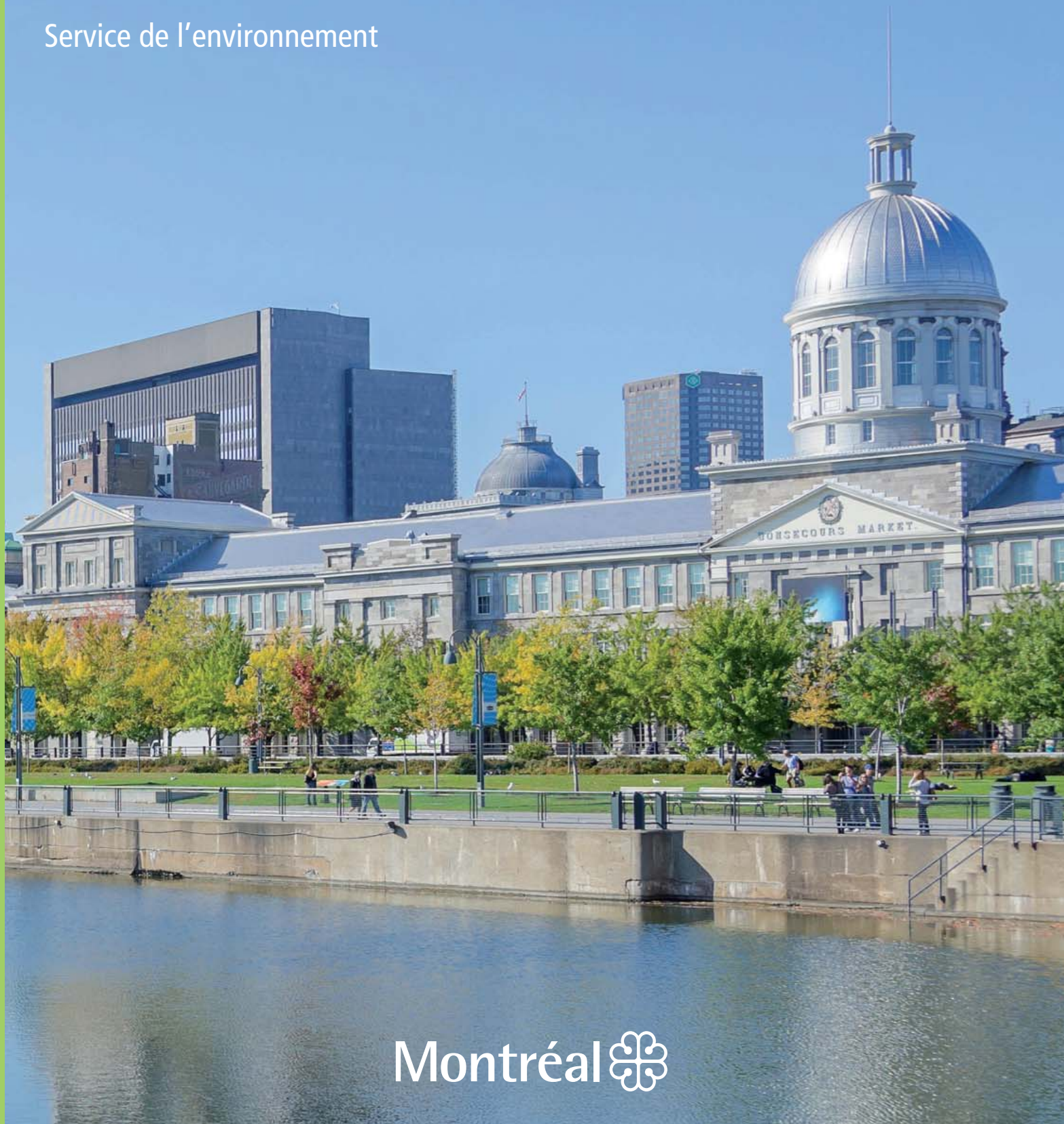
2014 Environmental Assessment Report

# AIR QUALITY IN MONTRÉAL

Service de l'environnement




Montréal

# Highlights

## PORTRAIT OF THE AIR QUALITY

- Fine particles ($PM_{2.5}$) are responsible for 63 days of poor air quality. Of these, 10 smog days were observed in the wintertime. There were no smog days during the summer.
- The proportion of poor air quality hours during the year was less or equal to 1%, except at station 13 (15% were due to the presence of a pizza wood-burning oven) and at station 17 (12% due to the presence of a transport equipment yard).

## ROAD TRANSPORTATION, A SOURCE OF POLLUTION

- Concentrations of gas pollutants associated with road traffic (carbon monoxide and nitrogen dioxide) vary depending on the time of day, thus resulting in a different pattern according to peak traffic periods. These concentrations are lower during the weekends.
- Annual concentrations of formaldehyde decreased in the past 10 years, whereas those of acetone remained the same. These results are similar to those observed in other Canadian cities.

## DOSSIER: WOOD HEATING

- The health and environmental impacts of residential wood heating were thoroughly documented in 2014. For the first time, a report on $PM_{2.5}$ emissions was prepared for the Montréal agglomeration. Although based on estimates, the report indicates that residential wood heating was the second source of $PM_{2.5}$ emissions after transportation, all categories included (maritime, road, airport).
- The results of a study conducted on the samples collected at station 55, located in Rivière-des-Prairies, demonstrated that, when the quality of air was poor, one third of the volume of fine particles stemmed from wood combustion.
- The draft regulation on solid fuel devices and fireplaces was the subject of a public consultation, whose results will be known in 2015 upon filing of the recommendations of the *Commission permanente sur l'eau, le développement durable et les grands parcs*.

## NEW AMBIENT AIR QUALITY STANDARDS

- New Canadian ambient air quality standards for fine particles and ozone came into force in 2015. A comparative study between these standards and the results obtained for the Montréal agglomeration reveals that these standards were compliant in the 2012-2014 period.

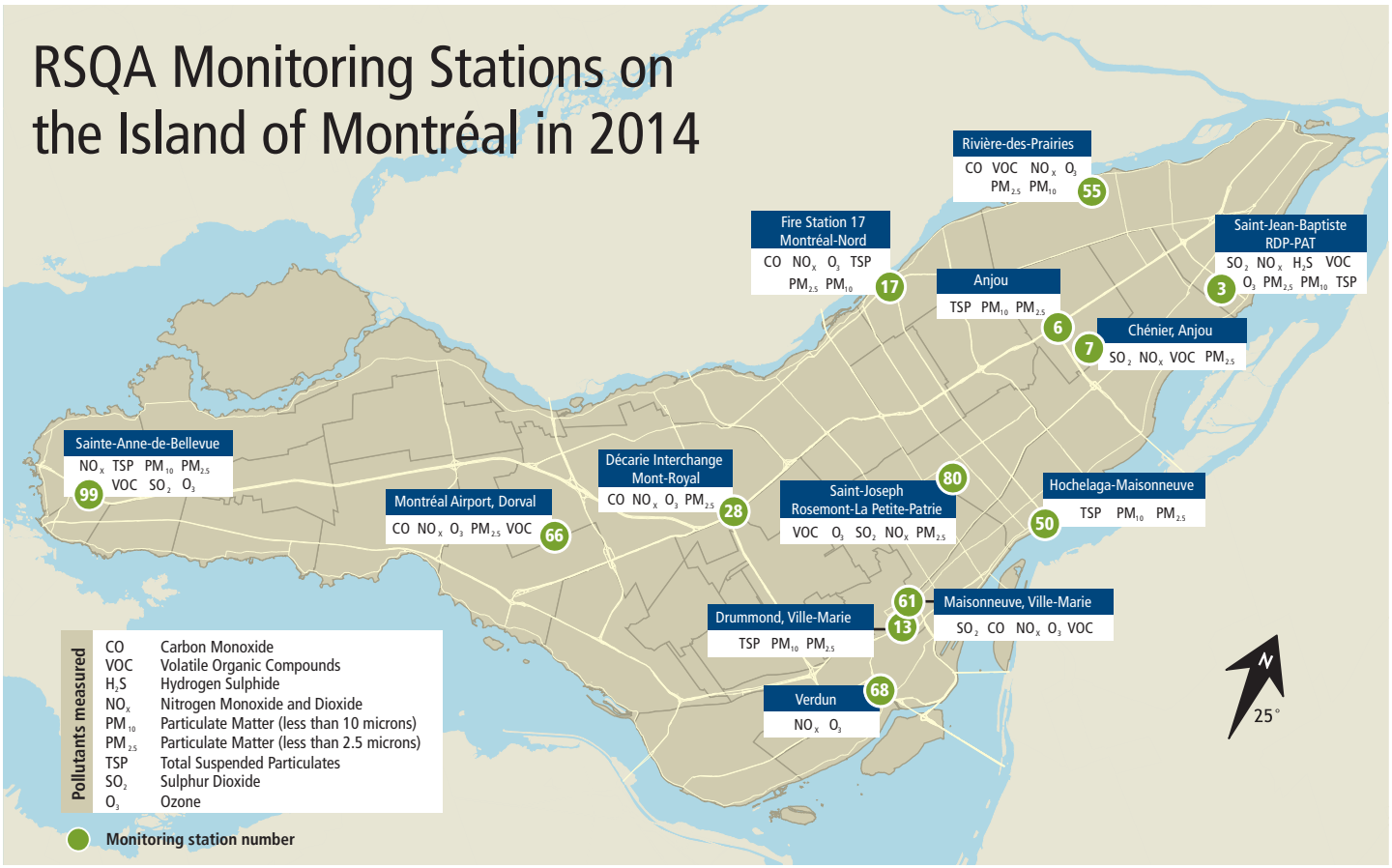
# The RSQA network

In order to measure air quality on the territory of the agglomeration of Montréal, the *Réseau de surveillance de la qualité de l'air* (RSQA) relies on 13 monitoring stations equipped with all sorts of monitors. Some of these monitors continuously measure concentrations of pollutants such as ozone, carbon monoxide, sulphur dioxide, nitrogen monoxide and fine particles, thus allowing for the calculation of a real-time air quality index. This index, as well as many data on air quality in Montréal, are available 24/7 on the rsqa.qc.ca Web site.

Other measures and analyses, performed according to the sampling schedule of the National Air Pollution Surveillance (NAPS) Network, are used to collect information on volatile organic compounds and polyaromatic hydrocarbons, among other substances. The results obtained allow us to draw an annual portrait and to follow the evolution of these pollutants in Montréal over a number of years.

Each year, some devices, having reached the end of their useful life, are replaced. In preparation for the replacement of these fine particle measuring devices, scheduled for 2015, Sharp 5030 monitors were deployed in five stations. A performance analysis of these devices was achieved by comparing the results obtained with those of the TEOM-FDMS presently in use. A technical team comprised of eight people is responsible for the maintenance, measuring accuracy and validation of the many results obtained with these devices.


The Sharp 5030 monitor takes continuous measurements of fine particles in the ambient air.

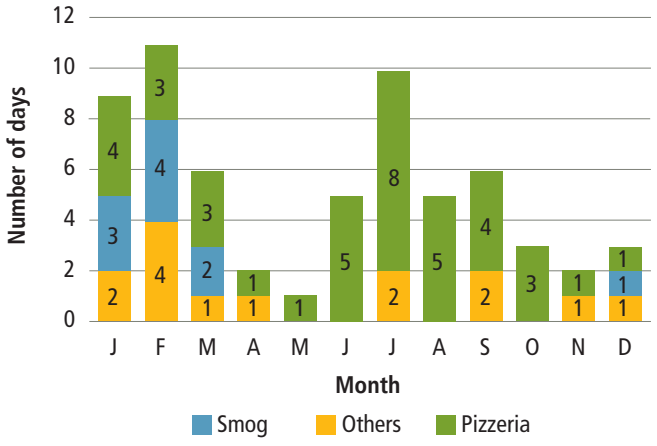


# Portrait of the air quality

What exactly makes for a poor air quality day? According to established criteria, a day is qualified as being a poor air quality day as soon as fine particle concentrations are greater than 35 µg/m$^3$ during at least three hours for a given station. To be qualified as a smog day, strong concentrations must be measured over at least 75% of the territory of the Montréal agglomeration. Smog days generally result in high concentrations of fine particles over a 24-hour period and sometimes longer.

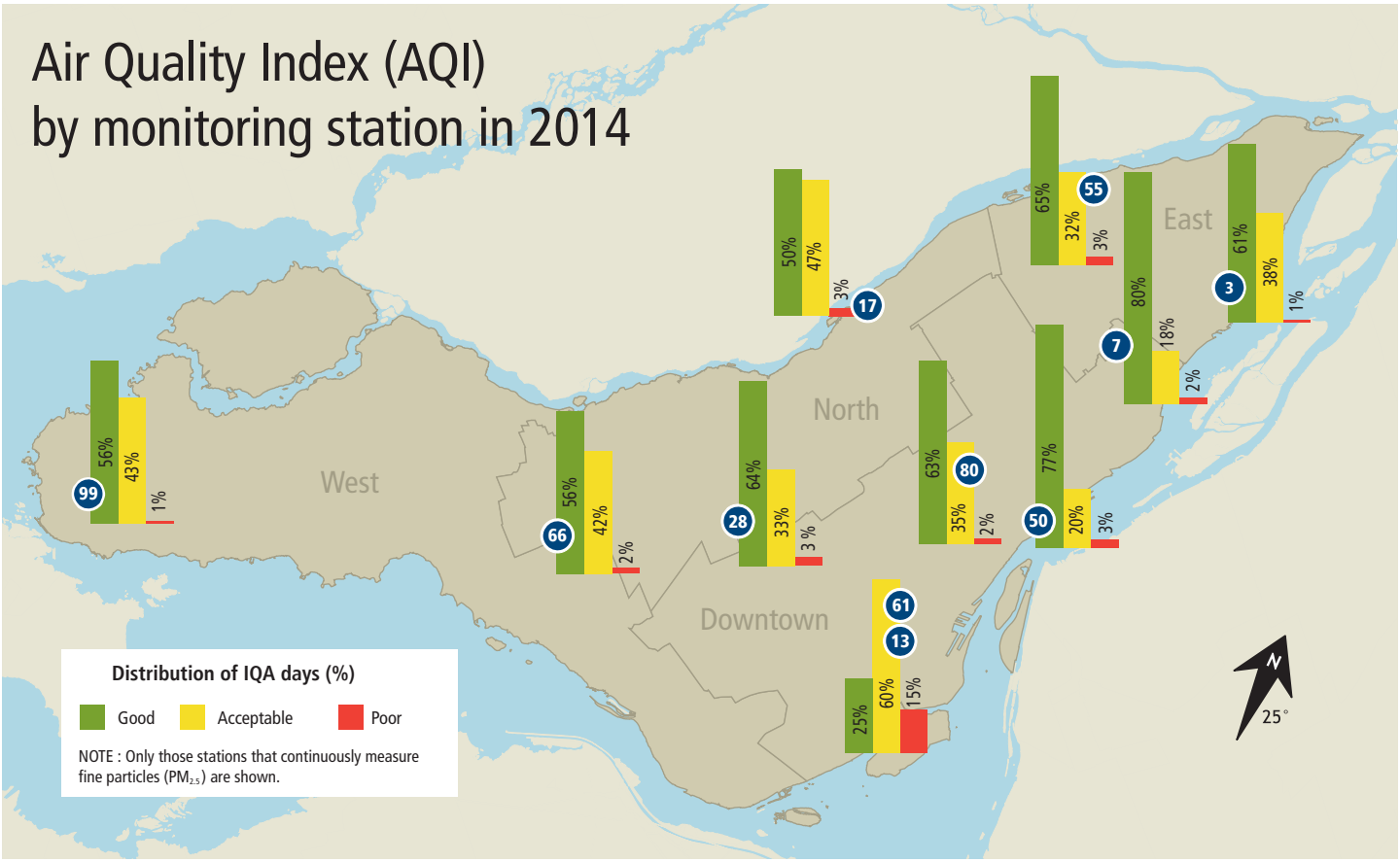
In 2014, 63 poor air quality days were recorded, of which 10 were smog days. The poor air quality of these days was due to the presence of fine particles. The majority of these days occurred in the wintertime. As was observed in 2013, the 10 smog days observed in 2014 were recorded in the months of January, February, March and December. There were no smog days in the summertime.

**Poor air quality days in Montréal in 2014 due to fine particles ($PM_{2.5}$)**




The other events responsible for poor air quality days were:

- the presence of a wood-burning pizza oven (39 days, station 13);
- the Loto-Québec fireworks, July 12 and 13 (2 days, station 50);
- a burning building in downtown Montréal, February 28 (1 day, station 13);
- other human activities with a local impact (11 days, all stations).



Referring to the map, the air quality indices calculated for each station are presented as percentages in relation to the total number of days in a year. Station 13 is the one that stands out the most with the greatest number of poor air quality days (15% or 54 out of 365 days). This is mainly due to the presence of a smoke plume during meal hours from a nearby pizza wood-burning oven. Excluding these periods, the quality of the air is similar to that measured by other stations.

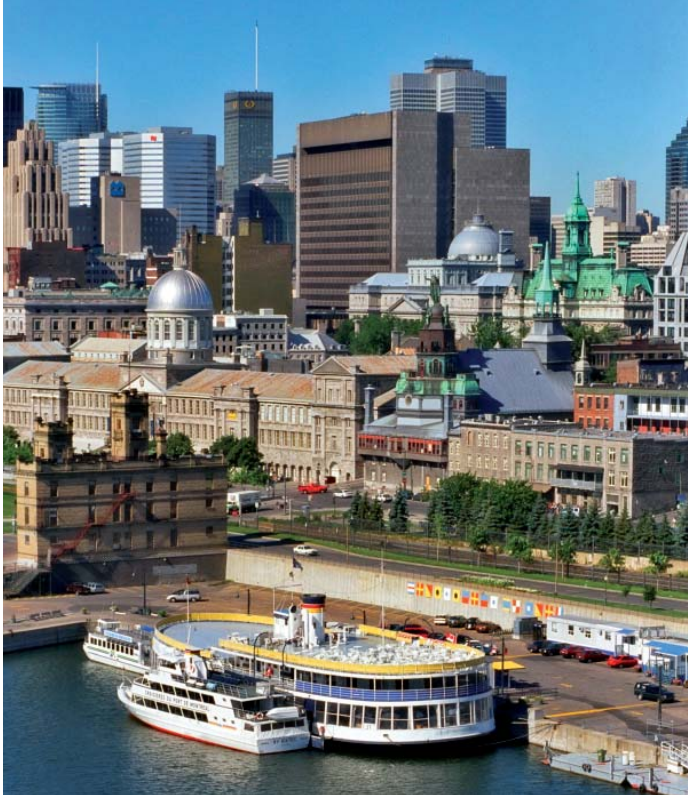
**Air quality - Number of days for 2014***

| Station | Good | Acceptable | Poor |
|---|---|---|---|
| 3 | 224 | 138 | 3 |
| 7 | 291 | 66 | 8 |
| 13 | 93 | 217 | 54 |
| 17 | 184 | 171 | 10 |
| 28 | 232 | 122 | 11 |
| 50 | 280 | 74 | 11 |
| 55 | 238 | 117 | 10 |
| 66 | 204 | 154 | 7 |
| 80 | 213 | 118 | 6 |
| 99 | 204 | 158 | 3 |

* Due to power failures or failures of another nature, the total number of days may be less than 365.

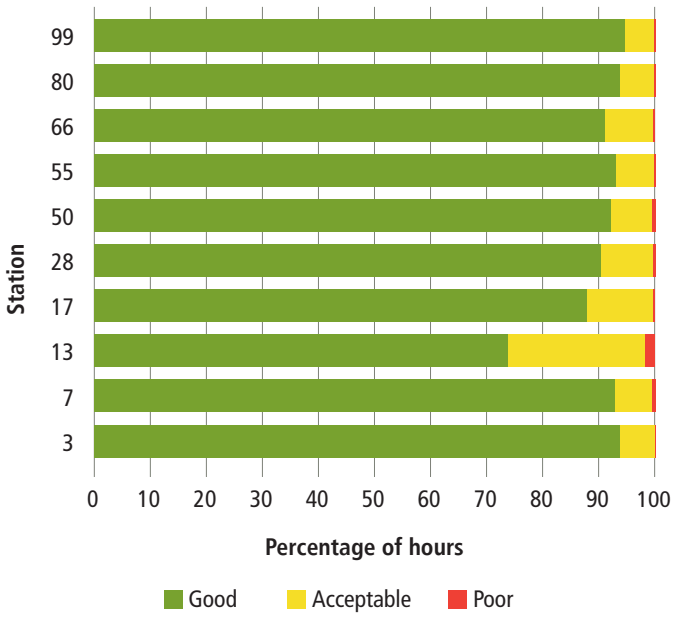
When a local event occurs, such as a smoke plume from a pizza oven or fireworks, it's the whole day that is categorized as "poor", despite the fact that only a few hours of that day may have been impacted by strong concentrations of fine particles. In such cases, the fine particles are dispersed as they are emitted and the air quality quickly reverts to an acceptable or good status. After refining our analysis of the results obtained, to consider the number of hours during which air quality was deemed poor, acceptable or good, it is worthwhile mentioning that for a majority of monitoring stations, air quality was good for more than 90% of the hours during which measures were taken during the year.

Stations 13 and 17 stand out with respectively 74% and 88% of hours classified as being of good air quality. Station 13, again in 2014, is the station having recorded the greatest number of poor air quality days. However, despite the fact that these days show an occurrence of 15% (54 days out of 365), the result accounts for only 2% of the total number of hours during which measures were taken (157 hours out of 8,563). It's also at this location that the percentage of acceptable air quality hours was the greatest



with 24%. The results for station 17 are explained by the coming and going of the vehicles responsible for the maintenance of roadworks and the transshipment of abrasives, since the facilities of the borough's Department of Public Works are located nearby. The records show that 12% of hours are categorized as being acceptable in terms of air quality, whereas less than 0.5 % of hours are deemed poor. As far as the other stations are concerned, the percentage of hours in the acceptable category varies between 10 and 5%, whereas the percentage in the poor category is inferior or equal to 1%. These results demonstrate the impacts of local sources on the air quality of a specific environment.

**Air quality in 2014 (% of hours)**



# Road transportation a source of atmospheric pollution

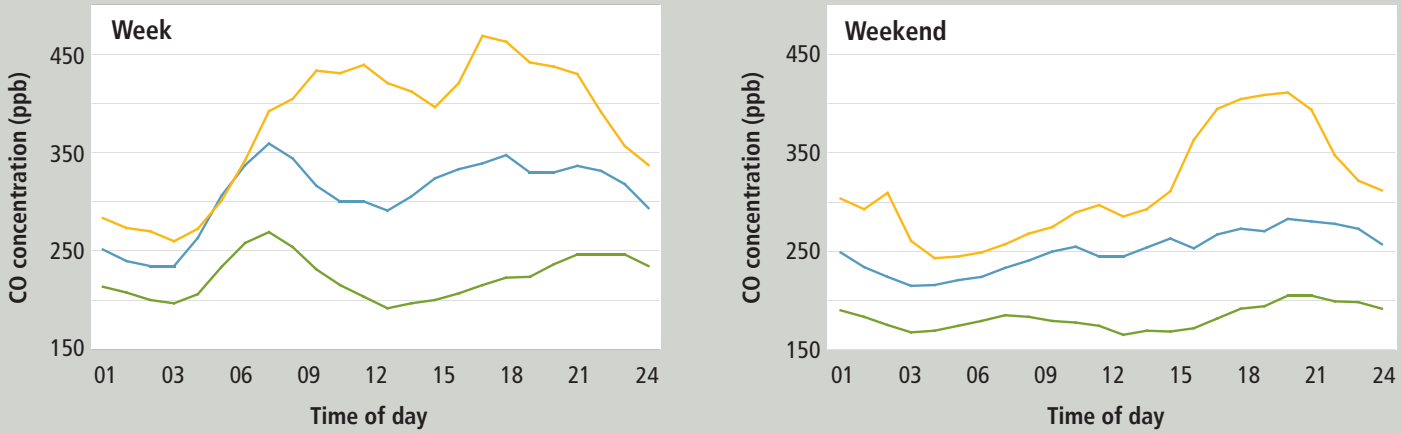
Nitrogen oxides ($NO_x$), carbon monoxide (CO), fine particles ($PM_{2.5}$) and volatile organic compounds (VOC) are major atmospheric pollutants generated, among others, by the transportation sector. The *Société d'assurance automobile du Québec* (SAAQ) issues, on an annual basis, more than 900,000 vehicle registrations to residents of the Montréal agglomeration, which includes registrations for passenger, institutional, professional or commercial vehicles as well as restricted circulation and off-road vehicles (motorcycles, snowmobiles, etc.). This number is further increased by the number of vehicles commuting from north and south shore communities.

Traffic congestion is no surprise to anyone during the morning and evening peak hours on the Island of Montréal. The pollution generated by this traffic is heavier at those monitoring stations located near the major throughways. That's the case for station 61, located downtown at the corner of Metcalfe and De Maisonneuve Streets, and station 28, located at the intersection of Autoroutes 40 and 15 on Duncan Road. These stations recorded CO and nitrogen dioxide ($NO_2$) levels far superior to those recorded by other stations for the same time periods.

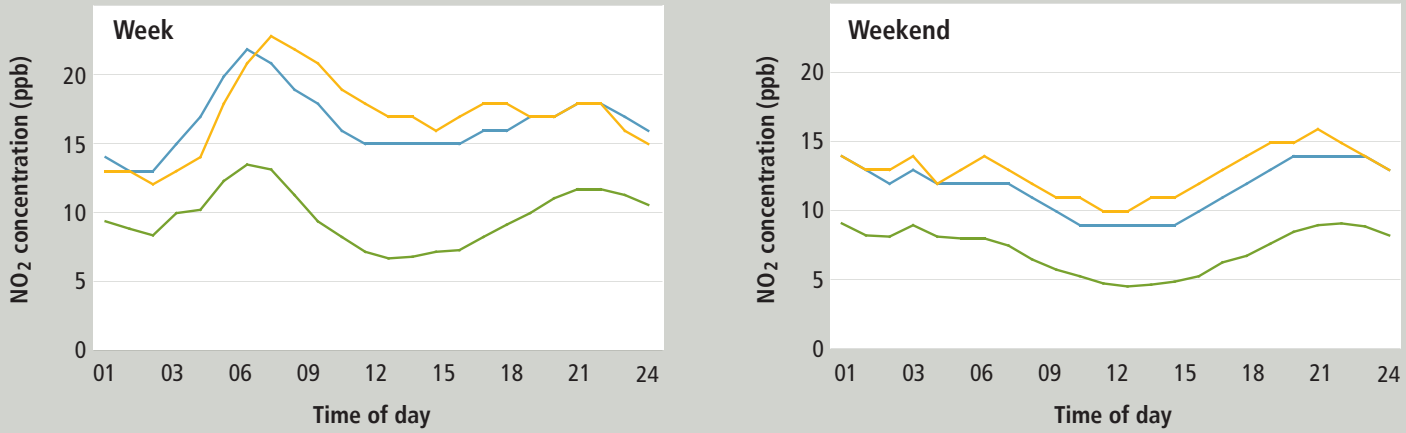
## GAS POLLUTANTS

The graphs below show that the hourly concentrations of CO and $NO_2$ are much greater at stations 28 and 61 during the week compared to those measured at the same stations during the weekend. These concentrations also exceed those measured at other stations of the RSQA, and this, irrespective of whether the day that is monitored falls during the week or weekend.

**Hourly concentration of carbon monoxide (CO) for 2014**




**Hourly concentration of nitrogen dioxide ($NO_2$) for 2014**



The average concentrations of CO for the week, at stations 28 and 61, are approximately 30% and 40% superior to those of other stations for the same period. One can observe a similar trend for $NO_2$, at stations 28 and 61, where the average concentrations are 45% greater than those at other stations during the week. There are clearly two concentration peaks for CO and $NO_2$, which correspond to the morning and evening traffic situations independently of the station. The variance, though slighter during the weekend, is still present.

The low concentrations of carbon monoxide and nitrogen dioxide measured at the other stations are due to the absence of significant automobile traffic. These results amply demonstrate that automobiles are a major source of air quality deterioration in Montréal. However, it is possible to get around in the city while polluting less. Carpooling, public transit and active modes of transportation are all ecological alternatives.

## VOLATILE ORGANIC COMPOUNDS

Volatile organic compounds (VOC) can react with other substances, such as $NO_x$, present in the ambient air to form ozone and secondary fine particles. The RSQA has measured the concentrations of 17 distinct polar VOCs, also known as aldehydes-ketones, since the beginning of the 1990s in five monitoring stations. In urban environments, these compounds are omnipresent, given that they are used in a multitude of products: paints, solvents, insecticides, cosmetics, detergents, etc. They are also found in the emissions generated by wood combustion and road vehicles.

Among the compounds measured, formaldehyde (HCOH) is classified in Group 1 by the International Agency for Research on Cancer (IARC). This agency was created by the World Health Organization (WHO) in 1965. It classifies substances according to their degree of carcinogenicity for humans and coordinates and leads the research on cancer. Given that formaldehyde is classified in Group 1, it is carcinogenic for humans.

Acetone has not been classified by the IARC and is not suspected of being carcinogenic for humans. However, it is one of the most often used organic solvents on the market. Also, similar to formaldehyde, it is irritating and corrosive for the skin and eyes.

**Groups used by the IARC to classify agents[1]**

| | |
|---|---|
| Group 1 | The agent is carcinogenic to humans. |
| Group 2A | The agent is probably carcinogenic to humans. |
| Group 2B | The agent is possibly carcinogenic to humans. |
| Group 3 | The agent is not classifiable as to its carcinogenicity to humans. |
| Group 4 | The agent is probably not carcinogenic to humans. |

A retrospective of the last 10 years is presented for the two aldehydes-ketones as they are the most common in the ambient air in Montréal.

### Formaldehyde

With respect to formaldehyde, annual concentrations decreased at all stations from 3-4 µg/m³ in 2004 to approximately 1 µg/m³ in 2014.

Automobile non catalyzed exhaust fumes are the greatest anthropogenic (man-made) source of formaldehyde. Although, by law, automobile manufacturers must install catalytic converters on new petrol fueled vehicles since the mid-1970s, some of the exhaust fumes are not catalyzed, as the converters are not 100% efficient.

1. WORLD HEALTH ORGANIZATION. *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans*, "Agents classified by IARC monograph", [Online], updated March 23, 2015. [monographs.iarc.fr/ENG/Classification/] (Consulted April 21, 2015).

For reference purposes, the 1 hr and 8 hr standards of Bylaw 90 (2001-10 of the Communauté métropolitaine de Montréal (CMM)) are of 12 µg/m³ for **formaldehyde**. The Bylaw does not prescribe any standard for acetone.

Station 61, located downtown and strongly impacted by road traffic, is the one that boasts the highest annual average over the past six years. This result can perhaps be explained by the ever increasing number of vehicles in Montréal. Indeed, according to *Montréal en statistiques*, the total number of vehicles on the road in the agglomeration of Montréal has increased by 7.4% from 2004 to 2013 (the most recent year available). On the opposite end of the spectrum, station 99 often records the lowest annual average concentrations of formaldehyde, owing to its remote location, far away from industrial, commercial and vehicle contamination sources. This station serves as a barometer of the pollution originating in Ontario and the northeastern United States.

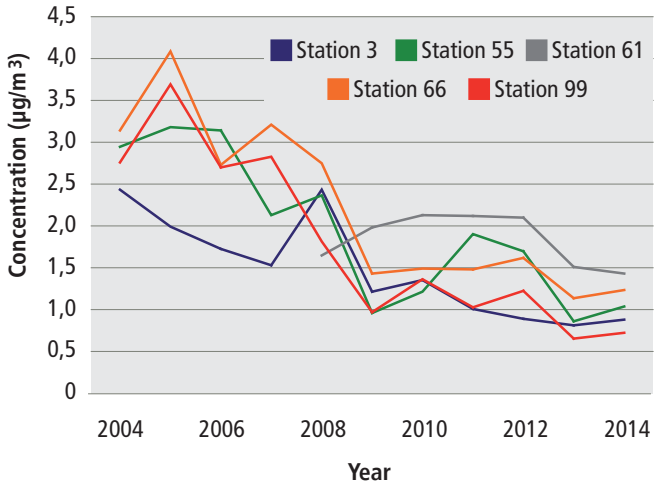
## Acetone

Acetone is used as a solvent in chemical and petrochemical plants and is one of the key intermediates used in the synthesis of many materials and polymers.

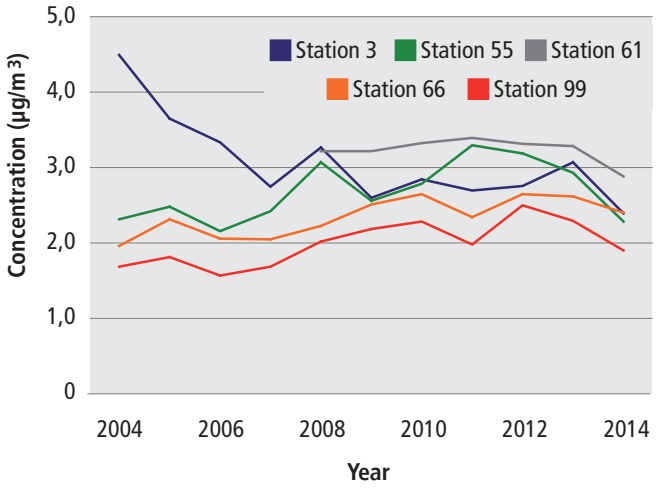
From 2004 to 2008, the greatest values of acetone were measured at station 3 located in the East end of Montréal, a sector known for the presence of chemical and petrochemical factories. However, since 2009, acetone concentrations have decreased and are now comparable to those of other stations.

During the past six years, it is station 61 that presents the greatest annual acetone values, despite its downtown location far from the plants. Scientific literature confirms that automobile exhaust fumes are the greatest source of acetone emissions, which explains the higher results recorded at station 61, which bears the brunt of heavy road traffic on a daily basis.

**Average annual formaldehyde values in Montréal (2004-2014)**




**Average annual acetone values in Montréal (2004-2014)**



## Elsewere in Canada

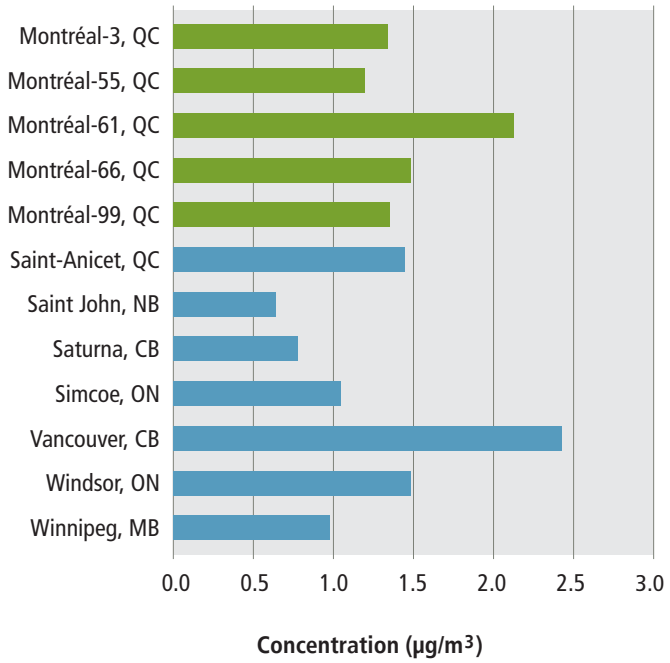
There are few cities elsewhere in Canada that monitor and analyse aldehydes-ketones. The following graphs compare annual concentrations of formaldehyde and acetone for the RSQA stations with those in the rest of Canada for 2010 (the most recent data available).

The formaldehyde data for the cities of Saint John (New Brunswick) and Saturna (British Columbia) are the lowest in Canada with annual averages of 0.6 and 0.8 µg/m$^3$ respectively. The station in Saint John, whose Metropolitan Region is home to 120,000 residents, is located in a residential district, whereas the station on the Island of Saturna is located near farms in a municipality with a population of barely 400. Consequently, transportation and industries are not a major factor for these stations. The City of Vancouver (British Columbia) has a population density comparable to Montréal's and the formaldehyde results of its monitoring station located in an industrial environment are the greatest in Canada with an average of 2.4 µg/m$^3$. Montréal's station 61 ranks second with 2.1 µg/m$^3$. All other stations have similar annual averages in the 1-2 µg/m$^3$ range.

The stations of the agglomeration of Montréal are those that present the greatest acetone annual averages in Canada for 2010. The cities of Winnipeg (Manitoba), Windsor (Ontario) and Saint-Anicet (Quebec) have similar acetone concentrations. The city of Windsor is greatly affected by cross-border traffic and the State of Michigan's industries (coal-fired plants, automobile industries, etc.). Winnipeg's station is located in a commercial district, while Saint-Anicet's is located near an agricultural zone. Vancouver's station, which has the greatest annual average in Canada for formaldehyde, boasts the lowest annual average for acetone, with a value of 1.4 µg/m$^3$, even lower than that of Saturna (1.6 µg/m$^3$).

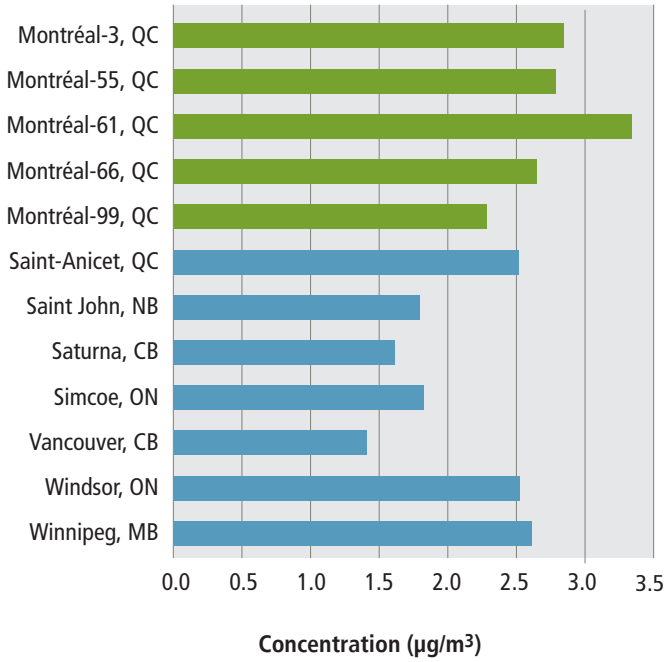
The aldehydes-ketones values recorded by Montréal's stations are in line with those of other Canadian cities. An overview of the 2004-2014 data for formaldehyde and ketone highlights the annual fluctuations and allows us to identify local issues such as the impact of transportation. Consequently, this monitoring is essential as some of these compounds present health risks and may result in air quality problems.

**Formaldehyde concentrations in Canada in 2010**




Source: Data base of the National Air Pollution Surveillance (NAPS) Program compiled by Environment Canada

**Acetone concentrations in Canada in 2010**




Source: Data base of the National Air Pollution Surveillance (NAPS) Program compiled by Environment Canada

# Assessment of emissions

## NATIONAL AND PROVINCIAL INVENTORIES

The data concerning fine particle emissions in Canada and Quebec, for 2011 (the most recent year available), are drawn from the National Pollutant Release Inventory (NPRI) Web site where they were published in February 2013[2].

According to these data, in Canada, firewood combustion ranks first among all emission sources of fine particles followed by industrial, transportation and other sources, when disregarding open air sources. The scenario is similar in Quebec as regards the contribution of the various emission sources. Therefore, firewood combustion holds the first rank followed by industrial, transportation and other sources.

**Fine particles emitted in Quebec in 2011 by type of activity (%)**

Firewood combustion 64%

Industrial sources 19%

Transports 14%

Various sources 3%

These statistics only take into account the fine particles emitted during anthropogenic or man-made activities. The exclusion of open-air sources (those emissions resulting from agricultural activities, non residential construction, the dust from paved and unpaved roads, mine tailings, waste, open air fires and controlled burns) and natural sources (forest fires, vegetation and the soil) is explained by the desire to quantify the emissions related to man-made activities, for control purposes. Indeed, it is difficult to mitigate open-air or natural sources. When these emissions are accounted for, the contribution of firewood combustion results in it slipping to the second rank among emission sources. However, their emissions remain superior to those of industrial and transportation sources.

These inventories were conducted on the basis of estimates and a certain margin of error is inevitable, as is the case with all estimates. They are mainly useful in establishing a relative ranking among emission sources.

## MONTRÉAL INVENTORY

An inventory of fine particle emissions was conducted for the Montréal agglomeration in order to assess the proportion of emissions due to firewood combustion.

According to the inventory performed in 2014, there were 70 **businesses** (pizzerias and bagel bakeries) that used wood ovens in the Montréal agglomeration and their emissions of fine particles were of approximately 60 tons, less than 10% of the total emissions contributed by residential combustion.

An estimate of the emissions from the **transportation** sector was calculated based on the Reported emissions by province for 2011 and by relying on the number of registrations for the region, in order to determine the contribution by the road network, whereas the contribution of air, train and maritime transportation was determined on a prorata basis of the population. The result obtained was approximately 818 tons of fine particles. In 2008, Montréal adopted a transportation plan intended to improve the quality of life of its citizens and the quality of its environment. The plan, to be implemented over a period of 10 years and relying on strategies to reduce dependency on the automobile, should result in a decrease of fine particles contributed by the transportation sector.

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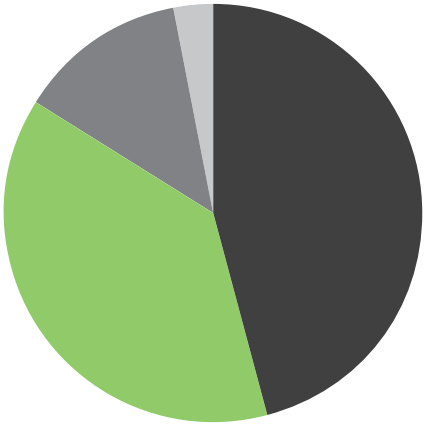
2. ENVIRONEMENT CANADA. *National Pollutant Release Inventory – National air pollutant emission summaries of the key atmospheric pollutants*, 2011, published in February 2013. (Personal communication by Gilles Morneau).

With respect to emissions from **industrial sources**, the data were drawn from the NPRI for the year 2011 and were estimated at 241 tons[3]. Since the beginning of the 1970s, Montréal's *Division du contrôle des rejets industriels* has monitored and controlled those industries likely to emit particles in the atmosphere, relying on Bylaw 2001-10 (MMC) pertaining to air purification. Also, industries must report their atmospheric emissions. The emissions of more than one hundred industries are accounted for in this report.

Finally, the contribution of **residential wood combustion**, 701 tons, was calculated by Environment Canada on the basis of a wood combustion model and the number of devices recorded in 2009 in the database of the *Service de l'évaluation*. These data were confirmed by an inventory of the habits of citizens of the borough of Ahuntsic-Cartierville performed in the summer of 2014.

**Results of fine particle ($PM_{2.5}$) emissions Agglomeration of Montréal**



| ACTIVITY SECTOR | TONS $PM_{2.5}$ | PERCENTAGE |
|---|---|---|
| Transportation | 818 | 45% |
| Residential wood combustion | 701 | 39% |
| Industrial sources | 241 | 13% |
| Commercial wood combustion | 59 | 3% |

The compilation of these data indicates that residential wood combustion is the second source of fine particles on the territory.

With its 50,000 devices, the City's contribution to Montréal agglomeration emissions is equal to 400 tons of fine particles. Simulations, performed on the basis of the proposed regulatory scenario, indicate that the number of fine particle emissions resulting from residential wood combustion would decrease to some 40 tons, for a reduction of 90%.

## POSSIBLE SOLUTIONS

Integrating the measures provided for in the city's Bylaw within the Bylaw on Clean Air Regulations could contribute to lowering residential wood combustion's first rank among fine particle emission sources to the third rank after transportation and industrial sources.

Since the adoption of Bylaw 11-018 concerning the construction and conversion of buildings, no other intervention has been performed by the City to lower the emissions from solid fuel devices. The regulatory proposal submitted to a public consultation in 2014 will allow us to finalize what was initiated in 2009 through the adoption of a bylaw aiming to control the emissions of existing devices. Once this source is controlled, our focus will turn to transportation modes and the need to reduce the dependency on petrol powered vehicles, which in turn will also contribute to reducing greenhouse gas emissions, the subject of ambitious reduction plans adopted in 2013.

3. ENVIRONEMENT CANADA. *National Pollutant Release Inventory Downloadable Datasets*, [Online]. [www.ec.gc.ca/inrp-npri/default.asp?lang=en&n=0EC58C98] (Consulted August 20, 2014).

# Specialized studies

## FINE PARTICLES

From 2009 to 2013, 441 samples were taken at Montréal station 55 to détermine the chemical composition of particles. The methodology used to collect the samples (a speciation apparatus) allows for the reconstruction of the mass of particles by adding the percentages of the components of said particles[4]. The data analysis was performed taking into account the seasons, the winter season including the months of November to March. Among the compounds identified, organic matter (OM) and elementary carbon (EC), representative of wood combustion, were more abundant in the fine particles collected in the winter. By using the existing relationship between concentrations of levoglucosan, a marker typical of wood combustion, and the concentrations of organic matter and elementary carbon, the contribution of wood heating to fine particles may be quantified.

When the exercise is conducted for the Rivière-des-Prairies sector, the average contribution of wood heating is 2.8 µg/m$^3$. This value accounts for 27% of the sector's fine particle concentrations measured in the winter. However, in the winter, there are certain days for which the results are much greater than the usual average, reflecting those days where air quality is poor. When these results are analysed based on the existing relationship between levoglucosan, organic matter and elementary carbon, the impact of wood combustion on concentrations of fine particles reaches 11 µg/m$^3$ or 33% of the concentration of fine particles measured in the sector. These results were then compared to those of another station also affected by wood heating, operated by Environment Canada and located outside the Montréal region. For the same years, an analysis of the results revealed a contribution of 27% by wood heating to concentrations of $PM_{2.5}$, thus confirming the observations made at Montréal's station 55.

**Fine particles measured at station Montréal-55 (2009-2013)**

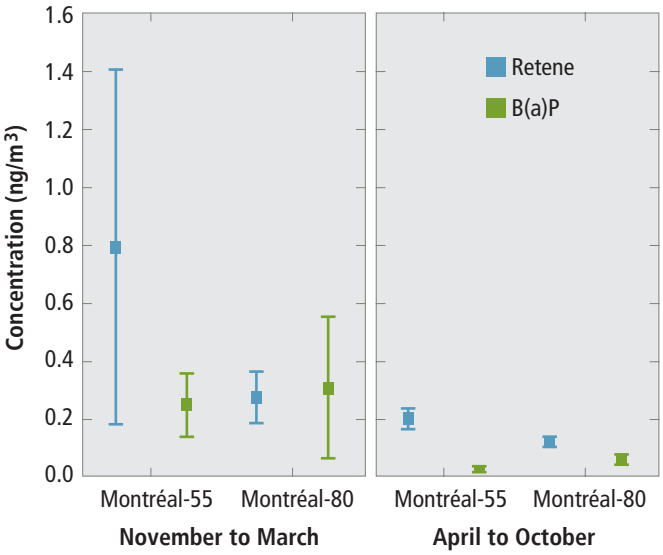
| Winter average | Weight of wood heating | Poor air quality | Weight of wood heating |
|---|---|---|---|
| 10.2 µg/m$^3$ | 2.8 µg/m$^3$ | 32.9 µg/m$^3$ | 11 µg/m$^3$ |
| | 27% | | 33% |

## POLYAROMATIC HYDROCARBONS

A certain number of toxic or mutagenic chemical products are found in wood smoke, including polyaromatic hydrocarbons (PAH), aldehydes and free radicals. Retene (PAH) seems unique to wood combustion emissions and is generally found in much greater concentrations in softwoods than in hardwoods[5].

From 2009 to 2013, PAHs were measured at stations Montréal-55 and Montréal-80. The results for retene and benzo(a)pyrene are presented below. A seasonal analysis reveals that concentrations of the two compounds are 4 to 8 times greater in the winter than during the other seasons. Retene concentrations are also much higher at the Rivière-des-Prairies station than at the Saint-Joseph station.

**Retene and benzo(a)pyrene concentrations in Montréal (2009-2013)**




4. DABEK-ZLOTORZYNSKA, EWA et al. (2011). "Canadian National Air Pollution Surveillance (NAPS) $PM_{2.5}$ speciation program: methodology and $PM_{2.5}$ chemical composition for the years 2003-2008". *Atmospheric Environment*, vol. 45, no. 3, p. 673-686.

5. BARI M., G. BAUMBACH, B. KUCH AND G. SCHEFFKNECHT (2009). "Wood smoke as a source of particle-phase organic compounds in residential areas", *Atmospheric Environment*, vol. 43, no. 31, p. 4722-4732.

# Regulations

## MONTRÉAL IS ACTING

By adopting its Bylaw on solid fuel devices in 2009, Montréal demonstrated that it was preoccupied by the quality of the air that its citizens breathe. To be consistent in its approach and since it has been demonstrated that concentrations of fine particles are still high, the City proposed going further by adopting a bylaw, complementary to the first adopted in 2009. A bylaw, adopted under its powers respecting environmental matters, is more appropriate to the existing situation. Also, EPA's proposal to tighten the emission standards for wood-burning heating devices is timely and considers the improved technologies now available.

This regulatory proposal is intended to reduce the impact of the use of solid fuel heating devices in Montréal by considering the following:

- the impact of fine particles on human health;
- the quantity of fine particles emitted by wood combustion in urban milieus;
- concentrations of fine particles recorded in Montréal;
- new air quality standards to be complied with starting in 2015;
- the various potential improvement scenarios during smog episodes;
- the new performance standards proposed by the EPA, a reputed American organization in the environmental protection field;
- the consistency between this new bylaw and Bylaw 11-018 concerning construction already in force;
- the possibility of using the device during a power failure.

This bylaw incorporates less polluting alternatives and provides citizens with a transition period of a few years.

The new regulatory proposal, to be submitted to a public consultation in November 2014, is in response to comments expressed in April 2009 to control emissions by existing devices and to obtain a substantial improvement in air quality.

## PUBLIC CONSULTATIONS

The *Commission permanente sur l'eau, l'environnement, le développement durable et les grands parcs* (Standing committee on water, the environment, sustainable development and large parks) was entrusted with the responsibility of holding a public consultation on the regulatory proposal concerning the use of solid fuel-burning devices and fireplaces. Representatives of the *Service de l'environnement de la Ville de Montréal* and of the *Direction de la santé publique de Montréal* presented an overview of the regulatory proposal last November 18, 2014, and clearly emphasized its merits in terms of air quality and public health. Many representatives of the various departments involved were on hand to respond to the preoccupations of the citizens present. Overall, the proposal was well received by the participants.

A total of 25 memorandums from citizens, environmental groups and members of the industry were presented to the commission during the public consultations held December 8

and 9, 2014. The details concerning this issue are available on the Website of the Standing Commissions at the following address: ville.montreal.qc.ca/commissions, section *Transport et environnement - Projet 2014*.

In short, the participants were unanimous regarding the urgency to act rapidly to prohibit the use of devices that performed poorly and were very pollutant. The proposed date, 2020, was seriously criticized, both by citizens and the industry, as it was pointed out that the City would be tolerating for another five years emissions of toxic particles for human health, when technological solutions were already available to mitigate the situation. Moreover, the majority of interventions emphasized the need for the City to peg its regulation to a recognized and consensual standard, such as EPA's.

In light of the preoccupations presented by participants during the public consultations, the commissioners held working sessions to review the draft proposal. The commission's recommendations will be filed in March 2015 during a public information meeting. The final regulation will be adopted by the City Council.

## The draft bylaw submitted to a consultation

In accordance with the guidelines defined by the Administration with respect to this issue, it is proposed to adopt a bylaw using the powers of the City in environmental matters to regulate the use of solid fuel devices:

- This draft bylaw is intended to prohibit, as of December 31, 2020*, the use of any device or fireplace that uses solid fuel, save for those certified devices that emit no more than 1.3g/h* fine particles in the atmosphere. The prohibition shall not apply to EPA certified pellet devices, installed before the coming into force of this bylaw.
- The bylaw shall also prohibit, starting in 2015, the use of a solid fuel device when a smog warning is in effect, which prohibition shall also apply to pellet devices. The use of a solid fuel device shall however be authorized in the event of a power failure lasting more than 3 hours*.
- The owner of a solid fuel device or fireplace and the owner who replaces or removes such a device or fireplace shall report to the Administration within the 60 day-period* following the coming into force of the bylaw.
- Section 12 of the Bylaw respecting the construction and conversion of buildings (11-018) shall be amended to be consistent with this new bylaw.

For further information, please consult the City's Web site at ville.montreal.qc.ca/chauffageaubois.

* To be confirmed upon adoption of the Bylaw.

# New ambient air quality standards

## CANADIAN STANDARDS

With the view of replacing the existing Canadian standards, new Canadian ambient air quality standards (CAAQS) were developed for fine particles and ozone. Efforts are ongoing to elaborate standards for carbon dioxide ($NO_2$) and sulphur dioxide ($SO_2$). These new standards are at the heart of the Air Quality Management System (AQMS) put forth by the Canadian Council of Ministers of the Environment (CCME). The CAAQS relative to $PM_{2.5}$ and ozone were established in the form of objectives under the Canadian Environmental Protection Act (1999) in May 2013. The federal, provincial and territorial governments all have a role to play and responsibilities to assume in the implementation of the AQMS.

October 11, 2012, all provincial governments, with the exception of Québec's, agreed to start implementing the Air Quality Management System (AQMS). Although Québec supports the general objectives of the AQMS, it will not implement the System as the AQMS provides federal requirements for industrial emissions that would duplicate Quebec's Clean Air Regulation. However, Québec will collaborate with the other provinces toward the elaboration of other elements of the System, particularly air zones and airsheds.

Despite this situation, the proposed standards constitute a basis for the comparison of the fine particle and ozone results obtained for the agglomeration of Montréal.

**Canadian ambient air quality standards (CAAQS) for fine particles ($PM_{2.5}$) and ozone**

| Pollutant | Period of average | Standards (numeric values) 2015 | 2020 | Measure parameter |
|---|---|---|---|---|
| $PM_{2.5}$ | 24 hours (calendar day) | 28 µg/m³ | 27 µg/m³ | Three-year average of the 98th annual percentile of daily average concentrations over 24 hours |
| $PM_{2.5}$ | One year (calendar year) | 10 µg/m³ | 8.8 µg/m³ | Three-year average of the average annual concentrations |
| Ozone | 8 hours | 63 ppb | 62 ppb | Three-year average of the 4th greatest annual value of the daily maximums of the average concentrations over 8 hours |

## PORTRAIT OF MONTRÉAL'S SITUATION

### Fine particles

For the 2012-2014 period, as far as the "Three-year average of the 98th annual percentile of daily average concentrations over 24 hours" parameter is concerned, the results lie below the two proposed standards (28 and 27 µg/m³). And, as regards the "Three-year averages of the average annual concentrations" for the same period, the result of 9.6 µg/m³ complies with the 2015 standard. The situation has improved, since 2009-2011, a decrease of 1 µg/m³ having been observed up until now. However, attaining the objective of 8.8 µg/m³ scheduled for 2020 will prove to be a huge challenge. It's only by implementing measures to control fine particles at the source, for instance through an ambitious transportation plan, that Montréal's administration will reach its goal.

**Concentration of fine particles expressed in µg/m³**

| Three-year average of the 98th annual percentile of daily average concentrations over 24 hours<br>Standard = 28 in 2015 Standard = 27 in 2020 | | | | |
|---|---|---|---|---|
| 2008-2010 | 2009-2011 | 2010-2012 | 2011-2013 | 2012-2014 |
| 31 | 29 | 28 | 26 | 25 |

| Three-year averages of the average annual concentrations<br>Standard = 10 in 2015 Standard = 8.8 in 2020 | | | | |
|---|---|---|---|---|
| 2008-2010 | 2009-2011 | 2010-2012 | 2011-2013 | 2012-2014 |
| 10.4 | 10.6 | 9.9 | 9.7 | 9.6 |

### Ozone

Ozone concentrations recorded on the Island of Montréal range below the 2015 and 2020 standards. This parameter is on a downward trend, a positive development for future years.

**Ozone concentration expressed in ppb**

| Three-year average of the 4th greatest annual value of the daily maximums of the average concentrations over 8 hours<br>Standard = 63 in 2015 Standard = 62 in 2020 | | | | |
|---|---|---|---|---|
| 2008-2010 | 2009-2011 | 2010-2012 | 2011-2013 | 2012-2014 |
| 60 | 56 | 58 | 57 | 55 |

## RSQA outreach

RSQA chemists participated in conferences to contribute to the dissemination of the air quality results and the furtherance of the know-how and scientific methods used for the Montréal RSQA network.

Mrs. Diane Boulet, a chemist and team leader, participated in a workshop jointly organized by Ontario's Ministry of the Environment and the Air & Waste Management Association in Sarnia, on the measurement of volatile organic compounds and leak detection and repair (LDAR) programs. She gave a presentation prepared in collaboration with Mr. Sébastien Wagner, an engineer with the City's *Division du contrôle des rejets industriels*, and entitled "*Ambient Air Monitoring Network & Review of LDAR By-law Amendment*".

Mrs. Sonia Melançon, a chemist, also gave a presentation on the analysis results of volatile organic compounds during the convention of the *Association francophone pour le savoir* held in Montréal. Her presentation, entitled "The evolution of the analysis of BTEXs (benzene, toluene, ethyl benzene, xylene) in the air of Montréal", was well received by the conventioneers and was the subject of an article on the blog "*Sciences dessus dessous*" of journalist Jean-François Cliche.

ville.montreal.qc.ca/RSQA

**VILLE DE MONTRÉAL**

**PRODUCTION**
Service de l'environnement
Division de la planification et du suivi environnemental
Réseau de surveillance de la qualité de l'air (RSQA)

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