

Potential Approaches

For Managing Greenhouse Gas Emissions From
Large Buildings In Metro Vancouver

Discussion Paper

June 2022

Overview

The Intergovernmental Panel on Climate Change has stated that immediate and deep greenhouse gas emissions reductions across all sectors are necessary to limit global warming to 1.5°C, with global emissions needing to be reduced by almost half by 2030. In response, the Metro Vancouver Board of Directors (Board) adopted the *Climate 2050 Strategic Framework* in 2018 and endorsed the *Clean Air Plan and Climate 2050 Buildings Roadmap* in 2021. The goals and targets in these air quality and climate change-related plans include the following:

- Reduce greenhouse gas (GHG) emissions 45% below 2010 levels by 2030;
- Achieve regional carbon neutrality by 2050; and
- Ensure that 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

The Clean Air Plan also includes targets specific to the building sector including:

- A 35% reduction in GHG emissions from buildings below 2010 levels by 2030;
- A 15% reduction in nitrogen oxides emissions below 2020 levels by 2030; and

- A 35% reduction in fine particulate matter emissions below 2020 levels by 2030

The *Clean Air Plan* and *Climate 2050 Buildings Roadmap* include key actions – called “Big Moves” – which are necessary to achieve our climate and air quality targets for 2030 and 2050. Some of these Big Moves signal the transition to zero emission buildings through requirements and standards that would help address an existing gap to manage greenhouse gases. In addition, more stringent ambient air quality objectives were adopted by the Metro Vancouver Board in 2019 to protect public health and the environment and align with federal standards and provincial objectives.

Metro Vancouver Regional District (MVRD) is responsible for managing and regulating air quality in the region under authority delegated from the provincial government in the *Environmental Management Act*. Metro Vancouver protects public health and the environment through a tiered approach to managing the discharge of air contaminants that applies the use of site-specific permits, sectoral emission regulations, and provisions in the *Greater Vancouver Regional District (GVRD) Air Quality Management Bylaw No. 1082, 2008* (Bylaw 1082).



A tiered approach to regulating air contaminants in Metro Vancouver. A Large Building GHG Emission Regulation and proposed amendments to the Boilers & Process Heaters Emission Regulation Bylaw (Bylaw 1087) would fall into the “regulations and bylaws” category.

This discussion paper is one of two discussion papers that present related proposals for managing emissions from stationary combustion equipment. The two discussion papers address the discharge of:

- GHG air contaminants from natural gas and propane burning equipment in large buildings.
- Health-harming air contaminants from boilers used to provide heat or energy for buildings in commercial, institutional, residential or industrial settings, and from process heaters used in industrial settings. Emissions of air contaminants from these sources are currently regulated under the *Greater Vancouver Regional District Boilers and Process Heaters Emission Regulation Bylaw No. 1087, 2008* (Bylaw 1087).

This summary highlights the linkages between these initiatives to inform dialogue with interested parties.

Conceptual Approach for Managing GHG Emissions from Large Buildings

A conceptual approach for managing GHG emissions from large buildings is described in this discussion paper, for the purpose of obtaining feedback. Establishing performance requirements for emissions of greenhouse gases from large buildings is one of the Big Moves in the *Clean Air Plan*, and such requirements could eventually be incorporated into a bylaw regulating GHG and other air emissions from buildings. This discussion paper seeks to provide context for dialogue on the approach of establishing GHG limits to make significant and measurable GHG emission reductions from existing large buildings to achieve the region's climate targets.

The types of buildings envisioned to be within the scope of the approach in this discussion paper include commercial, institutional, and multifamily residential buildings over 2,322 m² (25,000 ft²) in gross floor area (GFA). In order to allow time for building owners to prepare for upgrades and avoid large investments

in projects that do not align with greenhouse gas emission reduction targets, a phased implementation approach is desirable, but it will be important to clearly signal longer term targets and requirements. In addition to reducing GHG emissions, buildings that consume renewable natural gas to achieve interim GHG emission limits, or natural gas or propane, would need to concurrently manage emissions of health-harming air contaminants in accordance with the requirements in Bylaw 1087 or other relevant regional air emission control requirements.

Proposed Amendments to the Boilers and Process Heaters Emission Regulation (Bylaw 1087)

Emissions of health-harming air contaminants such as nitrogen oxides from boilers and process heaters with a facility capacity of 50 MW or less, including boilers found within large buildings, are currently managed through Bylaw 1087. Nitrogen oxides, or NO_x, include both nitrogen dioxide (NO₂) and nitric oxide (NO). In November 2019, the Board adopted stricter regional Ambient Air Quality Objectives for nitrogen dioxide (NO₂) that align with the 2020 NO₂ Canadian Ambient Air Quality Standards (CAAQS). The NO₂ CAAQS are expected to become even stricter by 2025. Amendments to Bylaw 1087 are proposed to support ongoing attainment of the Ambient Air Quality Objectives. The discussion paper titled "Proposed Amendments to the *GVRD Boilers and Process Heaters Emission Regulation Bylaw No. 1087, May 2022*" proposes stricter emission limits for nitrogen oxides and additional requirements for dispersion modelling and emission stack design to reduce localized impacts.

The proposals and approaches set out in the discussion papers for amendments to Bylaw 1087 and for managing GHG emissions from large buildings create opportunities for co-benefits in meeting our climate targets to avoid the worst impacts of climate change and to improve local and regional air quality.

Zero-emission technology, such as electrification or zero-emission district energy, can simultaneously achieve zero emissions of health-harming air contaminants and GHG emissions.

Overview of Engagement on the Related Regulatory Proposals and Approaches

Overlapping audiences for engagement on these two initiatives include the general public, building owners and managers, developers, district energy providers, and staff at member jurisdictions and other orders of government. To meet the needs of audiences interested in both initiatives, coordinated engagement on managing GHG emissions from large buildings and amendments related to boilers and process heaters will be conducted in 2022. Audiences will also be invited to participate in engagement activities specific to the individual initiatives. Engagement on the proposed amendments to Bylaw 1087 is expected to be completed in 2022 and followed by the development of amendments to

Bylaw 1087 for consideration by the Board. Feedback from engagement on GHG emissions will inform the development of more detailed proposals that could be included in a future bylaw, including the possibility of amalgamating requirements into one bylaw covering all building-related emissions. The more detailed proposals would be the subject of additional engagement, if supported by the Board.

Metro Vancouver Key Audiences Impacted by Proposed Approaches to Reduce GHG and Air Contaminant Emissions in Buildings



	 PROPOSED APPROACH FOR MANAGING GHG EMISSIONS LARGE Large Buildings >25,000ft ²	 BOILERS & PROCESS HEATER BYLAW AMENDMENTS Boilers < 50 MW	
AUDIENCES	Owners of Large Buildings (Heating Capacity up to 50MW) >2,322 m ² (25,000 ft ²)	✓	✓
	District Energy Providers	✗	✓
	Industrial Buildings with Process Heating	✓ for Space and Domestic Hot Water Heating/Cooling ✗ Process Heating/Cooling	✓
	Developers of Newly Constructed Buildings	✗	✓

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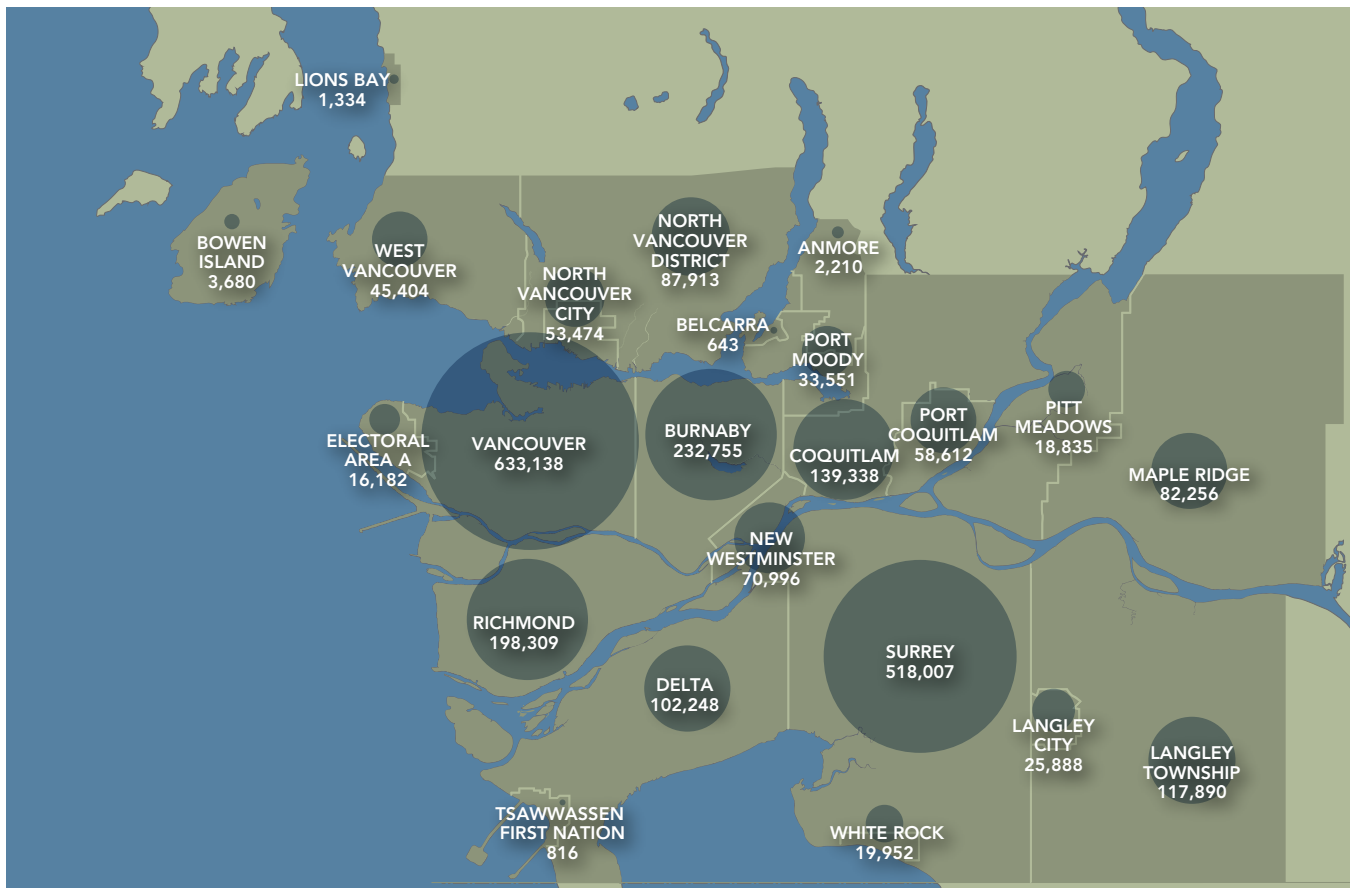
Introduction

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. Essential services include drinking water, sewage treatment, and solid waste disposal, along with regional services such as regional parks, housing, land use planning and air quality management that help keep the region one of the most livable in the world.

The *Clean Air Plan* is Metro Vancouver's air quality and greenhouse gas management plan. Actions in the plan will reduce **air contaminant** emissions including **greenhouse gases (GHG)** by 2030, and support the goal of becoming a **carbon neutral region** by 2050, outlined in Metro Vancouver's *Climate 2050 Strategic Framework*. The development of regulatory

requirements for existing large buildings to meet GHG emission performance targets is an action in the *Clean Air Plan* and will accelerate GHG reductions.

Under delegated authority from the BC *Environmental Management Act (EMA)*, the Metro Vancouver Regional District is seeking feedback from affected audiences about potential approaches for managing GHG emissions from large buildings. Metro Vancouver is interested in reducing GHG emissions from the region's building sector, since GHG emissions are air contaminants that damage or are capable of damaging the environment.



Purpose

The purpose of this discussion paper is to:

- Provide information about the GHG emissions from the building sector in the region, as well as the benefits of establishing a timeline for requirements to achieve deep reductions in GHG emissions from the sector
- Encourage feedback from affected and interested parties on potential approaches to manage GHG emissions from large buildings in Metro Vancouver

This discussion paper may be of interest to:

- Member jurisdictions
- Building owners, managers, and developers

- Industry and business associations including boards of trade and chambers of commerce
- Other orders of government
- First Nations who may be considering or have implemented aligned regulations
- District energy providers
- Utility providers
- General public

Interested parties are invited to provide feedback by November 30, 2022.

Terms in bold letters are defined in the glossary at the end of this discussion paper.



Defining the Problem

Buildings in Metro Vancouver produce a significant share of the region's total GHG emissions, representing the second highest emitting sector. The GHG emissions from buildings in Metro Vancouver also account for approximately 50% of province-wide GHG emissions from buildings.

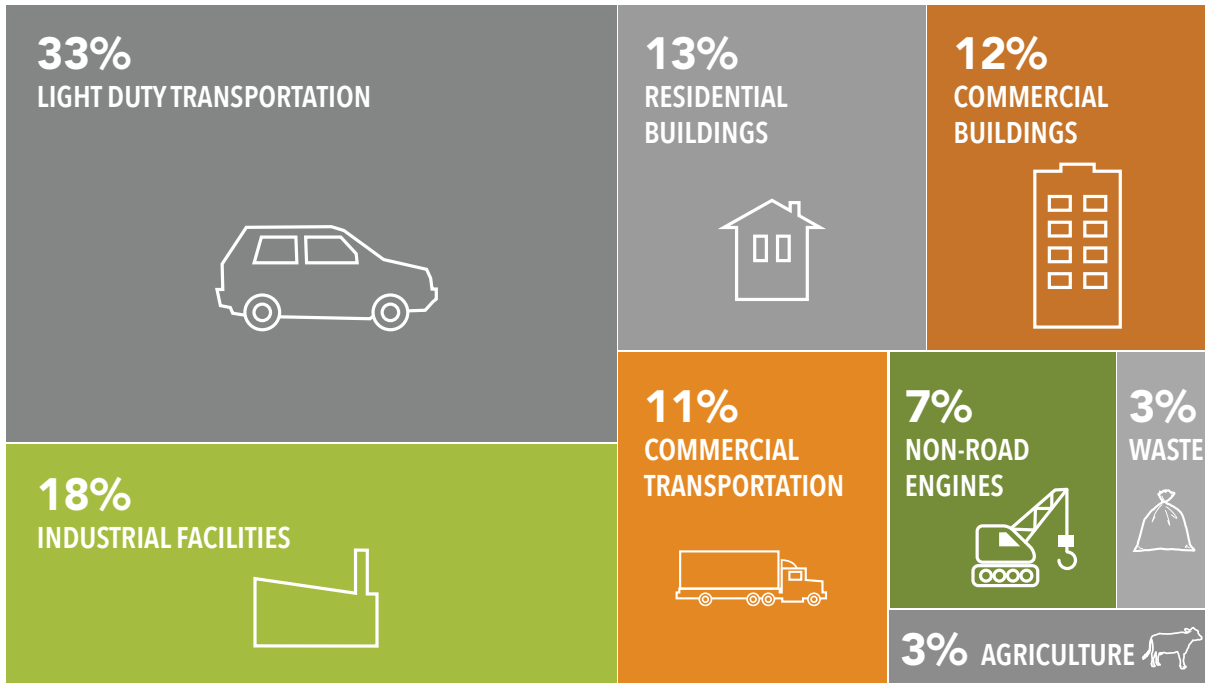
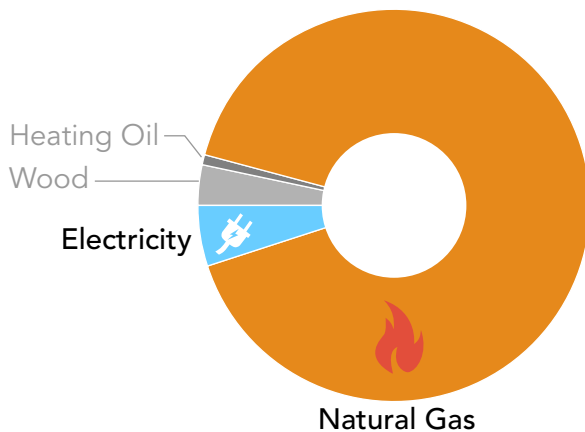


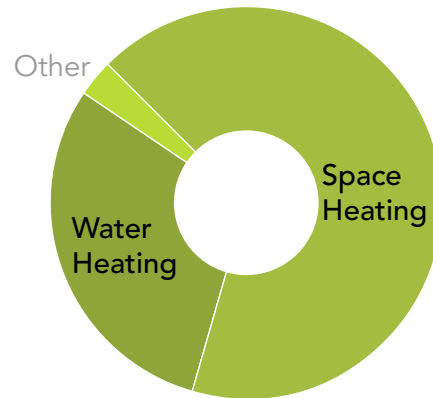
FIGURE: A BREAKDOWN OF THE METRO VANCOUVER REGION'S GHG EMISSIONS BY SECTOR IN 2015.

In our region, over 90% of GHG emissions from buildings come from burning natural gas for space heating, hot water, and some household appliances, while close to 3% come from out-of-region electricity generation. Space and water heating are responsible for nearly all of the natural gas use in buildings.

GHG EMISSIONS BY FUEL SOURCE



GHG EMISSIONS BY END USE



There are nearly 500,000 buildings throughout Metro Vancouver that collectively have more than 185 million m² (2 billion ft²) of floor space. Together, these buildings are the second largest source of greenhouse gas emissions in Metro Vancouver after transportation, emitting over 4 million tonnes per year. Regardless of programs and incentives in place, greenhouse gas emissions from buildings have risen 10% since 2010 in Metro Vancouver. This increase is due in large part to the widespread and continued use of natural gas to heat space and water in many of our new and existing buildings. Buildings also last a long time, and decisions made a century ago about design and construction are affecting our GHG levels today. Similarly, the decisions we make today about the design and retrofit of buildings will determine the amount of GHG emissions they create well beyond 2050.

An initial Metro Vancouver modelling [study](#) showed that requirements to limit GHG emissions from existing buildings will make a significant contribution to the deep emission reductions necessary to bring

the region closer to meeting climate targets, and in turn reducing the impacts of climate change. Reductions in GHG emissions from large buildings can be achieved through a number of policies and requirements. Most existing buildings will eventually need retrofits to reduce their GHG emissions, such as switching to heat pumps or improving insulation and air tightness. Equipment options are currently available for many building types that can reduce a building's GHG emissions as well as emissions of health harming air contaminants such as **nitrogen oxides (NOx)**.

Reducing GHG emissions from the region's building sector will be an important step to ensure that Metro Vancouver does its part in the global effort to take action on climate change and create more resilient and healthy communities.

How to Address the Problem: Zero Emission and Resilient Buildings by 2050

The [Climate 2050 Strategic Framework](#) sets out the region's long term strategy for climate action. Under this Framework, Metro Vancouver has set the following goals:

- Achieving a 45% reduction in GHG emissions from 2010 levels, by 2030
- Becoming a carbon neutral region by 2050
- Ensuring infrastructure, ecosystems, and communities are resilient to the impacts of climate change.

Metro Vancouver's *Clean Air Plan* and *Climate 2050 Buildings Roadmap* set sector specific GHG reduction target for the region's building sector:

- By 2030, a 35% reduction in GHG emissions below 2010 levels.
- All buildings are zero emissions in their operation, deriving all energy needs from 100% clean and renewable sources.

Both policy documents describe specific strategies, actions and metrics required in the building sector to meet the *Climate 2050* long term emission reduction, and resiliency targets. This proposed approach responds to one of these key actions, which is to "establish GHG performance requirements for large existing buildings".

Why Manage GHG Emissions from Large Buildings Through Requirements?

Given our ambitious climate targets, requirements to reduce GHG emissions in buildings would provide more certainty of achieving regional, provincial, and local government climate targets. Many leading jurisdictions in North America have implemented regulatory requirements in order to decarbonize their building sectors. Metro Vancouver is proposing a similar approach to work towards the region's long term climate goals. These requirements would provide an important signal to building owners to prepare for zero-emission retrofits, but to be successful they

would need to be paired with supporting resources, tools and programs. Metro Vancouver's Clean Air Plan and Climate 2050 Buildings Roadmap include actions that will support zero-emission retrofits, including the creation of a Large Building Retrofit Accelerator. The Retrofit Accelerator aims to be a regional resource hub that provides technical support and resources to building owners and managers to implement low- and zero-emission retrofits.

The Clean Air Plan and the Climate 2050 Buildings Roadmap include strategies and actions, including several actions that are identified as a "Big Move". Big Moves are key actions that are foundational to meeting the GHG emission reduction targets for 2030 and beyond. To meet targeted GHG emission reductions for the region's building sector, a specific action was identified as a Big Move for buildings as outlined below:

"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."*

Reducing GHG emissions, as well as other health harming air contaminants, will require long term planning to help support a transition to zero carbon emission buildings by 2050. The potential approach for managing large building GHG emissions is an important tool to signal the changes to a building that will be necessary, so that building owners can plan for emission reductions as a part of the decision-making process for building upgrades and equipment replacements.

Where implemented carefully and effectively, requirements for reporting and limiting GHG emissions from buildings have been demonstrated to greatly accelerate the number and depth of building retrofits across a jurisdiction. Examples of programs operating in other North American jurisdictions that require reporting, set GHG emission limits, or both, include: Ontario, Seattle, New York City, and Washington DC.



Co-Benefits of Reducing Building-Related GHG Emissions

Reducing GHG emissions from large buildings contributes to meeting our climate targets and helps to avoid the worst impacts of climate change. However, investments in energy-efficient, low-carbon building systems also have a number of other demonstrated benefits that are increasingly valued by occupants, tenants, and investors, including:

- Improvements to local air quality
- Improvements to occupant health, where improvements to ventilation systems are often made in conjunction with emission reduction measures and energy efficiency improvements
- Improvements to occupant comfort and safety, especially where low-carbon systems such as electric heat pumps (which provide both heating and cooling) are installed
- Improved resilience to power outages and extreme weather events, especially where energy efficiency upgrades are paired with on-site renewable energy systems and energy storage

Working within the Legislation

Potential approaches to managing GHG emissions from large buildings would need to fill a gap in existing policy to reduce GHG emissions from buildings in our region. This section outlines the current legislation across orders of government, and describes the opportunity to significantly reduce GHG emissions from existing buildings.

Federal Regulations & Actions

The Government of Canada *Pan-Canadian Framework on Clean Growth and Climate Change (PCF-CGCC)*: A Healthy Environment and Healthy Economy, and the federal *Net Zero Accountability Act* set GHG reduction targets of 40%-45% by 2030, and net zero by 2050 (relative to 2005 levels). Recognizing that buildings account for 12% of total national emissions in 2019, the *PCF-CGCC* commits the federal government to support retrofits of existing building through strategies including, but not limited to:

- Developing a model building alterations code by 2030 to be adopted by provinces and territories.
- Supporting the continuation and expansion of provincial and territorial efforts to retrofit existing buildings.
- A Canada Investment Bank commitment to invest \$2 billion to finance up-front capital costs of commercial and large scale building retrofits.

Provincial Regulations and Actions

Through its *CleanBC* plan, the Province of BC has committed to developing new standards for building upgrades via the introduction of an alterations code for existing buildings by 2024, which will bring existing buildings up to modern standards for efficiency and comfort. With the release of the *Clean BC Roadmap to 2030*, the following plans have been identified:

The introduction of GHG emission standards in the BC Building Code for newly constructed buildings in 2024, with zero carbon new construction required by 2030.

- After 2030, all new space and water heating equipment sold and installed in B.C. will be at least 100% efficient (i.e. electric resistance heating, heat pumps).

If enacted, the initiatives outlined above would support efforts to reduce GHG emissions from newly constructed buildings. They would also support low carbon upgrades in existing buildings at the time of replacement of building equipment, after 2030.

The Province also administers the [Better Buildings](#) incentive program to support existing building energy efficiency and emissions reductions.

Existing Policies and Programs in the Region

In Metro Vancouver, a number of local governments have continued to push for action to enable building level greenhouse gas reporting (often referred to as “benchmarking”) and setting GHG emission limits. Building on its voluntary Building Energy Challenge program, the City of Richmond has drafted a model bylaw for a building energy benchmarking policy for use by other municipalities. Additionally, the cities of Burnaby, Richmond, Surrey, Vancouver and others have since introduced energy benchmarking requirements for new Part 3 (commercial, multifamily, industrial) buildings, alongside BC Energy Step Code requirements.

Going further, the City of Vancouver’s Climate Emergency Action Plan, adopted in late 2020, outlines requirements to meet their 2030 space and water heating targets of cutting GHG emissions in half from 2007 levels. Through the Plan, Vancouver City Council directed staff to bring forward recommendations to limit annual GHG emissions from existing large commercial buildings, and detached homes beginning in 2025, as well as recommendations to require energy and emissions reporting by 2023. City of Vancouver staff intend to bring forward proposed bylaws to address the recommendations in May of 2022.





Metro Vancouver: A Path Forward

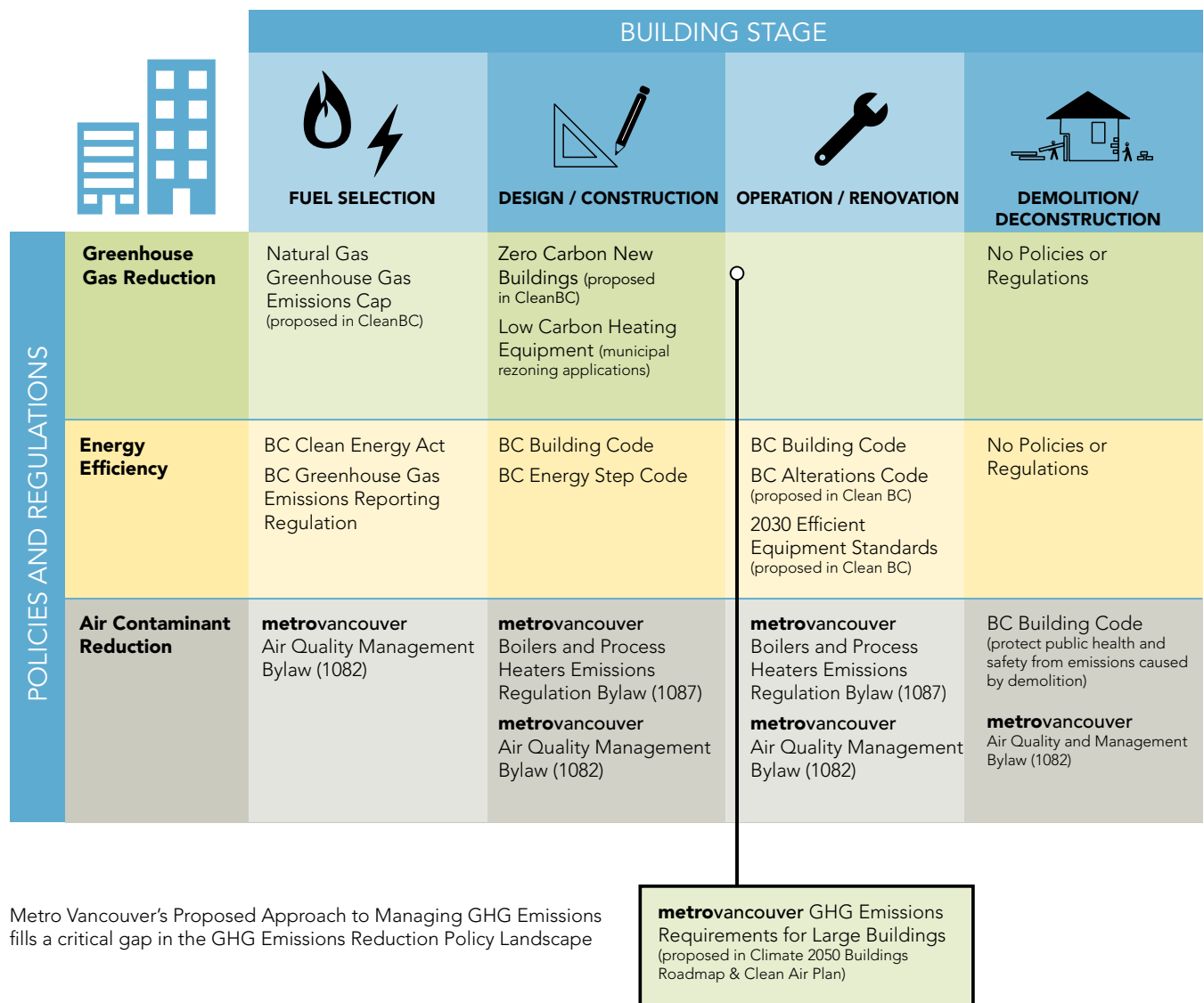
There is currently a gap in the BC policy landscape to manage GHG emissions from existing buildings in the region (outside of the City of Vancouver). In this section, an approach is proposed for consideration, outlining how Metro Vancouver would manage GHG emissions from large buildings, which could address this gap, and complement provincial and local action by ensuring improved performance in buildings that have been constructed to older and less stringent standards for energy use and GHG emissions. The proposed approach would also support improvements prior to (or alongside) any requirements that could be triggered by upcoming provincial requirements for efficient equipment standards.

As proposed, the approach could provide coordination and streamlined administration of requirements to reduce GHG emissions from large buildings across multiple local government jurisdictions, reducing the burden on individual member jurisdictions. Metro Vancouver would ensure that requirements to limit GHG emissions from large buildings integrate efficiently with other provincial codes and programs. Metro Vancouver would also work with its member jurisdictions to ensure they are informed and able to support the implementation of the approach particularly by identifying and supporting building owners in their communities.

In addition to the efforts taken by other levels of government, many building owners in Metro Vancouver already benchmark and disclose energy use and emissions from their buildings on a voluntary basis. A growing number of these owners also participate in the Building Benchmark BC program, which seeks to increase building benchmarking and disclosure to accelerate low carbon retrofits. These owners represent more than 1600 commercial, residential, industrial, and institutional properties

in BC. Analysis shows that voluntary benchmarking programs alone will not be sufficient to achieve the necessary GHG emissions reductions. However, the growing use of benchmarking and lessons learned from Building Benchmark BC would inform a regional approach to reporting of energy consumption and GHG emissions that would support the design of potential requirements to manage GHG emissions in large buildings.

FIGURE: THE PROPOSED APPROACH TO MANAGING LARGE BUILDING GHG EMISSIONS WOULD FILL A GAP IN CURRENT PROVINCIAL POLICIES AND REGULATIONS FOR REDUCING GREENHOUSE GASES FROM THE BUILDING SECTOR.



Metro Vancouver – Developing an Approach for Managing GHG Emissions from Large Buildings

Metro Vancouver is interested in hearing about any challenges or opportunities associated with accelerating the transition to zero-emission buildings through Metro Vancouver’s proposed management of GHG emissions from large buildings.

Guiding Principles

The guiding principles and directions that will help shape the management of GHG emissions are:

1. Minimize the risk to public health, the local environment, and the global climate from GHG emissions and other air contaminants
2. Set and signal requirements in advance to allow time for building owners to prepare for upgrades and avoid large investments that do not align with GHG emission reduction goals
3. Develop fair requirements that consider the particular challenges faced by various building types
4. Collaborate with affected parties and organizations to create a coordinated, streamlined, efficient, and well-supported program
5. Recover costs efficiently, in a fair and effective manner that reflects the harmful impacts of GHG emissions

Program Scope

The proposed approach to managing GHG emissions would require building owners to report the GHG emissions from their buildings on an annual basis to ensure that emissions fall below limits established by the Metro Vancouver Regional District for specified building types and sizes. Building types and sizes that could be in the scope of the potential requirements are commercial, institutional, and residential buildings over 2,322 m² (25,000 ft²). Agricultural buildings would not be within the scope of the proposal.

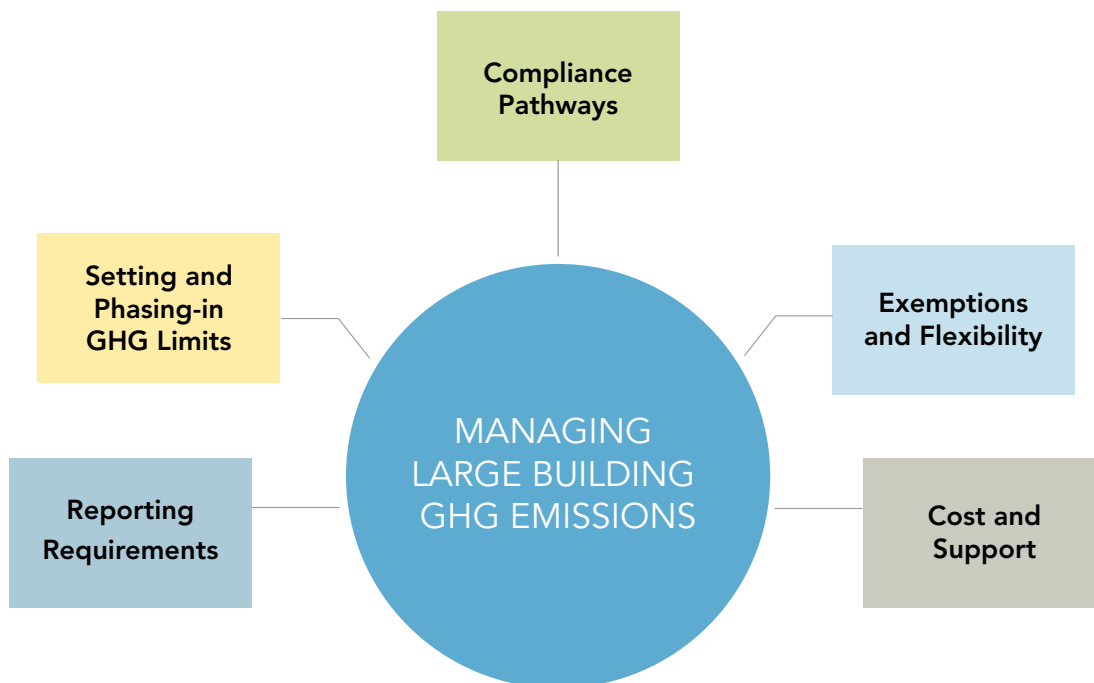
While only making up 2% of the total number of buildings in the region, large buildings comprise 35% of the total building floor area of all buildings, and will contribute to a significant amount of the GHG emission reductions required to meet the region’s climate targets.

Design Elements

The following are key considerations for developing an approach to reducing emissions from large buildings:

- **Reporting Requirements:** Type of data reported and frequency of reporting.
- **Setting and Phasing-in GHG Emission Limits:** Initial GHG emission limits based on research and analysis, future interim limits based on analysis of reported data from various types of buildings. Limits would be phased in over time for various building types, depending on their capacity to implement changes.
- **Compliance Pathways:** The ways in which a building owner may be able to achieve compliance with the emission limits.

- **Exemptions and Flexibility:** Exemptions or more flexible requirements for certain building types or circumstances.
- **Cost and Support:** Technical support would be available to assist building owners with planning for cost-effective transitions to zero-emission technology. Program fees would be designed to support the achievement of health and environmental benefits from emission reductions, promote continuous improvement, and recover costs of program development and compliance promotion based on the established principles of discharger-pay, equity, and fairness.



Reporting Requirements

Several municipalities have expressed interest in benchmarking energy use and emissions of buildings, and the Province administers the voluntary [Building Benchmark BC](#) reporting program. Standardized annual reporting of energy consumption and type of fuel to Metro Vancouver could be proposed, to reduce the time and resources that building owners and managers spend on reporting data. Metro Vancouver could also explore the feasibility of using current industry standards for reporting such as the [ENERGY STAR Portfolio Manager](#) online platform. Metro Vancouver would convert energy consumption to GHG emissions based on the type of fuel consumed using the **carbon dioxide** equivalent (CO₂e) emission factor for each respective fuel, set by the [Province of BC Best Practices Methodology for Quantifying GHG Emissions Report](#).

This information about buildings can be used to calculate the greenhouse gas intensity (GHGi), which is a measure of the total GHG emissions (kg or tonnes of carbon dioxide equivalent) divided by the gross floor area of a building (m²) emitted in a year. GHGi facilitates the comparison of emissions from buildings of a similar type and size, and the identification of appropriate GHGi limits for various building types and sizes.

Energy use and emissions reporting programs generally collect the following information about buildings:

Types of Data Generally Collected - All Buildings	
<ul style="list-style-type: none"> Property name 	<ul style="list-style-type: none"> Twelve consecutive months of energy data for all energy sources
<ul style="list-style-type: none"> Property address 	<ul style="list-style-type: none"> Fuel sources
<ul style="list-style-type: none"> Owner name 	<ul style="list-style-type: none"> Metered areas ('whole building' is usually the only 'compliant' response) *
<ul style="list-style-type: none"> Property type 	<ul style="list-style-type: none"> Metered areas ('whole building' is usually the only 'compliant' response)*
<ul style="list-style-type: none"> Total gross area of property 	<ul style="list-style-type: none"> GHG emissions and emissions intensity
<ul style="list-style-type: none"> Gross floor area for each property use in the building 	<ul style="list-style-type: none"> Heating or hot water technologies
<ul style="list-style-type: none"> Year of construction 	<ul style="list-style-type: none"> Reporter contact information
<ul style="list-style-type: none"> Number of buildings 	

*Sub-metered portions of a building could be tracked separately, but total consumption reported must encompass the whole building for performance metrics to be meaningful

TABLE 1: BUILDING DATA TYPICALLY COLLECTED FOR BENCHMARKING (I.E. REPORTING) PROGRAMS.



Setting and Phasing-in Greenhouse Gas Emission Intensity Limits

Different GHG emission intensity limits for different building types, representing the maximum emissions that a building of a particular type could emit per unit of floor area, could be established and phased in over time. Building types are groupings of buildings with similar characteristics such as occupancy class, age, size, and design features for which emissions performance can be compared. Examples of building types may include, but are not limited to, various size categories within the following:

- Large Office Buildings
- Large Retail Buildings
- Office Buildings and Retail Complexes
- Mid-rise Residential
- Multifamily Residential

For brevity, this document refers to GHG emission intensity limits as “GHG emission limits”. Initial GHG emission limits could be determined by research and analysis of GHGi of different building types. More stringent GHG emission limits could then be developed and introduced over time based on the reported information about energy use and emissions, for fairness, accuracy, and alignment with the region’s GHG reduction goals and other local government initiatives.

Over time, more buildings within scope would make changes to meet the GHG emission limit for their building type. Buildings with the lowest GHG emissions would only be affected further in the future, as the region approaches the goal of zero-emission buildings by 2050.

Compliance Pathways for Building Owners

Building owners would have the flexibility to choose the most cost-effective upgrades and retrofits needed to ensure building emissions meet or are below the GHG emission limit that could be set for their building type.

Deep emission reductions require long term planning. As buildings make decisions today about replacing heating equipment and other building components, it will be important to consider the [long term](#) implications of those decisions, given the long life cycles of buildings and heating equipment.

Building upgrades could be required to meet or be better than GHG emission limits for that building type through various pathways, with examples shown in the figure below. In the near term, improved energy efficiency could play a strong role in reducing emissions. However, to achieve the goal of zero-emission buildings by 2050, buildings would eventually be required to use zero-emission technology and renewable energy sources, such as electricity and low- or zero-emission district energy.

Submission of a building GHG emission reduction plan and timeline could also be a compliance pathway.

Renewable natural gas (RNG) may have a role as a compliance pathway for buildings. For some existing heating systems that are harder to electrify quickly, such as high-temperature water or steam **boilers**, RNG may be a viable path to reduce GHG emissions. While RNG reduces GHG emissions, it still produces harmful air contaminants such as NO_x when it is burned. Building owners who choose to purchase RNG to lower their GHG emissions would still be subject to other air quality requirements under Bylaw 1087.

Learn more about low carbon fuel options for buildings in [the Climate 2050 Buildings Roadmap](#).

Exemptions and Flexibility

Some building types over 2,322 m² (25,000 ft²) may require more flexibility to address challenges such as:

1. Specific constraints related to the operations of a building

Some building types house specialized processes and activities that increase energy use and related GHG emissions, complicating the comparison of GHGi. Examples of buildings in this category include:

- Industrial facilities
- Recreational facilities (such as buildings that include ice rinks or swimming pools)

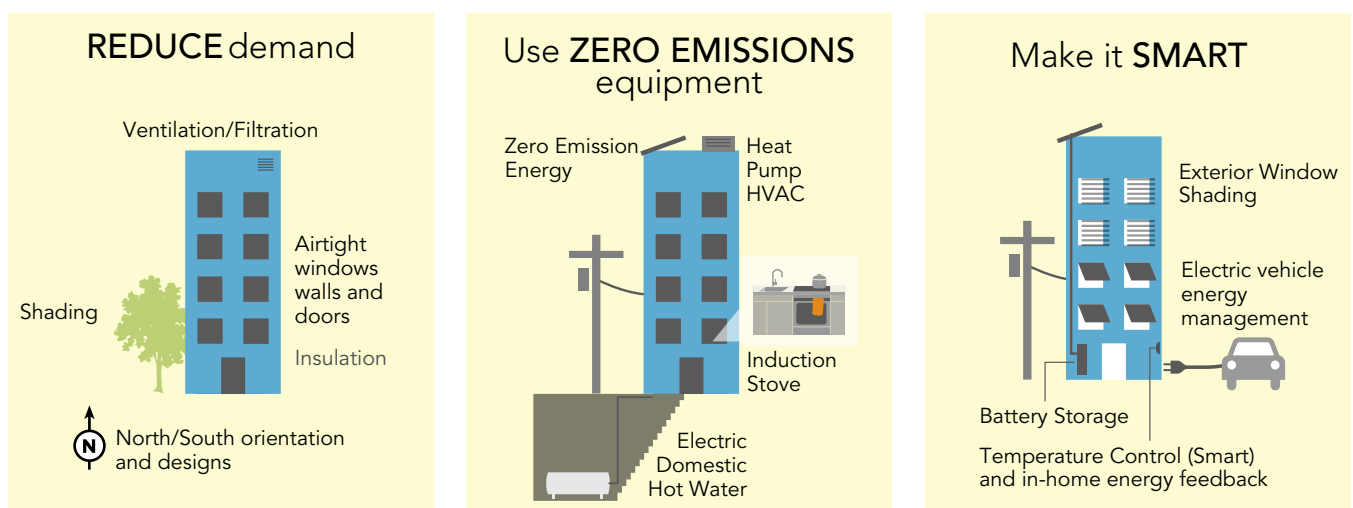


FIGURE: TAKING A WHOLE BUILDING APPROACH TO INCREASE EFFICIENCY AND REDUCE GHG EMISSIONS.

2. Financial constraints or hardship

There are some building types that may need a longer timeline to make upgrades or retrofits, regardless of building size, due to risks related to affordability. There may also be financial hardships that can delay a building's ability to meet proposed requirements. Examples include:

- Purpose built rentals (e.g. non-market rental housing)
- Buildings under severe financial distress or other forms of hardship

3. Recently constructed buildings and building sales

Recently constructed buildings could be required to comply with GHG emission limits after occupancy. Proposed requirements would need to consider the financial and logistical challenges for a recently completed building to implement changes to reduce GHG emissions soon after the building was constructed. This points to the critical need to ensure new buildings today are designed and built to zero emissions or zero-emission-ready standards to avoid future retrofit costs for building owners.

Another consideration is the transfer of building ownership and how to provide flexibility for new building owners to meet the requirements.

4. District energy connected buildings

Buildings that receive all of their space and water heating from an offsite district energy facility may not be included in the proposed requirements. Reducing GHG emissions from buildings connected to district energy systems depends in part on the attributes of each district energy system and whether connected buildings receive energy from other sources. Many district energy systems in the region already have

plans to significantly reduce GHG emissions. Metro Vancouver could assess opportunities to support GHG emission reductions in district energy systems, and determine if additional requirements may be necessary at the source to accelerate this transition, as indicated in the *Clean Air Plan*.

5. Large building portfolio owners

Metro Vancouver is considering how Real Estate Investment Trusts (REIT), institutional organizations, and other large building portfolio owners could achieve compliance at the portfolio scale for buildings located in the Metro Vancouver region.

Cost and Support

Metro Vancouver recognizes the significant investments needed to upgrade or retrofit buildings to reduce GHG emissions. Technical support would be available to help building owners identify the most cost-effective pathways to transition to zero emissions. Metro Vancouver has initiated a three year (2022-2024) project to develop a Large Building Retrofit Accelerator, and anticipates close collaboration with the Metro Vancouver Zero Emissions Innovation Centre and other organizations supporting the transition to a low-carbon future.

Other jurisdictions in North America have used different methods to support program administration. For example, the City of Los Angeles charges an annual fee per building, while other jurisdictions have used tax revenue or energy efficiency funding to support program delivery. Metro Vancouver is exploring options that would align with the principles of discharger-pay, equity, and fairness. There would be further engagement with affected audiences on proposed mechanisms for program cost recovery, if supported by the Board.

Providing Feedback and Comments

Interested parties are invited to provide feedback by November 30, 2022.

Metro Vancouver staff and contractors will treat comments received with confidentiality; however, please note that comments you provide and information that identifies you as the source of those comments may be publicly available if a freedom of information (FOI) request is made under the Freedom of Information and Protection of Privacy Act.

If you have any questions or comments regarding this initiative, please call 604-432-6200 or email us at climate2050@metrovancover.org.

Visit metrovancover.org, search “building emissions action” for more information. Sign up for the project mailing list to receive updates and notification about engagement opportunities.

Glossary

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.

Boiler means any combustion equipment fueled solely by natural gas, propane, or biomass that produces hot water or steam, but does not include: (a) waste heat boilers; (b) sulphur plant reaction furnaces, steam reformer heaters and steam cracking heaters in the refined petroleum products industry as identified in the North American Industry Classification System (NAICS) code 324110; and (c) process heaters.

Carbon dioxide (CO₂) is a greenhouse gas, and the primary driver of climate change. Carbon dioxide is produced both naturally and through human activity, primarily by burning fossil fuels.

Carbon neutral region means that we have achieved the deepest greenhouse gas emissions reductions possible across all economic sectors, and any emissions left are balanced out by the carbon dioxide removed from the atmosphere by the plants, trees, and soil in the region, as well as by potential carbon capture technologies that are under development.

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

Nitrogen oxides (NO_x) 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.

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.

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).

