The Lower Fraser Valley airshed

Metro Vancouver is situated within the Lower Fraser Valley. Air pollution can freely cross our borders both from and into the surrounding areas. These include the Fraser Valley Regional District to the east, Whatcom County in the State of Washington to the south, Vancouver Island to the west and Howe Sound and the Sunshine Coast to the north.

Managing air quality successfully requires effective collaboration with our neighbours and other levels of government, and participation from businesses, public institutions, non-government organizations, and residents. Many of the articles in this publication reflect these partnerships.

We would like to acknowledge the contributions made to this publication by:

City of North Vancouver
Climate Action; Public Opinion

In 2017 Metro Vancouver conducted a public opinion survey to understand the attitudes of Metro Vancouver residents towards both climate change and local government responses to climate change. The research explored residents’ opinions on the causes of climate change, the aspects of climate change that are of most concern, people’s perception of the efforts of governments, businesses and individuals to address climate change, and support for future actions to address climate change.

The results of the survey support the development of a regional climate action plan, Climate 2050 (see page 2). Metro Vancouver residents want to see more local action.

• Metro Vancouver residents are highly aware of and concerned about climate change, and the impacts in our region.

• Metro Vancouver residents generally have low awareness of current actions being taken to address climate change, particularly those taken by local government.

Along with goals to protect air quality and public health, Metro Vancouver’s Climate Action Committee provides advice and direction to minimize the region’s contribution to global climate change. This survey shows that there is public support for further regional action on climate change.

The Climate 2050 strategy will be an overarching climate action strategy for Metro Vancouver. It will outline Metro Vancouver’s vision and goals to both reduce greenhouse gas emissions and adapt to climate impacts. It will also establish a framework to develop and implement dynamic roadmaps for future climate action by Metro Vancouver, and facilitate learning and sharing of best practices with our members and others.

LOCAL GOVERNMENTS CAN LEAD INITIATIVES TO ADDRESS CLIMATE CHANGE IN AREAS SUCH AS:

- Protect lands that absorb climate impacts such as floods and droughts
- Prioritize energy efficient infrastructure design and the delivery of clean energy
- Increase commitments to clean energy
- Engage on best practices to reduce GHG emissions
- Adhere to building codes to reduce GHG emissions from municipal buildings
- Choose lower emissions vehicles for corporate fleets
Climate change is both a global challenge and a local challenge – we are already feeling the impacts of climate change across the planet, including here in Metro Vancouver. Meeting the climate challenge requires bold leadership, creative thinking, and extensive collaboration. Cities and regional governments are at the forefront of global action on climate change. Much of the region’s infrastructure, as well as policies and initiatives that impact our neighbourhoods and daily lives, are managed and coordinated by cities and regions.

For nearly 20 years Metro Vancouver and local cities have been taking action on climate change, embedding effective climate actions into existing management plans. But we need to do more. Everyone stands to benefit from a coordinated and collaborative approach to maximize the benefits of our climate initiatives.

To that end, Metro Vancouver is currently developing the Climate 2050 strategy. Climate 2050 will guide policy and actions across the Metro Vancouver region, using our resources efficiently to reduce carbon emissions and prepare for the unavoidable impacts of global warming. The strategy will apply a ‘climate lens’ to all policies and actions undertaken by Metro Vancouver, to inform climate change adaptation and prevention in coming years.

Metro Vancouver is committed to an open decision-making process, and to setting goals that can be measured, reported, and evaluated. In addition to working closely with its member jurisdictions Metro Vancouver will engage businesses and residents, and coordinate with other orders of government and key agencies who have critical roles in achieving climate goals.

You can find more information at metrovancouver.org, search ‘Climate 2050’.
Metro Vancouver operates a world class air quality monitoring network with 29 monitoring stations from Horseshoe Bay to Hope. More than ten pollutants are measured throughout the network with high quality equipment that is strictly maintained. These data provide a ‘gold standard’ for accurately measuring air quality.

New sensor technology has led to the development of low-cost air quality monitors that are readily available to anyone and allow you to collect your own data anywhere you want. This is cool, but you might be wondering “how good are the data”? There are several things to consider.

**Location** Air quality is worse the closer you are to sources of air pollutants, so don’t put the sensor next to your BBQ – these data will not represent the air that you breathe most of the time.

**Consistency** Metro Vancouver’s team of qualified technicians calibrate and audit air quality analyzers regularly to check they are performing correctly. Most low-cost sensors don’t let you do this.

**Quality** Instruments costing tens of thousands of dollars offer accurate, precise and reliable measurements. Don’t expect that a sensor costing a few hundred dollars or less will match the performance of more sophisticated equipment.

**Data interpretation** Many of the sensors on the market report instantaneous data collected every second. These measurements should not be compared with longer term (e.g. daily) health-based thresholds as several of the sensor websites do. You have to compare a 24-hour measurement with the 24-hour threshold.

AirAware is a new citizen science outreach project developed by Metro Vancouver to understand how and why people are using these low-cost sensors. Metro Vancouver will be looking for participants this summer (2018) to learn more about their sensors, how they compare to Metro Vancouver’s instruments, and how they can fit in with the regional monitoring network. Through collaboration with residents and other partners, such as Vancouver Coastal Health Authority, this project will help us determine how we can all get the most out of this new technology.

You can access data from the air quality monitoring network at [www.airmap.ca](http://www.airmap.ca).
Where Air Emissions Come From in Metro Vancouver

What is an emissions inventory?

Every five years, Metro Vancouver compiles an inventory of air pollutant and greenhouse gas (GHG) emissions in the Lower Fraser Valley airshed (see map inside front cover). The inventory reports on air emissions from a broad range of sources: industrial facilities; commercial, institutional, residential, agricultural, and naturally occurring sources; and mobile sources, such as cars and trucks, non-road equipment, rail locomotives, aircraft and marine vessels.

Here’s a snapshot of what we found.

1 Modest decrease in GHG emissions

In 2015 we found that GHG emissions in Metro Vancouver had decreased compared to 2010 to about 15 million tonnes, which is a 2% reduction. While a modest decrease is encouraging, more needs to be done to meet regional targets (see page 2).

Heating and cooling of buildings, such as our homes or commercial buildings, require energy and are major contributors of regional GHG emissions. Between 2010 and 2015 emissions from buildings decreased by more than 10%, thanks to reduced natural gas consumption, partly through improved efficiency of equipment.

GHG emissions from industrial sources increased between 2010 and 2015, primarily because of economic growth in the cement and petroleum products sectors. Vehicle traffic emissions also increased due to growth in the region’s population and economy.

A business-as-usual forecast projects that regional GHG emissions will decrease by about one percent in 2035. GHG emissions from cars and trucks are projected to fall by about 35% by 2035, due to emission regulations, but this is offset by increases in GHG emissions from buildings and industry because of regional population and economic growth.

We also looked at the potential effect of a quicker shift from conventional cars and trucks to electric vehicles (EVs) as a way of achieving greater GHG emission reductions in the region. We found that strong EV policies could result in nearly 50% of new vehicle sales being EVs and plug-in EVs, providing a significant drop in GHG emissions. See page 6 for the details.

2 Smog-forming pollutant emissions still decreasing

In 2015, major sources of smog-forming pollutants were chemical products, cars and trucks, marine vessels, non-road engines and industrial sources.

Emissions of smog-forming pollutants, such as nitrogen oxides (NOx) and volatile organic compounds (VOC), have decreased since 1995 thanks to improved engine emissions standards, vehicle repairs required through the former AirCare program, improved fuel and product formulation, and regulation of evaporative sources of VOC. This trend is expected to continue to 2030, although VOC reductions are projected to slow as emissions from chemical products such as paints, industrial solvents and coatings, adhesives, and personal care products increase as the region grows.
Proportion of GHG emissions by sector in 2015. GHG emissions overall totalled approximately 15 million tonnes.

<table>
<thead>
<tr>
<th>Sector</th>
<th>Emissions (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARS AND TRUCKS</td>
<td>31%</td>
</tr>
<tr>
<td>BUILDINGS</td>
<td>26%</td>
</tr>
<tr>
<td>AIR, MARINE, RAIL</td>
<td>7%</td>
</tr>
<tr>
<td>INDUSTRIAL EMITTERS</td>
<td>17%</td>
</tr>
<tr>
<td>NON-ROAD ENGINES</td>
<td>8%</td>
</tr>
<tr>
<td>AGRICULTURE</td>
<td>3%</td>
</tr>
<tr>
<td>WASTE</td>
<td>3%</td>
</tr>
<tr>
<td>HEAVY DUTY VEHICLES</td>
<td>5%</td>
</tr>
</tbody>
</table>

How do we use an emissions inventory?

The emissions inventory provides insights into key sources of air emissions in our region, and helps us examine the current state of and our impacts on the region’s air quality and climate.

Emissions inventory forecasts allow us to assess the potential benefits of regulations and policies. Forecasts are also used to evaluate actions in regional climate action and air quality management plans, and to identify areas where emission reductions may be needed.

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Sulphur oxide emissions have decreased

Sulphur oxide (SOx) emissions dropped more than 70% from 2010 to 2015, largely because of implementation of the North American Emission Control Area (ECA) in 2012. The ECA requires vessels to use cleaner marine fuels, reducing marine vessel SOx emissions by about 95%. However, SOx emissions are expected to increase slightly to 2035, primarily as marine traffic in our region increases.

An article in Caring for the Air 2017 (page 13) shows the benefit of the ECA on our air quality.

Fine particulate matter emissions have decreased overall

Fine particulate matter (PM2.5) emissions have been decreasing steadily since 1995, driven by reductions in emissions from the wood products and petroleum refining industries, as well as reduced vehicle emissions. However, significant sources of PM2.5 remain in 2015, including residential wood burning, non-road engines, industrial sources and marine vessels.

In a business-as-usual forecast, transportation emissions are expected to continue decreasing, driven by increasingly stringent emission standards for vehicles, non-road engines and marine vessels, and cleaner fuels.

With the longevity and slow replacement of wood burning appliances, indoor wood burning is expected to be the most significant source of PM2.5 emissions to 2035. However, phasing out conventional fireplaces and uncertified inserts and woodstoves through regulatory and non-regulatory measures could reduce over 90% of PM2.5 emissions from indoor wood burning by 2035 compared to the business-as-usual scenario.
The air quality and greenhouse gas emissions benefits of electric vehicles are often publicized, but what is the cumulative effect in an airshed?

As part of a recent analysis of emissions (the 2015 Lower Fraser Valley Emissions Inventory), Metro Vancouver investigated possible future scenarios for electric vehicle uptake in Metro Vancouver and the Fraser Valley Regional District. Researchers at Simon Fraser University and Navius Research produced three potential future scenarios that reflect different degrees of policy support for the electrification of light-duty vehicles. These included scenarios based on: (1) weak demand, (2) strong demand, and (3) strong supply and demand.

The scenarios were applied against the actual light-duty vehicle fleet for the Metro Vancouver region, taking into account natural turnover, vehicle growth rates and actual vehicle kilometres travelled in this region.

Emissions forecasts were then derived for air pollutants and greenhouse gases (GHGs) from 2015 to 2035.

The results of the study show that a transition to electric vehicles is projected to significantly reduce GHG emissions (10% and 27% by 2035 in Scenarios 2 and 3, respectively) and have a measurable impact on air pollutant emissions. For example, a 7% and 18% reduction for PM2.5 by 2035 in Scenarios 2 and 3, respectively.

Electrification is expected to have a greater impact on GHGs than air contaminants because federal standards on the latter are more stringent. Beginning in model year 2017, light-duty vehicles are subject to standards which effectively bring air emissions down to near-zero. Although Canada has adopted GHG standards for light-duty vehicles which tighten between 2017 and 2025, they are far from near-zero.

Effect of potential EV scenarios on emissions from light-duty vehicles
Individually, new vehicles are much cleaner than 20 years ago, but collectively the personal vehicle fleet remains the dominant source of some pollutants in our region.

Metro Vancouver’s 2015 emissions inventory shows that while there are many sources of emissions in our region, personal vehicles are the largest source of smog-forming pollutants and climate changing greenhouse gases (see page 4). In fact, a relatively small number of older vehicles produce a substantial amount of smog-forming pollutants. Newer vehicles generate less smog-forming pollutants, but due to their large number, produce more greenhouse gases than older vehicles (see page 6).

Metro Vancouver is investigating how to reduce the amount of air pollutants released from personal vehicles such as cars and trucks. Vehicle emissions policies focussed on protecting human health and our environment need to address both air quality and climate change issues.

Vehicle pollution can be reduced using many different approaches, including incentives to reduce emissions from older vehicles, more stringent engine standards for new vehicles, and shifting more travel into other modes such as transit, cycling and walking. Jurisdictions around the world have implemented many approaches to reduce these air contaminants but what works in other jurisdictions may not work as well in Metro Vancouver because of our size and different regulatory structures.

A Metro Vancouver study will help identify benefits and trade-offs between different approaches that could be implemented in our region. The best approach may consider issues such as housing affordability, social equity, feasibility and alignment with related initiatives including the Mobility Pricing Independent Commission and federal Electric Vehicle Strategy. The study will provide important information to support evidence-based policy making that will help us reach air quality and climate goals.
What’s the purpose of an air permit?
Metro Vancouver uses air permits to reduce the impacts of air contaminants emitted from businesses.

Who decides whether a permit is issued?
The District Director, a staff person appointed by the Metro Vancouver Board, decides whether to issue a new permit or amendment after reviewing an application from a business and hearing from concerned persons.

How does the public find out about an application?
When a business applies for major changes or a new permit they must post a copy of the notice (the application summary) at their site, and publish it in local newspapers and the BC Gazette.

Metro Vancouver posts the notice on our website and notifies anyone who has complained about the facility in the past three years or subscribed to our notification list. Metro Vancouver also asks the host municipality, local health authority and other agencies for comments on the application. The District Director may require the applicant to organize meetings to provide information to the public.

Notification provides information to help the public make informed comments about a permit application.

How do I voice my concerns?
Anybody who thinks they may be negatively affected by an air permit application has the right to have their concerns considered by the District Director during the permitting process. A person has at least 30 days after the last public notification to provide comments, in writing. The applicant gets a chance to respond to all comments.

When deciding whether a permit should be issued, the District Director may consider relevant information provided by the applicant, Metro Vancouver staff and any others who have provided comments.

How will I know what has been decided and what if I don’t like the decision?
Once the District Director makes a decision about a permit, the applicant, agencies and comment providers are notified. Any person who may be affected by the decision can appeal to the BC Environmental Appeal Board (www.eab.gov.bc.ca).

Where can I find out more?
More information about Metro Vancouver’s air permitting process is available at metrovancouver.org (search: apply permit).
Wood Changes Make Sense

Many people enjoy the ambience created by a wood fire, but burning wood releases harmful pollutants into the air we breathe. Wood smoke contains fine particulate matter (PM2.5), which is made up of tiny particles suspended in the air that can be inhaled deep into our lungs. Exposure to PM2.5 can aggravate heart and lung conditions and reduce life expectancy. Wood smoke also contains a mixture of chemicals that have other negative impacts on human health (see Toxic Air Pollutants Risk Assessment).

Indoor residential wood burning is the largest source of PM2.5 in the region. To help reduce wood smoke emissions, Metro Vancouver runs an exchange program which allows residents to apply for a rebate when they replace their uncertified wood burning appliance (e.g. fireplace or older wood stove) with a new, lower emission unit. Funding is limited and rebates are offered on a first come, first served basis:

- **$400** if you exchange an uncertified wood-burning appliance for a pellet stove, electric heat pump, or a natural gas or propane appliance.
- **$250** if you exchange an uncertified wood-burning appliance for a CSA or EPA-certified wood-burning appliance or electric insert.

The wood stove exchange program has been in place since 2009 and over 500 exchanges have been made, resulting in ongoing emissions reductions of over 9,000 kilograms of PM2.5 per year. This helps improve air quality in neighbourhoods where people live, work and play.

In 2017 and 2018 Metro Vancouver undertook consultation and engagement on a phased approach to adding regulatory mechanisms to manage indoor residential wood burning emissions.

Replacing a fireplace or old wood-burning appliance with a gas fireplace or new wood-burning appliance will give you more efficient heating and help reduce PM2.5 levels for everybody. To find out more about the exchange program and qualifying appliances, visit: metrovancouver.org (search: ‘wood stove exchange’).
Benefits From Retiring Your Dirty Diesel Engines

Since 2012, Metro Vancouver’s Bylaw 1161 has regulated the oldest and dirtiest (Tier 0 and Tier 1) non-road diesel engines, such as those found in construction and other heavy-duty equipment, to reduce the impacts of harmful diesel particulate matter on human health and the environment. More than 140 engines have been retired. Assuming each of these was replaced with a Tier 2 or newer engine, the estimated diesel particulate reduction is almost 5,500 kg, which is equivalent to taking 4,600 newer diesel pick-up trucks off the road.

Metro Vancouver estimates that there are more than 600 Tier 0 and Tier 1 engines no longer being used that were registered but never formally retired. This additional unconfirmed reduction in emissions means a combined total of 30 tonnes of diesel particulate matter has been taken out of the air we breathe.

Owners of Tier 0 and Tier 1 engines pay fees to operate in the region. Metro Vancouver currently only charges fees for the most polluting engines, to encourage owners to retire older units and replace them with cleaner engines. When an owner retires an engine, they become eligible to receive a cash refund of up to 80% of the fees paid in the previous three years. Engine retirements also provide a healthier workplace for the operator, as well as a healthier overall environment for everybody in the region.

If you own a ‘not in use’ Tier 0 or Tier 1 engine, apply for a refund as soon as possible. A small amount of paperwork could mean hundreds of dollars in your pocket. You have one year from the date of retirement to apply for a refund.

Our officers routinely inspect worksites so if you haven’t registered your Tier 0 or Tier 1 engine, we encourage you to do so as soon as possible or risk fines. More information is available at metrovancouver.org (search: ‘fee refund’ or ‘register engine’).
Health Impact Assessments: Improving Our Future

When a ‘big project’ (such as a major construction project like a bridge replacement) is being considered in our region, it is common to engage the public to get feedback about issues and concerns. By involving the public, the social impacts of a project can be considered in design alternatives. But what about potential health impacts, which may be less visible and more difficult for residents to anticipate?

A Health Impact Assessment (HIA) provides a standardized way of assessing both the bad and good health impacts a project might have, ranging from risk of injury to health risks associated with air pollution and noise. By identifying potential impacts at an early stage in a project planning process, it is possible to find solutions and reduce long term negative effects.

Metro Vancouver has developed a guidebook and toolkit to help with preparation of a Health Impact Assessment. Several large projects in our region have used this approach successfully in recent years. One example is the Georgia and Dunsmuir viaduct replacement project. This will be a large demolition and construction project with the potential to impact residents for an extended period of time. By using HIA, public health has been assessed throughout a project’s lifecycle.

<table>
<thead>
<tr>
<th>HEALTH INDICATOR</th>
<th>PREDICTED HEALTH EFFECT</th>
<th>REASON</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Quality</td>
<td>Neutral</td>
<td>Emissions from the project will be relatively minor compared to other sources in the area, and vehicle traffic is predicted to decrease.</td>
</tr>
<tr>
<td>Noise</td>
<td>Neutral</td>
<td>The project will limit construction at night. Once the project is completed, noise mitigation measures will include earth berms, low-noise pavement, and upgraded sound insulation at a nearby building that has been predicted to be most significantly affected by project noise.</td>
</tr>
<tr>
<td>Active Transportation</td>
<td>Positive</td>
<td>The project includes improved walking and cycling infrastructure.</td>
</tr>
<tr>
<td>Access to Green Spaces</td>
<td>Positive</td>
<td>The project includes an opportunity to expand a nearby park.</td>
</tr>
</tbody>
</table>

Examples of how an HIA is used to look at the potential impacts of factors that can affect health.

From: City of Vancouver Georgia and Dunsmuir viaduct replacement Desktop Health Impact Assessment
Hot and Dry Conditions – A Recipe for Bad Air Quality

Prolonged hot and dry conditions caused extreme fire risk and led to intense wildfire activity in 2017.

In the summer of 2017 wildfires burned aggressively across the province, resulting in the largest burnt area of B.C. ever being recorded in a season. The smoke from these wildfires affected people throughout North America, including in Metro Vancouver and the Fraser Valley Regional District. Metro Vancouver’s air quality expertise was critically important in detecting the arrival of wildfire smoke in the Metro Vancouver and Lower Fraser Valley airshed, and for getting information out to the public and media.

When air quality becomes degraded, Metro Vancouver issues an air quality advisory in partnership with other agencies in the region. Air quality advisories provide information about what is causing air quality degradation, the health effects associated with it, and the actions people can take to protect themselves and others.

Wildfire smoke in the summer of 2017 was more intense and lasted longer than ever previously measured in our airshed. Fine particulate matter in the smoke was detected at monitoring stations from Hope to Horseshoe Bay. Five air quality advisories were issued, totalling an unprecedented 19 days with an advisory in effect. The longest continuous period under an advisory occurred from August 1st to 12th, when levels of fine particulate matter were high due to wildfire smoke. Ground-level ozone also became elevated at times during hot sunny weather.

Metro Vancouver residents generally enjoy clean, clear air, so the wildfire smoke impacts on the region for two of the last three summers is notable. These events may provide a taste of how an increase in the severity and occurrence of wildfires caused by our changing climate could affect us more severely in the future.

Metro Vancouver has a goal of having zero days of air quality advisories. Metro Vancouver has put policies in place, such as the Regional Ground Level Ozone Strategy and the Non-Road Diesel Engine Program, to reduce the occurrence of advisories.
Air Quality in 2017

Although outdoor air quality in Metro Vancouver is generally good most of the time, occasionally air quality objectives are not met. Wildfire smoke had significant impacts on air quality in the region in 2017 (see page 12). Hot, sunny weather also caused levels of ground-level ozone to increase at times. Both of these factors resulted in exceedances of air quality objectives.

Metro Vancouver and other air quality agencies strive for continuous improvement in air quality to protect health and the environment. As additional information becomes available, new, more protective objectives are adopted that require tighter standards to be met. New federal standards for sulphur dioxide (SO2) were added to the Canadian Ambient Air Quality Standards (CAAQS) in 2016. In November 2017, Metro Vancouver adopted more stringent objectives for SO2 of concentrations of 70 ppb measured over one hour and 5 ppb averaged over a year, which replaced the interim objective adopted by Metro Vancouver in 2015.

Air Quality Trends

The regional trends charts (right) illustrate the change in average air quality across the region over time. Measurements from monitoring stations located from Horseshoe Bay to Hope are averaged to represent the ambient (outdoor) air quality typically experienced in the region.

Average trends for the region show that improvements have been made over the last decade for most air contaminants, even while the region’s population has grown. The region’s air quality improvements are a result of many emission reduction actions that have been implemented (see pages 4 and 5).

Peak ground-level ozone levels (not shown), which occur during summertime hot and sunny afternoons, are better now than in the 1980s and early 1990s. However, despite lower levels of pollutants that form ground-level ozone, average levels of ground-level ozone are increasing slightly. This is partly due to an increase in ozone formed outside Canada coming into our region.
FINE PARTICULATE MATTER (PM$_{2.5}$) IN 2017

The Canadian Ambient Air Quality Standard for fine particulate matter (PM$_{2.5}$) was achieved for 2017 at all monitoring stations with the exception of Hope (see map above). Levels were better than Metro Vancouver’s annual objective at all stations with the exception of the Vancouver near-road monitoring station. Peak levels at all stations were worse than the short-term objective (25 µg/m$^3$ based on an average over 24 hours) in August and September. This was due to wildfire smoke. Additional exceedances of the objective occurred in July at Hope also due to wildfire smoke, in November and December in several locations thought to be caused by local wood burning and two locations in October likely due to Halloween activities.

GROUND-LEVEL OZONE IN 2017

The map above shows that the Canadian Ambient Air Quality Standard for ground-level ozone was achieved at all monitoring stations except Hope in 2017. Monitoring data also showed that peak levels were higher than Metro Vancouver’s 8-hour objective (65 ppb) and 1-hour objective (82 ppb) on a few occasions in Burnaby, Richmond, Pitt Meadows, Maple Ridge, Langley, Abbotsford, Mission, Chilliwack, Agassiz, and Hope in August. It is unusual for ozone exceedances to occur in the west (i.e., Burnaby and Richmond) and it is thought that wildfire smoke enhanced ozone production. Exceedances were also briefly observed in May, June and July at a few stations.
SULPHUR DIOXIDE IN 2017

Average concentrations of sulphur dioxide for 2017 are shown above. All stations were better than Metro Vancouver’s annual objective of 5 ppb. Peak levels were better than Metro Vancouver’s 1-hour objective of 70 ppb at all stations in 2017 except for at Capitol Hill, where exceedances occurred in February, March, October and December for a total of six hours. Peak levels at Capitol Hill are mainly influenced by the nearby oil refinery.

NITROGEN DIOXIDE IN 2017

In 2017, nitrogen dioxide concentrations were better than Metro Vancouver’s 1-hour air quality objective at all monitoring stations. Measurements averaged over the entire year were within Metro Vancouver’s annual objective with the exception of at the near-road monitoring station on Clark Drive in East Vancouver (shown above). The near-road station is heavily influenced by traffic emissions. The highest average nitrogen dioxide concentrations in the region are measured in highly urbanized areas near busy roads.
Embracing new technology, using information about health impacts

Many pollutants, such as fine particulate matter (PM2.5), are measured continuously by the air quality monitoring network’s 29 long-term air quality monitoring stations, with data reported in near-real time. Other pollutant samples, such as some toxic air pollutants, are collected on a regular schedule for detailed analysis in a laboratory. Here’s how the network is keeping up to date and responding to new priorities and emissions sources.

**Case 1**: Health research tells us that smaller particles (less than 2.5 micrometres) cause the greatest health effects. Increased monitoring of fine particulate matter (PM2.5) and new instruments providing more complete measurements of PM2.5 have been integrated into the network in recent years.

As interest grows in measuring even smaller particles, known as ultrafine particles, Metro Vancouver is exploring how we can measure these effectively in the region.

**Case 2**: A new instrument was acquired in 2017 to improve our ability to evaluate air toxics, such as benzene, and to help assess the air quality implications of industrial projects such as the Trans-Mountain Pipeline expansion project.

Staying informed about weather trends

Weather conditions greatly affect air quality and how pollution levels vary throughout the day, from season to season, and across the region. Wind speed, wind direction, temperature, rainfall and humidity measurements improve air quality forecasts, predictions of air quality advisories, environmental and health assessments, and our response to air quality complaints.

The important connection between weather and air quality means that meteorology is measured at most air quality stations in the network. There are also some stations that only measure meteorology. Some of these data are used by the provincial government’s Climate Related Monitoring Program to improve our knowledge about changing weather patterns in our region. Understanding future climate projections and impacts on the region helps when developing the new Metro Vancouver climate action strategy (Climate 2050).

To find weather or air quality data in your community, check out [AirMap.ca](http://AirMap.ca).
Metro Vancouver is working to clear the air – and reduce human health risks – by tackling air emissions from automotive refinishing facilities (commonly called autobody shops). Automotive refinishing activities release air contaminants into the air, including volatile organic compounds, hazardous air pollutants and particulate matter. These pollutants are associated with adverse health and environmental effects.

Potential changes to the Greater Vancouver Regional District Automotive Refinishing Emission Regulation Bylaw No. 1086, 2008, which regulates emissions from these facilities, have been proposed.

The existing bylaw requires that most vehicles are spray coated in appropriate spray booths using approved paints and cleaners. There are several key potential changes being considered, including modernizing the paint standards to meet or exceed national standards. Another potential change is ensuring that all spray coating operations follow bylaw requirements, since some operations conducting similar work are currently not covered by the bylaw. The requirements are designed to protect residents’ health and the environment. Other changes also being considered would simplify bylaw enforcement and clarify requirements for businesses who are subject to the regulation.

Metro Vancouver hosted a series of consultation events between November 2017 and March 2018, including three webinars and three stakeholder meetings. The feedback received is being reviewed and will be reported to the Metro Vancouver Board later in 2018.

More information about the proposals and consultation events can be found on Metro Vancouver’s website (search: ‘Potential amendments to Bylaw 1086’).
Managing Odour in Metro Vancouver

Odorous air contaminants have the potential to cause everything from nuisance in residential neighbourhoods, to health concerns at elevated levels. Requirements to control emissions from odour-generating facilities can be included in air quality permits and regulations. However, as residential, industrial and commercial density increases in Metro Vancouver, it is anticipated that odour concerns and complaints will continue to rise.

Metro Vancouver is responsible for managing and regulating air quality in our region. With an increasing number of complaints from the public about unpleasant odours emanating from a variety of sources, including compost and food processing facilities, the current approach to odour management needs to be improved to address current and future needs. This has led Metro Vancouver to explore more effective tools to reduce odour emissions across the region.

Metro Vancouver is working with communities, businesses and government partners to revise its framework for managing odorous air contaminants in a responsible manner that respects both community and business values. Approaches being considered to improve how Metro Vancouver deals with odours are:

- Specifying limits on the level of odour occurring at the facility boundary or in the affected community;
- Emission limits for sources at facilities, designed to reduce odour impacts in nearby communities;
- Applying technology requirements to control odour;
- Requiring the use of best management practices for new or existing facilities;
- Employing economic instruments to encourage emissions reductions and allow administrative costs to be recovered from authorized sources of odorous air contaminants; and
- Changing existing bylaws to clarify provisions for managing the impacts of emissions of odorous air contaminants.

These approaches could be applied, individually or in combination, to reduce odour and offer a future odour management framework the flexibility to find effective solutions for existing issues and prevent new issues arising.

More information about the consultation can be found at metrovancouver.org (search: ‘odorous air contaminants’).
Nitrogen dioxide (NO₂) and nitric oxide (NO) are known collectively as nitrogen oxides (NOₓ). NOₓ are formed when fuel is burned at high temperatures, for example, in an engine or a boiler.

Nitrogen dioxide is a highly-reactive, reddish-brown gas with a pungent and irritating odour. It is sometimes responsible for “brown haze” seen in the air. It is linked to health effects such as decreased lung function and respiratory health problems, particularly for children and adults with asthma. It also plays a major role in ground-level ozone formation and secondary particulate formation, which can affect visual air quality in the region.

Transportation is a key source of NO₂ emissions, so it’s no surprise that areas near busy roads and intersections, such as downtown Vancouver, tend to have the highest concentrations of NO₂. Lower concentrations are often observed where there is less traffic, such as eastern areas of Metro Vancouver.

Metro Vancouver sets outdoor air quality objectives for air pollutants, including NO₂, to protect human health and the environment. NOₓ emissions in the region have been decreasing since 1995, and concentrations of NO₂ have followed suit. Concentrations are generally better than objectives in the region (see page 15).

The setting of air quality objectives in Metro Vancouver follows a principle of continuous improvement, and in 2017, the Metro Vancouver Board adopted new, more stringent objectives for sulphur dioxide (SO₂), consistent with Canadian Ambient Air Quality Standards (CAAQS) established by the federal government. In 2017, the federal government established new CAAQS for NO₂ when new science indicated that the previous national NO₂ standards were no longer sufficiently protective. The NO₂ CAAQS take effect in 2020, and will be followed by even stricter requirements in 2025. Similar to the process for SO₂, Metro Vancouver is reviewing the new CAAQS for NO₂ for incorporation in the region. It’s expected that the 2020 CAAQS are achievable for the region, but achieving the standards in 2025 will require further reductions in NO₂ emissions.
Stepping Up to Better Building Energy Efficiency

Buildings contribute 27% of the region’s greenhouse gas emissions and 7% of smog forming pollutants, mostly from burning fossil fuels for heating. The BC Energy Step Code is a new voluntary provincial standard that will improve the energy efficiency and carbon footprint of new buildings beyond current minimum standards.

The Energy Step Code has five steps, each step representing a higher standard of energy efficiency. At the highest level (Step 5), a building will be “net-zero ready”. This means that if a renewable energy technology is installed, the building will produce at least as much clean energy as it consumes.

Added benefits of the Step Code are improved health and comfort for building occupants as well as more affordable operating costs and consumer protection. Step Code buildings are:

- Healthier, through better air circulation;
- More comfortable, through better management of ambient temperature; and
- Quieter, through better air sealing and insulation.

Many local governments are adopting the Step Code, recognizing the benefits, and their role in contributing to a growing effort to dramatically reduce building emissions in the Metro Vancouver region. The BC Energy Step Code is a vital tool for governments to achieve greenhouse gas reduction goals.

North Shore Leads the Way
The City of North Vancouver has worked with the development industry to increase energy efficiency in buildings for many years. In December 2017, the City became the first local government in BC to enact the BC Energy Step Code in its zoning and construction regulation bylaws.

The Districts of North and West Vancouver have followed suit, creating an “efficient new home zone” from Horseshoe Bay to Deep Cove. From July 2018, all new low-rise condos, town homes and houses built on the North Shore will be required to meet Step 2 of the Step Code and all new commercial buildings will meet Step 1.

Moving early to adopt the Step Code in a coordinated way across the North Shore has increased certainty for developers and provided time for them to respond to new energy efficiency requirements.

The province has set a goal of achieving net-zero energy ready new construction in BC by 2032.