Caring for the Air

Metro Vancouver 2013

What’s inside?

Information on what’s being done about our most pressing air quality and climate change issues including:

• Diesel particulate matter
• Air quality around the Burrard Inlet
• Greenhouse gas emissions
• Visual air quality
• Data on the “state of the air” in the Lower Mainland – key sources of emissions and measured air quality concentrations
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.

Successfully managing air quality requires collaboration with our neighbours and other levels of government, and participation from businesses, public institutions, non-government organizations, and residents.

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B.C. Ministry of Environment
Vancouver Coastal Health
Fraser Health
Port Metro Vancouver
City of Vancouver

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MODIS image (page 7): We acknowledge the use of Rapid Response imagery from the Land Atmosphere Near-real time Capability for EOS (LANCE) system operated by the NASA/GSFC/Earth Science Data and Information System (ESDIS) with funding provided by NASA/HQ.

Logs (page 15):
Prince George Air Improvement Roundtable (PGAIR)

Woodstove and chimney sweep (page 15):
Eric Vance, U.S. EPA Burn Wise

Low emission device (page 15):
woodstove photo from David Sims

Southeast False Creek Neighbourhood Energy Utility (page 18):
Ausenco Sandwell

Vancouver and North Shore mountains (page 20):
Environment Canada

You can find additional material from italic text, icons and images in this interactive version.
THEN AND NOW

This is our second annual Caring for the Air report, where you will find information on programs to improve our air quality, and the state of the air in our air shed.

A number of the stories in this publication have a ‘then and now’ theme, comparing air quality issues today to what we experienced decades ago. It is fitting to follow that theme and acknowledge five pioneers of the air quality program we have today. This list includes, but of course is not limited to:

• Barrie Mills, who was the manager and inspirational leader of the air quality department;

• Morris Mennell, administrator of the air quality planning program and architect of our first Air Quality Management Plan in 1994 (which was also the first plan of its kind in Canada);

• Bob Smith, administrator of the air quality regulatory program, responsible for implementing many of the regional air quality bylaws and regulations;

• Ken Stubbs, administrator of the monitoring program which provided the critical air quality data that was the foundation of all of our air quality plans; and

• Hu Wallis, from the Ministry of Environment, who deftly provided the essential link to provincial government air quality programs.

These five individuals are all retired now from “active” public service but remain in touch with today’s air quality programs – the programs for which they laid the groundwork over twenty years ago. This edition of Caring for the Air is dedicated to them. Their vision has inspired countless others who have contributed to air quality management in our region.

The amazing bridges that they helped to build in making air quality improvement a collaborative effort is reflected in this publication. We applaud the efforts of the team that produced this report, not only Metro Vancouver staff but also all of our air quality partners.
Although our region generally enjoys good air quality today, this wasn’t always the case. In the 1930s and 40s industrial chimneys and beehive burners belched smoke into the air that hung over the city. Newspaper articles from the 1950s tell stories of residents finding soot on clean laundry that was left to dry in the sun.

Major improvements began in the 1970s, thanks to growing public demand for clean air. The GVRD became responsible for protecting air quality. A number of large industrial sources closed down or moved away from the region under pressure from escalating real estate prices and the transition to a service and tourism-based economy, as well as public
We see a rise in concern about air quality. By the 1980s regional growth and transportation shifted much of the focus of air quality programs to vehicle emissions. The introduction of vehicle emission control technology and vehicle emissions testing significantly improved air quality in the 1990s.

Although air quality has improved considerably through the years, challenges remain. Metro Vancouver is now tackling local issues such as diesel exhaust in neighbourhoods, along with regional and global challenges such as ground-level ozone and climate change.

1980: The last sawmill in False Creek closed
1983: Backyard burning was banned in the City of Vancouver
1987: Lead was banned from gasoline

2005: GVRD adopted its second Air Quality Management Plan
2007: New regulation on heavy trucks and buses marked a new era in air emission standards

In 2007 the GVRD became known as Metro Vancouver.

Early 1990s: Three of the four operating petroleum refineries in the Lower Mainland shut down
1992: The AirCare vehicle emission inspection and maintenance program was born
1994: GVRD adopted its first Air Quality Management Plan

2011: Metro Vancouver’s Integrated Air Quality and Greenhouse Gas Management Plan was adopted
2012: Air emission requirements for marine vessels in Canadian and US waters came into effect.
WHERE DO OUR EMISSIONS COME FROM?

In the first half of the 20th century, industrial emissions resulted in the type of scenes illustrated on page 2. Today, our air quality has improved and air emissions inventories are an important tool in tracking those improvements. Inventories allow us to know what and how much is being released into our air, and identify the sources of these emissions.

SMOG-FORMING EMISSIONS

Emissions of smog-forming pollutants are much lower than they were 20 years ago due to stricter emission regulations and controls, better technology, and cleaner fuels.

Industries (such as oil refineries, cement plants and sawmills) emit about 6% of smog-forming pollutants in our region. On the other hand, other sources contribute more significant amounts. Personal and commercial transportation and non-road engines account for almost half of the smog-forming pollutants released into the air in our region. The use of consumer products, including paints, stains, adhesives, inks and personal or household products accounts for another 16% of emissions.

GREENHOUSE GAS EMISSIONS

Unlike smog-forming pollutants, greenhouse gas emissions are higher today than they were 20 years ago. Greenhouse gases are primarily released when fossil fuels (gasoline, diesel and natural gas) are burned. As growth has increased, fossil fuel consumption has too.

Day to day activities familiar to many of us are major sources of greenhouse gases. Driving our vehicles and heating and cooling our homes, offices, hospitals and schools contribute nearly 60% of the total greenhouse gas emissions in the region.
Do you ever see diesel trucks leaving thick plumes of black smoke in their wake? It’s certainly the image many people have when “air pollution” and “trucks” are mentioned in the same breath – but is it true in this day and age? Metro Vancouver and our partners tried to find out in the summer of 2012.

A technique called remote sensing was used to collect information about tailpipe emissions from semi-trailer trucks, dump trucks, buses and other heavy-duty vehicles. You may have seen the testing equipment at highway on-ramps, weigh scales and bus yards in the region during the summer of 2012 - it was used in over two dozen locations across the Lower Fraser Valley. Trucks and buses don’t need to slow down or stop since measurements are made as vehicles pass by on the road.

In 55 days of testing, 40,000 vehicles passed through the testing equipment, including over 11,000 heavy-duty vehicles.

The results from this study will help Metro Vancouver understand the region’s heavy-duty diesel vehicle fleet. We will have a better grasp of which vehicles are the worst emitters, which is crucial to developing the right policies and programs to reduce emissions from these vehicles.

“Breathing diesel exhaust is as bad if not worse than breathing second hand smoke.”

Dr. Patricia Daly, Chief Medical Health Officer, Vancouver Coastal Health
AIR QUALITY MONITORING NEWS

FVRD STATIONS

The air quality monitoring network is expanding in the FVRD to reach the communities of Mission and Agassiz. Two new stations will provide an air quality health index (AQHI) – based on measurements of nitrogen dioxide, fine particulate matter and ground-level ozone – and related health information every hour from these locations. The stations will also increase our understanding of ground-level ozone patterns and lead to better informed strategies for tackling this key air pollutant which is responsible for summertime smog advisories.

AQHI

The Air Quality Health Index (AQHI) takes measured air quality conditions and provides information on the associated health risk. It was developed by Health Canada to provide general guidance to help people adjust their activities according to symptoms they may experience. It is reported for six zones across the Lower Fraser Valley.

MAMU

Metro Vancouver’s Mobile Air Monitoring Unit (MAMU) is used to make measurements throughout the region in locations from residential neighbourhoods to busy roads. It is an important air quality monitoring tool that complements the fixed stations of the air quality monitoring network.

The first MAMU has operated for over 20 years and is being replaced with more modern technology and features. The new unit will be used for local air quality studies, education and outreach, compliance monitoring, evaluation of air quality “hot spots” and emergency situations, and air quality research studies.
Air quality objectives are established to protect air quality. When air quality deteriorates to levels where the objectives are exceeded, Metro Vancouver can issue an Air Quality Advisory. Advisories contain information that describes the immediate issue, the impacts it may have, and what everyone can do to protect themselves and improve air quality.

On August 17, 2012, following several days of hot weather, an air quality advisory was issued for parts of Metro Vancouver and the Fraser Valley. Ground-level ozone had increased over acceptable limits at air quality monitoring stations located in Maple Ridge, Langley, Chilliwack, Abbotsford, Surrey and Burnaby. This was the first air quality advisory issued because of high ground-level ozone levels since 2009, and the first air quality advisory issued since the summer of 2010.

Although there were no advisories issued related to particulate matter, the region was impacted by wildfire smoke on several occasions in 2012. Between July 6 and 8, hazy conditions resulted from wildfire smoke transported all the way from Siberia. For the rest of the summer we continued to see haze from wildfire smoke coming from northern BC, western parts of the United States as well as Siberia and Asia. Satellites collected some dramatic images of smoke plumes.

The photo shows smoke from Washington extending over the Lower Fraser Valley and up the coast of British Columbia to the northern tip of Vancouver Island on September 20, 2012.

Air quality objectives define generally accepted limits for air pollutants that protect our health and environment. Everybody in the region plays a role in ensuring good air quality, but occasionally an air quality objective is exceeded. The objectives for key pollutants are shown in the following pages.

Become a follower of Metro Vancouver on Twitter or Facebook to stay informed about air quality.
Air Quality in 2012

AIR QUALITY DATA 2012

FINE PARTICULATE MATTER (PM2.5)

In 2012, fine particulate matter (PM2.5) levels throughout the region were better than the Canada-wide standard (see map). Measurements averaged over the entire year were within Metro Vancouver’s annual objective and planning goal. Peak levels, based on the highest 24-hour average, were worse than the short-term objective (25 µg/m³) on only one occasion in 2012 – in North Delta on one day in November. PM2.5 is emitted from many sources in the region, such as heating, transportation and burning, and can also be transported long distances, as we saw with wild fire smoke from Siberia in 2012. Find out more about PM2.5 on page 13.

GROUND-LEVEL OZONE

Ground-level ozone levels were better than the Canada-wide standard at all monitoring stations in the region (see map). However, levels went over acceptable short-term limits in the summer of 2012 on two separate days during hot and sunny weather. The exceedances of Metro Vancouver’s stringent 8-hour and 1-hour air quality objectives occurred in eastern parts of Metro Vancouver and the FVRD. Ground-level ozone is formed from sunlight-driven reactions involving nitrogen oxides and volatile organic compounds. Find out more about ground-level ozone in the 2012 edition of Caring for the Air.
Nitrogen dioxide concentrations were better than Metro Vancouver’s long-term and short-term air quality objectives throughout 2012. Annual averages are shown on the map. Approximately 70% of the regional emissions of nitrogen oxides (which includes nitrogen dioxide) come from cars, trucks, marine vessels, and non-road engines. The highest average nitrogen dioxide concentrations are measured in highly urbanized areas near busy roads.

Sulphur dioxide levels were better than Metro Vancouver’s air quality objectives at all stations in 2012. Annual averages are shown in the map. The largest sources in the region are marine vessels (mainly ocean-going vessels) and the oil refinery. The highest sulphur dioxide levels are observed near these sources, especially in the Burrard Inlet area. Further away from the Burrard Inlet area, sulphur dioxide levels are much lower. Find out more about sulphur dioxide and air quality on page 13.

Carbon monoxide levels were well below Metro Vancouver’s air quality objectives at all stations in 2012. The main emission source is from motor vehicles. The highest levels are measured near major roadways during peak traffic periods. Lower levels are observed where there is less influence from road traffic.
**AIR QUALITY TRENDS**

**AIR QUALITY CONTINUES TO IMPROVE THROUGHOUT THE REGION.**

Air quality has generally improved over the last 10 to 20 years in our region. Some key historical actions are described on pages 2 and 3, and in spite of population growth in the region, levels of air pollutants have generally decreased. For example, sulphur dioxide levels have improved because of lower sulphur in car and truck fuels, the shutdown of several refineries in Metro Vancouver, and lower emissions from the cement industry.

Peak ground-level ozone levels (not shown), which usually occur during hot, sunny afternoons in summer, are better now than in the 1980s and early 1990s. Despite reductions in the pollutants that form ground-level ozone, current research indicates that average levels of ground-level ozone have levelled off or are increasing slightly, which may be partly the result of an increase in background levels (i.e., ozone formed outside of Canada and moved into our region). Metro Vancouver is currently developing a ground-level ozone reduction strategy to tackle this issue in the Lower Fraser Valley.

**PM2.5 MONITORING**

Metro Vancouver has been measuring particles in the air since 1973. Even before that, the City of Vancouver measured particles in the air. Dustfall collectors were used to measure the amount of soot and ash that fell out of the air.

Since then things have changed - for the better. Air quality is much better now and so is the monitoring technology. Today we don’t have to worry about falling ash, but we do have to measure the tiny particles in the air known as fine particulate matter or PM2.5. These particles are important because they can have impacts on our health.

Starting in 2013, Metro Vancouver will switch to a new, improved technology to monitor fine particulate matter. This will give us a better understanding of where this pollutant comes from, and how to control it. Many other areas in Canada will follow suit.

The new technology is able to give a more complete picture, measuring some particles that the previous instruments could not. While the particles in the air have not actually increased, the amount measured and the numbers reported may.

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**SAME AIR QUALITY, IMPROVED MEASUREMENTS**

**NEW INSTRUMENT**

**OLD INSTRUMENT**
Marine vessels and port operations emit air pollutants. Port Metro Vancouver is fully committed to reducing air emissions even as the Port expands over the next decade. Here’s how Port Metro Vancouver is working collaboratively with many partners along the supply chain to help keep the air clean.

**WHAT’S NEW AT THE PORT?**

**COMING**

New shoes, new clothing, new electronics, new cars, new appliances and more! These items typically travel a long way on large ships and then pass through a port terminal before they arrive at a store near you.

**GOING**

Newly manufactured goods, raw materials, grains and other resources from throughout Canada pass through Port Metro Vancouver on their way to the rest of the world.

- **MARINE VESSELS** at anchor and berth are charged reduced harbour dues if they use cleaner fuels and technology through the Port’s *EcoAction Program*.

- **CRUISE SHIPS** docked at Canada Place can use ‘Shore Power’, plugging in to the electrical grid instead of using their diesel engines.

- **CARGO HANDLING EQUIPMENT** transfers goods between ships, trucks, and rail. Through its *Air and Energy Action Plan*, the Port encourages terminal operators to adopt cleaner, more efficient cargo handling equipment and improve operational efficiencies.

- **HEAVY DUTY TRUCKS** move goods locally to and from the terminals. The Port’s *Truck Licensing System* requires trucks accessing the Port to meet stringent environmental standards, phasing out older, more polluting trucks from the fleet.

- **SWITCH LOCOMOTIVES** position rail cars at the terminals for loading and unloading of goods. Several terminals throughout the region operate modern low emission locomotives.

- **LONG HAUL LOCOMOTIVES** transport about 70% of the bulk and containerized goods that connect the Port to the rest of Canada.

- **ZERO WASTE** We all buy stuff like clothing, computers, phones and batteries, but what do we do when they no longer meet our needs? Visit [www.metrovancouverrecycles.org](http://www.metrovancouverrecycles.org) to find places to donate or recycle just about anything!

On August 1, 2012, the east and west coasts of Canada and the United States became a Marine Emission Control Area, the third such area in the world. Ships sailing within 200 nautical miles of North American ports must now use cleaner fuels and adopt new technologies to reduce emissions and comply with regulations. These regulations will help to reduce smog in our region.

Visit the Chamber of Shipping’s website for more information: [www.chamber-of-shipping.com](http://www.chamber-of-shipping.com)
AIR QUALITY IN THE BURRARD INLET

Burrard Inlet is one of the most recognizable features in our region. It is bounded by several municipalities and home to a wide variety of activities. To better understand air quality in this area, Metro Vancouver added 10 temporary monitoring sites to complement existing air quality monitoring stations in the area. Using measurements from these sites, air quality was compared to other areas in the Lower Mainland, as well as Metro Vancouver’s air quality objectives.

WHAT DID WE FIND?

- Sulphur dioxide levels were better than Metro Vancouver’s air quality objectives most of the time, except during one fog event in January 2009, but exceeded the World Health Organization’s guidelines several times in most locations.

- Although generally better than Metro Vancouver’s objectives, sulphur dioxide levels in the Burrard Inlet area were higher than the rest of Metro Vancouver and the Fraser Valley Regional District.

- The largest sources of sulphur dioxide emissions in the Burrard Inlet area are marine vessels and a petroleum refinery.

- Fine particulate matter levels were elevated from time to time in the central Burrard Inlet area, but were better than Metro Vancouver’s objectives most of the time.

- Environment Canada analyzed the fine particles and found elevated levels of black carbon (soot), vanadium and nickel. Black carbon is an indicator of diesel exhaust and/or wood smoke, while vanadium and nickel are indicators for marine fuel combustion.
WHAT NEXT?
The Burrard Inlet area will benefit from initiatives Metro Vancouver, Port Metro Vancouver and several partners are taking to improve air quality:

- Port Metro Vancouver is investigating the feasibility of installing shore power for other ocean-going vessels like container ships and bulk carriers.
- Transport Canada is putting Marine Emission Control Area actions into effect.
- Metro Vancouver, the port and other partners are implementing actions from the Integrated Air Quality and Greenhouse Gas Management Plan to reduce diesel exhaust.
- Metro Vancouver will continue to work with Chevron Refinery staff to minimize sulphur dioxide emissions.
- Environment Canada is considering additional requirements for industrial sectors such as petroleum refineries.
- Metro Vancouver is working with Port Metro Vancouver to increase air quality monitoring so we can track the effectiveness of these emission control measures.
- Metro Vancouver is reviewing its sulphur dioxide objectives in 2013. The adoption of more stringent objectives promotes continuous improvement in the airshed and emission reductions from the initiatives listed above will help to lower sulphur dioxide levels.

WHAT IS SULPHUR DIOXIDE?
Sulphur dioxide is a colourless gas that smells like burnt matches. It is formed when sulphur-containing fuels are burned and can react with other substances in the air to form fine particulate matter.

Sulphur dioxide damages plants, land and buildings and can contribute to visual air quality degradation. There are also serious health effects. At high levels, sulphur dioxide can cause breathing problems in people with asthma. Exposure to elevated sulphur dioxide levels may increase hospital admissions and premature deaths (Health Canada 2006).

WHAT IS FINE PARTICULATE MATTER?
The term fine particulate matter refers to airborne particles with an aerodynamic diameter of 2.5 micrometres (μm) or less. Fine particulate matter (PM2.5) is emitted by a variety of man-made and natural sources, but it can also be created when other pollutants react in the atmosphere in the presence of sunlight.

PM2.5 is small enough to be breathed deeply into the lungs and can impact both respiratory and cardiovascular systems.

PM2.5 can also impair visual air quality.

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AIR QUALITY DATA 2012
AIR QUALITY REGULATION

DIESEL EMISSIONS

In 2012, Metro Vancouver’s Environmental Regulation and Enforcement Division began implementation of the Non-Road Diesel Engine Emission Regulation Bylaw (No. 1161). This regulation requires owners/operators of diesel engines that have no emission standards (Tier 0) to register, label and pay fees for equipment. In the first year of the program, 1,420 or roughly two thirds of the Tier 0 engines believed to be operating in the region were registered. Operators are eligible for fee refunds if they permanently retire equipment from the region or if the particulate matter (PM) emission rate from an engine is lowered using an approved emissions reduction measure. Similar requirements for Tier 1 engines will take effect in 2014.

Biomass Boilers

Using renewable energy sources, such as wood based biomass, in district energy systems will help the region reduce the use of fossil fuels and meet Metro Vancouver’s air quality and climate change goals. Biomass boilers under 50MW are currently regulated under the Metro Vancouver Boilers and Process Heaters Regulation Bylaw (No. 1087). Changes to the Bylaw will help reassure residents that these systems do not introduce new environmental or health issues.

OPEN BURNING

Regardless of whether for waste disposal (backyard burning, land clearing), ambience (firepits) or heating (outdoor wood-fired boilers), open/outdoor burning results in the creation of more smoke than other forms of disposal or controlled combustion. Smoke introduces fine particulate matter (PM2.5) to the air which can affect human health. Metro Vancouver is proposing new requirements for open/outdoor burning to reduce the impact of localized smoke on urban residents living near to these sources.

In June 2012, the World Health Organization classified diesel exhaust as carcinogenic to humans. Diesel exhaust particles are responsible for 67% of the lifetime cancer risk associated with air pollution in the Metro Vancouver region.

More information about the Non-Road Diesel Engine Emission regulation can be found on www.metrovancouver.org/nonroaddiesel.
WHERE THERE’S FIRE, THERE’S WOOD SMOKE

If you’ve ever roasted marshmallows around a campfire you’ll be familiar with wood smoke. What you may not know is that some of the constituents of wood smoke are toxic or carcinogenic. Wood smoke can increase the risk of heart and lung diseases, and make you more susceptible to illness. Children, the elderly, and people with existing lung and heart disease are especially vulnerable. Even healthy individuals can experience eye, nose and throat irritation because of wood smoke.

In years gone by, many homes were heated by burning wood and sawdust, and Vancouver’s False Creek was home to many smoky beehive burners. Today, areas like False Creek have changed and the beehive burners are gone. However, many local neighbourhoods are still affected by wood burning. Although people enjoy the ambience created by a wood fire, some of those fires can create a different kind of ambience for their neighbours - rooms and homes filled with wood smoke, and health problems.

A recent local survey indicated that the average wood burning appliance in our region is over 30 years old. In addition, less than 10% of the devices in our region are certified as a clean burning low-emission device. The oldest, uncertified devices are the smokiest.

To reduce wood smoke in our neighbourhoods, Metro Vancouver’s Wood Stove Exchange Program offers incentives to replace an uncertified wood burning appliance with a newer, low emission unit. A $250-$350 rebate is available from Metro Vancouver for electric, natural gas, propane, or certified wood burning replacement appliances. Additional rebates, such as the $300 rebate from Fortis for EnerChoice appliances, are available for the cleanest devices.

IF YOU BURN, THERE ARE MANY WAYS TO BURN SMART AND BURN CLEAN:

- Burn only clean, seasoned wood
- Build small hot fires and avoid smouldering
- Get your chimney inspected and swept regularly
- Use a low emission device and learn how to operate it correctly

If you burn, there are many ways to burn smart and burn clean.
Faced with a warming planet, local regional governments have committed to reducing the greenhouse gases emitted from providing services for residents. Metro Vancouver, most of the region’s municipalities, and nearly all the other communities in British Columbia have agreed to become “carbon neutral” (see right column).

Metro Vancouver has looked at greenhouse gas emissions from a range of sources such as vehicles, buildings, the drinking water system, and waste water treatment. Significant reductions in greenhouse gas emissions have already been made:

- Waste water treatment plants in the region now produce less than a third of the amount of greenhouse gases than they did in 1997. Further improvements are also being made.
- In Metro Vancouver’s vehicle fleet, new hybrid and all-electric vehicles have been purchased, replacing some conventional cars and trucks and reducing fuel use.
- Several Metro Vancouver buildings have had solar hot water heaters installed and energy-efficient lighting upgrades.

Some emissions can’t be completely eliminated yet (from natural gas burned to heat our buildings and the vehicles that use gasoline and diesel). To offset these remaining greenhouse gas emissions, innovative projects are underway (see left).

3 COOL PROJECTS
TO COOL OUR PLANET

STORING CARBON IN MATURE FORESTS KEEPS AN IMPORTANT GREENHOUSE GAS OUT OF THE AIR AND PROVIDES BEAUTIFUL NATURAL SPACES FOR US ALL TO ENJOY.

GREENHOUSE GASES FROM LANDFILLS CAN BE KEPT OUT OF THE AIR AND USED TO PROVIDE ENERGY.

NEW ELECTRIC VEHICLES DO NOT EMIT GREENHOUSE GASES

CARBON NEUTRALITY
Under the Climate Action Charter, local governments aim to become carbon neutral in their “traditional local government services” by 2012. Metro Vancouver signed the Charter in 2007.

Metro Vancouver is following four steps to achieve carbon neutrality:

I. Measure all greenhouse gas emissions
II. Reduce emissions as much as possible
III. Implement offsets projects
IV. Purchase carbon credits as a last resort, from accredited organizations

CARBON CREDITS AND OFFSETS
Local governments can’t become carbon neutral just by reducing emissions - fuel needs to be burned to provide essential services to the public - but there are other ways to reduce greenhouse gas emissions. Carbon credits can be earned by reducing greenhouse gas emissions from other projects. These credits “offset” the emissions from essential services.
HOTTER THAN WE SHOULD BE: EXTREME EVENTS AND CLIMATE CHANGE

Human societies have always experienced extreme weather events, and different parts of the world are subject to different events. But we are hearing more and more about these events, and they seem to be occurring more often and sometimes with greater severity.

The cause appears to be climate change (see the How? below). Scientists have studied decades of data and are forecasting that extreme weather events are increasing and will increase more in the future.

Climate change is not completely unavoidable. Emissions of greenhouse gases that we have already caused in the past will persist in the atmosphere for a very long time. As a result we will see some impacts on climate and we need to take steps to prepare for a world of more extreme events. We can also take steps to reduce our greenhouse gas emissions today and in the future, to lessen the effects of climate change (see "3 Cool Projects" to the left as well as Metro Vancouver’s efforts towards carbon neutrality).

Climate change is demonstrating how closely connected our world is. The choices we make in our everyday lives may have far reaching effects. See what you can do to reduce your emissions (www.metrovancouver.org).
DISTRICT ENERGY

District energy systems - sometimes called community energy systems or neighbourhood energy utilities - provide heating, hot water and cooling for homes and offices in a neighbourhood from a centralized facility. In some cases, a cogeneration system generates on-site electricity for the buildings as well.

Electricity and natural gas are often used to produce the heat and hot water we need. The use of centralized rather than individual home and office systems can be more efficient as well as more carefully controlled in terms of releases of air pollutants and greenhouse gases. Centralized systems waste less energy and can make use of alternative energy sources such as geo-exchange, solar, biomass, and waste heat recovery [see right]. As a bonus, many people report that distributed heating (often in the form of in-floor radiant heating) is superior in comfort.

Some district energy systems have been in use for decades in our region. These include the steam system in the downtown core and systems at the University of British Columbia and the hospitals. New district energy systems are also being developed (see map below).

CONDOS GET HEAT FROM SEWERS – ENERGY INNOVATION IN VANCOUVER

Untreated urban sewage contains heat energy and is a renewable energy source. In Vancouver’s Southeast False Creek (SEFC), an innovative neighbourhood energy system uses this energy to provide heat and hot water to local buildings. More than 70% of the SEFC’s total heat needs are supplied through the SEFC Neighbourhood Energy Utility’s (NEU’s) sewage heat recovery. As a result, neighbourhood greenhouse gas emissions are reduced by close to 65%.

The NEU is self-funded and provides a return to the City of Vancouver’s taxpayers while supplying service to customers at competitive rates. It also helps SEFC building developers meet energy efficiency and green building requirements cost effectively and with reduced risk.

The City of Vancouver is working to establish and expand systems like the NEU, and looking for opportunities to support using renewable energy sources that would otherwise be wasted.
As far back as the 1980s, agencies received complaints about haze and smog from residents of the Lower Fraser Valley. Still today, our views can become hazy and washed out because of air pollutants, rather than the vividly coloured scenery we see when our air is clean and crystal clear. “Visual air quality” refers to the effect of air pollution on our views.

The brownish tinge we sometimes see in the haze is associated with nitrogen dioxide, much of which comes from vehicle tailpipes in our region, and soil dust. The white haze is caused by small particles suspended in the air. Some small particles are emitted from burning, transportation, heating, and industrial activities, but pollutant gases including ammonia, sulphur dioxide, and organic vapours, as well as nitrogen dioxide, all contribute to the formation of additional small particles in the air. Visual air quality, also known as visibility, can become impaired at relatively low pollutant levels, even at levels far below those traditionally used to classify good air quality.

We have found that the impacts of impaired visual air quality are widespread: affecting our feelings of wellbeing, spiritual needs and participation in cultural events, and our economy. Metro Vancouver is currently working with other government agencies to solve the problem. A project is underway in the Lower Fraser Valley to understand which air pollutants we need to reduce and what actions we can take to protect and improve our visual air quality.

Learn more about visual air quality and this project at www.clearairbc.ca.
These photos show downtown Vancouver and the North Shore mountains. Degraded visual air quality has changed the view dramatically.

WE KNOW WHEN WE SEE IT BUT HOW DO YOU MEASURE A VIEW?

The agencies working on the Lower Fraser Valley visual air quality project have developed a visual air quality rating (VAQR) to measure and report visual air quality conditions in the Lower Fraser Valley.

The VAQR was developed by asking local residents to categorize different levels of visual air quality impairment using photos of a view in the Lower Fraser Valley. Each photo was matched with air quality data. By looking at how people categorized the view when different amounts of pollution were present, a scale was defined for the VAQR.

The VAQR was tested in the summer of 2012, a period in which our views of the mountains were affected by haze on many days.

Photos are a great way of capturing how views look. Check out LIVE photos of the views near you at www.clearairbc.ca/community
HELP! THERE’S SOMETHING IN THE AIR

WHO SHOULD I CONTACT?

**METRO VANCouver**

Metro Vancouver manages air quality in the region, which includes controlling pollution from air emissions, operating the ambient air monitoring network, and addressing complaints about outdoor air quality issues from odour to smog to visible pollution such as dust and smoke. Air pollution knows no boundaries, so we also work collaboratively with other agencies to solve air quality problems affecting the whole airshed.

**VANCOUVER COASTAL HEALTH AUTHORITY AND FRASER HEALTH AUTHORITY**

Health Authorities work collaboratively with other agencies on outdoor air quality issues in the region. Their focus is on educating the public about the sources and health impacts of air pollution, supporting regulatory activity to improve air quality and encouraging small but positive changes in everyday activities that help people reap the health benefits of cleaner air. They also deal with a number of issue-specific indoor air issues such as second hand smoke where prohibited by provincial legislation and reported exposure to indoor air borne contaminants.

**BC MINISTRY OF ENVIRONMENT**

The BC Ministry of Environment regulates air emissions, including compliance and enforcement activities and air quality complaints, outside of Metro Vancouver including in the eastern Fraser Valley. The Ministry also works collaboratively with the other agencies involved in protecting air quality in the region through interagency air quality and visual air quality groups and provides support in developing local air quality and emissions management strategies to local governments.

**FRASER VALLEY REGIONAL DISTRICT**

The FVRD has air quality planning authority at the eastern end of the Lower Fraser Valley and works collaboratively with Metro Vancouver and the BC Ministry of Environment in a number of important areas such as air quality monitoring, air quality advisories and visual air quality management.

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<tr>
<td>Outdoor air quality and odour complaints in Metro Vancouver</td>
<td>Metro Vancouver: 604-436-6777</td>
</tr>
<tr>
<td>Outdoor air quality complaints in FVRD</td>
<td>BC Ministry of Environment: 604-582-5200</td>
</tr>
<tr>
<td>General outdoor air quality information enquiries</td>
<td><a href="mailto:AQInfo@metrovancouver.org">AQInfo@metrovancouver.org</a></td>
</tr>
<tr>
<td>Smoking vehicles</td>
<td>604-435-SMOG (7664)</td>
</tr>
<tr>
<td>Smoking vehicles (trucks and buses)</td>
<td>1-888-775-8785</td>
</tr>
<tr>
<td>Burning approval for yard debris</td>
<td>your local municipality</td>
</tr>
<tr>
<td>Backyard burning complaints</td>
<td>your local fire department</td>
</tr>
<tr>
<td>Workplace indoor air quality</td>
<td>WorkSafe BC: 604-276-3100</td>
</tr>
<tr>
<td>Indoor air quality health concerns</td>
<td>your local health authority</td>
</tr>
</tbody>
</table>

**ADDITIONAL GENERAL INFORMATION ABOUT AIR QUALITY AND ITS IMPACTS ON HEALTH AND THE ENVIRONMENT IS AVAILABLE AT:**

- [www.metrovancouver.org/air](http://www.metrovancouver.org/air)
- [www.bcairquality.ca](http://www.bcairquality.ca)
- [www.bclung.ca](http://www.bclung.ca)