metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

METRO VANCOUVER REGIONAL DISTRICT
CLIMATE ACTION COMMITTEE

REGULAR MEETING

Friday, September 9, 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

A G E N D A[1]

1. ADOPTION OF THE AGENDA

1.1 September 9, 2022 Regular Meeting Agenda
That the Climate Action Committee adopt the agenda for its regular meeting scheduled for September 9, 2022 as circulated.

2. ADOPTION OF THE MINUTES

2.1 July 8, 2022 Regular Meeting Minutes *pg. 4*
That the Climate Action Committee adopt the minutes of its regular meeting held July 8, 2022 as circulated.

3. DELEGATIONS

4. INVITED PRESENTATIONS

5. REPORTS FROM COMMITTEE OR STAFF

5.1 Howe Sound Community Forum - Principles for Cooperation and MOU *pg. 11*
That the MVRD Board:
a) endorse the updated Howe Sound Community Forum Principles for Cooperation; and
b) authorize the CAO and Corporate Officer to sign the Memorandum of Understanding with the Howe Sound Biosphere Region Initiative Society on behalf of Metro Vancouver.

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

5.2 BC Local Government Climate Action Program (LGCAP) *pg. 31*
That the Climate Action Committee receive for information the report dated August 15, 2022, titled "BC Local Government Climate Action Program (LGCAP)".

5.3 Managing Metro Vancouver's Corporate Energy and Greenhouse Gas Emissions (2017 to 2021) *pg. 35*
That the Climate Action Committee receive for information the report dated July 19, 2022, titled "Managing Metro Vancouver's Corporate Energy and Greenhouse Gas Emissions (2017 to 2021)".

5.4 Climate Change and Habitat Suitability for New Invasive Plants in Metro Vancouver *pg. 87*
That the Climate Action Committee receive for information the report dated July 29, 2022, titled "Climate Change and Habitat Suitability for New Invasive Plants in Metro Vancouver".

5.5 Manager's Report *pg. 94*
That the Climate Action Committee receive for information the report dated August 29, 2022 titled "Manager's Report".

6. INFORMATION ITEMS

6.1 Sewage and Waste: Heat Recovery Policy *pg. 103*
Report to Liquid Waste Committee dated July 13, 2022 and the Zero Waste Committee dated July 15, 2022, titled "Sewage and Waste: Heat Recovery Policy".

6.2 Heavy Fuel Oil and Exhaust Gas Cleaning Systems in Marine Vessels *pg. 116*
Correspondence from the Honourable Steven Guilbeault, Minister of Environment and Climate Change, to Chair Dhaliwal, dated July 4, 2022.

6.3 Banning the Use of Exhaust Gas Cleaning Systems *pg. 118*
Correspondence from the Honourable Omar Alghabra, Minister of Transport, to Chair Dhaliwal, dated July 7, 2022.

6.4 Addressing the Use of Heavy Fuel Oil and Exhaust Gas Cleaning Systems in Marine Vessels in the Region *pg. 120*
Correspondence from the Prince Rupert Port Authority, to Chair Dhaliwal, dated June 16, 2022.

7. OTHER BUSINESS

7.1 Committee Members Roundtable
Verbal Update

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.

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

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

(i) the receipt of advice that is subject to solicitor-client privilege, including communications necessary for that purpose;

90 (2) A part of a meeting must be closed to the public if the subject matter being considered relates to one or more of the following:

(b) the consideration of information received and held in confidence relating to negotiations between the regional district and a provincial government or the federal government or both, or between a provincial government or the federal government or both and a third party."

10. ADJOURNMENT/CONCLUSION

That the Climate Action Committee adjourn/conclude its regular meeting of September 9, 2022.

Membership:

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

METRO VANCOUVER REGIONAL DISTRICT
CLIMATE ACTION COMMITTEE

Minutes of the Regular Meeting of the Metro Vancouver Regional District (MVRD) Climate Action Committee held at 1:03 p.m. on Friday, July 8, 2022 in the 28th Floor Boardroom, 4515 Central Boulevard, Burnaby, British Columbia.

MEMBERS PRESENT:
Chair, Councillor Adriane Carr, Vancouver
Councillor Petrina Arnason*, Langley Township
Chief Ken Baird*, Tsawwassen
Councillor Laura Dupont*, Port Coquitlam
Councillor David Hocking, Bowen Island (departed at 2:55 p.m.)
Councillor Dylan Kruger*, Delta
Director Jen McCutcheon*, Electoral Area A
Councillor Jessica McIlroy*, North Vancouver City (departed at 2:37 p.m.)
Mayor Ron McLaughlin*, Lions Bay
Councillor Allison Patton*, Surrey
Councillor Zoë Royer*, Port Moody
Councillor Harold Steves*, Richmond
Councillor Chris Wilson*, Coquitlam
Councillor Ahmed Yousef*, Maple Ridge

MEMBERS ABSENT:
Vice Chair, Councillor Sav Dhaliwal, Burnaby

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

1. ADOPTION OF THE AGENDA

1.1 July 8, 2022 Regular Meeting Agenda

It was MOVED and SECONDED
That the Climate Action Committee adopt the agenda for its regular meeting scheduled for July 8, 2022 as circulated.

CARRIED

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

2. ADOPTION OF THE MINUTES

2.1 June 10, 2022 Regular Meeting Minutes

It was MOVED and SECONDED
That the Climate Action Committee adopt the minutes of its regular meeting held June 10, 2022 as circulated.

CARRIED

3. DELEGATIONS

No items presented.

4. INVITED PRESENTATIONS

No items presented.

5. REPORTS FROM COMMITTEE OR STAFF

5.1 Tilbury Marine Jetty and Tilbury Phase 2 LNG Expansion Projects

Report dated June 13, 2022, from Derek Jennejohn, Lead Senior Engineer, Parks and Environment and Nicole Chan, Project Engineer, Parks and Environment providing the Climate Action Committee with an assessment of the proposed Tilbury Marine Jetty Project and Tilbury Phase 2 Liquefied Natural Gas Expansion Project.

Members expressed concerns regarding negative impacts of Liquefied Natural Gas on Metro Vancouver's long-term climate action goals. Discussion ensued regarding the need for more information in order to make a recommendation to the MVRD Board and expressed that urgent action ought to be taken in order to achieve climate action goals.

It was MOVED and SECONDED
That the Climate Action Committee refer the report titled "Tilbury Marine Jetty and Tilbury Phase 2 LNG Expansion Projects", dated June 13, 2022 back to staff for more information.

DEFEATED

Discussion ensued on Alternative Recommendation 2 and Alternative Recommendation 3 being distinct but relevant recommendations that ought to be addressed.

It was MOVED and SECONDED
That the MVRD Board write to the BC Minister of Environment and Climate Change Strategy, BC Minister of Energy, Mines and Low Carbon Innovation, federal Minister of Environment and Climate Change, BC Environmental Assessment Office, and the Impact Assessment Agency of Canada, communicating its concerns relating to climate change and air quality associated with the Tilbury

Marine Jetty and Tilbury Phase 2 LNG Expansion Projects, and requesting that these issues be addressed prior to any approval of the projects.

CARRIED

Main Motion
It was MOVED and SECONDED
That the MVRD Board:

a) express its opposition to the Tilbury Marine Jetty and Tilbury Phase 2 LNG Expansion Projects, because of overall concerns related to upstream and downstream greenhouse gas emissions and inconsistency with Metro Vancouver climate targets;
b) authorize the Board Chair to write to the BC Minister of Environment and Climate Change Strategy, BC Minister of Energy, Mines and Low Carbon Innovation, federal Minister of Environment and Climate Change, BC Environmental Assessment Office, and the Impact Assessment Agency of Canada, to communicate this opposition; and
c) send copies of all letters and this staff report to Metro Vancouver member jurisdictions for their consideration in taking a similar position.

Discussion ensued regarding softening the language in the recommendation to show concern versus opposition.

Amendment to the Main Motion
It was MOVED and SECONDED
That the Climate Action Committee amend the Main Motion at the start of subsection a), by replacing "opposition" with "initial concern".

The Amendment was deemed out of order as it duplicates the aforementioned carried motion.

Question on the Main Motion
Question was then called on the Main Motion and it was

CARRIED
Mayor McLaughlin, Councillor Kruger, Councillor Wilson and Councillor Yousef voted in the negative

5.2 MVRD Open Burning Emission Regulation Bylaw No. 1355, 2022
Report dated June 8, 2022, from Julie Saxton, Air Quality Planner, Parks and Environment and Esther Berube, Division Manager, Air Quality Bylaw and Regulation Development, Parks and Environment, providing the MVRD Board with an overview of the *Metro Vancouver Regional District Open Burning Emission Regulation Bylaw No. 1355, 2022.*

Members were provided with a presentation on the current situation on open burning, with an overview of the proposed emission regulation and highlighted concerns and feedback on the proposed regulation.

Members were informed of further edits required on the bylaw that will be corrected prior to the report going to the Board, highlighting that the edits will not change the intent of the bylaw.

Presentation material titled "Proposed Open Burning Emission Regulation" is retained with the July 8, 2022 Climate Action Committee agenda.

It was MOVED and SECONDED
That the MVRD Board:

a) give first, second, and third reading to *Metro Vancouver Regional District Open Burning Emission Regulation Bylaw No. 1355, 2022*; and
b) pass and finally adopt *Metro Vancouver Regional District Open Burning Emission Regulation Bylaw No. 1355, 2022*.

CARRIED

Members were advised to pass a motion directing staff to make the necessary revisions to the bylaw prior to it being considered by the Board.

It was MOVED and SECONDED
That the Climate Action Committee direct staff to revise *Metro Vancouver Regional District Open Burning Emission Regulation Bylaw No. 1355, 2022* to correct 3 administrative errors and bring the revised bylaw forward to the July 29, 2022 MVRD Board meeting.

CARRIED

5.3 Air Quality and Climate Action Initiatives in Caring for the Air 2022

Report dated June 13, 2022, from Amy Thai, Senior Policy Analyst, Parks and Environment, presenting the Climate Action Committee with the 2022 edition of the annual Caring for the Air publication and providing information about outreach conducted for the 2021 edition.

Members were provided with a presentation on an overview of the Caring for the Air publication, highlighting sustainability innovation fund projects and how the publication is communicating progress on climate action.

Presentation material titled "Caring for the Air 2022" is retained with the July 8, 2022 Climate Action Committee agenda.

It was MOVED and SECONDED
That the Climate Action Committee receive for information the report dated June 13, 2022, titled "Air Quality and Climate Action Initiatives in *Caring for the Air* 2022".

CARRIED

5.4 Metro Vancouver Climate 2050 Snapshot 2021/2022

Report dated June 8, 2022, from Johann Zerbe, Policy Analyst, Parks and Environment, providing the Climate Action Committee with an overview of the Climate 2050 Snapshot report, which summarizes *Climate 2050* roadmap development and implementation in 2021 and 2022 year-to-date.

Members were provided with a presentation reporting on highlights on the 10 *Climate 2050* issue areas, communicating progress on *Climate 2050* Roadmap development and implementation, and highlights on key roadmap actions and other climate projects implemented by Metro Vancouver in 2021 and 2022.

Presentation material titled "Climate 2050 Snapshot – 2021/2022" is retained with the July 8, 2022 Climate Action Committee agenda.

It was MOVED and SECONDED
That the Climate Action Committee receive for information the report dated June 8, 2022, titled "Metro Vancouver Climate 2050 Snapshot 2021/2022".

CARRIED

5.5 2022 Update on Water Sustainability Innovation Fund Projects

Report dated June 13, 2022, from Aby Sharma, Acting Director, Policy, Planning and Analysis, Water Services, providing the Climate Action Committee with an update on projects funded under the Water Sustainability Innovation Fund.

Members were provided with a presentation on an annual update on the Sustainability Innovation Fund as well as updates on 7 projects highlighting the purpose and outcome of projects.

2:37 p.m. Councillor McIlroy departed the meeting.

Presentation material titled "2022 Update on Sustainability Innovation Fund Projects" is retained with the July 8, 2022 Climate Action Committee agenda.

It was MOVED and SECONDED
That the Climate Action Committee receive for information the report dated June 13, 2022, titled "2022 Update on Water Sustainability Innovation Fund Projects."

CARRIED

5.6 Metro Vancouver Membership in the BC Building to Electrification (B2E) Coalition

Report dated June 8, 2022, from Claire Ewing, Senior Policy and Planning Analyst, Parks and Environment and Erik Blair, Senior Planner, Parks and Environment, seeking the MVRD Board's authorization to become a member of the BC Building to Electrification Coalition (B2E).

Members were provided with a verbal presentation highlighting the importance for Metro Vancouver to work with governments and other regional partners to develop a Building Decarbonization Coalition responding directly to the shared goal of decarbonizing buildings across the region.

It was MOVED and SECONDED
That the MVRD Board authorize Metro Vancouver to become a member of the BC Building to Electrification Coalition (B2E).

CARRIED

5.7 Manager's Report

Report dated June 28, 2022, from Roger Quan, Director, Air Quality and Climate Change, Parks and Environment, providing the Climate Action Committee with information on the Climate Action Committee 2022 Work Plan, BC's Climate Preparedness and Adaptation Strategy, Climate Change and Health Adaptation Framework, Initiating Engagement on Electrification of Landscaping Equipment and an Engagement Update.

It was MOVED and SECONDED
That the Climate Action Committee receive for information the report dated June 28, 2022 titled "Manager's Report".

CARRIED

6. INFORMATION ITEMS

No items presented.

7. OTHER BUSINESS

7.1 ICLEI World Congress 2021 – 2022: The Malmö Summit

Adriane Carr, Chair, Climate Action Committee provided the Climate Action Committee with a verbal update on the Malmö Summit.

2:55 p.m. Councillor Hocking departed the meeting.

Members were provided with a presentation on the Malmö Summit and highlighted key climate action initiatives of C40 cities.

Presentation material titled "ICLEI World Congress 2021-2022 The Malmö Summit" is retained with the July 8, 2022 Climate Action Committee agenda.

It was MOVED and SECONDED

That the Climate Action Committee direct staff to work with City of Vancouver staff to investigate and report back on the scope, logistics and resources needed for Vancouver to host, as a C40 city, a C40-supported workshop on accelerating local climate action plans.

CARRIED

7.2 Committee Members Roundtable

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 July 8, 2022.

CARRIED

(Time: 3:48 p.m.)

_____ _____

Rapinder Khaira,
Legislative Services Coordinator

Adriane Carr, Chair

53871652 FINAL

To: Climate Action Committee

From: Marcin Pachcinski, Division Manager, Electoral Area and Implementation Services
Regional Planning and Housing Services Department

Date: July 14, 2022 Meeting Date: September 9, 2022

Subject: **Howe Sound Community Forum - Principles for Cooperation and MOU**

RECOMMENDATION

That the MVRD Board:

a) endorse the updated Howe Sound Community Forum Principles for Cooperation; and
b) authorize the CAO and Corporate Officer to sign the Memorandum of Understanding with the Howe Sound Biosphere Region Initiative Society on behalf of Metro Vancouver.

EXECUTIVE SUMMARY

Metro Vancouver has been a participant in the bi-annual Howe Sound Community Forums since 2000 and signed the latest version of the Forum's Principles for Cooperation in 2014. The Howe Sound Biosphere Region Initiative Society is a registered non-profit that was created in 2017 to support the forums and was the lead organization responsible for the designation of the Átl'ka7tsem/Howe Sound as a UNESCO biosphere region, which was granted in September 2021. At the most recent forum meeting in October 2021, members were asked to consider long-term support of the Howe Sound Biosphere Region Initiative Society to ensure the UNESCO designation is maintained, and the Howe Sound Community Forum continues. To this end, the Society is requesting that Metro Vancouver endorse the updated Howe Sound Community Forum Principles for Cooperation and to sign an MOU that would commit it to supporting and cooperating with the Society as it manages the biosphere, the Howe Sound Community forums, and its sub-committees. Proposed agreements and support of the Forum's principles do not commit Metro Vancouver to any funding at this time. Any future funding request, such as the $2,250 request to co-host a Forum in 2025, will be considered through the usual Board budget process.

PURPOSE

To provide the Climate Action Committee and MVRD Board with the opportunity to consider endorsing the updated Howe Sound Community Forum Principles for Cooperation and signing an MOU with the Howe Sound Biosphere Region Initiative Society.

BACKGROUND

Metro Vancouver has been an active member of the Howe Sound Community Forum since 2002 and signed the latest version of the Forum's Principles for Cooperation in 2014. It was through this forum that a request was made in October 2021 for Forum members to consider long-term support of the Howe Sound Biosphere Region Initiative Society to ensure the UNESCO designation is maintained, and the Howe Sound Community Forum continues.

On June 4, 2022, Metro Vancouver received a letter (Attachment 1) from the President of the Howe Sound Biosphere Region Initiative Society requesting support for the updated Principles for Cooperation, (co-)hosting of a future forum, and signing of an MOU. This report addresses the requests made in the letter.

HOWE SOUND COMMUNITY FORUM AND BIOSPHERE REGION INITATIVE SOCIETY

The Howe Sound Community Forum is a bi-annual meeting that brings together representatives from government, First Nations and various stakeholder groups to discuss issues and projects of interest to Howe Sound communities. Metro Vancouver has been a participant in the forums since they started in 2000, and signed the original Principles for Cooperation in 2002 as well as the current version in 2014.

The Howe Sound Biosphere Region Initiative Society is a non-profit formed in 2017 with the aim to strengthen collaboration and engagement in Átl'ka7tsem/Howe Sound. It led efforts to designate Átl'ka7tsem/Howe Sound as a UNESCO biosphere region, which was achieved in September 2021 with the support of Metro Vancouver and other government bodies and local First Nations. It is the main organization responsible for maintaining and implementing the UNESCO biosphere designation and goals.

REQUESTS MADE BY THE HOWE SOUND BIOSPHERE REGION INITIATIVE SOCIETY

1. **Support for the updated Howe Sound Community Forum Principles for Cooperation via letter**
   Attachment 2 shows the proposed changes to the 2014 Principles for Cooperation, which Metro Vancouver signed. The Society advises that the proposed changes "reflect the societal and logistical changes since the last update in 2014". The proposed changes include greater recognition of First Nations values and more detailed descriptions of the role of the Society and of forum host communities.

   Attachment 3 is a clean version of the updated version of the Principles of Cooperation.

   Recommendation (a) addresses this request and, if supported, would be communicated via letter.

2. **Commitment to co-host or host a Howe Sound Community Forum in the future**
   Bi-annual forums rotate to different communities around Howe Sound. In 2017, Metro Vancouver and the Village of Lions Bay co-hosted a forum and shared in forum costs, such as catering. Metro Vancouver provided $725 in support of the 2017 Forum. The request is for Metro Vancouver to co-host a forum in 2025 and to budget $2,250 for associated costs. Staff will bring forward this request to the relevant Committee for consideration as part of the 2025 budget process. Therefore, no recommendation is included at this time for the Board's consideration for this request.

3. **Support via an MOU with the Howe Sound Biosphere Region Initiative Society**
   As noted in the letter, one of the recommendations discussed amongst forum members at their October 2021 meeting was for each of the member local governments to enter into an MOU with

the Howe Sound Biosphere Region Initiative Society to sustain the Átl'ka7tsem/Howe Sound UNESCO Designation.

The proposed MOU (Attachments 4 and 5) outlines the role of Howe Sound Biosphere Region Initiative Society, common objectives and ways communities can support the Society. It would commit Metro Vancouver to support and cooperate with the Society as it manages the biosphere, the Howe Sound Community forums and its sub-committees (Metro Vancouver currently participates in the Ocean Watch Action sub-committee). This would include:

- Assigning a staff liaison position as the main point of contact with the Society.
- Continue as active and engaged participants in the Howe Sound Community Forum.
- Budget for and co-host or host a forum on a rotating schedule.
- Support the Principles of Cooperation and the Nchu'ú7mut/Unity Plan through the contribution of information.
- Consider the priority goals and objectives of the Nchu'ú7mut/Unity Plan in policy and planning decisions
- Promote and reference with pride the UNESCO Biosphere Region.
- Offer and facilitate funding resources for the Society for educational opportunities and beneficial projects through grants and/or in-kind support.

Recommendation (b) addresses this request and, if supported, would enable the CAO or Corporate Officer to sign the MOU on behalf of Metro Vancouver.

ALTERNATIVES

1. That the MVRD Board:
   a) endorse the updated Howe Sound Community Forum Principles for Cooperation; and
   b) authorize the CAO and Corporate Officer to sign the Memorandum of Understanding with the Howe Sound Biosphere Region Initiative Society on behalf of Metro Vancouver.

2. That the MVRD Board receive for information the report dated July 14, 2022, titled "Howe Sound Community Forum - Principles for Cooperation and MOU" and provide alternate direction to staff.

FINANCIAL IMPLICATIONS

One of the requests made is for a commitment to budget $2,250 for 2025 to pay for costs associated with co-hosting a bi-annual forum (e.g. venue, catering). Staff will bring forward this request for the relevant Committee to consider as part of the 2025 budget process.

The MOU also would committee Metro Vancouver to "offer and facilitate funding resources for the Society for educational opportunities and beneficial projects through grants and/or in-kind support". These resources are described in Attachment 5 as potentially considering additional fees on commercial filming permits, creating a nature tax, or service area tax, grants in-aid, an annual contribution for administrative services, funding a portion of project costs or matching funds with other government or funding contributions, in-kind time of staff resources, and waiving costs of meeting rooms. Any proposed funding would be brought forward for Committee and Board consideration.

CONCLUSION

The bi-annual Howe Sound Community Forums and the ongoing work of the Howe Sound Biosphere Region Initiative Society broadly align with Metro Vancouver's environmental, climate change, and reconciliation goals. The request made by the Society is intended to provide long-term support for their work and to implement UNESCO biosphere goals. Staff recommend Alternative 1.

Attachments

1. Letter from the Howe Sound Biosphere Region Initiative Society, dated June 4, 2022
2. Principles for Cooperation – marked-up version, dated May 2022
3. Principles for Cooperation – clean version, dated May 2022
4. Draft Howe Sound Memorandum of Understanding
5. Howe Sound Memorandum of Understanding – Appendix A

53574341

June 4, 2022

To: Director Jen McCutcheon, Area A, and the Board of Metro Vancouver

Re: Howe Sound Community Forums 2022 and beyond

Dear Director McCutcheon,

This letter is a request for:

1. A letter of support for the updated Howe Sound Community Forum Principles for Cooperation
2. Commitment to co-host or host a Howe Sound Community Forum in the future.
3. Support via a Memorandum of Understanding with the Howe Sound Biosphere Region Initiative Society.

Background

Metro Vancouver was a founding member of the Howe Sound Community Forums in 2000 and played a key role in the development of the original Principles for Cooperation. Successive Area A Directors have participated in the bi-annual meetings and sub-committees of the Howe Sound Community Forum. Area A co-hosted a forum with the Village of Lions Bay in 2017.

Metro Vancouver was an active supporter of the Átl'ka7tsem/Howe Sound UNESCO Biosphere Region designation. Having achieved this designation in 2021, the next phase is sustaining the UNESCO designation for future generations. The Howe Sound Biosphere Region Initiative Society (HSBRIS) is responsible for the management of the Biosphere Region. Sustaining the organization requires continued support from the authorities, collaboration and reliance on various sources of funding.

At the October 2021 forum on Bowen Island and the April 2022 forum at Furry Creek, Mayor Karen Elliott, District of Squamish, invited forum members to consider long-term support of the HSBRIS to ensure the UNESCO designation is maintained, and the Howe Sound Community Forum continues. We responded to the feedback received from the Forum members; this letter is the next step.

Continued…

Maintaining the Howe Sound Community Forum 2022 and Beyond

The attached Principles for Cooperation have been updated to reflect the societal and logistical changes since the last update in 2014. We are asking you and Metro Vancouver to acknowledge and support these changes. Please see the proposed letter of support attached.

Forum members take turns hosting, and the previous Director Maria Harris co-hosted with Mayor Buhr of Lions Bay on May 5, 2017, at the Lions Bay Community Hall. Metro Vancouver would not be due to host again until 2025. A commitment to budget $2,250 for that year or $563 over the next four years would include attendance and participation for elected council members and staff to attend bi-annual forums and sub-committees convened by HSBRIS.

Sustaining the Áthl'ka7tsem/Howe Sound UNESCO Designation

One of the recommendations discussed amongst forum members was for each of the Howe Sound Community Forum member local governments to enter into a memorandum of understanding (MOU) with HSBRIS. Please see the draft attached. This MOU outlines the role of HSBRIS, common objectives and ways the community can support HSBRIS – see appendix A.

As the pressures of growth, development and the impacts of climate change affect our region, we hope the Area A Directors of Metro Vancouver will continue to participate in the Áthl'ka7tsem/Howe Sound community of communities and take pride in the prestigious UNESCO recognition that is reflective of this beautiful part of the world where humanity and nature thrive.

Sincerely,

Ruth Simons
President, Howe Sound Biosphere Region Initiative Society
howesoundbri@gmail.com

PO Box 465
Lions Bay, B.C.
V0N 2E0

Enclosures:

1. Principles for Cooperation with tracked changes
2. Principles for Cooperation clean final copy
3. Sample letter of support to HSBRIS
4. Draft Memorandum of Understanding
5. Appendix A

Principles for Cooperation
Átl'ka7tsem/Howe Sound Community Forum

To provide an overview of the need, purpose and structure for cooperative efforts by interested local governments and First Nations operating on the unceded territory of the Coast Salish Peoples in the Átl'ka7tsem Howe Sound region.

1. Statement of Purpose

To provide a forum for elected representatives of local governments, Regional Districts and First Nations as well as federal and provincial elected members to have discussions focused on how to maintain and enhance the economic, environmental, cultural and social well-being of the Átl'ka7tsem/Howe Sound (the Region) for the benefit of present and future generations.

2. Rationale (The Need)

The Átl'ka7tsem/Howe Sound Community Forum (the Forum) will enhance collective action among local governments, regional districts and First Nations by:

- Providing a common forum for dialogue
- Sharing knowledge and information to avoid duplication of effort and to enhance any single organization's capacity for action
- Promoting the use of transparent processes that encourage awareness and involvement.
- Providing a forum for gaining a better understanding of and from First Nations peoples in the Region.

3. Scope

The Átl'ka7tsem/Howe Sound region includes the marine waters and all the lands that drain into these waters, the surrounding airshed on the east side of the Salish Sea (Strait of Georgia) between Point Atkinson and Gower Point, and interested adjacent communities.

4. Common Vision

The Forum envisions that communities within the Region can be healthy, productive and sustainable by:

- understanding the use and occupancy of the region by the Squamish Nation/Skwxwú7mesh Úxwumixw, who have occupied and managed Átl'ka7tsem for many thousands of years;
- building appreciation for the spiritual and cultural values of the region;
- understanding, promoting and implementing best practices, including traditional practices;
- promoting compact and complete communities;
- encouraging safe and livable communities;

- encouraging an integrated transportation system;
- preserving a healthy and natural environment;
- nurturing cultural heritage
- supporting sustainable use of resources;
- fostering a vibrant and dynamic economy;
- raising awareness about land use; and
- ensuring the public is informed and encouraged to be active.

5. Shared Values

The Forum will involve the collective efforts of First Nations and a wide variety of governments, non-government organizations, the private sector, educational institutions and individuals to pursue the following values and objectives. The Forum shares the following values and objectives.

Value…Recognition of Indigenous Rights and Titles

Objective – Respect and support of Aboriginal Rights and Title, traditional knowledge and sacred places….

Value...Spirit of Sharing

Objective - The many interests and organizations in the Region can strengthen the effectiveness of programs by openly sharing information and knowledge.

Value... Action Orientation

Objective - The Forum will encourage groups to take actions that produce positive observable results and public benefit to communities.

Value...Efforts towards Sustainability

Objective – The Forum members recognize the need to effectively manage and maintain a balanced relationship between community development and the protection of ~~unique biophysical~~, First Nations sacred places and cultural qualities, and the unique biophysical and environmental qualities of the Region.

Value.. The need for Cooperation and observing protocol

Objective -Governments, First Nations and organizations will be encouraged to work together.

Value...Stewardship

Objective - Voluntary action of individuals and organizations as a powerful and effective tool for achieving positive results. ~~is an objective of the Forum.~~

Value... Transcending Jurisdictions

Objective - The Forum will encourage communities to work together for the greater good because jurisdictional ~~territorial~~ lines on a map mean nothing in terms of sustainability.

Value...Focus and Transparency

Objective - Forum member programs will encourage clear objectives and use accountable processes that are available to Forum members and the public.

Value... Respect for Diversity

Objective - It is recognized that while every member of the Forum may have a different focus or interest, they are encouraged to acknowledge a shared interest in the sustainability of the Region.

6. Structure (The Members)

A hosting community from the membership will work cooperatively with the Howe Sound Biosphere Region Initiative Society (HSBRIS) as the convening organization. ~~They act as the focal point and be responsible to coordinate meetings and agenda material.~~

The hosting community will rotate among the Forum members, and meetings will be held bi-annually, or more frequently, as requested by any member or as predicated by local issues.

Task forces or subforums may be established to focus on specific projects.

Charter members of the Átl'ka7tsem/Howe Sound Community Forum include elected representatives of the following communities ~~at~~:

Bowen Island Municipality	Squamish Nation/Sḵwx̱wú7mesh Úxwumixw
Gambier Island Local Trust Committee	Sunshine Coast Regional District
Town of Gibsons	Village of Lions Bay
Metro Vancouver Regional District	District of West Vancouver
District of Squamish	Resort Municipality of Whistler
Squamish-Lillooet Regional District	~~Village of Pemberton~~

West Vancouver/Sunshine Coast/Sea to Sky Member of Parliament

Powell River/Sunshine Coast Member of the Legislative Assembly

West Vancouver/Sea to Sky Member of the Legislative Assembly

6. Other Participants

Neighbouring communities, First Nations, organizations and members of society who have a shared interest in the region and support these Principles for Cooperation are welcome to participate in the forums as observers and/or presenters.

7. Activities (Action and Results)

The Forum members are not expected to make decisions as a body and will achieve its objectives through activities that build on the talents, knowledge and actions of its individual members by:

- Facilitating information exchange about local or regional projects.
- Supporting members by sharing information, research and best practices.
- Apprise the public of topical and important matters that affect us all.
- Identifying areas of public policy that require attention and projects that deserve attention or support of Forum members. ~~policy that require attention and projects that deserve the support of the Forum members.~~
- Assessing progress through the benchmark, monitoring, and program assessments; and

- Promoting transparency and accessibility by the Forum members.

8. Logistics (Organizing and Facilitating)

The role of the Howe Sound Biosphere Region Initiative Society as the convening organization is to:

- Maintain and make publicly available a historical record of the past forums
- Work with future hosts and appointed host representative(s) to plan and organize future forums
- Maintain contact records of invitees and appointed representatives of the members
- Recommend topics and themes of relevant interest to the Forum members.
- Develop and maintain respectful interactions and communications
- Plan, organize and coordinate the logistics and technology for successful engagement and attendance
- Initiate, manage and maintain invitations, attendance and respond to requests
- M/C the event to ensure members and observers are participating respectfully
- Manage the recording of the event and items for follow-up.
- Negotiate costs, manage budget, bookkeeping, and prompt payments.

The role of the host community is to:

- Budget and fund the costs of hosting a forum which includes costs of:
    - Venue for up to 70 people
    - A/V equipment needs
    - Catering
    - HSBRIS convening costs
    - Negotiable extras such as transportation, post tour, honorariums
- Appoint representatives to be the point of contact for planning and support before, during and after the event.

Therefore, unless explicitly expressed, all the Howe Sound Community Forum members commit to respecting the Principles for Cooperation.

It is understood the Principles for Cooperation may be amended from time to time and will be circulated to members and participants in advance of each Forum.

May 2022

Principles for Cooperation
Átl'ka7tsem/Howe Sound Community Forum

To provide an overview of the need, purpose and structure for cooperative efforts by interested local governments and First Nations operating on the unceded territory of the Coast Salish Peoples in the Átl'ka7tsem Howe Sound region.

1. Statement of Purpose

To provide a forum for elected representatives of local governments, Regional Districts and First Nations as well as federal and provincial elected members to have discussions focused on how to maintain and enhance the economic, environmental, cultural and social well-being of the Átl'ka7tsem/Howe Sound (the Region) for the benefit of present and future generations.

2. Rationale (The Need)

The Átl'ka7tsem/Howe Sound Community Forum (the Forum) will enhance collective action among local governments, regional districts and First Nations by:

- Providing a common forum for dialogue
- Sharing knowledge and information to avoid duplication of effort and to enhance any single organization's capacity for action
- Promoting the use of transparent processes that encourage awareness and involvement.
- Providing a forum for gaining a better understanding of and from First Nations peoples in the Region.

3. Scope

The Átl'ka7tsem/Howe Sound region includes the marine waters and all the lands that drain into these waters, the surrounding airshed on the east side of the Salish Sea (Strait of Georgia) between Point Atkinson and Gower Point and interested adjacent communities.

4. Common Vision

The Forum envisions that communities within the Region can be healthy, productive, and sustainable by:

- understanding the use and occupancy of the region by the Squamish Nation/Skwxwú7mesh Úxwumixw, who have occupied and managed Átl'ka7tsem for many thousands of years;
- building appreciation for the spiritual and cultural values of the region;
- understanding, promoting and implementing best practices, including traditional practices;
- promoting compact and complete communities;
- encouraging safe and livable communities;
- encouraging an integrated transportation system;

- preserving a healthy and natural environment;
- nurturing cultural heritage;
- supporting sustainable use of resources;
- fostering a vibrant and dynamic economy;
- raising awareness about land use; and
- ensuring the public is informed and encouraged to be active.

5. Shared Values

The Forum will involve the collective efforts of First Nations and a wide variety of governments, non-government organizations, the private sector, educational institutions and individuals to pursue the following values and objectives. The Forum shares the following values and objectives.

Value…Recognition of Indigenous Rights and Titles

Objective – Respect and support of Aboriginal Rights and Title, traditional knowledge and sacred places….

Value...Spirit of Sharing

Objective - The many interests and organizations in the Region can strengthen the effectiveness of programs by openly sharing information and knowledge.

Value... Action Orientation

Objective - The Forum will encourage groups to take actions that produce positive observable results and public benefit to communities.

Value...Efforts towards Sustainability

Objective – The Forum members recognize the need to effectively manage and maintain a balanced relationship between community development and the protection of First Nations sacred places and cultural qualities, and the unique biophysical and environmental qualities of the Region.

Value.. The need for Cooperation and observing protocol

Objective -Governments, First Nations and organizations will be encouraged to work together.

Value...Stewardship

Objective - Voluntary action of individuals and organizations as a powerful and effective tool for achieving positive results.

Value... Transcending Jurisdictions

Objective - The Forum will encourage communities to work together for the greater good because jurisdictional lines on a map mean nothing in terms of sustainability.

Value...Focus and Transparency

Objective - Forum member programs will encourage clear objectives and use accountable processes that are available to Forum members and the public.

Value... Respect for Diversity

Objective - It is recognized that while every member of the Forum may have a different focus or interest, they are encouraged to acknowledge a shared interest in the sustainability of the Region.

6. Structure (The Members)

A hosting community from the membership will work cooperatively with the Howe Sound Biosphere Region Initiative Society (HSBRIS) as the convening organization.

The hosting community will rotate among the Forum members, and meetings will be held bi-annually, or more frequently, as requested by any member or as predicated by local issues.
Task forces or subforums may be established to focus on specific projects.
Charter members of the Átl'ka7tsem/Howe Sound Community Forum include elected representatives of the following communities:

Bowen Island Municipality	Squamish Nation/Skwxwú7mesh Úxwumixw
Gambier Island Local Trust Committee	Sunshine Coast Regional District
Town of Gibsons	Village of Lions Bay
Metro Vancouver Regional District	District of West Vancouver
District of Squamish	Resort Municipality of Whistler
Squamish-Lillooet Regional District	

West Vancouver/Sunshine Coast/Sea to Sky Member of Parliament
Powell River/Sunshine Coast Member of the Legislative Assembly
West Vancouver/Sea to Sky Member of the Legislative Assembly

6. Other Participants

Neighbouring communities, First Nations, organizations and members of society who have a shared interest in the region and support these Principles for Cooperation are welcome to participate in the forums as observers and/or presenters.

7. Activities (Action and Results)

The Forum members are not expected to make decisions as a body and will achieve its objectives through activities that build on the talents, knowledge, and actions of its individual members by:

- Facilitating information exchange about local or regional projects.
- Supporting members by sharing information, research, and best practices.
- Apprise the public of topical and important matters that affect us all.
- Identifying areas of public policy that require attention and projects that deserve the attention or support of the Forum members.
- Assessing progress through the benchmark, monitoring, and program assessments; and
- Promoting transparency and accessibility by the Forum members.

8. Logistics (Convening, organizing and facilitating)

The role of the Howe Sound Biosphere Region Initiative Society as the convening organization is to:

- Maintain and make publicly available a historical record of the past forums
- Work with future hosts and appointed host representative(s) to plan and organize future forums
- Maintain contact records of invitees and appointed representatives of the members
- Recommend topics and themes of relevant interest to the Forum members.
- Develop and maintain respectful interactions and communications
- Plan, organize and coordinate the logistics and technology for successful engagement and attendance
- Initiate, manage and maintain invitations, attendance and respond to requests
- M/C the event to ensure members and observers are participating respectfully
- Manage the recording of the event and items for follow-up.
- Negotiate costs, manage budget, bookkeeping, and prompt payments.

The role of the host community is to:

- Budget and fund the costs of hosting a forum which includes costs of:
    - Venue for up to 70 people
    - A/V equipment needs
    - Catering
    - HSBRIS convening costs
    - Negotiable extras such as transportation, post tour, honorariums
    - Appoint representatives to be the point of contact for planning and support before, during and after the event.

Therefore, unless explicitly expressed, all the Howe Sound Community Forum members commit to respecting the Principles for Cooperation.

It is understood the Principles for Cooperation may be amended from time to time and will be circulated to members and participants in advance of each Forum.

May 2022

Logo here

ATTACHMENT 4

Átl'ka7tsem/Howe Sound Biosphere Region Initiative
Collaborating for a Sustainable Future

Memorandum of Understanding (DRAFT)

between

Howe Sound Biosphere Region Initiative Society ("HSBRIS")

and

Metro Vancouver Regional District ("Metro Vancouver")

In this memorandum, these terms have the following meanings:

- UNESCO — United Nations Educational, Scientific and Cultural Organization
- AHSUBR — Átl'ka7tsem/Howe Sound UNESCO Biosphere Region
- HSBRIS — Howe Sound Biosphere Region Initiative Society
- AHSCF — Átl'ka7tsem/Howe Sound Community Forum

1) The Átl'ka7tsem/Howe Sound UNESCO Biosphere Region (AHSUBR)

AHSUBR is located in the territory of the Sḵwx̱wú7mesh Úxwumixw (Squamish Nation People). The In-SHUCK-ch, q̓ićəy̓ (Katzie), Líl̓wat, xʷməθkʷəy̓əm (Musqueam), shíshálh (Sechelt), Stó:lō, səlilwətaɬ (Tsleil-Waututh) Nations, and First Nations within the St'at'imc Chiefs' Council (includes Lillooet Tribal Council Bands), and the Hul'qumi'num Treaty Group have claims in the region.

a) The AHSUBR boundary follows the partial watershed from the height of land to the bottom of the ocean and includes lands and communities within three regional districts – Metro Vancouver (West Vancouver, Bowen Island, Lions Bay and Electoral Area A), Sunshine Coast (Gibsons and Areas E, Elphinstone and F West Howe Sound) and Squamish-Lillooet (Furry Creek, Britannia Beach, Squamish and Brackendale).
b) The AHSUBR is 218,723 hectares, 84% terrestrial and 16% marine. 6% of the AHSUBR is Rural Regional District and Reserve Lands, 5% of the terrestrial is privately owned or "urban" and 89% of the terrestrial area is under the management and shared stewardship of the Province of BC and First Nations.

2) Howe Sound Biosphere Region Initiative Society (HSBRIS)

HSBRIS is a B.C. registered non-profit Society and is responsible for the management of the AHSUBR through the Nchu'ú7mut/Unity Plan; and for advancing the objectives of UNESCO Biosphere Regions (biodiversity

conservation, sustainable development, reconciliation, model regions for learning, research and monitoring). UNESCO Biosphere Region organizations provide logistic support.

HSBRIS' priorities are to:

a) Advance Sustainable Development. Key partnerships and adequate supports, data and tools are in place for planning gaps across the region to be filled and the region's sustainability targets are defined and embedded with the UN's Sustainable Development Goals (SDGs) in the planning and decision-making processes.
b) Advance Biodiversity Conservation. Key partnerships work to further education, monitoring, and research, fill knowledge gaps, and increase stewardship and connection to place.
c) Advance Reconciliation, Equity & Inclusion. The AHSUBR roundtable and forums for convening in an ethical space are well established to further the relationships, dialogue and understanding in the context of all AHSUBR nations and communities.

HSBRIS provides logistic support through programs aimed at strengthening collaboration for a sustainable future. Programs include communications, convening and facilitating, advising and coordinating projects.

HSBRIS provides support to the Átl'ka7tsem/Howe Sound Community Forum and other subcommittees of the forum by planning, coordinating and reporting. HSBRIS maintains a trusted role.

3) Metro Vancouver Electoral Area A

Metro Vancouver has 23 members: 21 municipalities, one Treaty First Nation and one Electoral Area. Electoral Area A is the unincorporated area of the regional district.

Metro Vancouver acts as the local government for Electoral Area A, providing certain key services. Electoral Area A occupies approximately 818 Km^2 of land and includes the following communities and inhabited areas that are located within the Átl'ka7tsem/Howe Sound region boundary:

- Lands along Howe Sound, located between the District of West Vancouver and Squamish-Lillooet Regional District (excluding the Village of Lions Bay). This includes the communities of Ocean Point, Strachan Point and Montizambert Wynd.
- Bowyer and Passage Islands (in Howe Sound)

Metro Vancouver has developed an Official Community Plan (OCP) for parts of Electoral Area A, which was adopted in 2018 and follows the collective vision of *Metro Vancouver 2040: Shaping our Future*, the regional growth strategy. The vision statement for Howe Sound communities of Electoral Area A in the OCP states:

> *Howe Sound is envisioned as a quiet and peaceful area to live and to access marine and mountain recreational opportunities. Residents feel protected against threats from fire, highway traffic and rail movement. New development is limited, as this area has servicing and access constraints, and falls beyond the urban containment boundary. Any activity causing disturbance to the natural environment considers the local waterfront / mountainside character and impacts on drinking water and highway access.*

4) The Átl'ka7tsem/Howe Sound Community Forum and the Principles of Cooperation

The purpose of the AHSCF is to provide a forum for local governments, regional districts and First Nations to have discussions on how to maintain and enhance the economic, environmental, cultural and social well-being

of the Howe Sound for the benefit of present and future generations. The Principles of Cooperation is a document that all members, local governments, regional districts and First Nations, signed in 2002. The Principles of Cooperation state the need, scope, common vision, shared values and structure of the forums.

5) Relevant Background

In the late 1990s, the Greater Vancouver Regional District (now Metro Vancouver) funded a process that brought together the Squamish and Sechelt First Nations, the elected officials of the three Regional Districts, and the Islands Trust. Staff from Provincial and Federal Ministries and municipalities, societies such as the Fraser Basin Council, industry, environmentalists, recreational leaders and the public at large were also invited to discuss the possibility of a Howe Sound Regional District.

This resulted in the development of the Principles for Cooperation with the GVRD (now Metro Vancouver) being a signatory to in 2002. Metro Vancouver's Electoral Area A Director has been an active member of the Forums and its committees. Electoral Area A co-hosted a community forum in 2017.

The convening of the Howe Sound Community Forum has been conducted by Ruth Simons since 2014. Ruth Simons is now the Executive Director of the Howe Sound Biosphere Region Initiative Society.

Metro Vancouver supported the nomination of Átl'ka7tsem/Howe Sound as a UNESCO Biosphere Region in principle through Board resolution in July 2017. In November 2019, Metro Vancouver provided a letter of support that was included in the nomination package.

6) It is understood:

Metro Vancouver will support and cooperate with the HSBRIS as it manages the AHSUBR and the Howe Sound Community forums and sub-committees. In doing so Metro Vancouver will act as an ambassador for the UNESCO Biosphere Region through consideration of the following, as Metro Vancouver deems appropriate, and as further detailed in Appendix A to this memorandum:

- Assigning a staff liaison position to be the main point of contact with HSBRIS.
- Continue as active and engaged participants in the Átl'ka7tsem/Howe Sound Community Forum.
- Budget for and co-host or host a forum in the future.
- Support the Principles of Cooperation and the Nchu'ú7mut/Unity Plan through the contribution of information.
- Consider the priority goals and objectives of the Nchu'ú7mut/Unity Plan through the contribution of information.
- Promote and reference with pride the AHSUBR UNESCO Biosphere Region.
- Consider potential funding resources for HSBRIS for educational opportunities and beneficial projects through grants and/or in-kind support.

This memorandum is not legally binding. This memorandum represents a non-legally binding framework for collaboration between HSBRIS and Metro Vancouver.

It is also understood this memorandum of understanding will be reviewed every new Board term and may be amended at any time by mutual agreement.

On behalf of Metro Vancouver Regional District	On behalf of Howe Sound Biosphere Region Initiative Society
_____	_____
_____	Ruth Simons, Executive Director
Date Signed: _____	Date Signed: _____

Memorandum of Understanding
Appendix A

1. **Assigning a staff liaison position as the main point of contact with HSBRIS.**

   This role is intended to involve knowledge transfer by attending meetings on behalf of the local government, responding to requests from HSBRIS that fall within this memorandum of understanding, and communicating back to staff and the Board. The person appointed is intended to have and share knowledge, contribute perspectives, and be knowledgeable of the history and the principles of the tl'ka7tsem/Howe Sound UNESCO Biosphere Region and the Nchu'ú7mut/Unity Plan. They would attend meetings and maintain relationships and good communications while respecting the policy direction of the local government.

2. **Continue as active and engaged participants in the Howe Sound Community Forum.**

   It is intended that representatives of the local government's Board and staff will attend the bi-annual forums and sub-committees and will report back to the Board. The local government will consider updates to the Principles for Cooperation as these may occur and as may be agreed upon by community forum members.

3. **Budget for and co-host or host a forum in the future.**

   The local government may offer to host a forum at any time. It is intended that forums will follow a rotating schedule of the members.

4. **Support the Principles of Cooperation and the Nchu'ú7mut/Unity Plan through the contribution of information.**

   Consider the priority goals and objectives of the Nchu'ú7mut/Unity Plan in Electoral Area A policy and planning decisions.

5. **Promote and reference with pride the AHSUBR UNESCO Biosphere Region designation.**

The local government will work with HSBRIS communications and reference the AHSUBR UNESCO Biosphere Region designation on its website, signage, and other communication, as the local government deems appropriate, and having regard to the branding guidelines of UNESCO and HSBRIS where appropriate.

6. Consider the priority goals and objectives of the Nchu'ú7mut/Unity Plan in Electoral Area A policy and planning decisions

UNESCO Biosphere Regions require a management plan that considers the land and marine use of the Biosphere Region. The management plan, referred to as Nchu'ú7mut/Unity Plan, serves as a guiding document.

7. Consider potential funding resources for HSBRIS for educational opportunities and beneficial projects.

This may include potential opportunities to support resources for secretariat services, educational opportunities, and beneficial projects through potential grants and/or in-kind support.

These potential opportunities may be in the form of:

- Additional fees on commercial filming permits
- Create a nature tax, or service area tax
- Grants in-aid
- An annual contribution for secretariat services
- Funding a portion of project costs or matching funds with other government or funding contributions
- In-kind time of staff resources
- Waiving costs of meeting rooms

To: Climate Action Committee

From: Johann Zerbe, Policy Analyst
Conor Reynolds, Division Manager, Air Quality and Climate Change Policy
Parks and Environment Department

Date: August 15, 2022 Meeting Date: September 9, 2022

Subject: **BC Local Government Climate Action Program (LGCAP)**

RECOMMENDATION

That the Climate Action Committee receive for information the report dated August 15, 2022, titled "BC Local Government Climate Action Program (LGCAP)".

EXECUTIVE SUMMARY

In May 2022, the BC government announced the new Local Government Climate Action Program (LGCAP), which will provide funding to eligible local governments and Modern Treaty Nations for climate action initiatives to reduce emissions and increase climate resilience. LGCAP replaces the Climate Action Revenue Incentive Program (CARIP) which was cancelled in 2021.

Funding under LGCAP is based on each community's population and a base amount, and most communities will receive an increase in provincial funding for climate action compared to CARIP. From 2022 to 2025, Metro Vancouver will receive $250,000 per year under LGCAP, compared to amounts ranging from 200,000 to 220,000 in recent years.

LGCAP includes a number of reporting requirements for 2022, including reporting on corporate greenhouse gas (GHG) emissions, community GHG emissions, and reporting on projects linked to the objectives of the provincial *CleanBC Roadmap to 2030* and/or the *Climate Preparedness and Adaptation Strategy*.

PURPOSE

To inform the Climate Action Committee of the new LGCAP program, expected funding under the program, and eligibility and reporting requirements of local governments.

BACKGROUND

On May 11, 2021, the BC government announced the cancellation of the Climate Action Revenue Incentive Program (CARIP) without prior consultation with local governments. The Mayors Committee and MVRD Board considered this matter, recognizing the potential impact on local government climate action, and referred the matter to the Climate Action Committee. At its meeting on June 10, 2021, the Climate Action Committee considered the report titled "Cancellation of Provincial Climate Action Revenue Incentive Program (CARIP)", and approved the following recommendation:

That the MVRD Board authorize the Board Chair to write a letter to the Provincial Minister of Municipal Affairs, Minister of Environment and Climate Change Strategy, and Minister of Finance, regarding the cancellation of the Climate Action Revenue Incentive Program, providing details of key elements to be retained in a replacement program and suggested improvements, based on the analysis in the report dated May 27, 2021, titled "Cancellation of Provincial Climate Action Revenue Incentive Program (CARIP)".

In May 2022, following a period of consultation with local governments, the new BC Local Government Climate Action Program (LGCAP) was announced. This report describes the new program, including the flexible and consistent funding that it provides, and conveys the first year of Metro Vancouver's reporting to the Province under this program.

BC LOCAL GOVERNMENT CLIMATE ACTION PROGRAM (LGCAP)

BC Climate Action Charter

As signatories to the BC Climate Action Charter, local governments have committed to measure and report GHG emissions, aim for carbon neutrality in their own operations, and plan compact, energy efficient communities. CARIP was created by the Province as a reporting and funding framework for signatories to the Charter. Participants were required to annually report their climate actions, quantify the GHG emissions associated with corporate operations, and demonstrate progress towards carbon neutrality. Local governments that fulfilled these requirements were eligible to receive a refund of their carbon taxes paid on direct fuel purchases. Since the inception of the Climate Action Charter, 187 of 190 municipalities, regional districts and the Islands Trust have signed on and have been publicly reporting their climate actions, including Metro Vancouver and all of its member municipalities.

As a signatory to the Charter, Metro Vancouver has committed to measuring and reporting GHG emissions, reducing corporate emissions, and becoming carbon neutral in its operations. Report 5.3 in this agenda package, dated August 15, 2022, titled "Managing Metro Vancouver's Corporate Energy and Greenhouse Gas Emissions (2017 to 2021)", provides quantitative information on Metro Vancouver's corporate emissions as well as its carbon neutral reporting.

Announcement of BC Local Government Climate Action Program

On May 16, 2022, the BC government announced the Local Government Climate Action Program (LGCAP), which provides funding to local governments and Modern Treaty Nations to support the implementation of climate change mitigation and adaptation projects (Reference 1). Similar to CARIP, LGCAP provides stable, predictable funding to local governments for climate action initiatives, and includes annual reporting requirements, including to measure and report corporate and community GHG emissions, demonstrate investment in climate action initiatives, and report on projects linked to the objectives of the provincial *CleanBC Roadmap to 2030* and/or the *Climate Preparedness and Adaptation Strategy*.

Funding for Climate Action

The LGCAP funding model aims to distribute funding more equitably between smaller and larger communities. Funding is based on each community's population and a base amount, and most

communities will receive an increase in provincial funding for climate action compared to CARIP, with smaller communities receiving the largest proportional increase. Previously, funding was distributed to local governments based on the amount of carbon tax paid. For 2022, Metro Vancouver will receive $250,000, similar to what was received in 2021. Funding amounts will not change for the first 3 years. In their annual reporting, local governments must confirm commitment of matching funds equivalent to 20% of the amount received. Funding for the first year of the program will be disbursed on August 31, 2022.

New Reporting Requirements

In addition to being signatories to the BC Climate Action Charter, local governments are required to meet a number of reporting requirements to be eligible for the first year of funding. For the first year of the program, local governments are required to: measure and report corporate GHG emissions; report on community emissions where data is available; report on projects linked to one or more objectives from the *CleanBC Roadmap to 2030* and/or the *Climate Preparedness and Adaptation Strategy*, including climate action initiatives related to buildings, transportation, community initiatives, and climate resilience. For 2022, local governments fulfilled these reporting requirements by completing an online survey form, which they are required to publicly post online. Additional reporting requirements are expected to be introduced in future years of the program.

The province of BC will use information collected in its annual Climate Change Accountability Report, to track progress, highlight climate leadership and advance further action. For 2022, Metro Vancouver's survey highlights a number of initiatives implemented in 2021, many of which were included in the Climate 2050 Snapshot (Reference 2), reported to the Committee in June 2022. As per the Provincial requirements, Metro Vancouver has posted its survey responses on the Metro Vancouver website (Reference 3 - 'Metro Vancouver's Local Government Climate Action Program Response').

The BC Climate Action Toolkit (Reference 4) is a website available to help local governments meet the new program requirements. The website has been redesigned to further highlight best practices and other resources for local government climate action.

ALTERNATIVES

This is an information report. No alternatives are presented.

FINANCIAL IMPLICATIONS

Metro Vancouver will receive LGCAP funding of $250,000 in 2022, and the following two years, which will be used to directly support Metro Vancouver's corporate and regional climate action projects and programs. This new climate action funding program provides a continuation of provincial funding that was previously delivered under the Climate Action Revenue Incentive Program (CARIP). Consistent funding for Metro Vancouver's climate action projects and program is critical for the implementation of actions in the *Climate 2050 strategy*, which in turn are needed if the province is to reach its GHG reduction targets in the *CleanBC Roadmap to 2030.*

CONCLUSION

Metro Vancouver and its member jurisdictions are advancing innovative climate actions that are critical to enabling the Province to meet its *CleanBC* GHG reduction targets. The provision of consistent flexible funding for climate action under the LGCAP will directly support Metro Vancouver's corporate and regional climate action projects and programs as outlined in *Climate 2050*, which aim to reduce emissions and transition to a more resilient region. The reporting requirements under LGCAP align with Metro Vancouver's existing climate reporting practices, and support Metro Vancouver's commitment to provide transparent reporting on progress to implement the Climate 2050 roadmaps.

References

1. News Release: BC launches new program to accelerate local climate action (May 16, 2022)
2. Metro Vancouver Climate 2050 Snapshot 2021/2022
3. Metro Vancouver's Local Government Climate Action Program – 2022 Response
4. BC Climate Action Toolkit

54093289

To: Climate Action Committee

From: George Friedrich, Senior Project Engineer, Liquid Waste Services Department
Johann Zerbe, Policy Analyst, Parks and Environment Department
Nicole Chan, Project Engineer, Parks and Environment Department

Date: July 19, 2022 Meeting Date: September 9, 2022

Subject: **Managing Metro Vancouver's Corporate Energy and Greenhouse Gas Emissions (2017 to 2021)**

RECOMMENDATION

That the Climate Action Committee receive for information the report dated July 19, 2022, titled "Managing Metro Vancouver's Corporate Energy and Greenhouse Gas Emissions (2017 to 2021)".

EXECUTIVE SUMMARY

Metro Vancouver uses energy to provide services to the region. While some energy use generates greenhouse gas emissions, Metro Vancouver also produces clean, renewable energy for internal use and for sale to others. Metro Vancouver spent over $32 million in 2021 to purchase energy and maintain its energy generation systems. Metro Vancouver's 2021 energy use (1.6 million GJ), energy-related GHG emissions (25,300 tonnes CO2e), and costs ($32.4 million), were up 11%, 14%, and 30%, respectively, compared to 2014 (baseline year), while population has grown by 12%. Increases were driven by the need to transport the historic stockpile of land-dried biosolids at Iona Island Wastewater Treatment Plant, increased electricity purchases during the Annacis Island Wastewater Treatment Plant cogeneration system upgrade, and the installation of larger natural gas burners at the Waste-to-Energy Facility to meet new regulatory requirements. To help manage energy costs and reduce greenhouse gas emissions, Metro Vancouver is working on developing corporate energy and GHG emissions reduction targets in 2022 that align with *Climate 2050* targets.

PURPOSE

To inform the Climate Action Committee of trends in Metro Vancouver's corporate energy use, energy costs, and greenhouse gas (GHG) emissions for 2017 through 2021 and to provide an overview of energy and GHG emissions management actions.

BACKGROUND

As a signatory to the BC Climate Action Charter, Metro Vancouver has committed to measuring and reporting greenhouse gas emissions, reducing corporate emissions, and becoming carbon neutral in its operations. In 2022, the BC government replaced the Climate Action Revenue Incentive Program (CARIP) with the Local Government Climate Action Program (LGCAP). Like CARIP, LGCAP provides stable, predictable funding to local governments for climate action initiatives, and includes annual reporting requirements. Report 5.2 in this agenda, titled "BC Local Government Climate Action Program (LGCAP)", provides additional information on the new program.

As part of the *Climate 2050* strategy, the Metro Vancouver Board has adopted regional targets to become a carbon neutral region by 2050, with an interim target of reducing GHG emissions by 45% from 2010 levels by 2030. Corporate energy and GHG management will seek to align with *Climate 2050* targets, while maintaining delivery of all Metro Vancouver's services.

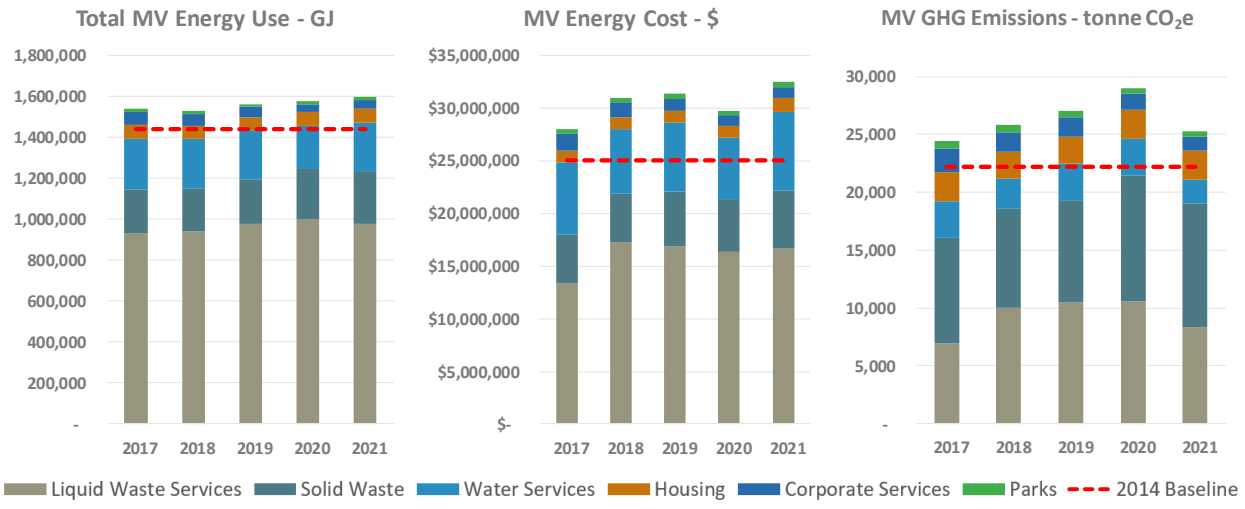
A suite of corporate policies that emphasize Metro Vancouver energy and GHG management have been adopted since 2014, including the *Corporate Energy Management Policy*, *Carbon Price Policy*, *Fleet Planning and Acquisition Policy*, *Sewage and Waste Heat Recovery Policy*, and the *Sustainable Infrastructure and Buildings Policy*. Specifically, the *Corporate Energy Management Policy* articulates Metro Vancouver's commitment to continuously improving the efficiency of its energy use, production, generation, and recovery, as well as establishing energy targets, and regularly reporting on progress toward those targets.

METRO VANCOUVER'S ENERGY AND EMISSIONS PROFILE

Metro Vancouver and its contractors purchase energy to power facilities, buildings, and fleets in order to provide vital services to the region. In addition to using purchased energy, Metro Vancouver also "self-generates" a substantial amount of energy. In most cases, this self-generated energy is used by Metro Vancouver, though Metro Vancouver does sell energy to BC Hydro and FortisBC.

Metro Vancouver's purchased energy cost (primarily electricity, natural gas, diesel, and gasoline) exceeded $32.4 million in 2021, an increase of 30% over the baseline year of 2014. Total energy use (including both purchased and self-generated energy) for 2021 was 1.6 million GJ, an increase of 11% over the 2014 baseline. Total energy use resulted in corporate GHG emissions of 25,300 tonnes carbon dioxide-equivalent (CO_2e) in 2021, an increase of 14% over 2014. Regional population has increased approximately 12% over this same time period.

"Metro Vancouver Annual Corporate Energy and Greenhouse Gas Emissions Management Report 2017 to 2021" (Attachment 1) summarizes the five-year trend in energy and emissions for Metro Vancouver's operations. It provides details on trends in energy use, energy costs, and GHG emissions by service area. The 5 year trends are summarized as follows.



Establishing Corporate Energy and GHG Emissions Reduction Targets

In its 10-Year Plan (published in 2019), Metro Vancouver Housing committed to reducing energy consumption by 25% (from 2015 National Energy Code for Buildings) for major rehabilitations and new construction, and to reducing GHG emissions in the Housing portfolio by 45% by 2030 compared to 2010 levels. Liquid Waste Services has committed to reducing energy use by 10% compared to 2019, by 2030. In 2020, all Metro Vancouver departments committed to setting energy and GHG emissions targets. This process is ongoing and the targets will be established in 2022.

Managing Energy Use and Energy Costs

Metro Vancouver's Corporate Energy Management Program aims to identify and implement energy savings opportunities in the operation and maintenance of existing facilities, and to ensure new facilities are designed with an energy-efficiency lens. Since the *Corporate Energy Management Policy* was adopted in 2014, up to the end of 2021, energy conservation projects implemented by the program have resulted in cumulative energy savings of more than 324,000 GJ, resulting in cumulative operating cost savings of approximately $8.5 million and ongoing savings of over $1.7 million per year. Despite these efforts, Metro Vancouver's total energy use has been trending upwards, increasing 11% in 2021 compared to 2014, though per-capita energy use has remained relatively constant. Much of the increased energy usage can be attributed to the operation of major new facilities such as the Capilano Raw Water Pump Station (2015) as well as increases in fossil fuel use for Iona Island WWTP residuals hauling and Waste-to-Energy Facility operation.

Corporate GHG Emissions and Trends

Total corporate GHG emissions from all energy use were 25,300 tonnes carbon dioxide-equivalent (CO_2e) in 2021, an increase of 14% over 2014. This increase is driven by increases in fossil fuel use for transporting the historic stockpile of land-dried biosolids at Iona Island WWTP, and increased natural gas use at the Waste-to-Energy Facility after the installation of larger natural gas burners in 2018 to meet new regulatory requirements in the facility's provincial Operational Certificate.

Fossil-based emissions from combustion of municipal solid waste at the Waste-to-Energy Facility were 131,820 tonnes CO_2, an increase of 22% compared to 2014, as the disposal ban on organic materials in 2015 has led to an increase in the proportion of non-biogenic GHG emissions, along with the increase in natural gas use noted above.

2021 Carbon Neutral Reporting

"Metro Vancouver's 2021 Carbon Neutral Reporting" (Attachment 2) reports on a subset of energy-related emissions associated with the delivery of "traditional local government services", which excludes emissions such as those from Metro Vancouver Housing services, the Waste-to-Energy Facility, and certain contracted emissions. This scope of services is defined in the provincial Carbon Neutral Framework for local governments, which was established under the BC Climate Action Charter. In 2021, these emissions were 18,102 tonnes CO_2e. Metro Vancouver implements a portfolio of non-energy related emission reduction projects to achieve measurable and verifiable regional GHG emissions reductions, and claims GHG reduction credits from these projects to balance emissions from traditional local government services. For 2021 these projects include a landfill gas collection system, several avoided forest conversion projects and the ecological restoration of Burns Bog. As a result of these credit projects, Metro Vancouver has maintained carbon neutrality for 2021, which is

the third consecutive year that carbon neutrality has been achieved, under the provincial Carbon Neutral Framework.

Regional Clean, Renewable Energy Projects

Metro Vancouver produces, recovers, and uses substantial amounts of clean and renewable energy as part of its operations, which can affect the cost and emissions associated with purchased energy. Although energy recovery and production is not part of Metro Vancouver's core mandate, energy opportunities are examined where there is the potential for regional emissions reductions, renewable energy provision to the region, or significant revenue generation. As part of its *Climate 2050* strategy, Metro Vancouver has developed the draft Energy Roadmap that includes strategies and actions to transition to 100% clean, renewable and resilient energy in the region by 2050; this Roadmap will include regionally significant corporate actions that support this goal.

Metro Vancouver is pursuing a number of projects to produce, recover, and use or sell clean, renewable energy, which include: production of biogas and upgrade of this to renewable natural gas; production of biocrude through hydrothermal processing; electricity generation; alternative fuel recovery from solid waste; and recovery of waste heat from the Waste-to-Energy Facility and sewage collection network. A complete list of projects and opportunities, which are either underway or are being explored, is included in Attachment 1.

ALTERNATIVES

This is an information report. No alternatives are presented.

FINANCIAL IMPLICATIONS

There are no financial implications to this report. Energy purchases and resources associated with corporate energy and GHG reduction actions were included and approved under the 2022 budget. Continued action on energy and GHG reduction will be brought back to the Committee and Board in coordination with departmental budgeting and work planning processes.

CONCLUSION

Metro Vancouver aims to manage both energy and GHG emissions in a manner that balances service quality and reliability, fiscal responsibility, and works towards Metro Vancouver's commitment to reducing corporate emissions, achieving corporate carbon neutrality, and a carbon-neutral region. Metro Vancouver undertakes a range of regionally significant clean, renewable energy projects to work towards these goals. However, energy use and costs, as well as GHG emissions, continue to increase. As part of the implementation of the *Corporate Energy Management Policy* and *Climate 2050*, Metro Vancouver seeks to reduce energy use and costs by setting energy and GHG emissions targets by service area. Reporting on progress toward achieving these targets will be provided at regular intervals.

Attachments

1. "Metro Vancouver's Annual Corporate Energy and GHG Emissions Management Report: 2017 to 2021", dated, July 15, 2022
2. "Metro Vancouver's 2021 Carbon Neutral Reporting", dated July 15, 2022

52669396

Metro Vancouver Annual Corporate Energy and Greenhouse Gas Emissions Management Report

2017 to 2021

15 July, 2022

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. EXECUTIVE SUMMARY

Metro Vancouver and its contractors used more than 1.6 million gigajoules (GJ) of energy in 2021 costing $32.4 million and resulting in 25,300 tonnes of carbon dioxide equivalent (CO_2e) greenhouse gas (GHG) emissions. In 2021, Liquid Waste Services was Metro Vancouver's largest energy user followed by Solid Waste Services, Water Services, Housing, Corporate Services, and Regional Parks. Figure 1, below, summarizes five-year trends in energy use, energy costs, and GHG emissions from energy use.

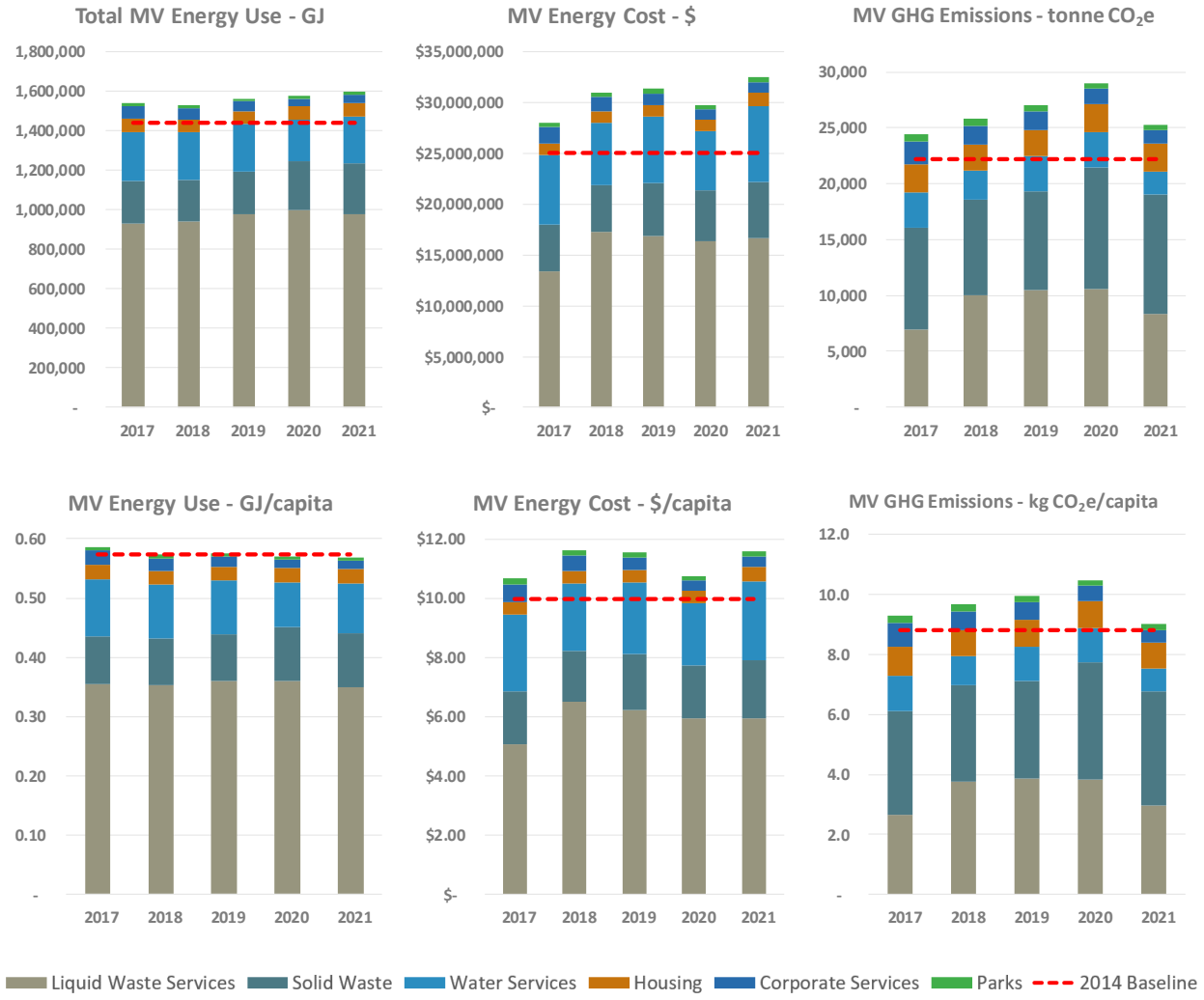


Figure 1: Five-Year Trends by Service Area

As shown in Figure 1, 2021 Corporate energy use has increased by 11% compared to 2014 (Metro Vancouver's energy management baseline year), energy costs have increased by 30%, and GHG emissions associated with energy use have increased by 14%. Much of the cost increase seen from 2017 to 2021 was the result of increased electricity purchases required while the Annacis Island Wastewater Treatment Plant cogeneration engines were taken out of service in late 2017 to enable the cogeneration system upgrade. Commissioning of the new upgraded system began in 2020 and continued to mid-2021. Also

shown in Figure 1 and compared to 2014, per capita energy use has remained relatively constant, per capita energy cost has increased by 16% and per capita GHG emissions have increased by 2%. Variability in GHG emissions is driven largely by increases in Liquid Waste Services purchased electricity and fossil fuel use for residuals management, Solid Waste Services fossil fuel use for Waste-to-Energy Facility operation, and annual changes to the GHG emissions intensity factor for grid electricity.

Energy efficiency projects completed from 2014 through 2021 have contributed to savings of nearly 47,000 GJ per year. Cumulative cost savings from these projects over this period are estimated at $8.5 million and cumulative GHG emissions reductions are 4,564 tonnes CO_2e.

Progress has been made toward implementing corporate policies related to energy use and GHG emissions including the *Corporate Energy Management Policy*, the *Sustainable Infrastructure and Buildings Policy*, the suite of *Asset Management* policies, and development of the *Climate 2050* Roadmaps. Development of a Corporate Strategic Energy Management Plan including energy targets and establishing corporate GHG targets is underway for all service areas and is expected to be complete in 2022.

As part of the Climate 2050 Strategy, which commits to achieving a carbon neutral, resilient region by 2050, Metro Vancouver is committed to tracking and reporting its corporate GHG emissions, and working towards corporate carbon neutrality. In 2021, Metro Vancouver implemented emissions reduction projects to maintain carbon neutrality status for its delivery of traditional local government services, as defined in the provincial Carbon Neutral Framework for local governments, which was established under the BC Climate Action Charter.

2. INTRODUCTION

Energy plays a fundamental role in allowing Metro Vancouver to provide services to the region. Energy use represents one of Metro Vancouver's largest operating costs – totaling over $32 million in 2021 – and is Metro Vancouver's second-largest[1] source of presently-quantified corporate greenhouse gas (GHG) emissions. In 2021, Metro Vancouver used more than 1,500,000 gigajoules (GJ) of energy including both purchased energy – such as electricity, natural gas, diesel, gasoline, propane, and steam – and energy that Metro Vancouver self-generated. In addition to the energy that Metro Vancouver uses, it also generates and exports electricity at its Waste-to-Energy facility through combustion of municipal solid waste. This electricity is sold to BC Hydro. Liquid Waste Services has invested in a new biogas upgrading system and began selling renewable natural gas to FortisBC in 2021.

Effective energy and GHG emissions management is therefore critical to demonstrating Metro Vancouver's corporate fiscal responsibility and commitment to achieving corporate carbon neutrality.

This report presents Metro Vancouver corporate trends in energy use, energy cost, and GHG emissions for each service area from 2017 through 2021. All costs presented are actual costs in the year that they were incurred. Service areas examined in this report comprise Liquid Waste Services, Water Services, Solid Waste Services, Metro Vancouver Housing Corporation (Housing), Regional Parks (Parks), and Corporate Services. The report also provides updates on progress that Metro Vancouver has made in implementing corporate policies related to energy and GHG emissions management and an update on the role that Metro Vancouver staff play in participating in various energy and climate-related corporate initiatives.

[1] GHG emissions from the combustion of municipal solid waste at the Waste-to-Energy Facility are Metro Vancouver's largest source of corporate GHG emissions.

3. ENERGY PRODUCTION/GENERATION[2], USE, COST AND GHG EMISSIONS TRENDS

With the objectives of managing corporate GHG emissions and energy-related operating costs, Metro Vancouver's *Corporate Energy Management Policy* commits the organization to continuously improving the efficiency with which it uses and produces energy. This section summarizes trends in corporate Metro Vancouver energy use, energy costs (both purchased and self-generated), and GHG emissions related to energy use as well as trends in energy production/generation. These trends are compared to data from 2014: the year that the *Corporate Energy Management Policy* was adopted.

3.1 ENERGY UNIT COSTS

Energy costs play a significant role in the analyses and discussions that follow. Energy costs are driven by a combination of energy consumption – which Metro Vancouver can manage by establishing processes to design efficient systems and to operate and maintain those systems for peak efficiency – and energy unit rates over which Metro Vancouver has no control.

On a GJ basis, electricity represented 65% of the energy that Metro Vancouver and its contractors purchased in 2021 followed by fuel for mobile vehicles/equipment (20%), and natural gas for stationary equipment (14%). Small amounts of other stationary fossil fuels (diesel, gasoline, and propane) and steam were also purchased. Table 1 provides trends for aggregate energy unit rates (total cost divided by total energy use) for Metro Vancouver.

Table 1: Aggregate Energy Unit Rates

Metro Vancouver Aggregate Energy Unit Rates ($/GJ)											
	Year						Percent Change Relative to Baseline (2014)				
	Baseline (2014)	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
Electricity	$ 23.01	$ 26.72	$ 25.19	$ 25.52	$ 26.51	$ 26.04	16%	9%	11%	15%	13%
Stationary Fuels	$ 12.39	$ 9.04	$ 11.04	$ 10.30	$ 11.50	$ 12.86	-27%	-11%	-17%	-7%	4%
Steam	$ 20.43	$ 19.91	$ 20.88	$ 25.20	$ 25.29	$ 26.51	-3%	2%	23%	24%	30%
Mobile Energy	$ 36.28	$ 25.51	$ 32.39	$ 32.78	$ 25.60	$ 31.69	-30%	-11%	-10%	-29%	-13%

Notes:
Decrease (change less than zero)
Increase (change greater than zero)

With electricity representing 65% of energy purchases, electricity unit rates – which have increased by 13% compared to 2014 – largely drive corporate energy cost increases. From 2017 through 2020, fossil fuel unit rates have generally decreased compared to 2014, with the exception of the increase seen in 2021. Only one Metro Vancouver site (Housing's Regal Place) purchases steam, which is generated by Creative Energy using natural gas.

[2] In this report, *energy production* refers to the production of sources of energy (such as biogas produced at wastewater treatment plants) and *energy generation* refers to the conversion of energy sources into usable energy (electricity and heat)

3.2 ENERGY USE, COST, AND GHG EMISSIONS TRENDS BY SERVICE AREA

2021 Energy Use, Cost, and GHG Emissions Distribution by Service Area

Figure 2 presents the distribution of 2021 energy use, energy costs[3], and GHG emissions from energy use amongst all Metro Vancouver service areas. Energy costs presented in this report include costs for purchased energy (by Metro Vancouver and its contractors) as well as maintenance costs Metro Vancouver incurs in maintaining its own energy generation systems. GHG emissions from other sources are discussed in Section 4.

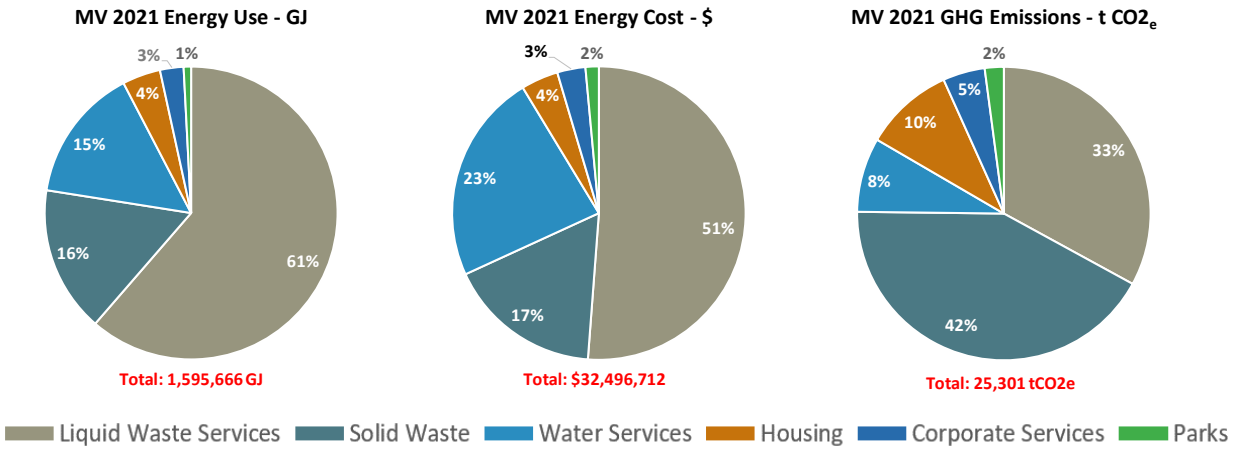


Figure 2: 2018 Energy Use, Cost, and GHG Emissions Distribution by Service Area

In recent years, Provincial guidelines for calculating GHG emissions from electricity use have used GHG emissions intensity factors that reflect only emissions from electricity generated within BC. In 2021, the Climate Action Secretariat announced that local governments will be required to use new annual emissions intensities – going back to 2010 – that also include emissions related to electricity imported into BC. These "Integrated Grid" factors are used throughout this report and have resulted in significantly increasing Metro Vancouver's corporate GHG emissions compared to the earlier reporting protocol. Future Integrated Grid factors will be incorporated into Metro Vancouver's reporting methodology as the Provincial Government updates the factors.

Table 2 provides annual integrated electricity grid GHG emissions intensities used in this report.

[3] All energy costs presented in this report are actual for the year those costs were incurred.

Table 2: Annual Integrated Grid Electricity Emission Intensity Factors

Year	tonnes CO_2e/GWh
2014	31.6
2015	34.2
2016	32.8
2017	31.7
2018	25.3
2019	29.9
2020	40.1
2021	9.7

The significant drop in 2021 relative to previous years is due to two primary changes in the methodology used to determine the intensity factor: a move from a "gross imports" basis to a "net imports" basis and from a 3-year rolling average to a 4-year rolling average. This updated methodology will be used going forward.

In 2021, Liquid Waste Services was the largest corporate energy user followed in order by Solid Waste Services, Water Services, Housing, Corporate Services, and Regional Parks. Energy costs in 2021 followed the same general trends with the exception of Water Services costs exceeding Solid Waste Services costs. GHG emissions intensities (mass of CO_2e emitted per unit of energy used) are greatest for fossil fuels such as natural gas, diesel, gasoline, and propane. In contrast, the majority of grid electricity in British Columbia is hydroelectrically generated and therefore considered a clean, renewable source of energy with low GHG emissions intensity. These relative differences in GHG emissions intensities is the reason that the GHG emissions pie chart shown in Figure 2 appear very different to the Energy Use and Energy Cost pie charts. Liquid Waste Services and Solid Waste Services use large amounts of fossil fuels to transport wastewater treatment residuals (biosolids, grit, and scum) and municipal solid waste, respectively; Solid Waste Services, Housing, and Corporate Services use significant quantities of natural gas. Water Services energy use is predominantly low-emissions – but high cost – electricity plus some fossil fuel use for managing residuals generated through the water treatment process at Seymour Capilano Filtration Plant.

The following sections present five-year trends in energy use, energy cost, and GHG emissions associated with energy use for Corporate Metro Vancouver and for each service area.

Metro Vancouver's Corporate Energy Management Policy commits the organization to continuous improvement in energy performance. Because energy use is often driven by variables outside Metro Vancouver's control, key performance indicators (KPIs) have been established for Corporate Metro Vancouver and for each service area to monitor progress toward meeting the continuous improvement objective. The following sections also present five-year KPI trends for the corporation and for each service area. For each metric, comparisons are drawn against 2014, Metro Vancouver's energy management baseline year.

Corporate Metro Vancouver

This section discusses energy trends for Corporate Metro Vancouver, the aggregate of all services areas: Liquid Waste Services, Solid Waste Services, Water Services, Housing, Parks, and Corporate Services. Figure 3 presents Metro Vancouver corporate five-year trends by service area for energy use, energy cost (including energy production/generation maintenance costs), and GHG emissions from energy use both gross and KPI-normalized; these data are tabulated in Table 3.

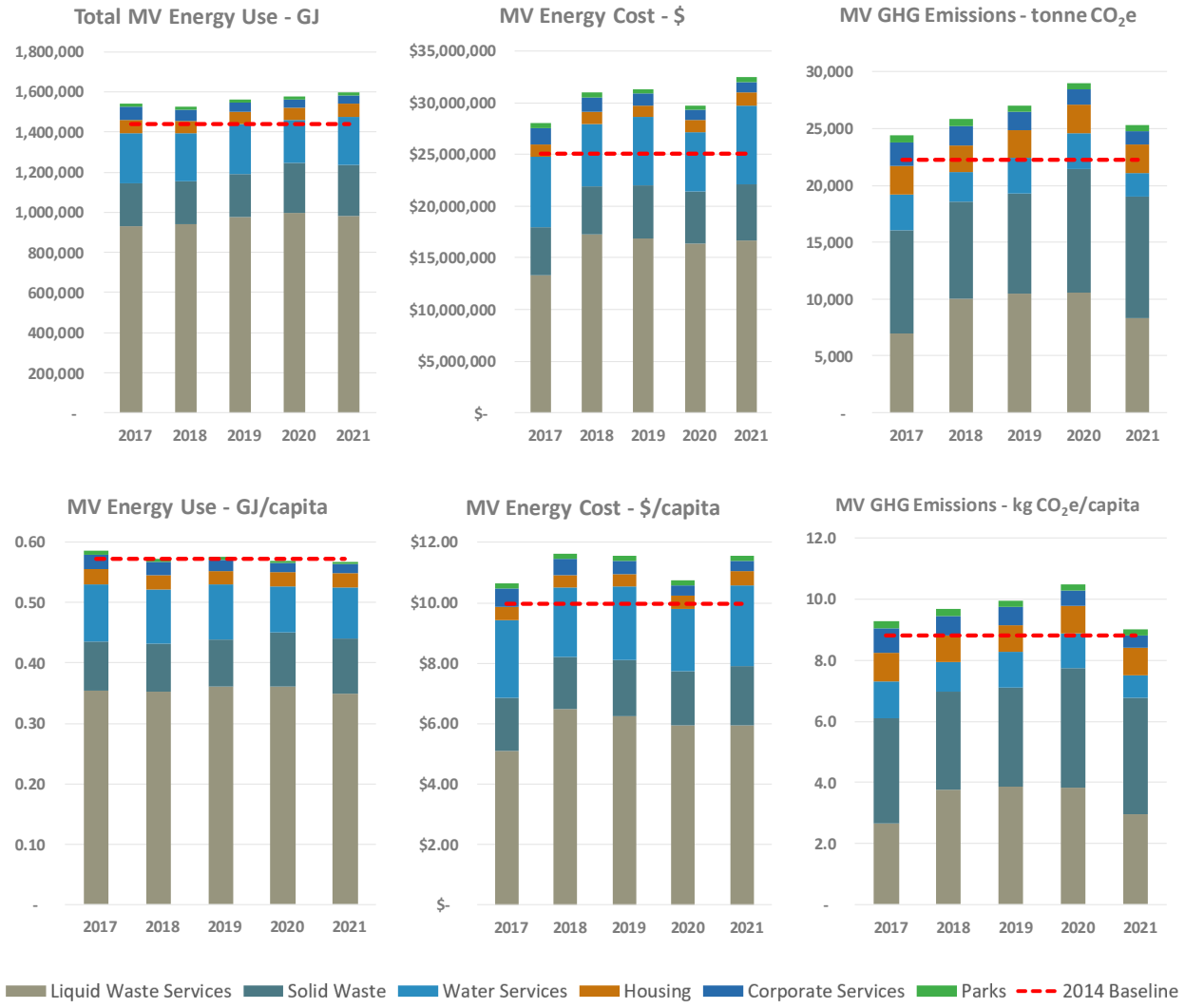


Figure 3: **Five-Year Trends by Service Area**

Table 3 also provides percent changes for each metric compared to 2014, the energy management baseline year. Throughout this report, percent changes highlighted green indicate performance improvements or changes favourable to energy or GHG emissions management (e.g. a decrease in annual wastewater volume requiring treatment); percent changes highlighted red indicate a degradation in performance or changes unfavourable to energy or GHG emissions management (e.g. an increase in annual wastewater volume requiring treatment).

Table 3: Five-Year Energy and GHG Emissions Trends – Corporate Metro Vancouver

Metro Vancouver											
	Year						Percent Change Relative to Baseline (2014)				
	Baseline (2014)	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
Total Energy Use (GJ)	1,442,301	1,540,707	1,527,555	1,561,772	1,576,526	1,595,666	7%	6%	8%	9%	11%
Total Cost ($)	$ 25,083,905	$ 28,021,285	$ 31,012,517	$ 31,343,756	$ 29,701,540	$ 32,496,712	12%	24%	25%	18%	30%
Total GHG Emissions (t CO2e)	22,225	24,446	25,838	27,014	29,021	25,301	10%	16%	22%	31%	14%
Population	2,517,276	2,629,574	2,666,670	2,714,794	2,766,954	2,807,469	4%	6%	8%	10%	12%
GJ/capita	0.573	0.586	0.573	0.575	0.570	0.568	2%	0%	0%	-1%	-1%
$/capita	$ 9.96	$ 10.66	$ 11.63	$ 11.55	$ 10.73	$ 11.58	7%	17%	16%	8%	16%
kg CO2e/capita	8.8	9.3	9.7	10.0	10.5	9.0	5%	10%	13%	19%	2%

Notes:
Improvement / Favourable (change less than zero)
Degradation / Unfavourable (change greater than zero)

Since 2014, Metro Vancouver has experienced an increase of approximately 11% in energy use with costs increasing by 30% over the same period. Cost increases are largely driven by increases in electricity rates. Much of the cost increase seen from 2017 through to 2021 was the result of increased electricity purchases required when the Annacis Island Wastewater Treatment Plant cogeneration engines were taken out of service in late 2017 to enable the cogeneration system upgrade, the commissioning of which began in 2020 and continued into 2021. Increases in GHG emissions experienced in 2018 through 2021 were driven by these increases in electricity purchases and fossil fuel use by Liquid Waste Services (for transportation of wastewater treatment plant residuals) and Solid Waste Services Waste-to-Energy facility operation. Variability in GHG emissions is also the result of annual changes in electricity GHG emissions intensities.

Corporate Metro Vancouver KPIs for energy use, energy costs, and GHG emissions from energy use are calculated per capita total regional population as summarized in Table 3. Corporate energy use per capita has remained relatively constant since 2014. Reasons for increases in energy cost per capita and GHG emissions per capita are provided in the preceding paragraph.

Liquid Waste Services

Table 4 summarizes Liquid Waste Services gross energy and GHG emissions trends, as well as those trends normalized against the Liquid Waste Services KPI: per megalitre[4] of wastewater collected and treated.

Table 4: Five-Year Energy and GHG Emissions Trends – Liquid Waste Services

Liquid Waste Services											
	Year						Percent Change Relative to Baseline (2014)				
	Baseline (2014)	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
Total Energy Use (GJ)	948,600	932,641	938,919	977,812	997,371	979,181	-2%	-1%	3%	5%	3%
Total Cost ($)	$ 12,604,704	$ 13,355,039	$ 17,311,459	$ 16,910,763	$ 16,401,565	$ 16,637,560	6%	37%	34%	30%	32%
Total GHG Emissions (t CO2e)	7,591	6,990	10,016	10,500	10,558	8,339	-8%	32%	38%	39%	10%
ML Collected & Treated	440,763	449,542	455,545	434,466	459,118	451,732	2%	3%	-1%	4%	2%
GJ/ML Collected & Treated	2.15	2.07	2.06	2.25	2.17	2.17	-4%	-4%	5%	1%	1%
$/ML	$ 28.60	$ 29.71	$ 38.00	$ 38.92	$ 35.72	$ 36.83	4%	33%	36%	25%	29%
kg CO2e/ML	17.2	15.5	22.0	24.2	23.0	18.5	-10%	28%	40%	34%	7%

Notes:
Improvement / Favourable (change less than zero)
Degradation / Unfavourable (change greater than zero)

As Metro Vancouver's largest energy user, Liquid Waste Services significantly influences overall Metro Vancouver energy and GHG emissions trends. Over the period of 2017 through 2021, Liquid Waste Services experienced average increases in energy use, energy costs, and GHG emissions associated with

[4] One megalitre equals one million litres

energy use of 2%, 28%, and 2%, respectively. Significant Liquid Waste Services energy cost increases are predominantly the result of increasing purchased electricity use coupled with increasing electricity unit rates. Since the late 1990s, Annacis Island Wastewater Treatment Plant has used biogas produced in the wastewater treatment process to power engines that cogenerate electricity and heat for use in the plant. In December 2017, the cogeneration system was taken out of service to allow the installation of new engines and generators with significantly higher cogeneration capacity. The cogeneration system remained out of service for the duration of 2018 and 2019. Since the cogeneration system was decommissioned, electricity that would have been generated on-site had to be purchased from BC Hydro. This was a significant contributor to the cost increases seen in 2017 through 2021. Commissioning of the new cogeneration system began in the spring of 2020 and continued into 2021. The Iona Island cogeneration system experienced sporadic downtime in 2020 and 2021, which also contributed to increased electricity purchase costs in those years. The cogeneration issues have since been resolved.

Increases in GHG emissions that began in 2018 and continued through 2020 are primarily a result of increased use of fossil fuels for transportation of the historic stockpile of land-dried biosolids at Iona Island Wastewater Treatment Plant to beneficial use sites and landfill for non-conforming materials. This work will continue for several more years until the stockpile is removed in preparation for the secondary upgrade of the treatment plant. As a result of the Annacis Island cogeneration engines being taken out of service in December 2017, GHG emissions from Annacis Island electricity purchases also contribute significantly to this trend.

Over the period of 2017 through 2021, average increases in energy use per megalitre treated, energy costs per megalitre treated, and GHG emissions associated with energy use per megalitre treated were 0%, 25%, and 20%, respectively. The average increase in the volume of wastewater collected and treated over the same period was 2%.

Solid Waste Services

Solid Waste Services is Metro Vancouver's second largest energy user in 2021. Table 5 summarizes Solid Waste Services gross energy and GHG emissions trends, as well as those trends normalized against the Solid Waste Services KPI: per tonne of municipal solid waste disposed.

Table 5: Five-Year Energy and GHG Emissions Trends – Solid Waste Services

Solid Waste Services												
	Year						Percent Change Relative to Baseline (2014)				
	Baseline (2014)	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
Total Energy Use (GJ)	192,026	212,532	214,401	213,564	250,156	257,372	11%	12%	11%	30%	34%
Total Cost ($)	$ 5,246,106	$ 4,631,611	$ 4,580,528	$ 5,116,817	$ 4,994,201	$ 5,511,659	-12%	-13%	-2%	-5%	5%
Total GHG Emissions (t CO2e)	7,570	9,042	8,593	8,788	10,854	10,685	19%	14%	16%	43%	41%
Mass Disposed (tonnes)	542,477	590,002	590,805	577,950	572,222	589,929	9%	9%	7%	5%	9%
GJ/tonne disposed	0.35	0.36	0.36	0.37	0.44	0.44	2%	3%	4%	23%	23%
$/tonne disposed	$ 9.67	$ 7.85	$ 7.75	$ 8.85	$ 8.73	$ 9.34	-19%	-20%	-8%	-10%	-3%
kg CO2e/tonne disposed	14.0	15.3	14.5	15.2	19.0	18.1	10%	4%	9%	36%	30%

Notes:
Improvement / Favourable (change less than zero)
Degradation / Unfavourable (change greater than zero)

Mass disposed data in Table 5 includes garbage and organics. Solid Waste Services energy use, cost and CO2 emissions related to fuel use have stayed flat since 2017 except for impacts of increased natural gas use at the Waste-to-Energy Facility starting in 2018 and increasing in 2020. Increased natural gas use at the Waste-to-Energy Facility is the result of changes to regulatory requirements for the facility in the 2016 Provincial Operational Certificate that required larger natural gas burners to meet response limit

requirements during periods of volatile fuel and during start-up and shut-down to maintain the temperature in the furnace to ensure complete combustion. Comparisons of emissions with the 2014 baseline year are challenging as Metro Vancouver entered into new contracts in 2017 for operation of recycling and waste centres as well as waste transportation that used different basis of calculation to determine GHG emissions and energy use.

Water Services

Table 6 summarizes Water Services gross energy and GHG emissions trends, as well as those trends normalized against the Water Services KPI: per megalitre of drinking water treated and delivered.

Table 6: Five-Year Energy and GHG Emissions Trends – Water Services

Water Services												
	Year						Percent Change Relative to Baseline (2014)					
	Baseline (2014)	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
Total Energy Use (GJ)	181,141	250,564	240,304	246,415	211,273	237,266	38%	33%	36%	17%	31%
Total Cost ($)	$ 4,564,972	$ 6,831,447	$ 6,091,365	$ 6,602,055	$ 5,762,478	$ 7,529,294	50%	33%	45%	26%	65%
Total GHG Emissions (t CO2e)	2,698	3,183	2,560	3,171	3,206	2,074	18%	-5%	18%	19%	-23%
ML Treated & Delivered	381,261	389,177	389,800	383,400	378,734	391,709	2%	2%	1%	-1%	3%
GJ/ML Treated & Delivered	0.475	0.64	0.62	0.64	0.56	0.61	36%	30%	35%	17%	27%
$/ML	$ 11.97	$ 17.55	$ 15.63	$ 17.22	$ 15.22	$ 19.22	47%	31%	44%	27%	61%
kg CO2e/ML	7.1	8.2	6.6	8.3	8.5	5.3	16%	-7%	17%	20%	-25%

Notes:
Improvement / Favourable (change less than zero)
Degradation / Unfavourable (change greater than zero)

Water Services was Metro Vancouver's third-largest energy user in 2021. Over the period of 2017 through 2021, Water Services experienced average increases in energy use, energy costs, and GHG emissions associated with energy use of 31%, 44%, and 5%, respectively. Increases in energy use and energy costs compared to 2014 are largely attributed to the completion of the Twin Tunnels in early 2015. Prior to 2015, approximately 17% of water delivered to member jurisdictions originated from Capilano Lake and was treated by chemical disinfection but not filtration. Since the completion of the Twin Tunnels, Capilano Lake water is pumped by the Capilano Raw Water Pump Station (CRWPS) to Seymour Capilano Filtration Plant (SCFP) where it is filtered and disinfected. Changes in GHG emissions are largely driven by annual variability in grid electricity GHG emissions intensities.

Over the period of 2017 through 2021, average increases in energy use per megalitre treated, energy costs per megalitre treated, and GHG emissions associated with energy use per megalitre treated were 29%, 42%, and 4%, respectively. The average increase in the volume of drinking water treated and delivered over the same period was 1%.

Housing

Table 7 summarizes Housing gross energy and GHG emissions trends and those trends normalized against the Housing KPI: per million square metres of conditioned floorspace per heating degree day (HDD)[5].

[5] The heating degree day (HDD) is the recognized energy management metric used to quantify the energy required to heat a building. It is the number of degrees that a day's average temperature is below 18 °Celsius. Annual HDD is the summation of daily HDDs over the course of a year.

Table 7: Five-Year Energy and GHG Emissions Trends – Housing

Housing											
	Year						Percent Change Relative to Baseline (2014)				
	Baseline (2014)	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
Total Energy Use (GJ)	66,969	66,785	62,263	61,917	63,965	67,232	0%	-7%	-8%	-4%	0%
Total Cost ($)	$ 1,133,904	$ 1,157,065	$ 1,129,645	$ 1,110,182	$ 1,161,536	$ 1,331,473	2%	0%	-2%	2%	17%
Total GHG Emissions (t CO2e)	2,490	2,496	2,357	2,365	2,476	2,500	0%	-5%	-5%	-1%	0%
Million m^2*HDD	750	833	774	810	787	820	11%	3%	8%	5%	9%
kJ/(m^2*HDD)	89.283	80.18	80.47	76.45	81.30	82.00	-10%	-10%	-14%	-9%	-8%
$/(million m^2*HDD)	$ 1,511.71	$ 1,389	$ 1,460	$ 1,371	$ 1,476	$ 1,624	-8%	-3%	-9%	-2%	7%
g CO2e/(m^2*HDD)	3.3	3.00	3.05	2.92	3.15	3.05	-10%	-8%	-12%	-5%	-8%

Notes:
Improvement / Favourable (change less than zero)
Degradation / Unfavourable (change greater than zero)

Since 2014, Housing has made significant investments in energy-efficient condensing natural gas space heating and domestic hot water heating equipment, low-carbon electric make-up air units, building envelope upgrades at two sites, targeted window replacements, LED lighting efficiency upgrades, and laundry appliance efficiency improvements. Additional natural gas savings have been realized through tenant energy awareness campaigns conducted at eleven Housing sites. These investments have translated into the performance improvements noted in Table 7. The 2020 and 2021 increases in energy use, energy cost, and GHG emissions are partially a result of completing and opening Heather Place A, which uses natural gas for space heating and domestic hot water heating.

Corporate Services

Corporate Services includes Corporate Safety, Human Resources, Fleet Management, and Corporate Facilities. Throughout this report, energy use, energy costs, and GHG emissions associated with energy use specific to fleet vehicles and equipment have been allocated to individual service areas where specific vehicles and equipment are assigned to those service areas. Energy data for vehicles and equipment that are not assigned to individual departments (pool vehicles and loaner vehicles, for example) are reported in Corporate Services. Table 8 summarizes Corporate Services gross energy and GHG emissions trends and those trends normalized against the Corporate Services KPI: per capita regional population.

Table 8: Five-Year Energy and GHG Emissions Trends – Corporate Services

Corporate Services											
	Year						Percent Change Relative to Baseline (2014)				
	Baseline (2014)	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
Total Energy Use (GJ)	36,556	62,961	56,933	48,972	41,145	41,546	72%	56%	34%	13%	14%
Total Cost ($)	$ 872,617	$ 1,576,220	$ 1,424,627	$ 1,170,396	$ 968,381	$ 1,010,175	81%	63%	34%	11%	16%
Total GHG Emissions (t CO2e)	1,080	2,072	1,679	1,628	1,379	1,173	92%	55%	51%	28%	9%
Population	2,517,276	2,629,574	2,666,670	2,714,794	2,766,954	2,807,469	4%	6%	8%	10%	12%
GJ/capita	0.015	0.02	0.02	0.02	0.01	0.01	65%	47%	24%	2%	2%
$/capita	$ 0.35	$ 0.60	$ 0.53	$ 0.43	$ 0.35	$ 0.36	73%	54%	24%	1%	4%
kg CO2e/capita	0.4	0.8	0.6	0.6	0.5	0.4	84%	47%	40%	16%	-3%

Notes:
Improvement / Favourable (change less than zero)
Degradation / Unfavourable (change greater than zero)

From the time that Metro Vancouver purchased Metrotower III as its new Head Office building in January 2016, until the former two Head Office buildings were sold in early 2019, Metro Vancouver operated all three buildings. This is the primary reason for the significant increases in all Table 8 indicators up to 2018. Following the sale of the former Head Office buildings in early 2019 and completion of energy efficiency improvements late in 2018 at Metrotower III, energy and GHG emissions trends improved in 2019 but increased in 2020 and 2021 as a result of energy use associated with increased ventilation rates in Metrotower III during the COVID-19 pandemic.

Regional Parks

Table 9 summarizes Regional Parks gross energy and GHG emissions trends and those trends normalized against the Regional Parks KPI: per capita regional population.

Table 9: Five-Year Energy and GHG Emissions Trends – Regional Parks

Parks											
	Year						Percent Change Relative to Baseline (2014)				
	Baseline (2014)	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
Total Energy Use (GJ)	17,008	15,224	14,736	13,092	12,615	13,069	-10%	-13%	-23%	-26%	-23%
Total Cost ($)	$ 531,123	$ 469,903	$ 474,892	$ 433,542	$ 413,380	$ 476,549	-12%	-11%	-18%	-22%	-10%
Total GHG Emissions (t CO2e)	797	663	632	562	549	529	-17%	-21%	-29%	-31%	-34%
Population	2,517,276	2,629,574	2,666,670	2,714,794	2,766,954	2,807,469	4%	6%	8%	10%	12%
MJ/capita	6.756	5.79	5.53	4.82	4.56	4.65	-14%	-18%	-29%	-33%	-31%
$/capita	$ 0.21	$ 0.18	$ 0.18	$ 0.16	$ 0.15	$ 0.17	-15%	-16%	-24%	-29%	-20%
kg CO2e/capita	0.3	0.25	0.24	0.21	0.20	0.19	-20%	-25%	-35%	-37%	-40%

Notes:
Improvement / Favourable (change less than zero)
Degradation / Unfavourable (change greater than zero)

Savings shown for all indicators in Table 9 are primarily attributed to fuel reductions for the Parks fleet since 2014 and winter shut-down of the swimming pool at Capilano River Regional Park beginning in 2019.

Corporate Carbon Neutrality

In addition to Metro Vancouver's total corporate GHG emissions of 25,300 tonnes CO_2e presented in this report, "Metro Vancouver's 2021 Carbon Neutral Reporting" (Attachment 2) reports on a subset of energy-related emissions associated with the delivery of "traditional local government services", which excludes emissions such as those from Metro Vancouver Housing services, the Waste-to-Energy Facility, and certain contracted emissions. This scope of services is defined in the provincial Carbon Neutral Framework for local governments, which was established under the BC Climate Action Charter. In 2021, these emissions were 18,102 tonnes CO2e. Metro Vancouver implements a portfolio of non-energy related emission reduction projects to achieve measurable and verifiable regional GHG emissions reductions, and claims GHG reduction credits from these projects to balance emissions from traditional local government services. For 2021 these projects include a landfill gas collection system, several avoided forest conversion projects and the ecological restoration of Burns Bog. As a result of these credit projects, Metro Vancouver has maintained carbon neutrality for 2021, which is the third consecutive year that carbon neutrality has been achieved, under the provincial Carbon Neutral Framework.

3.3 ENERGY PRODUCTION/GENERATION TRENDS BY SERVICE AREA

This section summarizes trends in Metro Vancouver corporate energy production/generation from 2017 through 2021 for the three Metro Vancouver service areas that generate energy: Liquid Waste Services (Metro Vancouver's largest energy generator), Solid Waste Services, and Water Services. Annual trend data is compared against the 2014 energy baseline year: the year that the Corporate Energy Management Policy was adopted. In this report, *energy production* refers to the production of sources of energy (such as biogas produced at wastewater treatment plants) and *energy generation* refers to the conversion of energy sources into usable energy (electricity and heat).

Liquid Waste Services

Liquid Waste Services produces methane-rich biogas – a clean, renewable energy source – at four of its five wastewater treatment plants when volatile suspended solids in the wastewater are metabolized (destroyed) by micro-organisms in the solids treatment processes. Most of the biogas produced is used within the plants for beneficial purposes: to generate heat and/or electricity or to power pumps. Table 10 summarizes biogas uses at the four wastewater treatment plants where biogas is produced. Biogas production in excess of what can be used by each plant is flared to the atmosphere ("wasted") or upgraded and sold to FortisBC (see Sections 6.2 and 6.3).

Table 10: Wastewater Treatment Plant Biogas Uses – Liquid Waste Services

Wastewater Treatment Plant	Biogas Uses
Annacis Island	• Electricity and heat generation in cogeneration engines • Heat generation in boilers
Iona Island	• Electricity and heat generation in cogeneration engines
Lulu Island	• Heat generation in boilers
Lions Gate	• Heat generation in boilers • Wastewater pump engines
Northwest Langley	• This facility does not produce biogas

Table 11 provides trends in total biogas production, percent of biogas used, and biogas production per tonne of volatile suspended solids removed from the wastewater. Most of the energy used by Liquid Waste Services is derived from clean, renewable sources: purchased electricity and energy derived from biogas. Non-renewable (fossil) energy is used primarily to transport wastewater treatment residuals to beneficial use sites and landfills (for material that can't be beneficially used). Table 11 also provides trends in the percentage of energy used by Liquid Waste Services that is derived from renewable sources. Changes are measured relative to the energy management baseline year of 2014: the year that the Corporate Energy Management Policy was adopted.

Table 11: Biogas Production and Utilization Trends – Liquid Waste Services

LIQUID WASTE SERVICES - BIOGAS PRODUCED AND USED											
	Year						Percent Change Relative to Baseline (2014)				
	Baseline (2014)	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
Mass Volatile Solids Destroyed (tonne)	40,791	41,780	42,940	42,914	40,553	42,153	2%	5%	5%	-1%	3%
Volume Biogas Produced (m3)	33,586,289	33,889,059	35,707,557	37,423,064	35,701,917	34,797,702	1%	6%	11%	6%	4%
Volume Biogas Produced per Mass Volatile Solids Destroyed (m3/tonne)	823	811	832	872	880	826	-1%	1%	6%	7%	0%
Biogas Systems Maintenance Costs[+]	$ 3,515,945	$ 3,308,403	$ 3,858,870	$ 3,957,481	$ 4,371,745	$ 3,953,874	-6%	10%	13%	24%	12%
% Biogas Used	69%	69%	50%	54%	62%	61%	0%	-27%	-22%	-10%	-11%
% Renewable Energy Use	92%	94%	89%	89%	91%	89%	2%	-4%	-3%	-2%	-4%

Notes:

Improvement / Favourable

Degradation / Unfavourable

Renewable Energy** = Electricity Purchased + Biogas-Derived Energy Used

[+] - includes costs to maintain digestion systems, cogeneration equipment, and Lions Gate influent pump engines

Over the period of 2017 through 2021 biogas production and biogas production per mass of volatile solids destroyed have improved on average by 3%. Percent biogas used over the same period has decreased on average by 14%, due to the Annacis Island cogeneration engines being taken out of service in late 2017 and sporadic downtime for the Iona Island cogeneration engines in 2020 and 2021. With commissioning

of the new cogeneration system at Annacis Island complete and the Iona Island cogeneration issued resolved, biogas utilization is expected to increase in 2022.

Costs to maintain Annacis Island digestion and cogeneration systems increased in 2016, 2018, 2019, and 2020. The decrease in percent renewable energy use seen starting in 2018 was primarily the result of increased fossil fuel used for hauling larger quantities of the historic biosolids stockpile in preparation for the upgrade of the Iona Island Wastewater Treatment Plant.

Table 12 provides trends for combined electricity production from biogas at Annacis Island and Iona Island Wastewater Treatment Plants.

Table 12: Electricity Generation from Biogas Trends – Liquid Waste Services

LIQUID WASTE SERVICES - COGENERATION											
	Year						Percent Change Relative to Baseline (2014)				
	Baseline (2014)	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
Biogas Used in Cogens (m3)	18,679,458	17,316,388	8,024,538	9,003,155	13,052,865	13,433,018	-7%	-57%	-52%	-30%	-28%
Electricity Self-Generated (GJ)	149,610	132,972	61,035	67,673	104,376	130,140	-11%	-59%	-55%	-30%	-13%
Electricity Generated per Volume Biogas Burned (MJ/m3)	8.0	7.7	7.6	7.5	8.0	9.7	-4%	-5%	-6%	0%	21%
Cogen Maintenance Costs*	$1,625,226	$1,860,029	$617,200	$1,179,729	$1,758,149	$1,397,684	14%	-62%	-27%	8%	-14%
Cogen Maintenance Costs per Unit Electricity Generated ($/kWh)	$ 0.039	$ 0.050	$ 0.036	$ 0.063	$ 0.061	$ 0.039	29%	-7%	60%	55%	-1%
Blended BC Hydro Purchase Price+ ($/kWh)	$ 0.075	$ 0.085	$ 0.078	$ 0.076	$ 0.083	$ 0.085	13%	3%	1%	11%	13%

Notes:

Improvement / Favourable

Degradation / Unfavourable

* - Annacis maintenance costs excluded during cogen upgrade (2018 and 2019)

+ - Annual blended rate (energy and peak demand) Iona Island amd Annacis Island WWTPs

Liquid Waste Services, in partnership with BC Hydro, completed a project in 2015 that has allowed additional electricity generation of approximately 12,600 GJ per year from the Iona Island Wastewater Treatment Plant cogeneration engines. This improvement reduces electricity purchases from BC Hydro and results in significantly less flaring of biogas.

The Annacis Island cogeneration engines were out of service from December 2017 through to the spring of 2020 when commissioning of the new engines began. The volume of gas utilized by the cogeneration systems, electricity production, and electricity generated per volume of biogas combusted all began to improve in 2020 as the new Annacis Island cogeneration engines were commissioned. System commissioning was complete by mid-2021. As previously discussed, Iona Island cogeneration system experienced higher than normal downtime in 2020 and 2021 resulting in reduced electricity generation during those years.

Maintenance costs for the Annacis cogeneration system are not included in the table above during the period that the system was out of service for upgrade (2018 and 2019). From 2017 through 2021, cogeneration system maintenance costs per unit of electricity generated were higher than in the baseline year but remained below the blended (including energy and peak demand charges) electricity rate for electricity paid by Iona Island and Annacis Island Wastewater Treatment Plants. This performance metric is expected to improve once the Annacis cogeneration system is fully commissioned.

Solid Waste Services

Since 1988, Solid Waste Services has generated steam, and later electricity, through burning municipal solid waste at its Waste-to-Energy facility that manages roughly a quarter of the region's municipal solid waste. As the waste burns, the hot gases from the combustion process pass into a boiler area where they

heat water-filled tubes. The water boils to become steam while the gas passes through an air pollution control process. The steam powers a turbine to generate electricity. The facility produces enough electricity to power 16,000 homes per year. The electricity is sold to BC Hydro generating more than $7 million in revenue each year. Table 13 summarizes Waste-to-Energy Facility electricity generation trends from 2017 through 2021 with comparisons drawn to the 2014 energy management baseline year.

Table 13: Metro Vancouver Waste-to-Energy Facility Electricity Generation Trends – Solid Waste Services

WTEF ELECTRICITY GENERATION											
	Year						Percent Change Relative to Baseline (2014)				
	Baseline (2014)	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
Inbound Tonnage (tonne)	275,266	259,747	253,123	253,184	244,362	241,531	-6%	-8%	-8%	-11%	-12%
Electricity Generation (GJ)	537,110	611,018	587,633	621,374	544,558	599,656	14%	9%	16%	1%	12%
Electricity Generation per Tonne Municipal Solid Waste Burned (GJ/tonne)	1.95	2.35	2.32	2.45	2.23	2.48	21%	19%	26%	14%	27%

Notes:
Improvement / Favourable (change greater than zero)
Degradation / Unfavourable (change less than zero)

Tonnage managed by the Waste-to-Energy Facility has decreased compared to 2014 while electricity generation per tonne of municipal solid waste processed has increased compared to 2014. The overall increase in electricity generation with decreasing waste flows can be attributed to multiple factors. A disposal ban on organic materials such as food scraps that Metro Vancouver put in place in January 2015. With organics removed from the Waste-to-Energy process stream, there has been a relative increase in proportion of municipal solid waste of higher heating value which provides more heat when burned. As the boilers are heat-limited, this allows the facility to generate more electricity per tonne of municipal solid waste. The air cooled condenser at the Waste-to-Energy Facility was upgraded in April 2014, this improvement allowed for more overall electrical generation with the same steam flows.

Water Services

The elevations of the Seymour Capilano Filtration Plan and the Coquitlam Water Treatment Plant provide the water transmission system with a significant amount of “free” energy in the form of gravity-generated hydraulic pressure. Using gravity supply, the water utility is able to avoid pumping in much of the transmission system when regional water demands are low enough to allow this practice. Gravity transmission contributes to energy cost savings.

Water Services produces hydroelectricity as treated drinking water flows from Seymour Capilano Filtration Plant to Capilano Energy Recovery Facility where the water turns a turbine and generates electricity. This electricity is used to offset a portion of the purchased electricity required to operate pumps at the Capilano Raw Water Pump Station. Table 14 summarizes trends in Capilano Energy Recovery Facility electricity generation and maintenance costs since the facility was commissioned in February 2016. The table also includes percent changes relative to 2016.

Table 14: Capilano Energy Recovery Facility Electricity Generation Trends – Water Services

CERF ELECTRICITY GENERATION											
	Year						Percent Change Relative to Baseline 2016				
	Baseline 2016	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
Treated Water Tunnel Flow (ML)	146,745	144,482	156,324	149,521	140,293	132,455	-2%	7%	2%	-4%	-10%
Electricity Generation (GJ)	14,482	10,658	31,217	20,987	24,282	3,976	-26%	116%	45%	68%	-73%
Flow Utilization (MJ/ML)	99	74	200	140	173	30	-25%	102%	42%	75%	-70%
Generation Capacity Utilization[+++]	27%	20%	58%	39%	45%	7%	-26%	116%	45%	68%	-72%
% BC Hydro Generation Requirement	42%	31%	91%	61%	71%	12%	-26%	116%	45%	68%	-73%
Annual Maintenance Costs	$ 48,105	$ 130,594	$ 56,920	$ 138,797	$ 140,988	$ 378,466	171%	18%	189%	193%	687%
BC Hydro Incentive Clawback Payments	$ 45,499	$ 36,643	$ -	$ -	$ -	$ -	-19%	n/a	n/a	n/a	n/a
(O&M Costs* + Clawback) per Unit Electricity Generated ($/kWh)	$ 0.02	$ 0.06	$ 0.01	$ 0.02	$ 0.02	$ 0.34	143%	-72%	2%	-10%	1373%
BC Hydro Purchase Price ($/kWh)	$ 0.04	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	4%	7%	14%	13%	13%

Notes:

Generation Capacity Utilization[+++] - based on 1.7MW generator operating continuously

Improvement / Favourable (change greater than zero)

Degradation / Unfavourable (change less than zero)

O&M Costs* - costs for Operations site visit labour plus all site maintenance

n/a - not applicable

Since its commissioning in 2016, the facility has experienced several operational issues each year except 2018, which have resulted in lower than expected electricity generation. Generation capacity utilization – the percentage of actual electricity generation compared to theoretical generation potential of the 1.7 megawatt (MW) turbine – has ranged from a minimum of 7% in 2021 to a maximum of 58% in 2018. The primary reasons for low generation in 2021 were due to an extended outage of the turbine and generator, initially for planned maintenance, and then due to equipment failure. Water Services is developing operational strategies to maximize the flow passing through the turbine and maintenance strategies to minimize turbine down-time. These strategies are intended to maximize Capilano Energy Recovery Facility electricity generation.

Annual costs for facility maintenance and labour for facility site visits have ranged from a minimum of approximately $57,000 in 2018 to $378,000 in 2021.

Water Services received approximately $2.7 million incentive funding from BC Hydro for the construction of Capilano Energy Recovery Facility. The funding agreement requires Water Services generate 9.5 gigawatt hours of electricity per year (34,200 GJ/year) to avoid clawback payments to BC Hydro (pro-rated to the amount of the shortfall). The shortfalls during the first and second years of operation (2016 and 2017) required Water Services to repay BC Hydro $45,498 and $36,643 in 2019 and 2021, respectively. Clawback payments for generation shortfalls in subsequent years have not yet been determined with BC Hydro.

Electricity generated by Capilano Energy Recovery Facility is used by the Capilano Raw Water Pump Station thus offsetting electricity that would have had to have been purchased from BC Hydro to operate the Pump Station. Considering all costs of generation (annual Operations labour costs, maintenance costs, and BC Hydro clawbacks paid to date), costs per unit electricity generated have remained below the rate that would have been paid to BC Hydro for Pump Station electricity for all years reported except 2021. This analysis does not include debt financing for facility construction.

Water Services recovers energy from water pressure at three additional facilities: turbines at Seymour Falls Dam and Cleveland Dam generate electricity; and water pressure at Cleveland Dam Pump House is used to drive water distribution pumps. Table 15 summarizes energy generation trends at these facilities from 2017 through 2021 with comparisons drawn to the baseline year.

Table 15: Other Energy Generation Trends – Water Services

OTHER ENERGY GENERATION											
	Year						Percent Change Relative to Baseline (2014)				
	Baseline (2014)	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
Cleveland Dam Pump House (GJ)*	2,574	2,619	2,805	2,771	2,573	2,686	2%	9%	8%	0%	4%
Cleveland Dam Turbine (GJ)+	2,475	2,424	2,518	2,450	2,541	2,399	-2%	2%	-1%	3%	-3%
SFD Turbine (GJ)	1,611	1,696	1,569	1,473	1,561	1,586	5%	-3%	-9%	-3%	-2%
Total	**6,660**	**6,738**	**6,892**	**6,694**	**6,674**	**6,671**	**1%**	**3%**	**1%**	**0%**	**0%**

Notes

* - Calculated pump house flows

+ - Calculated from the turbine generation curve for an average annual Capilano Lake level

Improvement / Favourable (change greater than zero)

Degradation / Unfavourable (change less than zero)

4. OTHER GHG EMISSIONS TRENDS

In addition to GHG emissions originating directly from energy use (discussed above), Metro Vancouver's total corporate GHG emissions also include emissions originating from other sources.

Solid Waste Services' Waste-to-Energy Facility is Metro Vancouver's largest source of quantified non-energy GHG emissions. The facility emits GHGs through the combustion of municipal solid waste and natural gas to fuel the process burners. Emissions from municipal solid waste are classified as either biogenic (derived through the combustion of organic material) or fossil-based (derived through the combustion of fossil-based materials such as plastics and natural gas). Table 16 summarizes the facility's trends in biogenic (organics-derived) and fossil-derived GHG emissions.

Table 16: GHG Emissions from Metro Vancouver Waste-to-Energy Facility – Solid Waste Services

GHG Emissions (t CO2e) - Solid Waste Services Waste-to-Energy Facility											
	Year						Percent Change Relative to Baseline (2014)				
	Baseline (2014)	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
Inbound Tonnage (tonne)	275,266	259,747	253,123	253,184	244,362	241,531	-6%	-8%	-8%	-11%	-12%
Biogenic Emissions from MSW	158,383	168,676	147,857	152,646	151,015	171,214	6%	-7%	-4%	-5%	8%
Fossil Emissions from MSW	108,171	112,451	122,201	115,154	135,269	131,820	4%	13%	6%	25%	22%
Fossil Emissions from Natural Gas	563	1,032	2,006	2,191	3,416	3,570	83%	256%	289%	507%	534%
Total GHG Emissions	**267,117**	**282,159**	**272,064**	**269,991**	**289,700**	**306,605**	6%	2%	1%	8%	15%
Total GHG Emissions from MSW	**266,554**	**281,127**	**270,058**	**267,800**	**286,284**	**303,034**	5%	1%	0%	7%	14%
Total GHG Emissions per Tonne MSW	**0.97**	**1.09**	**1.07**	**1.07**	**1.19**	**1.27**	12%	11%	10%	22%	31%

Notes:
Improvement / Favourable (change less than zero)
Degradation / Unfavourable (change greater than zero)

Biogenic emissions from waste combustion have decreased three out of the last five years, which can be attributed to the disposal ban on organic materials that Metro Vancouver introduced in 2015. This has led to a corresponding increase in fossil-based emissions from waste combustion as the proportion of non-biogenic material managed at the facility has increased. The increase in natural gas emissions at the Waste-to-Energy Facility is due to the installation of larger capacity gas burners in 2018, as required by the facility's Operational Certificate. These gas burners are used to maintain furnace temperatures during start up and shut down events and any other time as necessary to maintain the secondary combustion zone temperature and control carbon monoxide emissions. Metro Vancouver is working with the Waste-to-Energy Facility operator to ensure natural gas is used only when necessary.

Liquid Waste Services has several other potential sources of other GHG emissions. Of these emissions, those resulting from flared biogas are the only emissions that have thus far been quantified and tracked as summarized in Table 17.

Table 17: GHG Emissions from Wasted Biogas – Liquid Waste Services

LIQUID WASTE SERVICES - GHG EMISSIONS FROM WASTED BIOGAS											
	Year						Percent Change Relative to Baseline (2014)				
	Baseline (2014)	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
Energy Wasted (GJ)	260,937	244,897	412,074	404,243	313,395	315,842	-6%	58%	55%	20%	21%
GHG Emissions from Energy Wasted (t CO2e)	76	71	120	117	91	92	-6%	58%	55%	20%	21%

Notes:
Improvement / Favourable (change less than zero)
Degradation / Unfavourable (change greater than zero)

The amount of biogas flared and associated GHG emissions increased significantly in 2018 primarily due to the decommissioning of the Annacis Island Wastewater Treatment Plant cogeneration engines in

December 2017 to make way for higher capacity units. Since that time and throughout 2018 and 2019, biogas was used to directly fire the plant's boilers but because boiler demand alone is less than cogeneration engine demand (which supplied both heat and electricity to the plant), more biogas was flared (wasted). These emissions began to decrease in 2020 as commissioning of the upgraded Annacis cogeneration system began. The Iona Island Wastewater Treatment Plant cogeneration system experienced sporadic downtime in 2020 and 2021, which also contributed higher than normal biogas flaring in those years. The Iona cogeneration issues have since been resolved.

Other potential sources of non-energy-related Liquid Waste Services GHG emissions include fugitive emissions of biogas and nitrous oxide – both very potent GHGs – from the collections system, the wastewater treatment process, lagoons, and stockpiles. Although studies were conducted several years ago to estimate GHG emissions from lagoons and stockpiles at the Iona Island Wastewater Treatment Plant, the results were inconclusive due to high levels of uncertainty in measurements and methods used. Similarly, investigations in 2019 by UBC Sustainability Scholars regarding potential sources of fugitive methane and nitrous oxide emissions from Annacis Island Wastewater Treatment Plant demonstrated high uncertainties in estimating fugitive emissions. Liquid Waste Services has not yet quantified emissions associated with refrigerant use and the production, transportation, and use of chemicals used in treatment processes and consumables. Liquid Waste Services will continue to investigate these non-energy GHG emissions sources to determine if any are significant and will develop emissions management strategies for those deemed significant.

Similarly, the remaining service areas (Water Services, Solid Waste Services, Housing, Corporate Services, and Regional Parks) will also investigate other potential sources of GHG emissions and develop management strategies for those found to be significant.

5. CORPORATE POLICY IMPLEMENTATION AND INITIATIVE UPDATE

Since 2014, Metro Vancouver has developed a number of policies and initiatives aimed at managing energy costs and GHG emissions. This section provides an update on Metro Vancouver's progress toward implementing these policies and participating in these initiatives.

5.1 CORPORATE ENERGY MANAGEMENT POLICY

The *Corporate Energy Management Policy* was adopted by the Board in 2014. The policy articulates Metro Vancouver's commitment to continuously improving energy efficiency in its operations, and to continuously improving the efficiency of energy production, generation, and recovery. It also provides direction for staff to put processes in place to effectively manage energy following International Organization for Standardization (ISO) energy management practices. The following table provides a summary of progress Metro Vancouver has made in completing the directives defined in the *Corporate Energy Management Policy*.

Table 18: *Corporate Energy Management Policy* Implementation Status

Policy Directive	Status
• Establish substantiated, realistic, and measurable targets that motivate continuous improvement and are consistent with other objectives.	• In 2018, Housing became the first department to set a GHG emissions reduction target which was published in its 2019 Work Plan. Both GHG emissions reduction targets and energy performance targets have been set in the Housing 10-Year Plan published in 2019. • In 2019, Liquid Waste Services committed to reducing energy use by 10% by 2030 compared to 2019 energy use. • In 2020, all service areas (Liquid Waste Services, Water Services, Solid Waste Services, Corporate Services, and Regional Parks) committed to setting energy and GHG emissions management targets in 2020 and establishing reporting systems to monitor progress toward meeting those targets. This work is ongoing and is expected to be complete in 2022.
• Develop a strategic energy management planning process for achieving these targets using triple bottom line analysis methods.	• Housing undertakes triple bottom line life-cycle cost analyses on all mechanical equipment upgrades. Housing is currently developing a strategic plan to meet the energy and GHG emissions targets set in its 10-Year Plan (2019). • The Corporate Energy Management Steering Committee was re-established in 2022. Representatives from each service area will work with the Energy Management team to develop detailed Strategic Energy Management Plans for each service area. Actions and priorities will be established in reference to the Corporate Energy Management Assessment completed by BC Hydro in early 2022.
• Regularly monitor and report on progress toward meeting these	• Metro Vancouver invested in software as service in 2013 to establish its corporate energy and GHG emissions database.

Policy Directive	Status
targets using a corporate energy and GHG tracking system.	The database will be used to report on progress toward meeting targets as they are established. • Housing is participating in Building Benchmark BC, which encourages building owners and managers to measure and disclose their energy use and GHG emissions. By measuring and comparing this data, resources can be funneled towards the best interventions, in the right buildings, to achieve the highest climate benefit. In parallel, Housing has benchmarked its building portfolio to compare the performance of its existing building stock. • Water Services and Housing report energy use per megalitres treated and GHG emissions respectively on Metro Vancouver's publicly-accessible Performance Monitoring Dashboard. • Liquid Waste monitors energy use through its Balanced Scorecard • Annual reporting to the Climate Action Committee and Board will continue.
• Establish processes that continuously improve Energy Performance in planning, design, procurement, construction, operation, and maintenance of Metro Vancouver assets and services.	• Energy efficiency and GHG emissions management content based on life-cycle options analysis has been included in Metro Vancouver's Project Management Guidelines. • Housing included energy efficiency considerations in the 2018 update of its Unit Standards. • Options analysis processes have been developed for Housing and are being carried out on all mechanical equipment upgrades to identify the most energy efficient and least GHG intensive solutions on a life cycle net present value basis. This process will be formalized once refined. • Housing implements options that improve building energy performance through the guidance of industry standards, BC Energy Step Code, options analysis, energy studies and modelling. • Housing is a partner (along with BC Housing, BC Non-Profit Housing Association, and City of Vancouver) in the Reframed initiative led by Pembina Institute. The initiative is intended to develop a systematic approach to deep energy retrofits in the low income housing sector. • Energy efficiency and GHG emissions have been or are being considered for a number of large Liquid Waste Services and Solid Waste Services capital projects. Formal processes will be developed for capital projects and for operations and maintenance projects. • Energy efficiency and GHG emissions impacts have been considered in development of guidelines for the *Sustainable Infrastructure and Buildings Policy* (discussed in Section 5.4).
• Provide access to energy information and training for staff.	• A corporate energy management communication strategy is under development. The reporting system described above will become an integral component of this strategy. • A Corporate Energy Management Newsletter is published on a periodic basis.

Policy Directive	Status
	• Energy management workshops were delivered for O&M staff at Lulu Island Wastewater Treatment Plant, Seymour-Capilano Filtration Plant, and Coquitlam Water Treatment Plant. • Iona Island and Lulu Island Wastewater Treatment Plants participated in a provincial two-year (2019 to 2021) wastewater treatment cohort funded by BC Hydro. • A formal process for identifying training needs will be initiated. • Housing has included an energy efficiency section in its regular newsletters to tenants and creates energy conservation posters for those residences participating in natural gas conservation competitions. The Metro Vancouver Energy Management Group presents annual energy and GHG emissions performance updates to Housing management and field staff.
• Empower staff to generate solutions that meet the objectives of this policy.	• Liquid Waste Services Management has established Incubator workshops to encourage staff to bring forward ideas for innovation and efficiency that promote continuous improvement. • Tenant energy awareness campaigns conducted at seven Housing sites.

5.2 CARBON PRICE POLICY

In June 2017, the MVRD Board approved Metro Vancouver's Carbon Price Policy. The policy is being incorporated into life cycle cost analyses during Metro Vancouver's capital planning processes, and in particular, into financial business casing tools used for options analyses that concern energy decisions. In light of the announced increases to the carbon tax to $170 per tonne of CO2e emissions by 2030, this policy is being reviewed and an update is planned for early 2023 to reflect the increased carbon tax.

Metro Vancouver's corporate carbon price of $150 per tonne of CO2e emissions was applied to the business case for Liquid Waste Services' effluent heat recovery project at the new North Shore Wastewater Treatment Plant. Heat recovered from treated effluent will provide heating to Lonsdale Energy Corporation's district energy customers, displacing natural gas use and reducing regional GHG emissions. The $17 million cost of investing in these GHG reductions, which equates to approximately $120 per tonne on a life-cycle basis, is lower than the price of carbon established in the Carbon Price Policy and is therefore a cost-effective GHG emission reduction investment.

Housing completes options analyses on all lighting and mechanical equipment (boilers, water heaters, ventilation systems, etc.) replacement projects to identify the option with the lowest life cycle net present value cost while factoring in Metro Vancouver's corporate carbon price. In 2021, Housing expanded this decision-making process to new construction projects such as Welcher Avenue and Kingston Gardens.

Currently-available electric heat pump technology could replace natural gas use and reduce Housing GHG emissions from building energy use by more than 90%. To date, the carbon price has strengthened the already-positive business case for high efficiency natural gas equipment but has not been successful in financially justifying investment in the lowest-carbon electric option.

Solid Waste Services is exploring ways to incorporate carbon pricing into its procurement processes. For a contingency waste disposal hauling project currently underway, the impact of greenhouse gas emissions is being factored into the technical evaluation criteria as part of the request for proposals process. Proponents will be asked to provide emission details associated with their proposed transportation route including tonnes of CO_2e/km and tonnes of particulate matter/km, and will be given weighted scores accordingly. Future procurements could use the carbon price to translate greenhouse gas emissions into a value using the carbon price so they could be evaluated as part of the financial criteria.

The corporate carbon price is also used in fleet procurement decisions discussed in Section 5.3 and sewer heat recovery business-casing discussed in Section 6.2.

5.3 FLEET PLANNING AND ACQUISITION POLICY

In September 2016, the Metro Vancouver Board adopted the *Fleet Planning and Acquisition Policy* aimed at:

- Reducing overall size of fleet
- Rightsizing vehicles (transitioning to smaller, more fuel-efficient vehicles)
- Transitioning to lower-carbon vehicles (reducing GHG emissions per km traveled)

Implementation of the policy is the responsibility of MetroFleet Services. MetroFleet evaluates market options for replacement of aging compact sedans and sport utility vehicles in the context of meeting the objectives of the Fleet Planning and Acquisition Policy. The evaluation involves life-cycle net present value costing (including the Corporate Carbon Price) for purchase and operation of each powertrain option. Makes and models of preferred powertrain options become those recommended in the Low Emissions Vehicle Standards – a hierarchy of most-preferred to least preferred technologies based on GHG emissions – for vehicle replacements made in the following year.

Global positioning systems (GPSs) have been installed in all fleet vehicles. The system is being used to track utilization and could be used in the future to improve route planning and thereby reduce fuel use and GHG emissions.

Table 19 compares trends in Metro Vancouver fleet energy and GHG emissions performance indicators for 2016 (the year the policy was adopted) through 2021.

Table 19: Fleet Energy and GHG Emissions Reduction Performance Trends

Metro Vancouver							Percent Change Relative to Baseline (2016)				
	Baseline (2016)	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
Fleet Size (no. vehicles)	420	424	452	456	494	476	1%	8%	9%	18%	13%
Percent Fuelled Solely from Fossil Sources	87.4%	85.6%	84.5%	84.9%	83.8%	81.3%	-2%	-3%	-3%	-4%	-7%
Fossil Fuel Use (GJ)	39,953	38,623	37,790	36,645	35,359	34,550	-3%	-5%	-8%	-11%	-14%
Fossil Fuel Cost	1,224,968	1,332,922	1,467,473	1,403,220	1,143,542	1,394,628	9%	20%	15%	-7%	14%
GHG Emissions from Fossil Fuel Use (t CO_2e)	2,722	2,626	2,571	2,492	2,404	2,349	-4%	-6%	-8%	-12%	-14%

Notes:
Improvement / Favourable (change less than zero)
Degradation / Unfavourable (change greater than zero)

Since adoption of the Fleet Planning and Acquisition Policy in 2016, the size of the corporate fleet has increased by 13% while the percentage of vehicles fueled only by fossil fuels has decreased by 7%. Total emissions from the corporate fleet have decreased by 14% since 2016. MetroFleet is working to improve mileage data collection to allow the indicators shown in Table 19 to be normalized against distance traveled.

Other recent MetroFleet activities include:

- Implementation of Fleet standardization contracts with access to Battery Electric Vehicles (BEV)
    - 30 electric pickup trucks on order
    - Preparing orders for electric panel vans
- Feasibility study for electric vehicle infrastructure at Lake City Operations Centre and Production Way Operations Centre in progress
- Onboarding to new fuel agreement with access to renewable fuels in progress
- Compressed Natural Gas Maintenance Facility feasibility study for Lake City Operations Centre

Metro Vancouver is also working to support electric vehicle adoption by staff and the public. This includes developing consistent practices for planning, purchasing, installing, maintaining, and using both fleet and non-fleet electric vehicle infrastructure.

5.4 SUSTAINABLE INFRASTRUCTURE AND BUILDINGS POLICY

In October 2018 the Metro Vancouver Board adopted the Sustainable Infrastructure and Buildings Policy. This policy aims to ensure infrastructure and buildings projects incorporate performance-based considerations for energy efficiency and GHG emissions, sustainable and efficient use of resources, and ecological health. The policy targets Leadership in Energy and Environmental Design (LEED) Gold and BC Energy Step Code Level 3 as minimum standards for occupied buildings and Envision Gold for eligible infrastructure.

In 2021, with support from the Sustainability Innovation Fund, staff in Air Quality and Climate Change and the CAO's Office completed a Sustainable Infrastructure and Buildings Policy Design Guide to provide detailed technical guidelines to be used by Metro Vancouver staff and consulting teams to assist delivering high performance, sustainable infrastructure and building projects. Since the completion of the Guide, staff are now developing instructional materials to train staff on the use of the Guide, which will be largely informed through feedback and learning from using the Guide on real projects. Currently, staff are advising other groups on the Guide and policy outcomes, and are also working with Water Services to pilot the Guide throughout the preliminary design phase of the Cape Horn, Pitt River, and Clayton re-chlorination station upgrades. This phase is anticipated to run from June 2022 to June 2023. Further piloting may also be done on later stages of the project while concurrently applying those learnings to the broader list of capital projects at Metro Vancouver.

Staff intend to bring a report in late 2022 or early 2023 to convey progress and learnings on implementation of the Guide and Policy. The Guide has been published on Metro Vancouver's public website, to inform the public, member municipalities and future consultants of the sustainability requirements that are central to delivering Metro Vancouver's infrastructure and buildings projects.

5.5 SEWAGE AND WASTE: HEAT RECOVERY POLICY

This policy aims to encourage beneficial use of waste heat from Metro Vancouver's liquid waste and solid waste systems, and to maximize greenhouse gas emission reductions by using the heat to displace fossil fuel use, in support of Metro Vancouver's *Climate 2050* strategy. This policy will replace the Liquid Waste Heat Recovery Policy.

In 2014, the GVS&DD Board first adopted an Interim Sewer Heat Policy to enable beneficial use of sewer heat in 2014. There is enough excess heat energy in the liquid waste collection system to heat 100,000 homes throughout the region, which could reduce GHG emissions by nearly 250,000 tonnes per year. The Policy was later amended and renamed to the Liquid Waste Heat Recovery Policy to broaden the scope and to allow for potential GVS&DD investments in sewer heat projects. The most recent proposed amendment will replace the existing policy with an overarching Sewage and Waste: Heat Recovery Policy for liquid waste and solid waste projects. The Policy provides guidelines for greenhouse gas emission reduction calculations, calculation and allocation of environmental attributes, and application of the Carbon Price Policy. The proposed policy was endorsed by the Liquid Waste Committee in July 2022. It will be considered by the Zero Waste Committee in July 2022 as well, and reviewed for potential approval by GVS&DD Board in July 2022.

Policy implementation began in 2016 and continues to develop. The GVS&DD Board has approved capital investments in two sewer/effluent heat projects to date, at the North Shore Wastewater Treatment Plant in coordination with Lonsdale Energy Corporation, and in coordination with the City of New Westminster, for the Sapperton District project, and has approved a project at the Waste-to-Energy Facility in Burnaby in coordination with River District. The GVS&DD Board will be considering a third investment for a project in coordination with the City of Surrey in July 2022. This proposed investment was endorsed by the Liquid Waste Committee in July 2022. Other projects are underway that do not involve a GVS&DD capital investment, including a project in North Richmond. Several additional sewer heat recovery projects are under development or assessment.

5.6 ASSET MANAGEMENT POLICIES

Metro Vancouver delivers its services through an extensive and complex portfolio of assets. In 2018 and 2019, the Board approved separate asset management policies for Liquid Waste Services, Water Services, Solid Waste Services, Housing, and Regional Parks. These policies establish asset management principles and frameworks to balance asset performance, risk, and cost to deliver Metro Vancouver services. Staff are currently developing the methodology to manage these assets in a manner that minimizes asset failure risks and impact to customers, and optimizes the lifecycle value of assets. Energy represents a major component of the life-cycle operating costs and GHG emissions and energy performance can be a measure of asset condition and functionality. Energy will therefore be included in processes for monitoring annual asset performance and operation costs.

5.7 *CLIMATE 2050*

In 2018, Metro Vancouver's Board adopted the *Climate 2050*[1] *Strategic Framework*, and amended it in 2019 to set more aggressive GHG reduction targets. *Climate 2050* aims to demonstrate bold leadership in responding to climate change by ensuring our infrastructure, ecosystems, and communities are resilient to the impacts of climate change, and by pursuing a carbon neutral region by 2050, with an interim target of reducing greenhouse gas emissions by 45% from 2010 levels by 2030. To implement this strategy, Metro Vancouver is currently developing a series of Roadmaps, which will include specific actions to reduce

[1] *Climate 2050* Website: http://www.metrovancouver.org/climate2050

greenhouse gas emissions. Metro Vancouver can set the path towards carbon neutrality, but it will not be able to achieve the targets on its own without significant cooperation, collaboration, and commitment from member jurisdictions, other orders of government, partner organizations, stakeholders, and the public. With its regional partners, Metro Vancouver is developing the first iterations of the *Climate 2050* Roadmaps between 2021 and 2023.

Metro Vancouver is committed to pursuing carbon neutral status on an ongoing basis. Efforts are underway to support this commitment, including the establishment of a Liquid Waste Services department team to develop and implement projects for this purpose. The Liquid Waste Services department team is also developing corresponding plans for addressing and reducing the impacts of climate change on liquid waste infrastructure and operations, to continue to protect human health and the environment.

6. ENERGY- AND CLIMATE-RELATED PROJECTS

As a signatory to the B.C. Climate Action Charter, Metro Vancouver is committed to pursuing carbon neutrality. To help facilitate this goal, the *Corporate Climate Action Plan* was developed and presented to the GVRD Board in 2010. The objective of the Plan is to become a "carbon neutral corporation resilient to the impacts of climate change". This objective is to be achieved through three strategies:

- Reducing energy consumption through efficiencies;
- Transitioning to renewable energy; and
- Maximizing energy recovery.

Aligning with these strategies, this section provides an update regarding energy- and climate-related projects that have been completed by Metro Vancouver from 2014 through 2021.

6.1 ENERGY EFFICIENCY

Table 20 summarizes estimated annual energy savings for energy efficiency projects completed by each department from 2014 through 2021. Annual savings realized in each year perpetuate in subsequent years, summing to the Cumulative Savings shown in Table 20.

Table 20: Energy Efficiency Project Activities by Service Area

Completed Energy Efficiency Projects - Estimated Annual and Cumulative Savings								
Project Completion Year		Liquid Waste Services	Water Services	Solid Waste Services	Housing	Corporate Services	Parks	Metro Vancouver Total
Estimated Annual Savings (GJ)	2014	772	2,703	-	-	-	-	3,475
	2015	-	190	-	-	-	-	190
	2016	4,579	623	-	2,801	-	1,124	9,127
	2017	3,152	818	-	1,338	-	10	5,318
	2018	2,530	1,688	60	525	2,484	572	7,860
	2019	1,293	2,196	-	3,628	738	-	7,856
	2020	-	2,385	-	905	-	-	3,290
	2021	8,855	-	-	863	-	-	9,718
Total		**21,181**	**10,604**	**60**	**10,060**	**3,222**	**1,707**	**46,834**
Cumulative Savings*	Energy (GJ)	109,965	142,650	220	54,168	9,443	8,040	324,486
	Cost	$ 3,116,501	$ 4,143,222	$ 6,568	$ 990,586	$ 186,311	$ 75,874	$ 8,519,062
	GHG Emissions (t CO2e)	1060	1140	2	1692	272	399	4,564

* - cumulative savings for projects completed in 2014 through 2021

From 2014 through 2021, Metro Vancouver completed energy efficiency projects that saved nearly 47,000 GJ per year. Cumulatively these projects have reduced energy use by over 324,000 GJ, energy costs by $8.5 million, and GHG emissions by 4,564 tonnes CO_2e.

Liquid Waste Services

Liquid Waste Services energy efficiency and energy generation improvement projects account for approximately 45% of total Metro Vancouver annual savings from 2014 through 2021. These include both energy efficiency upgrades to capital equipment as well as process optimization projects. Total estimated savings for Liquid Waste Services energy efficiency project completions are 24,200 GJ/year; cumulative savings from 2014 through 2021 are estimated at 113,900 GJ, $3.2 million, and 1,069 tonnes CO_2e. In addition to energy efficiency projects, Liquid Waste Services in partnership with BC Hydro completed a project in 2015 that has allowed an average 7% increase in annual electricity generation compared to the four-year period prior to the change. This improvement reduces electricity purchases from BC Hydro and results in significantly less flaring of biogas.

Water Services

Water Services energy efficiency projects account for approximately 23% of total Metro Vancouver annual savings for the period reported. These projects include both energy efficiency upgrades to capital equipment as well as process optimization projects. Total estimated savings for energy efficiency project completions are 10,600 GJ/year; cumulative savings since 2014 are estimated at 143,000 GJ ($4,1 million) and 102 tonnes CO_2e. In addition to these energy efficiency projects, Capilano Energy Recovery Facility began generating electricity in 2016. From 2016 through 2021, the facility generated over 106,000 GJ of electricity that was used by the Capilano Raw Water Pump Station. The Capilano Energy Recovery Facility is expected to generate 34,200 GJ of electricity per year once operation is fully optimized.

Solid Waste Services

The new United Boulevard Recycling and Waste Centre – opened on March 14, 2022 – includes energy-efficient features such as translucent panels to reduce the need for electrical lighting, LED lighting, air-source heat pumps for space heating, and variable speed ventilation control. Similar energy-efficient features have been included in the design of new Central Surrey Recycling and Waste Centre – expected to be complete in summer 2022 and opening shortly after. This facility is being constructed under the guidance of the Metro Vancouver Sustainable Infrastructure and Buildings Policy.

The non-ferrous recovery system at the Waste-to-Energy Facility recovers non-ferrous metals and additional ferrous metals from the bottom ash by using magnetic and eddy current separation technology. Recovered non-ferrous metals are sold to a third-party metals recycling company. The project was commissioned in the fall of 2018 and recovers approximately 250-500 tonnes per year of non-ferrous metals and an additional 400-500 tonnes per year of ferrous metals. Based on non-ferrous metals recovery data from 2019, 2020, and 2021, project emissions reductions were calculated to be 969 tonnes CO_2e, 755 tonnes CO_2e, and 1,030 tonnes CO2e respectively. Metro Vancouver is working with a consultant for validation of this project plan, and annual third party verification of emissions reductions calculated under the validated plan. Verified emissions reductions can be claimed as carbon credits to offset Metro Vancouver's carbon footprint for "traditional local government services" (see Section 3.2 for more information). These are reported in Metro Vancouver's Carbon Neutral Reporting in the year they are claimed.

The beneficial use of bottom ash from the Waste-to-Energy Facility could result in a reduction of up to 40,000 tonnes per year of material requiring disposal. Implementation of the non-ferrous metal recovery system has improved both the physical and chemical characteristics of the bottom ash, increasing options for beneficial use of the material. At full scale, beneficial use of bottom ash could reduce regional disposal requirements by approximately 5% and reduce greenhouse gas emissions associated with mining and transporting raw materials. Metro Vancouver has engaged Birco Environmental Services to complete pilot testing in support of full scale beneficial use of bottom ash. The pilot test will include processing 1,000 tonnes of bottom ash to remove recyclable metals, crushing, then use as a feedstock in cement production at the Lehigh Cement Plant in Delta BC. Extensive analytical testing of both the ash and the emissions at the cement kiln will be used to evaluate the success of the pilot test.

Solid Waste Services' increased waste diversion efforts and disposal bans for recyclable materials have contributed to increased recycling rates and reduced regional GHG emissions from waste disposal.

Housing

Housing energy efficiency projects account for approximately 21% of total corporate Metro Vancouver annual savings from 2014 through 2021. Total estimated savings for Housing energy efficiency project completions exceed 10,000 GJ per year; cumulative savings since 2014 are estimated at 54,000 GJ ($186,000) with GHG emissions reductions of 272 tonnes CO_2e. Housing has strategically invested in energy-efficient mechanical equipment (boilers and hot water heaters), laundry equipment, and lighting systems. Housing has also taken advantage of FortisBC incentives that installed equipment – free of charge – to reduce residential hot water use.

In its 10-Year Plan (published in 2019) Housing has committed to reducing energy consumption by 25% for major rehabilitations, such as comprehensive building envelope upgrades, and for new construction (from 2015 National Energy Code for Buildings). The 10-Year Plan also commits to reducing GHG emissions in the Housing portfolio by 45% over the next 10 years (compared to 2010 levels).

In 2019 a Sustainability Innovation Fund application was approved for Housing: *Energy Step Code Implementation Impacts for Building Envelope Rehabilitations of Existing Buildings*. The study will investigate the energy use, financial implications, and GHG emissions reduction impacts that the different levels of the BC Energy Step Code could have on rehabilitation of the existing Housing portfolio. Housing intends to engage a consultant in 2022 to begin this work.

The NetZero Feasibility Study for the Welcher Affordable Housing Development was completed in July 2021. The final energy model in the study outlined key design changes that would reduce the operational energy usage from the minimum BC Step Code 3 value of 120 kWh/m^2/year to approximately 60 kWh/m^2/year, and operational GHG emissions from 6.5 $kgCO_2eq/m2$/year to 0.7 $kgCO_2eq/m2$/year. Over a 50-year timeframe, this translates into an overall GHG emissions reduction of approximately 1,700 tonnes of CO_2. The reductions would be achieved through a combination of improvements to the building enclosure design and mechanical and electrical systems, and converting the building's energy source to fully electric from a combination of electricity and natural gas. Following the issue of the report, the MVHC Board approved proceeding with the implementation of the identified energy and GHG emission reduction design measures into the project design. Construction of the Welcher Affordable Housing Development is anticipated to begin in the third quarter of 2022.

With a focus on meeting the energy usage targets of MHV's 10-year plan with an expanding portfolio, while also complying with the requirements of member municipalities and funding partners, current new construction projects are designed with energy efficiency at the forefront. All current development projects in the design phase are pursuing high-performance building envelope designs along with the incorporation of energy efficient mechanical and electrical systems. Current projects are targeting operational energy usage values consistent with BC Energy Step Code level 3 and above.

Corporate Services

Colliers International (Colliers) has managed Metro Vancouver's Head Office building, Metrotower III, since mid-2018. Since then and to the end of 2021, Colliers completed several projects targeting energy efficiency improvements. These include programming adjustments of building systems (heating, ventilation, DDC and lighting controls), upgrading most of the of base building lighting fixtures to LED (office space floors 7-29, stair wells, lobby, parkade, loading bay), and improvement/repairs to the

building's three boilers. Projects completed to the end of 2021 have cumulatively reduced energy consumption by approximately 190 GJ despite building ventilation increases required in response to COVID-19. Collier's water conservation initiatives have reduced building water usage by 7%. Colliers has commissioned a series of studies to identify future projects that reduce energy use and GHG emissions in the future. These include a 2019 solid waste audit, a 2020 low carbon electrification study that is being followed up with an in progress Net Zero Roadmap study. Recommendations to be presented in 2022.

Regional Parks

In the autumn of 2018, Regional Parks began shutting down the pool annually from the end of September through to the beginning of March. Regional Parks also installed programmable thermostats to control electric baseboard heater at its Central Area Office. From 2016 through 2018, these improvements have saved over $25,000 in energy costs and reduced GHG emissions by 145 tonnes CO_2e.

Additional energy efficiency initiatives undertaken by Regional Parks since 2017 include:

- A lawn mowing reduction program at Pacific Spirit, Iona Beach, Derby Reach, and Aldergrove Regional Parks that have reduced diesel use for lawn mowing at these sites by 30 to 50%;
- Mechanical and electrical upgrades to Campbell Valley washroom building that included new LED lights, sensor faucets, lower flow toilets, low VOC paint and programmable ventilation system;
- Efficiency upgrades with LED lighting and double-pane windows at various building locations across the system;
- Energy-efficient design features of the Kanaka Creek Watershed Stewardship Centre that opened in 2017;
- The new Nature Discovery Area at Aldergrove Regional Park, the area includes xeriscape planting and uses site water sources to establish new trees rather than trucking water;
- Service yard replacement projects are underway at Colony Farm (2019), Crippen (2021) and Capilano River (2022) and will include energy-efficient design to replace aged inefficient facilities; and
- Traffic / demand management strategies (including pay parking) have been implemented at several sites to encourage park visitors to carpool and use other means of travel (including public transit). These measures are expected to reduce regional energy use and GHG emissions.

Fleet

Refer to Section 5.3 for a summary of activities related to energy efficiency improvements for the Metro Vancouver fleet.

6.2 ENERGY RECOVERY

Liquid Waste Services

Biogas Production and On-site Utilization

Liquid Waste Services has produced biogas from treatment processes at four of its five wastewater treatment plants for decades and this is the utility's largest existing energy recovery endeavour. The majority of the biogas is used within the four treatment plants to produce heat, electricity, and/or mechanical energy thus offsetting the purchase of fossil natural gas and grid electricity. Pursuing efficiency

improvements in biogas production would increase energy recovery rates and further reduce Liquid Waste Services fossil fuel dependence and grid electricity purchases as well as enhance opportunities for sale of renewable natural gas to mitigate regional GHG emissions.

In 2015, a multi-year project was completed by Liquid Waste Services and BC Hydro that allowed more biogas to be used by the Iona Island Wastewater Treatment Plant cogeneration engines than had been previously permitted. These improvements resulted in annual biogas utilization increasing from an average of 73% for 2010 to 2014 to an average of 77% for 2015 to 2021. This has translated to an increase of 5% in annual electricity generation comparing the same two periods.

Late in 2017, the Annacis Island Wastewater Treatment Plant cogeneration system was taken out of service and the construction phase of upgrading the system with increased generation capacity began. The new cogeneration system is expected to significantly reduce the amount of biogas that needs to be flared (wasted) and is expected to significantly increase electricity generation. Annacis Island Wastewater Treatment Plant will use all electricity generated to reduce electricity purchases from BC Hydro. Commissioning of the new system began in spring 2020 by August 2021 was mostly complete with the system operating reliably. Annacis Island electricity generation for August through December 2021 exceeded the average generation for those months from 2014 through 2017 (the four years preceding the upgrade) by more than 840,000 kWh.

Heat Recovery

The North Shore Wastewater Treatment Plant, currently under construction, will include a systems that will recover heat from the plant effluent for on-site use and for sale to Lonsdale Energy Corporation (LEC), which will significantly reduce the use of fossil natural gas in LEC's district energy system. The effluent heat recovery systems will be commissioned along with the wastewater treatment processes.

In 2020, Metro Vancouver staff determined that recovering heat from the Lulu Island Wastewater Treatment Plant effluent for on-site use is financially viable under certain conditions, which are being pursued. The project proceeded to preliminary design stage in 2021. The Effluent Heat for RNG project at Lulu Island will reduce the amount of biogas required by the plant to meet its thermal demands thus liberating additional quantities of biogas for clean-up and sale to FortisBC as described in Section 6.3.

Sewer heat and effluent heat recovery within the Liquid Waste Services utility have the potential to contribute enough energy to heat approximately 700 high rise buildings in the region. The most promising opportunities to establish financially feasible sewer heat recovery facilities will often be new high-density development close to large sewer lines. In addition to the North Shore Wastewater Treatment Plant effluent heat recovery project described above, several municipalities, including Richmond, New Westminster, and Surrey, are currently planning large district energy systems. In 2020, preliminary design work was initiated for a sewer heat recovery project in north Richmond. The Sewer Heat Policy, which enables sewer heat recovery projects, was revised in 2021 to enable capital investments in such projects. Detailed implementation protocols are under development in 2022. Initial assessments indicate that sewer heat is the most reliable and cost-effective energy source for such systems. Assuming that this heat displaces heat that would have been generated by natural gas, these systems are capable of reducing greenhouse gas emissions by tens of thousands of tonnes per year by 2030, and potentially by hundreds of thousands of tonnes per year by 2050.

Renewable Natural Gas

Biogas produced at wastewater treatment plants can be cleaned up and sold as renewable natural gas (RNG), a renewable source of energy. FortisBC buys RNG and delivers it to a growing market, displacing fossil natural gas use and thus reducing greenhouse gas emissions. One project of this kind began construction in July 2019 at the Lulu Island Wastewater Treatment Plant. The system was tested and commissioned in 2021. Testing and performance improvements continue in 2022. In 2021, Lulu Island sold over 3,600 GJ of RNG to FortisBC for a revenue of over $74,000. This concept could be applied to other new wastewater treatment plants in the region, and could generate revenue and reduce regional greenhouse gas emissions by tens of thousands of tonnes per year. Assessments of the potential for applying this approach at several other Metro Vancouver wastewater treatment plants have been initiated.

Research has shown that the methane content in biogas can be increased by promoting the right microbial communities within the anaerobic digesters that produce the biogas. Given the current and increasing capacity of Metro Vancouver's digesters, a team of innovators are developing a renewable natural gas (RNG) Optimizer for future trials at the Lulu Island Wastewater Treatment Plant. The RNG Optimizer could boost methane generation by 15% to 25%. This will help reduce RNG cleanup requirements and substantially increase generation of GHG credits and revenues from RNG sales. The successful implementation of the RNG Optimizer at wastewater treatment facilities could motivate its application at other anaerobic digestion facilities processing agricultural or food wastes. Bench-scale testing was initiated in 2021 and will continue in 2022. If successful, Metro Vancouver plans to develop and test a pilot-scale unit at Lulu Island.

Biocrude

Metro Vancouver is implementing the world's first hydrothermal processing (HTP) demonstration system integrated with an operating wastewater treatment facility. HTP converts wastewater biomass into biocrude, a renewable and low carbon version of crude oil, while minimizing the production, transportation and disposal of solid residuals from the wastewater treatment process. A local refinery and project partner will process the biocrude into low-carbon transportation fuels such as marine biofuel, sustainable aviation fuel, or biodiesel. The first barrels of biocrude from wastewater are scheduled for production in 2024. This circular economy demonstration could reduce GHG emissions by 80% at equivalent or lower costs than current processes. If the demonstration is successful, HTP systems can be scaled up for Metro Vancouver and other wastewater treatment facilities globally. Further, wet feedstocks from other industries such as municipal solid waste, agriculture, and forestry could provide additional decarbonization opportunities.

Water Services

Water Services has opportunities to recover energy from water flowing in pipes. From its commissioning in 2016 to the end of 2021, Capilano Energy Recovery Facility generated over 106,000 GJ of electricity that was used to offset a portion of electricity purchases to operate the Capilano Raw Water Pump Station.

Staff have investigated additional opportunities to generate electricity at two pump stations and at Seymour Capilano Filtration Plant from Seymour Lake where pressure reduction is required. The BC Hydro Standing Offer Program that would allow generation at the pump stations was suspended indefinitely in

2017, thus temporarily precluding pursuit of these generation opportunities. Further steps related to energy recovery at Seymour Capilano Filtration Plant are on hold until a decision to proceed with full twinning of Seymour Lake water main line is made, which is not anticipated for several years.

The Angus Drive Pressure Reducing Valve Chamber, constructed in 2016, was designed to accommodate the future addition of a turbine to generate electricity as water flows from Kersland Reservoir to the City of Richmond. The project is on the Long Range Plan potentially scheduled for 2028/2029, providing BC Hydro's Standing Offer Program is reinstated.

As part of the long-term Joint Water Use Plan planning process, Water Services is evaluating the viability of using a turbine to produce electricity from water leaving the Capilano Reservoir. The electricity generated could be used at existing water facilities such as Capilano Raw Water Pump Station or sold to BC Hydro if and when its Standing Offer Program is reinstated. In 2023, green hydrogen production may also be investigated as a potential end use for power generation at this site.

Solid Waste Services

The Waste-to-Energy District Energy System will use heat generated at the Waste-to-Energy Facility to provide heat and domestic hot water to nearby residential and commercial developments. According to technical, environmental and economic assessments, a district energy project using heat from the Waste-to-Energy Facility could result in greenhouse gas emission reductions of up to 45,000 tonnes CO_2e per year. Metro Vancouver has signed an Agreement with River District Energy, and is working with the cities of Vancouver and Burnaby to develop access agreements for the necessary infrastructure. A consultant is being engaged to complete detailed design of the project.

The new United Boulevard Recycling and Waste Centre has been designed to reduce heating energy requirements by recovering heat from ventilation air to pre-heat fresh air entering the ventilation system. These features were also included in the new Central Surrey Recycling and Waste Centre.

The Alternative Fuel and Recyclables Recovery Project will involve processing approximately 60,000 tonnes per year (more than 5% of all regional garbage) of small load waste received at Metro Vancouver recycling and waste centres to recover recyclables and alternative fuel. This project will reduce overall waste disposal and eliminate up to 20,000 tonnes per year of regional GHG emissions by using small load-based alternative fuel in place of fossil fuels. Metro Vancouver envisions small loads will be processed at an existing licensed private facility, and is currently obtaining a proposal to undertake this project.

Housing, Corporate Services, and Regional Parks

Housing, Corporate Services, and Regional Parks did not undertake any energy recovery projects during the period reported. However, opportunities for heat recovery have been identified (e.g., recovering heat from ventilation systems) and will be evaluated as part of the capital improvement options analysis process.

6.3 TRANSITION TO RENEWABLE ENERGY

Liquid Waste Services

Liquid Waste Services' primary sources of stationary energy – electricity and biogas – are renewable. Opportunities nonetheless exist to transition from natural gas and mobile fossil fuels. For example, improving efficiencies of biogas production will reduce Liquid Waste Services use of fossil natural gas.

Except during the coldest days in winter, Lulu Island Wastewater Treatment Plant typically produces more biogas than it requires to meet the plant's thermal demands, with excess gas flared to the atmosphere. As mentioned in Section 6.2 (Energy Recovery), construction began in 2019 to build a facility at Lulu Island Wastewater Treatment Plant to purify the excess biogas to pipeline quality and sell the gas to FortisBC as renewable natural gas. Sales of renewable natural gas from Lulu Island to FortisBC began in 2021. The sale of this gas by FortisBC will allow others in the region to transition from fossil natural gas to renewable energy.

Contracted residuals hauling services are Liquid Waste Services' largest users of fossil fuels. As of 2021, the biosolids hauling contractor transitioned from provincially-mandated 4% biodiesel-based fuel to a 5% biodiesel-based fuel. The contractor also has a short term emissions reduction strategy which uses driver performance metrics to moderate driving behaviour and promote fuel efficient driving habits. Future opportunities might exist to transition contractors' vehicles to lower-carbon fuel sources such as hydrogen, electricity, and renewable natural gas.

With respect to transitioning fleet vehicles to lower-carbon fuel sources, the impacts of changes to the Liquid Waste Services fleet are discussed in Section 5.3.

Water Services

Currently, the primary source of stationary energy used by the water utility is purchased hydroelectricity which, in British Columbia, is considered a clean, renewable energy. Water Services fleet and residuals management use fossil fuels to operate vehicles. Transitioning these mobile fuels to less carbon-intensive energy sources may provide opportunities to reduce GHG emissions from these sources. Water Services is also responsible for the operation of a small number of facilities that use fossil natural gas for space heating. The technical and financial feasibility of meeting these space heating loads using electric air-source heat pumps will be investigated in the future. Beyond transitioning the Water Services fleet to less carbon-intensive fuel sources discussed in Section 5.3, no other Water Services projects are currently planned for transition to renewable energy.

As is the case with Liquid Waste Services, contracted residuals hauling services are also the largest users of fossil fuels for Water Services. Opportunities might exist to encourage these contractors to transition to lower-carbon fuel sources.

Solid Waste Services

Fuels used by solid waste transfer service trucks are one of Metro Vancouver's largest users of fossil fuels. Opportunities might exist to encourage these contractors to transition to lower-carbon fuel sources. The operations contractor of the Central Surrey Recycling and Waste Centre will be using an electric front end loader and forklift as part of the operation of that site. In 2023, Metro Vancouver is also switching 25% of

the natural gas used at the Waste-to-Energy Facility to renewable natural gas, reducing GHG emissions by approximately 750 tonnes CO_2e per year.

Electric vehicle charging stations have been included at the new United Boulevard and Central Surrey Recycling and Waste Centres, and are being investigated for the Waste-to-Energy Facility. Natural gas will not be used at either of the two new recycling and waste centres; all heating requirements will be met with electricity.

The CarbMin Lab at the University of British Columbia is a world leader in carbon mineralization research in industrial alkaline waste and geological materials. They are currently evaluating the potential to use a variety of locally-sourced industrial waste materials, including bottom ash, in carbon sequestration. Initial lab work has confirmed reactivity to CO_2 and the CarbMin Lab estimates a capacity of 100+ tonnes CO_2 per year based on 45,000 tonnes of bottom ash. An in-depth assessment of the mineralization potential is underway. Metro Vancouver has an active procurement process to use bottom ash as a feedstock for cement production.

Housing

Housing is historically[6] Metro Vancouver's largest consumer of fossil natural gas, which is used for space heating and hot water heating. As mentioned earlier, electricity in British Columbia is considered a clean, renewable source of energy. Transitioning from natural gas space heating to electric space heating using high-efficiency heat pumps in Housing buildings is seen as one of the most promising opportunities for Housing to transition to renewable energy. Unfortunately, even when factoring in Metro Vancouver's internal carbon price of $150 per tonne of carbon dioxide equivalent emissions, business cases completed to date have shown that it is not yet financially viable to invest in electric heat pump technology for end-of-life mechanical system upgrades. Improved financial incentives from BC Hydro, the Provincial Government, and/or Federal Government could tip the business case to the positive in the future. In the meantime, Housing will continue to evaluate how heat pump technology could play a role in achieving the GHG emissions reduction targets set out in Housing's 10-Year Plan and in Climate 2050. Housing's focus over the next 10 years will be on new construction and major rehabilitation, and this presents a significant opportunity to shift towards electrification to meet its energy and climate objectives. Although transitioning from natural gas to electricity for facility thermal demands will significantly reduce GHG emissions related to these demands, electrification options tend to carry significantly higher capital, operations, and maintenance costs. Metro Vancouver staff are investigating means by which Housing will be able to fund these additional costs to make the transition away from natural gas financially sustainable while keeping rents affordable.

Housing has taken on two projects within the Sustainability Innovation Fund. *Building Resilience: Exploring the Potential of Renewable Energy Building Infrastructure* will investigate types of renewable energy infrastructure for domestic hot water in affordable housing. This study will help Housing meet Metro Vancouver's Climate 2050 strategy target of a 45% reduction in greenhouse gas emissions by 2030. The *Netzero Feasibility Study* for Metro Vancouver Housing's Welcher redevelopment project was completed

[6] For the first time, natural gas use at the Waste-to-Energy exceed natural gas used by the entire Housing portfolio in 2020.

in 2021. The study provided valuable insight into operational building energy usage and greenhouse gas emissions, as well as effective methods to reduce them through the project design. Following the lessons learned from the feasibility study, energy use and greenhouse gas emission reduction measures were incorporated into the design resulting in an expected energy use reduction of 50% and greenhouse gas emission reduction of 87% once the building is in operation. Additional benefits of these design measures will include higher resiliency under changing climate conditions and power interruptions, along with lower energy costs for the tenants. Lessons learned from the Welcher *Netzero Feasibility Study* will be applied to future Housing projects, thereby contributing to improvements in energy use and greenhouse gas emission performance.

Corporate Services

Before sale of the its former Head Office building, Metro Vancouver evaluated the option to relocate the solar thermal collectors on that building to its new Head Office building, but costs to do so could not be justified and the project did not proceed.

Regional Parks

The works yard at Colony Farm Regional Park does not have access to grid electricity. In 2018, Regional Parks installed solar panels at the works yard to generate electricity that, until then, had to be generated by a gasoline-powered generator. The initiative was funded by Metro Vancouver's Sustainability Innovation Program and will reduce GHG emissions and noise pollution associated with generator operation. Staff are monitoring the effectiveness and efficiency of this pilot project to determine whether similar installations are feasible at other park or utility sites that currently rely on gas-powered generators.

Regional Parks has increased use of emissions-free, battery-powered power tools and small equipment (weed-eaters) to reduce fossil fuel use and its associated GHG emissions.

To help reduce regional energy use and GHG emissions, Regional Parks has installed electric vehicle chargers for public and Metro Vancouver fleet use and is bringing forward a clean air incentive for film companies to use existing grid electricity tie-ins to replace diesel generators for local film projects.

Fleet

Refer to Section 5.3 for a summary of activities related to transitioning the Metro Vancouver fleet to less carbon-intensive fuel sources.

7. SUMMARY

Metro Vancouver and its contractors used 1.6 million GJ of energy in 2021 costing $32.4 million and resulting in 25,300 tonnes of carbon dioxide equivalent (CO_2e) greenhouse gas (GHG) emissions. Corporate energy use has increased by 11% since 2014, energy costs have increased by 30%, and GHG emissions associated with energy use have increased by 14%. Per capita energy use has decreased by 1%, per capita energy cost has increased by 16% and per capita GHG emissions have increased by 2%.

Energy efficiency projects completed from 2014 through 2021 have contributed to savings of nearly 47,000 GJ per year. Cumulative cost savings from these projects over this period are estimated at $8.5 million and cumulative GHG emissions reductions are 4,564 tonnes CO_2e.

Progress has been made toward implementing corporate policies related to energy use and GHG emissions including the *Corporate Energy Management Policy*, the *Sustainable Infrastructure and Buildings Policy*, the suite of *Asset Management* policies, and development of the *Climate 2050* Roadmaps. Development of a Corporate Strategic Energy Management Plan including energy targets is underway for all service areas and is expected to be complete in 2022.

For its corporate GHG emissions, Metro Vancouver is committed to tracking and reporting its corporate GHG emissions, and pursuing carbon neutrality status on an ongoing basis.

APPENDIX A

SUPPLEMENTAL DATA

Table A1: Summary of Departmental Energy and GHG Emissions Trends

Metro Vancouver											
	Year						Percent Change Relative to Baseline (2014)				
	Baseline (2014)	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
Total Energy Use (GJ)	1,442,301	1,540,707	1,527,555	1,561,772	1,576,526	1,595,666	7%	6%	8%	9%	11%
Total Cost ($)	$ 25,083,905	$ 28,021,285	$ 31,012,517	$ 31,343,756	$ 29,701,540	$ 32,496,712	12%	24%	25%	18%	30%
Total GHG Emissions (t CO2e)	22,225	24,446	25,838	27,014	29,021	25,301	10%	16%	22%	31%	14%
Population	2,517,276	2,629,574	2,666,670	2,714,794	2,766,954	2,807,469	4%	6%	8%	10%	12%
GJ/capita	0.573	0.586	0.573	0.575	0.570	0.568	2%	0%	0%	-1%	-1%
$/capita	$ 9.96	$ 10.66	$ 11.63	$ 11.55	$ 10.73	$ 11.58	7%	17%	16%	8%	16%
kg CO2e/capita	8.8	9.3	9.7	10.0	10.5	9.0	5%	10%	13%	19%	2%
Liquid Waste Services											
	Year						Percent Change Relative to Baseline (2014)				
	Baseline (2014)	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
Total Energy Use (GJ)	948,600	932,641	938,919	977,812	997,371	979,181	-2%	-1%	3%	5%	3%
Total Cost ($)	$ 12,604,704	$ 13,355,039	$ 17,311,459	$ 16,910,763	$ 16,401,565	$ 16,637,560	6%	37%	34%	30%	32%
Total GHG Emissions (t CO2e)	7,591	6,990	10,016	10,500	10,558	8,339	-8%	32%	38%	39%	10%
ML Collected & Treated	440,763	449,542	455,545	434,466	459,118	451,732	2%	3%	-1%	4%	2%
GJ/ML Collected & Treated	2.15	2.07	2.06	2.25	2.17	2.17	-4%	-4%	5%	1%	1%
$/ML	$ 28.60	$ 29.71	$ 38.00	$ 38.92	$ 35.72	$ 36.83	4%	33%	36%	25%	29%
kg CO2e/ML	17.2	15.5	22.0	24.2	23.0	18.5	-10%	28%	40%	34%	7%
Water Services											
	Year						Percent Change Relative to Baseline (2014)				
	Baseline (2014)	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
Total Energy Use (GJ)	181,141	250,564	240,304	246,415	211,273	237,266	38%	33%	36%	17%	31%
Total Cost ($)	$ 4,564,972	$ 6,831,447	$ 6,091,365	$ 6,602,055	$ 5,762,478	$ 7,529,294	50%	33%	45%	26%	65%
Total GHG Emissions (t CO2e)	2,698	3,183	2,560	3,171	3,206	2,074	18%	-5%	18%	19%	-23%
ML Treated & Delivered	381,261	389,177	389,800	383,400	378,734	391,709	2%	2%	1%	-1%	3%
GJ/ML Treated & Delivered	0.475	0.64	0.62	0.64	0.56	0.61	36%	30%	35%	17%	27%
$/ML	$ 11.97	$ 17.55	$ 15.63	$ 17.22	$ 15.22	$ 19.22	47%	31%	44%	27%	61%
kg CO2e/ML	7.1	8.2	6.6	8.3	8.5	5.3	16%	-7%	17%	20%	-25%
Solid Waste Services											
	Year						Percent Change Relative to Baseline (2014)				
	Baseline (2014)	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
Total Energy Use (GJ)	192,026	212,532	214,401	213,564	250,156	257,372	11%	12%	11%	30%	34%
Total Cost ($)	$ 5,246,106	$ 4,631,611	$ 4,580,528	$ 5,116,817	$ 4,994,201	$ 5,511,659	-12%	-13%	-2%	-5%	5%
Total GHG Emissions (t CO2e)	7,570	9,042	8,593	8,788	10,854	10,685	19%	14%	16%	43%	41%
Mass Disposed (tonnes)	542,477	590,002	590,805	577,950	572,222	589,929	9%	9%	7%	5%	9%
GJ/tonne disposed	0.35	0.36	0.36	0.37	0.44	0.44	2%	3%	4%	23%	23%
$/tonne disposed	$ 9.67	$ 7.85	$ 7.75	$ 8.85	$ 8.73	$ 9.34	-19%	-20%	-8%	-10%	-3%
kg CO2e/tonne disposed	14.0	15.3	14.5	15.2	19.0	18.1	10%	4%	9%	36%	30%
Housing											
	Year						Percent Change Relative to Baseline (2014)				
	Baseline (2014)	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
Total Energy Use (GJ)	66,969	66,785	62,263	61,917	63,965	67,232	0%	-7%	-8%	-4%	0%
Total Cost ($)	$ 1,133,904	$ 1,157,065	$ 1,129,645	$ 1,110,182	$ 1,161,536	$ 1,331,473	2%	0%	-2%	2%	17%
Total GHG Emissions (t CO2e)	2,490	2,496	2,357	2,365	2,476	2,500	0%	-5%	-5%	-1%	0%
Million m^2*HDD	750	833	774	810	787	820	11%	3%	8%	5%	9%
kJ/(m^2*HDD)	89.283	80.18	80.47	76.45	81.30	82.00	-10%	-10%	-14%	-9%	-8%
$/(million m^2*HDD)	$ 1,511.71	$ 1,389	$ 1,460	$ 1,371	$ 1,476	$ 1,624	-8%	-3%	-9%	-2%	7%
g CO2e/(m^2*HDD)	3.3	3.00	3.05	2.92	3.15	3.05	-10%	-8%	-12%	-5%	-8%
Corporate Services											
	Year						Percent Change Relative to Baseline (2014)				
	Baseline (2014)	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
Total Energy Use (GJ)	36,556	62,961	56,933	48,972	41,145	41,546	72%	56%	34%	13%	14%
Total Cost ($)	$ 872,617	$ 1,576,220	$ 1,424,627	$ 1,170,396	$ 968,381	$ 1,010,175	81%	63%	34%	11%	16%
Total GHG Emissions (t CO2e)	1,080	2,072	1,679	1,628	1,379	1,173	92%	55%	51%	28%	9%
Population	2,517,276	2,629,574	2,666,670	2,714,794	2,766,954	2,807,469	4%	6%	8%	10%	12%
GJ/capita	0.015	0.02	0.02	0.02	0.01	0.01	65%	47%	24%	2%	2%
$/capita	$ 0.35	$ 0.60	$ 0.53	$ 0.43	$ 0.35	$ 0.36	73%	54%	24%	1%	4%
kg CO2e/capita	0.4	0.8	0.6	0.6	0.5	0.4	84%	47%	40%	16%	-3%
Parks											
	Year						Percent Change Relative to Baseline (2014)				
	Baseline (2014)	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
Total Energy Use (GJ)	17,008	15,224	14,736	13,092	12,615	13,069	-10%	-13%	-23%	-26%	-23%
Total Cost ($)	$ 531,123	$ 469,903	$ 474,892	$ 433,542	$ 413,380	$ 476,549	-12%	-11%	-18%	-22%	-10%
Total GHG Emissions (t CO2e)	797	663	632	562	549	529	-17%	-21%	-29%	-31%	-34%
Population	2,517,276	2,629,574	2,666,670	2,714,794	2,766,954	2,807,469	4%	6%	8%	10%	12%
MJ/capita	6.756	5.79	5.53	4.82	4.56	4.65	-14%	-18%	-29%	-33%	-31%
$/capita	$ 0.21	$ 0.18	$ 0.18	$ 0.16	$ 0.15	$ 0.17	-15%	-16%	-24%	-29%	-20%
kg CO2e/capita	0.3	0.25	0.24	0.21	0.20	0.19	-20%	-25%	-35%	-37%	-40%

Notes:

Improvement / Favourable (change less than zero)

Degradation / Unfavourable (change greater than zero)


metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

Metro Vancouver's 2021 Carbon Neutral Reporting

15 July, 2022

As a signatory to the BC Climate Action Charter, and in accordance with requirements of the Climate Action Revenue Incentive Program (CARIP), Metro Vancouver has reported annually on its actions to reduce greenhouse (GHG emissions) and adapt to a changing climate. In 2022, CARIP was replaced with the Local Government Climate Action Program (LGCAP). While no longer a provincial requirement under LGCAP, Metro Vancouver continues to report carbon credits claimed from greenhouse gas (GHG) emissions reduction projects to balance GHG emissions from traditional local government services (a subset of Metro Vancouver's total GHG emissions). This scope of services is defined in the provincial Carbon Neutral Framework for local governments, which was established under the BC Climate Action Charter.

Metro Vancouver's 2021 Carbon Neutral Reporting includes direct and contracted 2021 GHG emissions associated with the delivery of traditional local government services, in line with established provincial reporting practices. This excludes emissions from Metro Vancouver Housing services and the Waste-to-Energy Facility, and certain contracted emissions. To balance these emissions, Metro Vancouver implements a portfolio of emission reduction projects to achieve real, measurable, and verifiable regional GHG emissions reductions, or avoid the release of GHGs altogether. For 2021, these projects include a landfill gas capture project, several avoided forest conversion projects and the ecological restoration of Burns Bog. These emission reductions are claimed by Metro Vancouver as GHG reduction credits. Metro Vancouver reports and tracks projects with GHG emissions reduction credits through the Local Carbon Registry, which includes project planning, and third-party validation and verification documents for each project. As a result of these credit projects, Metro Vancouver has maintained carbon neutrality related to delivery of traditional local government services in 2021, which is the third consecutive year that carbon neutrality has been achieved, under the methodology used.

Metro Vancouver reports on a wider set of energy-related GHG emissions through *Managing Metro Vancouver's Corporate Energy and Greenhouse Gas Emissions (2017 to 2021).* Metro Vancouver also reports on climate action initiatives, and progress on *Climate 2050,* through the *Climate 2050 Snapshot,* which reports on a number of corporate and regional climate action projects implemented in 2021 and 2022 to reduce GHG emissions and support climate adaptation and resilience. Metro Vancouver is also completing public reporting for 2021 to meet LGCAP reporting requirements. These public reports are available to stakeholders and residents to promote awareness of the range of climate actions Metro Vancouver is undertaking.

Metro Vancouver has used *Becoming Carbon Neutral: A Guidebook for Local Governments in British Columbia* and reports on Green Communities Committee-supported Option 1 and Option 2 Projects.

Reporting on Direct GHG Emissions

Direct emissions covered in this report include "traditional local government services" and are primarily related to electricity and fuel use for: Buildings; Wastewater collection and treatment; Water treatment and transmission; and Corporate fleet mobile emission sources.

Reporting on Contracted GHG Emissions

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

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

Metro Vancouver 2021 Carbon Neutral Reporting

2021 Carbon Emissions

Corporate GHG emissions (in tonnes of carbon dioxide equivalent) from services delivered directly by your local government:	7,086
Corporate GHG emissions (in tonnes of carbon dioxide equivalent) from contracted services:	11,016
TOTAL A: CORPORATE GHG EMISSIONS FOR 2021	**18,102 tCO_2e**

2021 Carbon Reductions

In order to ensure transparency of Metro Vancouver GHG reduction projects, projects are registered to the Local Carbon Registry (https://www.localcarbonregistry.org/), which is a publicly accessible platform that can be utilized by local and regional governments to set up their GHG inventory, and register their emission reduction projects and carbon neutrality progress.

To be carbon neutral, a local government must balance its TOTAL corporate GHG emissions generated in 2021 by one or a combination of the following actions:

- Undertake Green Communities Committee-supported Option 1 Project(s)
- Undertake Green Communities Committee-supported Option 2 Project(s)
- Purchase carbon offsets from a credible offset provider

If applicable, please report the 2021 GHG emissions reductions (in tonnes of carbon dioxide equivalent (tCO_2e)) being claimed from Option 1 GHG Reduction Projects:

OPTION 1 PROJECTS	**REDUCTIONS**
1E Avoided Forest Conversion	
Barker Property	2,786
Thompson Mountain Property	366
Grant Hill (Kanaka Creek Regional Park)	185
Minnekhada Quarry Road (Minnekhada Regional Park)	76
Lane Property (Kanaka Creek Regional Park)	58
TOTAL B: REDUCTIONS FROM OPTION 1 PROJECTS FOR 2021	**3,471 tCO_2e**

If applicable, please report the names and 2021 GHG emissions reductions (in tonnes of carbon dioxide equivalent (tCO2e)) being claimed from Option 2 GHG Reduction Projects:

OPTION 2 PROJECT NAME	**REDUCTIONS**
Coquitlam Landfill Gas Collection System (2019 and 2020)	3,535

Ecosystem Restoration of the Burns Bog Ecological Conservancy Area (2012-2016)[1]	12,647
TOTAL C: REDUCTIONS FROM OPTION 2 PROJECTS FOR 2021	**16,182 tCO_2e**

2021 Carbon Offsets

If applicable, please report the number of offsets purchased (in tonnes of carbon dioxide equivalent (tCO2e)) from an offset provider for the 2021 reporting year:

OFFSET PROVIDER	REDUCTIONS
Not applicable	N/A
TOTAL D: OFFSETS PURCHASED FOR 2021	**0 tCO_2e**

TOTAL REDUCTION AND OFFSETS FOR 2021 (Total B+C+D) = 19,653 tCO_2e

Corporate GHG Emissions Balance for 2021

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

CORPORATE GHG EMISSIONS BALANCE FOR 2021 = (A – (B+C+D)) = -1,551 tCO_2e

If your local government was carbon neutral in 2021, please record any emissions reductions you will be carrying over for future years and the source of the reductions, including the year they were earned (e.g. organics diversion, 2020 100 tCO2e):

	Source of Carryover Emission Reduction	Year Earned	GHG Emissions Reductions
1.	Ecosystem Restoration of the Burns Bog Ecological Conservancy Area	2012-2016	1,551
TOTAL E - BALANCE OF REDUCTIONS ELIGIBLE FOR CARRY OVER TO NEXT YEAR			**1,551 tCO_2e**

References

1. Local Government Climate Action Program
2. BC Carbon Neutral Framework
3. BC Local Carbon Registry

[1] The 12,647 tonnes is a portion of the total GHG emissions reductions credits from the years 2012-2016, and represents credits from the project that were carried forward from the previous year's carbon neutral reporting.

To: Climate Action Committee

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

Date: July 29, 2022 Meeting Date: September 9, 2022

Subject: **Climate Change and Habitat Suitability for New Invasive Plants in Metro Vancouver**

RECOMMENDATION

That the Climate Action Committee receive for information the report dated July 29, 2022, titled "Climate Change and Habitat Suitability for New Invasive Plants in Metro Vancouver".

EXECUTIVE SUMMARY

Invasive species can negatively impact property and recreational values, infrastructure, agriculture, public health and safety, and the ecosystem services provided by natural spaces. To improve local understanding of the role climate change plays in spreading invasive plant species, Metro Vancouver partnered with local researchers at the University of British Columbia and Trinity Western University. The research team used local climate projections and a habitat suitability model to predict habitat suitability changes for four high-risk invasive plants. The researchers found that some species will gain and some will lose suitable habitat in the future with climate change, but local efforts should continue to contain or eradicate existing infestations and prevent further introductions. This regional-scale model could be used to assess future habitat suitability for additional invasive species of concern. This research is an example of how Metro Vancouver is supporting member jurisdictions and other land managers with tools to inform risk management, best practices, and coordination of measures to prevent the spread of highly invasive species across the region.

PURPOSE

To provide the Climate Action Committee with an overview of local research supported by Metro Vancouver and other partners to better understand how new high-risk invasive plant species may respond as the climate continues to change.

BACKGROUND

Since 2018, the Climate Action Committee has received staff reports regarding best management practices and guides that have been developed to combat local priority invasive species. Each best management practice guide includes a 'Climate Change Adaptation' section that theorizes how each species may withstand, and possibly thrive, with the changing climate conditions in this region. While these guides solely focus on invasive species that have already established throughout this region, other high-risk species have been detected in adjacent jurisdictions (or within this region in small quantities); these other species also have the potential to spread into, within, and beyond this region.

THE NEED FOR CLIMATE CHANGE AND HABITAT SUITABILITY RESEARCH

Academics recently identified a local knowledge gap regarding whether the future local climate conditions (e.g. an extended growing season, fewer frost days, hotter drier summers, warmer wetter

winters) will change the suitability of local habitats for new high-risk invasive species. In 2019, Trinity Western University professor, Dr. David Clements, presented a proposal to the Regional Planning Advisory Committee – Invasive Species Subcommittee to develop a habitat suitability model that would use Metro Vancouver's downscaled climate change projections to predict how new high-risk invasive plants may spread locally. Recognizing the value of this research for local preventive management, Metro Vancouver became a partner in this study.

RESEARCH TEAM AND PARTNERS

To guide this project, Trinity Western University established a team of non-academic partners (i.e. B.C. Ministry of Agriculture, the Invasive Species Council of Metro Vancouver, and Metro Vancouver) and researchers, including:

- Emma Nikkel, Master's candidate at the University of British Columbia – Researcher;
- Dr. David Clements, Co-Chair, Department of Geography and Environment and Professor, Department of Biology at Trinity Western University – Research team lead and co-supervisor; and
- Dr. Jennifer Williams, Associate Professor, Department of Geography at the University of British Columbia – Co-supervisor

Metro Vancouver provided seed funding to bolster the research team's application for grant funding through the Natural Sciences and Engineering Research Council of Canada Alliance Program.

STUDY OBJECTIVES AND METHODOLOGY

The main objective of this study was to predict how suitable habitats may change due to climate change for four relatively new invasive plants species in the Pacific Northwest region of North America, which is a particularly vulnerable area due to its mild climate. The four invasive plant species that were selected from the Provincial Early Detection and Rapid Response (EDRR) list have varied habitat requirements and invasion status; two are terrestrial plants (i.e. shiny geranium and mouse-ear hawkweed), and two are aquatic plants (i.e. flowering rush and water hyacinth). These species were chosen based on their current limited establishment in the region, and the major impacts they can have in their introduced ranges. Possible impacts are shown in Table 1.

Table 1. Potential impacts from selected invasive plant species

Species	**Potential Impacts (References 1-4)**
Shiny geranium	- Dominates forest understories - Threatens species at risk
Mouse-ear hawkweed	- Degrades forage for livestock; reduces the quality and value of crops - Dominates beneficial native plant communities
Flowering rush	- Impedes the use of shallow waters for recreation, irrigation and industrial activities - Alters sensitive ecosystems
Water hyacinth	- Slows water flow and can block drainage - Can disrupt recreational activities, boating, swimming and fishing

The researchers assembled species occurrence, land cover, human influence, bioclimatic, current climate, and future climate scenarios datasets as inputs to run a habitat suitability model. Changes in suitable habitat for each of the species were projected to the years 2050 and 2080 using IPCC scenarios RCP 4.5, 7.0, and 8.5.

STUDY FINDINGS

Table 2 below summarizes the predicted habitat suitability changes by 2050, and the Attachment provides snapshots of the model outputs for each species. The study's main researcher also provided recommendations regarding current management efforts based in her results.

Table 2. Predicted Habitat Suitability Changes within Metro Vancouver by 2050

Species	Current Suitability	Future Suitability (2050)	Recommendations
Shiny geranium	Many areas in Metro Vancouver are moderately to highly suitable	Likely to **gain** suitable habitat, potential expansion poleward	- Contain 11 existing sites and take measures to prevent further spread*
Mouse-ear hawkweed	Many areas in Metro Vancouver are highly suitable	Likely to **lose** habitat suitability	- Continue with efforts to eradicate 16 existing sites and prevent further spread*
Flowering rush	Eastern areas of Metro Vancouver are highly suitable	Likely to **gain** moderately suitable habitat inland and **lose** suitability in a some areas	- Monitor and take measures to prevent establishment**
Water hyacinth	Moderately to highly suitable in coastal lowland areas of Metro Vancouver	**Remains** moderately to highly suitable in coastal lowland areas	- Eradicate from one existing site - Monitor and take measures to prevent establishment**

*For shiny geranium and mouse-eared hawkweed, it is important to clean clothing, vehicles, and equipment before leaving an infested site.
**For flowering rush and water hyacinth, the main pathway for introduction is nursery sales.

The general conclusion from this research is that invasive plant species are not and will not be impacted by climate change equally; local habitats will likely become more suitable for some of the four species studied, while others will lose suitable habitat. However, local efforts should continue to contain or eradicate existing infestations and measures should also be taken to prevent further introductions.

NEXT STEPS

This study's regional-scale model can be used as a template to model future habitat suitability for additional invasive species of concern. Coupled with local invasive species risk assessments, such modelling will assist member jurisdictions and other local land managers to develop and implement targeted, preventative management strategies.

ALTERNATIVES

As this is an information report, no alternatives are provided.

FINANCIAL IMPLICATIONS

The 2020 and 2021 MVRD Board-approved Regional Planning budgets each included $15,000 to support this research. The research team also secured $57,000 in grant funding for this project from the Natural Sciences and Engineering Research Council of Canada Alliance Program.

CONCLUSION

Metro Vancouver recently supported a team of researchers at the University of British Columbia and Trinity Western University to investigate how climate change could impact the spread of four identified high-risk invasive plants. The results suggest that while some species will gain and some will lose suitable habitat in the future with a changing climate, local efforts should continue to contain or eradicate existing shiny geranium, mouse-ear hawkweed, and water hyacinth infestations. Measures should also be taken to prevent further introductions of those species and new introductions of flowering rush. This research will help member jurisdictions and other land managers to better understand the influence of climate change on the potential spread of highly invasive species across the region, and the need to take targeted, preventative action.

Attachment

Invasive plants in a changing climate – Research Summary

References

1. Shiny Geranium – Provincial Alert
2. Mouse-ear Hawkweed – Provincial Alert
3. Flowering Rush – Provincial Alert
4. Water hyacinth

48516783

Invasive plants in a changing climate

Invasive plants can pose a significant threat to the environment, economy, infrastructure, agriculture, and/or human health. Ongoing climate change impacts (such as a longer growing season, hotter drier summers, warmer wetter winters) will influence the ability of invasive plants to establish and spread across the Metro Vancouver region. Employing a habitat suitability model, researchers at the University of British Columbia and Trinity Western University predicted how the distribution of four high-risk invasive species may evolve under future climate scenarios.

From left to right: shiny geranium (credit: D. Clements), mouse-ear hawkweed (credit: L. Michels), flowering rush (credit: C. Fischer), and water hyacinth (credit: aquaticbiologists.com)

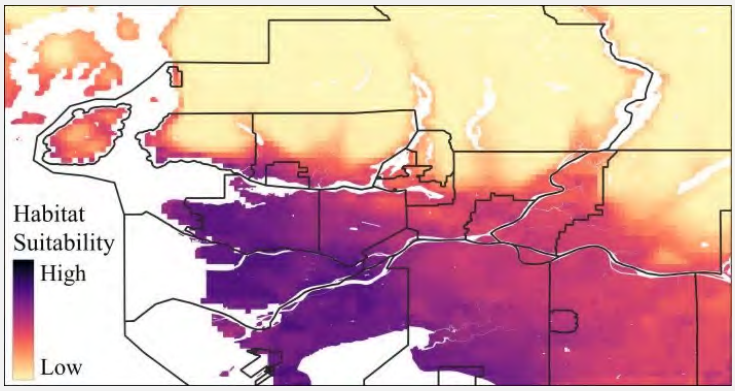
These species appear on the Provincial Early Detection and Rapid Response list, which means the Provincial government regards them as high priority for eradication. With unique habitat requirements and climate tolerances, each species was studied under current and future climate conditions. The Metro Vancouver region was found to be particularly suitable and hence vulnerable to invasion.

Species	Origin	Preferred Habitat	Current MV Sites
Shiny geranium (*Geranium lucidum*)	Temperate Europe and Asia	Terrestrial; shaded conifer and riparian forests	11
Mouse-ear hawkweed (*Pilosella officinarum*)	Temperate and sub-arctic Europe	Terrestrial; exposed grassland, roadsides, and disturbed areas	16
Flowering rush (*Butomus umbellatus*)	Europe and Western Asia	Aquatic; lake shores, slow-moving waterways, ditches, and wetlands	0
Water hyacinth (*Pontederia crassipes*)	Amazon Basin, South America	Aquatic; lakes, ponds, rivers, wetlands, and marshes	1

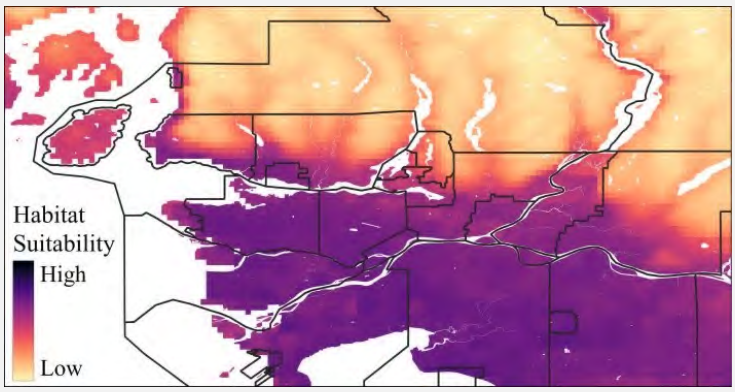
Shiny geranium

Under current climate, the Metro Vancouver region is moderately to highly suitable for the establishment of shiny geranium. In fact, this species has already been found in 11 sites within Metro Vancouver. By 2050, under future climate scenarios, the Metro Vancouver region is predicted to remain or become more highly suitable for invasion.

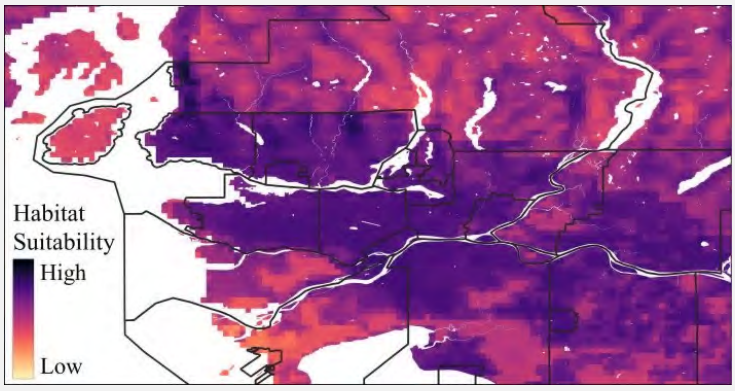
Containment of existing shiny geranium sites and prevention of further spread is critical as climate change may increase the susceptibility of the Metro Vancouver region to further invasion, particularly the eastern portions and areas north of Burrard Inlet. Unfortunately, the Province removed shiny geranium from the early detection and rapid response list in October 2021 and has shifted the management approach from eradication to containment.



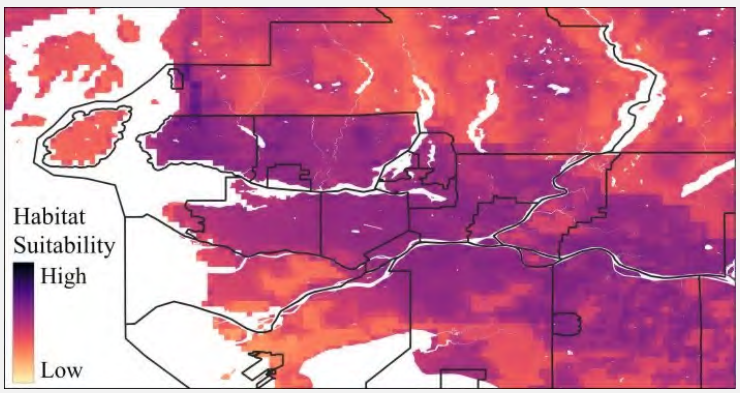
Current suitable habitat



Climate scenario RCP 8.5 2050



Current suitable habitat



Climate scenario RCP 8.5 2050

Mouse-ear hawkweed

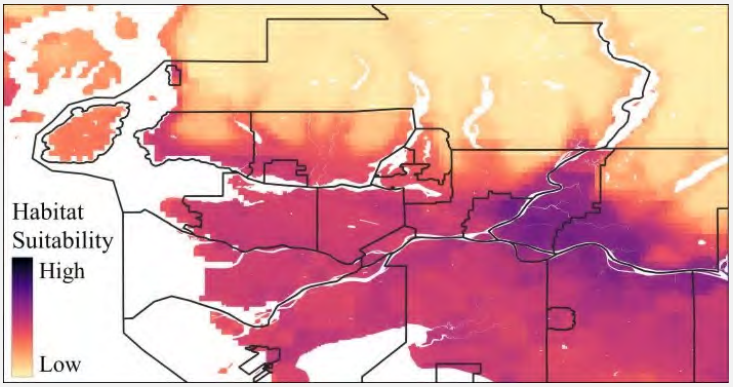
At present, many areas of the Metro Vancouver region are highly suitable for the establishment of mouse-ear hawkweed. There are currently 16 sites with mouse-ear hawkweed in Metro Vancouver, but these sites are actively being contained within the City of Vancouver. By 2050, under future climate scenarios, habitat in Metro Vancouver is predicted to become less suitable for mouse-ear hawkweed. However, populations that have already become established will likely remain viable.

Although mouse-ear hawkweed may not be a high priority species when considering climate change impacts, eradication and prevention efforts should continue.

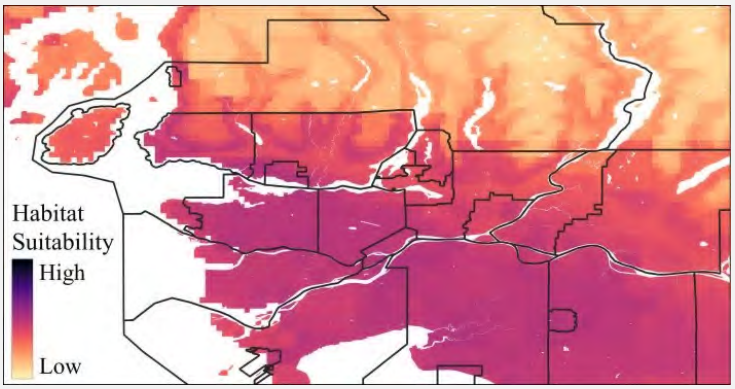
Flowering rush

Currently, eastern areas of the Metro Vancouver region are highly suitable for the establishment of flowering rush. While there are no known sites in Metro Vancouver currently, flowering rush has been detected in the Hatzic area of the Fraser Valley. By 2050, the region as a whole will be moderately suitable for flowering rush. Moderate suitability combined with high risk of introduction may result in the establishment and proliferation of flowering rush.

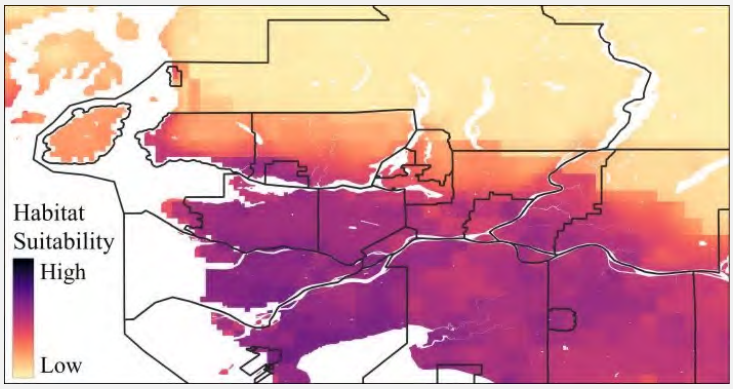
Local risk assessments combined with this modelled suitability map suggest areas for targeted monitoring and prevention of this species. Flowering rush spreads mainly by human water recreation (boats moving between water bodies without cleaning) and improper garden plant disposal. However, nursery sales are the main pathway for long distance dispersal.



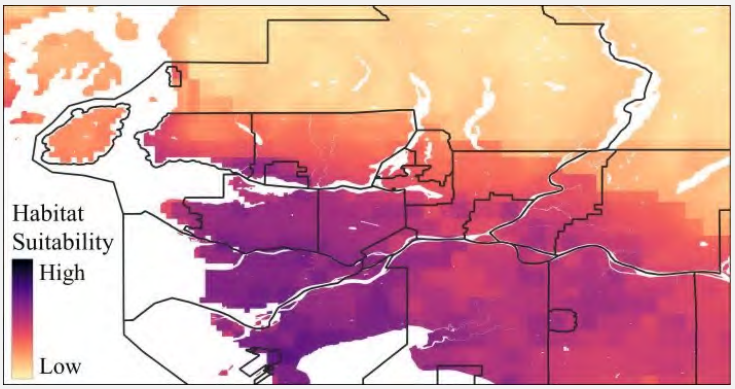
Current suitable habitat



Climate scenario RCP 8.5 2050



Current suitable habitat



Climate scenario RCP 8.5 2050

Water hyacinth

The current climate of the Metro Vancouver region suggests that the habitat is already moderately to highly suitable for water hyacinth. The model predicts that this suitability may only result in year-round establishment approximately 50% of the time. Under future climates, the suitability of the region remains moderately to highly suitable; however, fewer frost days may increase the likelihood that water hyacinth will over winter and spread.

Given water hyacinth's status as a high-risk species, and the habitat suitability of the region, close monitoring and prevention is highly recommended for this species. While nursery sales are the main vector of spread, the increased frequency of flooding, such as the November 2021 flood event, increases the likelihood of seeds spreading and remaining dormant for many years.

To: Climate Action Committee

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

Date: August 29, 2022 Meeting Date: September 9, 2022

Subject: **Manager's Report**

RECOMMENDATION
That the Climate Action Committee receive for information the report dated August 29, 2022 titled "Manager's Report".

Climate Action Committee 2022 Work Plan
Attachment 1 to this report sets out the Committee's Work Plan for 2022. The status of work program elements is indicated as pending, in progress, or complete. The listing is updated as needed to include new issues that arise, items requested by the Committee, and changes to the schedule. The work plan includes several Climate 2050 roadmaps for completion in 2022, in addition to the buildings and transportation roadmaps completed in 2021. While these are well underway, with an update on the engagement processes provided below, they will be brought forward to the Committee and Board in the new year, to coincide with the development of a new Board strategic plan.

Climate 2050 Engagement Update
Four Draft Climate 2050 Roadmaps—Agriculture, Energy, Industry & Business, and Nature & Ecosystems—were open for engagement over the summer, with the comment period closing on July 30. The opportunity to provide comment was promoted through Metro Vancouver's social media channels (Facebook, Twitter, LinkedIn, Instagram) between June 1 and July 30, 2022. In total, the social media ads reached over 60,000 Metro Vancouver residents, generating over 6,900 engagements (likes, comments, shares and link clicks), including over 6,000 link clicks to the Climate 2050 Roadmap Engagement Page, where residents were able to learn more about each of the four Roadmaps, and provide public comment by completing a feedback form.

In July, staff hosted a webinar for the Industry & Business Roadmap focusing on the adaptation content, and offered additional opportunities for the Energy Technical Advisory Working Group to comment on the Energy Roadmap. Staff are continuing to meet with audiences that are likely to comment, be impacted, or have a role in implementation until the Roadmaps are adopted by the Board; including a special workshop in September at the Metro Vancouver Agriculture Advisory Committee. Staff are also working to strengthen to the local and Indigenous perspectives in all four draft Roadmaps.

Proposed Amendments to BC Zero-Emissions Vehicles Act
The BC Government is undertaking a formal review of the *Zero-Emissions Vehicles (ZEV) Act*, which was originally passed in 2019, and has proposed amendments to align the Act with targets in the Provincial *CleanBC Roadmap to 2030*. The current ZEV Act requires automakers to meet an escalating

annual percentage of new light-duty ZEV sales, reaching 10% of light-duty vehicle sales by 2025, 30% by 2030, and 100% by 2040. The ZEV Act is intended to ensure a greater availability of ZEVs at more affordable prices. ZEV uptake in BC is already exceeding the ZEV Act's original targets. In the Metro Vancouver region, for example, almost 11% of new vehicles sold in 2020 were ZEVs, exceeding the ZEV Act's 2025 target of 10%.

An intentions paper has been released (Reference 1) that proposes the adoption of more stringent sales targets in the ZEV Act, which would require that 26% of light-duty vehicles sold in BC would be ZEVs by 2026, 90% by 2030 and 100% by 2035. Other changes include a higher weight cutoff for the light-duty vehicle classification in the Act (so the ZEV sales targets would apply to heavier vehicles like large pickup trucks), and incentives for automakers to manufacture more 100% ZEVs like battery-electric vehicles (instead of plug-in hybrid vehicles, which run on batteries plus combustion engines powered by gasoline and diesel).

Metro Vancouver's *Clean Air Plan* and *Climate 2050 Transportation Roadmap* include a target to reduce greenhouse gas emissions from light-duty vehicles by 65% by 2030, relative to 2010 levels. One of the Big Moves in the *Clean Air Plan* and the *Transportation Roadmap* is to advocate to the BC Government to increase the stringency of the ZEV Act to accelerate the adoption of ZEVs. The proposed amendments to the ZEV Act appear to align with that Big Move, although the proposed 2026 ZEV target of 26% for new vehicle sales is low relative to the 2030 target of 90%. Metro Vancouver staff are undertaking a detailed review of the proposed amendments as outlined in the intentions paper, with consideration of whether they are sufficient to accelerate the transition to ZEVs in the Metro Vancouver region. Staff aim to submit technical questions and comments to the Province by the September 27, 2022 deadline.

Staff are continuing to work with key partners, including TransLink and member jurisdictions, to implement actions from the *Clean Air Plan* and *Transportation Roadmap*, to reduce emissions from light-duty vehicles and other transportation sources. Updates on specific actions, including related to the ZEV Act. will be reported to the Climate Action Committee at key milestones.

2022 UBCM Resolutions on Air Quality and Climate Change from Metro Vancouver Member Jurisdictions

A key function of the Union of British Columbia Municipalities (UBCM) is to pass resolutions on behalf of its membership. At its 2022 convention taking place in Whistler between September 12 to 16, 2022, UBCM members will vote on those resolutions. In total, Metro Vancouver's member jurisdictions put forward 9 resolutions that align with current or planned Metro Vancouver actions in the *Clean Air Plan* and the *Climate 2050 Roadmaps*. These resolutions focus on a number of themes including flood resilience, extreme heat response, buildings, transportation, energy, nature & ecosystems, and air quality.

Attachment 2 provides a summary in table form of the Metro Vancouver member jurisdictions' 2022 UBCM resolutions related to air quality and climate change, categorized based on relevance to specific issue areas (i.e. climate adaptation (resilience to extreme heat and flooding), transportation, buildings, energy, and nature & ecosystems).

Tilbury Marine Jetty and Phase 2 LNG Expansion

Over the period from April to July 2022, the Climate Action Committee received delegations, invited presentations, and a staff report related to the Tilbury Marine Jetty and Tilbury Phase 2 LNG Expansion projects. At its July meeting, the Committee adopted two recommendations to the MVRD Board: that the Board express its opposition to the projects, and that the Board express its concerns about the projects and advocate for these concerns to be addressed by decision-makers prior to any approval.

At the MVRD Board meeting on July 29, the matter was referred back to staff, via the following resolution:

> *That the MVRD Board refer the report dated July 8, 2022, titled "Tilbury Marine Jetty and Tilbury Phase 2 LNG Expansion Projects" back to staff to report back to the Board at the conclusion of the environmental assessment for the Tilbury Marine Jetty and at the appropriate time for the Phase 2 development.*

Per direction, staff will report back to the Climate Action Committee and Board.

Air Quality Advisory Update

The first air quality advisory of 2022 was issued on July 26 and remained in place until August 1, coinciding with a heat wave with maximum daytime temperatures exceeding 35 degrees Celsius in parts of the region. The advisory was initiated for ground-level ozone in the eastern portions of Metro Vancouver and the Fraser Valley. Ground-level ozone is not emitted directly, but formed from atmospheric reactions between volatile organic compounds and nitrogen oxides in the presence of sunlight. Nitrogen oxides are emitted when fuels are burned while volatile organic compounds are emitted from a variety of sources including fossil fuels, cannabis production, agricultural activities, solvents like paint thinners and varnishes, as well as natural sources. While the frequency and severity of ground-level ozone advisories has been reduced in the last two decades with management actions (e.g. Regional Ground-Level Ozone Strategy), the high temperatures caused ozone concentrations to exceed air quality objectives at numerous stations for both 1-hour and 8-hour concentrations. The advisory was cancelled on August 1 with a return to cooler temperatures.

As of this report's publication, wildfire activity in the province has increased with multiple fires burning within the Coastal Fire Zone. Currently there are multiple fires burning south of Hope near Chilliwack Lake and these fires may contribute to locally hazy conditions and elevated ground level concentrations of fine particulate matter. There remains the possibility that additional advisories could be issued but it is highly dependent on fire activity over the remainder of the summer.

Lower Fraser Valley Air Zone Report for 2018-2020

In June 2022, the province of BC published "air zone" reports for BC's seven air zones, for the 2018-2020 reporting period. These reports are provided to Environment and Climate Change Canada as part of the national Air Quality Management System. Air Zone reports are used to compare air quality levels in broad reporting areas to the Canadian Ambient Air Quality Standards (CAAQS), for ozone, fine particulate matter ($PM_{2.5}$), nitrogen dioxide (NO_2), and sulphur dioxide (SO_2). The Lower Fraser Valley Air Zone report (Reference 2), which includes Metro Vancouver and the Fraser Valley Regional District, indicates that the CAAQS for ozone, $PM_{2.5}$, NO_2 and SO_2 were achieved.

Air zone reports assign management levels to each air zone, to help determine the need to maintain or improve air quality. Air zone management levels are assigned a colour code based on the highest concentrations within an air zone, after removing the effects of transboundary or exceptional events such as wildfires, where there is little opportunity for control over emissions. Management levels describe the level of action to be taken by the responsible jurisdictions, and are described as follows:

- Green – Actions for keeping clean areas clean
- Yellow – Actions for preventing air quality deterioration
- Orange – Actions for preventing CAAQS exceedance
- Red – Actions for achieving air zone CAAQS

The table below summarizes 2018-2020 concentrations and management levels assigned to the Lower Fraser Valley Air Zone for the various CAAQS. The management levels for $PM_{2.5}$ and ozone in the 2018-2020 air zone report remained the same as reported in the previous air zone report.

CAAQS		Concentrations (based on 2018 - 2020 data)	Management Level
Ozone (8-hour)	62 ppb	38 ppb at Vancouver – Robson Square to 58 ppb in Maple Ridge	Orange
$PM_{2.5}$ (24-hour)	27 µg/m^3	11 µg/m^3 in Horseshoe Bay and Tsawwassen to 18 µg/m^3 in Vancouver - Clark Drive	Orange
$PM_{2.5}$ (annual)	8.8 µg/m^3	3.9 µg /m^3 in Horseshoe Bay to 6.9 µg/m^3 at Vancouver - Clark Drive	Orange
NO_2 (1-hour)	60 ppb	24 ppb in Langley to 50 ppb at Vancouver - Clark Drive	Orange
NO_2 (annual)	17 ppb	5.3 ppb in Tsawwassen to 15.8 ppb at Vancouver - Clark Drive	Orange
SO_2 (1-hour)	70 ppb	3 ppb in Richmond, Langley, Chilliwack and Abbotsford - Airport to 35 ppb in North Burnaby – Capitol Hill	Yellow
SO_2 (annual)	5 ppb	0.1 ppb in Tsawwassen, Richmond, Langley, and Chilliwack to 0.5 ppb in Vancouver Pandora Park and North Burnaby Eton	Green

While the CAAQS are non-statutory limits and do not come with legal requirements (unless stipulated directly in a regulation or authorization), they are intended for use in assessing air quality and guiding air management decisions.

The air zone report notes that Metro Vancouver has responsibility for managing air emissions within its boundaries, and that key planning documents such as the *Clean Air Plan* and *Regional Ground-Level Ozone Strategy*, developed collaboratively with the Fraser Valley Regional District and other orders of government, are important for continuing to manage air quality in the region. The CAAQS will become more stringent in 2025.

Update on Residential Indoor Wood Burning Bylaw Outreach and Upcoming Requirements

Metro Vancouver's seasonal residential indoor wood burning restrictions are in effect from May 15 to September 15 every year. Outreach campaigns have resulted in enquiries from the media and residents for more information about MVRD Residential Indoor Wood Burning Emissions Regulation Bylaw No. 1303 (Bylaw 1303), requirements, and upcoming phases.

Starting September 15, 2022, Bylaw 1303 requires anyone using residential indoor wood burning appliances to submit a declaration of compliance with best burning practices and to register eligible appliances located in urban areas before use. Residents throughout Metro Vancouver were informed about the upcoming requirements through a communications strategy that combined both digital and traditional media. Tactics included social media (Facebook, Twitter, LinkedIn and Instagram), email communications to key audiences including municipal fire departments and mailing list subscribers, and coordination with member jurisdictions. There have also been newspaper advertisements in multiple languages and distribution of educational rack cards to residents. Outreach to date has resulted in resident enquiries about how and where to register their appliance.

An online tool has been developed as the primary means to submit a declaration of compliance with best burning practices and, if applicable, register eligible wood burning appliances located within Metro Vancouver's Urban Containment Boundary (UCB). Paper forms are also available upon request to allow declaration and registration requirements to be met.

Healthy Climate Solutions Fair

The BC chapter of the Canadian Association of Physicians for the Environment (CAPE) has organized a Healthy Climate Solutions Fair that explores the health impacts of climate change, and highlights the energy solutions available in Canada now to accelerate the transition to clean, healthy, and renewable energy. The inaugural Fair was held on August 20, 2022, and there will be a second opportunity to attend the Fair on September 17, 2022, between 11AM and 3PM, at the Milton Wong Plaza in Olympic Village, Vancouver.

The Fair includes demonstrations of clean energy solutions like wind, hydro, solar, battery storage, and green hydrogen, and there will be clean energy industry experts onsite to answer questions. At 11AM and 1PM there will be cooking demonstrations using electric induction burners with prominent local chefs. For families, there is an art tent where kids can create art about clean energy and a healthy planet. Elected officials in attendance are invited to identify themselves to one of the organizers (members of CAPE), who can answer questions and provide a tour of the event.

Regional Greenways Strategy

At the July 8, 2022 Climate Action Committee meeting, a comment was made about greenway connections in the region. For the Committee's information, Metro Vancouver's *Regional Greenways 2050* plan was approved by the MVRD Board in 2020 and describes the region's shared vision for a network of recreational multi-use paths for cycling and walking that connects residents to large parks, protected natural areas and communities to support regional livability.

The plan was developed in consultation with local jurisdictions, agencies, First Nations and key stakeholders, and focuses on regional-scale recreational greenways. This network is complementary

to TransLink's Major Bikeway Network identified in Transport 2050. Together the two networks contribute to active transportation infrastructure in the region.

The Regional Greenway Network is composed of about 860 km of multi-use paths of which about 490 km or 57% are currently operational.

The *Regional Greenways 2050* plan identifies current challenges and benefits, provides an updated vision for a gap-free system of regional greenways and an implementation framework that focuses on actions that can be undertaken in the next five years that will enable measurable progress toward this long term vision.

Attachment

1. Climate Action Committee 2022 Work Plan, dated August 29, 2022
2. Metro Vancouver Member Jurisdictions' 2022 UBCM Resolutions Related to Air Quality and Climate Change

References

1. BC Zero-Emission Vehicles Act and Regulation: 2022 Formal Review Intentions Paper
2. Lower Fraser Valley Air Zone Report

54011279

Climate Action Committee 2022 Work Plan
Report Date: August 29, 2022

Priorities

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

ATTACHMENT 2

Metro Vancouver Member Jurisdictions' 2022 UBCM Resolutions
Related to Air Quality and Climate Change

Category	Resolution Title	Jurisdiction	Resolution Summary
Climate Adaptation – Extreme Heat Response	Extreme Heat Response	Delta	For the Provincial government to recognize extreme heat events as public health emergencies, and fund local government response measures to ensure the public has access to cooling centres and other assistance during extreme heat events.
Climate Adaptation-Flood Recovery and Resiliency	Support Flood Recovery that Creates Safe Communities and Healthy, Resilient Ecosystems	Port Moody	For federal and provincial governments to ensure flood control projects provide multiple benefits to communities by aligning flood control funding and criteria with other core objectives (i.e. reconciliation, biodiversity, green infrastructure, climate adaptation and mitigation) and that federal and provincial governments co-create technical guidance for local governments on achieving short-and long-term flood recovery needs that are multi-beneficial and improve climate adaptation needs.
Buildings	Expanding BC Manufacturing and Construction of Wood-Frame Housing	Vancouver	For the Provincial government to enable, support and promote the development of zero-carbon standard, wood frame modular housing manufacturing industry in the Province, including the modification of Building and Step code for a faster permitting process.
Buildings	Training of BC Workers in Deep Energy Retrofits and Climate-Smart Construction	Vancouver	For the Provincial government to increase support and funding for trades training programs in deep energy retrofits.
Transportation	Re-Investing in EV Infrastructure	Port Moody	An ask for all orders of government (federal, provincial and local) and BC Hydro to increase investment in EV infrastructure and decrease user fees (including Step 2 EV exemptions) until EV uptake is sufficient; and that the Government of Canada immediately make all necessary regulatory changes to allow for pricing EV charging by unit of energy.
Transportation	Review of the Regulatory Environment Pertaining to E-Mobility Devices	Coquitlam	For the Provincial government to review the Motor Vehicle Act regulations to enable local governments to pilot the operation of a broader suite of e-mobility device.

Category	Resolution Title	Jurisdiction	Resolution Summary
Energy	Fossil Fuel Non-Proliferation Treaty	Richmond Port Moody New Westminster	For the Province to follow through on its CleanBC commitment to enact a GHG emissions cap for natural gas utilities, and to support the objectives of the Fossil Fuel Non-Proliferation Treaty initiative.
Energy	Increasing Provincial Incentives for Installing Solar Panels and Solar Hot Water Systems	Vancouver	For the Provincial government to increase financial incentives, including increased feed-in-tariffs, for home and building owners to install solar (photovoltaic) panels and solar hot water systems; and that UBCM request that the Government of BC modify the BC Building Code, and include in a future BC Existing Buildings Alterations Code, specifications for solar (photovoltaic) panels and solar hot water systems.
Nature & Ecosystems	Advocacy for Legislation to Protect Biological Diversity and Ecosystem Health	Port Moody	For the Provincial government to work with Indigenous leadership to develop new legislation to protect and restore biological diversity and ecosystem health, in a manner consistent with the United Nations Declaration on the Rights of Indigenous Peoples, and with involvement of local governments, civil society groups, Indigenous and western scientific experts, and the concerned public.

To: Climate Action Committee

From: Jeff Carmichael, Division Manager, Liquid Waste Services
Sarah Wellman, Senior Engineer, Solid Waste Services

Date: July 12, 2022 Meeting Date: September 9, 2022

Subject: **Sewage and Waste: Heat Recovery Policy**

The attached report dated July 5, 2022 titled "Sewage and Waste: Heat Recovery Policy" was presented to the Liquid Waste Committee and the Zero Waste Committee for consideration and recommendation at their respective July 13, 2022 and July 15, 2022 meetings, and was approved by the GVS&DD Board at its July 29, 2022 meeting. The report is presented to the Climate Action Committee for its information only.

Attachment
"Sewage and Waste: Heat Recovery Policy", dated July 5, 2022

53115876

metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

To: Liquid Waste Committee and Zero Waste Committee

From: Jeff Carmichael, Division Manager, Business Development, Liquid Waste Services
Sarah Wellman, Senior Engineer, Solid Waste Operations, Solid Waste Services

Date: July 5, 2022 Meeting Dates: July 13, 2022
July 15, 2022

Subject: **Sewage and Waste: Heat Recovery Policy**

RECOMMENDATION

That the GVS&DD Board approve the proposed *Sewage and Waste: Heat Recovery Policy*, as presented in the report dated July 5, 2022, titled "Sewage and Waste: Heat Recovery Policy".

EXECUTIVE SUMMARY

Metro Vancouver has the opportunity to reduce greenhouse gas emissions by investing in waste heat recovery to offset fossil fuel use for building heat and hot water. Metro Vancouver's *Climate 2050* strategy includes a target of a climate neutral region by 2050 with an interim target of 45% greenhouse gas emission reductions by 2030. Metro Vancouver's liquid waste system and the Waste-to-Energy Facility have the potential to provide heat and hot water for up to 130,000 homes, reducing greenhouse gas emissions by up to 300,000 tonnes per year, or equivalent to approximately the annual emissions of 60,000 passenger vehicles. The proposed *Sewage and Waste: Heat Recovery Policy* facilitates maximizing the recovery of this resource.

The proposed *Sewage and Waste: Heat Recovery Policy* replaces the existing *Liquid Waste Heat Recovery Policy*:

- incorporating Waste-to-Energy Facility district energy projects;
- standardizing the baseline for GHG emission reduction calculations;
- updating the approach to allocating GHG emission reduction credits between the GVS&DD and member jurisdictions; and
- standardizing the approach for applying the *Carbon Price Policy* to liquid waste and solid waste system projects.

PURPOSE

To present a proposed *Sewage and Waste: Heat Recovery Policy* for consideration by the GVS&DD Board.

BACKGROUND

On June 23, 2017, the MVRD Board approved a *Carbon Price Policy* for Metro Vancouver that established a Carbon Price (inclusive of any applicable external carbon taxes) of $150 per tonne of CO_2e. On July 26, 2019, the MVRD Board approved the *Climate 2050 Strategic Framework*, which targets 45% reduction in greenhouse gas (GHG) emission by 2030 and a climate neutral region by 2050.

On March 26, 2021, the GVS&DD Board approved the following resolutions:

> *a) approve the revised Liquid Waste Heat Recovery Policy, as presented in the report dated March 2, 2021, titled "Liquid Waste Heat Recovery Policy Amendments to Expand Opportunities for Sewer Heat Recovery"; and*
> *b) direct staff to work with GVS&DD members' staff to assess the range of options available for carbon accounting for liquid waste heat recovery projects; and if appropriate, develop a framework for allocation of carbon offset credits among the GVS&DD members; and report back to the GVS&DD Board by the end of 2021.*

The updated policy included the potential for GVS&DD investment in sewer heat projects considering the GHG emission benefits of the projects.

On May 28, 2021, the GVS&DD Board approved proceeding with development of a district energy system for the Waste-to-Energy Facility that will serve River District in Vancouver along with developments in Burnaby and potentially New Westminster.

This report proposes replacement of the *Liquid Waste Heat Recovery Policy* with an overarching *Sewage and Waste: Heat Recovery Policy* for liquid waste and Waste-to-Energy Facility projects consistent with the *Carbon Price Policy.* The proposed policy supports maximizing energy recovery and GHG emission reduction by offsetting fossil fuel use.

SEWAGE AND WASTE: HEAT RECOVERY POLICY

The purpose of the proposed *Sewage and Waste: Heat Recovery Policy* is to facilitate maximizing heat recovery from the region's liquid waste and solid waste systems. The proposed *Sewage and Waste: Heat Recovery Policy* is attached to this report.

Liquid Waste and Waste-to-Energy Facility Heat Recovery Opportunity

There is enough excess heat energy in the liquid waste collection system to heat 100,000 homes throughout the region, which could reduce GHG emissions by nearly 250,000 tonnes per year. An agreement is in place to provide heat to Lonsdale Energy Corporation, a capital contribution toward the Sapperton District sewer heat project has been approved by the Board, and several additional sewer heat recovery projects are under development or assessment.

The Waste-to-Energy Facility currently generates approximately 20 MW of electricity, sufficient for 16,000 homes. Developing a district energy system in addition to continuing to generate electricity will triple the energy recovery efficiency for the facility compared to electricity generation alone. The Waste-to-Energy Facility district energy system will provide heat and hot water for up to 30,000 homes and reduce GHG emissions by up to 45,000 tonnes per year. An agreement is in place with River District Energy in Vancouver to substitute Waste-to-Energy Facility waste heat for natural gas to provide heat and hot water for the development. Agreements are being negotiated with Vancouver and Burnaby to facilitate access to municipal streets, and in the case of Burnaby to provide energy for district energy systems for developments in Burnaby.

The total emission reduction potential of liquid waste system projects and the Waste-to-Energy Facility district energy system projects equate to the emissions of approximately the annual emissions of 60,000 passenger vehicles.

***Sewage and Waste: Heat Recovery Policy* Elements**

Greenhouse Gas Emission Reduction Calculation: Member jurisdictions have different policies in place with respect to green building requirements. To allow a standardized approach for GHG emission reduction calculations the proposed *Sewage and Waste: Heat Recovery Policy* establishes a baseline for GHG emission reduction calculations as the Provincial regulatory standard for building construction. On that basis, the current baseline for calculating GHG emission reductions would be natural gas heating.

Environmental Attributes: Given the different green building policies in the region, GHG emission reduction credits may vary between projects. To ensure GVS&DD investment can be provided equitably in all member jurisdictions, the amount of GHG emission reduction credits generated by a project will not be a criterion for determining investment in projects. In the event there are GHG emission reduction credits generated by a project, those credits will be allocated between GVS&DD and the other project participants based on financial and non-financial contributions to the project, with the allocation being subject to Board approval as part of any agreement with those parties.

For credits allocated to Metro Vancouver, those credits will be used for the GVS&DD to attain carbon neutrality with any residual credits distributed to member jurisdictions based on population.

Application of Carbon Price Policy: The proposed *Sewage and Waste: Heat Recovery Policy* allows for investment in projects with the maximum investment determined by the *Carbon Price Policy*. Investment would be limited such that the cost to the consumer would not be reduced below the least expensive alternative allowed under Provincial regulatory requirements – currently natural gas.

***Sewage and Waste: Heat Recovery Policy* Implementation Examples:** Under the proposed *Sewage and Waste: Heat Recovery Policy*, GVS&DD capital investments in sewer heat projects would be calculated based on the *Carbon Price Policy*, with heat users paying all operating and maintenance costs. For the Waste-to-Energy District Energy system, GVS&DD would provide heat to member district energy systems with pricing based on natural gas prices with the maximum GVS&DD investment based on the *Carbon Price Policy*.

Municipal Staff Advisory Committee Engagement

An original draft of the policy was provided to municipal staff advisory committees including the Regional Engineers Advisory Committee and the Regional Administrators Advisory Committee. The proposed *Sewage and Waste: Heat Recovery Policy* includes suggestions provided by those committees.

ALTERNATIVES

1. That the GVS&DD Board approve the proposed *Sewage and Waste: Heat Recovery Policy*, as presented in the report dated July 5, 2022, titled “Sewage and Waste: Heat Recovery Policy”.

2. That the Liquid Waste and Zero Waste Committees receive for information the report dated July 5, 2022, titled " Sewage and Waste: Heat Recovery Policy" and provide alternate direction to staff.

FINANCIAL IMPLICATIONS

If the Board approves Alternative 1, Metro Vancouver will negotiate agreements for the recovery of waste heat with member jurisdictions consistent with the new policy. Each agreement will be negotiated based on business casing considering the benefit of GHG emission reductions. If Provincial regulatory requirements change or if the price of natural gas increases, future agreements will be based on the new baseline conditions as determined by Provincial regulatory requirements.

CONCLUSION

Metro Vancouver's *Climate 2050* strategy includes targets for regional GHG reductions of 45% by 2030 compared to 2010 levels, and a carbon neutral region by 2050. The proposed *Sewage and Waste: Heat Recovery Policy* supports capital funding for projects that recover energy from liquid and solid waste systems for building heat and hot water. These projects reduce greenhouse gas emissions by offsetting the use of fossil fuels. The policy will replace the *Liquid Waste Heat Recovery Policy*. Staff recommend Alternative 1.

Attachments

1. Proposed *Sewage and Waste: Heat Recovery Policy* (blackline version)
2. Proposed *Sewage and Waste: Heat Recovery Policy* (clean version)

49319410

metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

~~LIQUID~~ SEWAGE AND WASTE: ~~HEAT RECOVERY~~HEAT RECOVERY

Effective Date: June 23, 2017 (revised ~~March 26, 2021~~July 29, 2022)
Approved By: GVS&DD Board

Policy No. UT-008

PURPOSE

To ~~enable~~encourage beneficial use of waste heat from Metro Vancouver's liquid waste and ~~associated~~solid waste systems, and maximize greenhouse gas emission reductions ~~from Metro Vancouver's liquid waste system~~ by ~~external parties~~using the heat to displace fossil fuel use.

DEFINITIONS

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

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

POLICY

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

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

LIQUID WASTE COLLECTION SYSTEM PROJECTS

Allocation of Waste Heat

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

Ownership and Responsibilities

GVS&DD owns a sewerage system and is responsible for sewage in its liquid waste system, including any associated resources such as heat. The boundaries of responsibility for heat recovery equipment and infrastructure ~~are primarily tied to property ownership and~~ will be defined in a contract between GVS&DD and the heat user. GVS&DD will in all situations own and be responsible for the portion of the tie-in up to and including a shut-off valve on both the diversion and return lines~~.~~, and may also own and maintain additional supporting infrastructure. GVS&DD will consider an in-line heat recovery system built directly in a GVS&DD sewer if the system will not impair GVS&DD operations.

Cost Recovery

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

All maintenance and operating costs borne by GVS&DD from GVS&DD infrastructure will be recovered from ~~energy purchasers~~heat users.

LIQUID WASTE TREATMENT PLANT AND OUTFALL PROJECTS

Allocation of Waste Heat

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

Ownership and Responsibilities

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

Cost Recovery

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

SOLID WASTE PROJECTS - WASTE-TO-ENERGY FACILITY

Ownership and Responsibilities

The GVS&DD is developing a district energy system to distribute heat from the Waste-to-Energy Facility. GVS&DD expects to deliver heat to local distribution systems including River District in Vancouver and various developments in Burnaby and potentially New Westminster. GVS&DD expects to own and operate an energy centre at the Waste-to-Energy Facility, and potentially large scale distribution piping delivering heat to the local distribution systems as well.

Allocation of Heat

Heat will be allocated to potential users on a first-come first served basis considering proximity to heat distribution infrastructure and expected heat user load. Modelling of potential heat demand has demonstrated that there is sufficient waste heat available from the Waste-to-Energy Facility to connect River District, Metrotown, Edmonds, and downtown New Westminster.

Cost Recovery

The Waste-to-Energy Facility District Energy system will require capital investment by GVS&DD and will require ongoing operations and maintenance by GVS&DD. GVS&DD staff will evaluate heat recovery projects using established life cycle cost analysis and options analysis frameworks and will consider each project on a case-by-case basis. Benefits will include the value of avoided greenhouse gas emissions. Anticipated lost revenue resulting from any reduction in electricity sales revenue will be included in any business case. A contract with the heat user will be established for each project that assigns the costs and benefits between GVS&DD, the heat user and other funding sources.

ALL PROJECTS

Environmental Attributes

Benefits associated with avoided greenhouse gas ~~reductions~~emissions (such as carbon ~~offset~~ credits) and the costs of administering those benefits will be allocated on a case-by-case basis, in accordance with the costs and risks incurred by the parties involved in developing the heat recovery project. If a project does not create carbon credits, credits will not be allocated.

~~Carbon credits~~GVS&DD will ~~be allocated to the~~negotiate carbon credit allocation with each project participant (including host member jurisdiction ~~as~~) on a ~~project proponent for~~case-by-case basis, based on one or more of (1) contributions to the project that can be financially valued (~~other than Tier 1~~excluding contributions paid as part of GVS&DD liquid waste disposal fees and ~~2 cost apportionments). In recognition of the important role of the host~~levies or solid waste tipping fees) and ~~of impacts~~(2) contributions to the project that cannot be ~~valued~~ financially~~, the host jurisdiction will receive 5% of the~~ valued. GVS&DD credits allocated to ~~GVS&DD, for the initial term of the~~the project participants will be subject to approval by the GVS&DD Board as part of any agreement ~~for~~with the ~~sale of heat~~parties.

Carbon credits from GVS&DD ~~emissions reduction~~waste heat recovery projects that have been allocated to GVS&DD as a project proponent will be retained by GVS&DD, up to the amount needed

for GVS&DD to be carbon neutral in a given year. If GVS&DD achieves carbon neutrality in a given year, excess carbon credits will be transferred to member jurisdictions. The distribution of excess carbon credits among member jurisdictions will be calculated based on ~~capital contribution to~~BC Stats population estimates for the ~~portfolio of GVS&DD liquid waste heat recovery emissions reduction projects.~~previous year. Calculated excess carbon credit distributions less than one tonne will not be transferred~~, but will instead be redistributed among the other member jurisdictions~~.

Life Cycle Cost Analysis Parameters

In determining the quantity of avoided greenhouse gas emissions, GVS&DD will compare greenhouse gas emissions based on Provincial regulatory requirements to greenhouse gas emissions based on the proposed sewer heat or Waste-to-Energy Facility district energy system. On this basis, greenhouse gas emission reductions for a project will be calculated by comparing the emissions following implementation of the project to the emissions assuming building heat and hot water were provided using the lowest cost alternative based on Provincial regulatory requirements – currently natural gas.

GVS&DD's will invest in projects based on the difference between the life cycle project revenues and combination of capital and operational costs of a waste heat recovery project. The investment will be the lower of the value of the avoided greenhouse gas emissions based on Metro Vancouver's *Carbon Price Policy* or the amount required for the end-user of the heat's costs to not exceed their costs using the least expensive option under Provincial regulations – currently natural gas.

metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

SEWAGE AND WASTE: HEAT RECOVERY

Effective Date: June 23, 2017 (revised July 29, 2022)

Approved By: GVS&DD Board

Policy No. UT-008

PURPOSE

To encourage beneficial use of waste heat from Metro Vancouver's liquid waste and solid waste systems, and maximize greenhouse gas emission reductions by using the heat to displace fossil fuel use.

DEFINITIONS

"Waste heat" is excess heat that is available from GVS&DD operations, including but not limited to heat from untreated sewage, treated effluent, and municipal solid waste processing.

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

POLICY

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

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

LIQUID WASTE COLLECTION SYSTEM PROJECTS

Allocation of Waste Heat

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

Ownership and Responsibilities

GVS&DD owns a sewerage system and is responsible for sewage in its liquid waste system, including any associated resources such as heat. The boundaries of responsibility for heat recovery equipment and infrastructure will be defined in a contract between GVS&DD and the heat user. GVS&DD will in all situations own and be responsible for the portion of the tie-in up to and including a shut-off valve on both the diversion and return lines, and may also own and maintain additional supporting infrastructure. GVS&DD will consider an in-line heat recovery system built directly in a GVS&DD sewer if the system will not impair GVS&DD operations.

Cost Recovery

GVS&DD will charge the heat user for all costs incurred to establish and maintain access to sewage. The value of sewage will be assessed using business case processes, including consideration of nominal value of sewage, and incorporated into sewage access contracts. GVS&DD may consider capital investment in heat recovery projects accessing sewage from GVS&DD infrastructure. GVS&DD staff will evaluate heat recovery projects using established life cycle cost analysis and options analysis frameworks and will consider each project on a case-by-case basis. Benefits will include the value of avoided greenhouse gas emissions. A contract with the heat user will be established for each project that assigns the costs and benefits between GVS&DD, the heat user and other funding sources.

All maintenance and operating costs borne by GVS&DD from GVS&DD infrastructure will be recovered from heat users.

LIQUID WASTE TREATMENT PLANT AND OUTFALL PROJECTS

Allocation of Waste Heat

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

Ownership and Responsibilities

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

Cost Recovery

Heat recovery projects within wastewater treatment plants and effluent outfalls will require capital investment by GVS&DD and will require ongoing operations and maintenance by GVS&DD. GVS&DD staff will evaluate heat recovery projects using established life cycle cost analysis and options analysis frameworks and will consider each project on a case-by-case basis. Benefits will include the value of avoided greenhouse gas emissions. A contract with the heat user will be established for each project that assigns the costs and benefits between GVS&DD, the heat user and other funding sources.

SOLID WASTE PROJECTS - WASTE-TO-ENERGY FACILITY

Ownership and Responsibilities

The GVS&DD is developing a district energy system to distribute heat from the Waste-to-Energy Facility. GVS&DD expects to deliver heat to local distribution systems including River District in Vancouver and various developments in Burnaby and potentially New Westminster. GVS&DD expects to own and operate an energy centre at the Waste-to-Energy Facility, and potentially large scale distribution piping delivering heat to the local distribution systems as well.

Allocation of Heat

Heat will be allocated to potential users on a first-come first served basis considering proximity to heat distribution infrastructure and expected heat user load. Modelling of potential heat demand has demonstrated that there is sufficient waste heat available from the Waste-to-Energy Facility to connect River District, Metrotown, Edmonds, and downtown New Westminster.

Cost Recovery

The Waste-to-Energy Facility District Energy system will require capital investment by GVS&DD and will require ongoing operations and maintenance by GVS&DD. GVS&DD staff will evaluate heat recovery projects using established life cycle cost analysis and options analysis frameworks and will consider each project on a case-by-case basis. Benefits will include the value of avoided greenhouse gas emissions. Anticipated lost revenue resulting from any reduction in electricity sales revenue will be included in any business case. A contract with the heat user will be established for each project that assigns the costs and benefits between GVS&DD, the heat user and other funding sources.

ALL PROJECTS

Environmental Attributes

Benefits associated with avoided greenhouse gas emissions (such as carbon credits) and the costs of administering those benefits will be allocated on a case-by-case basis, in accordance with the costs and risks incurred by the parties involved in developing the heat recovery project. If a project does not create carbon credits, credits will not be allocated.

GVS&DD will negotiate carbon credit allocation with each project participant (including host member jurisdiction) on a case-by-case basis, based on one or more of (1) contributions to the project that can be financially valued (excluding contributions paid as part of GVS&DD liquid waste disposal fees and levies or solid waste tipping fees) and (2) contributions to the project that cannot be financially valued. GVS&DD credits allocated to the project participants will be subject to approval by the GVS&DD Board as part of any agreement with the parties.

Carbon credits from GVS&DD waste heat recovery projects that have been allocated to GVS&DD as a project proponent will be retained by GVS&DD, up to the amount needed for GVS&DD to be carbon neutral in a given year. If GVS&DD achieves carbon neutrality in a given year, excess carbon credits will be transferred to member jurisdictions. The distribution of excess carbon credits among member jurisdictions will be calculated based on BC Stats population estimates for the previous year. Calculated excess carbon credit distributions less than one tonne will not be transferred.

Life Cycle Cost Analysis Parameters

In determining the quantity of avoided greenhouse gas emissions, GVS&DD will compare greenhouse gas emissions based on Provincial regulatory requirements to greenhouse gas emissions based on the proposed sewer heat or Waste-to-Energy Facility district energy system. On this basis, greenhouse gas emission reductions for a project will be calculated by comparing the emissions following implementation of the project to the emissions assuming building heat and hot water were provided using the lowest cost alternative based on Provincial regulatory requirements – currently natural gas.

GVS&DD's will invest in projects based on the difference between the life cycle project revenues and combination of capital and operational costs of a waste heat recovery project. The investment will be the lower of the value of the avoided greenhouse gas emissions based on Metro Vancouver's *Carbon Price Policy* or the amount required for the end-user of the heat's costs to not exceed their costs using the least expensive option under Provincial regulations – currently natural gas.

Ministre de l'Environnement et
du Changement climatique

Minister of Environment
and Climate Change

Ottawa, Canada K1A 0H3

Mr. Sav Dhaliwal
Chair
Metro Vancouver Board
chair@metrovancouver.org

Dear Mr. Dhaliwal:

Thank you for your correspondence of May 3, 2022, concerning ways to address the use of heavy fuel oil and exhaust gas cleaning systems in marine vessels in the Metro Vancouver region. I regret the delay in responding.

Environment and Climate Change Canada appreciates your concern with the growing use of exhaust gas cleaning systems, or scrubbers, by marine vessels. The Department has been closely monitoring the growth in the number of ships within Canadian waters using scrubbers to meet equivalent clean fuel requirements, as well as investigating the efficacy and quantifying pollutants associated with their use. Most recently, the Department has included air and water emissions from ships equipped with scrubbers into its Marine Emissions Inventory Tool (*https://ec-meit.ca/app.html*) to quantify the pollutants associated with their use in Canadian waters.

In 2020, Environment and Climate Change Canada hired the International Council on Clean Transportation to recommend appropriate emission factors for releases to air and water from the use of scrubbers. The resulting report (https://theicct.org/sites/default/files/publications/air-water-pollution-scrubbers-nov2020.pdf) found that scrubbers are not as effective in reducing particulate matter or black carbon—and produce higher greenhouse gas emissions—compared to the use of distillate fuels. The report also provided estimated release rates to receiving waters for several compounds, including polycyclic aromatic hydrocarbons, metals, and nitrates.

Furthermore, I can assure you that Environment and Climate Change Canada is working closely with other federal departments, including Transport Canada, to evaluate policy options for scrubbers moving forward. In addition, the Department is involved in the International Maritime Organisation's work on this important issue.

…/2

In its recent 2030 Emissions Reduction Plan (*www.canada.ca/en/services/environment/weather/climatechange/climate-plan/climate-plan-overview/emissions-reduction-2030.html*), the Government of Canada committed to developing a national action plan to enable the marine sector to reduce its emissions. Developing this plan will require the Government to engage with stakeholders on energy efficiency and carbon intensity requirements for domestic vessels. The Government will also examine options to help deploy low-carbon fuel equipment at ports, including electric shore power, as you noted.

I trust that this information is of assistance, and I extend my best regards.

Sincerely,

The Honourable Steven Guilbeault, P.C., M.P. (il/lui/he/him)

From: Minister of Transport / Ministre des Transports (TC) [mailto:TC.MinisterofTransport-MinistredesTransports.TC@tc.gc.ca]
Sent: Thursday, July 7, 2022 11:40 AM
To: Chair Dhaliwal <chair@metrovancouver.org>
Cc: Steven.Guilbeault@parl.gc.ca
Subject: Regarding banning the use of exhaust gas cleaning systems ("scrubbers")

July 7, 2022

Sav Dhaliwal
Chair, Board of Directors
Metro Vancouver
chair@metrovancouver.org

Dear Chair Dhaliwal:

Thank you for your correspondence of May 3, 2022, which was also addressed to my Cabinet colleague, the Honourable Steven Guilbeault, Minister of Environment and Climate Change, regarding banning the use of exhaust gas cleaning systems ("scrubbers") in the North American Emissions Control Area.

The Government of Canada is committed to protecting the health of Canadians and the environment from the potential risks of marine pollution. Canada has a comprehensive regulatory regime under the *Canada Shipping Act, 2001* and associated regulations. Transport Canada is responsible for carrying out compliance and enforcement activities related to the prevention of pollution, such as inspections of Canadian and foreign vessels in Canadian waters for compliance with environmental regulations and standards.

Transport Canada ensures that the marine environment regulations that continue to keep Canadian waters safe and clean are routinely reviewed and kept up to date. Departmental officials are currently reviewing these regulations and analyzing international best practices. Transport Canada recognizes the potential negative impacts around the use of scrubbers in Canadian waters and continues to study the environmental impacts.

The Government of Canada more broadly is looking to explore options that will reduce the potential negative impacts of scrubbers on the air and marine environment through ongoing studies and research and will work with the marine transportation industry and other stakeholders to explore options that can reduce impacts from all vessels. The use

of cleaner fuels, including renewable fuels, and shore power are part of the solutions explored over the course of this work.

Additionally, Transport Canada is also committed to the ongoing work at the International Maritime Organization (IMO) to evaluate and develop harmonized rules and guidance on the discharge of scrubber washwater in the aquatic environment. Transport Canada is also looking at approaches implemented in other jurisdictions that go beyond IMO requirements, with the view to inform this process. This will ensure that when feasible, best practices and additional requirements can be incorporated in Canada's environmental protection framework.

Thank you again for taking the time to share your concerns about exhaust gas cleaning systems' impacts on the air and marine environment.

Sincerely,

The Honourable Omar Alghabra, P.C., M.P.
Minister of Transport

c.c. The Honourable Steven Guilbeault, P.C., M.P.
Minister of Environment and Climate Change

PRINCE RUPERT PORT AUTHORITY
ADMINISTRATION PORTUAIRE DE PRINCE RUPERT
200-215 COW BAY ROAD / *CHEMIN COW BAY*
PRINCE RUPERT, B.C. / *C.-B.* V8J 1A2

P/*TÉL*: 250 627 8899
FAX: 250 627 8980

Frans Tjallingii
Board Chair
Prince Rupert Port Authority

June 16, 2022

Via Email: CAOAdministration@metrovancouver.org

Mr. Sav Dhaliwal
Chair, Metro Vancouver Board
4515 Central Boulevard
Burnaby, BC V5H 0C6

RE: Addressing the Use of Heavy Fuel Oil and Exhaust Gas Cleaning Systems in Marine Vessels in the Region

Dear Chair Dhaliwal:

Thank you for your correspondence dated May 3, 2022, expressing Metro Vancouver's support for actions to reduce port-related air emissions, and its specific support and encouragement for actions to prohibit gas cleaning system washwater discharges from vessels.

The Prince Rupert Port Authority also recognizes the need to investigate and implement actions to continue to reduce marine vessel emissions, and has been active in implementing policy, regulations, and initiatives to make progress in this regard within our jurisdiction.

In this regard, PRPA has publicly set a goal to reduce GHG emission intensity within its jurisdiction by 30% by 2030 from its 2018 base levels and has committed to a long-term goal of becoming net-zero by 2050. The largest portion of these emissions are marine vessel-based, and while the International Maritime Organization has made important global commitments in this regard, local actions can accelerate this transition. In this regard, we would note that PRPA has made a significant investment into shore power at Fairview terminal that will enable container vessels to switch to electric power while at berth, offers financial incentives in the form of discounted harbour dues to vessels that incorporate emission reduction measures (and other environmental practices), and is actively investigating measures to limit time spent at anchor.

PRPA is aware of the impacts of scrubber use as an alternative compliance mechanism for the IMO's fuel sulphur standards, in particular the discharge of effluents into the marine environment. We are also aware of the restrictions introduced by the Vancouver Fraser Port Authority earlier this year, as well as the IMO's recent new guidelines and guidance on exhaust gas cleaning system discharges. PRPA is actively working to implement similar restrictions, which will be informed by discussions with industry, Indigenous communities, and other stakeholders.

Sincerely,

Frans Tjallingii

Cc: Shaun Stevenson, President & CEO, PRPA
Ken Veldman, Vice President, Public Affairs & Sustainability, PRPA
Neal Carley, General Manager, Parks & Environment, Metro Vancouver
Roger Quan, Director, Air Quality & Climate Change, Metro Vancouver