



Waste Management

Discussion Paper to support *Climate 2050* and the *Clean Air Plan*

Reducing emissions and increasing climate resilience for waste management systems in the Metro Vancouver region over the next 10 to 30 years

June 2020



Your feedback is valued.

This paper was drafted in Spring 2020, and introduced for public and stakeholder comment during the COVID-19 pandemic response. Metro Vancouver assesses work plans on a case by case basis to determine if the COVID-19 pandemic response requires an adjustment to any work plans, including engagement components. For air quality and climate change programs and initiatives, this means continuing with work plans that protect human health and the environment, but adjusting how we approach engagement.

Goals and targets in Metro Vancouver's climate-related plans are science-based and remain a priority. The interim target of a 45% reduction in greenhouse gas emissions below 2010 levels by 2030 has a time horizon of less than ten years. Pursuing a carbon neutral region by 2050 requires taking bold action now.

Across the globe, the pandemic response has had an unexpected benefit of significant environmental improvements in terms of air quality and greenhouse gas emissions. This provides a glimpse of what is possible and what we can achieve with coordinated efforts and common goals.

Public feedback is valued and project teams continue to seek input, create online feedback opportunities, and ensure feedback is reflected as policy development moves forward. Documents, feedback forms, and direct email links to the project team are all posted to the Metro Vancouver website, metrovancover.org, search "Clean Air Plan" or "Climate 2050".

Overview

Waste management facilities in the region handle the solid waste (i.e., garbage, recycling, etc.) and liquid waste (i.e., wastewater from toilets, sinks, etc.) of half the population of BC. These facilities are a multi-billion-dollar investment that protects people and the natural environment. As we advance our waste management practices to reduce greenhouse gas emissions, we can also reduce the vulnerability of waste management infrastructure to climate hazards like floods and wildfires, and contribute to a more resilient economy.

Greenhouse gas emissions from solid waste are driven by the end-of-life management of goods and products, including disposal, recycling and composting. Air contaminant emissions from liquid waste are linked to population size, which is expected to rise. We need to accelerate our climate actions to reduce consumption-related emissions, improve air quality, and achieve carbon neutral waste management.

We are creating a roadmap to help us reach a carbon neutral, resilient future. By 2050, we can reduce solid waste emissions by preventing waste from being created in the first place through transitioning to a circular economy that designs out waste. We can also reduce emissions by further diverting waste through reuse and recycling, and recovering more low-carbon energy from solid waste sources. Liquid waste management can continue to focus on generating more low-carbon energy.

This roadmap development will align with the upcoming update to Metro Vancouver’s solid waste management plan and liquid waste management plan.

Please give your feedback on these ideas by September 30, 2020.



Lulu Island Wastewater Treatment Plant

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Introduction

Planning for the Future

Climate 2050 and the *Clean Air Plan* will be the key climate change and air quality planning documents for Metro Vancouver to support a transition to a carbon neutral and resilient region, while continuing to improve air quality to protect public health and the environment.

Climate 2050 is an overarching long-term strategy that will guide our region's policies and collective actions to transition to a carbon neutral and resilient region over the next 30 years. Metro Vancouver is implementing *Climate 2050* through 10 issue area *Roadmaps* (see Figure 1), which will describe how the region can reduce greenhouse gas emissions and adapt to climate change impacts. Implementation of the *Roadmaps* will be driven by Metro Vancouver's management plans and other policies, including the *Clean Air Plan*.

The *Clean Air Plan* is the near-term action plan that will set Metro Vancouver's direction for air quality and greenhouse gas management for the next 10 years. The Plan will outline actions to reduce emissions of air contaminants, including greenhouse gases, from all regional sources. The *Clean Air Plan* will primarily be organized around six issue areas (see Figure 1). More information on the relationship between the *Clean Air Plan*, *Climate 2050* and the issue areas is available in the [Clean Air Plan Background](#).

Underlined words are key concepts and are defined in the Glossary on [page 20](#).

Key questions for feedback are shown in boxes marked 

This discussion paper is about the **waste management** systems in the Metro Vancouver region and how they impact regional air contaminant emissions, including greenhouse gases. The paper examines how liquid waste and solid waste are managed in the region as well as how transitioning to a circular economy can help reduce global emissions of greenhouse gases. Waste management facilities are key infrastructure for the region, handling the solid and liquid waste of half the population of BC, and are a multi-billion-dollar investment to protect people and the natural environment. The paper is intended to promote discussion and enable feedback that will be used in the *Clean Air Plan* and the *Climate 2050 Waste Roadmap*.

The feedback will also inform other planning documents for regional services such as the upcoming updates to the Metro Vancouver *Integrated Solid Waste and Resource Management Plan* and the Metro Vancouver *Integrated Liquid Waste and Resource Management Plan*. These two plans support the region in diverting solid waste from disposal and utilizing energy from solid and liquid waste, thereby reducing emissions of air contaminants, including greenhouse gases.



Figure 1: Issue areas for *Climate 2050* and the *Clean Air Plan*; overlapping issue areas are highlighted in blue.

Solid Waste

Solid waste is the garbage and recycling from residences, businesses, institutions, and construction and demolition. In this region, we generate close to 3 million tonnes of solid waste per year, of which about 2 million tonnes are recycled. Garbage and recycling, including organics, are collected and processed at facilities such as transfer stations and drop-off depots. Final disposal of garbage is managed at the Metro Vancouver Waste-to-Energy Facility and the Vancouver Landfill. Garbage in excess of what can be managed locally is shipped to landfills outside the region. Recyclables are managed at public and private facilities throughout the region. A relatively small but measurable amount of yard trimmings and land clearing waste is burned on residential and commercial properties.

Liquid Waste

Liquid waste (often called wastewater) comes from flushing toilets, doing laundry, washing dishes, and anything else that sends “used” water into a drain. In this region, about 80% of wastewater comes from our homes; the rest is generated by commercial and industrial operations. Every day, Metro Vancouver residents, businesses and industries produce about 1 billion litres of wastewater.

Wastewater is collected through a network of sewers, which carry it to five wastewater treatment plants. Here, it is treated, heat and organic material are recovered and the treated wastewater is released into receiving waters. Wastewater also includes rainwater runoff in areas of the region where stormwater is not handled by separate sewers.

Circular Economy and Climate Change

The global production of goods is estimated to generate 45% of global greenhouse gas emissions every year. Converting our current linear economy (“take-make-dispose”) to a circular economy could reduce annual global greenhouse gas emissions from the production of goods by over 40%¹. This transition would gradually decouple economic activity from the consumption of finite resources by designing waste out of the system and helping to regenerate natural systems. The concept of the circular economy applies to technical products like cars, clothes and building materials, as well as biological materials associated with the production and consumption of food and wood fiber and the resulting flow of biological or organic waste.

In a circular economy, the first step is to design waste and pollution out of products, packaging and systems to minimize the amount of natural resources that need to be used and then to

ensure that products can be shared and reused or disassembled into materials that can be remade, recycled or recovered. Keeping materials circulating and functioning at their highest potential value helps reduce embodied emissions, which are the greenhouse gas emissions associated with resource extraction, manufacturing and the distribution of new products in the global marketplace.

In terms of the biological cycle, solid waste and liquid waste management systems result in outputs which are nutrient and energy rich. Organics from solid waste streams can be composted while biosolids from liquid waste system can be made into fertilizers. Both can be used to regenerate soils and natural systems. There are also opportunities to use these waste flows to create low-carbon, renewable sources of energy and heat that can be used to replace fossil fuels. Find more at www.nzwc.ca.

¹ Ellen MacArthur Foundation, 2019. https://www.ellenmacarthurfoundation.org/assets/downloads/Completing_The_Picture_How_The_Circular_Economy_-_Tackles_Climate_Change_V3_26_September.pdf

Meeting Long-Term Targets for the Region

Metro Vancouver, together with its member jurisdictions, has been taking action on air quality and greenhouse gases for decades. But actions must be accelerated to reduce our impacts on global climate change, and to protect public health and the environment. The region also needs to adapt to the anticipated impacts from a changing climate.

There is significant overlap between the sources of greenhouse gases and common air contaminants, so actions that reduce emissions to protect public health can often (but not always) reduce greenhouse gases, and vice versa. Metro Vancouver aims to maximize co-benefits by focusing on policies and programs that reduce both greenhouse gases and common air contaminants

Climate Change Targets

Climate change is directly associated with greenhouse gases, primarily carbon dioxide. While emissions are global, we all have a shared responsibility to take local

action. The major sources of greenhouse gases in this region are transportation, buildings and industry, with smaller contributions from waste management and agriculture. Climate change projections for this region by the year 2050 include longer, hotter and drier summers, warmer and wetter fall and winter seasons with decreased snowpack, and more extreme weather.

Metro Vancouver has adopted the following regional climate change targets:

1. reduce regional greenhouse gas emissions by 45% from 2010 levels by 2030;
2. become a carbon neutral region by 2050; and
3. ensure our infrastructure, ecosystems, and communities are resilient to the impacts of climate change.



Surrey Biofuels Facility (photo courtesy of City of Surrey)

Although the region has made progress over the past 15 to 20 years, we need to accelerate our climate actions to meet these targets and avoid dangerous impacts of climate change. More information on climate change in our region is available on the [Climate 2050 website](#).

We need to accelerate our climate actions to meet these targets and avoid dangerous impacts of climate change.

Air Quality Targets

Health researchers have found that there are no known safe levels for some common air contaminants, including fine particulate matter, ground-level ozone and nitrogen dioxide. Health Canada estimates that at least 1,600 British Columbians die prematurely every year due to common air contaminants and many more live with the associated health effects.²

As part of the *Clean Air Plan*, Metro Vancouver has proposed two new regional air quality targets for 2030:

1. ambient air quality in the region meets or is better than ambient air quality objectives and standards set by Metro Vancouver, the BC Government and the Government of Canada; and
2. increase the amount of time that visual air quality is classified as excellent.



Please consider if these are the right air quality targets for the region.

Residents in the region generally experience good air quality, but additional emission reduction actions are needed to continue protecting human health and the environment.

More information on the health and environmental impacts of air contaminants is listed in the *Glossary* (page 20) and on the [Metro Vancouver website](#).

Additional emission reduction actions are needed to continue protecting human health and the environment.

² Health Canada, 2019. Health Impacts of Air Pollution in Canada. <http://publications.gc.ca/site/eng/9.874080/publication.html>

We Need Your Feedback

The purpose of this waste management discussion paper is to enable feedback on key air quality and climate change issues related to managing solid and liquid waste and on ways to reduce emissions and adapt to a changing climate. This discussion paper is intended for the public, stakeholders and other governments, including First Nations.

The goals, targets and actions identified herein are considered potential opportunities for the region's solid and liquid waste management systems. We must continue to reduce emissions from managing our waste, and ensure that waste management systems are resilient to a changing climate, and we need your help to figure out the best way forward.

Climate change and degraded air quality impact some neighbourhoods, households and individuals more than others. Also, some households are better able to prepare for and protect themselves from climate change and air quality impacts. A priority of both the *Clean Air Plan* and *Climate 2050* is to incorporate the voices and needs of a full range of communities into program and policy design to ensure that fairness and equity are reflected in the actions that Metro Vancouver implements or advocates for. Policies and programs that reduce emissions should support an equitable distribution of benefits and costs, such as increased economic opportunities in a low-emission and carbon neutral economy, affordable housing, and more diverse transportation options. Issues of intergenerational equity will also be considered.

Specific opportunities to provide feedback are described under *Feedback and Engagement Process*, on [page 19](#).

Linkages to Other Issue Areas

There are many linkages between waste management and other issue areas covered by *Climate 2050* and the *Clean Air Plan*. Metro Vancouver is considering these linkages when developing policies and actions. Some of the related issue areas for solid and liquid waste management are outlined below.

Infrastructure – Transfer stations, recycling facilities, disposal facilities, wastewater treatment plants and other components of the waste management system are key to the region's infrastructure and must be adapted to operate in a changing climate.

Buildings – Addressing embodied emissions and reducing the disposal of building materials in landfill can lessen global greenhouse gas emissions and regional emissions from solid waste.

Transportation – Modernizing solid waste collection routes and using newer fleets with cleaner fuels can minimize air contaminant emissions, including greenhouse gases, and improve the economics of solid waste management.

Energy – Capturing heat and fuels from solid waste and liquid waste systems provides low-carbon sources of energy and reduces greenhouse gas emissions in the region.

Industry – Enhancing opportunities for maximizing the use of recycled materials as feedstocks to industry will enhance waste diversion opportunities in the region.

These issue areas will be explored in discussion papers of their own. As discussion papers are developed, they will be made available on the [Metro Vancouver website](#).

Regional Waste Management Emissions and Air Quality

Emission Sources

Managing solid waste and liquid waste generates air contaminants, including greenhouse gases and odorous air contaminants. Solid waste emissions are driven by the end-of-life management of goods and products, including disposal, recycling and composting. Air contaminant emissions related to managing liquid waste are directly associated with the size of the regional population, which is expected to grow.

According to Metro Vancouver’s 2015 emissions inventory, solid and liquid waste management account for 3% of regional greenhouse gas emissions (see Figure 2). In terms of air quality, the management of solid and liquid waste generates sulphur oxides and ammonia emissions; emissions of these and other air contaminants from waste management have been dropping in recent years.

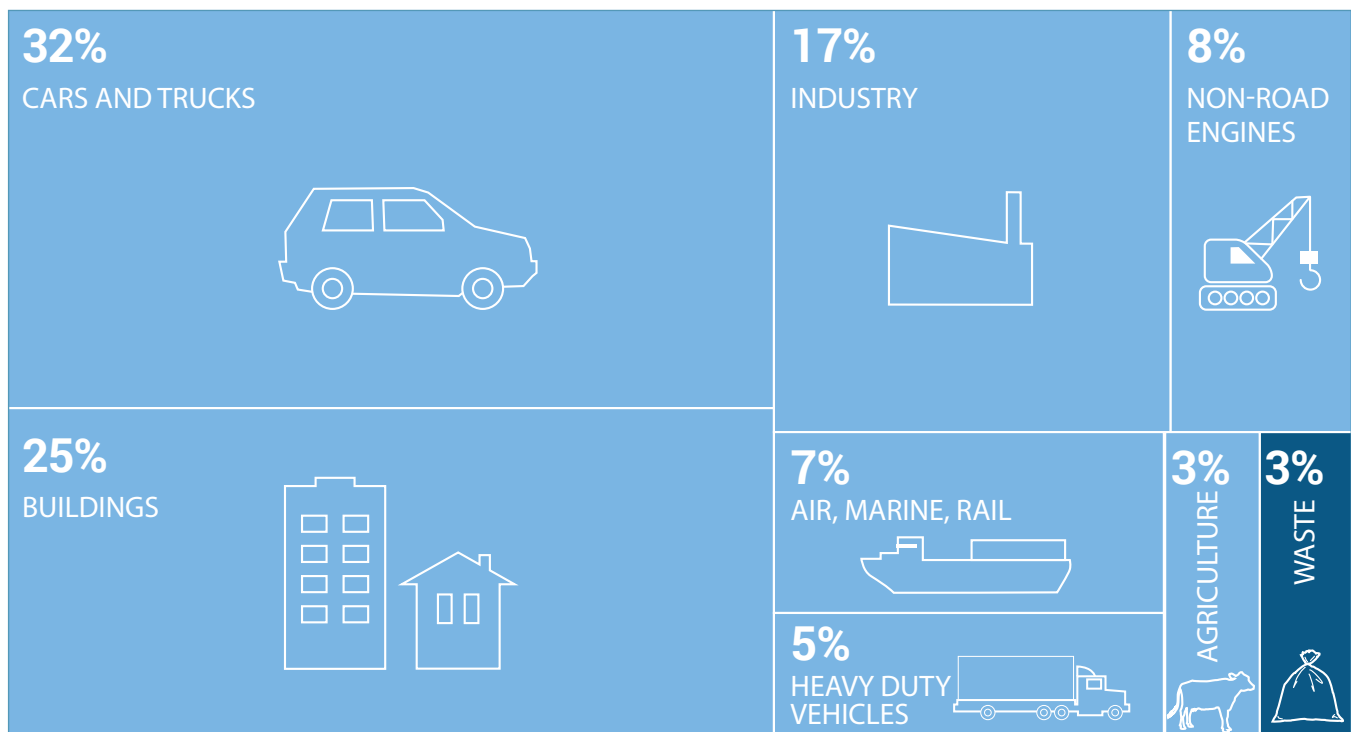


Figure 2: Contribution of different emission sources to total regional greenhouse gas emissions. The contribution from solid waste and liquid waste management is highlighted in dark blue.

The largest sources of emissions from solid waste management in our region are landfills, the Waste-to-Energy Facility and organic waste management facilities. Decomposing solid waste at landfills releases methane, a potent greenhouse gas; landfills are the largest source of greenhouse gases from waste management in the region. The Waste-to-Energy Facility is the largest source of sulphur oxides from waste management. Organic waste management facilities generate odorous air contaminants, which can have negative impacts on human health. The emissions from hauling recycling and solid waste are considered in the [Transportation Discussion Paper](#).

Backyard burning of woody and other organic debris is a small source of emissions within the region. For the purposes of this discussion paper these emissions are grouped with other solid waste management emissions.

The five wastewater treatment plants in the region are the primary source of emissions from liquid waste management in the region; air contaminants of interest released by these plants include ammonia and odorous air contaminants.

Opportunities to reduce emissions from solid waste management include achieving higher levels of waste prevention and diversion through reuse and recycling, transitioning to a circular economy, and recovering more energy from solid waste sources. Opportunities to reduce emissions associated with liquid waste will include a focus on generating more low-carbon energy.

Current Actions to Reduce Emissions from Waste Management

Metro Vancouver, together with other local governments and the BC Government, is already reducing emissions from solid and liquid waste management. Significant current actions in our region are outlined below.

(Additional information on the actions is listed in the web links shown.)

SOLID WASTE MANAGEMENT – Prevention, Reduction and Diversion

1. **Disposal Ban Programs** support and expand the recycling and reuse of a range of products, including paper, plastic, metals and organics (food scraps, yard waste, and wood waste), reducing emissions associated with solid waste disposal. Metro Vancouver's organics ban has diverted approximately two-thirds of organics (or 430,000 tonnes annually) away from landfills and into digestion and composting facilities that generate low-carbon energy and recover nutrients that can be used in compost. The decay of organics in landfills generates methane, a potent greenhouse gas, and so diversion to facilities is particularly important ([Metro Vancouver](#)).
2. **Behaviour change campaigns** create awareness of the amount of waste generated by households and the associated environmental and economic impacts, and encourage changes in behaviours to mitigate those impacts. In some cases, the campaign provides ideas for preventing waste (e.g., [Love Food Hate Waste](#); [Think Thrice](#); [Create Memories, Not Garbage](#)). In other cases, the campaigns are designed to support disposal bans (e.g., [Food Scraps Aren't Garbage](#), [Put Waste in Its Place](#)). (Metro Vancouver, local governments).

3. **Extended Producer Responsibility Programs** require goods manufacturers to fund and manage the end-of-life management of products, which reduces landfill emissions ([BC Government](#)).
4. **National Zero Waste Council**, an initiative of Metro Vancouver, brings together businesses, industry, governments and community organizations to advance waste prevention and the transition to a circular economy in Canada ([Metro Vancouver and members](#)).
5. **Food Recovery Programs** collect safe and nutritious surplus foods from food processors, distributors, grocery stores and food services and deliver them to small businesses, food banks, and community organizations. Effective food recovery programs reduce food waste and emissions while feeding people ([Food Mesh](#), [Food Stash](#), Greater Vancouver Food Bank, Second Harvest).
6. The **National Industrial Symbiosis Program** pilot initiative supports circular supply chains by identifying opportunities for partnering between businesses to use waste streams as a resource, reducing solid waste and greenhouse gas emissions ([Lighthouse](#)).
9. **Carbon Price Policy** considers greenhouse gas emissions in option analyses for all corporate projects or initiatives ([Metro Vancouver](#)).
10. **Consumption-based emissions inventories** help communities understand the embodied emissions of their activities and consumption habits, and along with potential policy interventions can reduce community greenhouse gas emissions ([City of North Vancouver](#)).
11. **Water treatment and solid waste residuals** are beneficially used in local cement manufacturing, which reduces emissions from landfills and mining raw materials ([Metro Vancouver](#)).

SOLID WASTE MANAGEMENT – Reducing Embodied Emissions

7. **Demolition recycling requirements** set minimum recycling and reuse requirements for demolition and construction projects, which help maintain the carbon stored in construction lumber (Coquitlam, [New Westminster](#), City of North Vancouver, Port Moody, [Surrey](#), Richmond, [Vancouver](#), West Vancouver).
8. **Sharing platforms** use digital technologies and shared ownership to increase the use of underused assets, such as cars, tools and musical instruments (Evo, Modo, [Vancouver Tool Library](#), Vancouver Public Library).



North Shore Reuse Day

SOLID WASTE MANAGEMENT – Energy Recovery and Generation

12. **Landfill biogas capture and utilization** reduce methane emissions from landfills as well as demand for other energy sources ([Metro Vancouver](#), [Delta](#), [Vancouver](#)).
13. **Landfill Gas Management Regulation** sets requirements for landfill gas capture from large landfills ([BC Government](#)).
14. **Biofuel facilities** convert organic waste into renewable natural gas ([Surrey](#)).

SOLID WASTE MANAGEMENT – Controlling Emissions

15. **Emission controls** reduce air contaminant emissions from the Waste-to-Energy Facility ([Metro Vancouver](#)).
16. **Organic waste management facilities** are fully enclosed to manage odours generated during the composting of organics ([Surrey](#)).
17. **Metro Vancouver Odour Management Framework** is continually being applied and enhanced ([Metro Vancouver](#)).
18. **Authorization of emissions** from open-air burning of vegetative debris reduces the impacts of smoke emissions ([Metro Vancouver](#)).
19. **Options to reduce smoke emissions from open-air burning of vegetative debris** are being explored ([Metro Vancouver](#)).

LIQUID WASTE MANAGEMENT

20. **Waste heat recovered** from sewage pipes is used in district energy systems to heat buildings ([Vancouver](#), [Metro Vancouver](#)).
21. **Biogas** produced during wastewater treatment is captured to provide energy for use within wastewater treatment plants ([Metro Vancouver](#)).
22. **Odour control systems** reduce odour emissions from the sewer system and wastewater treatment plants ([Metro Vancouver](#)).
23. **Biosolids used for land reclamation and restoration** help store carbon in soil and reduce the use of chemical fertilizers ([Metro Vancouver](#)).
24. **Biosolids covering decommissioned landfills** reduce climate change impacts by converting the methane in escaping landfill gas into carbon dioxide, a less potent greenhouse gas ([Metro Vancouver](#)).



Biosolids recovered from wastewater are rich in nutrients and organic matter

Roles and Responsibilities in Solid and Liquid Waste Management

Metro Vancouver is responsible for managing solid waste and liquid waste generated in the region through waste management plans approved by the BC Government. Metro Vancouver works to divert materials from entering the solid waste systems and recover materials and energy from solid and liquid waste streams to minimize environmental impacts.

Under authority delegated by the BC Government in the *Environmental Management Act*, Metro Vancouver is also responsible for managing and regulating air quality and greenhouse gases in the region, including emissions from waste management.

Air quality management and climate action require close coordination among all governments as well as businesses, utilities, institutions and residents. The roles of key partners in reducing waste emissions are outlined below.

- **BC Government** requires regional districts to complete waste management plans for solid and liquid waste, and also establishes criteria for waste management.
- **Government of Canada** identifies and regulates emissions of toxic substances through limits, standards and related practices, under the

Canadian Environmental Protection Act, and establishes standards for wastewater treatment.

- **Municipalities** collect solid waste and transport it to waste management facilities. Some municipalities own and operate waste management infrastructure, and some hire private haulers for solid waste collection and transportation. Municipalities install, operate and maintain sewers to convey liquid waste to Metro Vancouver trunk sewers.
- **Industry** is increasingly implementing corporate sustainability and zero waste programs, including Extended Producer Responsibility programs. The waste management industry in the region includes haulers that transport waste and recyclables, as well as owners and operators of recycling drop-off and waste processing facilities.
- **Local businesses** support emission reductions by properly sorting their recycling, adopting circular economy business models, and managing what they put into drains.
- **Local residents** support emission reductions by buying quality items that last, reusing what they have, repairing items, properly sorting their recycling, and managing what they put into drains.

Our Emissions Reduction Opportunity

Transitioning the region to a circular economy will help reduce local and global greenhouse gas emissions, preserve finite resources, and restore natural systems. Businesses are already testing new circular business models as they not only make environmental sense, but also make good business sense. In a circular economy, products and systems are designed to not generate waste and pollution.

Figure 3 shows how a circular economy reduces waste and emissions. The right side of the diagram illustrates material flows in the technical cycle – the things that are manufactured from natural resources. Materials and products in a circular economy are kept in use through systems of sharing, reuse, repair, remanufacture and recycling and not disposed after first use. Resource extraction, manufacturing and the distribution of products in a global economy tend to be energy intensive and reliant on fossil fuel sources, so by reducing the amount of materials used in the economy, emissions of greenhouse gases should also decrease. Incorporating recycled content into products improves markets for recycling and reduces emissions from extracting virgin materials.

The left hand side of the diagram is the flow of biological materials originating from agriculture, fishing, and forestry. The liquid waste and organics generated by the food system are nutrient-rich and can be processed into compost and fertilizer that can be used in landscaping and restoration products and, if the quality is high, into agriculture. Converting organic waste into compost reduces emissions from landfilling organics and creates low-carbon alternatives for conventional fertilizers. Improving on current solid waste reduction and diversion rates will require further collaboration between residents, businesses and governments. New programs, policies and campaigns to further reduce emissions from landfills will be considered in the upcoming update to the solid waste management plan.

In addition, there are significant opportunities to expand the generation of low-carbon energy sources from solid and liquid waste in this region. For solid waste, these might include renewable natural gas from organic waste, landfill gas capture, increasing heat recovery from solid waste through district energy systems, and solid fuels derived from municipal solid waste (e.g., wood waste). For liquid waste, options include developing low-carbon energy sources from the effluent and biosolids produced by wastewater treatment, as well as recovering the heat from sewer pipes. Increasing the local use of compost and fertilizers derived from solid and liquid waste management systems can improve soil health, resulting in more carbon capture.

In addition to generating low-carbon, renewable sources of energy, solid and liquid waste management facilities can implement additional technologies and processes to further reduce energy use and emissions, explore better odour control and monitoring; and explore opportunities for carbon capture.

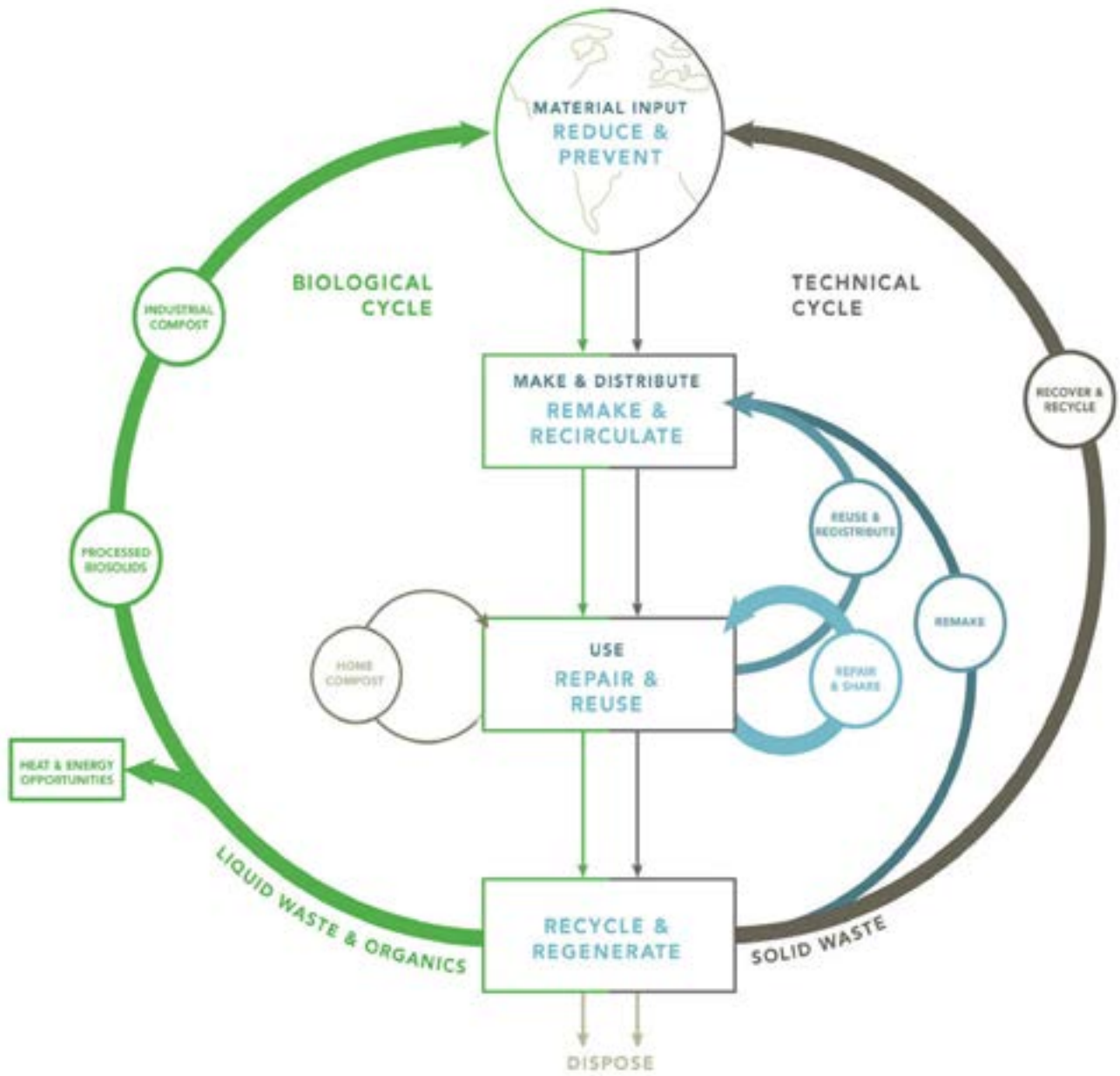



Figure 3: Schematic of how the circular economy reduces waste and emissions.

Discussion: Reducing Emissions from Solid Waste and Liquid Waste Management

The following sections outline proposed goals, example targets, example actions, and potential Big Ideas to reduce emissions from the management of solid and liquid waste in the region.

Proposed Long-Term Goals for Waste Management Emission Reductions

Long-term goals describe a desired future state for low-emission and carbon neutral waste management, with expected achievement in 2050 and beyond. Long-term goals will help identify and prioritize new actions to achieve the emission reduction opportunities from solid waste and liquid waste management.

 *Please consider the following long-term goals proposed for waste management in our region. Will these goals help us reach our desired future state?*

SOLID WASTE MANAGEMENT


- 1. The regional solid waste management system is carbon neutral.**
- 2. Air contaminant emissions from solid waste management do not impact public health, quality of life and the environment.**
- 3. Businesses, governments and residents follow circular economy business models, policies and lifestyles, which significantly reduce consumption-related emissions.**

LIQUID WASTE MANAGEMENT

- 4. The regional liquid waste management system is better than carbon neutral, and is a net provider of energy.**
- 5. Air contaminant emissions from liquid waste management do not impact public health, quality of life and the environment.**

Example Waste Management Emission Reduction Targets

Near-term targets are milestones to support achievement of the long-term goals and will be included in the *Climate 2050 Waste Roadmap* and the *Clean Air Plan*. They will also be considered in the upcoming updates to the solid waste and liquid waste management plans.

 *Please consider the following near-term targets from other jurisdictions. Are any of these the right milestones to help us reach our long-term goals? What should our near-term targets look like?*

(Additional information on the targets is listed in the web links shown.)

1. By 2030, reduce net regional greenhouse gas solid waste emissions by 92% from 1990 levels ([Portland](#)).
2. By 2030, use 100% renewable energy at Southeast False Creek Neighbourhood Energy Utility ([Vancouver](#)).
3. By 2030, eliminate organic material sent to landfill ([Victoria](#)).

Example Waste Management Emission Reduction Actions

Actions are the policies and programs, including regulations, incentives and educational outreach campaigns, which will lead to emission reductions. Actions will be included in the *Clean Air Plan* and the *Climate 2050 Waste Roadmap*. They will also be considered in the upcoming updates to the solid and liquid waste management plans. In addition to existing actions (see [page 8](#)) we need new actions to address the many opportunities we have to further reduce emissions and meet our near- and long-term targets.



Please consider the following actions from other leading jurisdictions, which show a range of actions that could be implemented to reduce emissions. Could any of these help us further reduce emissions to reach our goals? What should new, additional actions look like?

(Additional information on the actions is listed in the web links shown.)

SOLID WASTE MANAGEMENT

1. **Best Available Control Technology** requirements for composting facilities reduce common air contaminant emissions ([California](#)).
2. **Environmental purchasing policies** reduce embodied emissions and support recycling by requiring recycled content for items such as office paper ([Portland](#)).
3. **Construction procurement process** considers embodied emissions of materials ([Helsinki](#), [Washington State](#)).
4. **Consumption-based emissions inventory** expands on traditional emissions inventories by estimating the greenhouse gas emissions of the entire lifecycle of goods (manufacturing and production, use, and disposal) ([Portland](#)).
5. **No sales tax** on the reuse and repair of goods ([Sweden](#)).
6. **Buildings as material banks** increase the value of construction materials to reduce construction and demolition waste and associated emissions ([European Union](#)).
7. **Cradle to Cradle Certified product standard** supports products that are designed to minimize disposal in solid waste streams ([Cradle to Cradle Products Innovation Institute](#)).
8. **Using organic waste as animal feed** (e.g., for pigs and insects) reduces emissions from growing animal feed ([East Asia](#), [Canada](#)).
9. **Wood chipping incentive program** reduces backyard burning of wood waste and other organic debris ([Regional District of Okanagan-Similkameen](#)).

LIQUID WASTE MANAGEMENT

10. **Local biosolids use** reduces emissions from hauling them away and supports local community gardens to grow crops and contribute to food banks ([Tacoma](#)).
11. **Compost procurement programs** requires the use of locally sourced biosolids compost, in construction, transportation and development projects ([Washington](#)).
12. **Quantifying carbon sequestration potential of biosolids** from wastewater utility to achieve “Beyond Carbon Neutral” commitment ([King County](#), [Washington](#)).
13. **Co-digestion** of sewage sludge with food waste, agricultural waste or other organics, such as food fats, oils and grease, to enhance the production of biogas in wastewater treatment plant digesters ([Oakland](#), [California](#)).

Potential Big Ideas for Waste Management Emission Reductions

To achieve a cleaner, healthier, more equitable future, we need to think big and act quickly. Metro Vancouver has identified several **Big Ideas** to accelerate emission reductions in waste management. The Big Ideas were selected for different reasons, including potential for significant reductions of air contaminant emissions (including greenhouse gases), ease of implementation or their foundational nature (i.e., they are needed to support other actions).



Please consider the following Big Ideas. Could any of these help us drive significant emission reductions to reach our goals? What other Big Ideas should Metro Vancouver consider?

Big Idea 1: *Prioritize climate solutions when updating and implementing the region's solid waste and liquid waste management plans*

Since Metro Vancouver adopted its *Integrated Solid Waste and Resource Management Plan* in 2011, the region has progressed substantially towards its zero waste and circular economy goals. In 2018, 64% of regional solid waste was diverted through reduction, reuse or recycling. An updated plan will build on the strengths of the current plan and identify opportunities to accelerate waste reduction and diversion and promote a circular economy. The updated plan will prioritize further reductions of greenhouse gases generated by how we manage solid waste to support the region's target to be carbon neutral by 2050. Metro Vancouver will work closely with other governments to ensure alignment with climate initiatives such as *CleanBC*, the provincial climate plan.



Sewer heat recovery at False Creek Neighbourhood Energy Utility (photo courtesy of City of Vancouver)

The Metro Vancouver *Integrated Liquid Waste and Resource Management Plan* adopted in 2011 set requirements for Metro Vancouver and its members to track greenhouse gas emissions from liquid waste services as well as to consider risks from the impacts of climate change in liquid waste planning and asset management programs. The forthcoming update to the plan provides Metro Vancouver and its members with an opportunity to accelerate current climate change actions associated with liquid waste management. The regulatory authority of the *Environmental Management Act* can be leveraged to implement the climate change actions approved by the BC Government.

Big Idea 2: *Create low-carbon energy from waste*

Metro Vancouver's solid and liquid waste management operations will continue to collect some waste products. Metro Vancouver continues to focus on maximizing the beneficial use of these waste products, converting them to low-carbon energy where possible. Metro Vancouver and its partners are exploring or pursuing several key opportunities to create low-carbon energy from solid waste and liquid waste, as outlined below.

- **Alternative Fuel and Recyclables Recovery Centre** could recover energy (and recyclables) from small loads at regional transfer stations. About half the waste in small loads is wood, which can be used as a low-carbon fuel at industrial facilities or district heating systems. The feasibility of such a centre is being explored.
- **Additional district energy use of waste heat** from solid and liquid waste infrastructure, including the Waste-to-Energy Facility, wastewater treatment plants and large sewers (see box: District Energy Opportunities in Metro Vancouver).
- **Low-carbon fuels** can be recovered from the liquid waste system. Metro Vancouver is exploring technologies to convert biosolids into a fuel that replaces higher carbon fuels such as coal in cement kilns. Metro Vancouver is also testing a process

that transforms sewage sludge into bio-crude oil that can be refined to create low-carbon transportation fuel.

- **Facility to upgrade biogas** recovered from wastewater treatment and inject renewable natural gas into the natural gas distribution system is being built.
- **Biomethane booster** to increase generation of renewable natural gas from the wastewater treatment facilities is being developed with UBC.

The above projects, if they were all implemented, could reduce regional greenhouse gas emissions by over 100,000 tonnes per year.

Metro Vancouver is exploring these and other opportunities to create low-carbon energy for the region. Future directions include considering low-carbon energy generation potential in all capital planning for the liquid waste systems and accelerating Metro Vancouver's investment in infrastructure to provide low-carbon district energy from the liquid waste system.

District Energy Opportunities in Metro Vancouver

District energy systems are centralized facilities that provide heating and cooling to a network of residential and commercial buildings more efficiently and with less emissions than individual building heating and cooling systems. Metro Vancouver is currently building a facility to recover heat from wastewater effluent and supply it to a district energy provider. Other opportunities to supply heat to district energy providers are also being explored, including using steam generated at the Waste-to-Energy Facility or heat recovered from large sewer pipes.

Waste Management and Adaptation to Climate Change

Waste management facilities in the Metro Vancouver region include recycling depots, organics processors, recycling processors, transfer stations, landfills, wastewater treatment plants, and liquid waste pump stations.

Climate change will impact these facilities and other activities associated with waste management. The waste management system is susceptible to the following climate hazards:

- severe weather;
- sea-level rise, storm surges and floods; and
- heat waves and wildfires.

The region has existing protocols and plans to address some of these hazards, such as managing a large influx of solid waste following a flood. These protocols and plans provide some guidance to help protect the region's existing waste management facilities from climate change-related events. As climate change impacts escalate additional protocols and plans will be needed to ensure these facilities can keep operating.

Actions to protect key infrastructure include raising dykes, and improving both stormwater management plans and professional practice guidelines. Climate change must be considered during the design and repair to existing waste management infrastructure to avoid creating vulnerabilities that make adaptation more difficult and expensive for future generations.

Across the region, many organizations are considering climate change adaptation and are beginning to coordinate response plans that have us working together now to prepare for a more resilient future. Regional adaptation initiatives will require the cooperation and support of all governments.

A discussion paper on *Infrastructure*, as part of this series, will include a discussion on how key regional infrastructure, such as liquid waste management facilities, will be adapted to a changing climate.

Feedback and Engagement Process

Metro Vancouver invites feedback from diverse viewpoints to help shape *Climate 2050* and the *Clean Air Plan*. Metro Vancouver will carefully consider all input. Feedback is welcome by email at CleanAirPlan@metrovancover.org or Climate2050@metrovancover.org or by telephone at 604-432-6200.

To ensure your comments are considered please provide feedback by September 30, 2020.

Participation Opportunities

Metro Vancouver will provide a variety of engagement opportunities to hear input on this discussion paper. The public, stakeholders, and other governments can participate via the following:

- open comments to a dedicated email account; and
- direct feedback to Metro Vancouver staff.

Details about events will be posted on the *Climate 2050* and *Clean Air Plan* websites (see blue box on the this page).

Feedback on any part of this discussion paper is welcome at any time through the engagement period. Events will focus on proposed goals, example targets and metrics, identification of potential actions, and consideration of the potential pathways need to reach carbon neutrality.

To ensure your comments are considered please provide feedback by Sept. 30, 2020.

How Feedback Will Be Used

With revisions, content from this discussion paper will form the basis of the waste management section of the *Clean Air Plan* and the *Climate 2050 Waste Roadmap*, both of which will be available for feedback before they are finalized. (Note that actions identified in the final *Clean Air Plan* and any of the *Climate 2050 Roadmaps* that could result in significant changes to existing air emission regulations or new regulations may require an independent public engagement process before being adopted.)

Comments and suggestions will be compiled into a summary report for consideration by the Metro Vancouver Board and will be made publicly available.

Feedback on this discussion paper will also be shared to the Metro Vancouver project teams for the upcoming updates to the solid waste and liquid waste management plans.

Metro Vancouver staff will treat personal information with confidentiality; please note that comments you submit may be provided to a third party if a freedom of information request is made under the *Freedom of Information and Protection of Privacy Act*. If you have any questions or comments regarding the consultation process, please call 604-432-6200.

Thank you for taking the time to provide your valuable feedback.

For more information, visit metrovancover.org and search "Clean Air Plan" or "Climate 2050" or call 604-432-6200.

Glossary

Air contaminants are any substances emitted into the air that do or could a) harm public health (including material physical discomfort) and property, b) damage the environment, including the climate, c) impede normal business operations, or d) impair visual air quality.

Ambient air quality objectives and standards are health-based targets which define the acceptable outdoor concentration of key air contaminants. Metro Vancouver and the federal and provincial governments adopt objectives and standards that become more stringent over time, to drive continuous improvement in air quality.

Ammonia (NH₃) is poisonous if inhaled in greater quantities, and is irritating to the eyes, nose and throat in lesser amounts. Ammonia can also react with other substances in the air to form particulate matter.

Best Available Control Technology (BACT) is the technology that results in the lowest emissions from a set of available options that has practical potential at a specific site, has been proven to work at other locations, and is not cost prohibitive. Some emission control technologies can result in increased energy usage or generation of other residuals, which is considered during technology selection.

Biosolids are the treated solids recovered from wastewater. The solids have been treated by microorganisms and heat to eliminate pathogens and reduce odours. The final product is similar to soil and is rich in nutrients and organic matter.

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

Circular economy is an economy where the value of products is retained after their initial use through reuse, repair and remanufacturing. Keeping products functioning at their highest potential reduces embodied emissions and reduces emissions associated with waste management. Transitioning to a circular economy will gradually decouple economic activity from the consumption of finite resources by designing waste out of the system and helping to regenerate natural systems.

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

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

Embodied emissions are the greenhouse gas emissions associated with the construction of goods and products, including the raw materials and the transport of the good or product to where it is sold.

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

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

Ground-level ozone (O₃) can have harmful impacts on everyone, especially children, seniors, and people with lung and heart conditions. It is primarily formed when nitrogen oxides and volatile organic compounds react in the air on hot and sunny days.

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

Nitrogen dioxide (NO₂) can damage people's health by aggravating existing lung diseases like asthma and bronchitis and reducing immunity to lung infections. It is formed during high-temperature fuel combustion.

Sulphur oxides (SO_x) are a group of gases, which includes sulphur dioxide, that are emitted during the combustion of sulphur-containing fuels. Exposure to high levels of sulphur dioxide can damage people's health by aggravating asthma and increasing respiratory symptoms. Sulphur oxides can also react with other substances in the air to form particulate matter.

Visual air quality is how clear the air looks to the average observer. Metro Vancouver and its partners measure visual air quality on a scale from "very poor" to "excellent" at five sites in the Lower Fraser Valley.

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

Metro Vancouver is a federation of 21 municipalities, one Electoral Area and one Treaty First Nation that collaboratively plans for and delivers regional-scale services. Its core services are drinking water, wastewater treatment and solid waste management. Metro Vancouver also regulates air quality, plans for urban growth, manages a regional parks system and provides affordable housing. The regional district is governed by a Board of Directors of elected officials from each local authority.

Member jurisdictions of Metro Vancouver include:

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



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