

# Clean Air Plan

## 2021



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

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

The goals and targets in Metro Vancouver's air quality and climate-related plans are a science-based 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. The *Clean Air Plan* was prepared in winter 2020/2021, and introduced for public and stakeholder comment during the COVID-19 pandemic. Across the globe, the pandemic response has provided a glimpse of what is possible and what we can achieve with coordinated efforts and common goals.



# Executive Summary

The *Clean Air Plan* is Metro Vancouver's air quality and greenhouse gas management plan. Actions in the Plan will reduce air contaminant emissions and impacts, including greenhouse gases, over the next 10 years, and in doing so support the 30-year commitment to a carbon neutral region by 2050. This management plan also helps improve air quality for the region, to protect human health and the environment.

The *Clean Air Plan* focuses on actions that Metro Vancouver has the authority to implement, and also identifies actions for implementation by others. The Plan targets air contaminants that can harm human health, together with greenhouse gases, as many sources in the region emit both types of air contaminants. The *Clean Air Plan* was developed with input from across the region, and will be implemented through to 2030.

## Challenge

Air quality impacts from health-harming air contaminants, such as fine particulate matter and nitrogen dioxide, have significant health costs, and have the most impact on children, the elderly, and residents with underlying health conditions. Climate change is already impacting our health and our environment (e.g., wildfires, heat waves), and those impacts will become more evident in coming years. Climate change and air quality impacts can harm some neighbourhoods, households and individuals more than others.

Metro Vancouver, together with its member jurisdictions, has been taking action on air quality and climate change for more than twenty years.

**But governments, businesses and residents must accelerate actions to reduce our contributions to climate change and improve our regional air quality, both of which will protect human health and the environment.**





## Vision

Metro Vancouver is a carbon neutral region where residents experience healthy, clean and clear air.

## Regional 2030 Targets

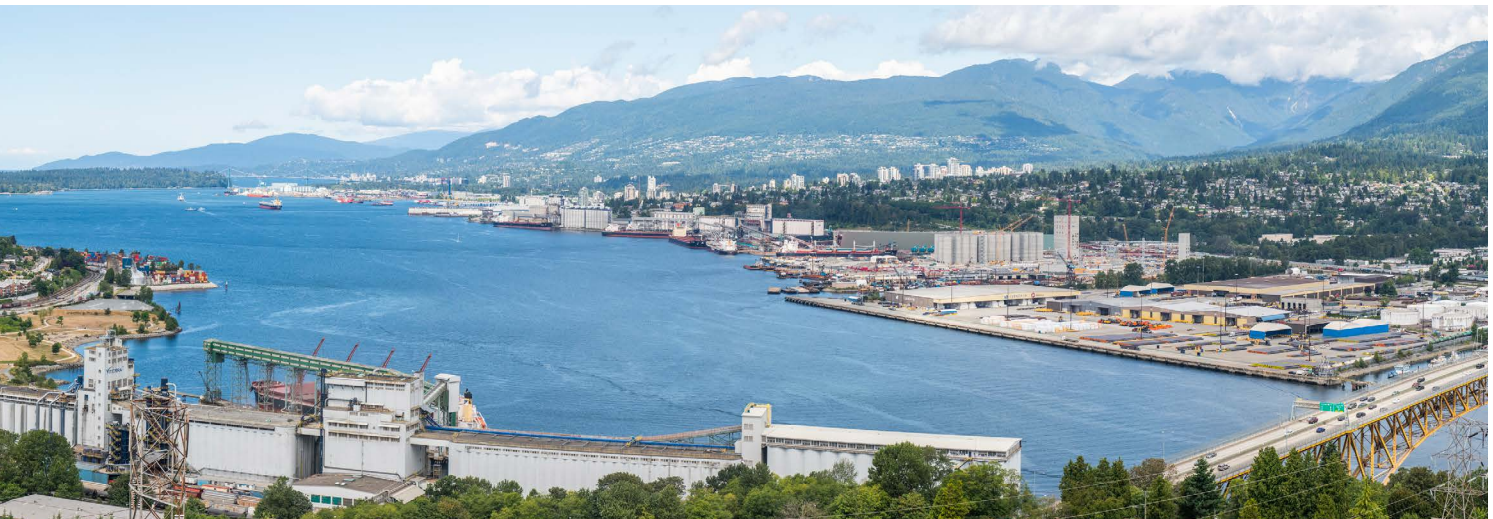
1. Reduce regional greenhouse gas emissions by 45% from 2010 levels.
2. Air quality in the region is continually improving, protecting human health and the environment, by ensuring that:
  - a. Ambient air quality meets or is better than the ambient air quality objectives and standards that are regularly updated by Metro Vancouver, the BC Government and the Government of Canada; and
  - b. The amount of time that visual air quality is classified as "excellent" is increasing.

The *Clean Air Plan* can help the region achieve deep reductions in regional greenhouse gas emissions. Achieving the 2030 greenhouse gas target is a significant challenge that our region is committed to tackling. The Plan can also help to continue to improve regional air quality, which will reduce the health care costs of health-harming air contaminants, among other benefits.

## Guiding Principles

The following principles describe the fundamental values that guide the *Clean Air Plan*.

1. Ambitious
2. Evidence-based
3. Equitable
4. Inclusive & Collaborative
5. Preventative
6. Continuous Improvement
7. Prioritize Co-benefits
8. Dynamic
9. Transparent
10. Comprehensive & Integrated



**Transportation**

- Enhance and Improve Regional Transit (1.1.1)
- Use Pricing to Reduce Driving and Emissions (1.1.2)
- Expand Active Transportation Networks (1.1.3)
- Accelerate Sales Targets for New Electric Passenger Vehicles (1.2.1)
- Develop Regional Emission Requirements for Passenger Vehicles (1.2.2)
- Make Electric Vehicles More Affordable (1.2.3)
- Regulate Existing Medium and Heavy Trucks (1.3.1)
- Require Zero Emission Sales Targets for New Medium and Heavy Trucks (1.3.2)
- More Stringent Low Carbon Fuel Standards (1.3.3)
- Accelerate Emission Reductions from Marine Vessels (1.4.1)



**Industry**

- More Stringent Greenhouse Gas Requirements for Large Industrial Emitters (3.1.1)
- Integrate Greenhouse Gas Requirements into Emission Regulations and Permits (3.1.2)
- Implement Renewable Gas Content Requirements (3.1.3)
- Tighten Emission Regulation for Non-road Diesel Engines (3.2.1)
- Regional Low Carbon Procurement (3.3.1)







## Buildings

- Greenhouse Gas Performance Requirements for Existing Large Buildings (2.1.1)
- Greenhouse Gas Performance Requirements for Existing Homes and Townhomes (2.1.2)
- New Buildings are Highly Efficient and Electric (2.1.3)
- Require Greenhouse Gas Reductions during Renovations (2.1.4)
- Building Electrification Mandate for BC Hydro (2.1.5)
- Expand Incentives for Low Carbon Upgrades (2.2.1)
- Online Decision Support Tools for Low Carbon Upgrades in Buildings (2.2.2)
- Implement Requirements for Higher Emitting Wood Burning Appliances (2.3.1)
- Emission Requirements for District Energy Systems (2.4.1)
- Incorporate Embodied Emissions into the BC Building Code (2.5.1)



## Agriculture

- Reduce Emissions from Greenhouses (4.1.1)
- Reduce Open-Air Burning (4.1.2)



## Cross-cutting

- Develop Long-Term Approach to Equity in Air Quality and Greenhouse Gas Management (Equity 1)
- Strengthen Relationships with First Nations on Air Quality Issues (5.1.1)



## Issue Area 2030 Targets

### Transportation Targets

- Passenger vehicles:
  - 65% reduction in greenhouse gas emissions, from 2010 levels
- Commercial vehicles, rail locomotives, marine vessels and aircraft:
  - 35% reduction in greenhouse gas emissions, from 2010 levels
- Passenger and commercial vehicles, rail locomotives, marine vessels and aircraft:
  - 25% reduction in diesel particulate matter emissions, from 2020 levels
  - 40% reduction in nitrogen oxides emissions, from 2020 levels

### Buildings Targets

- All buildings:
  - 35% reduction in greenhouse gas emissions from buildings, from 2010 levels
  - 35% reduction in fine particulate matter emissions from buildings, from 2020 levels
  - 15% reduction in nitrogen oxides emissions from buildings, from 2020 levels
- New buildings:
  - All new buildings are zero emissions in their operations
  - All new buildings produce 40% less embodied emissions from construction



### Industry Targets

- Industrial facilities:
  - 35% reduction in greenhouse gas emissions, from 2010 levels
  - 10% reduction in fine particulate matter emissions, from 2020 levels
  - 10% reduction in nitrogen oxides emissions, from 2020 levels
- Non-road equipment:
  - 35% reduction in greenhouse gas emissions, from 2010 levels
  - 50% reduction in diesel particulate matter emissions, from 2020 levels

### Agriculture Targets

- 35% reduction in greenhouse gas emissions, from 2010 levels
- 10% reduction in fine particulate matter, from 2020 levels

### Measure, Monitor and Regulate Target

- 98% reliability of ambient air quality monitoring network

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# Metro Vancouver

Underlined words are key concepts defined in the [Glossary on Page 58](#).

Metro Vancouver is a federation of 21 municipalities, one Electoral Area and one Treaty First Nation, working collaboratively in planning and providing vital utility and local government services to 2.7 million people. Core services include drinking water, sewage treatment, and solid waste management, along with regional services like regional parks, affordable housing, regional land-use planning and air quality and climate action that help keep the region one of the most livable in the world.

## Mission

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

### 1. Serve as a Regional Federation

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

### 2. Deliver Core Services

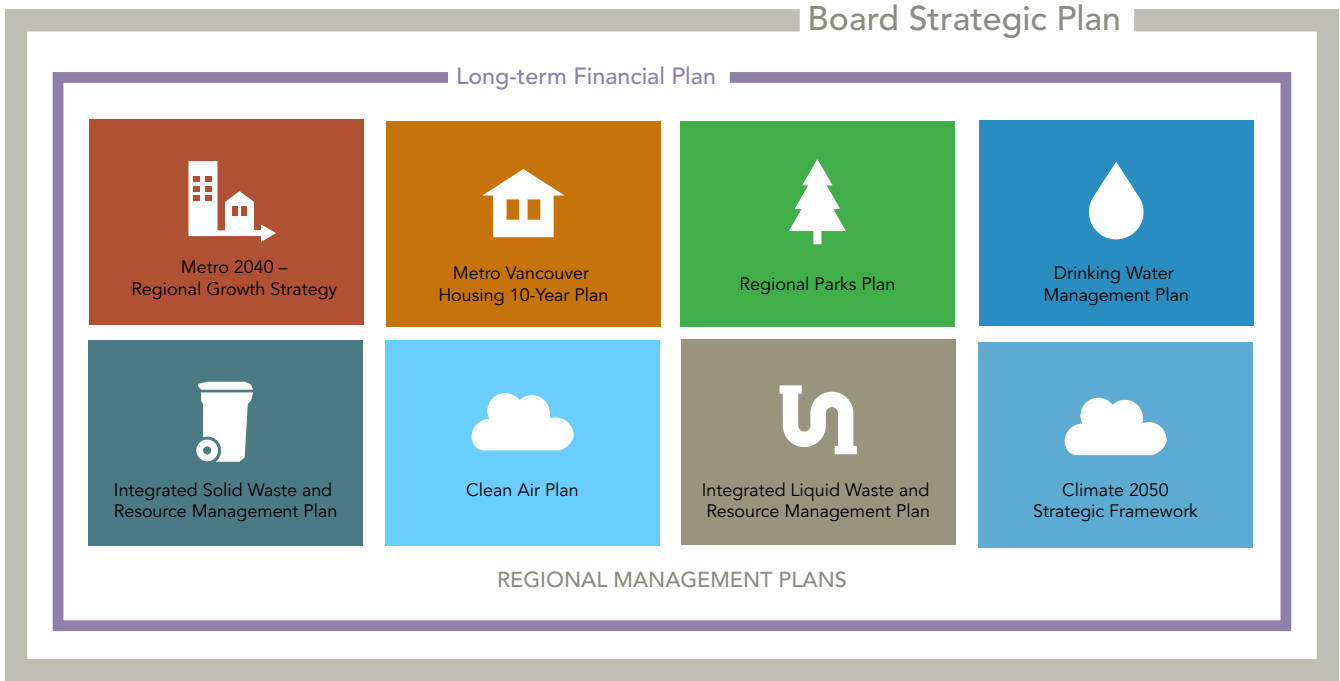
Provide regional utility services related to drinking water, liquid waste and solid waste to members. Provide regional services, including parks and affordable housing, directly to residents and act as the local government for Electoral Area A.

### 3. Plan for the Region

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







# Building a Resilient Region

Building the resilience of the region is at the heart of Metro Vancouver’s work. Each of Metro Vancouver’s regional plans and strategies adopts a vision, guiding principles, goals, strategies, actions and key performance measures that will support a more resilient, low carbon and equitable future. Metro Vancouver’s interconnected plans and strategies are guided by the *Board Strategic Plan*, which provides strategic direction for each of Metro Vancouver’s

legislated areas of responsibility, and the Long-Term Financial Plan, which projects total expenditures for capital projects and operations that sustain important regional services and infrastructure. Together these documents outline Metro Vancouver’s policy commitments and specific contributions to achieving a resilient region.

# Plan Context

## Challenges and Opportunities

The air we breathe is mostly nitrogen and oxygen, and also contains air contaminants, some of which are damaging. Higher levels of air contaminants degrade air quality and cause climate change, with associated impacts on human health and the environment. The air contaminants with the most impact in the Metro Vancouver region are described below.

- Health-harming air contaminants damage air quality, harming human health and the environment. Some impact visual air quality, and others have odorous characteristics. Health-harming air contaminants include fine particulate matter, diesel particulate matter, ground-level ozone, nitrogen dioxide, sulphur dioxide, volatile organic compounds, and hazardous air pollutants.
- Greenhouse gases trap heat and are the cause of climate change. Greenhouse gases include carbon dioxide, methane, nitrous oxide, halocarbons (e.g., refrigerants), black carbon and ground-level ozone.

**Air Quality:** Residents in the region generally experience good air quality today, due to air quality management efforts by Metro Vancouver and others in recent decades. Air quality monitoring by Metro Vancouver shows that most health-harming air contaminant levels have been improving, even while the region's population has grown.

**Greenhouse Gases:** Greenhouse gas emissions have both local and global impacts and we all have a shared responsibility to take local climate action. Climate change projections for the region for 2050 include longer, hotter and drier summers, warmer and wetter fall and winter seasons with decreased snowpack, and more extreme weather events.

### How degraded air quality and climate change can harm residents in Metro Vancouver

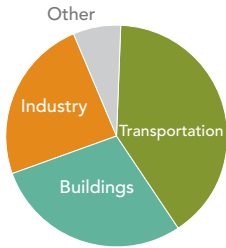
Higher levels of health-harming air contaminants can cause heart and lung disease and cancer, and increase the risk of hospitalization, asthma and bronchitis. These impacts increase costs to our health care system. Children, the elderly, people who are active outdoors, and those with pre-existing health conditions are at higher risk from air quality impacts. The most harmful air contaminants in the region are fine particulate matter (including diesel particulate matter), ground-level ozone and nitrogen dioxide. Health researchers have demonstrated that there are no known safe levels for fine particulate matter, ground-level ozone and nitrogen dioxide. Health Canada estimates that at least 1,900 British Columbians die prematurely every year due to those three contaminants and many more live with the associated health effects.

As the climate changes, wildfires are expected to become more intense and more frequent, impacting residents with harmful smoke. Sea level rise, increased storm surge and more extreme rainfall all increase the risk of flooding in Metro Vancouver communities, which can hurt residents, their homes and businesses. More extreme heat can cause heat stress in vulnerable populations. Some households are better able to prepare for and protect themselves from climate change and air quality impacts.

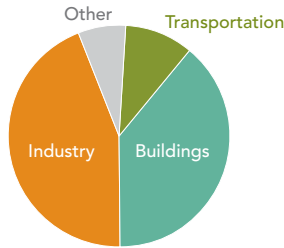
**Regional Emission Sources:** Emissions in the Metro Vancouver region are primarily from burning fossil fuels such as gasoline, diesel, natural gas and coal, as well as burning renewable fuels such as wood. The major sources of regional emissions are transportation, buildings and industry, as shown in the graphics on [Page 13](#), with smaller contributions from agriculture, waste management and other sources.

## Regional Emissions by Air Contaminant and Issue Area

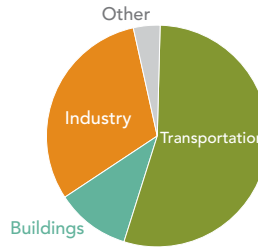
GREENHOUSE GASES



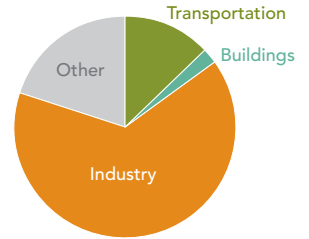
FINE PARTICULATE MATTER



NITROGEN OXIDES



VOLATILE ORGANIC COMPOUNDS



Metro Vancouver, together with its member jurisdictions, has been taking action on air quality and climate change for decades. **But governments, businesses and residents need to do more to reduce our contributions to climate change, improve our regional air quality, and protect human health and the environment.**

The *Clean Air Plan* is Metro Vancouver's fourth regional air quality and greenhouse gas management plan. The Plan is developed with input from across the region, and will be implemented through to 2030.

### Roles and Responsibilities

Metro Vancouver is responsible for managing and regulating air contaminants in the region under authority delegated by the BC Government in the *Environmental Management Act*. Under that authority, the discharge of air contaminants, in the course of conducting an industry, trade or business, is prohibited unless conducted in compliance with a Metro Vancouver bylaw, permit, order or approval. Vancouver's management program includes developing plans, strategies and regulations (i.e., bylaws); promoting compliance with permits and regulations; monitoring air quality; and delivering awareness and incentive programs (see Issue Area 6 for more details).

Metro Vancouver also coordinates with other governments and regional partners on air quality and greenhouse gas management. Coordination will be essential to achieving the Plan's regional air

quality and greenhouse gas targets because some key actions will be led by others. The roles and responsibilities of Metro Vancouver's key partners are described below.

- The **Government of Canada** sets emission standards for on-road vehicles, non-road equipment, rail locomotives, home heating appliances, fuels, and some industrial sources. The Government of Canada coordinates the national Air Quality Management System to improve air quality in Canada, and regulates federal undertakings such as ports and airports.
- The **BC Government** sets emission standards for fuels and other emission sources, and manages air quality in BC for areas outside of Metro Vancouver, including adjacent regional districts.
- **First Nations** in the Metro Vancouver region provide services to their communities. For example, Tsawwassen First Nation, as a Treaty First Nation and Metro Vancouver member jurisdiction, has similar authorities and powers as other member jurisdictions with respect to climate change. In addition, many non-treaty First Nations in the region have operational Land Codes (similar to municipal land-use plans), which empower Indigenous governments to address environmental management and sustainability issues. Beyond providing services to their communities, in-region First Nations also have a stewardship obligation to protect the lands, waters and wildlife within their respective territories.



- **Member jurisdictions** (i.e., local municipalities) are responsible for land-use policy and enforcing building codes. Many member jurisdictions have adopted climate action and environmental plans, and are implementing actions to reduce emissions within their jurisdictions.
- **TransLink** plans, finances and operates public transit in the region, and shares responsibility for the major road and regional cycling networks with municipalities and the BC Government. The Government of Canada and the BC Government also fund transit and transportation projects.
- The **Vancouver Fraser Port Authority** oversees federal port lands in the region. It protects the environment, considers local communities and safely facilitates Canada’s trade objectives.
- The **Fraser Valley Regional District** shares the Canadian Lower Fraser Valley airshed with Metro Vancouver. The Fraser Valley Regional District has air quality planning authority and operates air quality programs.
- **Health authorities** provide research and information on the health impacts of air contaminants to support air quality management.
- **Energy utilities** such as BC Hydro and FortisBC supply energy for residents and businesses, as well as provide incentives to owners to reduce emissions and energy consumption.

Other partners include the public, businesses and associations, community groups, and non-governmental and labour organizations.

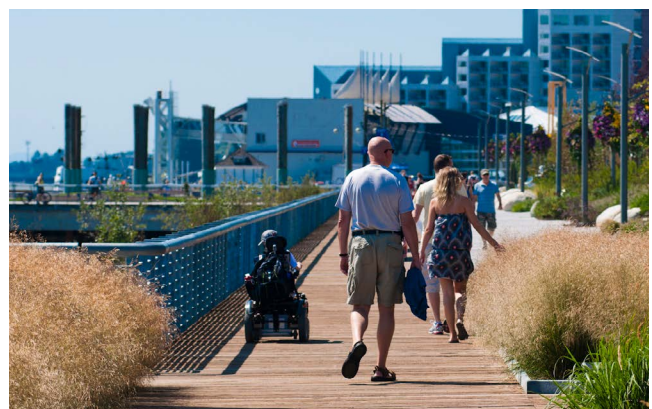
## Relationship of Clean Air Plan to other Metro Vancouver Roles and Strategic Plans

The *Clean Air Plan* supports the vision of *Climate 2050*, Metro Vancouver’s strategy to transition the region to a low carbon and resilient future, increasing the health, wellbeing and prosperity of Metro Vancouver residents. The *Clean Air Plan* identifies







the initial actions needed to meet the region’s 2030 greenhouse gas target – a 45% reduction in regional greenhouse gas emissions from 2010 levels. Achieving the 45% target sets the foundation for moving the region towards the *Climate 2050* commitment to a carbon neutral region by 2050. A series of dynamic *Climate 2050 Roadmaps* will describe the current opportunities and best approaches to reach climate targets for the region.

### Land-use and growth management supports emission reductions

Metro Vancouver, in partnership with its member jurisdictions, manages regional land-use and growth through the *Regional Growth Strategy (Metro Vancouver 2040: Shaping our Future)*. The Strategy outlines a vision for a compact region with a network of complete communities well connected by public transit, and protected agricultural and natural areas. Strong regional land-use policies are foundational to achieving the targets in the *Clean Air Plan*. Building compact, mixed-used communities that connect homes, jobs and recreation with walking, cycling and public transit will reduce driving emissions and will support the protection of important lands such as agricultural and industrial lands, and natural areas. Protecting natural areas allows them to absorb and store carbon dioxide (known as natural carbon sequestration). Higher density communities also reduce emissions from buildings. The Strategy also establishes greenhouse gas targets for the region.



The *Clean Air Plan* also supports and is supported by actions by other Metro Vancouver services. The table below outlines the links between the *Clean Air Plan* and actions and plans under other Metro Vancouver services.

METRO VANCOUVER SERVICE	LINKS WITH AIR QUALITY AND GREENHOUSE GAS MANAGEMENT
 Regional Planning	<ul style="list-style-type: none"> <li>• See “land-use and growth management supports emission reductions” info box on previous page.</li> </ul>
 Water Services	<ul style="list-style-type: none"> <li>• Contamination of water resources is minimized by reducing air contaminant emissions.</li> <li>• Natural areas in the watersheds help sequester carbon.</li> <li>• Management of natural areas and a wildfire suppression program reduce wildfire risks, which protects air quality.</li> </ul>
 Housing	<ul style="list-style-type: none"> <li>• The <i>Metro Vancouver Housing 10-Year Plan</i> sets targets to reduce energy consumption by 25% for major rehabilitation and new construction, and reduce greenhouse gas emissions in the housing portfolio by 45% by 2030 through electrification.</li> </ul>
 Regional Parks	<ul style="list-style-type: none"> <li>• Regional greenways help reduce traffic emissions.</li> <li>• Natural areas in regional parks help sequester carbon.</li> <li>• Park land acquisition protects green spaces and bolsters carbon sequestration.</li> <li>• Management of natural areas and a wildfire suppression program reduce wildfire risks, which protects air quality.</li> </ul>
 Liquid Waste Services	<ul style="list-style-type: none"> <li>• Pursuing opportunities to create low carbon energy from liquid waste streams and residuals, to help displace fossil fuel use.</li> <li>• Biosolids used for land reclamation and restoration help sequester carbon in soil.</li> <li>• Odour control systems reduce odours from the sewer system and wastewater treatment plants.</li> <li>• Increasing energy efficiency and switching to clean, renewable energy both reduce emissions.</li> </ul>
 Solid Waste Services	<ul style="list-style-type: none"> <li>• Diversion and circular economy processes minimize the generation of solid waste, which reduces emissions of greenhouse gases and other air contaminants.</li> <li>• Landfill gas management reduces emissions of methane, a powerful greenhouse gas.</li> <li>• Pursuing opportunities to create low carbon energy from solid waste streams, to help displace fossil use.</li> </ul>

# Clean Air Plan

The *Clean Air Plan* is Metro Vancouver's fourth regional air quality and greenhouse gas management plan. Actions in the Plan will reduce air contaminant emissions and impacts, including greenhouse gases, in our region over the next 10 years, and in doing so support the 30-year commitment to a carbon neutral region by 2050. These actions will improve air quality in the region, protecting human health and the environment.

## Vision

Metro Vancouver is a carbon neutral region where residents experience healthy, clean and clear air.

## Regional 2030 Targets

The regional 2030 targets are quantitative measures that help to describe when we have achieved the vision.

1. Reduce regional greenhouse gas emissions by 45% from 2010 levels.
2. Air quality in the region is continually improving, protecting human health and the environment, by ensuring that:
  - a. Ambient air quality meets or is better than the ambient air quality objectives and standards that are regularly updated by Metro Vancouver, the BC Government and the Government of Canada; and
  - b. The amount of time that visual air quality is classified as "excellent" is increasing.

### Visual air quality

Visual air quality is how clear the air looks to the average observer. Visual air quality is another way of tracking air quality. In general, the more air contaminants there are in the air, the hazier the view. Improving air quality generally improves visual air quality. Improving visual air quality can improve the economy (through increased tourism, etc.) and the wellbeing of residents, including local First Nations.

## Guiding Principles

The *Clean Air Plan* was written considering the following Guiding Principles, which describe the fundamental values that guide the Plan. These principles will also guide implementation of the actions in the Plan. The Guiding Principles were adapted from the United Nations Habitat principles for local climate action.

1. **Ambitious** – Demonstrate global and local leadership in tackling local climate change and air quality challenges.
2. **Evidence-based** – Inform decision-making with the most current science and local conditions, including cost impacts, and understand and consider Indigenous knowledge.
3. **Equitable** – Consider equity in all actions to address climate change and air quality. This includes sharing the costs and benefits, considering affordability and a responsibility to future generations.
4. **Inclusive & Collaborative** – Involve all voices in planning and implementation.
5. **Preventative** – Prioritize actions that minimize air contaminant emissions through design or efficiency approaches, rather than remedial efforts such as emission controls.
6. **Continuous Improvement** – Continually reduce emissions and air quality impacts.
7. **Prioritize Co-benefits**: Prioritize actions that both improve air quality and reduce greenhouse gas emissions, while considering trade-offs and minimizing negative or unintended consequences.
8. **Dynamic** – Support innovation, leverage new information and explore emerging opportunities.
9. **Transparent** – Follow an open decision-making process, and set goals and targets that can be measured, reported, verified, and evaluated.
10. **Comprehensive & Integrated** – Implement air quality and climate change actions across all sectors and communities, integrating and aligning efforts with other governments.



## Equity

Metro Vancouver's air quality and greenhouse gas management program has historically focused on the sources with the largest impacts in the region as a whole. These impacts are strongly linked to the amount and harm potential of air contaminants emitted by key sources. However, management programs have expanded beyond a regional focus to a community level, recognizing that climate change and degraded air quality impact some neighbourhoods, households and individuals more than others.

Equity is the promotion of fairness, justice and the removal of structural barriers that may cause or aggravate disparities experienced by different groups of people. The *Clean Air Plan* was developed based on a set of principles that includes "equity", which is a commitment that Metro Vancouver will consider equity in actions to address climate change and improve air quality, and will work to reduce disproportionate impacts. **Actions that reduce emissions must also support an equitable distribution of benefits and avoid an inequitable distribution of costs.**

Integrating equity into Metro Vancouver's air quality and climate change programs is a work in progress. The *Clean Air Plan* includes six actions to support that work, recognizing that more will be needed in the future.

These actions will help Metro Vancouver further understand the impacts and benefits of air quality and climate change actions on all communities. The actions can clarify where inequities in air quality and climate change exist in the region, consider how equity can be better integrated into actions, and develop tools to address gaps.

## Equity Actions

1. **Long-Term Approach for Equity.** Develop a long-term approach to evaluate and address equity in the design and implementation of air quality and greenhouse gas management programs, policies and regulations. The results of any equity analysis, both positive and negative, would be communicated to the public, including any disproportionate burdens that may be experienced by specific groups.
2. **Equity Community Input Process.** Develop a community input process to review equity impacts in the design and implementation of programs, policies and regulations, working with community partners.
3. **Air Quality Inequities Tool.** Develop a publicly accessible tool to highlight and track existing inequities experienced in air quality impacts across the region (e.g., due to underlying health conditions, or proximity to large emission sources or major roads), working with health authorities and community partners. The tool could support similar work on disproportionate climate impacts in the region.
4. **Equity Metrics and Targets.** Develop metrics and targets to measure progress on equity in the region as it relates to air quality and greenhouse gas management.
5. **Share Equity Best Practices with Other Organizations.** Work with health authorities, member jurisdictions, the BC Government and other regional partners to integrate equity best practices into the design and implementation of air quality and greenhouse gas policies, programs and regulations across the region.
6. **Equity-Building Air Quality Pilot.** Develop and pilot at least one air quality project focused on equity-building, working with health authorities and community partners.

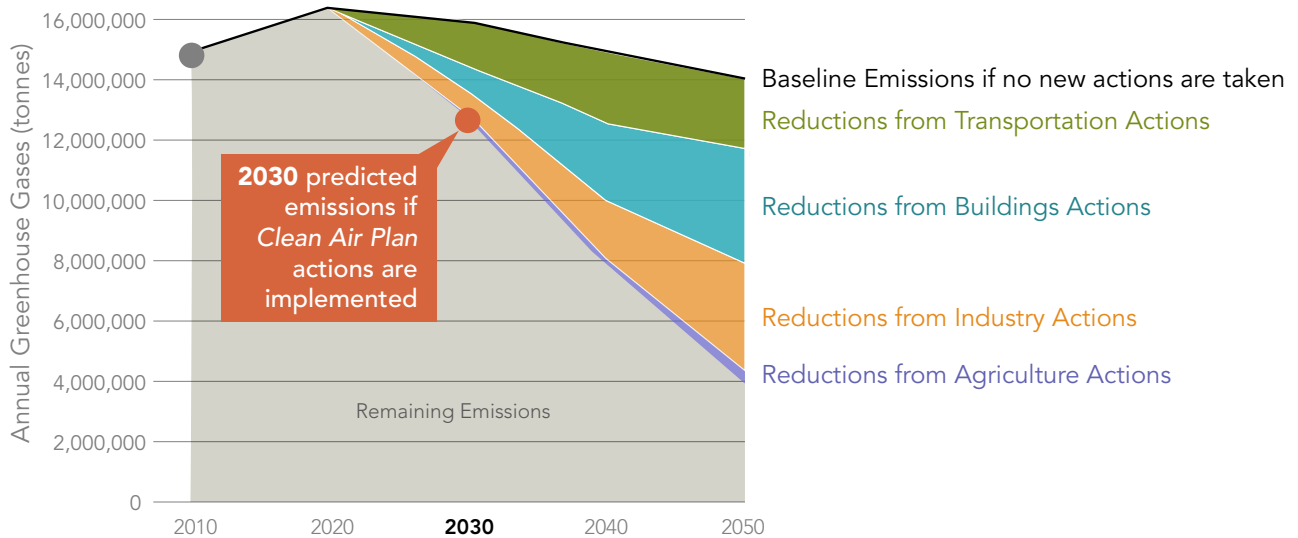


## Potential Emission Impacts of Clean Air Plan

The actions in the *Clean Air Plan* were modelled to estimate their impact on regional emissions. This modelling suggests that with bold actions by all governments and broad adoption by the public and local businesses, emissions in the Metro Vancouver region can be significantly reduced over the next 30 years. The graph below shows the potential reduction in greenhouse gas emissions by 2050 by implementing an aggressive and achievable suite of actions, starting with the actions outlined in the *Clean Air Plan*.

Metro Vancouver’s initial modelling of the actions in the *Clean Air Plan* indicates that **if all the actions in the Plan were implemented, regional greenhouse gas emissions could be reduced by approximately 2 million tonnes by 2030**, or 15% below the 2010 regional total. Starting implementation on the actions in the *Clean Air Plan* is critical to achieve these emission reductions.

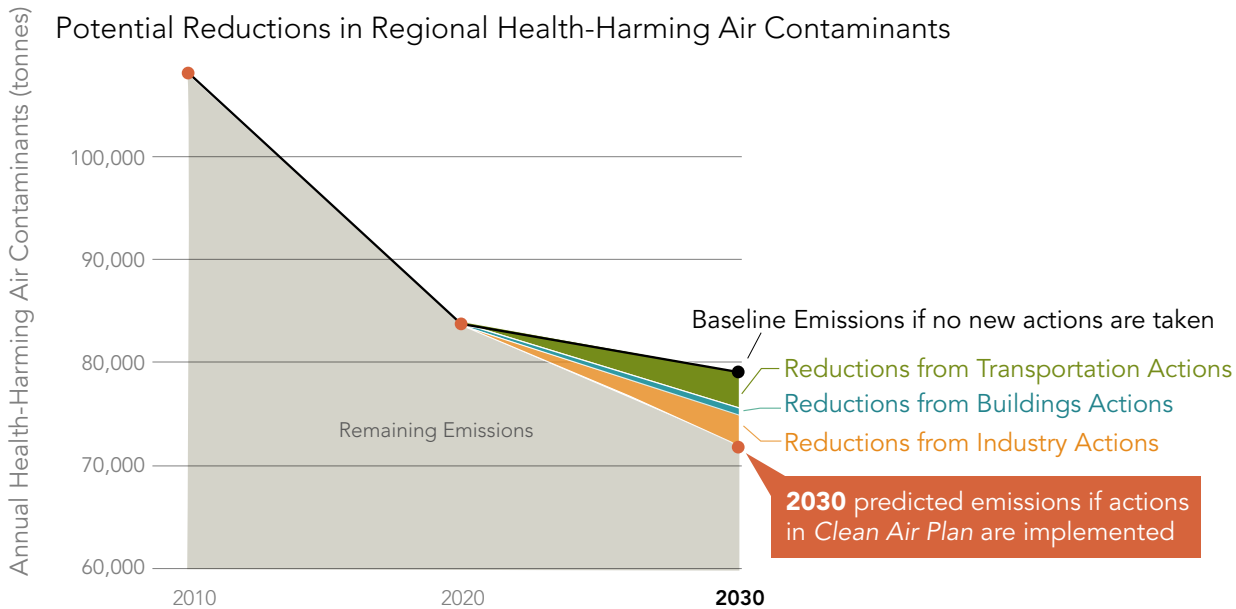
Potential Reductions in Regional Greenhouse Gases



These potential emission reductions are significant but do not achieve the 2030 target to reduce regional greenhouse gas emissions by 45% from 2010 levels. Metro Vancouver will continue to work with residents, businesses and governments to accelerate these actions even further. Additional climate actions to help transition the region to carbon neutrality will be identified in the *Climate 2050 Roadmaps*.

To support these actions, 2030 greenhouse gas targets were established by issue area based on technological readiness and economic considerations of the different sectors. The issue area targets combine to align with the 2030 regional target.

The suite of actions in the *Clean Air Plan* are also expected to lead to significant improvements in regional air quality and public health. The graph below shows the impact of the Plan on the combined emissions of four key health-harming air contaminants: fine particulate matter, nitrogen oxides, sulphur oxides and volatile organic compounds. The steep drop in emissions between 2010 and 2020 is primarily due to cleaner engines in passenger vehicles, medium and heavy duty vehicles, and non-road equipment. By 2030, the actions in the Plan could reduce annual regional emissions of fine particulate matter by 700 tonnes, nitrogen oxides by 3,800 tonnes, and volatile organic compounds by 3,000 tonnes. The expected impact of these emission reductions on public health are described on the following page.





## Costs of Action, Costs of Inaction

A 45% reduction in greenhouse gas emissions by 2030 is an ambitious target and requires an investment in our future. The science is clear as is recent experience, climate change is already having an impact on our health, communities, the economy and ecosystems. More extreme weather events and sea level rise have financial, health and environmental costs including wildfire damage, negative impacts on human health and wellbeing, damage to buildings and infrastructure, changes to local food production, threats to nature and ecosystems, and more. The cost of reducing regional and global greenhouse gas emissions as well as the costs of adaptation will only grow, the best cost option is to take action now.

The *Clean Air Plan* identifies actions needed to transition this region to a low carbon and resilient future. This will involve new investments; from residents who invest in electric vehicles and retrofits to businesses that invest in a range of emission reduction technologies. Governments have a critical role in this transition first in setting out the targets and timelines to reducing emissions as well as incentivizing (and, in some cases, requiring) consumers and businesses to adopt solutions that will reduce emissions.

Governments can enable the switch to clean, renewable energy as well as stimulate innovations that accelerate the transition to a carbon neutral region by 2050. In this environment entrepreneurs will recognize the economic opportunities associated with low carbon and zero emission solutions.

Higher levels of health-harming air contaminants also have costs to society, including increased medical treatments, lost productivity, and the health and lifespan of residents. Assigning a value to the health benefits of the air quality actions in the *Clean Air Plan* depends on a variety of factors, including the health impacts of different health-harming air contaminants.

**Using data from Health Canada, Metro Vancouver assessed that the potential regional health benefits from the *Clean Air Plan* between 2020 and 2030 could be up to \$1.6 billion.**

While traditional cost-benefit analysis is oriented to the present, many of the costs of climate inaction will be borne by future generations. This is an equity issue that must be addressed in the analysis. As a society we must consider how the benefits, costs and risks of climate and air quality actions are shared now and into the future.



## Structure and Implementation

The *Clean Air Plan* focuses on actions that Metro Vancouver can implement under our delegated authority. The Plan also identifies where other governments and partner agencies need to take action to help achieve our regional vision and 2030 targets.

Actions in the *Clean Air Plan* include guidance, incentives, awareness and outreach programs, standards, policies, programs and regulations. Most of the greenhouse gas actions in the *Clean Air Plan* will be included in the relevant *Climate 2050 Roadmaps*. Actions related to [climate adaptation](#) (i.e., climate resiliency) will also be identified in the relevant *Climate 2050 Roadmaps* and are not included in the *Clean Air Plan*.

### The *Clean Air Plan* is organized around six issue areas:

1. Transportation;
2. Buildings;
3. Industry;
4. Agriculture;
5. Health; and
6. Measure, Monitor and Regulate.

### How nature can help reduce emissions and improve public health

The Metro Vancouver region's rich and diverse [ecosystems](#) are vital to the people and wildlife who live here. Nature provides public benefits called ecosystem services. Some ecosystem services help address climate change and improve regional air quality; examples include natural carbon sequestration, shading (by urban trees), stormwater management (by green roofs) and more. Human activities, including urban development and climate change, are resulting in ecosystem changes and losses which reduce the ability of nature and ecosystems to provide climate-related benefits, now and in the future.

The challenges and opportunities with protecting and restoring nature and ecosystems will be described in the *Climate 2050 Nature & Ecosystems Roadmap* and are not included in the *Clean Air Plan*.

### Transitioning to Clean, Renewable Energy






Achieving our 2030 air quality and greenhouse gas targets will require a region-wide transition from fossil fuels to [clean, renewable energy](#). Clean, renewable energy is low or [zero emission](#) energy that is replenished over days or years. In British Columbia, electricity is produced primarily from hydro power, a clean, renewable source of energy that produces significantly less emissions than fossil fuels. Therefore, electrification is a primary pathway to cleaner air and lower greenhouse gas emissions. Other renewable fuels will also be needed, particularly for sectors that are more expensive or complicated to electrify. However, most renewable fuels (e.g., wood, [renewable natural gas](#)) still produce health-harming air contaminants, which harm air quality, human health and the environment. The *Climate 2050 Energy Roadmap* will describe the opportunities and challenges in transitioning the regional energy system to clean, renewable energy. This transition will require expansions in the supply and distribution capacity for both electricity and renewable natural gas.

Metro Vancouver will work to implement the strategies and actions in the *Clean Air Plan*, reflecting them in annual work plans and budgets. Strategies and actions will be implemented following the Guiding Principles on [Page 16](#). Progress on achieving the *Clean Air Plan* goals and targets will be publicized through the annual Caring for the Air and air quality monitoring reports, regional emission inventories, as well as online reporting for *Climate 2050* and related initiatives.

Some actions in the *Clean Air Plan* may require a public engagement process prior to implementation, including new air emission regulations or significant changes to existing air emission regulations. Metro Vancouver values public feedback and will continue to seek feedback from the full range of voices and communities in the region. Feedback will be reflected in the design and implementation of actions.

# Strategies and Actions

## Key to reading the strategies and actions

<p><b>Long-term Goals</b></p>	<p>Long-term goals frame the bright green future we want in the region around 2050, for each issue area.</p>
<p><b>2030 Targets</b></p>	<p>Targets help measure progress toward the long-term goals of the issue areas. Emission targets account for potential impacts of the issue area strategies, as well as emission impacts due to previously implemented policies.</p>
<p>Potential Impacts of Strategy in 2030</p>	<p>The highest potential emission reductions due to all actions in the strategy, relative to the expected baseline emissions in 2030. Greenhouse gas estimates include carbon dioxide, methane and nitrous oxide. Health-harming air contaminant estimates include the sum of fine particulate matter, nitrogen oxides, sulphur oxides and volatile organic compounds. The potential impacts reflect the emissions modelling described on <a href="#">Pages 18 and 19</a>.</p>
<p>BIG MOVES</p>	<p> Big Moves are foundational to achieving the 2030 targets, and should lead to the most significant emission reductions.</p>
<p>CORPORATE LEADERSHIP</p>	<p> Corporate Leadership actions are ones Metro Vancouver will implement in its corporate operations to demonstrate leadership and support regional actions.</p>
<p><b>Lead Agency(ies)</b></p>	<p>Agency(ies) with the largest role(s) in completing the action. The lead agency(ies) could be Metro Vancouver, others or a combination.</p>
<p><b>Potential Impacts of Action</b></p>	<p> The action <b>does/does not</b> have the potential to reduce greenhouse gas emissions.</p> <p> The action <b>does/does not</b> have the potential to improve regional air quality.</p> <p> The action <b>does/does not</b> have the potential to improve regional visual air quality.</p>
<p><b>Start Year(s)</b></p>	<p>Year(s) when Lead Agency(ies) would start development on the action.</p>





## Issue Area 1: Transportation

The transportation system serves and shapes our region's communities and economy. Roads, rail lines, shipping lanes, flight paths, transit networks, and bike paths link us with our destinations, but burning fuels to travel these routes can worsen air quality and contribute to climate change. As the region grows and changes, we need a transportation system that will keep us connected and goods moving while also reducing emissions.

### Transportation emissions

Transportation generates about half of regional emissions. Within transportation, passenger vehicles are the primary contributors of greenhouse gases and volatile organic compounds, while marine vessels, medium and heavy duty vehicles, and rail locomotives are most responsible for harmful emissions from diesel use, including fine particulate matter.

The strategies to reduce emissions of these air contaminants align with best practices from around the world. They include reducing driving; more compact, complete communities; shifting to lower emission modes of transportation (e.g., cycling, walking, transit, high-speed rail); electrification; and cleaner fuels and engines. More information on climate change and transportation will be included in the *Climate 2050 Transportation Roadmap*.

### Long-term Goals

1. All personal travel within the region is made by active transportation or using zero emission technologies powered by clean, renewable energy.
2. All medium and heavy duty vehicles, and rail locomotives operating within the region use zero emission technologies powered by clean, renewable energy.
3. All aircraft and marine vessels operating within the region use low emission and zero carbon technologies powered by clean, renewable energy.

## 2030 Targets

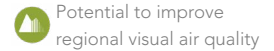
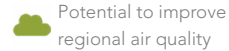
- Passenger vehicles:
  - 65% reduction in greenhouse gas emissions, from 2010 levels
- Medium and heavy duty vehicles, rail locomotives, marine vessels and aircraft:
  - 35% reduction in greenhouse gas emissions, from 2010 levels
- Passenger and medium and heavy duty vehicles, rail locomotives, marine vessels and aircraft:
  - 25% reduction in diesel particulate matter emissions, from 2020 levels
  - 40% reduction in nitrogen oxides emissions, from 2020 levels

## Key Benefits of Accelerating Emission Reductions from Transportation

- Reduced climate change and air quality impacts
- Driving less can reduce traffic congestion and road maintenance
- More active transportation can improve public health and, along with more public transit, can increase transportation options for all residents
- Electric and other zero emission vehicles generally have lower maintenance and energy costs

## Key Costs of Accelerating Emission Reductions from Transportation

- Public investments in active transportation and public transit
- Capital costs for electric and other zero emission vehicles
- Premium for renewable diesel and other renewable fuels
- Public and private investments to build zero carbon refueling infrastructure
- Research costs to develop zero carbon marine vessels, aircraft and rail locomotives



## Strategies and Actions

### Strategy 1.1 Reduce Driving through Active Transportation and Public Transit.

Transportation emissions at the community scale are driven by where people live, work, learn and play. The Metro Vancouver *Regional Growth Strategy* (see Info Box on [Page 14](#)) and the TransLink *Regional Transportation Strategy* both outline policies to help create communities that are complete, compact, and transit oriented. When people live closer to where they work, learn and play, more trips can happen by active transportation (e.g., walking, cycling) and public transit. Public transit can effectively move people medium and long distances, while active transportation is better for short and medium distances. Reducing the amount of driving in the region will significantly contribute to achieving the 2030 transportation targets for greenhouse gases and nitrogen oxides. Active transportation, in particular, also has important co-benefits such as improved physical health. However, helping residents and businesses to drive less is a long-term transition, so significant funding is needed to expand public transit and active transportation options. Pricing driving can also help reduce emissions.

#### Potential Impacts of Strategy in 2030

- Reduce annual greenhouse gases by up to **280,000** tonnes
- Reduce annual health-harming air contaminants by up to **400** tonnes

#### Key Partners

- Member jurisdictions
- TransLink
- BC Government
- Government of Canada

**BIG  
Move**

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

**Lead Agency** TransLink



Ongoing

**BIG  
Move**

**1.1.2 Use Pricing to Reduce Driving and Emissions.** Work with the BC Government, TransLink, member jurisdictions and other regional partners to develop and implement a policy that puts a price on driving in the region, to help reduce emissions. The program could include **mobility pricing**, transportation pricing, usage-based insurance, fuel taxes, etc. Any program should prioritize fairness and equity and be supported by transit expansion (Action 1.1.1). Any program should align with any low or zero emission zones in the region (see Actions 1.2.2 and 1.3.2).

**Lead Agencies** BC Government, TransLink, member jurisdictions, Metro Vancouver



Ongoing

**BIG  
Move**


**1.1.3 Expand Active Transportation Networks.** Advocate to member jurisdictions to expand regional and local active transportation networks so it's the most convenient choice for most shorter trips. The networks should be well-connected, comfortable for most, and integrated with public transit. Network expansion should prioritize under-served areas to ensure all residents have access to active transportation options in a connected region. Network elements should include walking and cycling paths, regional greenways, separated bike lanes, and end-of-trip facilities. The facilities should be suitable for all bike and mobility types, and include charging for electric bikes, electric scooters and other similar electric mobility devices.


**Lead Agency** Member jurisdictions



























Ongoing

 Potential to reduce greenhouse gas emissions

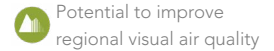
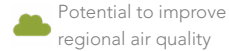
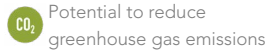
 Potential to improve regional air quality

 Potential to improve regional visual air quality

<p><b>1.1.4 More Stable Infrastructure Funding for Regional Active Transportation Networks.</b> Advocate to the BC Government and the Government of Canada to expand stable funding for comprehensive regional and local active transportation networks, to enable Action 1.1.3.</p> <p><b>Lead Agencies</b> BC Government, Government of Canada</p>	  	<p><b>Start Years</b> 2022 – 2023</p>
<p><b>1.1.5 More Stable Funding for Regional Transit.</b> Advocate to the BC Government and the Government of Canada to expand stable funding for the regional public transit system to cover both operations and capital investments, to enable Action 1.1.1.</p> <p><b>Lead Agencies</b> BC Government, Government of Canada</p>	  	<p><b>Start Years</b> 2022 – 2023</p>
<p><b>1.1.6 Regional Parking Strategy to Reduce Driving.</b> Develop a Regional Parking Strategy to prioritize active transportation and other low emission transportation options, coordinating with member jurisdictions and TransLink. The strategy could include replacing building parking minimums with maximums, establishing parking minimums for bicycles, implementing dynamic parking pricing and reducing free parking spaces. The strategy could also support uptake of electric and car-share vehicles by establishing electric vehicle charging requirements for parkades, and enhancing preferential parking rates and spaces for electric and car-share vehicles.</p> <p><b>Lead Agencies</b> Metro Vancouver, member jurisdictions</p>	  	<p><b>Start Years</b> 2023 – 2024</p>
<p><b>1.1.7 Support Residents and Businesses in Active Transportation.</b> Advocate to the BC Government and the Government of Canada to provide funding (e.g., incentives, tax credits) to residents and businesses to support active transportation, including for buying, renting or sharing all bike and mobility types. Funding should prioritize groups who generally cannot access these transportation options, such as low income residents and households.</p> <p><b>Lead Agencies</b> BC Government, Government of Canada</p>	  	<p><b>Start Years</b> 2022 – 2023</p>
<p><b>1.1.8 Communicate the Benefits of Walking, Cycling and Public Transit.</b> Support outreach campaigns led by TransLink, member jurisdictions and health authorities that show the benefits of walking, cycling (including electric bikes) and public transit, including the associated improvements to regional air quality and greenhouse gas emissions.</p> <p><b>Lead Agencies</b> TransLink, member jurisdictions</p>	  	<p>Ongoing</p>
<p><b>1.1.9 Implement Trip Reduction Programs.</b> Advocate to the BC Government to require large employers and major trip generators (e.g., shopping malls) to implement trip reduction programs. Such programs could require large employers and other major trip generators to measure staff or customer driving habits and take action to reduce driving. These programs should consider availability of lower emission alternatives and opportunities for remote and flexible work options.</p> <p><b>Lead Agency</b> BC Government</p>	  	<p><b>Start Years</b> 2024 – 2025</p>
<p><b>1.1.10 Regional Bike- and Car-Sharing Strategy.</b> Develop a regional strategy to support the increased use of bike- and car-sharing services, coordinating with member jurisdictions, TransLink and other regional partners. These services have been shown to reduce total driving distances among users.</p> <p><b>Lead Agency</b> Metro Vancouver</p>	  	<p><b>Start Years</b> 2024 – 2025</p>
<p><b>1.1.11 Support Low Emissions Commuting by Staff.</b> Develop and implement a Metro Vancouver corporate commuting strategy to reduce driving emissions. The strategy would encourage more commuting by active transportation, public transit and car-pooling. The strategy could also review parking policies, explore distributed and remote work options where operationally feasible, and recommend additional electric vehicle chargers at work sites.</p> <p><b>Lead Agency</b> Metro Vancouver</p>	  	<p><b>Start Years</b> 2022 – 2023</p>







## Strategy 1.2 Accelerate Transition of the Passenger Vehicle Fleet to Electric Vehicles.

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

### Potential Impacts of Strategy in 2030

- Reduce annual greenhouse gases by up to **710,000** tonnes
- Reduce annual health-harming air contaminants by up to **1,400** tonnes

### Key Partners

- Member jurisdictions
- BC Government
- BC Hydro

**BIG**  
Move

**1.2.1 Accelerate Sales Targets for New Electric Passenger Vehicles.** Advocate to the BC Government to accelerate the sales targets in the *Zero Emission Vehicles Act* to reach 100% zero emission vehicle sales by 2030 (instead of the current 2040 target). The BC Government should also modify the Act to prioritize 100% electric vehicles. Advocate to the Government of Canada to establish sales targets for zero emission passenger vehicles, reaching 100% by 2030 (instead of the current 2035 target).

**Lead Agencies** BC Government, Government of Canada



**Start Years** 2022 – 2023

**BIG**  
Move

**1.2.2 Develop Regional Emission Requirements for Passenger Vehicles.** Develop regulatory emission requirements for existing passenger vehicles, to be implemented by the BC Government or Metro Vancouver. Requirements could include low or zero emission zones, or a vehicle emissions levy with rebates for replacing older vehicles. Requirements should target both health-harming air contaminants and greenhouse gases. Any regulatory program must consider equity and be coordinated with member jurisdictions. Any program could also support actions focused on reducing total driving distances, including Action 1.1.2 on pricing driving.

**Lead Agencies** BC Government, Metro Vancouver



**Start Years** 2023 – 2024

**BIG**  
Move

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

**Lead Agencies** BC Government, Government of Canada



**Start Years** 2022 – 2023

**1.2.4 Regional Electric Vehicle Charging Strategy.** Develop a long-term regional strategy for electric vehicle charging infrastructure, coordinating with member jurisdictions, energy utilities, TransLink, industry, and other regional partners. A strategy would identify where additional publicly accessible electric vehicle chargers are needed to ensure equitable access, as well as provide guidance on user fees, design and siting. The strategy should align with similar actions for medium and heavy duty vehicles, and non-road equipment (Actions 1.3.7 and 3.2.4).

**Lead Agency** Metro Vancouver



**Start Years** 2022 – 2023

**1.2.5 Make New Passenger Vehicles Cleaner.** Advocate to the Government of Canada to establish more stringent fuel economy and emission standards for new passenger vehicles, prioritizing greenhouse gas reductions. New quality standards should also be established to reduce non-tailpipe emissions, such as particulate matter emissions from brake and tire wear.

**Lead Agency** Government of Canada



**Start Years** 2024 – 2025

CO<sub>2</sub> Potential to reduce greenhouse gas emissions

Potential to improve regional air quality

Potential to improve regional visual air quality

**1.2.6 Expand Electric Vehicle Charging in Buildings.** Work with member jurisdictions, the BC Government, BC Hydro and the Government of Canada to expand access to electric vehicle charging in buildings. This should include adoption of provincial “Right-to-Charge” legislation as well as code requirements that new or substantially renovated buildings are wired for electric vehicle chargers. Expanding access should also include increased support and funding (e.g., incentives, loans, tax credits) for electric vehicle charging in existing buildings. Funding should prioritize groups who generally would not have access to chargers, such as residents living in rental buildings, strata buildings, non-market housing or secondary suites.

**Lead Agencies** BC Government, member jurisdictions



**Start Years** 2022 – 2023

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

**Lead Agency** Metro Vancouver



Ongoing

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

**Lead Agency** BC Government



**Start Years** 2024 – 2025

**1.2.9 Eliminate Tampering with Vehicle Emission Controls.** Work with the BC Government and the Government of Canada to reduce the air quality impacts from tampering with emission control systems in passenger vehicles, and medium and heavy duty vehicles. This could include banning the sale or import of tampering devices, and improving enforcement of tampering in vehicles and by automotive repair shops.

**Lead Agencies** BC Government, Government of Canada, Metro Vancouver



**Start Years** 2022 – 2023

**1.2.10 Reduce Vehicle Idling Emissions.** Advocate to member jurisdictions to adopt Metro Vancouver’s model anti-idling bylaw, enforce existing anti-idling requirements and educate residents about the human health and environmental impacts of idling.

**Lead Agency** Member jurisdictions



**Start Years** 2025 – 2026

**1.2.11 Transition the Corporate Fleet to Zero Emissions.** Transition Metro Vancouver’s corporate on-road fleet to zero carbon emission between 2035 and 2040, and zero emission by 2050. The transition would include both passenger and medium and heavy duty vehicles (see Action 3.2.7 for related action on corporate non-road fleet).

**Lead Agency** Metro Vancouver



Ongoing





Potential to reduce greenhouse gas emissions



Potential to improve regional air quality



Potential to improve regional visual air quality

### Strategy 1.3 Reduce Medium and Heavy Truck Emissions and Support Early Adoption of Zero Emission Trucks.

As our economy grows, goods movement in the region will continue to grow. The 40,000 medium and heavy duty vehicles registered in the region (plus the trucks that travel in and out of the region) generate 5% of regional greenhouse gas emissions and 10% of regional diesel particulate matter. Federal emission standards ensure new trucks are cleaner, and provincial clean fuel standards have reduced the carbon intensity of diesel, the main fuel used by medium and heavy duty vehicles. Programs that target high emitting medium and heavy duty vehicles will help achieve the 2030 transportation targets for diesel particulate matter and nitrogen oxides. Sales targets, incentives and a regional zero carbon refueling strategy will accelerate the long-term transition to zero emission medium and heavy duty vehicles, reducing greenhouse gases and improving regional and local air quality.

#### Potential Impacts of Strategy in 2030

- Reduce annual greenhouse gases by up to **170,000** tonnes
- Reduce annual health-harming air contaminants by up to **200** tonnes

#### Key Partners

- BC Government
- Vancouver Fraser Port Authority
- Member jurisdictions
- Trucking industry

**BIG**  
Move

**1.3.1 Regulate Existing Medium and Heavy Trucks.** Develop regulatory requirements for existing medium and heavy duty vehicles, to be implemented by the BC Government or Metro Vancouver. Regulatory approaches to reduce emissions could include an inspection and maintenance program that requires repairs on higher emitting trucks, registration requirements targeting older trucks, a regional smoking vehicle hotline, and low or zero emission zones (aligned with Action 1.2.2). Requirements should be developed in coordination with member jurisdictions, the Vancouver Fraser Port Authority and other regional partners. Requirements would align with TransLink’s transition to clean, renewable energy in Action 1.1.1. Requirements would initially target health-harming air contaminants but should eventually include greenhouse gas emissions.

**Lead Agencies** Metro Vancouver, BC Government, member jurisdictions



**Start Years** 2022 – 2023

**BIG**  
Move

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

**Lead Agency** BC Government



**Start Years** 2023 – 2024

**BIG**  
Move

**1.3.3 More Stringent Low Carbon Fuel Standards.** Advocate to the BC Government to further increase the stringency of the BC *Low Carbon Fuel Standard* to reduce the carbon intensity of transportation fuels, primarily through increasing use of renewable diesel and ethanol. Advocate to the Government of Canada to further tighten the federal *Clean Fuel Standard* to include more stringent carbon intensity targets for all transportation fuels (see Actions 1.4.1, 1.4.2, 1.5.1 and 1.5.2).

**Lead Agencies** BC Government, Government of Canada



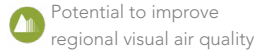
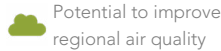
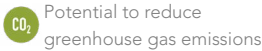
**Start Years** 2025 – 2026

**1.3.4 Long-term Emissions Strategy for Medium and Heavy Trucks.** Work with the BC Government and partners to develop a long-term province-wide emissions strategy for medium and heavy duty vehicles. The strategy should identify a phased timeline to implement a suite of policies and programs (including the other actions under Strategy 1.3) that would accelerate fleet turnover to cleaner vehicles while preparing for the longer term transition to zero emission vehicles. The strategy should target both greenhouse gas emissions and health-harming air contaminants, while providing a level-playing field and minimizing stranded assets.

**Lead Agency** BC Government



**Start Years** 2022 – 2023



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

**Lead Agencies** BC Government, Government of Canada



**Start Years** 2023 – 2024

**1.3.6 Regulate Fuel Economy and Emissions for Medium and Heavy Trucks.** Advocate to the Government of Canada to establish more stringent fuel economy and emission standards for medium and heavy duty vehicles, prioritizing greenhouse gas reductions. Cleaner trucks will improve regional air quality in the short term and support the long-term transition to zero emission vehicles.

**Lead Agency** Government of Canada



**Start Years** 2023 – 2024

**1.3.7 Zero Carbon Refueling Strategy for Medium and Heavy Trucks.** Develop a long-term regional zero carbon refueling strategy for medium and heavy duty vehicles, coordinating with member jurisdictions, energy utilities, the Vancouver Fraser Port Authority, TransLink, fuels industry and other regional partners. The strategy would identify where refueling stations are needed for different fuels including electricity, hydrogen, renewable diesel and others. The strategy could identify pilot projects and should also consider opportunities to leverage public investment in electric bus charging infrastructure for commercial vehicle use. This strategy should align with similar strategies for passenger vehicles and non-road equipment (Actions 1.2.4 and 3.2.4, respectively).

**Lead Agency** Metro Vancouver



**Start Years** 2025 – 2026

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

**Lead Agencies** BC Government, Government of Canada



**Start Years** 2025 – 2026

**1.3.9 Large Fleets to Adopt “ZEV-First” Procurement.** Develop and support implementation of “ZEV-first” fleet procurement policies to transition large fleets to zero emission vehicles by the late 2040s, coordinating with member jurisdictions and large fleet operators in the region. The policies would be supported by regularly updated information on the availability of zero emission medium and heavy duty vehicles and passenger vehicles. The policies could also include guidance on right-sizing fleets, calculating total lifetime costs of zero emission vehicles, and could support regional coordination of purchases (i.e., bulk buy) of zero emission vehicles for fleets to help reduce costs.

**Lead Agencies** Metro Vancouver, BC Government, Vancouver Fraser Port Authority



**Start Years** 2023 – 2024

**1.3.10 Reduce Delivery Emissions.** Work with member jurisdictions, delivery industry, and other regional partners to implement programs to reduce delivery emissions. Programs should prioritize transitioning delivery fleets to zero emissions (aligned with Actions 1.3.7 to 1.3.9) and could also include off-peak deliveries, small urban consolidation centres (“microHubs”), and cargo bike deliveries. This should include exploring the emissions impact of growing online deliveries, along with any potential solutions.

**Lead Agencies** Member jurisdictions, delivery companies



**Start Years** 2023 – 2024

**1.3.11 Reduce Refuse Trucks Emissions.** Work with member jurisdictions and other regional partners to accelerate the transition to zero emission refuse trucks. Opportunities could include contracting, procurement, charging infrastructure, and regional coordination of purchases (i.e., bulk buy).

**Lead Agencies** Member jurisdictions, Metro Vancouver



**Start Years** 2023 – 2024

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

**Lead Agencies** BC Government, Government of Canada



**Start Years** 2022 – 2023

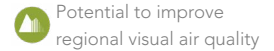
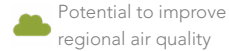
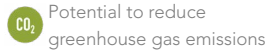
**1.3.13 Use Business Licences to Support Emission Reductions.** Work with member jurisdictions to explore whether business licences can be used to accelerate adoption of low and zero emission medium and heavy duty vehicles.

**Lead Agency** Member jurisdictions



**Start Years** 2025 – 2026





### Strategy 1.4 Reduce Marine and Rail Emissions.

Around 150 million tonnes of cargo are handled at port terminals in the region every year, supporting the regional economy. This cargo movement is the main driver of marine vessel and rail locomotive emissions in the region, causing 5% of greenhouse gas and 40% of diesel particulate matter emissions. Passenger ferries and rail are also a source of emissions. The Vancouver Fraser Port Authority is working to reduce greenhouse gas and health-harming air contaminant emissions associated with shipping in the region. Achieving significant emission reductions in the marine and rail sectors is challenging; significant progress will depend on efforts by the Government of Canada and the BC Government to develop and implement strategies to advance cleaner fuels and engine technologies. For marine emissions, the Government of Canada also needs to advocate to international organizations such as the International Maritime Organization to accelerate the implementation of more stringent standards.

#### Potential Impacts of Strategy in 2030

- Reduce annual greenhouse gases by up to **240,000** tonnes
- Reduce annual health-harming air contaminants by up to **2,000** tonnes

#### Key Partners

- Vancouver Fraser Port Authority
- Government of Canada
- BC Government



**1.4.1 Accelerate Emission Reductions from Marine Vessels.** Advocate to the Government of Canada and the BC Government to develop and implement long-term strategies to accelerate emission reductions from ocean-going marine vessels, harbour vessels and passenger ferries in the region. Different strategies may be needed for domestic and international vessels. In the short term, the strategies should prioritize cleaner engines, more renewable fuels and more shore power, particularly for vessels operating in areas that are most impacted by marine emissions. In the long term, the strategies should establish more stringent greenhouse gas emission targets, standards and regulations, to achieve a carbon neutral marine sector by 2050. The strategies should also consider efficiency improvements, as well as the design and funding needs for regional refueling infrastructure for zero carbon marine vessels, aligned with Actions 1.2.4, 1.3.7, 1.4.2 and 3.2.7.

**Lead Agencies** Government of Canada, BC Government



**Start Years** 2023 – 2024

**1.4.2 Accelerate Emission Reductions from Rail Locomotives.** Advocate to the Government of Canada and the BC Government to continue development and implementation of long-term strategies to accelerate emission reductions from rail locomotives in the region. Different strategies may be needed for local and long-haul locomotives. In the short term, the strategies should prioritize cleaner locomotives, particularly those operating near neighbourhoods that are most impacted by rail emissions, as well as fugitive emissions from rail cars. In the long term, the strategies should establish more stringent greenhouse gas emission targets, standards and regulations for long-haul, switch and local locomotives, to achieve a carbon neutral rail sector by 2050. The strategies should also consider efficiency improvements, as well as the design and funding needs for regional refueling infrastructure for zero carbon locomotives, aligned with Actions 1.2.4, 1.3.7, 1.4.1 and 3.2.7.

**Lead Agencies** Government of Canada, BC Government



**Start Years** 2023 – 2024

**1.4.3 Support Emissions Reduction Actions at Vancouver Fraser Port Authority.** Work with the Vancouver Fraser Port Authority to implement actions that reduce port-related greenhouse gas emissions and minimize air quality impacts on port-adjacent neighbourhoods. Areas of collaboration include phasing out older higher emitting equipment, increasing the availability of renewable fuels, developing infrastructure for zero emission equipment (e.g., shore power), and accelerating the adoption of zero emission solutions. Other opportunities include pilot or demonstration projects, and short-sea shipping.

**Lead Agency** Vancouver Fraser Port Authority




Ongoing


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


**Lead Agencies** BC Government, Government of Canada



**Start Years** 2023 – 2024

 Potential to reduce greenhouse gas emissions

 Potential to improve regional air quality

 Potential to improve regional visual air quality

### Strategy 1.5 Reduce Aviation Emissions.













Airports in the region handle 25 million passengers per year; these aircraft generate 2% of regional greenhouse gas emissions and under 10% of regional emissions of sulphur oxides. International standards have improved fuel economy from aircraft and the Vancouver International Airport Authority is aggressively electrifying airport operations. While electrification of small aircraft is progressing, achieving significant emission reductions for large aircraft is challenging. In the short term, increasing the availability of sustainable aviation fuel (i.e., renewable jet fuel) will reduce net greenhouse gases from aviation. In the long term, the Government of Canada needs to develop a national strategy to transition to a carbon neutral aviation sector. This likely would include advocacy to international organizations such as the International Civil Aviation Organization.

#### Potential Impacts of Strategy in 2030

- Reduce annual greenhouse gases by up to **3,000** tonnes
- Reduce annual health-harming air contaminants by up to **20** tonnes

#### Key Partners

- Government of Canada
- Vancouver International Airport Authority
- Airlines

<p><b>1.5.1 Carbon Neutral Aviation Sector.</b> Advocate to the Government of Canada to develop and implement a long-term strategy to accelerate greenhouse gas emission reductions from the aviation sector. The strategy should include more stringent fuel economy and emission standards for aircraft, to achieve a carbon neutral aviation sector by 2050. The strategy should also increase the availability of sustainable aviation fuel, and could include mandatory carbon offsets or carbon taxes for air travel.</p> <p><b>Lead Agency</b> Government of Canada</p>	  	<p><b>Start Years</b> 2023 – 2024</p>
<p><b>1.5.2 Develop Local Sources of Sustainable Aviation Fuel.</b> Support airlines at the Vancouver International Airport and other regional partners in increasing local availability of sustainable aviation fuel.</p> <p><b>Lead Agencies</b> Airlines, Vancouver International Airport Authority</p>	  	<p><b>Start Years</b> 2022 – 2023</p>
<p><b>1.5.3 Technologies for Zero Emission Aircraft.</b> Advocate to the Government of Canada and BC Government to support development of zero emission aircraft, including electrification of small aircraft.</p> <p><b>Lead Agencies</b> Government of Canada, BC Government</p>	  	<p><b>Start Years</b> 2023 – 2024</p>
<p><b>1.5.4 Stringent Fuel Sulphur Requirements.</b> Advocate to the Government of Canada to establish more stringent sulphur content requirements for aviation fuel. Fuels with less sulphur generate lower emissions of sulphur oxides.</p> <p><b>Lead Agency</b> Government of Canada</p>	  	<p><b>Start Years</b> 2025 – 2026</p>
<p><b>1.5.5 Support Low Carbon Corporate Business Travel.</b> Update and establish corporate business travel policies to reduce emissions, including air travel considerations, corporate carbon offsets, and remote attendance.</p> <p><b>Lead Agency</b> Metro Vancouver</p>	  	<p><b>Start Years</b> 2022 – 2023</p>





## Issue Area 2: Buildings

Buildings provide spaces for shelter, comfort, productivity and recreation—this is where we spend most of our time. Yet, heating our homes, businesses, schools, hospitals, and other buildings in the region emits greenhouse gases and health-harming air contaminants.

### Building emissions

The nearly 500,000 buildings in the region generate approximately 25% of regional greenhouse gas emissions, primarily from natural gas heating. Buildings also generate more than 35% of regional fine particulate matter emissions, primarily from wood burning in homes. Emissions are higher from buildings with less insulation and older windows or heating equipment.

Buildings can last a long time—50 years or more—so how we design, build and retrofit them in the next ten years will determine their emissions for decades. Improving building energy efficiency and heating buildings mostly with electricity are the most

effective ways to reduce emissions from buildings. Better insulated and sealed buildings are also more comfortable, healthier, quieter, and protect better against wildfire smoke and heat waves. Multi-family buildings (e.g., townhomes, apartments) need less energy per occupant to heat and cool, so the *Regional Growth Strategy's* policies on more compact communities will also reduce emissions. More information on climate change and buildings will be included in the *Climate 2050 Buildings Roadmap*.

Issue Area 2 focuses on reducing emissions from heating buildings; actions related to the construction and demolition of buildings are covered in Strategy 3.2 since most of the emissions from those activities come from non-road equipment.

### Long-term Goal

1. All buildings are zero emissions from heating and cooling.

## 2030 Targets

- All buildings:
  - 35% reduction in greenhouse gas emissions, from 2010 levels
  - 35% reduction in fine particulate matter emissions, from 2020 levels
  - 15% reduction in nitrogen oxides emissions, from 2020 levels
- New buildings:
  - All new buildings are zero emissions in their operations
  - All new buildings produce 40% less embodied emissions from construction

### Low carbon upgrades for buildings

Also known as “deep carbon retrofits”, [low carbon upgrades](#) for buildings include upgrading building insulation and windows, sealing out drafts and switching to electric heating and cooling. These upgrades can significantly reduce energy consumption and emissions.

## Key Benefits of Accelerating Emission Reductions from Buildings

- Reduced climate change and air quality impacts
- Low carbon upgrades reduce energy costs and improve health and comfort of occupants
- Increased cooling in buildings reduces the impacts of heat waves
- Better ventilation systems reduce the impacts of wildfire smoke
- Upgrading the existing buildings in the region will create construction jobs

## Key Costs of Accelerating Emission Reductions from Buildings

- Public investments in funding low carbon upgrades
- Capital costs for heat pumps and low carbon upgrades in buildings
- Premiums for electricity and renewable natural gas
- Capital costs for low emission wood burning appliances



## Strategies and Actions

### Strategy 2.1 Signal the Transition to Zero Emission Buildings through Requirements and Standards.

Natural gas use in buildings contributes approximately 25% of greenhouse gas and approximately 10% of nitrogen oxides emissions in the region. The BC *Energy Step Code* and upcoming BC Retrofit Code will improve the energy performance of new and renovated buildings, and both should require that most heating and cooling uses clean electricity. Emission requirements for existing homes and other buildings will also help achieve the 2030 buildings targets for reducing greenhouse gases and nitrogen oxides. A clearer mandate for BC Hydro will support electrification of buildings; equipment efficiency standards and the climate impacts of refrigerants must also be addressed.

#### Potential Impacts of Strategy in 2030

- Reduce annual greenhouse gases by up to **650,000** tonnes
- Reduce annual health-harming air contaminants by up to **500** tonnes

#### Key Partners

- BC Government
- Member jurisdictions
- BC Hydro
- Government of Canada

#### BIG Move

**2.1.1 Greenhouse Gas Performance Requirements for Existing Large Buildings.** Develop regulatory requirements for existing large buildings to meet greenhouse gas emission performance targets, which would reach zero carbon emissions before 2050. Requirements would apply to all existing commercial and large residential buildings, and would include energy consumption benchmarking, reporting and performance requirements, in coordination with BC Government regulatory requirements. Any regulation should also require that emissions from large buildings would not lead to local air quality that exceeds Metro Vancouver’s ambient air quality objectives, when also considering background levels. The requirements should align with Strategy 2.4 on district energy systems and could be developed with member jurisdictions. Public sector organizations could play a leadership role by establishing zero emission targets for their own existing buildings earlier.

**Lead Agency** Metro Vancouver



Ongoing

#### BIG Move

**2.1.2 Greenhouse Gas Performance Requirements for Existing Homes and Townhomes.** Develop regulatory requirements for existing homes and townhomes to meet greenhouse gas emission performance targets, which would reach zero carbon emissions before 2050, in coordination with the BC Government regulatory requirements. These requirements could be developed with member jurisdictions, and would also help with achieving Metro Vancouver’s ambient air quality objectives.

**Lead Agency** Metro Vancouver



**Start Years** 2022 – 2023


#### BIG Move


**2.1.3 New Buildings are Highly Efficient and Electric.** Work with the BC Government to establish greenhouse gas performance requirements for new buildings, through the BC *Energy Step Code* or other legislation, reaching zero emissions (i.e., electric heating and cooling) by 2030. These requirements should allow local governments to voluntarily establish zero emission targets earlier. These requirements would apply to new homes, townhomes, commercial buildings, and large residential buildings. Public sector organizations should play a leadership role by establishing zero emission targets for their own new buildings in advance of provincial requirements.


**Lead Agency** BC Government



Ongoing

 Potential to reduce greenhouse gas emissions

 Potential to improve regional air quality

 Potential to improve regional visual air quality

**BIG**  
Move

**2.1.4 Require Greenhouse Gas Reductions during Renovations.** Advocate to the BC Government to establish the BC Retrofit Code with increasingly stringent greenhouse gas performance requirements for buildings undergoing significant renovations.

**Lead Agency** BC Government



Ongoing

**BIG**  
Move

**2.1.5 Building Electrification Mandate for BC Hydro.** Advocate to the BC Government to direct BC Hydro and the BC Utilities Commission to promote and accelerate building electrification and to reduce emissions from buildings. A clear mandate could also support the development of electricity rates for residents who wish to switch to electricity.

**Lead Agency** BC Government



**Start Years** 2022 – 2023

**2.1.6 Energy Labels for Homes and Buildings.** Work with the BC Government to require every building and home in the region to obtain an energy and greenhouse gas emissions label. The label must be disclosed publicly when a property is constructed or listed for sale, rental or lease. This should include outreach and training with real estate agents, property assessors, insurance providers and other related professions. Such labels would provide information to accelerate low carbon updates for buildings.

**Lead Agency** BC Government



Ongoing

**2.1.7 High Performance Heating and Cooling Equipment Import and Sale Standards.** Advocate to the Government of Canada and the BC Government to establish energy efficiency standards for new and imported heating and cooling equipment. The standards should require a rated energy performance of 100% or more, and greenhouse gas requirements for refrigerants, both by 2030. The standards would help buildings conserve energy while reducing emissions.

**Lead Agencies** Government of Canada, BC Government



**Start Years** 2022 – 2023

**2.1.8 Locate Exhausts to Minimize Local Air Quality Impacts.** Work with member jurisdictions, the BC Government and health authorities to establish more stringent exhaust requirements for building boilers and heaters, and restaurants. This would include updating municipal development and building permits, and the BC Building Code so that exhausts are located to minimize impacts on local air quality and human health.

**Lead Agencies** Member jurisdictions, BC Government



**Start Years** 2023 – 2024

**2.1.9 Significantly Reduce Refrigerant Leaks in Building Equipment.** Advocate to the BC Government to improve compliance with the requirements of the BC *Ozone Depleting Substances and other Halocarbons Regulation*. This is expected to involve enhanced outreach to help safely reduce refrigerant leaks and ensure effective refrigerant management in heating and cooling systems in buildings.

**Lead Agency** BC Government



**Start Years** 2022 – 2023

**2.1.10 Accurately Value Zero Emission and Resilient Buildings.** Work with the BC Government and the Government of Canada to establish guidelines for the valuation of low and zero emission, and resilient buildings. This would support lenders, appraisers and insurers in providing competitive products for low and zero emission, and resilient buildings, such as “Green Mortgages” and “Green Loans”.

**Lead Agencies** BC Government, Government of Canada



**Start Years** 2022 – 2023

## Strategy 2.2 Accelerate Demand for Zero Emission Buildings through Incentives, Education and Research.

Many technologies, like heat pumps and heat recovery systems, exist today to electrify most buildings that currently use natural gas for heating. Current technical support programs and incentives help home and building owners adopt these technologies, as well as improve the energy performance of homes and buildings. A regional Building Decarbonization Coalition will help significantly expand existing programs so more home and building owners can reduce their buildings emissions. These programs must work directly with community partners to identify how to involve more communities in the region so everyone can benefit from zero emission buildings. These approaches will help achieve the 2030 buildings targets for reducing emissions of greenhouse gases and nitrogen oxides.

### Potential Impacts of Strategy in 2030

- Reduce annual greenhouse gases by up to **110,000** tonnes
- Reduce annual health-harming air contaminants by up to **100** tonnes

### Key Partners

- Government of Canada
- BC Government
- Member jurisdictions
- BC Hydro

**BIG  
Move**

**2.2.1 Expand Incentives for Low Carbon Upgrades.** Advocate to the BC Government and the Government of Canada to increase funding for fuel-switching and energy efficiency incentives, to the scale required to transition to zero emission buildings in the region and the province. The funding (e.g., incentives, tax credits) should support more building electrification solutions for older homes and buildings, and should complement financing tools under Action 2.2.3. Specific incentives should also support rental and non-market housing building owners to conduct low carbon upgrades while avoiding increased evictions or significant cost increases for renters.

**Lead Agencies** BC Government, Government of Canada, energy utilities



**Start Years** 2022 – 2023

**BIG  
Move**

**2.2.2 Online Decision Support Tools for Low Carbon Upgrades in Buildings.** Work with the BC Government, the Government of Canada and member jurisdictions to develop innovative online decision support tools to help significantly increase public awareness of low carbon solutions. These tools would help home and building owners choose these solutions by simplifying the planning, financing and execution of low carbon upgrades in buildings. These tools would be supported by energy advisor services under Action 2.2.5.

**Lead Agencies** Metro Vancouver, BC Government



Ongoing

**2.2.3 New Financing Tools for Low Carbon Upgrades.** Work with the BC Government, the Government of Canada, member jurisdictions, energy utilities and other partners to develop strategic financing tools for home and building owners to accelerate low carbon upgrades in buildings. These tools allow owners to spread the cost of upgrades over a longer period, making them more affordable. Examples include Property Assessed Clean Energy (PACE) financing, on-bill financing and other related mechanisms. The tools should be available for homes, townhomes, commercial buildings, and large residential buildings, and would complement incentives under Action 2.2.1.

**Lead Agencies** BC Government, Government of Canada, energy utilities



**Start Years** 2022 – 2023


**2.2.4 Building Decarbonization Coalition.** Work with governments, energy utilities, construction industry, academic institutions, non-governmental organizations and other regional partners to develop a Building Decarbonization Coalition. The Coalition would collaborate to address major barriers (e.g., supply constraints for zero emission building equipment) and create opportunities to accelerate the transition to zero emission homes and buildings. The Coalition would also align with the regional working group focused on reducing embodied emissions in new and existing buildings (see Action 2.5.4).


**Lead Agency** Metro Vancouver





















**Start Years** 2022 – 2023

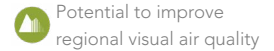
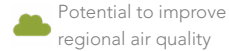
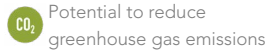
 Potential to reduce greenhouse gas emissions

 Potential to improve regional air quality

 Potential to improve regional visual air quality

<p><b>2.2.5 Energy Advisor Services for Homes and Buildings.</b> Work with the BC Government and the buildings industry to enhance energy advisor services for home and building owners. The expansion would help simplify the customer journey for home and building owners considering retrofits, so they can more easily access technical support and financial incentives through Action 2.2.3.</p>	  	Ongoing	
<p><b>2.2.6 Make Electricity Upgrades Faster and Cheaper.</b> Advocate to BC Hydro to work with member jurisdictions, trade associations and other regional partners to streamline electricity service upgrades, to reduce costs and installation timelines.</p>	  	<b>Start Years</b> 2022 – 2023	
<p><b>2.2.7 Increase Public Awareness of the Benefits of Zero Emission Buildings.</b> Work with member jurisdictions, the BC Government, health authorities, and other partners to deliver awareness and educational programs that encourage home and building owners to choose zero emission building solutions. These programs would highlight how health is improved by reducing emissions of indoor air contaminants; the benefits of using qualified installers; permitting requirements for heating, cooling and ventilation systems; and the consumer protections provided by municipal permits.</p>	  	<b>Start Years</b> 2022 – 2023	
<p><b>2.2.8 Training and Education in Zero Emission Buildings.</b> Work with industry stakeholders and other governments to ensure industry training and certification meets the growing market demand for zero emission building design, technology, installation and operation, for both new buildings and retrofits of existing buildings.</p>	  	<b>Start Years</b> 2022 – 2023	
<p>Corporate LEADERSHIP</p>	<p><b>2.2.9 Share Lessons from Transitioning Metro Vancouver Corporate Buildings to Zero Emissions.</b> Develop and promote case studies about low carbon upgrades completed in Metro Vancouver corporate buildings, including Metro Vancouver Housing buildings, to show the benefits and feasibility of electric and resilient buildings.</p>	  	<b>Start Years</b> 2023 – 2024
<p>Corporate LEADERSHIP</p>	<p><b>2.2.10 Test New Zero Emission Building Technologies.</b> Test new zero emission building technologies in Metro Vancouver corporate buildings, including Metro Vancouver Housing buildings. These pilot projects would include the installation, use and monitoring of building technologies that are not yet widely used in the region.</p>	  	<b>Start Years</b> 2022 – 2023





### Strategy 2.3 Make Wood Heating Systems Cleaner.

Residential indoor wood burning is responsible for more than 25% of fine particulate matter emissions in the region – more than any other single source. Since heating generally occurs in the fall and winter, wood smoke can contribute even more to fine particulate matter levels in the air that residents breathe during those times of the year. In more densely populated areas, the smoke from a single chimney can impact many more neighbours, compared to rural areas. Continuing with the implementation of Metro Vancouver’s *Residential Indoor Wood Burning Emission Regulation*, along with enhancing wood stove exchange and education programs, will help achieve the 2030 buildings target for fine particulate matter.













#### Potential Impacts of Strategy in 2030

- No greenhouse gas reductions are expected
- Reduce annual health-harming air contaminants by up to **600** tonnes

#### Key Partners

- BC Government



<p><b>2.3.1 Implement Requirements for Higher Emitting Wood Burning Appliances.</b> Continue with implementation of Metro Vancouver’s residential indoor wood burning regulation. The regulation requires that, by 2025, most residents in urban areas may only burn wood in an appliance that meets performance standards to ensure fine particulate matter emissions are low. Additional regulatory requirements come into effect in 2022. Actions 2.3.2 to 2.3.4 will support the regulation, along with ongoing outreach to the public.</p> <p><b>Lead Agency</b> Metro Vancouver</p>	  	<p>Ongoing</p>
<p><b>2.3.2 Enhance Wood Stove Exchange Program.</b> Advocate to the BC Government, the Government of Canada, energy utilities and other regional partners to increase funding for wood stove exchange incentives, aligned with the Metro Vancouver’s residential indoor wood burning regulation. Larger incentives should be available for low income households that use wood stoves as a primary heating source, and for households switching to electric heating.</p> <p><b>Lead Agencies</b> BC Government, Government of Canada</p>	  	<p><b>Start Years</b> 2023 – 2024</p>
<p><b>2.3.3 Enhance Wood Burning Education.</b> Enhance existing awareness and educational programs about regulatory requirements and how to reduce emissions from residential indoor wood burning.</p> <p><b>Lead Agency</b> Metro Vancouver</p>	  	<p><b>Start Years</b> 2023 – 2024</p>
<p><b>2.3.4 All Wood Stoves Are Certified.</b> Advocate to the BC Government and the Government of Canada to require that new wood burning stoves and devices imported into BC, as well as existing stoves and devices sold in BC, are certified by the Canadian Standards Association or the US Environmental Protection Agency. This should include enforcement mechanisms to limit the private sales of uncertified devices.</p> <p><b>Lead Agency</b> BC Government</p>	  	<p><b>Start Years</b> 2024 – 2025</p>

CO<sub>2</sub> Potential to reduce greenhouse gas emissions

Potential to improve regional air quality

Potential to improve regional visual air quality

### Strategy 2.4 Shift to Zero Carbon District Energy Systems.

District energy systems provide heating and cooling to a network of residential and commercial buildings more efficiently, and generally with lower emissions, than individual building heating and cooling systems. There are currently 18 district energy systems in the region, running on natural gas, recovered heat and biomass, and more systems are under development. Developing a long-term emissions pathway to transition district energy systems to clean, renewable energy will help achieve the 2030 buildings targets for greenhouse gases, nitrogen oxides and fine particulate matter. Metro Vancouver is currently exploring opportunities to provide clean, renewable energy to these systems; more information will be available in the *Climate 2050 Roadmaps*.

#### Potential Impacts of Strategy in 2030

- Reduce annual greenhouse gases by up to **80,000** tonnes
- Reduce annual health-harming air contaminants by up to **20** tonnes

#### Key Partners

- Member jurisdictions
- Energy utilities

**BIG**  
Move

**2.4.1 Emission Requirements for District Energy Systems.** Develop a regulatory pathway to achieve zero carbon district energy systems by 2050, working with member jurisdictions, the BC Government and energy utilities. Any regulation should also require that emissions from district energy systems would not lead to local air quality that exceeds Metro Vancouver's ambient air quality objectives, when also considering background levels. These requirements should align with Action 2.1.1 on large buildings.

**Lead Agency** Metro Vancouver



**Start Years** 2023 – 2024

**2.4.2 Low Carbon District Energy Policies.** Work with member jurisdictions with district energy systems to assess the feasibility of using sewer heat and biogas generation from Metro Vancouver and other member jurisdictions.

**Lead Agency** Metro Vancouver



**Start Years** 2023 – 2024



### Strategy 2.5 Accelerate the Transition to Lower Embodied Emissions in Buildings.

Embodied emissions are the greenhouse gas emissions associated with the resource extraction, manufacturing and distribution of products. Using construction materials with lower embodied emissions will reduce global emissions of greenhouse gases. Local governments in the region are establishing requirements for embodied emissions of construction materials. Convening a regional embodied emissions working group, and setting embodied emissions requirements in the building code and for new public buildings, will help accelerate the transition to lower embodied emissions in buildings.

#### Potential Impacts of Strategy in 2030

- Greenhouse gas impacts to be developed during implementation
- No regional air quality impacts are expected

### Key Partners

- Member jurisdictions
- BC Government
- Construction/renovation industry

#### Buildings and the circular economy

Constructing, retrofitting and demolishing buildings generates emissions, as well as waste. Currently, most demolition materials are too damaged to re-use in new construction. Salvaging more demolition materials by thinking of buildings as “material banks” will help the region transition to a circular economy that keeps building materials circulating at their highest potential value. This will be explored in more detail in the *Climate 2050 Buildings Roadmap*.



**2.5.1 Incorporate Embodied Emissions into the BC Building Code.** Advocate to the BC Government that future BC Building Code and Retrofit Code updates should include stringent embodied emissions performance targets for new construction and retrofits, and would incentivize the use of materials with low embodied emissions through consideration of cost and material availability.

**Lead Agency** BC Government



**Start Years** 2023 – 2024

**2.5.2 Use Building Materials with Low Embodied Emissions.** Work with the BC Government and member jurisdictions to update or create policies (e.g., procurement, design guidelines, zoning) to prioritize the use of building materials with low embodied emissions, including BC forest products. This should include development and maintenance of widely-supported standard calculations for the life cycle emissions of common building products.

**Lead Agencies** BC Government, member jurisdictions



**Start Years** 2022 – 2023

**2.5.3 New Public Buildings set Embodied Emission Reduction Targets.** Advocate to public sector organizations in the region to establish embodied emission reduction targets for new construction projects, ahead of BC Building Code and Retrofit Code changes.

**Lead Agency** Member jurisdictions



**Start Years** 2023 – 2024

**2.5.4 Regional Working Group to Reduce Embodied Emissions in Buildings.** Work with member jurisdictions, the BC Government, construction industry and other regional partners to develop a regional working group focused on reducing the embodied emissions in new construction and building retrofits. The working group should support accelerated policy development, establish a regional baseline for embodied emissions, and would also align with the Building Decarbonization Coalition (see Action 2.2.4).

**Lead Agency** Metro Vancouver



**Start Years** 2022 – 2023

**2.5.5 Strengthen Metro Vancouver's Corporate Sustainable Design Requirements.** Update Metro Vancouver's Sustainable Infrastructure and Buildings Policy to include increasingly stringent embodied emissions requirements and greenhouse gas performance limits. These requirements should align with the corporate low carbon procurement policies in Action 3.3.4.

**Lead Agency** Metro Vancouver



**Start Years** 2023 – 2024





### Issue Area 3: Industry

The region's diverse industrial facilities and businesses contribute to our local economy, providing jobs to residents and products to supply chains and consumers. Industry refers to a broad range of industrial, commercial and business operations. Actions in the "Industry" Issue Area focus on industrial facilities, non-road equipment, building construction and demolition, and supporting the broader transition to the low carbon regional economy.

#### Industry emissions

Regional industrial operations generate 25% of greenhouse gases and 65% of volatile organic compounds. Industrial facilities generate 15% of regional fine particulate matter and non-road equipment generates over 40% of regional diesel particulate matter. These emissions come from burning fuel, chemical and other manufacturing processes, product off-gassing, wind-blown particulate matter, and fugitive leaks from process equipment and piping. Some industrial and business activities create odorous air contaminants.

Industrial facilities are innovating to support clean technology solutions. Opportunities to reduce emissions from industry include transitioning to clean, renewable energy; adopting more low and zero emission technologies; replacing older non-road equipment; and supporting low and zero emission solutions for small and medium businesses. More information on climate change and industry will be included in the *Climate 2050 Industry Roadmap*.

#### Long-term Goals

1. The industrial sector is carbon neutral.
2. All industrial operations minimize air contaminant emissions using lowest achievable emission technologies.



## 2030 Targets


- Industrial facilities:
  - 35% reduction in greenhouse gas emissions, from 2010 levels
  - 10% reduction in fine particulate matter emissions, from 2020 levels
  - 10% reduction in nitrogen oxides emissions, from 2020 levels
- Non-road equipment:
  - 35% reduction in greenhouse gas emissions, from 2010 levels
  - 50% reduction in diesel particulate matter emissions, from 2020 levels


## Key Benefits of Accelerating Emission Reductions from Industry


- Reduced climate change and air quality impacts
- Energy efficiency projects reduce operating costs
- Zero emission non-road equipment generally have lower maintenance and energy costs, and are quieter
- Increasing regional production of renewable fuels and other low carbon products could support jobs in regional businesses
- Regional development of carbon capture technologies could support jobs in regional businesses
- Businesses in the region with lower climate-related risks can attract investments

## Key Costs of Accelerating Emission Reductions from Industry

- Public investments to support emission reductions at facilities
- Capital costs for emission controls and energy efficiency projects
- Premiums for renewable natural gas and other renewable energy sources
- Capital costs for low and zero emission non-road equipment
- Public and private investments to build zero carbon refueling infrastructure for non-road equipment
- Development costs for technological carbon capture and storage

 Potential to reduce greenhouse gas emissions

 Potential to improve regional air quality

 Potential to improve regional visual air quality

## Strategies and Actions

### Strategy 3.1 Accelerate Emission Reductions from Industrial Facilities.

Over 1,000 industrial facilities and related commercial operations operate under Metro Vancouver permits and regulations, which have historically focused on emissions of health-harming air contaminants. These operations make cement, concrete, and forest products; refine petroleum; distribute gasoline; paint vehicles; and more. There are significant technical challenges to decarbonizing some large industrial facilities, particularly the high heat requirements in some manufacturing processes. Integrating greenhouse gas requirements into Metro Vancouver’s permits and regulations, along with cleaner fuels and more stringent emission requirements, will help achieve the 2030 emission targets for industrial facilities.

#### Potential Impacts of Strategy in 2030

- Reduce annual greenhouse gases by up to **520,000** tonnes
- Reduce annual health-harming air contaminants by up to **2,100** tonnes

#### Key Partners

- BC Government
- Government of Canada
- Industrial facilities

**BIG  
Move**

**3.1.1 More Stringent Greenhouse Gas Requirements for Large Industrial Emitters.** Advocate to the BC Government to implement more stringent requirements for BC-based industrial facilities with significant greenhouse gas emissions. This could include increases to or expansion of the carbon tax, as well as mandatory carbon offsets. Requirements would be supported by incentives under Action 3.1.4.

**Lead Agency** BC Government



**Start Years** 2022 – 2023

**BIG  
Move**

**3.1.2 Integrate Greenhouse Gases into Emission Regulations and Permits.** Develop and implement processes to integrate greenhouse gas reduction requirements into new emission regulations, amendments of existing emission regulations, new permits, and permit amendments. Integration would consider greenhouse gas regulations implemented by the BC Government, as well as the benefits and trade-offs of reducing greenhouse gases versus improving regional air quality. Integration could include greenhouse gas emission limits and fees, and could require permitted industrial facilities to evaluate opportunities to transition to clean, renewable energy, better utilize waste heat, or to phase out the use of some fossil fuels.

**Lead Agency** Metro Vancouver



**Start Years** 2022 – 2023

**BIG  
Move**

**3.1.3 Implement Renewable Gas Content Requirements.** Advocate to the BC Government to establish content requirements for renewable gas, in line with targets in the provincial *CleanBC* plan. Renewable gas includes renewable natural gas, which has a lower carbon intensity than natural gas from fossil fuels.

**Lead Agency** BC Government



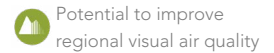
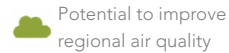
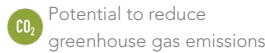
Ongoing

**3.1.4 Industrial Emission Reduction Incentives.** Advocate to the BC Government and the Government of Canada to enhance or develop incentives for industrial facilities to reduce emissions of greenhouse gases and other air contaminants. Incentives could include rebates on carbon tax or energy efficiency upgrades, tax credits, and innovative financing mechanisms. Incentives should be based on emission reductions that meet or exceed relevant industrial emission benchmarks.

**Lead Agencies** BC Government, Government of Canada



**Start Years** 2022 – 2023



**3.1.5 Develop Sector-Specific Regulations.** Develop and update sector-specific regulations to accelerate emission reductions from specific industrial, commercial or business sectors. Sectors targeted would be based on air quality and climate change impacts, emission reduction potential, emerging issues and other factors.

**Lead Agency** Metro Vancouver



Ongoing

**3.1.6 Provincial and Federal Industrial Emission Standards.** Advocate to the Government of Canada and the BC Government to continue developing stringent emission standards for industrial facilities to help improve air quality. Industrial sectors could include chemicals, petroleum refining, pipelines, shipping of bulk goods, and wood products.

**Lead Agencies** Government of Canada, BC Government



**Start Years** 2023 – 2024

**3.1.7 Carbon Tariffs.** Advocate to the Government of Canada and the BC Government to establish carbon tariffs or carbon border tax adjustments for imported industrial, manufactured and agricultural goods. This will help industrial facilities and businesses in the region to compete fairly against imported goods with higher carbon content.

**Lead Agencies** Government of Canada, BC Government



**Start Years** 2022 – 2023

**3.1.8 Regional Industrial Emissions Working Group.** Work with the BC Government, local First Nations, regional industry, business associations, academic institutions, port terminals and other partners to explore the opportunities for establishing a regional industrial emissions working group. If established, the working group would collectively identify the best opportunities to both minimize air quality impacts from industrial facilities and reduce industrial greenhouse gas emissions. The working group could help accelerate emission control innovation at industrial facilities, including supporting pilot projects.

**Lead Agency** Metro Vancouver



**Start Years** 2022 – 2023

**3.1.9 Improve Volatile Organic Compound Content Limits.** Advocate to the Government of Canada to implement more stringent volatile organic compound content limits for architectural and automotive paints, household products, industrial chemical products and other products that contribute to the formation of ground-level ozone.

**Lead Agency** Government of Canada



Ongoing

**3.1.10 Reduce Air Quality Impacts from Odorous Air Contaminants.** Continue to develop and implement a regional odour management framework, including measures to prevent, collect, control and disperse odorous air contaminants from industries and businesses. Odorous air contaminants are made up of many different compounds, some of which are immediately harmful to human health. This could include development of an emission regulation for organics processing facilities, which can be a source of odorous air contaminants.

**Lead Agency** Metro Vancouver



Ongoing

**3.1.11 Phase out High Global Warming Refrigerants.** Advocate to the Government of Canada to accelerate the phase out of halocarbons that have a high global warming potential, including refrigerants and blowing agents. The accelerated phase out should include coordination with technical and industry associations on certification and solutions for businesses. This would support Action 2.1.9 on enhancing compliance with existing halocarbon regulations.

**Lead Agency** Government of Canada



**Start Years** 2024 – 2025

**3.1.12 Improved Emission Controls at Petroleum Storage and Loading Facilities.** Work with the Government of Canada and the BC Government to explore any opportunities to reduce volatile organic compound emissions at federally and provincially regulated land- and marine-based facilities for storing and distributing petroleum products.

**Lead Agencies** Government of Canada, BC Government



**Start Years** 2025 – 2026

## Strategy 3.2 Reduce Non-Road Emissions and Support Early Adoption of Zero Emission Non-Road Equipment.

Almost 850,000 non-road equipment units are used in the region, primarily for construction and commercial operations, cargo handling, and lawn and garden maintenance. They are a regional source of harmful diesel particulate matter, nitrogen oxides and greenhouse gases. Metro Vancouver's *Non-Road Diesel Engine Emission Regulation* (and the Vancouver Fraser Port Authority's related program) are helping to manage emissions from older, higher-emitting non-road diesel engines. More stringent emission requirements for new and existing non-road engines will help achieve the 2030 non-road targets for greenhouse gases and diesel particulate matter. The BC Government and Government of Canada should support development and commercialization of zero emission non-road engines, which would reduce air contaminant emissions over the long term.

### Potential Impacts of Strategy in 2030

- Reduce annual greenhouse gases by up to **220,000** tonnes
- Reduce annual health-harming air contaminants by up to **200** tonnes

### Key Partners

- BC Government
- Government of Canada
- Vancouver Fraser Port Authority

**BIG**  
Move

**3.2.1 Tighten Emission Regulation for Non-Road Diesel Engines.** Update Metro Vancouver's emission regulation for non-road diesel engines with more stringent requirements that could cover additional air contaminants, equipment types, fuels and engine sizes. These updates should incentivize the early adoption of zero emission non-road equipment. Any updates should be coordinated with the Vancouver Fraser Port Authority to align requirements as much as possible.

**Lead Agency** Metro Vancouver



Ongoing

**3.2.2 Emission Standards for New Non-Road Equipment.** Advocate to the Government of Canada to establish more stringent fuel economy and emission standards for new non-road equipment. Cleaner non-road equipment standards will improve regional and local air quality and increase the availability of low and zero emission non-road equipment.

**Lead Agency** Government of Canada



**Start Years** 2022 – 2023

**3.2.3 Funding for Cleaner Non-Road Equipment.** Advocate to the BC Government and the Government of Canada to enhance funding (e.g., incentives, loans, tax credits) to replace or retrofit existing non-road equipment, to reduce emissions of health-harming air contaminants and greenhouse gases. Higher incentives should be available for zero emission equipment and if old equipment is scrapped. (Action 4.1.5 advocates for funding for cleaner agricultural non-road equipment.)

**Lead Agencies** BC Government, Government of Canada



**Start Years** 2022 – 2023

**3.2.4 Identify Infrastructure Needs for Zero Emission Non-Road Equipment.** Work with energy utilities, member jurisdictions, the Vancouver Fraser Port Authority, industry and other regional partners to identify the regional infrastructure needs to support a long-term transition to zero emission non-road equipment. This would consider the refueling and charging needs for different types of non-road equipment, funding requirements, potential pilot projects, and should align with similar actions for passenger vehicles and medium and heavy duty vehicles (Actions 1.2.4 and 1.3.7).

**Lead Agencies** Energy utilities, Metro Vancouver, member jurisdictions



**Start Years** 2025 – 2026

**3.2.5 Encourage Cleaner Non-Road Equipment through Municipal Approvals.** Advocate to member jurisdictions to encourage the use of low or zero emission non-road equipment for construction, film and other sectors. For example, builders and developers using cleaner non-road equipment could receive development benefits such as lower building permit fees.

**Lead Agency** Member jurisdictions



**Start Years** 2023 – 2024



Potential to reduce greenhouse gas emissions



Potential to improve regional air quality



Potential to improve regional visual air quality

**3.2.6 Awareness Program on Zero Emission Non-Road Equipment.** Develop and implement an awareness and outreach program for residents and businesses about the benefits of zero emission non-road equipment, working with member jurisdictions and other regional partners. The program would include regularly updated information on the availability of zero emission equipment and guidance on right-sizing non-road fleets, as well as supporting regional coordination of purchases (i.e., bulk buy) to help reduce costs.

**Lead Agencies** Metro Vancouver, member jurisdictions



**Start Years** 2023 – 2024

**3.2.7 Transition Corporate Non-Road Fleet to Zero Emissions.** Transition Metro Vancouver's corporate non-road fleet to zero carbon emissions by 2040, and zero emissions by 2050. (Action 1.2.11 includes similar targets for Metro Vancouver's corporate on-road fleet.)

**Lead Agency** Metro Vancouver



Ongoing



### Strategy 3.3 Reduce Emissions through Procurement and from Small and Medium Businesses.

Businesses in the region have been helping to improve regional air quality, as well as reduce their greenhouse gas emissions. Additional technical support and guidance will help businesses adopt cleaner operating practices. Developing regional guidance on buying low carbon products will help reduce the embodied greenhouse gas emissions of goods and services. These steps will help achieve the 2030 regional targets to improve air quality and reduce greenhouse gas emissions. Key partners for this strategy include member jurisdictions, local businesses, the Government of Canada and the BC Government.



**3.3.1 Regional Low Carbon Procurement.** Work with member jurisdictions, industry and business groups, and other regional partners to develop and implement regional guidance on procurement to prioritize low carbon products, equipment and services for construction and other projects. The guidance could outline best practices, available certifications, methods for life cycle emission calculations, circular economy considerations (e.g., disposal), greenhouse gas targets and emission disclosure requirements. Products covered by the guidance could include, for example, low carbon cement and concrete products. The guidance should align with Strategy 2.5 on reducing embodied emissions in buildings, as well as Action 3.3.4.

**Lead Agencies** Metro Vancouver, member jurisdictions



**Start Years** 2023 – 2024

**3.3.2 Air Quality Best Management Practices for Businesses and Organizations.** Develop and promote a best practices guide for small and medium businesses and similar organizations about how they can help improve regional air quality. The guide would fill gaps identified in coordination with local businesses and other regional partners. The guide would also reflect practices identified in Metro Vancouver's corporate guidance (Action 3.3.5).

**Lead Agency** Metro Vancouver



**Start Years** 2025 – 2026

**3.3.3 Integrate Climate Considerations into Standard Business Practices.** Advocate to the Government of Canada and the BC Government to integrate climate considerations into financial reporting and other standard business practices. Integration could include public disclosure of business carbon footprints and climate-related risks, as well as changes to legislation or accounting standards. These practices would push businesses and industrial facilities to prioritize management of climate risks in operations and practices.

**Lead Agencies** Government of Canada, BC Government



**Start Years** 2023 – 2024

**3.3.4 Low Carbon Corporate Procurement.** Establish low carbon procurement guidance as a Metro Vancouver corporate standard, in alignment with Action 3.3.1. Products covered by the guidance could include, for example, low carbon cement and concrete products. This would show how procurement can support low carbon (and resilient) buildings, infrastructure and services. This action aligns with Action 2.5.5 on updates to Metro Vancouver's Sustainable Infrastructure and Buildings Policy.

**Lead Agency** Metro Vancouver



**Start Years** 2022 – 2023

**3.3.5 Corporate Opportunities to Reduce Emissions of Health-harming Air Contaminants.** Explore and develop Metro Vancouver guidance to reduce corporate impacts on regional air quality. The guidance could identify practices that reduce emissions of health-harming air contaminants from activities such as construction, demolition, solvent use, painting and surface coating, road asphalt and more.


**Lead Agency** Metro Vancouver





**Start Years** 2025 – 2026





 Potential to reduce greenhouse gas emissions

 Potential to improve regional air quality

 Potential to improve regional visual air quality

### Strategy 3.4 Explore Opportunities for Technological Carbon Capture

Long-term modelling of regional greenhouse gas emissions indicates that climate actions focusing only on reducing emissions are likely insufficient for the Metro Vancouver region to reach carbon neutrality by 2050. Additional removal of carbon dioxide from the atmosphere is expected to be necessary, to avoid the worst impacts of climate change. While natural carbon sequestration can be increased in the region, any increase is expected to have limited impact on regional greenhouse gas levels, compared to the regional greenhouse gas targets. (This will be described in more detail in the *Climate 2050 Nature & Ecosystems Roadmap*.) As such, technological carbon capture will be needed. Initial research on the opportunities for these technologies in the region will support the 2030 greenhouse gas target for industrial facilities.

#### Potential Impacts of Strategy in 2030

- Reduce annual greenhouse gases by up to **50,000** tonnes
- No regional air quality impacts are expected

#### Key Partners

- BC Government
- Industrial facilities
- Academic Institutions

**3.4.1 Carbon Capture in Metro Vancouver Region.** Work with industry, academia and other regional partners to explore the potential opportunities for carbon capture technologies in the region, including pilot projects and uses of captured carbon dioxide.

**Lead Agency** Metro Vancouver



Ongoing

**3.4.2 Develop Carbon Capture Standards.** Advocate to the BC Government to develop technical standards for carbon capture technologies.

**Lead Agency** BC Government



**Start Years** 2023 – 2024



## Issue Area 4: Agriculture

Agriculture contributes to the regional economy and provides fresh, healthy food for local consumption and export. The agricultural sector faces challenges such as expensive land, fluctuating commodity prices and crop losses due to a changing climate. Agricultural land supports regional food security and provides ecosystem services. Ecosystem services help farmers adapt to the effects of climate change and also provide public benefits that include flood management, carbon sequestration and wildlife habitat. Agricultural activities also generate emissions of greenhouse gases and other air contaminants.

### Agriculture emissions

Agricultural activities generate 4% of regional greenhouse gas emissions, primarily from heaters and boilers in greenhouses, agricultural equipment, and livestock. Some agricultural activities cause emissions of ammonia, fine particulate matter and volatile organic compounds, which impact regional air quality, visual air quality, and human health. The main sources of these emissions are poultry and cattle manure, ammonia fertilizers, fuel combustion, open-air burning, wind erosion of soils, and fugitive dust.

Odours can come from normal farm practices such as manure application. Some agricultural practices generate odorous air contaminants, which are generally more challenging to manage than nuisance odours.

Additional information on climate change and agriculture will be outlined in the *Climate 2050 Agriculture Roadmap*, including opportunities on climate adaptation and enhancing carbon sequestration on agricultural lands.

### Long-term Goals

1. The agricultural sector is carbon neutral and maximizes carbon sequestration.
2. All agricultural operations minimize air contaminant emissions using best available management practices and technologies, and are powered by clean, renewable energy.

## 2030 Targets

- 35% reduction in agriculture greenhouse gas emissions, from 2010 levels
- 10% reduction in agriculture fine particulate matter emissions, from 2020 levels

## Key Benefits of Accelerating Emission Reductions from Agriculture

- Reduced climate change and air quality impacts, including reduced crop losses related to droughts
- Some newer agricultural practices (e.g., regenerative agriculture) can increase crop yields while reducing emissions
- Energy efficiency projects reduce energy costs
- Zero emission agricultural equipment generally have lower maintenance and energy costs
- Expanding local agriculture can support agricultural jobs in the region

## Key Costs of Accelerating Emission Reductions from Agriculture

- Public investments in Environmental Farm Plans
- Capital costs for lower emission farming practices and energy efficiency projects
- Premiums for renewable natural gas and other renewable energy sources
- Capital costs for low and zero emission agricultural equipment



## Strategies and Actions

### Strategy 4.1 Reduce Emissions from the Agricultural Sector.

The BC Government and the Government of Canada support emission reductions in agriculture through Environmental Farm Plans and Beneficial Management Practices. Improving energy efficiency in greenhouses and switching to clean, renewable energy for greenhouses and agricultural equipment will help achieve the 2030 agriculture emission targets for greenhouse gases and fine particulate matter. Alternatives to burning agricultural vegetative waste and enhanced Beneficial Management Practices will help achieve 2030 targets for greenhouse gases and fine particulate matter. Increasing the production of renewable natural gas through anaerobic digestion of agricultural and other waste will help to displace natural gas from fossil fuels in sectors where zero emission solutions are more challenging.

#### Potential Impacts of Strategy in 2030

- Reduce annual greenhouse gases by up to **100,000** tonnes
- Reduce annual health-harming air contaminants by up to **50** tonnes

#### Key Partners

- BC Government
- Agriculture community
- Member jurisdictions

	<p><b>4.1.1 Reduce Emissions from Greenhouses.</b> Work with the BC Government, the BC Agriculture Council, the BC Greenhouse Growers Association and member jurisdictions to explore opportunities to reduce emissions from greenhouses. Opportunities could include improving energy performance and transitioning to using more clean, renewable energy, while considering the need for supplemental carbon dioxide in greenhouses to support plant growth.</p> <p><b>Lead Agencies</b> BC Government, Metro Vancouver, member jurisdictions</p> <p><b>Start Years</b> 2024 – 2025</p>
	<p><b>4.1.2 Reduce Open-Air Burning.</b> Work with agricultural producers to accelerate adoption of alternatives to open-air burning of agricultural vegetative waste. These alternatives would complement open-air burning regulatory requirements.</p> <p><b>Lead Agency</b> Metro Vancouver</p> <p><b>Start Years</b> Ongoing</p>
	<p><b>4.1.3 Outreach Program on Reducing Agricultural Emissions.</b> Develop and implement an awareness and outreach program on reducing agricultural emissions. The program would be developed with the agriculture community, member jurisdictions and the BC Government, and would supplement existing agricultural outreach and support programs.</p> <p><b>Lead Agencies</b> Metro Vancouver, member jurisdictions</p> <p><b>Start Years</b> 2025 – 2026</p>
	<p><b>4.1.4 Enhance Funding for Environmental Farm Plans.</b> Advocate to the Government of Canada and the BC Government to enhance the funding for developing and implementing Environmental Farm Plans. This program helps agricultural operations reduce emissions of particulate matter, ammonia, nitrous oxide, methane and odorous air contaminants. This should include continued development and promotion of Beneficial Management Practices, as well as providing reliable incentives and technical guidance to farms to support adoption of low emission practices and technologies.</p> <p><b>Lead Agencies</b> Government of Canada, BC Government</p> <p><b>Start Years</b> 2023 – 2024</p>

<p><b>4.1.5 Incentives for Farmers to Transition to Lower Emission Equipment.</b> Advocate to the BC Government and the Government of Canada to enhance or develop funding supports for cleaner agricultural equipment (e.g., incentives, tax credits, loans). This would help accelerate the transition to lower emission equipment (e.g., a harvester with better emission controls) or encourage the installation of improved emission controls on existing equipment (e.g., diesel particulate filters). Higher incentives should be available if old equipment is scrapped and for zero emission equipment to increase their adoption. (Action 3.2.3 advocates for incentives for cleaner non-road equipment for non-agricultural uses.)</p>		<p><b>Start Year</b> 2023 – 2024</p>
<p><b>Lead Agencies</b> BC Government, Government of Canada</p>		
<p><b>4.1.6 Pilot Study with Zero Emission Agricultural Equipment.</b> Work with the BC Government and the agriculture community to develop a pilot study for zero emission agriculture equipment such as an electric tractor. The study could identify the long-term pathways for wider adoption of zero emission agricultural equipment, including charging and related infrastructure requirements.</p>		<p><b>Start Years</b> 2026 – 2027</p>
<p><b>Lead Agencies</b> BC Government, Metro Vancouver</p>		
<p><b>4.1.7 Regulatory Requirements for Cannabis Industry.</b> Develop an emission regulation to reduce air quality impacts from the cannabis industry. Regulatory requirements would be based on air quality impacts, emission reduction potential, and other factors.</p>		<p>Ongoing</p>
<p><b>Lead Agency</b> Metro Vancouver</p>		
<p><b>4.1.8 Streamline Emission Requirements for Anaerobic Digestion Facilities.</b> Develop an emission regulation for anaerobic digestion of manure, other agricultural waste and commercial food waste. The regulation would maintain equivalent protections for regional air quality and human health as the existing permit process, and would provide a simpler path to regulatory compliance.</p>		<p><b>Start Years</b> 2023 – 2024</p>
<p><b>Lead Agency</b> Metro Vancouver</p>		
<p><b>4.1.9 Expand Anaerobic Digestion of Agricultural Waste.</b> Advocate to the BC Government, the Government of Canada, energy utilities and member jurisdictions to expand development of anaerobic digestion facilities to process manure, other agricultural waste and commercial food waste. This could include funding (e.g., incentives, tax credits, loans) and removal of barriers in existing regulations. Any expansion should avoid the loss of agricultural land in the Metro Vancouver region.</p>		<p><b>Start Years</b> 2022 – 2023</p>
<p><b>Lead Agency</b> BC Government</p>		
<p><b>4.1.10 Encourage Local Agriculture.</b> Advocate to member jurisdictions and other regional partners to continue encouraging more local food production, prioritizing agricultural practices that reduce emissions or help maintain or sequester carbon.</p>		<p>Ongoing</p>
<p><b>Lead Agency</b> Member jurisdictions</p>		





## Issue Area 5: Health

Emissions are the air contaminants that emission sources release into the air; they are most concentrated near the source and are dispersed over time and distance. Exposure refers to the air contaminants that residents breathe where they live, learn, play and work. Managing exposure to health-harming air contaminants reduces their impacts on residents and communities in the Metro Vancouver region.

### Indoor air quality

Metro Vancouver will continue to work with the BC Government, health authorities and member jurisdictions to improve indoor air quality. Building owners and managers are responsible for managing indoor air quality, following guidance provided by health authorities and related agencies. Areas of concern include the impact of airtight buildings, infiltration of air contaminants from outdoors, and the impact of indoor sources such as gas stoves, wood burning, and consumer products.

## Long-term Goal

1. Residents in the region do not experience disproportionate impacts from air quality and climate change.

## 2030 Targets

- *Under development*

## Strategies and Actions

### Strategy 5.1 Reduce Residents' Exposure to Harmful Air Contaminants.

Managing exposure to health-harming air contaminants reduces their impacts on residents and communities in the Metro Vancouver region. Strengthening relationships with First Nations can help reduce air quality impacts in their communities. Integrating health impact assessments and protecting indoor air quality can reduce the amount of air contaminants residents breathe from medium and heavy duty vehicles, wildfires and other sources. The key partners for this strategy include health authorities, member jurisdictions and the BC Government.

	<p><b>5.1.1 Strengthen Relationships with First Nations on Air Quality Issues.</b> Work to strengthen relationships with local First Nations to improve understanding of air quality concerns in First Nations communities in the region (e.g., transportation and industrial emissions), along with potential solutions.</p> <p><b>Lead Agency</b> Metro Vancouver</p> <p>   Ongoing</p>
	<p><b>5.1.2 Integrate Health Impact Assessments into Major Projects.</b> Work with member jurisdictions, health authorities, the BC Government and the Government of Canada to develop a process to integrate health impact assessments into reviews for major transportation, development and industrial projects. Integration would be supported by guidance on how to reduce residents' exposure to harmful air contaminants, such as from medium and heavy duty vehicles. Guidance could include recommendations for assessment thresholds, urban form and land-use, infrastructure and ventilation design, and siting of emission sources.</p> <p><b>Lead Agencies</b> Metro Vancouver, health authorities</p> <p> <b>Start Years</b> 2024 – 2025</p>
	<p><b>5.1.3 Protect against Wildfire Smoke Impacts.</b> Work with health authorities, member jurisdictions and other regional partners to further protect against smoke from wildfires. Protections should prioritize vulnerable populations and could include actions to prevent wildfires, more "clean air" shelters in public buildings (e.g., community centres, libraries), resources to help residents and businesses manage indoor air quality (e.g., with portable air cleaners), and providing high quality information to the public during air quality advisories.</p> <p><b>Lead Agencies</b> Metro Vancouver, health authorities</p> <p> <b>Start Years</b> 2022 – 2023</p>
	<p><b>5.1.4 Health and Air Quality Awareness.</b> Work with health authorities and other health partners to develop awareness and outreach activities to inform residents and businesses about the links between air quality and personal and public health, including impacts on vulnerable populations. Outreach should ensure information reaches the populations who are most vulnerable to air quality impacts.</p> <p><b>Lead Agencies</b> Health authorities, Metro Vancouver</p> <p> <b>Start Years</b> 2022 – 2023</p>
	<p><b>5.1.5 Enhance Social Support Programs to Consider Air Quality Impacts.</b> Advocate to the BC Government and the Government of Canada to enhance social support programs to consider air quality impacts. Enhancements should support residents that are at higher risk from exposure to air contaminants, such as through poor building ventilation and heating systems.</p> <p><b>Lead Agencies</b> BC Government, Government of Canada</p> <p> <b>Start Years</b> 2022 – 2023</p>



## Issue Area 6: Measure, Monitor and Regulate

Metro Vancouver drives continuous improvement in air quality and greenhouse gas management through a fair, efficient and effective management program. Measuring emissions and monitoring ambient air quality provide the foundation for Metro Vancouver's air quality and greenhouse gas management program. Metro Vancouver authorizes emissions through permits and regulations, and promotes compliance through various mechanisms. Public communication ensures that residents and businesses are aware of and understand air quality and climate change issues. Metro Vancouver adapts its methods as needed to respond to technological advances, changing regulatory regimes and emerging issues.

This issue area outlines how Metro Vancouver currently operates as an air quality and greenhouse gas authority, as well as identifying future directions. The actions associated with measurement, monitoring and regulation cut across Issue Areas 1 to 5; many of the strategies and actions in those issue areas will require measurement or tracking on an individual issue area basis.

## Long-term Goals

1. Metro Vancouver implements world-leading and innovative air quality and greenhouse gas management services and solutions.
2. Metro Vancouver residents and organizations have a high awareness and accurate understanding of climate change and air quality issues, and can identify opportunities to take action through behaviour change, purchasing decisions and citizen advocacy.

## 2030 Target

- 98% reliability of ambient air quality monitoring network

## Strategy 6.1 Implement Leading Management Practices to Continually Improve Regional Air Quality and Reduce Greenhouse Gas Emissions.

Emerging and innovative technologies such as low cost sensors, big data and machine learning are creating opportunities to extend the reach of our existing monitoring network, and improve management of local impacts. Continuing to improve management practices and processes could streamline emission authorizations and reviews for regulated entities. Enhancing communications with the public will help achieve the public awareness goal.

Up to date information on any of the actions or directions in this strategy are available on Metro Vancouver’s website ([www.metrovancouver.org](http://www.metrovancouver.org), search “air quality and climate change”).

CURRENT ACTIONS	FUTURE DIRECTIONS
<p><b>6.1.1 Air Quality and Greenhouse Gas Management.</b> Work with member jurisdictions, health authorities, the BC Government and other partners on air quality, visual air quality and greenhouse gas management. Approaches include strategic planning, guidance, tools, dispersion modelling guidelines, public reporting, industrial proposal reviews, etc.</p>	<ul style="list-style-type: none"> <li>• Explore the adoption of service establishment bylaws to support regional climate change programs.</li> <li>• Pursue legislative changes to enable non-regulatory approaches to support emission reductions from businesses.</li> <li>• Explore and implement innovative technologies and approaches to improve air quality and greenhouse gas management, such as machine learning.</li> <li>• Explore the benefits of establishing regional carbon budgets to guide climate planning.</li> <li>• Continue to update <i>Climate 2050 Roadmaps</i> in response to changing science, technology, public opinion and partnership opportunities.</li> <li>• Continue to develop and implement tools to assess costs and benefits for policies, programs and regulations.</li> </ul>
<p><b>6.1.2 Ground-Level Ozone Management.</b> Implement targeted actions under existing <i>Regional Ground Level Ozone Strategy</i> to minimize ground-level ozone impacts in the Lower Fraser Valley, working with regional partners.</p>	<ul style="list-style-type: none"> <li>• Update <i>Regional Ground-Level Ozone Strategy</i> and continue to implement targeted actions to reduce impacts of ground-level ozone on regional air quality.</li> <li>• Continue to improve understanding of climate impacts on ozone formation, including from increasing temperatures and wildfires, along with potential solutions.</li> </ul>
<p><b>6.1.3 Odour Management.</b> Implement existing regional odour management framework. Framework addresses key sources of odorous air contaminants, odour monitoring, complaint management and public outreach.</p>	<ul style="list-style-type: none"> <li>• Continue development of sector-specific regulations that address air contaminants, including odorous air contaminants.</li> <li>• Develop odour monitoring capacity within the region.</li> </ul>
<p><b>6.1.4 Visual Air Quality Management.</b> Implement existing visual air quality management program for the Lower Fraser Valley, working with regional partners.</p>	<ul style="list-style-type: none"> <li>• Continue to develop and implement policies and programs to improve visual air quality in the Lower Fraser Valley.</li> </ul>
<p><b>6.1.5 Complaint Management.</b> Review and respond to air quality complaints. Responding can include communication with the alleged source, site visits, air quality monitoring and compliance or enforcement actions.</p>	<ul style="list-style-type: none"> <li>• Streamline complaint response process to identify and resolve new air quality issues.</li> </ul>
<p><b>6.1.6 Emissions Inventories and Related Data Sets.</b> Track and forecast regional emissions of air contaminants, including greenhouse gases, to measure performance, track progress towards goals and targets, and guide policy and regulatory development. The primary inventory is the Lower Fraser Valley emissions inventory developed every 5 years; specialized approaches include inventories of hazardous air pollutants, and additional tracking of greenhouse gases.</p>	<ul style="list-style-type: none"> <li>• Track regional greenhouse gas emissions on annual basis.</li> <li>• Continue to improve the consumption-based emissions inventory for greenhouse gases.</li> <li>• Improve understanding of emissions from refrigerants and halocarbons, natural volatile organic compounds, large sources of fugitive particulate matter, methane leakage, and automated vehicles.</li> <li>• Continue to work with member jurisdictions and other regional partners on developing, aligning, and sharing regional data sets.</li> <li>• Continue to improve corporate emissions inventories, to help guide corporate actions.</li> </ul>

<p><b>6.1.7 Air Quality Monitoring.</b> Measure levels of key air contaminants and visual air quality across the region, working with regional partners. Monitoring includes fixed and temporary sites, as well as specialized monitoring studies. Review monitoring network every 5-10 years to respond to regional changes, emerging issues and help protect human health and the environment.</p>	<ul style="list-style-type: none"> <li>• Enhance monitoring network with low cost and portable sensors, near-road and community monitoring, and carbon dioxide monitoring.</li> <li>• Measure the changing climate and the impacts to air quality, including visual air quality.</li> <li>• Develop and implement a user-friendly open data portal, so the public and researchers can more easily access and use data collected by Metro Vancouver.</li> <li>• Explore options to improve rapid monitoring capabilities during air quality emergencies.</li> </ul>
<p><b>6.1.8 Ambient Air Quality Objectives.</b> Develop and update ambient air quality objectives, establishing acceptable thresholds for concentrations of air contaminants. Measured ambient concentrations of air contaminants are compared to objectives to determine achievement of the objectives.</p>	<ul style="list-style-type: none"> <li>• Develop new and updated objectives based on current health research and best practices.</li> <li>• Explore expected impact of <i>Clean Air Plan</i> actions on achievement of ambient air quality objectives.</li> </ul>
<p><b>6.1.9 Air Quality Advisories.</b> Develop and issue air quality advisories and bulletins to inform the public during periods of degraded air quality, working with regional partners.</p>	<ul style="list-style-type: none"> <li>• Continue to work with regional partners on managing air quality advisories and bulletins, and enhancing public awareness.</li> </ul>
<p><b>6.1.10 Bylaw and Regulation Development.</b> Develop and amend bylaws and emission regulations to protect human health and the environment. Regulatory development uses best available evidence and includes engagement with the public, stakeholders and other governments.</p>	<ul style="list-style-type: none"> <li>• Continue to develop and implement tools to assess costs and benefits for new or significantly modified emission regulations.</li> <li>• Introduce expanded regulatory requirements for greenhouse gas emissions (Action 3.1.2).</li> </ul>
<p><b>6.1.11 Regulatory Authorizations and Compliance.</b> Authorize emissions through regulations and air permits. Promote compliance with regulatory requirements through inspections, report reviews and, where necessary, issuing notices of violation, tickets or orders. Identify opportunities in permits and regulations to reduce emissions and impacts, and work to address emerging air quality issues through existing regulatory tools.</p>	<ul style="list-style-type: none"> <li>• Develop a framework for issuing administrative penalties.</li> </ul>
<p><b>6.1.12 Public Communication.</b> Communicate with the public, stakeholders and other governments about local and regional air quality and climate change issues, and provide resources to support emission reductions. Some current approaches include the annual Caring for the Air report, Air Quality Health Index, annual Air Quality Monitoring Reports, <a href="http://www.AirMap.ca">www.AirMap.ca</a>, <a href="http://www.ClearAirBC.ca">www.ClearAirBC.ca</a>, public opinion research, and others.</p>	<ul style="list-style-type: none"> <li>• Improve online air quality and climate change communication tools.</li> <li>• Develop and promote a climate literacy online learning tool to support citizen advocacy and personal choices.</li> <li>• Develop metrics to track public awareness of air quality and climate change issues.</li> </ul>
<p><b>6.1.13 Environmental Assessments.</b> Provide technical feedback and mitigation recommendations to environmental and impact assessments for major projects conducted under provincial and federal regulations, and through inter-agency referrals.</p>	<ul style="list-style-type: none"> <li>• Advocate that environmental assessments improve consideration of upstream and downstream emissions, and recognize Metro Vancouver's recommended conditions.</li> </ul>
<p><b>6.1.14 Specialized Studies.</b> Conduct specialized studies on emerging areas of concern in local and regional air quality and climate change, such as air quality near major roads and regional climate projections.</p>	<ul style="list-style-type: none"> <li>• Improve understanding of the impacts and interactions between air contaminants and the region's natural environment (working with researchers), as well as the potential impacts of microplastics on air quality and health.</li> </ul>



# Glossary

**Active transportation** includes self-powered modes of transportation such as walking, cycling, skateboarding, in-line skating/rollerblading, jogging and running, wheel chairing, snowshoeing and cross-country skiing.

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

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

**Anaerobic digestion** breaks down waste products in the absence of oxygen to create biogas, which can be converted into renewable natural gas.

**Carbon dioxide** (CO<sub>2</sub>) is the primary driver of climate change, and is produced mainly by burning fossil fuels.

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

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

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

**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.

**Diesel particulate matter** (DPM) is a form of fine particulate matter from diesel engines that is classified as carcinogenic.

**District energy systems** provide heating and cooling to a network of residential and commercial buildings more efficiently, and generally with lower emissions than individual building heating and cooling systems.

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

**Embodied emissions** are 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.

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

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

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

**Ground-level ozone** (O<sub>3</sub>) can have harmful impacts on everyone, especially children, the elderly, 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.

**Hazardous air pollutants** (HAP) can damage people's health through effects such as cancer, neurological effects, reproductive effects, and developmental effects. HAPs include volatile and semi-volatile organic compounds, polycyclic aromatic hydrocarbons, heavy metals and carbonyl compounds.

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

**Low carbon building upgrades** include upgrading building insulation and windows, sealing out drafts and switching to electric heating and cooling. These upgrades can significantly reduce energy consumption and emissions.

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

**Medium and heavy duty vehicles** are mostly freight vehicles such as long-haul trucks and cube vans, and also include buses and refuse trucks.

**Methane** (CH<sub>4</sub>) is a short-lived greenhouse gas and is 25 times more effective than carbon dioxide at trapping heat in the atmosphere.

**Mobility pricing** refers to how we pay to get around. Some types of mobility pricing (e.g., decongestion charging, low emission zones) are used to manage demand for roads and reduce emissions.

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

**Nitrogen oxides** (NO<sub>x</sub>) are a group of gases, which includes nitrogen dioxide, that are produced during high-temperature fuel combustion, and can contribute to the formation of ground-level ozone and fine particulate matter.

**Nitrous oxide** (N<sub>2</sub>O) is a long-lived greenhouse gas, and is about 300 times more effective than carbon dioxide at trapping heat in the atmosphere.

**Non-road equipment** is any machine with an internal combustion engine that is not used or intended for transportation on public roads. Examples include stationary or mobile equipment such as loaders, cranes, generators, tractors, and lawn mowers.

**Passenger vehicles** include cars, SUVs, minivans, light trucks, and motorcycles. Transit buses, though used for passengers, are classified as medium and heavy duty vehicles.

**Renewable natural gas** is a renewable form of natural gas with a low carbon intensity. Sources of renewable natural gas include landfill gas and organic waste.

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

**Sulphur dioxide** (SO<sub>2</sub>) is 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** (SO<sub>x</sub>) are a group of gases, which includes sulphur dioxide, that are emitted during the combustion of sulphur-containing fuels. They 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.

**Volatile organic compounds** (VOC) are compounds that readily become vapours or gases; they are emitted during fuel combustion and from many consumer, commercial and industrial products. They have direct and indirect impacts on human health and contribute to the formation of ground-level ozone.

**Zero carbon** or **zero carbon emissions** are emissions that generate no net greenhouse gas emissions at the point of use. A zero carbon fuel source either produces no greenhouse gas emissions or any greenhouse gas emissions produced are offset by renewable energy (either generated on-site or purchased).

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

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

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

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

Climate Action Committee members:

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







