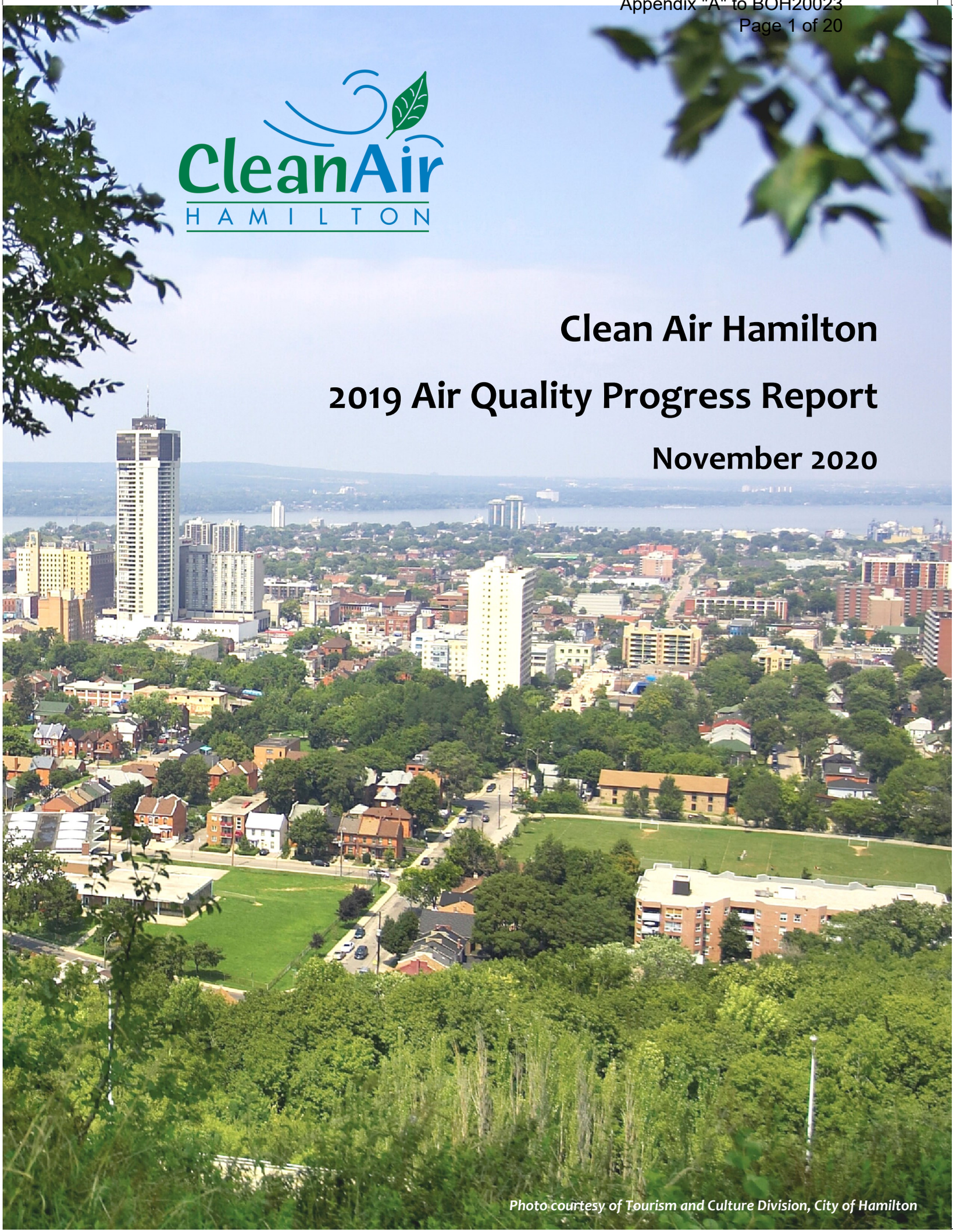

Clean Air Hamilton

2019 Air Quality Progress Report

November 2020

Photo courtesy of Tourism and Culture Division, City of Hamilton

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Top Row (left to right): Brian Jantzi, Nico Strabac, George McKibbon, Bruce Newbold (Chair), Dan Dobrin, Andrew Sebestyen, Ed Cocchiarella
Bottom Row (left to right): Trevor Imhoff, Denis Corr, Tiffany Singh, Shelley Rogers, Joel Kaushansky, Lynda Lukasik, Waverley Birch, Karen Logan
Missing: Giuliana Casimirri, Robert Clackett, Rob Conley, Natalie Stacey, Charles Hostovsky, John Lundrigan, Fran Scott, Sara Yonson

Message from the Chair

I am pleased to provide the Clean Air Hamilton 2019 Report which provides annual air quality data and highlights our on-going work to improve air quality in Hamilton. For previous years' activities please go to:

http://www.cleanairhamilton.ca

Over the past year, we continued our work to make improvements to Hamilton's air quality. We now enjoy cleaner air more than in the past, and 2019 Ministry of the Environment, Conservation and Parks (MECP) data (see pages 10-17), show reduced concentrations of several monitored air pollutants across a number of the study locations. Reductions were seen in ozone (O_3), inhalable particulate matter (PM_{10}) and respirable particulate matter ($PM_{2.5}$).

Nevertheless, there were occasional accidents such as demolitions in Hamilton in 2019 that resulted in a dense dust cloud that spread through north Hamilton, raising health concerns among local residents. Public Health's toxicological analysis of the dust collected by the MECP concluded low risk for exposure or long-term concerns with health. As a result, the city's Dust and Particulate Matter Committee, with active participation from industry has developed beneficial resources and guidance materials for construction and demolition projects that will be supplied with any city issued permits.

The Provincial government has also continued to recognize the need to improve air quality, with the province releasing the cumulative effects assessment maps for Hamilton (benzene and benzo[a]pyrene (BaP) in 2019). The maps help businesses see where the cumulative effects policy applies and informs additional requirements within these areas through the Environmental Compliance Approval (ECA) process. Air quality monitoring data shows there has been ongoing improvement in both BaP and benzene levels in recent years (see page 16).

Clean Air Hamilton's mandate includes involving and informing our citizens of all these issues and giving sound, science-based advice and recommendations. Reflecting this, we had begun planning for our bi-annual Upwind-Downwind conference. Planned for June 2020, a sub-committee of Clean Air Hamilton met regularly to begin planning for the event. Unfortunately, COVID -19 disrupted those plans, and the 2020 event was cancelled, although we are proceeding with alternate, virtual options.

We thank Healthy and Safe Communities and Hamilton City Council for their ongoing support of Clean Air Hamilton and its special projects. Funding has allowed us to work closely with local partners including Environment Hamilton, Corr Research, and Green Venture on projects that have raised awareness amongst local citizens about air quality issues, as well as working to improve local air quality. Together, Clean Air Hamilton and its various partners are working to reduce emissions as well as our personal exposures and live healthier lives. Clean Air Hamilton's special projects and this report helps us to do that.

Bruce Newbold, Ph.D.
Chair, Clean Air Hamilton

Strategic Activities

Clean Air Hamilton is dedicated to improving air quality across the City of Hamilton. This is accomplished through sound science-based decision making, using the most up-to-date information and tools available, such as the Hamilton Airshed Model (HAMS) and air monitoring data from the MECP and Hamilton Air Monitoring Network. Clean Air Hamilton focuses on education and outreach, air quality monitoring, and continues to update the HAMS and identify major sources of pollution to prioritize action for maximum air quality improvement and exposure reduction. Clean Air Hamilton has identified the following issues for research, communication and program activities in collaboration with our partners.

Governance & Structure:

Remain a multi-stakeholder group dedicated to improving air quality by increasing public perception and expanding Clean Air Hamilton membership while providing communication and promotion of realistic, science based decision making and sustainable practices.

Air Zone Management:

Comply with the MECP and Canadian Ambient Air Quality Standards. This is done using a systematic approach aligning with the federal Air Zone Management Framework (AZMF) and support for a mandatory industrial air emission monitoring regulation.

Transportation:

Encourage and facilitate more use of public and active transportation through commentary on transportation-related matters, supporting educational programs and localized monitoring leading to detailed information to encourage changes in behaviour.

Air Monitoring:

Improve air monitoring activities across the City of Hamilton by providing support for additional portable air monitors and fixed air monitors that provide real-time monitoring for contaminants of concern in Hamilton.

Dust & $PM_{2.5}$ Mitigation:

Lower concentrations of $PM_{2.5}$ across the City of Hamilton below Canadian Ambient Air Quality Standards by effectively utilizing the airshed model to create partnerships and pollution inventory specific to street sweeper and dust mitigation program.

2019 Meetings	2020 Meetings
January 14, 2019	January 13, 2020
February 11, 2019	February 10, 2020
March 11, 2019	March 9, 2020
April 8, 2019	n/a
May 13, 2019	*May 11, 2020
June 10, 2019	*June 8, 2020
August 12, 2019	*July 13, 2020
September 9, 2019	*September 14, 2020
October 7, 2019	*October 19, 2020
November 18, 2019	*November 9, 2020
December 2, 2019	*December 14, 2020

Clean Air Hamilton Meetings

Clean Air Hamilton meetings are usually held on the second Monday of each month located at 71 Main Street West, City Hall, Room 192/93. As of May 11th, 2020 and until further notice, all meetings are being held virtually. (*Denotes virtual meetings)

Photo courtesy of Tourism and Culture Division, City of Hamilton

Clean Air Hamilton (CAH) - 2019 Funded Projects

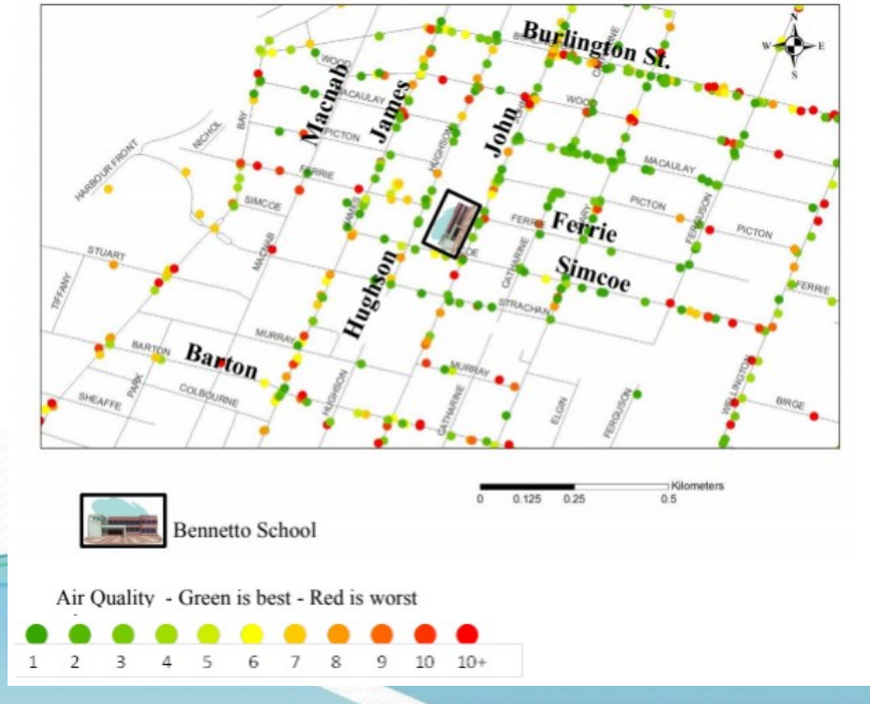
Clean Air Hamilton is an innovative, multi-stakeholder agent of change dedicated to improving air quality in our community. In 2019, Hamilton Public Health Services provided $35,000 to fund projects resulting in air quality improvement and awareness. These projects provide benefits that have reached hundreds of citizens and contributed to improving Hamilton's air quality through monitoring, promotion and increasing awareness. Clean Air Hamilton is proud to support the 2019 funded projects.

Fresh Air for Kids

In 2019, Green Venture and Corr Research teamed up to provide the Fresh Air for Kids program to four Hamilton elementary schools. The focus is educating students, teachers and the public about air quality around schools and the detrimental impact of engine idling. The program took place over a series of four visits and was delivered to Allan A. Greenleaf, Bennetto, and Strathcona Elementary Schools, and Our Lady of Peace Catholic Elementary Schools. The program included classroom work, in-the–field air monitoring and anti-idling awareness, and reached 181 children.

Students were taught about the importance of air quality and about the Air Quality Health Index (AQHI). They also gained an awareness of how their actions can impact and improve the air in their neighbourhoods. Students were able to measure local $PM_{2.5}$ and PM_{10}. The MECP Mobile Air Monitoring van was also used to monitor air quality near the participating schools. This baseline data was developed into air quality maps which students used to decide the best route to travel to and from their school.

Air Quality in the neighbourhood of Bennetto Elementary School



Clean Air Hamilton 2019 Funded Projects Cont'd...

Enhanced Fresh Air for Kids

Post Participation Comments

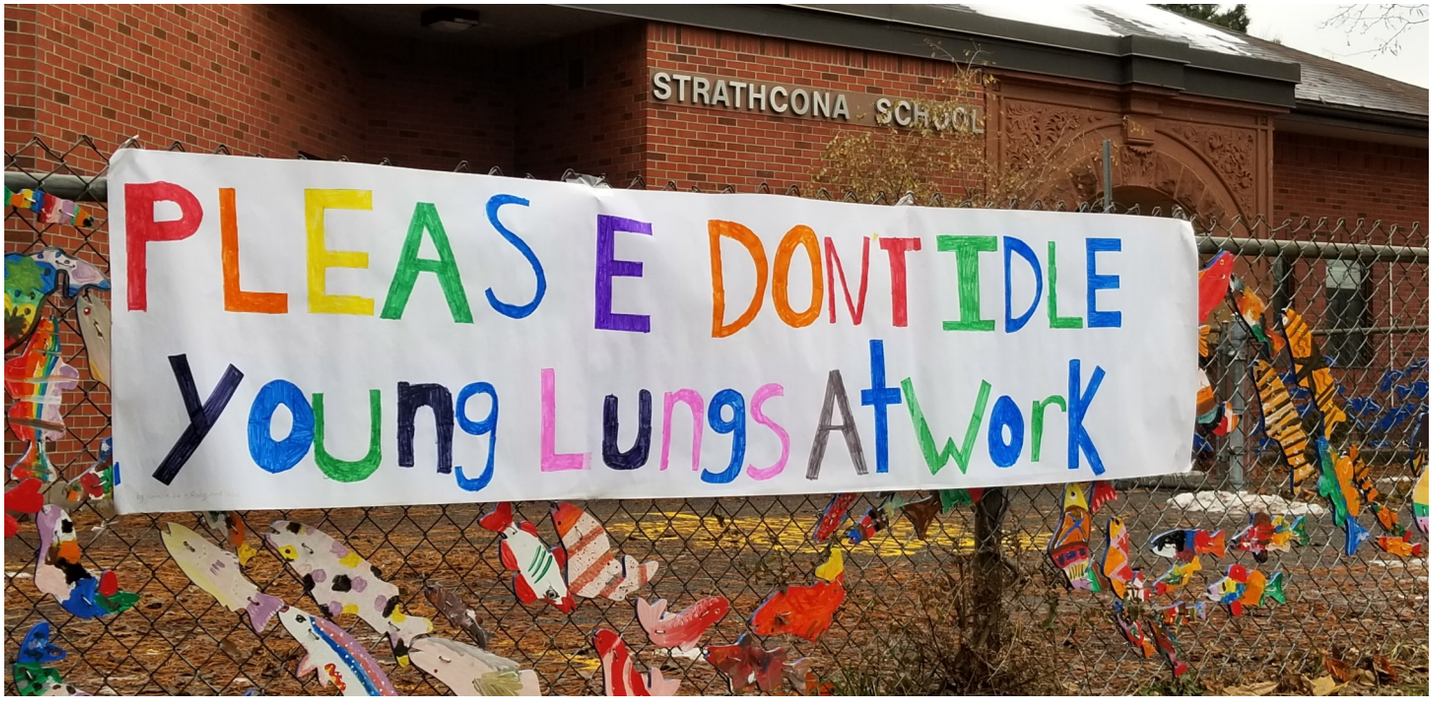
"My favourite part when was we got to time people idling." – Student at Allan. A. Greenleaf Elementary School

"My favourite part of the program was the idling campaign." – Student at Bennetto Elementary School

"All of it [was my favourite part of the program]." – Student at Strathcona Elementary School

"[The program provides] hands on activities that build learning over multiple sessions. Very engaging." – Teacher feedback from Strathcona Elementary School.

Above: A student from Strathcona Elementary holds up a quilt made in class



The City of Hamilton **Anti-Idling By-law No. 07-160** can be found on the City's Bylaw website at:

https://www.hamilton.ca/government-information/by-laws-and-enforcement/city-hamilton-by-laws

Friendly Streets Hamilton

Working together towards more walkable, bikeable neighbourhoods, Friendly Streets is a collaborative between Environment Hamilton and Cycle Hamilton, designed to engage community stakeholders in securing safer cycling and walking conditions in urban Hamilton. The program piloted in 2017 with great success. In 2018, the program received Clean Air Hamilton funding to conduct street-level air quality monitoring with street audits. In 2019, renewed support from Clean Air Hamilton allowed air quality-focused work in these neighbourhoods to both continue and increase.

The 2018 street audits raised concerns from local neighbourhood residents propelling a Friendly Streets and Truck Route collaborative in 2019 to conduct industrial truck counts over a total of eight days, across 12 hour periods. These counts were made possible from the dedicated group of volunteers. Count results ranged from 78 to 388 trucks per count with the highest frequency of trucks occurring at Queen St and York Blvd.

Above: Industrial truck counter volunteers

The Friendly Streets program also conducted walking and cycling audits around parts of Hamilton including Hamilton General Hospital and the Gibson and Landsdale neighbourhood. Community reception was very positive with approximately 25 participants.

The Friendly Streets program completed several education and awareness strategies including local media, delegations to Hamilton City Council and community surveys.

Above left: Participants of the Ward 3 cycling audit with Ward Councillor Nrinder Nann. Above Right: Participants cycling down Barton Street

The Importance of Land Use Compatibility

Coordinated municipal land use planning and the MECP (Ministry) air quality policy and regulation are needed to create healthy communities. The Ministry created land use compatibility policies in the 1980s. These policies buffered and separated industry from sensitive land uses like schools and residences. In the 1990s, responsibility for application of these land use policies in Official Plans and Zoning Bylaws was delegated from the Ministry to municipalities such as Hamilton.

This delegation separated the responsibility for applying land use compatibility policy from the Ministry's air quality management and regulation responsibilities. While the Ministry innovated new air computer modelling techniques and air standards regulations, land use compatibility policy didn't evolve in sync with these changes. For example, no compatibility policy was developed to address the Ministry's new policies and regulations for air quality in Ontario including:

- New air zone management and cumulative effects policy;
- Application of site specific and technical air quality standards; or
- New and intricate provisions of *Ontario Regulation 419/05: Air Pollution – Local Air Quality*.

The City of Hamilton has also recently developed Hamilton's Airshed Modelling System that needs to be taken into consideration as well along with these new policies and regulations.

Hamilton's Planning Act decisions must be consistent with the Provincial Policy Statement 2014 (PPS 2014).

In 2019, Clean Air Hamilton commented on Ontario's proposed land use compatibility revisions to the PPS 2014. These revisions strengthen land use compatibility requirements. Clean Air Hamilton believes strengthened land use compatibility policy and regulation will improve community health and strengthen our industrial sector.

Our challenge now is to help innovate and integrate Ministry air quality policy on cumulative effects, air zone management, and alternative standard setting procedures into Hamilton's Official Plan and Zoning Bylaw.

Best Management Practices for Building Demolition

Hamilton's building demolition approval process should be updated to ensure demolitions for higher risk commercial and industrial demolitions follow best practice for dust management - when the Planning Act does not apply. The province can empower municipalities the authority to regulate dust mitigation plans and/or Designated Substance Surveys for non-residential and residential demolition permit application by updating the Ontario Building Code, 1992 to reflect *Ontario Regulation 419/05: Air Pollution – Local Air Quality*.

Together with Hamilton's new Airshed Model, renewed land use compatibility policies and an improve building demolition process, we will create healthier Hamilton communities and stronger viable industries!

Clean Air Hamilton 2019 Funded Projects Cont'd...

Above: Tree measurement for inventory; Parkview neighbourhood; City's Forestry division and a volunteer during the 2019 community tree planting event

Trees Please!

Trees Please! is a citizen science project that collects data with a team of volunteers trained to use specialized equipment. The project comprises a tree inventorying (measuring, identifying and noting any changes on tress) and collecting air quality data, specifically particulate matter levels. The goal of this project is to engage residents on local issues around air quality and urban forest health, by helping community members understand that trees can help improve air quality among many other benefits.

When air quality data is layered with tree maps, strategic tree planting areas can be determined based on those areas with high particulate pollution as well as poor urban canopy tree cover. The main goal is to plant native trees in these vulnerable areas. By working with the neighbourhood residents, tree canopies can be increased through a variety of ways, including an organized free tree giveaway and by partnering with the City's Forestry Division in a community tree planting.

Main goals achieved:

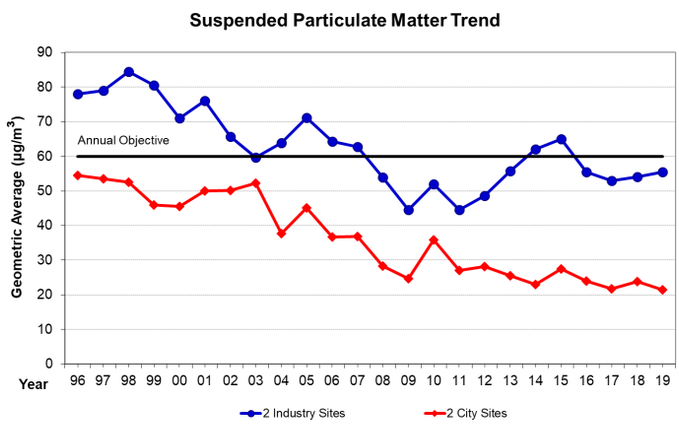
1. Inventoried 411 existing trees in the Parkview Area. This included measuring, identifying and noting any challenges the trees faced
2. Organized air quality monitoring walkabouts and distributed over 600 flyers
3. Increased the native tree canopy through a Free Tree Giveaway (31 trees in total)
4. Organized a community tree planting in 2019, planting 250 native trees with 45 volunteers

Hamilton's Ambient Air Quality Trends 2019

Particulate Material: Total Suspended Particulate (TSP)

Total suspended particulate (TSP) includes all particulate material with diameters less than about 45 micrometers (µm). A substantial portion of TSP is composed of road dust, soil particles and emissions from industrial activities and transportation sources.

There has been a steady decline in TSP at municipal and industrial sites. The 2019 emissions at industrial sites are below the annual objective (AO). The AO is the desired concentration established by the MECP as documented in the Ontario Ambient Air Quality Criteria (AAQC).



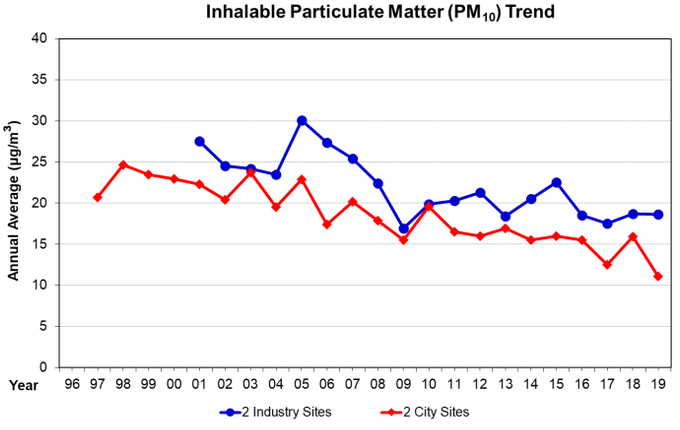
Included in the TSP category are inhalable particulates (PM10) and respirable particulates (PM2.5).

Particulate Material: Inhalable Particulate Matter (PM10)

Inhalable particulate matter (PM_{10}) has a diameter of 10 µm or less. PM_{10} makes up 40-50% of TSP in Hamilton and has been linked to respiratory, cardiovascular and other health impacts in humans.[1]

PM10 is primarily derived from vehicle exhaust emissions, industrial stack and fugitive dusts (non -stack), and the finer fraction of re-entrained road dust.

PM10 at City sites has steadily decreased over the past two decades. This is likely a combination of:



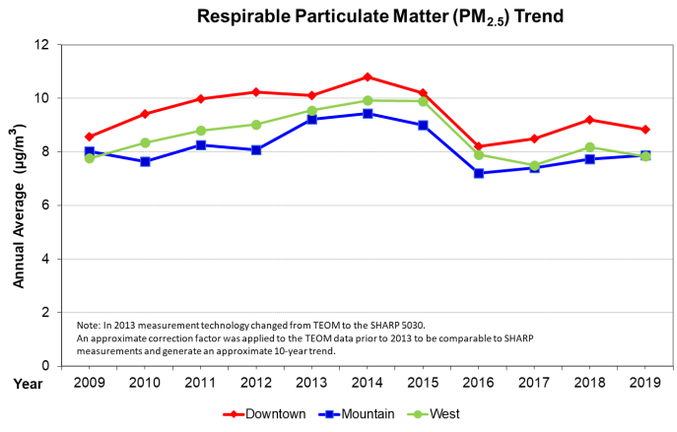
- Better performance of vehicle fleets
- Improved process emissions
- Increased management of dust track-out by industries, and
- The use of better street sweepers and street sweeping practices by the city

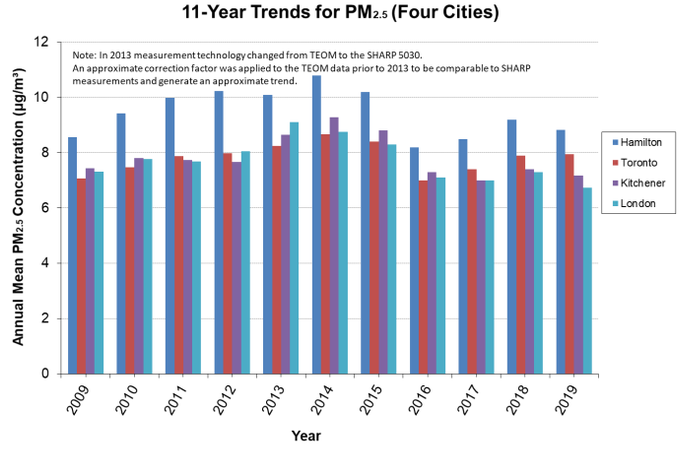
Particulate Material: Respirable Particulate Matter (PM2.5)

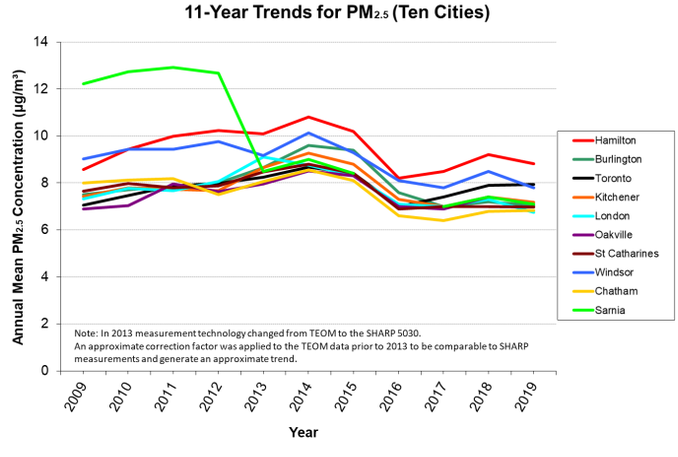
The Ontario government started measuring PM2.5 across Ontario in 1999. PM2.5 makes up about 60% of PM10 and in cities is mostly derived from residential and transportation sectors. Another significant portion of PM2.5 is regionally generated emissions that can travel hundreds of kilometers via wind from where they originated. These transboundary flows play a significant role in Ontario's air quality.

Exposure to fine particulate matter has been associated with hospital admissions and several serious health effects, including premature death[2]. The trend in PM2.5 showed a 3.5% decrease per year since 1999 until 2009 at the downtown and mountain air quality health index sites.

The apparent increase in 2013 is not reflective of a change in air quality but is a result of change in monitoring to a more sophisticated and sensitive PM2.5 monitoring technology. There has been a decline in PM2.5 concentrations across Hamilton with a slight peak in 2019. The Mountain and West remain below the Annual Canadian Ambient Air Quality Standard (CAAQS). CAAQS became more stringent in 2020 (decreasing from 10.0 µg/m^3 to 8.8 µg/m^3) and therefore more work will be needed to meet the standards for Downtown.



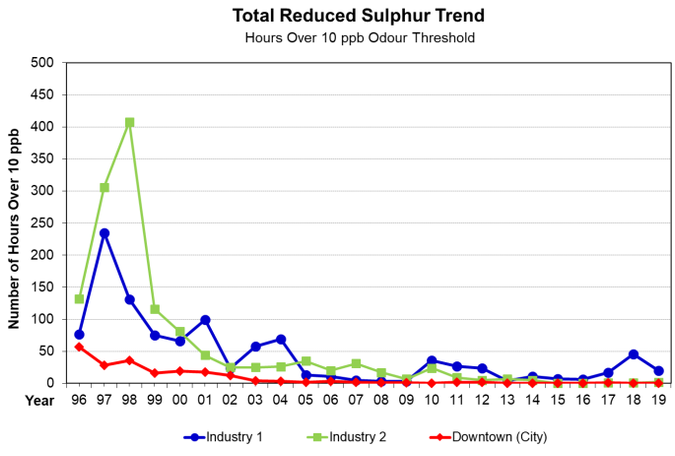




Total Reduced Sulphur (TRS)

Total Reduced Sulphur (TRS) is a measure of the volatile, sulphur-containing compounds that are the basis of many of the odour complaints related to steel mill operations. TRS compounds are not normally considered a health hazard. An odour threshold has been set at 10 parts per billion (ppb) TRS because at this level about one-half of any group of people can detect an odour similar to the smell of rotten eggs.

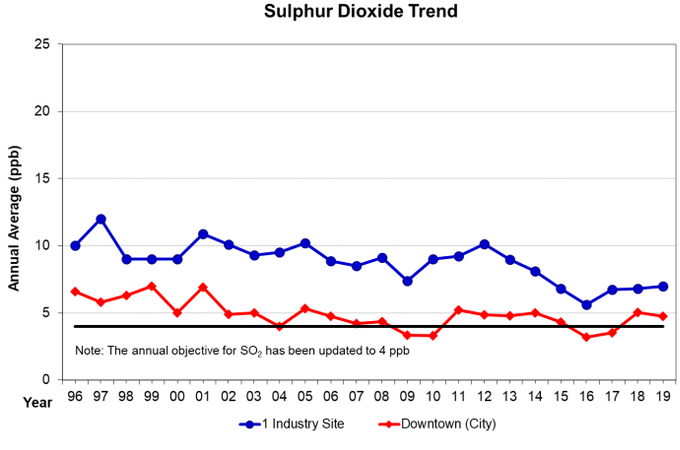
The number of hours per year in which measurements exceed 10 ppb have been reduced by over 90% since the mid-1990s. This is due to significant changes in the management and operation of the coke ovens, blast furnaces and slag quenching operations associated with steel mill operations.



Sulphur Dioxide (SO2)

Sulphur Dioxide is the product of industrial activity with over 90% generated within the City. SO2 is not only a respiratory irritant but is converted in the atmosphere over several hours to sulphuric acid (H2SO4), which is then converted to sulphate particles. These particles tend to be acidic and cause lung irritation.

Significant reductions in air levels of SO2 were made in the 1970s and 1980s. Since 1998, there has been a gradual and continuous decline in air levels of SO2 besides the recent increase in 2016 and 2017 and very slight increase for industrial site 1 in 2019.



Ground Level Ozone (O3)

Ozone is regional in nature and not emitted directly into the atmosphere but is formed from precursor emissions including NO_X and VOCs. O_3 is a colourless, odourless gas at ambient concentrations and is a major component of smog[3].

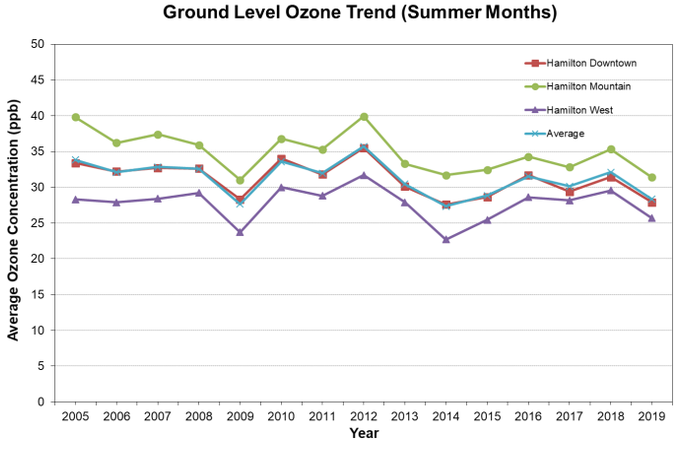
Ground-level ozone is not emitted directly into the atmosphere. It results from photochemical reactions between oxides of nitrogen (NO_x) and volatile organic compounds (VOCs) in the presence of sunlight[3]. This is why O3 concentrations are higher during summer months, generally from May to September.

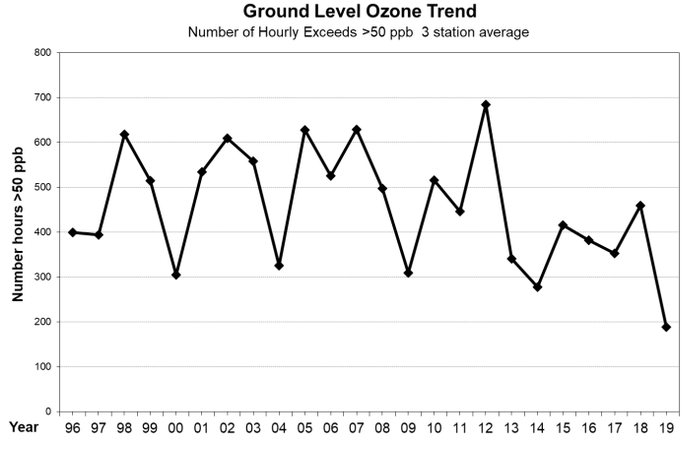
Sources include:

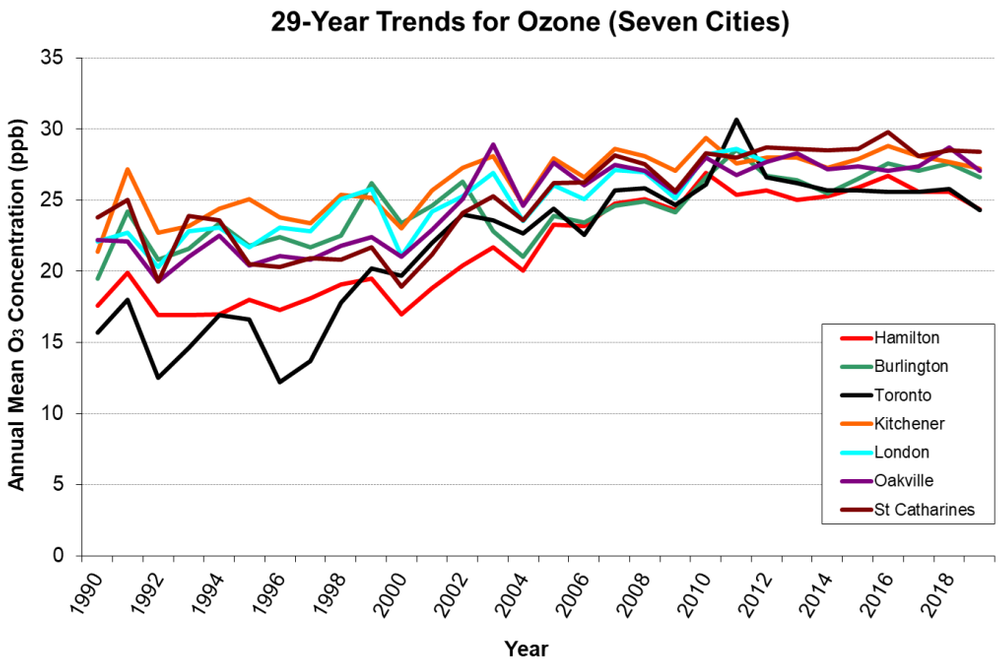
- coal-fired power plants
- vehicles
- urban activities

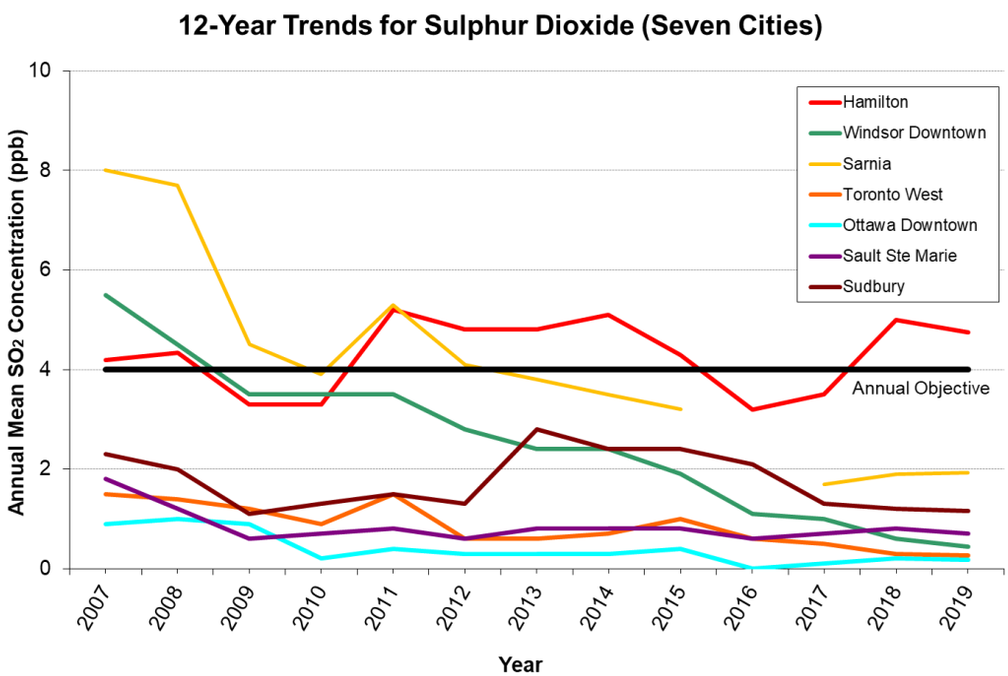
The trend in O3 shows that concentrations have been highly variable in the past 20+ years and showed a marked decrease for 2019 for almost all seven cities (see page 14). O3 is a main contributor for Hamilton's Special Air Health Advisories (SAHA) and Special Air Quality Statements (SAQS), and unlike other pollutants, the majority of O3 comes from precursors emitted by sources upwind of Hamilton such as the Midwest Ohio Valley region. Sources from Hamilton contributing to O3 pollution will affect areas downwind of Hamilton which makes lowering O3 very important.

The number of hourly exceedances greater than 50 ppb decreased in 2019 in part because O3 is formed from precursor emissions of NOx and VOCs which decreased in that time period.





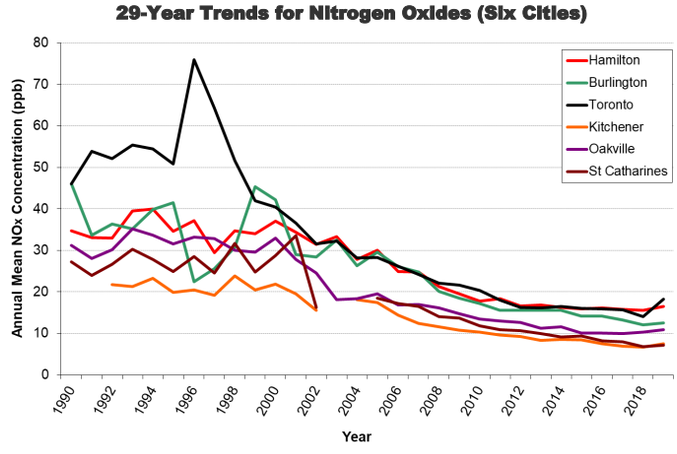

29-Year Trends for Ozone (Seven Cities)
Annual Mean O3 Concentration (ppb)
35
30
25
20
15
10
5
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
Year
Hamilton
Burlington
Toronto
Kitchener
London
Oakville
St Catharines


12-Year Trends for Sulphur Dioxide (Seven Cities)
Annual Mean SO2 Concentration (ppb)
10
8
6
4
2
0
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
Year
Hamilton
Windsor Downtown
Sarnia
Toronto West
Ottawa Downtown
Sault Ste Marie
Sudbury
Annual Objective

Nitrogen Oxides (NOx)

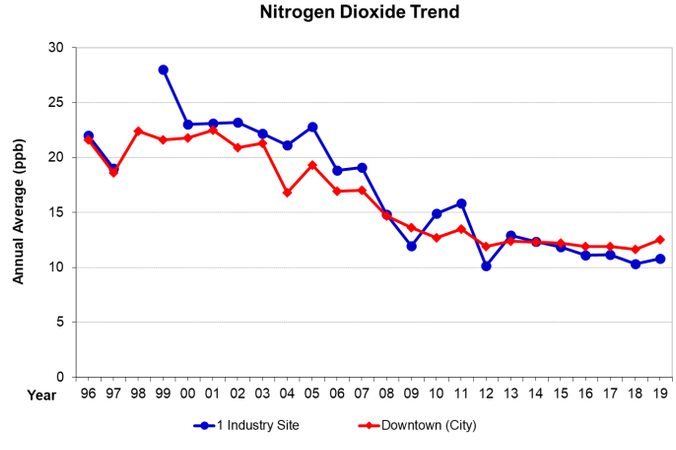
Nitrogen Oxides (NOx) are the collective term and combined total of Nitrogen Monoxide (NO) and Nitrogen Dioxide (NO2). NO and NO2 are routinely measured and their sum reported as NOx to reflect the presence of both species in urban areas.

This chart displays the steadily decreasing trend of NOx in six cities in Ontario, including Hamilton. Since the 1990s Toronto has seen reductions in NOx levels of approximately 60%. Hamilton's NOx levels have decreased by approximately 46% since 1990. The slower decrease of NOx levels in Hamilton is presumably due to the fact that Toronto does not have other sources (for example, industrial emissions) that contribute to overall NOx levels that Hamilton has. The decrease in NOx levels is a reflection of Improvements in emission performance of the vehicle fleets in Ontario over the past decade as well as industrial process improvements.



Nitrogen Dioxide (NO2)

NO2 is formed in the atmosphere from NO which is produced during combustion of fuels (i.e. gasoline, diesel, coal, wood, oil and natural gas) and is responsible for a significant share of the air pollution-related health impacts in Hamilton. The leading sectors producing these emissions are the transportation and industrial sectors. The level of vehicle use across Hamilton has increased slightly during the past decade, however overall NO2 levels have decreased most likely due to improved engine technologies.



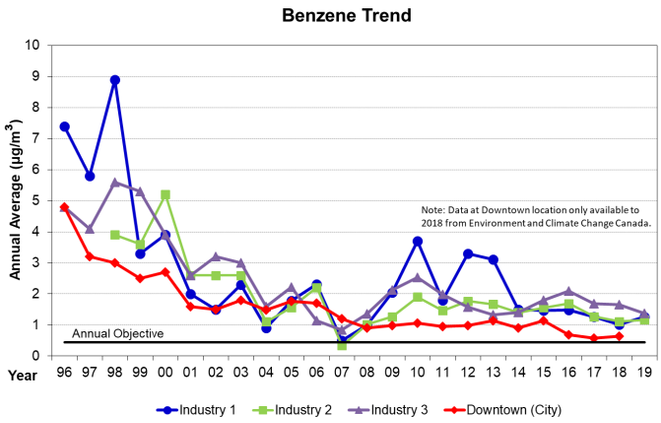
Nitrogen Oxide (NO)

NO is ultimately converted to NO2 which reacts with water in the atmosphere to produce nitric and nitrous acids (HNO3 and HNO2, respectively); these acids are converted into nitrate salts that constitute about 25% of the mass of fine particulate matter or PM2.5.

Benzene

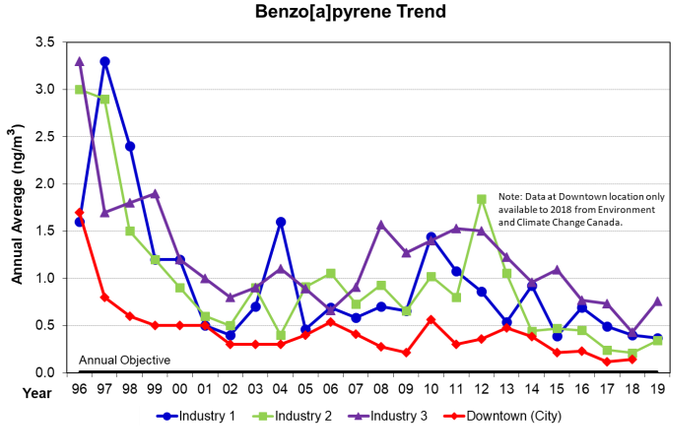
Benzene is a carcinogenic (cancer causing) VOC that is emitted from some operations within the steel industry, specifically coke ovens and coke oven by-product plant operations. Benzene is also a significant component of gasoline, which can be up to 5% benzene. Vapours containing benzene are released during pumping at gasoline stations.

Air levels of benzene have been reduced dramatically since 1990's, due to significant upgrading of coking plant operations, improved operating procedures and improved control of release of benzene vapours from the coke by-products. More work remains to be done to reduce exposures to benzene.



Benzo[a]pyrene

Benzo[a]pyrene (BaP) is also a carcinogen. BaP is a member of a larger class of chemical compounds called polycyclic aromatic hydrocarbons (PAHs), which are emitted when carbon-based fuels such as coke, oil, wood, coal and diesel fuel are burned. The principal sources of BaP in Hamilton are released from coke oven operations within the steel industry. Additional activities including any incomplete combustion producing smoke such as vehicle traffic, burning of refuse, cooking, tobacco smoking, and wood burning. There have been significant decreases in BaP levels since the late 1990s and further decreases since 2013. BaP concentrations for downtown for 2019 were not available.



Conclusions

In 2019, the City of Hamilton provided financial and in-kind support to Clean Air Hamilton and its activities. Descriptions of some of the programs supported by Clean Air Hamilton can be found on pages 5 - 8 in this report.

This annual funding is leveraged significantly in two ways: first, Clean Air Hamilton uses these funds in partnership with funds provided by other agencies and institutions to develop programs related to air quality; second, since all of the members of Clean Air Hamilton donate their time and expertise, there is a significant amount of in-kind support provided. It is estimated that Clean Air Hamilton's partners provide well over $200,000 in in-kind support.

Bruce Newbold, Ph.D.
Chair, Clean Air Hamilton

Hamilton Air Monitoring Network Beach Strip Station 29102

Public Health Services Airpointer

For more information contact Public Health Services (905) 546-2424 ext. 5288

References

[1] *SENES Consulting Ltd. (2011), Health Impacts Exposure to Outdoor Air Pollution in Hamilton, Ontario. Retrieved from http://cleanairhamilton.ca/air-quality-trends/ (i.e Inhalable particulate matter (PM10) is the airborne particles that have diameters of 10 µm or less. PM10 makes up 40-50% of TSP in Hamilton and has been linked to respiratory, cardiovascular and other health impacts in humans.)*

[2] *Air Quality Ontario, http://www.airqualityontario.com/science/pollutants/particulates.php*

[3] *Air Quality Ontario, http://www.airqualityontario.com/science/pollutants/ozone.php*

Air Quality - Additional Resources

To learn more about Clean Air Hamilton and our work visit www.cleanairhamilton.ca.

For annual air quality trends provided by the MECP, please see pages 10 through 16 of this report.

Air Quality and Health

To learn about how to protect your health visit: www.airhealth.ca

To learn about Hamilton Public Health Services and actions on air quality visit: http://preview.hamilton.ca/public-health/health-topics/air-quality-pollution-smog

Government Actions on Air Quality

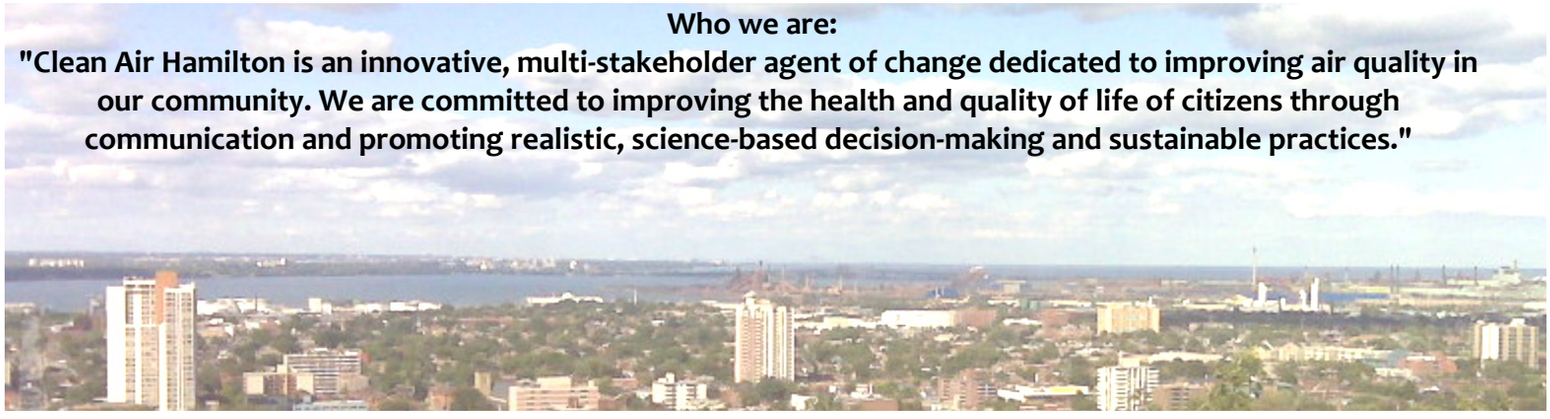
To learn about the Province of Ontario's actions on air quality visit: www.airqualityontario.com/

To learn about the Government of Canada's actions on air quality visit: http://www.ec.gc.ca/Air/default.asp?lang=En&n=14F71451-1

Air Quality Monitoring

For a detailed model of hourly concentrations for a variety of pollutants across Hamilton visit: http://www.hamiltonaqhi.com

To check our air pollution levels in Hamilton and Ministry run air monitors visit:



Who we are:

"Clean Air Hamilton is an innovative, multi-stakeholder agent of change dedicated to improving air quality in our community. We are committed to improving the health and quality of life of citizens through communication and promoting realistic, science-based decision-making and sustainable practices."

2019 MEMBERS

- Bruce Newbold, *Chair -McMaster University*
- ArcelorMittal Dofasco
- Citizens
- City of Hamilton - *Community Initiatives**
- City of Hamilton Planning - *Community Planning*
- City of Hamilton Public Works - *Office of Energy Initiatives*
- City of Hamilton Public Works - *Transportation Demand Management**
- Corr Research
- Cycle Hamilton Coalition Inc.
- Environment Canada*
- Environment Hamilton
- Green Venture
- Hamilton Conservation Authority
- Hamilton Industrial Environmental Association
- Hamilton-Oshawa Port Authority
- Hamilton Public Health Services
- Health Canada*
- The Lung Association
- McKibbon Wakefield Inc.
- McMaster Institute for Healthier Environments
- Ministry of Environment Conservation and Parks
- (MECP) - *Hamilton Regional Office*
- Mohawk College*
- Ontario Environmental Assessment Corporation (OEAC)
- Stelco

** indicates "observing member"*

This report and the work of our members is dedicated to the memory of Clean Air Hamilton member
Peter Chernets
(1949—2019)

Clean Air Hamilton, October 2020

Production: Public Health Services
City of Hamilton

For further information, please contact:

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or visit our website:
www.cleanairhamilton.ca

Acronym List

AO: Annual Objective

AAQC: Ambient Air Quality Criteria

AQHI: Air Quality Health Index

BaP: benzo[a]pyrene

CAAQS: Canadian Ambient Air Quality Standards

ECA: Environmental Compliance Approval

HAMS: Hamilton Airshed Model

HNO3: Nitric Acid

HNO2: Nitrous Acid

MECP: Ministry of Environment, Conservation and Parks

NO2: Nitrogen Dioxide

NOx: Nitrogen Oxides

O_3: Ozone

OEAC: Ontario Environmental Assessment Corporation

PPB: Part per Billion

PAH: Polycyclic Aromatic Hydrocarbons

PM: Particulate matter

PPS: Provincial Policy Statement

SO2: Sulphur Dioxide

SAQS: Special Air Quality Statement

TRS: Total Reduced Sulphur

VOC: Volatile Organic Compound

This report was prepared for Clean Air Hamilton with contributions from :

- The Hamilton Industrial Environmental Association (Heidi Levitzky)
- The City of Hamilton (Trevor Imhoff),
- McMaster University (Dr. Bruce Newbold), and
- McKibbon Wakefield Inc. (George McKibbon)