 of this Schedule 2, the registration fee payable for an operating period (annual, monthly, daily, low-use or moderate-use, as applicable) is prescribed in this Schedule 2 in accordance with the calculations respectively set out below for each type of operating period.

(f) Schedule 2, section 11 is deleted in its entirety and replaced with the following:

11. Until and including December 31, 2022, where a non-road diesel engine with an emission reduction measure qualifies for a reduction in the registration fee pursuant to sections 34 and 35 of the bylaw, the registration fee payable for a non-road diesel engine with an emission reduction measure is calculated as follows:

registration fee = reduced fee rate x hp + $15

Where:

reduced fee rate is — the fee rate calculated in accordance with sections 11(a) or 11(b) of this Schedule 2, as appropriate

hp is — engine horsepower

(a) The reduced fee rate for a Tier 0 non-road diesel engine with an emission reduction measure that does not meet the emission standard of a Tier 1 non-road diesel engine is calculated as follows:

$$\text{reduced fee rate} = \text{T1 rate} + \frac{\left[\frac{(100 - \text{Y})}{100} \times \text{T0 standard}\right] - \text{T1 standard}}{\text{T0 standard} - \text{T1 standard}} \times (\text{T0 rate} - \text{T1 rate})$$

Where:

Y is	the percentage of reduction in the diesel particulate matter emission rate as a result of the emission reduction measure
T0 rate is	the fee rate for a Tier 0 non-road diesel engine without an emission reduction measure, for the operating period;
T1 rate is	the fee rate for a Tier 1 non-road diesel engine without an emission reduction measure, for the operating period;
T0 standard is	the emission standard of a Tier 0 non-road diesel engine; and
T1 standard is	the emission standard of a Tier 1 non-road diesel engine.

(b) The reduced fee rate for a Tier 0 or Tier 1 non-road diesel engine with an emission reduction measure that meets the emission standard of a Tier 1 non-road diesel engine but does not meet the emission standard of a Tier 2 non-road diesel engine is calculated as follows:

$$\text{reduced fee rate} = \frac{\left[\frac{(100 - \text{Y})}{100} \times \text{R}\right] - \text{T2 standard}}{\text{T1 standard} - \text{T2 standard}} \times \text{T1 rate}$$

Where:

R is	the emission standard for the engine tier classification applicable to the non-road diesel engine without the emission reduction measure;
Y is	the percentage of reduction in the diesel particulate matter emission rate as a result of the emission reduction measure;
T1 rate is	the fee rate for a Tier 1 non-road diesel engine without an emission reduction measure, for the operating period;
T1 standard is	the emission standard of a Tier 1 non-road diesel engine; and
T2 standard is	the emission standard of a Tier 2 non-road diesel engine.

(g) Schedule 2, section 12 is added as follows:

12. Effective January 1, 2023, where a non-road diesel engine with an emission reduction measure qualifies for a reduction in the registration fee pursuant to sections 34 and 35 of the bylaw, the registration fee payable is as set out under section 1 of this Schedule 2 except that the registration fee for the applicable operating period may be reduced by a dollar value of reduction that is calculated as follows:

reduction = Y_{DPM} x [($*value of registration fee for the applicable operating period)* - $15]

Where:

Y_{DPM} is	the percentage of reduction in the diesel particulate emission rate as a result of an emission reduction measure, all as approved by the district director.

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

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

Sav Dhaliwal, Chair

Chris Plagnol, Corporate Officer

METRO VANCOUVER REGIONAL DISTRICT
NON-ROAD DIESEL ENGINE EMISSION REGULATION
BYLAW NO. 1329, 2021

A Bylaw to Regulate the Discharge of Air Contaminants from Non-Road Diesel Engines

WHEREAS:

1. The *Environmental Management Act* authorizes the Metro Vancouver Regional District to provide the service of air pollution control and air quality management and, for that purpose, the Board of the Metro Vancouver Regional District may, by bylaw, prohibit, regulate and otherwise control and prevent the discharge of air contaminants;

2. The *Environmental Management Act* authorizes the Metro Vancouver Regional District to, by bylaw, establish different prohibitions, regulations, rates or levels of fees, conditions, requirements and exemptions for different persons, operations, activities, industries, trades, businesses, air contaminants or works, to establish different classes of persons, operations, activities, industries, trades, businesses, air contaminants and works, and to require the keeping of records and the provision of information respecting air contaminants and their discharge; and

3. It is deemed desirable to regulate the discharge of diesel particulate matter and nitrogen oxides from non-road diesel engines.

NOW THEREFORE the Board of the Metro Vancouver Regional District enacts as follows:

Citation

1. The official citation of this bylaw is "Metro Vancouver Regional District Non-Road Diesel Engine Emission Regulation Bylaw No. 1329, 2021" ("this bylaw").

Repeal of Bylaws

2. "Metro Vancouver Regional District Non-Road Diesel Engine Emission Regulation Bylaw No. 1161, 2012" as amended, is hereby repealed.

Schedule(s)

3. The following Schedules are attached to and form part of this Bylaw:
   Schedule "1" Engine Tier Classification; and
   Schedule "2" Registration Fees.

Definitions [*pertaining to terms used in the sections of Bylaw 1329 relevant to the proposed amendments]*

4. In this bylaw:

"**approved**" means an approval given by the district director;

"**community care facility**" has the same meaning as in the *Community Care and Assisted Living Act*;

"**diesel particulate matter**" means the particles emitted into the environment from the exhaust of a non-road diesel engine;

"**diesel particulate matter emission rate**" means the rate of diesel particulate matter emitted from a non-road diesel engine, expressed in grams per brake-horsepower hour;

"**emergency**" means a present or imminent event or circumstance that:

(a) is caused by accident, fire, explosion, technical failure, labour strike or the forces of nature; and

(b) requires prompt coordination of action or special regulation of persons or property to protect the health, safety or welfare of a person or to limit damage to property or the environment;

"**emergency engine**" means an engine, including emergency generators and other stationary engines, intended for use only in an emergency;

"**emission reduction measure**" means an approved retrofit, remanufacture, or similar device, alteration, technological, or operational change made to a non-road diesel engine that reduces the diesel particulate matter emission rate;

"**emission standard**" means the diesel particulate matter emission rate stipulated for a non- road diesel engine, corresponding to both the engine's year of manufacture and its horsepower group, all as set out in Table 2 of Schedule 1;

"**engine tier classification**" means the classification of a non-road diesel engine as determined in accordance with Schedule 1;

"**non-road diesel engine**" means a diesel-fueled or alternative diesel-fueled compression ignition engine in a machine that is not primarily used or intended to be used for transportation on a public street, road or highway;

"**online registration system**" means the Metro Vancouver Non-Road Diesel Online Registration website that enables the registration of non-road diesel engines;

"**operating period**" means an operating period described in Schedule 2, which when purchased for an engine authorizes the engine's operation for the time period stipulated and in accordance with this bylaw;

"**operator**" means a person who is in control of or responsible for the operation of a non-road diesel engine;

"**original air emission control system**" means a system or device installed, attached or incorporated into a non-road diesel engine by the manufacturer of the engine to prevent or lessen the discharge of any air contaminants.

"**original registration date**" means the date when an engine was first registered for 90 days without cancellation for a non-road diesel engine for which all registration information required under Part 3 and if applicable Part 5 or Part 6 has been submitted to the district director;

"**owner**" means a person who is in possession of, has the right to control, or occupies or controls the operation of a non-road diesel engine;

"**registrant**" means a person who has completed a registration;

"**registration**" means the submission to Metro Vancouver Regional District of all registration information required under Part 3 and if applicable Part 5 or Part 6 for a non-road diesel engine, and when payment is received for an operating period for that engine;

"**registration fee**" means the fee prescribed in Schedule 2 for the operating period stipulated in the registration;

"remanufacture" means to rebuild an engine;

"**retire**" means to voluntarily and permanently withdraw from operation pursuant to Part 8 of this bylaw a non-road diesel engine, and upon such retirement, the engine can no longer be operated or registered to operate within the Metro Vancouver Regional District;

"**retrofit**" means a device installed on a non-road diesel engine that reduces diesel particulate matter emissions;

"sensitive receptor" means a hospital, an elementary school, a day care facility or a community care facility;

"**surcharge**" means a fee prescribed in Part 9 that is additional to the registration fee;

"**Tier 0**" means the engine tier classification described in Schedule 1;

"**Tier 1**" means the engine tier classification described in Schedule 1;

"**Tier 2**" means the engine tier classification described in Schedule 1;

"**Tier 3**" means the engine tier classification described in Schedule 1;

"**Tier 4**" means the engine tier classification described in Schedule 1;

5. Terms defined in the *Greater Vancouver Regional District Air Quality Management Bylaw No. 1082, 2008* or incorporated by reference into that bylaw have the same meaning in this bylaw.

6. References in this bylaw to an enactment include the enactment as it may be amended or replaced from time to time

Part 2 – Emergency Engines

11. Emergency engines are exempt from Parts 3, 4, 5, 6, ~~and~~ 9 and 11.

12. An emergency engine must be:

    (a) operated in accordance with the manufacturer's operating procedures; and

    (b) inspected and maintained in accordance with the manufacturer's recommendations.

13. The discharge of air contaminants from an emergency engine must not result in:

    (a) The recirculation of its stack exhaust into the building; or

    (b) The entrainment of its stack exhaust into surrounding building openings or air ventilation intakes.

14. An operator of an emergency engine must keep maintenance records and other records stipulated by the district director and, within 72 hours of a request by the district director or an officer, submit records as required.

Part 7 – Engine with Emission Reduction Measure

34. Subject to section 35, a person who causes, permits or allows the operation of a non-road diesel engine with an emission reduction measure is eligible for a reduction in the registration fee, to be calculated as prescribed in Schedule 2.

35. To be eligible for the reduction in the registration fee under section 34, a person must, prior to the operation of the non-road diesel engine, provide to the district director:

    (a) an accurate and detailed description of the proposed emission reduction measure made to that non- road diesel engine; and

    (b) upon request, any other information that the district director or an officer deems necessary to evaluate the proposed emission reduction measure or the application of this Part.

36. The registration of a non-road diesel engine with an emission reduction measure under this Part is immediately invalidated if the emission reduction measure is modified, tampered with, removed or otherwise does not operate to reduce the diesel particulate matter emission rate in the manner for which the district director gave approval.

37. If an emission reduction measure is modified, tampered with, removed, or otherwise changed, a person who causes, permits or allows the operation of that non-road diesel engine must, prior to operation:

    (a) amend the registration information; and

(b) pay the registration fee for the engine tier classification with which the non-road diesel engine conforms.

38. A person who causes, permits or allows the operation of a registered Tier 0, Tier 1, Tier 2 or Tier 3 non-road diesel engine with an emission reduction measure must:

(a) keep records including, maintenance records, alternative fuel receipts (if applicable), meter logged hours of operation or other records stipulated by the district director as required with use of an emission reduction measure; and

(b) within 72 hours of a request by the district director or an officer, submit records as required.

39. A vendor or provider of a proposed emission reduction technology may apply to the district director for assessment and approval of the emission reduction technology, upon payment to Metro Vancouver Regional District of a fee of $2000 for each proposed emission reduction technology.

Part 9 – Operating Prohibitions and Surcharges

44. For the purposes of this Part and the operation of a non-road diesel engine pursuant to section 46(b), section 48(b), section 50(b) or section 52(b), the surcharge payable is prescribed as follows:

    surcharge = [*($value of registration fee for the applicable operating period)* - $15] x 3.

45. If a Tier 0 non-road diesel engine was not registered for at least 90 days prior to January 1, 2015 or has been retired, then that non-road diesel engine must not be operated.

46. Notwithstanding section 45, a Tier 0 engine is not prohibited from operating ~~after January 1, 2023 if~~:

    (a) if the engine has an emission reduction measure to reduce the diesel particulate matter emission rate to meet the emission standard of a Tier 2~~1~~ non-road diesel engine or better;

    (a.1) if the engine has an emission reduction measure to reduce the diesel particulate matter emission rate to meet the emission standard of a Tier 1 non-road diesel engine or better and the engine was registered for at least 90 days prior to February 1, 2020; or

    ~~(a)~~(b) on or after January 1, 2023, if the registrant pays the registration fee for the applicable operating period plus the surcharge prescribed in section 44.

47. If ~~a Tier 0 or~~ a Tier 1 non-road diesel engine was not registered for at least 90 days prior to February 1, 2020~~January 31, 2021~~ or has been retired, then that non-road diesel engine must not be operated.

48. Notwithstanding section 47, a Tier 1 engine is not prohibited from operating ~~after January 1, 2023 if~~:

    (a) If the engine has an emission reduction measure to reduce the diesel particulate matter emission rate to meet the emission standard of a Tier 2 non-road dieselengine or better; or

    (b) On or after January 1, 2023, if the registrant pays the registration fee for the applicable operating period plus the surcharge prescribed in section 44.

49. If a Tier 2 non-road diesel engine has not been registered for at least 90 days prior to January 31, 2026 or has been retired, then effective February 1, 2026 that non-road diesel engine must not be operated.

50. Notwithstanding Section 49, a Tier 2 engine is not prohibited from operating after January 31, 2026 if:

    (a) the engine has an emission reduction measure to reduce the diesel particulate matter emission rate to meet the emission standard of a Tier 4 non-road diesel engine or better; or

    (b) the registrant pays the registration fee for the applicable operating period plus the surcharge prescribed in section 44.

51. If a Tier 3 non-road diesel engine has not been registered for at least 90 days prior to January 31, 2027, or has been retired, then effective February 1, 2027 that non-road diesel engine must not be operated.

52. Notwithstanding Section 51, a Tier 3 engine is not prohibited from operating after January 31, 2027 if:

    (a) the engine has an emission reduction measure to reduce the diesel particulate matter emission rate to meet the emission standard of a Tier 4 non-road diesel engine or better; or

    (b) the registrant pays the registration fee for the applicable operating period plus the surcharge prescribed in section 44.

Part 11 – Prohibited Operation Near Sensitive Receptor

57. No person may operate a Tier 0 or Tier 1 engine within 100 metres of a sensitive receptor.

Schedule 1 – Engine Tier Classifications

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1. "Tier 0" means a non-road diesel engine that has an engine power as specified in Column 1 of Table 1 and:

   (a) was manufactured for sale in Canada, the United States, or the European Union during the period specified in Column 2 of Table 1; or

   (b) was not manufactured for sale in Canada, the United States or the European Union and it cannot be demonstrated, to the satisfaction of the district director, that the manufactured engine emission standard meets a Tier 1 or better emission standard for the applicable engine power in Table 2.

2. "Tier 1" means a non-road diesel engine that has an engine power as specified in Column 1 of Table 1 and:

   (a) was manufactured for sale in Canada, the United States or the European Union during the period specified in Column 3 of Table 1; or

   (b) was not manufactured for sale in Canada, the United States or the European Union but it can be demonstrated, to the satisfaction of the district director, that the manufactured engine emission standard meets the Tier 1 emission standard for the applicable engine power in Table 2.

3. "Tier 2" means a non-road diesel engine that has an engine power as specified in Column 1 of Table 1 and:

   (a) was manufactured for sale in Canada, the United States or the European Union during the period specified in Column 4 of Table 1; or

   (b) was not manufactured for sale in Canada, the United States or the European Union but it can be demonstrated, to the satisfaction of the district director, that the manufactured engine emission standard meets the Tier 2 emission standard for the applicable engine power in Table 2.

4. "Tier 3" means a non-road diesel engine that has an engine power as specified in Column 1 of Table 1 and:

   (a) was manufactured for sale in Canada, the United States or the European Union during the period specified in Column 5 of Table 1; or

   (b) was not manufactured for sale in Canada, the United States or the European Union but it can be demonstrated, to the satisfaction of the district director, that the manufactured engine emission standard meets the Tier 3 emission standard for the applicable engine power in Table 2

5. "Tier 4" means a non-road diesel engine that has an engine power as specified in column 1 of Table 1 and:

   (a) was manufactured for sale in Canada, the United States or the European Union during the period specified in Column 6 of Table 1; or

   (b) was not manufactured for sale in Canada, the United States or the European Union but it can be demonstrated, to the satisfaction of the district director, that the manufactured engine emission standard meets the Interim Tier 4 emission standard for the applicable engine power in Table 2.

Table 1 – Engine Tier Classifications

Column 1	**Column 2**	**Column 3**	**Column 4**	**Column 5**	**Column 6**
Engine Power	**Tier 0**	**Tier 1**	**Tier 2**	**Tier 3**	**Interim Tier 4 or Tier 4**
19≤kW < 37 (25 ≤ hp < 50)	1998 and prior years	1999 to 2003 inclusive	2004 to 2007 inclusive	N/A	2008 and later years
37 ≤ kW < 56 (50 ≤ hp <75)	1997 and prior years	1998 to 2003 inclusive	2004 to 2007 inclusive	N/A	2008 and later years
56 ≤ kW < 75 (75 ≤ hp < 100)	1997 and prior years	1998 to 2003 inclusive	2004 to 2007 inclusive	2008 to 2011 inclusive	2012 and later years
75 ≤ kW < 130 (100 ≤ hp < 175)	1996 and prior years	1997 to 2002 inclusive	2003 to 2006 inclusive	2007 to 2011 inclusive	2012 and later years
130 ≤ kW < 225 (175 ≤ hp < 300)	1995 and prior years	1996 to 2002 inclusive	2003 to 2005 inclusive	2006 to 2010 inclusive	2011 and later years
225 ≤ kW < 450 (300 ≤ hp < 600)	1995 and prior years	1996 to 2000 inclusive	2001 to 2005 inclusive	2006 to 2010 inclusive	2011 and later years
450 ≤ kW < 560 (600 ≤ hp < 750)	1995 and prior years	1996 to 2001 inclusive	2002 to 2005 inclusive	2006 to 2010 inclusive	2011 and later years
560 ≤ kW < 900 (750 ≤ hp < 1,200)	1999 and prior years	2000 to 2005 inclusive	2006 to 2010 inclusive	N/A	2011 and later years
kW ≥ 900 (hp ≥ 1,200)	1972 and prior years	1973 to 2001 inclusive	2002 to 2004 inclusive	2005 to 2010 inclusive	2011 and later years

Table 2 – Metro Vancouver Diesel Particulate Matter (DPM) Emission Standards (g/bhp-hr)

Engine Year	DPM STANDARDS - ENGINE HORSEPOWER GROUPS g/HP-hr								
	25≤49	50≤74	75≤99	100≤174	175≤299	300≤599	600≤749	750≤1199	1200+
pre-1969	0.95	1.2	1.2	1.1	1.1	0.95	0.95	0.95	0.84
1969	0.95	1.2	1.2	1.1	1.1	0.95	0.95	0.95	0.84
1970	0.95	1.2	1.2	0.94	0.94	0.81	0.81	0.81	0.84
1972	0.95	1.2	1.2	0.78	0.78	0.68	0.68	0.68	0.84
1973 - 1987	0.95	1.2	1.2	0.78	0.78	0.68	0.68	0.68	0.72
1988	0.95	1.2	1.2	0.78	0.54	0.49	0.49	0.5	0.72
1989 - 1995	0.95	1.2	1.2	0.78	0.54	0.49	0.49	0.5	0.72
1996	0.95	1.2	1.2	0.78	0.4	0.4	0.4	0.5	0.72
1997	0.95	1.2	1.2	0.6	0.4	0.4	0.4	0.5	0.72
1998	0.95	1.09	1.09	0.6	0.4	0.4	0.4	0.5	0.72
1999	0.6	1.09	1.09	0.6	0.4	0.4	0.4	0.5	0.72
2000	0.6	1.09	1.09	0.6	0.4	0.4	0.4	0.4	0.72
2001	0.6	1.09	1.09	0.6	0.4	0.15	0.4	0.4	0.72
2002	0.6	1.09	1.09	0.6	0.4	0.15	0.15	0.4	0.54
2003	0.6	1.09	1.09	0.22	0.15	0.15	0.15	0.4	0.54
2004	0.45	0.30	0.30	0.22	0.15	0.15	0.15	0.4	0.54
2005	0.45	0.30	0.30	0.22	0.15	0.15	0.15	0.4	0.15
2006	0.45	0.30	0.30	0.22	0.15	0.15	0.15	0.15	0.15
2007	0.45	0.30	0.30	0.22	0.15	0.15	0.15	0.15	0.15
2008	0.22	0.22	0.3	0.22	0.15	0.15	0.15	0.15	0.15
2009	0.22	0.22	0.3	0.22	0.15	0.15	0.15	0.15	0.15
2010	0.22	0.22	0.3	0.22	0.15	0.15	0.15	0.15	0.15
2011	0.22	0.22	0.3	0.22	0.015	0.015	0.015	0.07	0.07
2012	0.22	0.22	0.015	0.015	0.015	0.015	0.015	0.07	0.07
2013	0.02	0.02	0.015	0.015	0.015	0.015	0.015	0.07	0.07
2014	0.02	0.02	0.015	0.015	0.015	0.015	0.015	0.07	0.07
2015	0.02	0.02	0.015	0.015	0.015	0.015	0.015	0.03	0.03
2016	0.02	0.02	0.015	0.015	0.015	0.015	0.015	0.03	0.03
2017	0.02	0.02	0.015	0.015	0.015	0.015	0.015	0.03	0.03
2018	0.02	0.02	0.015	0.015	0.015	0.015	0.015	0.03	0.03
2019	0.02	0.02	0.015	0.015	0.015	0.015	0.015	0.03	0.03
2020 and later	0.02	0.02	0.015	0.015	0.015	0.015	0.015	0.03	0.03

Tier 0 Engine		Tier 1 Engine		Tier 2 Engine		Tier 3 Engine		Interim Tier 4		Tier 4 Engine	

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Schedule 2 – Registration Fees

1. Subject to sections 11 and 12 of this Schedule 2, the registration fee payable for an operating period (annual, monthly, daily, low-use or moderate-use, as applicable) is prescribed in this Schedule 2 in accordance with the calculations respectively set out below for each type of operating period.

Reduction in Registration Fee for Engine with Emission Reduction Measure

11. Until and including December 31, 2022, where a non-road diesel engine with an emission reduction measure qualifies for a reduction in the registration fee pursuant to sections 34 and 35 of the bylaw, the registration fee payable for a non-road diesel engine with an emission reduction measure is calculated as follows:

registration fee = reduced fee rate x hp + $15

Where:

reduced fee rate is	the fee rate calculated in accordance with ~~sub~~sections 11(a) or 11(b) of this Schedule 2, as appropriate
hp is	engine horsepower

(a) The reduced fee rate for a Tier 0 non-road diesel engine with an emission reduction measure that does not meet the emission standard of a Tier 1 non-road diesel engine is calculated as follows:

$$\text{reduced fee rate} = \text{T1 rate} + \frac{\left[\frac{(100 - Y)}{100} \times \text{T0 standard}\right] - \text{T1 standard}}{\text{T0 standard} - \text{T1 standard}} \times (\text{T0 rate} - \text{T1 rate})$$

Where:

Y is	the percentage of reduction in the diesel particulate matter emission rate as a result of the emission reduction measure
T0 rate is	the fee rate for a Tier 0 non-road diesel engine without an emission reduction measure, for the operating period;
T1 rate is	the fee rate for a Tier 1 non-road diesel engine without an emission reduction measure, for the operating period;
T0 standard is	the emission standard of a Tier 0 non-road diesel engine; and

T1 standard is	the emission standard of a Tier 1 non-road diesel engine.

(b) The reduced fee rate for a Tier 0 or Tier 1 non-road diesel engine with an emission reduction measure that meets the emission standard of a Tier 1 non-road diesel engine but does not meet the emission standard of a Tier 2 non-road diesel engine is calculated as follows:

$$\text{reduced fee rate} = \frac{\left[\frac{(100 - Y)}{100} \times R\right] - \text{T2 standard}}{\text{T1 standard} - \text{T2 standard}} \times \text{T1 rate}$$

Where:

R is	the emission standard for the engine tier classification applicable to the non-road diesel engine without the emission reduction measure;
Y is	the percentage of reduction in the diesel particulate matter emission rate as a result of the emission reduction measure;
T1 rate is	the fee rate for a Tier 1 non-road diesel engine without an emission reduction measure, for the operating period;
T1 standard is	the emission standard of a Tier 1 non-road diesel engine; and
T2 standard is	the emission standard of a Tier 2 non-road diesel engine.

12. Effective January 1, 2023, ~~Where~~ where a non-road diesel engine with an emission reduction measure qualifies for a reduction in the registration fee pursuant to sections 34 and 35 of the bylaw, the registration fee payable is as set out under section 1 of this Schedule 2 except that the registration fee for the applicable operating period may be reduced by a dollar value of reduction that is calculated as follows:

$$\text{reduction} = Y_{DPM} \times [(\$\textit{value of registration fee for the applicable operating period}) - \$15]$$

Where:

Y_{DPM} is	the percentage of reduction in the diesel particulate emission rate as a result of an emission reduction measure, all as approved by the district director.

To: Climate Action Committee

From: Sheryl Cumming, Project Engineer
Parks and Environment Department

Date: December 16, 2021 Meeting Date: January 14, 2022

Subject: **Metro Vancouver Regional Consumption-Based Emissions Inventory**

RECOMMENDATION

That the Climate Action Committee receive for information the report dated December 16, 2021, titled "Metro Vancouver Regional Consumption-Based Emissions Inventory".

EXECUTIVE SUMMARY

Metro Vancouver developed a consumption-based emissions inventory (CBEI) to provide a comprehensive understanding of greenhouse gas emissions, as a complement to the in-region (territorial) emissions inventory. The CBEI extends the analysis to account for embodied emissions that occur outside the region's geographical boundary, but are associated with goods and services that are consumed within the region. The CBEI helps complete the picture of how in-region economic activity and consumption habits influence greenhouse gas emissions globally. This approach informs the development of potential emission reduction plans, policies, and regulations at the regional and municipal levels to reduce not only territorial but also embodied emissions. Consumption-based greenhouse gas emissions are 23.3 million tonnes, compared to the 2015 in-region emissions estimate of 14.8 million tonnes.

PURPOSE

To provide the Climate Action Committee with information about a consumption-based emissions inventory developed for Metro Vancouver, including key findings, trends, and potential implications for future greenhouse gas emissions policies, programs, and inventories.

BACKGROUND

Metro Vancouver's *Climate 2050* roadmaps and the *Clean Air Plan* set the direction for greenhouse gas emissions reduction actions towards a carbon neutral region by 2050. The Metro Vancouver regional CBEI is intended to inform the development of policies and implementation of actions in both the *Clean Air Plan* and the longer-term *Climate 2050* roadmaps. The CBEI helps identify embodied greenhouse gas (GHG) emission sources associated with the goods and services consumed by residents and businesses in the region. The regional CBEI can also support the efforts of Metro Vancouver member jurisdictions, a number of which are expressing interest in understanding and applying a consumption-based lens in reducing GHG emissions.

A CONSUMPTION-BASED APPROACH TO REGIONAL GREENHOUSE GAS EMISSIONS

A CBEI (Reference 1) was developed to complement Metro Vancouver's territorial (or in-region) emissions inventory, which provides foundational data for managing air quality and GHG emissions in the region. Metro Vancouver compiled its first inventory of air contaminants and GHG within the

regional boundaries for the year 1985, and has completed inventories every 5 years since then. Staff are preparing an inventory for 2020, which will be reported to the Committee later in 2022.

The territorial emissions inventory does not take into account embodied emissions that occur outside the region's geographical boundary and thus a regional consumption-based emissions approach helps complete the picture of how in-region economic activity influences greenhouse gas emissions globally (see Attachment, Figure 1). The CBEI was developed using available regional data and organized by emissions source: buildings, transportation, food, "consumables & waste", and water. In both the territorial and consumption-based inventories, GHG emissions from the operation of buildings and transportation ("operating emissions") are included, while embodied emissions (i.e. from energy and materials) are captured only in the CBEI. The different emissions categories used in the territorial and consumption-based inventories reflect the different approaches to measuring emissions and relative importance of emission sources under those approaches.

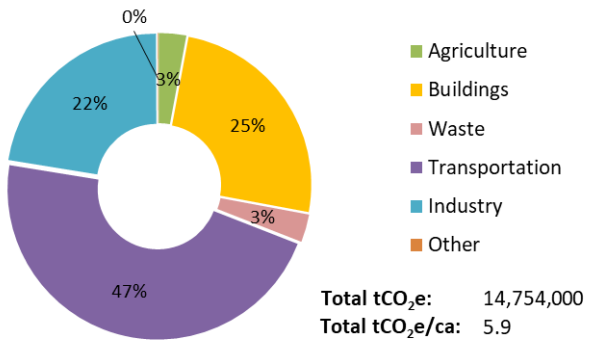
A CBEI captures GHG emissions generated from the production, transport, use, and disposal of goods, or from services (e.g. drinking water, waste management) that we depend on in the region, including related emissions that occur outside of Metro Vancouver. A CBEI can help in understanding the impacts of regional consumption habits on GHG emissions, and inform decarbonization policies and programs within *Climate 2050* and the *Clean Air Plan*.

Metro Vancouver's Consumption-Based Emissions

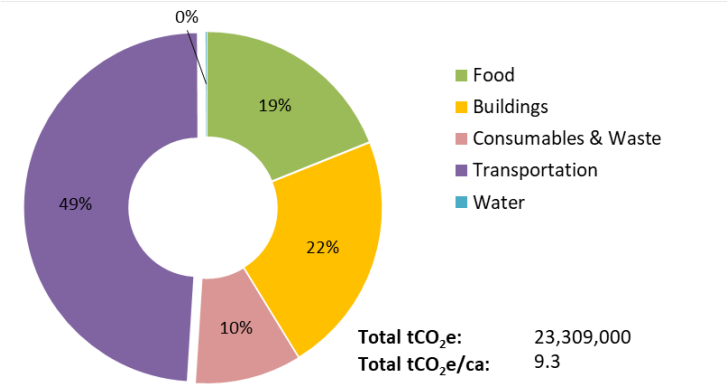
The CBEI shows that, as a region, Metro Vancouver consumption-based greenhouse gas emissions are 58% higher than the 2015 territorial emissions inventory. The CBEI reports an estimated total of 23.3 million tonnes of GHG (Mt CO_2e), while the territorial emissions were estimated at 14.8 Mt CO_2e. This result reflects a typical 'consumer' society that relies on imports of its consumable goods from outside the region as opposed to a 'producer' society where a greater proportion of emissions are associated with the manufacture of goods inside that jurisdiction.

The consumption-based emissions inventory shows that transportation (49%) and buildings (22%) are the top two sources of emissions associated with consumption in the region (see next figure). This is similar to the proportional contribution of transportation and buildings in the territorial emissions inventory. The results also show that food, and "consumables & waste" (e.g. paper and plastic products, organic waste, packaging and other household waste), make up the next largest portions of the CBEI, contributing about 19% and 10% of consumption-based GHG emissions.

Territorial Emissions Inventory



Consumption-Based Emissions Inventory



Food and "consumables & waste", which are only partially accounted for in the territorial inventory, add about 6.7 million tonnes of GHG emissions (Mt CO_2e). The embodied emissions associated with buildings and transportation account for a combined 5.5 Mt CO_2e, which is roughly half of the operational emissions from buildings and transportation. While the territorial inventory includes emissions from all industrial sources in the region, the CBEI only includes industrial greenhouse gas emissions associated with goods and services consumed within the region.

CONSUMPTION-BASED GREENHOUSE GAS EMISSIONS AT THE COMMUNITY LEVEL

In response to requests from member jurisdictions, the CBEI also provides estimates of the relative distribution of consumption-based GHG emissions across Metro Vancouver's member jurisdictions. Generally, the larger communities in the region have the highest overall emissions totals due to the larger population of "consumers" (Attachment, Figure 2), but other community characteristics also influence per capita emissions from buildings and transportation. Figure 3 in the Attachment and following sections describe those differences. For food, "consumables & waste", and water, estimates are generated by allocating emissions by population, and thus are equivalent across the region on a per capita basis. Where available, local activity data for the major GHG emission sources in the region – buildings and transportation – were used to present community level emissions for the 21 Metro Vancouver municipalities, 1 electoral area, and 1 treaty First Nation.

Buildings

In the CBEI, total regional emissions from buildings (e.g. from energy use, embodied energy and materials) were estimated at 5.2 Mt CO_2e. The emissions varied across Metro Vancouver communities driven by differences in housing size, housing type, and the level of commercial and institutional activity. Communities that do not have residential apartments in their building stock have greater proportions of lower density housing, which generally results in higher per capita embodied as well as operating emissions. The inventory also shows that increasing housing size or decreasing occupancy levels can lead to both higher per capita embodied and operating emissions.

Transportation

Transportation (e.g. emissions from fuel use, embodied energy and materials from vehicles and roads) contributed the highest CBEI emissions at about 11.4 Mt CO_2e. Metro Vancouver communities with higher per capita greenhouse gas emissions from transportation in the CBEI are linked with high per capita private vehicle ownership, high percentages of larger-sized vehicles owned, and high average vehicle trip distance. The CBEI shows lower greenhouse gas emissions associated with communities that have high density urban centres with lower vehicle ownership levels. Emissions from commercial vehicles, bus travel, BC Ferries, air travel, and non-road equipment/vehicles for each community were assigned the same per capita emissions for all member jurisdictions.

IMPLICATIONS FOR REGIONAL GREENHOUSE GAS EMISSIONS MANAGEMENT

A growing number of local governments, including Metro Vancouver member jurisdictions, are looking to consumption-based emissions inventories and similar quantification approaches to better understand the "embodied" or "upstream" GHG emissions attributed to consumption in their communities. The CBEI can inform the development of GHG emission reduction plans, policies, and regulations at the regional and municipal levels by expanding the understanding of the GHG emission impacts of the region's consumption. It can also inform decision-making and identify co-benefits and

trade-offs in emissions reduction measures, encouraging approaches that not only reduce regional emissions, but also maximize reductions in global greenhouse gas emissions.

As an example, the CBEI shows that operating emissions from transportation and buildings still make up the larger proportion of GHG emissions. These results reinforce that GHG reduction measures such as switching to low- to zero emissions vehicles and equipment, shifting to clean, renewable sources of heating in buildings, and improving energy and material efficiency use remain a top priority and thereby highlighting the importance of local government policies and programs in reducing emissions from these sources.

As government efforts to reduce operating emissions from buildings and transportation progress, the CBEI underscores the importance of considering the implications of these policies and other policies that address embodied emissions. Buildings policies such as low carbon products, and material recycling and reuse requirements can reduce embodied emissions. In transportation, zero emissions vehicle policies alone can increase embodied emissions, without complementary policies that support active transportation and transit. A consumption based approach also reveals that food and "consumables & waste" contribute a larger portion of greenhouse gas emissions than those estimated in the territorial inventory, and points to potential areas for future policy to reduce emissions. The *Clean Air Plan* and the *Climate 2050* roadmaps include actions focused on reducing operating emissions as well as actions to reduce embodied emissions.

ALTERNATIVES
This is an information report. No alternatives are presented.

FINANCIAL IMPLICATIONS
The overall resources required to develop a regional CBEI were approved in program budgets, including staff time and procurement of consulting services. Considerations for updates to Metro Vancouver's regional emissions inventories and implementation of greenhouse gas emissions reduction actions are made during annual and 5-year work plans and long term financial planning.

CONCLUSION
The Metro Vancouver regional consumption-based emissions inventory (CBEI) is intended to inform the development of policies and implementation of actions in both the *Clean Air Plan* and the longer-term *Climate 2050* roadmaps. While the CBEI aligns with the continuing need to reduce operating greenhouse gas emissions from buildings and transportation, it can also help in the development of greenhouse gas emission reduction plans and policies by understanding the broader greenhouse gas emission impacts of the region's consumer lifestyle and related behaviours, within and beyond the Metro Vancouver region.

Attachment
Consumption-Based Emissions Inventory Trends *(Doc #49726569)*

Reference
1. Metro Vancouver Regional Consumption-Based Emissions Inventory – Final Report

47387700

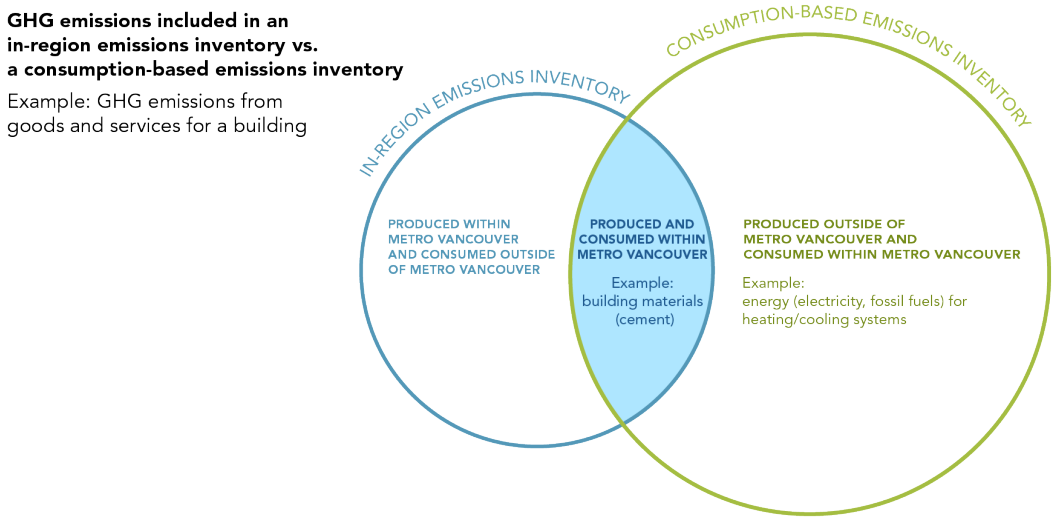


Figure 1: Territorial (or In-Region) versus Consumption-Based Approach in an Emissions Inventory

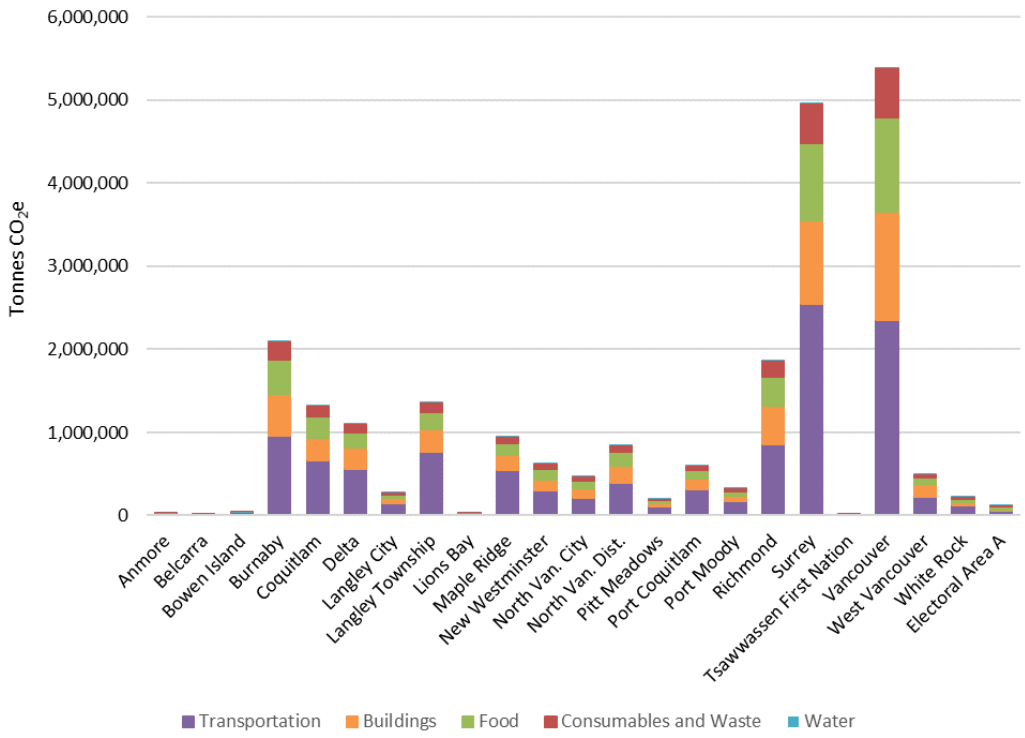


Figure 2: Consumption-Based Emissions Inventory (in tonnes CO_2e) by Metro Vancouver Community, 2015

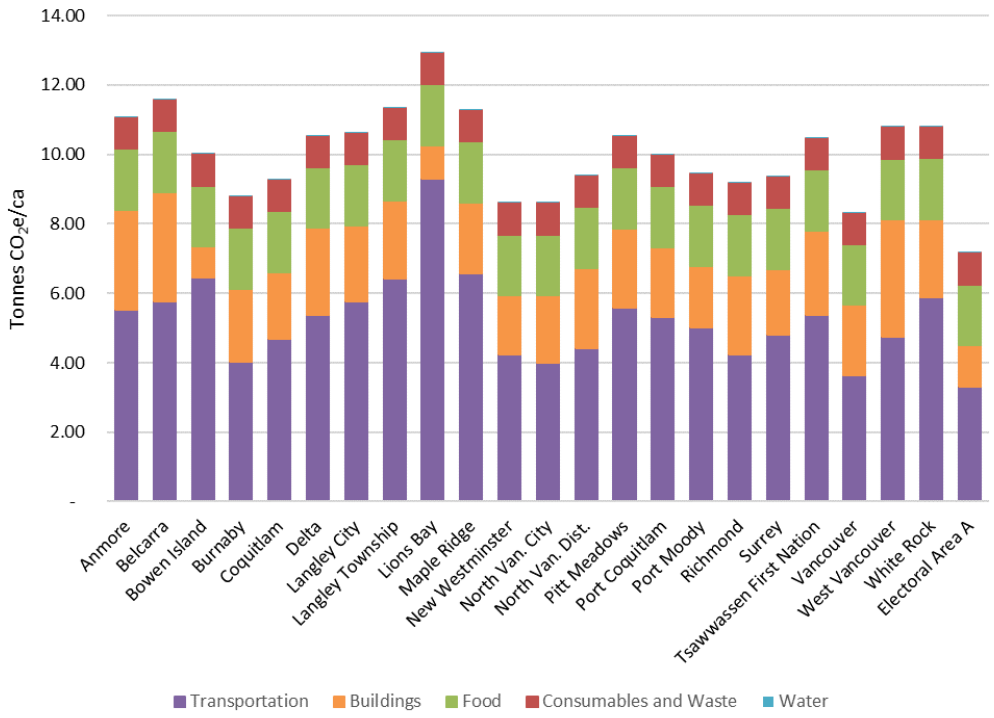


Figure 3: Consumption-Based Emissions Inventory (in tonnes CO_2e) per capita by Metro Vancouver Community, 2015

49726569

To: Climate Action Committee

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

Date: January 4, 2022 Meeting Date: January 14, 2022

Subject: **Manager's Report**

RECOMMENDATION
That the Climate Action Committee receive for information the report dated January 4, 2022, titled "Manager's Report".

Climate Action Committee 2022 Work Plan
The Climate Action Committee 2022 Priorities and Work Plan was the subject of Report 5.1 in the Committee's January 14, 2022 agenda package. Beginning with the February meeting, the 2022 work plan will be attached to the Manager's Report for each Committee meeting, with updates on the status of each item.

Attendance at 2022 Standing Committee Events
Participation at external events provides important learning and networking opportunities. The following events that fall under the purview of the Climate Action Committee were included in the 2022 Leadership and Engagement budget. Both in-person and virtual attendance will be considered depending on any restrictions due to the COVID-19 pandemic.

Air and Waste Management Association
Pacific Northwest International Section (PNWIS) Annual Conference
Place and Date: Suquamish, Washington, November 2-4, 2022
Number of attendee(s): 1
PNWIS provides a forum for discussion, education, and networking on technical issues relating to environmental management issues, including air quality, climate change, water quality, waste management, sustainable development, green buildings, and many others, in the U.S., Pacific Northwest, and Western Canada.

BC Lung Foundation Air Quality and Health Workshop
Place and Date: TBA
Number of attendee(s): 2
The annual workshop brings together air quality and environmental health experts and policymakers to share new insights regarding priority public health issues. The theme of the 2022 workshop is adapting the indoor environment to reduce the harmful impacts of climate change.

Globe Forum 2022: Destination Net Zero
Place and Date: Vancouver, BC and Virtual, March 29-31, 2022
Number of attendee(s): 2
The Globe Forum 2022 aims to converge the North American sustainability and climate community to set the course for a net-zero future. The forum will include local hubs and virtual programming options, to provide attendees with access to ideas, solutions and networking.

Green Transportation Summit & Expo
Place and Date: Tacoma, Washington, August 16-18, 2022
Number of attendee(s): 1
The Green Transportation Summit & Expo is an annual clean transportation convening event with relevance to the Pacific Northwest.

Please notify the Committee Chair or Committee Manager as soon as possible, but no later than February 28, 2022 for the Globe Forum and by the Committee's March 11 meeting for the other three events, if you are interested in attending any of the above-noted events. While these events were included in the approved budget, final approval on attendance rests with the Board Chair.

Metro Vancouver's Wood Stove Exchange Program Receives Additional Provincial Funding
Metro Vancouver received an additional $82,000 from the provincial government in November 2021 for continuation of the regional Wood Stove Exchange Program (see Reference 1). The exchange program helps to reduce emissions from residential wood burning in the region by providing incentives to residents upon replacement of older, uncertified wood-burning appliances (e.g. fireplaces, wood stoves) with appliances that are more energy efficient and comply with more stringent emissions standards.

Metro Vancouver offers a $300 rebate for the exchange of an uncertified wood burning appliance for a certified wood burning appliance or electric insert. A $500 rebate is provided for exchanges to a natural gas or propane appliance, or pellet stove. A $750 rebate is available for exchanges to an electric heat pump. Retailers participate in the program by entering into partnering agreements with Metro Vancouver. Operated properly, certified wood stoves and natural gas appliances can reduce fine particulate matter ($PM_{2.5}$) emissions by as much as 80% and 99% respectively, compared to uncertified appliances.

Metro Vancouver's exchange program is part of a provincial program operated by the BC Ministry of Environment and Climate Change Strategy and administered by the BC Lung Foundation. The Metro Vancouver program began in 2009, and since that time has received a total of approximately $423,000 and completed over 900 exchanges, resulting in ongoing $PM_{2.5}$ reductions of more than 18 tonnes per year, and air quality improvements in neighbourhoods across the region.

The exchange program supports Metro Vancouver Regional District Residential Indoor Wood Burning Emission Regulation Bylaw No. 1303, 2020. Bylaw 1303 is intended to reduce emissions from residential indoor wood burning in the region and has a phased approach that requires the use of

cleaner wood-burning appliances, such as the ones for which incentives are provided under the exchange program.

Clean Energy Discounted Rate for Filming in Metro Vancouver

At the November 26, 2021 MVRD Board meeting, a number of proposed bylaw amendments were adopted for *Metro Vancouver Regional District Regional Parks Regulation Bylaw No. 1177, 2012 (Bylaw 1177)*. Included is an amendment that aligns with the region's air quality and climate goals and is supportive of the *Clean Air Plan* strategy to reduce non-road emissions and support early adoption of zero emissions, non-road equipment. The new *clean energy discounted rate* was approved for film permits on Metro Vancouver lands.

The British Columbia film industry, through its *Reel Green* (Reference 2) initiative, has been working to improve sustainability during film productions, including the transition to cleaner zero emission power sources from traditionally-used diesel generators. Diesel generators are a source of diesel particulate matter, and greenhouse gas emissions. The amendment to *Schedule A - Fees and Charges* in *Bylaw 1177* will incentivize this switch to clean power in Metro Vancouver film locations with the introduction to a discounted film fee for the use of clean energy sources. The *clean energy discounted rate* will provide up to a $1000 incentive for filming projects in all Metro Vancouver filming locations that demonstrate that they have substituted one 400 amps (or greater) portable diesel generator with a clean energy source (i.e. tie-in to existing electrical power connections, battery technology or other non-fossil fuel sources of energy). This amendment is well aligned with other regional initiatives underway such as the Sustainability Innovation Fund (SIF) project; *Lights, Camera, Climate Action.* The *SIF* project will include a technical feasibility report of clean energy alternatives for the film industry, as well as the implementation of a pilot at a project site to allow for additional accessibility to clean energy infrastructure in our region. The amendment is also aligned with Metro Vancouver's *Non-Road Diesel Engine Emission Regulation Bylaw No. 1161*, which aims to improve air quality in the region through the management of high emitting non-road diesel engines. The approved amendment will come into effect on January 1, 2022.

Filming at Widgeon Marsh Regional Park

Race to Zero Initiative

At its October 15, 2021 meeting, the Climate Action Committee considered a delegation from the C40 Cities Climate Leadership Group on the Race to Zero initiative. The MVRD Board subsequently considered and approved a recommendation from the Committee in relation to this initiative.

Per Board direction, Metro Vancouver has joined the Cities Race to Zero initiative. The Board Chair signed the Cities Race to Zero pledge reaffirming Metro Vancouver's commitment to reducing regional emissions by 45% by 2030 and becoming a carbon neutral region by 2050 and identifying some of the key actions Metro Vancouver is taking to achieve those targets. The Board Chair has also sent a letter to the member jurisdictions forwarding information for their consideration on how to join the initiative.

ENGAGEMENT UPDATE

Managing Emissions from Cannabis Production and Processing

The deadline for feedback was scheduled to be November 30, 2021, but due to the regional impact of extreme weather events the deadline has been pushed to February 1, 2022, to allow more time for all who wish to comment on the regulatory proposal.

Between September and December, staff presented at municipal agricultural or environmental committees as well as the Metro Vancouver Agricultural Advisory Committee for feedback.

In late November an additional public webinar was added due to public demand, bringing the total to three public webinars. Staff have continued to hold meetings with both cannabis producers and government agencies, including one in-region First Nation, to continue discussions about the proposals. Additional meetings with cannabis producers and government agencies, to explore the proposals outlined in the discussion paper, are expected to be scheduled in January.

An advertisement in a provincial agricultural magazine was placed in early December to notify of this potential regulation and encourage feedback. In addition to promotion on social media, correspondence has gone out to a list of stakeholders in the form of emails to promote the webinars, as well as encourage all stakeholders to fill out a feedback form. Other available engagement opportunities include responding to an email address to correspond directly with project staff and arrange virtual meetings with project staff.

Managing Emissions from Open-Air Burning from Vegetative Debris

The deadline for feedback was scheduled to be October 31, 2021, but similar to the above item on cannabis production, the deadline has been extended to February 1, 2022 due to the regional impact of extreme weather events.

Three public webinars were completed by early October, and staff have continued to meet with staff from member jurisdictions, municipal fire departments, health agencies and other orders of government to discuss the proposals. Between August and November, staff also presented to six municipal advisory committee meetings with an agricultural or environmental focus as well as the Metro Vancouver Agricultural Advisory Committee to receive feedback on the proposals. In November, staff met with one in-region First Nation to discuss this potential regulation.

Opportunities to provide feedback through a feedback form, by email or through meetings with project staff were publicized on social media and by sending emails to an extensive stakeholder list, which included agricultural associations and other levels of government. Relevant professional associations have also promoted the proposals and opportunity for feedback via social media.

Air Quality Permit and Regulatory Fees Review

At its October 2021 meeting, the Metro Vancouver Board approved the *MVRD Air Quality Management Fees Regulation Bylaw* (Bylaw 1330). Staff have since posted the new Bylaw 1330 and updated the project website. An email was sent to facilities that hold air emission permits with Metro Vancouver, and a list of other impacted stakeholders, to notify of the adoption of the Bylaw 1330.

Staff will be reporting back to the Committee on proposed amendments to existing emission regulations, as a consequence of the new fees bylaw. Further notification to facilities whose emissions are authorized through emission regulations is scheduled for later in 2022.

STAFF PARTICIPATION IN EXTERNAL COMMITTEES

A key component of the Climate Action Committee's 2022 work plan will be implementation of the *Clean Air Plan*, and the *Climate 2050* roadmaps. Much of this work will be facilitated by staff participation in external committees and networks, to promote partnership and collaboration with external groups. The list below provides a partial list of external committees that staff in Air Quality and Climate Change are currently involved with.

Additional information on the membership, and terms of reference of these committees can be provided at the Committee's request.

Coordinated Air Quality Management with other orders of government

- Canadian Council of Ministers of the Environment (CCME) Air Management Committee
- CCME Canadian Ambient Air Quality Standards Development and Review Working Group
- CCME Mobile Sources Work Group
- Georgia Basin-Puget Sound International Airshed Strategy
- Lower Fraser Valley Air Quality Coordinating Committee
- BC Marine Vessel Air Quality Working Group
- BC Visibility Coordinating Committee
- Interagency Air Quality Meteorologist's Meeting

Coordinated Air Quality and Health Management with other orders of government

- Air Quality and Health Steering Committee
- Air Quality and Health Collaboration Committee

Air Quality and Climate Monitoring

- National Air Pollution Surveillance (NAPS) Program - Agency Managers
- National Air Pollution Surveillance (NAPS) Program Data Workgroup
- Climate Related Monitoring Program (CRMP)
- Environment and Climate Change Canada Small Sensors Working Group

Climate Action - general

- Zero Emissions Innovation Centre – Technical Advisory Group
- Engineers and Geoscientists BC: Climate Change Advisory Group
- Climate Risk Network

Energy and Fuels

- Community Energy Association
- UBC Clean Energy Research Centre Advisory Board
- Metro Vancouver Hydrogen Hub
- BC Hydro Community Energy Manager's Network
- FortisBC Climate Action Partners Program
- FortisBC Long Term Gas Resource Planning Advisory Group
- FortisBC Energy Efficiency and Conservation Advisory Group

Buildings-Related

- Local Government Retrofit Peer Network
- Local Government Step Code Peer Network
- Building 2 Electrification Coalition (B2E):
    - Leadership Council
    - Awareness Building and Communications Committee
- Home Performance Stakeholder Council Steering Committee
- Vancouver Commercial Building Advisory Committee

Transportation-Related

- Local Government Electric Vehicle Peer Network
- YVR EAC – YVR Environmental Advisory Committee
- Emotive Brand Advisory Committee

Environmental Assessment, Major Project Reviews

- BC Environmental Assessment Office Project Working Groups for several ongoing environmental assessments
- Trans Mountain Pipeline Expansion, Technical Working Group

Miscellaneous

- EGBC Women in Engineering and Geoscience Division Committee
- Regional Equity Network
- Creative BC: Climate Action Committee

References

1. Metro Vancouver Wood Stove Exchange Program
2. Reel Green

49767156

metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

To: Climate Action Committee

From: Gregory Freeman, Senior Economist, Invest Vancouver
Megan Gerryts, Senior Policy Advisor, Invest Vancouver

Date: January 4, 2022 Meeting Date: January 14, 2022

Subject: **Clean Transportation: Findings and Actions to Strengthen the Sector in the Metro Vancouver Region**

At its November 17, 2021 meeting, the Regional Economic Prosperity Board received for information the attached report titled "Clean Transportation: Findings and Actions to Strengthen the Sector in the Metro Vancouver Region", dated November 1, 2021. The report was subsequently received by the MVRD Board at its meeting on November 26, 2021.

This report is being presented to the Climate Action Committee for the committee's interest.

Attachment:
Report titled "Clean Transportation: Findings and Actions to Strengthen the Sector in the Metro Vancouver Region", dated November 1, 2021 *(Doc #48056497)*

metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

To: Regional Economic Prosperity Management Board

From: Gregory Freeman, Senior Economist, Invest Vancouver
Megan Gerryts, Senior Policy Advisor, Invest Vancouver

Date: November 1, 2021 Meeting Date: November 17, 2021

Subject: **Clean Transportation: Findings and Actions to Strengthen the Sector in the Metro Vancouver Region**

RECOMMENDATION

That the MVRD Board receive for information the report dated November 1, 2021, titled "Clean Transportation: Findings and Actions to Strengthen the Sector in the Metro Vancouver Region."

EXECUTIVE SUMMARY

The report *Clean Transportation: Findings and Actions to Strengthen the Sector in the Metro Vancouver Region* (Attachment 2) presents an overview of the categories and competencies in the sector, an analysis of the challenges faced by firms in the region, and recommended policies and actions to support and grow the sector. Attachment 1 consists of promotional material for the clean transportation sector in the region.

The key to the clean transportation sector is talent: the firms in the sector overwhelmingly report that they are present in the region because of the collected knowledge and experience in the workforce. That talent is developed, supported and supplemented by strong ties to research universities, incubators and accelerators.

In the clean transportation sector as a whole, the most pressing challenges revolve around delays and uncertainty related to permitting and the general lack of available industrial land. These obstacles need to be urgently addressed as their persistence risks seeing growing, successful firms unwilling to invest further in the region or leaving entirely when they cannot find suitable space.

PURPOSE

To present to the Board the findings and recommendations from Invest Vancouver's research into the clean transportation sector in the region.

BACKGROUND

Invest Vancouver provides independent, objective recommendations intended to position the region for success in a rapidly evolving global economy. Reports are intended to provide actionable intelligence that will better inform and guide the work of Invest Vancouver itself, as well as the deliberations and work of key decision makers.

The clean transportation sector was chosen as a first area of study due to its strong alignment with regional priorities for emissions reductions and "green jobs", as well as alignment with upcoming mobility-related events and the advancement of the B.C. Hydrogen Strategy.

CLEAN TRANSPORTATION

Clean transportation firms serve global markets, meaning that firms have a choice about where to locate, and do not necessarily need to do more than sell products, service, and technologies in the markets they serve. To support a flourishing clean transportation industry, the Metro Vancouver region needs to do more than create a consumer market for their products; it must position itself as an attractive place for such firms to site their headquarters and/or part of their operations. Therefore, this report seeks to understand two aspects of clean transportation in the Metro Vancouver region: What competitive advantages (if any) do firms in the industry enjoy by locating here? And what barriers (if any) keep the region from being a more attractive place for firms?

Methodology

This report is based on primary qualitative research, consisting of interviews with chief executives (CEOs), founders, and senior executives from clean transportation firms at all stages of development and ownership types. Invest Vancouver conducted in-depth interviews covering everything from business climate, infrastructure, physical spaces, capital, and workforce, to network organizations, R&D, suppliers and customers. Interviewees were encouraged to discuss the production and strategic gaps they have encountered along the product / service value chain continuums, from "idea" to "export", in this industry. The interviews were supplemented with secondary research consisting of a literature review of existing studies, data from Emsi Analyst and PitchBook and other sources.

Findings and Recommendations

The findings are divided into six economic development-related themes, with 13 recommendations across all themes. The themes were assigned an urgency level based on the risk that the underlying gaps could prompt clean transportation firms to leave the region, or choose another location to set up or expand their operations.

The recommendations are summarized in the table below:

Economic Development-Related Theme	Theme Urgency Level	Key Recommendations
Talent Development and Training Programs	Low	• Expand capacity within the BCIT Chemical and Environmental Technology program to increase the number of students graduating from 30 to 60 by 2025
Permitting Processes and Rules	High	• Modernize permitting processes for projects to provide greater accountability, certainty, predictability, and reduced risk • Update and harmonize rules governing hydrogen
Physical Spaces	High	• Invest in industry-critical physical spaces to be leased to firms at below-market rates • Amend the CleanBC Facilities Electrification Fund eligibility to include utility upgrades of warehouses to meet clean technology R&D power needs

Financial Capital Formation and Access	Medium	• Assess the capital formation and syndication relationships and network interactions within the region's clean transportation industry through predictive analytics work
Cluster Capacity Building Opportunities	High	• Launch a hydrogen hub • Fund a large-scale hydrogen powered heavy-duty vehicle demonstration project • Establish a centre to assert global leadership in hydrogen certification • Create certainty by establishing a long-term electric power rate for hydrogen production • Expand eligibility for zero-emission vehicle (ZEV) subsidies to include hydrogen fuel cell vehicles • Strive for technology-neutral rules whenever possible
Culture of Innovation	Medium	• Encourage greater participation in "Project Greenlight" and other public-private partnerships to encourage a culture of innovation across the Metro Vancouver region

All recommendations are intended to position the Metro Vancouver region for success and ensure the region is an attractive place for investors. Invest Vancouver staff will be advancing these recommendations to the responsible decision makers.

ALTERNATIVES
This is an information report. No alternatives are presented.

FINANCIAL IMPLICATIONS
There are no financial implications associated with this report.

CONCLUSION
Invest Vancouver provides independent, objective recommendations intended to position the region for success in a rapidly evolving global economy. Reports are intended to provide actionable intelligence that will better inform and guide the work of Invest Vancouver itself, as well as the deliberations and work of key decision makers. This report presents an overview of the regional specializations and competencies in the sector, an analysis of the challenges faced by firms in the region, and recommended policies and actions to support and grow the sector. The high priority recommendations are related to permitting, physical spaces and opportunities to develop the hydrogen cluster in the region. These areas were assigned high priorities, as they represent the greatest threat to having clean transportation firms leave the region, or choose another location for their operations.

Attachments
1. "Innovation in Clean Transportation" Sector Profile (November, 2021)
2. Clean Transportation: Findings and actions to strengthen the sector in the Metro Vancouver region

48056497

Innovation in Clean Transportation

Advantages and Specializations in the Metro Vancouver Region

INVEST VANCOUVER

Sector Highlights

60 Firms
Operating in the region

2,800+ Employees
Median firm employment: 21

$2.6 Billion+ Invested
From 2017 to 2021

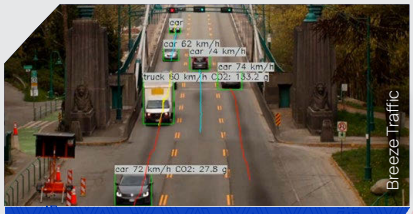
Anchored by a world-leading hydrogen cluster, these firms are scaling-up across many clean transportation specializations:

Low & Zero Emission Vehicles & Components

Alinker, AVL Fuel Cell Canada Inc., Ballard Power Systems, Blue-O Technology, cellcentric, Corvus Energy, Damon Motorcycles, ElectraMeccanica Vehicles, FTXT Energy Technology, FVT Research, GreenPower Motor Company, Grin Technologies, Ionomr Innovations, Loop Energy, Molicel, Nano One Materials, Rivian, Robert Allan Naval Architects and Marine Engineers, Sandvault, Unilia Fuel Cells, VeloMetro Mobility

Renewable & Low Carbon Fuels & Charging Infrastructure

AddEnergie Technologies, Analytics Systems, Consolidated Biofuels, Daanaa Resolution, Delta-Q Technologies, Ekona Power, Electrum Charging Solutions, Enbala, EverGen Infrastructure, G4, Greenlane Renewables, Greenlight Innovation, HTEC Hydrogen Technology and Energy Corporation, Hydra Energy, Hydrogen in Motion, IRDI System, Lab 498 Products/VoltSafe, Palcan Power Systems, Parkland Fuels, Powertech Inc, Quadrogen, Recharged Technologies, Shift Clean Energy, Tandem Technologies, West Coast Reduction, Westport Fuel Systems



Transferable Technologies & Services

7 Generation Capital, Breeze Traffic, Freightera, Greenline Technologies, Liftango, LOOPShare, Mojio, Plugzio, Poparide, Routific, Spare, Uplight, VuLog

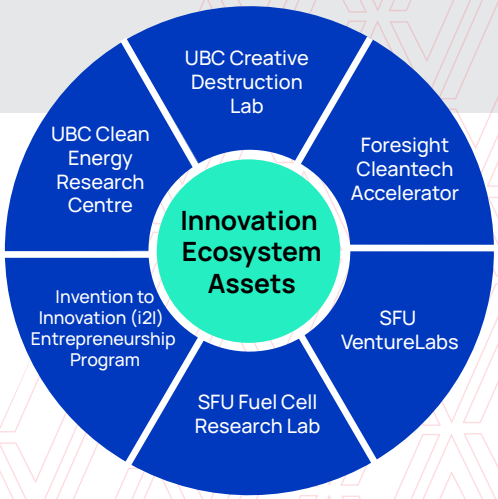
Firms identified in green are within the hydrogen cluster.

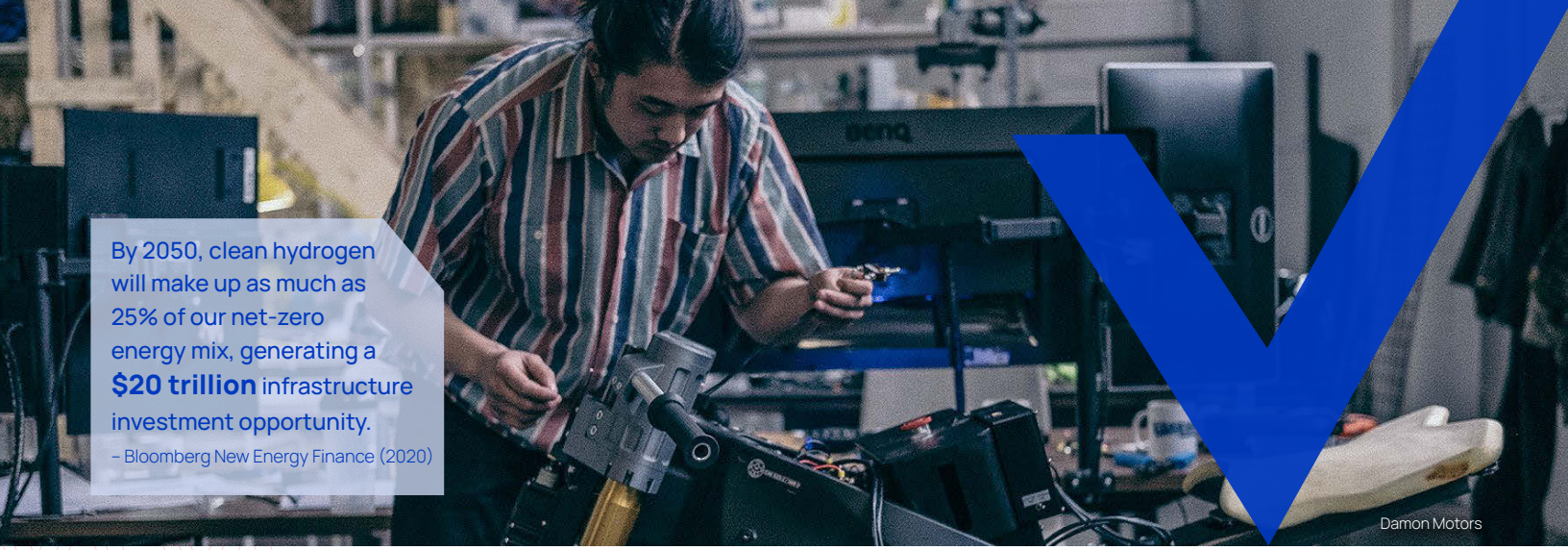
Metro Vancouver's clean transportation sector is buoyed by world-renowned research institutions and universities, sector-specific accelerators, and a supporting incentive and regulatory environment. Firms across the clean transportation industry value chain say their top reason for locating in the region is the access to a deep pool of talent across the educational attainment continuum.

The Metro Vancouver region has identified labour concentrations in the occupational categories:

- Mechanical Systems Engineers
- Infrastructure Team Leads
- Fuel Systems Engineers
- Test Engineers
- Research Scientists/ Engineers

Source: EMSI 2021.1





Capital Investment in Clean Transportation (2017-2021)

Investment in Firms Headquartered in the Region

Year	$ invested (millions)	Deal count
2017	94	22
2018	271	7
2019	102	19
2020	663	21
2021	1,536	16

Source: Pitchbook 2021

Where People Are Investing

67% Low & Zero Emission Vehicles & Components

29% Renewable & Low Carbon Fuels & Charging Infrastructure

4% Transferable Technologies and Services

Source: Pitchbook 2021

2021 Deals Highlights

- $922M cellcentric (Daimler Truck AG and Volvo Group)
- $217M HTEC
- $139M Westport Fuel Systems
- $100M Loop Energy

Source: Pitchbook 2021

Sector Support

- B.C. Hydrogen Strategy is setting the course for B.C. to be a world leader in the growing hydrogen economy
- Scientific Research and Experimental Development (SR&ED) tax programs to encourage Canadian businesses of all sizes and in all sectors to conduct research and development (R&D) in B.C. and Canada
- B.C. Low Carbon Fuel Standard provides a financial incentive for low carbon fuel use. This generates revenue for low carbon transportation fuel suppliers and supports investment in clean fuels and vehicles
- CleanBC Go Electric Advanced Research and Commercialization (ARC) program supports the development of companies operating in the zero-emission vehicle (ZEV) sector
- B.C. Centre for Innovation and Clean Energy will be an incubator for the research and commercialization of technologies, including carbon capture, utilization and storage, production and distribution of low-carbon hydrogen, biofuels, synthetic fuels, renewable natural gas, and battery technologies

Clean Transportation:

Findings and actions to strengthen the sector in the Metro Vancouver region

November 2021

Gregory Freeman, Senior Economist, Invest Vancouver

Megan Gerryts, Senior Policy Advisor, Invest Vancouver

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About Us

Invest Vancouver is the Metro Vancouver region's economic development leadership service, created to advance broadly shared prosperity for all residents of the region. This report has been prepared by Invest Vancouver, which offers independent, objective research, analysis, and economic development recommendations crafted to position the region for success in a rapidly evolving global economy; one in which capital is highly mobile and where firms have many choices about where to locate. The aim of the report is to provide actionable intelligence that will better inform and guide the strategic work of Invest Vancouver itself, as well as the work of key decision makers.

Invest Vancouver is a service of the Metro Vancouver Regional District, operating in support of the Metro Vancouver regional economy and the 2.7 million residents who depend on it.

I. Executive Summary

Advancements in clean transportation technologies are critical to reducing greenhouse gas emissions and addressing the ongoing climate emergency. The sector also presents an economic development opportunity, if the Metro Vancouver region can take urgent action to address obstacles faced by clean transportation firms seeking to start, locate or expand here.

The region is well-positioned for success, with a burgeoning clean transportation sector that includes strong entrants in particular niches and that has an advanced and growing hydrogen cluster. Invest Vancouver has undertaken this study as part of its work to build capacity in key industries in which the region has established and emerging industrial strengths, such as in the clean transportation sector.[1]

The key asset in the region's clean transportation sector is talent; firms in the sector overwhelmingly report that they are present in the region because of the access to and the leveragability of the collected knowledge and experience in the workforce. That talent is developed, supported, and supplemented by strong ties to research institutes and universities, incubators, and accelerators.

Policies that incentivize the reduction of greenhouse gas emissions are helping to create a local market in the Metro Vancouver region for clean transportation vehicles, components, and services. The firms that meet this demand, however, don't necessarily need to be located in the region. To support a flourishing clean transportation industry, the Metro Vancouver region needs to be an attractive place for firms that have a choice about where to locate.

Urgent Needs:

- Streamline industry-relevant permitting processes
- Invest in industry-critical physical spaces
- Launch a hydrogen hub in the region

In the clean transportation sector as a whole, the most pressing challenges revolve around delays and uncertainty related to permitting and the general lack of available industrial land. These obstacles need to be urgently addressed as their persistence risks seeing growing, successful firms unwilling to invest further in the region or leaving entirely when they cannot find suitable space.

The region also has a unique opportunity created by the presence of firms along the entire hydrogen value chain, from supply, transportation, and storage through membranes, fuel cells, and testing. The Metro Vancouver region has an early lead in the area due, in large part, to the presence and growth of Ballard Power Systems and the ecosystem that has developed around it. Other locations around the globe are moving forward with hydrogen; however, and the region needs to help early- and development- stage firms, particularly with the establishment of a hydrogen hub, if these firms are going to grow and thrive here.

Invest Vancouver seeks to understand two aspects of clean transportation in the Metro Vancouver region: What competitive advantages (if any) do firms in this industry enjoy by locating here? And what barriers (if any) keep the region from being a more attractive place for firms that have a choice about where to site their headquarters and operations? These questions are addressed based on primary qualitative research, consisting of interviews with chief executives (CEOs), founders, and senior executives from clean transportation firms at all stages of development and ownership types. This process led to the formulation of 13 recommendations to support a thriving clean transportation sector in the Metro Vancouver region.

1 For more on the regional economic development strategies pursued by Invest Vancouver, see the technical paper *Preparing Metro Vancouver for the Digital Economy*.

Recommendations Overview

Economic Development-Related Theme	Theme Urgency Level*	Key Recommendations
Talent Development and Training Programs	Low	• Expand capacity within the BCIT Chemical and Environmental Technology program to increase the number of students graduating from 30 to 60 by 2025
Permitting Processes and Rules	High	• Modernize permitting processes for projects to provide greater accountability, certainty, predictability, and reduced risk • Update and harmonize rules governing hydrogen
Physical Spaces	High	• Invest in industry-critical physical spaces to be leased to firms at below-market rates • Amend the CleanBC Facilities Electrification Fund eligibility to include utility upgrades of warehouses to meet clean technology research and development (R&D) power needs
Financial Capital Formation and Access	Medium	• Assess the capital formation and syndication relationships and network interactions within the region's clean transportation industry through predictive analytics work
Cluster Capacity Building Opportunities	High	• Launch a hydrogen hub • Fund a large-scale hydrogen powered heavy-duty vehicle demonstration project • Establish a centre to assert global leadership in hydrogen certification • Create certainty by establishing a long-term electric power rate for hydrogen production • Expand eligibility for zero-emission vehicle (ZEV) subsidies to include hydrogen fuel cell vehicles • Strive for technology-neutral rules whenever possible
Culture of Innovation	Medium	• Encourage greater participation in "Project Greenlight" and other public-private partnerships to encourage a culture of innovation across the Metro Vancouver region

*The urgency level has been assigned based on the risk that the underlying gaps could prompt clean transportation firms to leave the region, or choose another location to set up or expand their operations.

II. Clean Transportation Overview

The Metro Vancouver region is home to a vibrant network of emerging and mature clean transportation firms, which collectively benefit from the push to lower and eventually eliminate harmful transportation-related emissions. The sector is supported by research universities, specialized academic programs, start-up accelerators and incubators, and government policies.

Progressive municipal, regional, and provincial goals, targets, and initiatives aimed at lowering greenhouse gas emissions, particularly those from transportation, help create and sustain a local consumer market for low- and zero-emission mobility products and services. Indeed, the transition to clean transportation is well under way, with zero-emission vehicles (ZEVs) accounting for 9.4 percent of all light-duty vehicle sales in the province in 2020, the highest rate of adoption of ZEVs in North America.[2]

Creating a local market for clean transportation, while vital to meeting climate goals, is distinct from building and scaling a clean transportation *industry*. More specifically, ZEVs and their components, plus the related infrastructure, fuels, and services being adopted in the Metro Vancouver region, do not necessarily need to be designed, sourced or built locally. Firms located elsewhere, whether outside of the region or the nation, can and do meet many of these needs. **Supporting a clean transportation industry, therefore, begins with the recognition that firms serving global markets can choose where to site their headquarters, research and development (R&D) activities, and production facilities.**

To understand how to make the region an attractive place for clean transportation firms, consider the location decisions from their point of view. What is the cost and ease of doing business? How long does it take to get permits? Is a suitable location available? How difficult is it to find skilled workers? Are there opportunities to collaborate with and to transfer technologies out of research universities? Is it easy to connect with global suppliers, partners and customers? How is the access to capital? Are there investors? How hard will it be to find initial customers, especially for innovative early-stage products? This report considers these questions and more, with the **goal of identifying the challenges, roadblocks, and headaches faced by clean transportation firms in the Metro Vancouver region and recommending policies and actions to ameliorate them.**

2 Province of British Columbia, Zero-Emission Vehicle Update 2020.

Layout and Methodology

This report seeks to understand two aspects of clean transportation in the Metro Vancouver region: What competitive advantages (if any) do firms in the industry enjoy by locating here? And what barriers (if any) keep the region from being a more attractive place for firms? Answering these questions is critical for economic development, public policy, industry and labour association, and education and workforce development decision-makers. A purely statistical approach, such as an industry contribution analysis, would provide an estimate of economic, job, and fiscal impacts of clean transportation firms, but would not address competitive advantages or barriers. Indeed, there is no quantitative approach that will zero in on the answers to these specific questions.

Instead, this report is based on primary qualitative research, consisting of interviews with chief executives (CEOs), founders, and senior executives from clean transportation firms at all stages of development and ownership types, including, in certain instances, firms that no longer exist because they were acquired, or because they folded. Invest Vancouver conducted in-depth interviews lasting from 30 minutes to more than an hour covering everything from business climate, infrastructure, physical spaces, capital, and workforce, to network organizations, R&D, suppliers and customers. Interviewees were encouraged to discuss the production and strategic gaps they have encountered along the product / service value chain continuums, from "idea" to "export", in this industry.

Firms were identified for inclusion using existing industry resources and relevant news articles; by suggestions from local government members of the Invest Vancouver Advisory Committee; from industry associations and their memberships; by examining and classifying job postings aggregated by Emsi Analyst; by querying the PitchBook database of firms; and by reviewing relevant company materials.

Invest Vancouver met with interviewees from almost one-third of the region's clean transportation firms. The interviewees' experiences and insights underpin the report findings, and have not been attributed to specific individuals or firms to encourage candid discussion. Additional information was collected in helpful discussions with: the B.C. Ministry of Energy, Mines and Low Carbon Innovation; BC Hydro; FortisBC; and the Port of Vancouver, as well as with multiple industry associations.

Unless explicitly stated otherwise, the characterization of the industry gaps, and Invest Vancouver's recommendations for addressing them, do not represent the official policy or position of any of the firms, associations, or government entities mentioned in this report.

The report is presented in two sections. The first provides an overview of the clean transportation firms in the region, as well as the supporting assets that make it an advantage to locate, expand, hire and/or re-invest in the region. This section was prepared based on secondary research, including a literature review of previous studies supplemented with data from Emsi Analyst and PitchBook, and verified in discussions with the interviewees. The second describes the barriers preventing the region from being more attractive to clean transportation firms at different stages of firm development, and Invest Vancouver's specific, deployable recommendations for addressing them.

Identifying Clean Transportation Firms Based in the Metro Vancouver Region

The clean transportation sector is comprised of firms that are working to decarbonize transportation and to reduce greenhouse gas emissions. Following previous work done in this area, Metro Vancouver's clean transportation sector is divided into three categories: low- and zero-emission vehicles and components; renewable and low carbon fuels and charging infrastructure; and transferable technologies and services.

With these categories as a guide, deciding which firms to include still made for some hard choices. To be included, the firms have to be working on transportation (or an input to transportation, such as biofuels); their product, process, service, or technology needs to be exportable; and the firm has to be located in the Metro Vancouver region. Thus, local firms doing valuable work on renewable electricity, such as run-of-river hydroelectricity and tidal power, are not included despite the important contribution of clean energy to green transportation. Nor are firms doing innovative work on metal-air batteries, which are not primarily intended for transportation uses. There are firms providing mobility as a service that are helping reduce greenhouse gas emissions directly, for example by sharing electric cars or bikes, or indirectly by reducing demand for fossil fuel powered trips, that are not included because their focus is on the local market. And some leading B.C. companies in renewable fuels, for example, are not included because they are based outside the Metro Vancouver region.

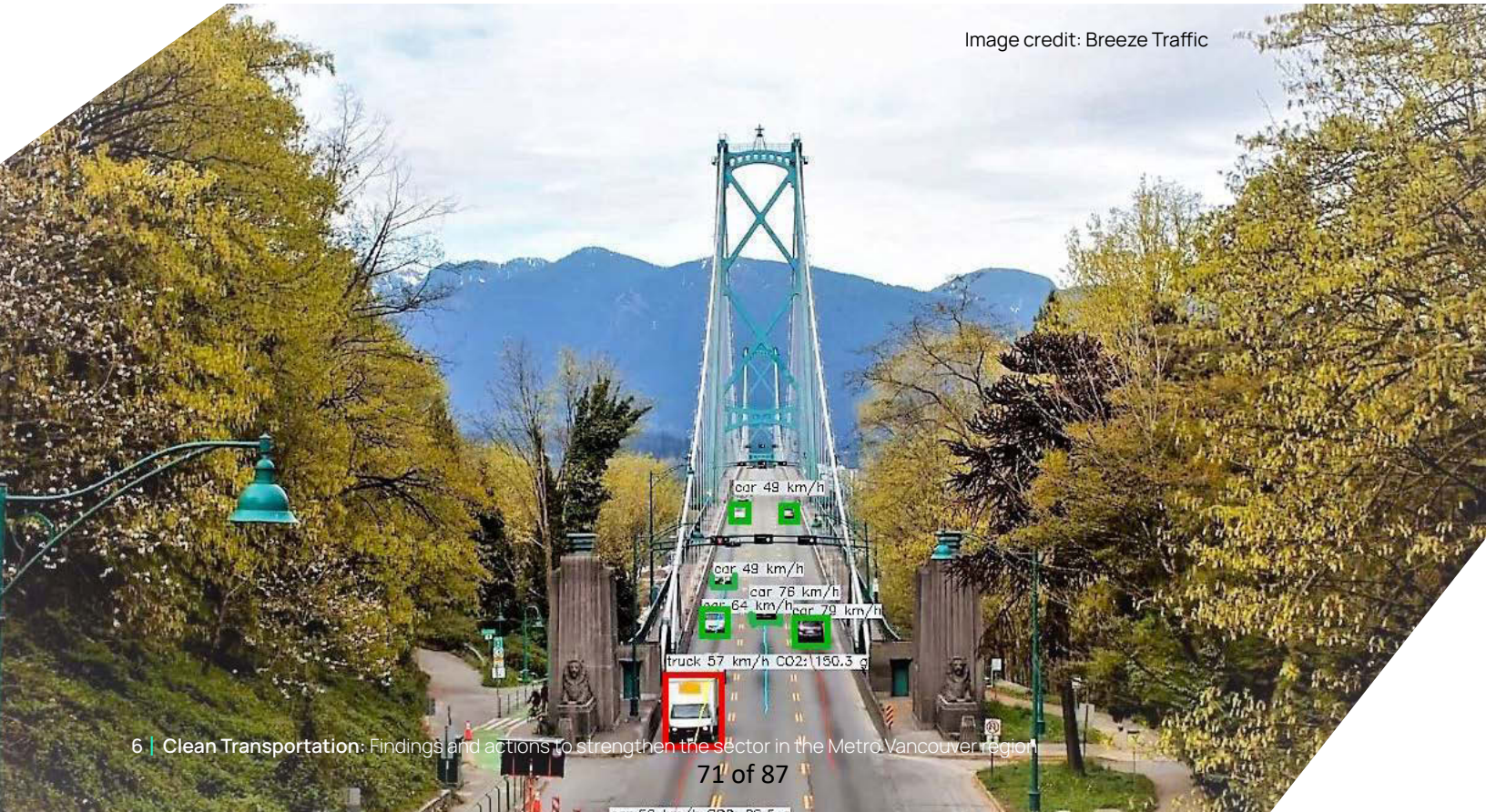


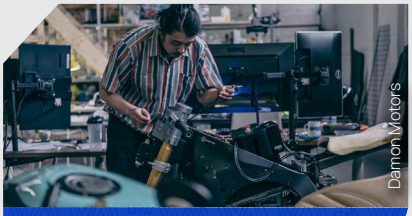
Image credit: Breeze Traffic

Clean Transportation Firms in the Metro Vancouver Region

In total, there are at least 60 export-oriented firms, of which 52 are firm headquarters, in the three above-identified clean transportation categories across the region. As locally anchored firms grow, their activity has major positive impacts, with a direct effect not only on employment, tax revenue, and earnings, which flow to the headquarters, but also on the municipalities in which they locate as they become part of the local social and community fabric. Region-wide, these firms directly employ more than 2,800 people,[3] and sustain many more indirect and induced jobs, which are created when the firms and their employees make purchases of goods and services in the local economy.

As a group, the firms are relatively young – 70 percent were founded in the past 15 years – which is unsurprising for an emerging field such as clean transportation. And, the presence of so many new and early-stage firms helps explain the median firm size of 21 employees.

Figure 1 lists firms in each clean transportation category in the region.

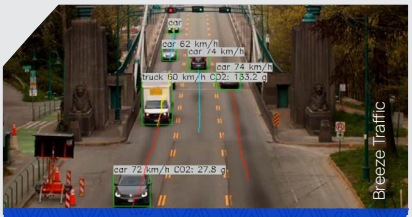


Low & Zero Emission Vehicles & Components

Alinker, AVL Fuel Cell Canada Inc., Ballard Power Systems, Blue-O Technology, cellcentric, Corvus Energy, Damon Motorcycles, ElectraMeccanica Vehicles, FTXT Energy Technology, FVT Research, GreenPower Motor Company, Grin Technologies, Ionomr Innovations, Loop Energy, Molicel, Nano One Materials, Rivian, Robert Allan Naval Architects and Marine Engineers, Sandvault, Unilia Fuel Cells, VeloMetro Mobility

Renewable & Low Carbon Fuels & Charging Infrastructure

AddEnergie Technologies, Analytics Systems, Consolidated Biofuels, Daanaa Resolution, Delta-Q Technologies, Ekona Power, Electrum Charging Solutions, Enbala, EverGen Infrastructure, G4, Greenlane Renewables, Greenlight Innovation, HTEC Hydrogen Technology and Energy Corporation, Hydra Energy, Hydrogen in Motion, IRDI System, Lab 498 Products/VoltSafe, Palcan Power Systems, Parkland Fuels, Powertech Inc, Quadrogen, Recharged Technologies, Shift Clean Energy, Tandem Technologies, West Coast Reduction, Westport Fuel Systems



Transferable Technologies & Services

7 Generation Capital, Breeze Traffic, Freightera, Greenline Technologies, Liftango, LOOPShare, Mojio, Plugzio, Poparide, Routific, Spare, Uplight, VuLog

Firms identified in green are within the hydrogen cluster.

Figure 1: Clean Transportation Firms by Category in the Metro Vancouver Region

3 The direct employment number will soon be higher still, as many of the firms report they are hiring now and/or expect to add more people soon.

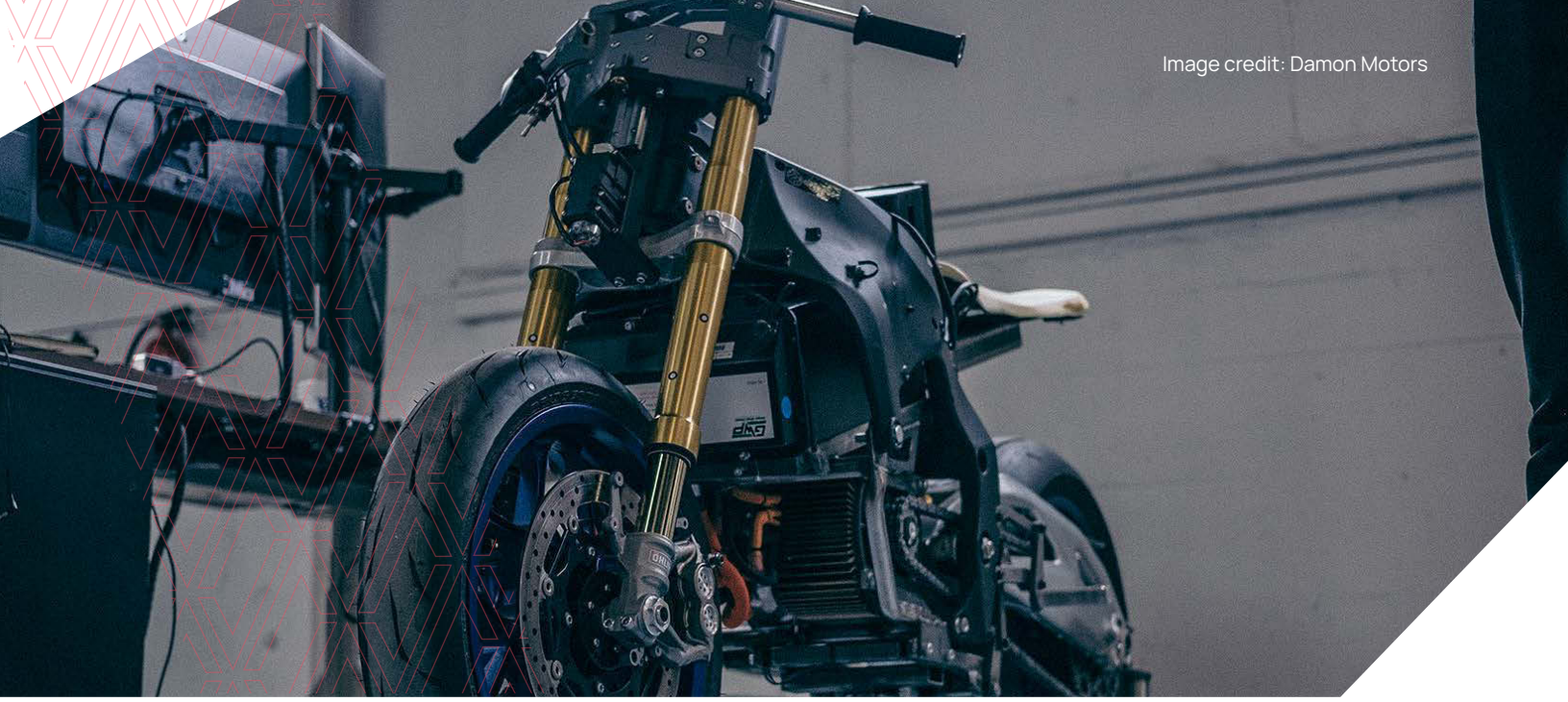


Image credit: Damon Motors

The internal combustion engine-based automotive manufacturing industry, including suppliers of parts and components, is highly concentrated in central Canada. Ontario accounts for virtually all light-duty passenger vehicles produced in Canada, while Quebec leads in recreational, heavy-duty, and speciality vehicles, plus buses. Given the deep supply chains and concentrations of talent there, it is unremarkable that Ford and GM are investing in battery electric vehicle production in Ontario.

The production of low- and zero-emission vehicles and components in the Metro Vancouver region, in contrast, is compromised of firms working in specialized niche markets. Surrey-based Damon Motors, for example, will soon begin commercial production of high-end electric motor cycles; Pitt Meadows-based FVT Research designs and installs electric drives that convert underground mining equipment to ZEVs; Vancouver-headquartered GreenPower Motor Company supplies electric buses; and Vancouver-based Robert Allan Naval Architects and Marine Engineers designs (among other things) electric tugboats. There is also an impressive collection of firms working on all aspects of hydrogen fuel cells, headlined by Burnaby-based Ballard Power Systems, cellcentric, and Loop Energy.

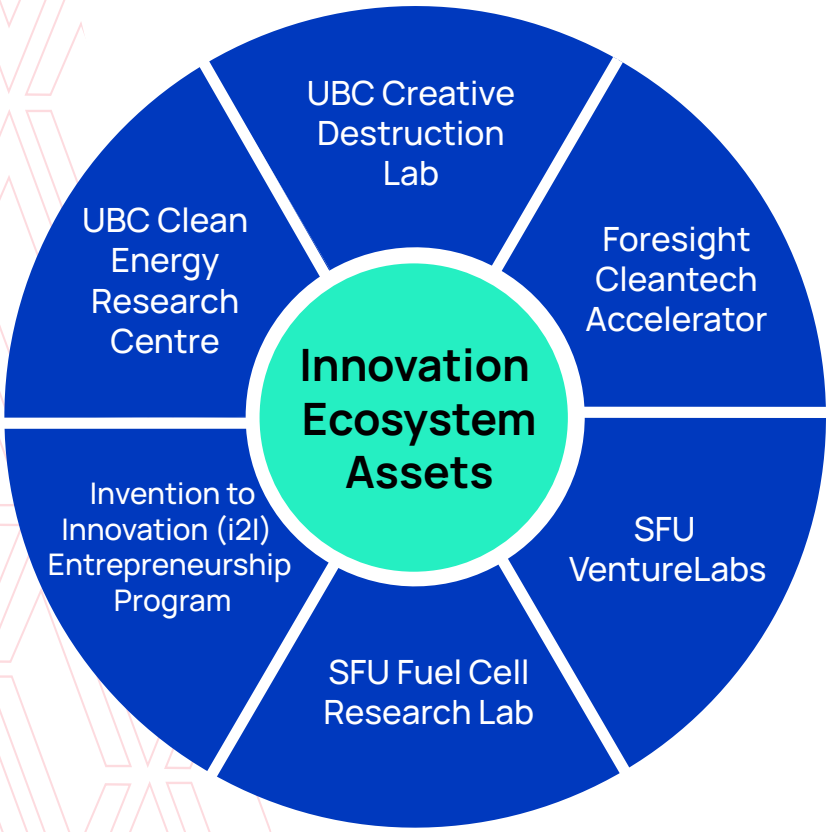
In renewables and low carbon fuels and charging infrastructure, there are firms working on renewable natural gas and biogas (such as Burnaby-based G4 and Quadrogen) and low carbon fuels (such as Burnaby-based Parkland Fuels, which uses feedstock from West Coast Reduction to produce biodiesel). Also batteries (Maple Ridge-based Molicel makes batteries for a variety of uses, including transportation) and battery chargers (Burnaby-based Delta-Q). Firms working on all aspects of hydrogen production and storage (such as Vancouver-based Ekona Power, Vancouver-based Hydrogen in Motion, North Vancouver-based HTEC, and many others) comprise the largest group in this category.

Transferable technologies and services is a small but exciting collection of firms working on clean transportation-related apps, software, technologies, and services. Vancouver-based Breeze Traffic, for example, converts "dumb" intersections to smart ones that can be optimized to reduce vehicles emissions using AI and machine vision; Richmond-based Plugzio sells a smart outlet and billing service that allows building owners to charge electric vehicle owners for power; and Vancouver-based 7 Generation Capital offers turn-key electric vehicle solutions for fleet operators.

Clean Transportation Assets in the Metro Vancouver Region

Firms across the clean transportation sector identify their top reason for locating in the Metro Vancouver region as frictionless access to skilled, "ready to work" talent. Firms started or moved here to take advantage of the knowledgeable and experienced workforce. In particular, the region has deep pools of talent in the following occupational categories: mechanical systems engineers; infrastructure team leads; fuel systems engineers; test engineers; and research scientists/engineers. The region's clean transportation sector is further supported by an active network structure and strong ties to research institutions and accelerators (see figure 2). Interviewees from firms in all three clean transportation categories praised the local innovation ecosystem.

Figure 2: Innovation Ecosystem Assets in the Metro Vancouver Region



Capital Investment

From 2017 through to 2021, firms headquartered in the region attracted more than $2.6 billion in capital investment (see figure 3).[4] This investment activity has been concentrated in low- and zero-emission vehicles and components (67%); followed by renewables and low-carbon fuels and charging infrastructure (29%), and transferable technologies and services (4%). The largest deals year-to-date are highlighted in the box (see figure 4).

Capital Investment (2017-2021)

Investment in Firms Headquartered in the Region		
Year	$ invested (millions)	Deal count
2017	94	22
2018	271	7
2019	102	19
2020	663	21
2021	1,536	16

Source: PitchBook 2021

Figure 3: Capital Investment in Firms Headquartered in the Region

2021 Deal Highlights

- $922M cellcentric (Daimler Truck AG and Volvo Group)
- $217M HTEC
- $139M Westport Fuel Systems
- $100M Loop

Source: PitchBook 2021

Figure 4: 2021 Deal Highlights

Public Sector Financial and Technical Support for the Clean Transportation Sector

B.C. Hydrogen Strategy is setting the course for B.C. to be a world leader in the growing hydrogen economy.

Scientific Research and Experimental Development (SR&ED) tax programs to encourage Canadian businesses of all sizes and in all sectors to conduct R&D in B.C. and Canada.

B.C. Low Carbon Fuel Standard provides a financial incentive for low carbon fuel use. This generates revenue for low carbon transportation fuel suppliers and supports investment in clean fuels and vehicles.

CleanBC Go Electric Advanced Research and Commercialization (ARC) program supports the development of companies operating in the zero-emission vehicle (ZEV) sector.

B.C. Centre for Innovation and Clean Energy will be an incubator for the research and commercialization of technologies, including carbon capture, utilization and storage, production and distribution of low-carbon hydrogen, biofuels, synthetic fuels, renewable natural gas and battery technologies.

BC-SMART Low Carbon Fuels Consortium brings together industry, the provincial government and UBC to encourage the production and use of drop-in biofuels to decarbonize long-distance transport.

4 The actual total is likely much higher, due to limitations with PitchBook which doesn't include, for example, a situation where a firm from outside the region sets up a new operation here.

III. Findings and Recommendations

Talent Development and Training Programs

Findings

The clean transportation sector requires specialized knowledge covering a wide range of occupations along the educational attainment continuum, including: mechanical and systems engineers; research scientists; technologists; machinists and technicians; and technical experts in areas ranging from software development to clean energy processes. The quality and specialization of the talent available in the Metro Vancouver region have been major draws for firms choosing to locate here. This is especially true of the hydrogen sector, where the engineering expertise in the region leads the world. Indeed, one firm described choosing to locate in the Metro Vancouver region "as a shortcut," because the ability to hire skilled engineers with hydrogen fuel cell expertise shaved years off its development schedule. Accordingly, this has also led to aggressive firm-to-firm competition for experienced engineers, with firms "poaching" talent from each other.

And while the clean transportation sector represents an attractive field for people looking for a career that contributes to a more sustainable future, the Metro Vancouver region faces significant challenges retaining talent and attracting new workers from outside the region due to the high overall cost of living, and in particular, high housing costs. This is especially seen in mid-career-level talent for in-demand positions, such as mechanical engineers, where a lack of affordable single-family homes deters relocations to the region. This could become an acute constriction point on growth as more affordable locales, such as the Calgary and Edmonton metropolitan regions, look to compete in the clean energy space, particularly in renewable natural gas (RNG).

Image credit: Loop Energy

Image credit: Damon Motors

In-Demand Hard Skills in the Hydrogen Cluster:

- New Product Development
- Mechanical Engineering
- Supply Chain
- Chemistry
- Instrumentation
- SolidWorks (CAD)
- Thermodynamics
- Chemical Engineering
- Data Analysis

Source: Emsi 2021.1

Figure 5: Top Hard Skills Identified in Hydrogen Sector Job Postings 2018-2021.

Technologists are an in-demand occupation in the region's hydrogen sector, with skills such as chemistry and instrumentation being highly sought after (figure 5). Technologists are also a critical component in the R&D phase of emerging clean energy technologies, such as hydrogen and biofuels. The British Columbia Institute of Technology (BCIT) Chemical and Environmental Technology program was specifically referenced during the interview process as an excellent program that graduates approximately 30 'ready to work' individuals per year in emerging clean energy fields. Often students graduating from this program have secured employment long before graduation, as their skill sets are in short supply. Fostering in-region talent is a critical step in offsetting the Metro Vancouver region's out-of-market talent attraction issues, as Metro Vancouver-based talent is often less willing to leave the region, housing challenges notwithstanding.

Recommendation:

Expand capacity within the BCIT Chemical and Environmental Technology program to increase the number of students graduating from 30 to 60 by 2025. A shortage of available technologists within the clean transportation sector has led to engineers and research scientists being underemployed as technologists. While BCIT currently does not have any plans to expand the program, it is in the midst of a program and curriculum review. That the program's graduates are effectively "over-subscribed" is clear evidence it is aligned with industry needs; increasing the capacity of such an industry-responsive program (or creating a similar program at another college or university campus) seems to be an easy choice.

Permitting Processes and Rules

Findings

Mirroring the experience of firms in other fast-growing industries, clean transportation firms are routinely encountering problems securing required permits in a timely fashion. Transferable technologies and services firms, whose physical space requirements are often modest, faced the least trouble, while those in renewable fuels and hydrogen reported the greatest difficulties. The process of getting permits for working with (and in particular, storing) hydrogen has been described by industry interviewees as "ridiculous," "frustrating," and "dreadful". In a related problem, existing regulatory regimes do not always account for hydrogen, as in rules covering the sale of gasoline and diesel at gas stations, which understandably did not anticipate the sale of hydrogen.

Interviewees were candid in describing the importance of a clear, timely, technology-based permitting process. One interviewee described the permitting issue as an "almost certain barrier to further in-region investment," and several interviewees acknowledged that their firms were adding space outside of the region in locations where permitting processes are perceived to be less onerous. The uncertainty, lack of transparency, and delays encountered in the permitting process could deter additional investments made in-market. Fixing burdensome and time-consuming permitting processes should be a top priority.

Recommendations:

Modernize permitting processes for projects to provide greater accountability, certainty, predictability, and reduced risk. Delays to obtaining permits are a significant barrier to success for clean transportation firms and risk future investments in this sector. A modernized approach needs to be implemented for the region to compete in this global market. As an example, Surrey City Council recently approved guaranteed permitting timelines as part of a shift to a more customer service-focused approach that includes multiple best practices such as:

- single point of contact / one project, one planner
- pre-application meetings
- enhanced digital service
- improved communications, including more regular permit status updates

A similar initiative of process reform should be considered by other cities within the Metro Vancouver region that are interested in attracting more clean transportation investment. Invest Vancouver will support this effort by conducting a best management practices scan of municipal permitting processes elsewhere in Canada and globally with the aim of identifying promising permit approval approaches that competitive firms expect when selecting a business location.

Update and harmonize rules governing hydrogen. There is currently a patchwork approach across the region to the rules governing hydrogen. Through relevant industry associations, such as the Canadian Hydrogen and Fuel Cell Association, industry and government should collaborate on a set of sample "model regulations" covering the distribution and sale of hydrogen that can be broadly relied upon, locally adapted, and eventually adopted by municipalities across the region.

Physical Spaces

Findings

Suitable physical spaces are in critical need for clean transportation firms, especially those that are engaged in industrial activities, such as storing of hydrogen and testing of hydrogen fuel cells or other clean energy processes including RNG or biofuels. The vacancy rate for industrial land region-wide has fallen below one percent (see figure 6), which is reflected in interviewees reporting site searches taking 12 to 18 months, or more. The problem is especially acute for light and heavy industrial spaces; the latter of which is required for chemical processes, for example, involved in low pressure hydrogen storage. Spaces larger than 50,000 square feet are particularly in need but hard to find, and those larger than 100,000 square feet are simply unavailable, which precludes many anchor-potential firms from considering and/or investing in the region.

Given these market conditions, it is unsurprising that many interviewees reported feeling "lucky" to have found the space(s) that they currently occupy. Policy makers should be worried about potential new entrants to the industry or market who are not as lucky, as well as existing firms looking to expand. All of the interviewees from firms in the hydrogen cluster, and many of those from non-hydrogen firms, reported their firms were growing, adding employees, and looking for space. If they were not currently looking for space, they expected to be looking within the next several years. If they are unable to find suitable industrial space in the region, these firms will be forced to look elsewhere, however deep the local pool of specialized talent.

Beyond issues of scarcity and cost, industrial land policy presents myriad challenges. From the perspective of clean transportation firms, they need options. As employers, they want centrally located, transit accessible sites that avoid burdening their employees with long commutes. Some firms working on RNG and hydrogen have addressed these needs by effectively converting warehouse space into de facto R&D spaces with addition of higher capacity electrical service. (Testing their prototypes, for example, requires considerably more power than is supplied to a typical warehouse, so the building's power supply has to be upgraded.)

Industrial Lands in Metro Vancouver

- Industrial lands comprise 4% of the region's land base, and accommodate 27% of the region's jobs.
- Industrial land prices in Metro Vancouver are amongst the highest in North America.
- Industrial jobs pay 10% higher than the regional average
- Business activity on industrial lands generates 30% of the region's total Gross Domestic Product (GDP).
- The Q3 2021 vacancy rate for industrial land in Metro Vancouver was 0.5%.

Sources: Metro Vancouver, Colliers

Figure 6: Industrial Lands in Metro Vancouver

Recommendations

Invest in sector-critical physical spaces to be leased to firms at below-market rates. For example, to assist with applied/translational research, prototyping, design, commercialization, production, and market penetration, the recently announced InBC fund should carve out a portion of the assets under management to invest in building or renovating clean transportation sector-supporting physical spaces, such as sites with hydrogen storage, and leasing them to clean transportation firms at below-market rates. Unlike investing directly or indirectly, through a fund-of-fund strategy or otherwise, in start-up and development-stage firms, investing in physical assets, such as sector-supporting facilities, would serve many vintages of start-up and development-stage firms, while providing the fund with an appreciating asset and coupon (in the form of lease payments) that could be re-invested in the fund.

Amend the CleanBC Facilities Electrification Fund eligibility to include utility upgrades of warehouses to meet clean technology R&D power needs. To reduce barriers to suitable industrial spaces, the eligibility of the CleanBC Facilities Electrification Fund should be amended to include clean technology R&D firms as eligible to receive a subsidy to upgrade their utility connections to meet their sizable power needs. Reducing the financial burden of having to upgrade warehouse spaces to suit their power needs will provide the clean transportation sector's R&D-intensive firms with more options when it comes to finding physical spaces in the region.

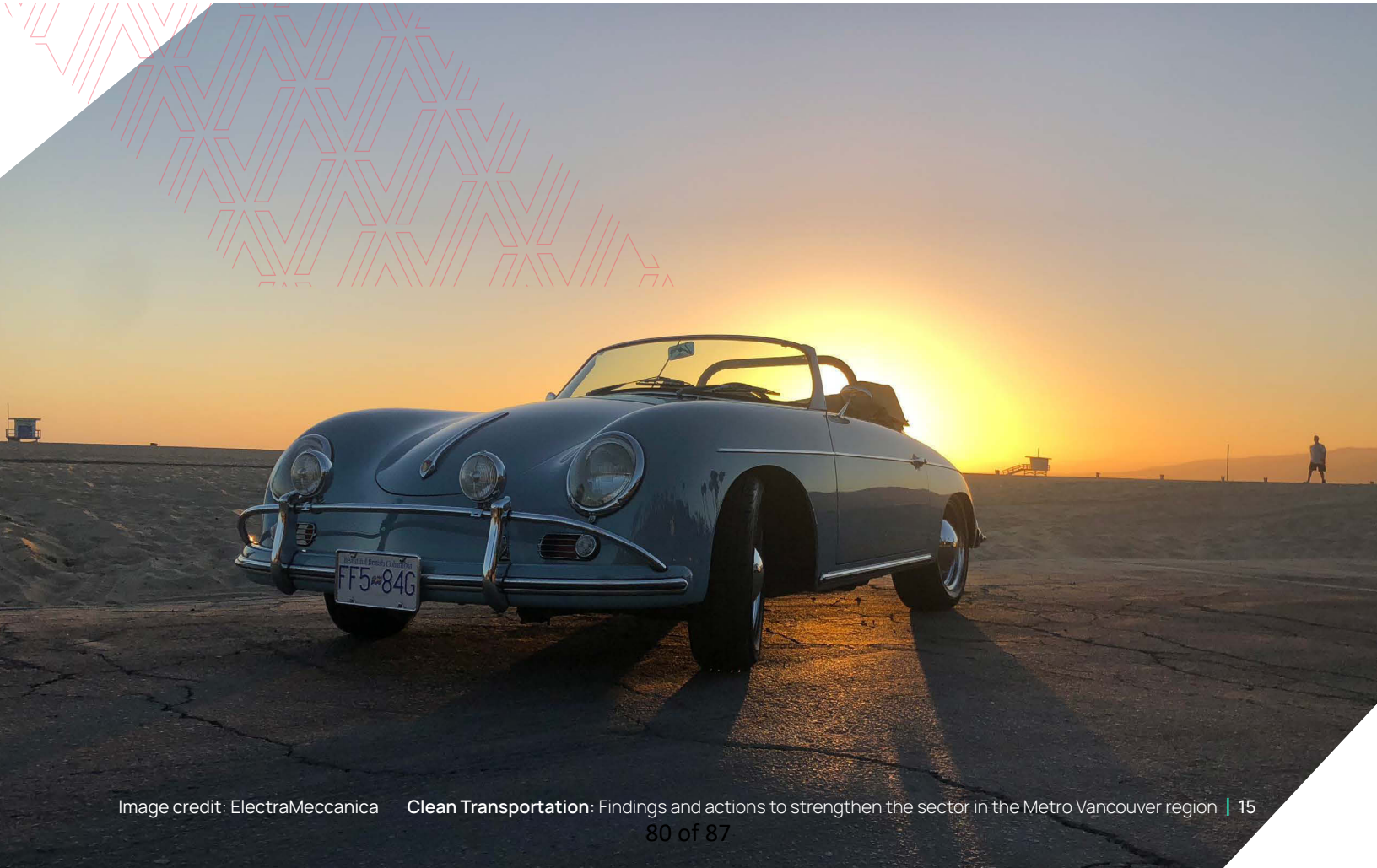


Image credit: ElectraMeccanica

Financial Capital Formation and Access

Findings

For firms operating in a globally competitive environment, access to debt, equity or specialty financial capital is a crucial input at every stage along a firm's development life-cycle. Many interviewees cited access to capital as a particular challenge. Fortunately, many of the interviewees said their firms have recently closed or are about to close funding rounds.

Generally, interviewees expressed support for the clean technology-related funding programs available through the federal and provincial governments, while still describing them as "difficult to access," even for interviewees who are serial entrepreneurs who have successfully secured funding from the same public sources for previous ventures. Some interviewees believed there is a public funding bias against certain clean fuel technologies, including hydrogen, associated with government funding programs. In addition, some interviewees also voiced concern that the financialization of real estate and the continued price escalations across most segments of the real estate market, with its potential for comparatively "quick and easy wins," were crowding out investment in other industries, including clean transportation.

Other interviewees expressed disappointment that despite the perceived environmentally conscious resident population of the province, local investors have been less willing to invest in clean transportation technologies compared to investors from the European Union and China. For some clean transportation firms, where the investment and demonstration opportunities for their technologies are coming from other countries, relocating out of the region becomes a more attractive option.

This was the case for Corvus Energy (Corvus), the battery technology company that found a receptive audience in Norway. In 2019, Corvus relocated their headquarters, effectively becoming a Norwegian company, with all the direct and downstream value-added economic benefits flowing to Norway instead of the Metro Vancouver region.

Finally, interviewees that had successfully built and 'exited' companies in the past were more easily able to navigate the capital finance and investing ecosystem due to relationships formed in past roles. This relationships-based funding often excludes women and communities of colour, who may be excluded from or not have access to the same network that traditionally offer connections to investors.

Recommendations

Assess the capital formation and syndication relationships and network interactions within the region's clean transportation industry through predictive analytics work. Private capital access, formation, and redeployment ('post-exit', for example) in the clean transportation sector, as well as across other industries in which the Metro Vancouver region has specialization, is a hotly debated issue; some believe there is a systemic lack of proof-of-concept, 'pre-seed', and 'seed'-stage capital in the Metro Vancouver region, while others believe the more pressing problem is not having enough "investment worthy" firms. And, of course, both could be equally or unequally true. This requires further analysis, as the economic development strategies differ markedly depending on what is found. For this reason, Invest Vancouver is undertaking a major investigation of the role of capital in this and other industries as a prelude to developing recommendations in this area.

Cluster Capacity Building Opportunities

Findings

A hydrogen-based industry cluster has developed in the Metro Vancouver region, encompassing all aspects of the hydrogen ecosystem, including production, transport, storage, membranes, fuel cells, testing, and consulting. Firms in the industry cluster have been attracting private capital investment and adding employees. The sector is poised to become an economic driver for the region if pressing challenges can be overcome, such as:

- breaking the supply/demand deadlock;
- creating opportunities to demonstrate hydrogen technology in the region; and
- addressing the lack of industrial space and resolving the difficulty with permits, as discussed above.

The growing hydrogen industry cluster represents a lucrative economic and fiscal opportunity for the region (see figure 7), as it is well positioned globally since so few other economic regions have an equally concentrated cluster of firms working with hydrogen. A concentration of firms in the same industry (or adjacent, complimentary industries) can foster the cross-pollination of ideas and create a reinforcing cycle where skilled workers are drawn to a regional industry's pooling of employment prospects in their respective fields, and new firms are attracted to or created by the collected pool of talent. This dynamic can be seen in the constellation of firms founded by former Ballard Power Systems employees, and the arrival in the region of AVL (an Austrian firm that is the world's largest independent powertrain company), as well as the joint venture between Daimler Truck and Volvo Group, cellcentric.

As touched on above, the hydrogen industry cluster's greatest strength is the presence of an unparalleled collection of experienced workers. It is bolstered by strong ties to the University of British Columbia (UBC), Simon Fraser University (SFU), and BCIT, along with locally-allied industry associations and accelerators, and the industry stands to benefit from provincial, and federal hydrogen strategies.

> It is estimated that by 2050 clean hydrogen will make up as much as 25 percent of the world's net-zero energy mix, generating a **$20 trillion** infrastructure investment opportunity, new technologies, companies, jobs, and ultimately a cheaper energy system.
>
> Source: Bloomberg New Energy Finance

Figure 7: the Future Hydrogen Economy

Yet, the development of the region's hydrogen industry cluster is at a critical juncture. The industry is plagued by a classic 'chicken-and-egg' problem with respect to supply and demand; namely, there is little incentive to supply hydrogen without demand, and such demand will never materialize without the promise of a steady supply. Access to readily available green hydrogen in the region (taking advantage of B.C.'s abundant supply of clean electricity) would encourage the testing of new technologies to lower greenhouse gas emissions, such as within heavy-duty vehicles. Firms that are pressing ahead with supply face multiple challenges, particularly with respect to regulations that do not account for hydrogen as a fuel.

Firms based here have to look elsewhere for demonstration opportunities, most notably in the Province of Alberta and countries, such as Italy, Germany, and China. One interviewee likened the situation in hydrogen to "trying to demonstrate a new computer graphics card by pointing to shelves full of computer parts in a room without an electrical outlet." Even more important than the obvious need to demonstrate new technologies, firms need opportunities for real-world testing. Multiple

Image credit: HTEC

interviewees stressed the importance of being able to test (and refine) their technologies closer to home. Deploying hydrogen applications in-region would be a powerful indication of support for the industry.

Permits and suitable workspace challenges (as described above) are acute for firms working with hydrogen. There is a real risk that unless these challenges can be overcome, firms will drift away one location, demonstration project, or permitting decision at a time, as happened with Corvus (described above).

Recommendations

Launch a hydrogen hub. Getting a reliable in-region hydrogen hub established in the Metro Vancouver region is a crucial component of the B.C. Hydrogen Strategy. The strategy emphasizes the importance of co-locating hydrogen production with end-use applications. In collaboration with the Ministry of Energy, Mines and Low Carbon Innovation and the Canadian Hydrogen and Fuel Cell Association, Invest Vancouver has agreed to convene member-municipalities to accelerate this project. Municipalities should support this effort as both a major economic development opportunity for the region's clean transportation sector and an opportunity to decarbonize hard-to-decarbonize sectors of the economy.

Fund a large-scale hydrogen powered heavy-duty vehicle demonstration project. No one wants to be the "first mover" on what are perceived to be unproven technologies. So understandably, municipalities and the Port of Vancouver are conservative in their procurement and purchasing decisions, and, for this reason, expecting them to commit huge sums to purchase early-stage technologies may not be realistic. The province, however, should purchase a small fleet (for example) of heavy-duty hydrogen-powered vehicles for lease to interested municipalities. By shifting some of the financial risk associated with early adoption, such a strategy might help encourage more expansive local deployment. And scaling up from tests to production will eventually help move hydrogen technologies along the cost curve towards lower prices and, most important, early deployments will serve as in-region 'test beds' for locally developed technologies. This is one way to move the industry along the development continuum from start-up stage, to development-stage, to commercial-stage, to production-stage, to global export-stage.

Establish a centre to assert global leadership in hydrogen certification. Create a centre that can test fuel cells and balance of plant components to the specifications of the U.S. Department of Energy, the European Union ("harmonized protocols", FCH-JU), and Japan (NEDO). The goal should be to follow the path in solar energy testing and certification blazed by Germany, and create accredited hydrogen

certification labs, much as the Fraunhofer Institute of Solar Energy Systems does for photovoltaics. This would deepen the R&D, design, and prototyping capacities of the hydrogen industry cluster here in the province, attract work from major original equipment manufacturers, and provide additional "stickiness" to the industry in the region. (Powertech Labs does some of the only global balance of system certification work and would be a logical partner.)

Create certainty by establishing a long-term electric power rate for hydrogen production. The new CleanBC industrial electrification rates offered by BC Hydro provide up to seven years of discounted power for industries setting up or expanding operations in B.C., including hydrogen. With the cost of major industrial facilities amortized over decades, it makes sense to create a matching, longer-lived rate structure as an incentive for "first movers" assuming the risk of building facilities for water electrolysis production of hydrogen in B.C. Certainty around the cost of green hydrogen production through electrolysis will act as signal to investors that hydrogen is a priority area for the province. Additionally, as more capital is invested in the production of hydrogen, technological improvements will be made and the cost of producing hydrogen will decline. Encouraging in-region production of green hydrogen will also mean that the need to use out-of-province higher carbon-intensity gray or blue hydrogen will decline in the region.

Expand eligibility for ZEV subsidies to include hydrogen fuel cell vehicles. Due to accelerating gains in productivity, specialization, and experience, hydrogen technologies will likely follow the same declining price per unit trend of other clean technologies, such as solar panels and electric vehicles. For now, hydrogen technology is earlier along the price curve (meaning it is more expensive), so the price cap for ZEV rebates, which were intended to prevent the public from subsidizing luxury battery electric vehicles, excludes fuel cell vehicles. The province should consider setting a provisionally higher limit for ZEV rebates specific to fuel cell vehicles, which would then decline over time as those productivity and other gains are realized and prices decline. This would have the effect of encouraging the use of hydrogen fuel cell vehicles in the province and Metro Vancouver region, providing industry with the opportunity to demonstrate their technologies and advancing improvements to bring the price down.

Strive for technology-neutral rules whenever possible. With rapidly changing technology, it is important to avoid locking in or locking out potential technological solutions, especially when the excluded ones just might beget entirely new industry sectors. For example, burning green hydrogen in a modified internal combustion engine is omitted from the provincial Commercial Vehicle Pilot program, and the Motor Fuel Tax regulation provides an exemption for hydrogen, but only "when used in fuel-cell vehicles." There is broad scope for applying this technological neutrality principle with respect to hydrogen in particular, and clean transportation in general. Technology-neutral policies should be standard, sending the signal to entrepreneurs and start-up companies all over the world that British Columbia offers a competitive landscape that values and wants you, your firm, and your intellectual property (and potential royalties) to come innovate, build, scale, headquarter, and export from here.

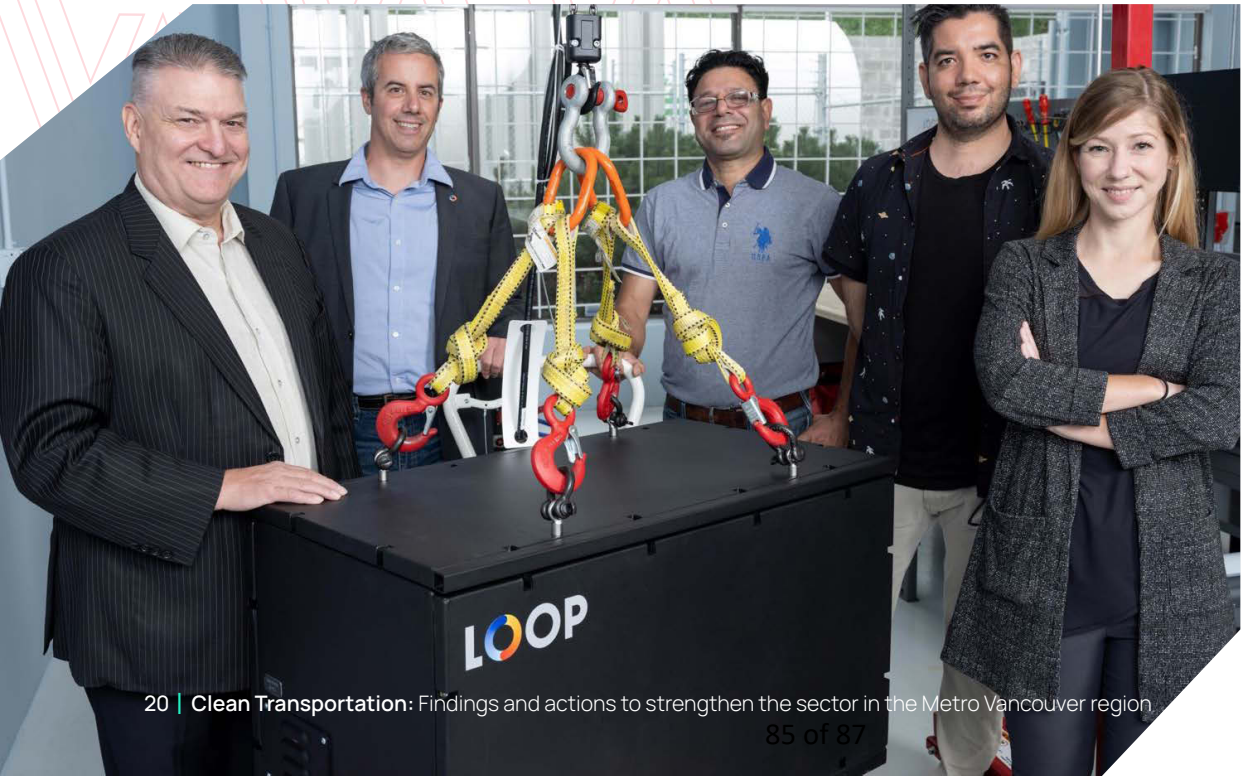
Culture of Innovation

Findings

Interviewees from firms in all three categories of clean transportation mentioned the need "to create a culture of innovation in the region." There is a general disappointment, amongst interviewees, that the commitment to tackling the climate emergency is not matched by public support for local firms developing the technologies that will make lowering greenhouse gas emissions possible. Municipalities, in particular, were cited for their "risk-aversion" when it comes to their procurement policies and purchasing new or emerging technologies from "home-grown" enterprises. Multiple firms described finding local governments in the U.S. and Alberta, for example, more open to supporting new technologies and enterprises in their procurement decisions than governments here.

Recommendations

Encourage greater participation in "Project Greenlight" and other public-private partnerships to encourage a culture of innovation across the Metro Vancouver region. Project Greenlight is a membership-driven demonstration platform that forges strategic partnerships between public and private enterprises ("members") and technology companies ("innovators"). Governments and government agencies should commit to greater participation in Project Greenlight, as well as in similar public-private partnership programs as a way to balance their understandable desire to de-risk their procurement decisions by purchasing "already commercialized" technologies with economic development. The goal should be to catalyze innovation and to build capacity within target industries, such as clean transportation, by using procurement levers to produce an environment in which innovative firms and new (and previously unknown) industry sectors can thrive, expand, hire and reinvest in the region.



IV. Conclusion

Talent, the innovation ecosystem, supporting incentive and regulatory environment, and leading hydrogen expertise mean that the Metro Vancouver region is well-positioned to seize the opportunities presented by the transition to a cleaner future. Yet, urgent action is needed to address barriers to investment for the clean transportation sector. Most time sensitive are the need to modernize and streamline the permitting process, improve access to highly-limited industrial space, and support a hydrogen hub to accelerate industry growth. The recommendations in this report will allow the region to go beyond creating a market for low carbon transportation and create a thriving clean transportation industry.

Invest Vancouver would like to thank all interviewees for their time and for sharing their insights.

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