Background information on two stroke gas-powered leaf blowers

Introduction

Two stroke, gas powered leaf blowers may seem like a temporary annoyance, but they are a serious threat to public health and the environment The toxic exhaust, dangerous dust and extreme noise they create is harmful to everyone – especially children and seniors.

As many people have expressed concern about gas-powered leaf blowers (GLBs).”is it safe to exercise or take walks with children while workers are using these machines?” The short answer is no. These machines expose the public—and workers—to unnecessary and preventable health risks since they are a major source of harmful pollutants including ozone-forming chemicals, carbon monoxide, and fine particulate matter (referred to as PM2.5). And the adverse effects of PM2.5 and ozone are well known cancer, heart disease, stroke, respiratory disease, and neurological and developmental/reproductive disorders.

A 2020 report by the California Air Resources Board found that emissions from small off-road engines, such as leaf blowers, lawn mowers, trimmers and chainsaws, were higher than those emitted from the state’s 14.4 million passenger cars. In most urban areas, it’s estimates that lawn equipment would be contributing 10 to 20 per cent of overall emissions.

Cities that have banned gas powered leaf blowers

Over 200 cities and municipalities across North America including Vancouver, Sherbrooke and Westmount have already restricted or banned gas-powered leaf blowers. A ban will reduce community greenhouse gas emissions, and help Toronto achieve its TransformTO net zero target which Toronto City Council approved unanimously.

Vancouver

Vancouver city council unanimously passed a motion to get the city to phase out gas-powered landscape maintenance equipment, which includes lawn mowers, chainsaws and hedge trimmers, for personal and commercial use by 2024. The motion also includes that the Vancouver Park Board, who has been switching its gas-powered landscaping equipment to low- or zero-emission alternatives as the equipment reaches its end-of-life, expects the transition to be complete in four years.

Ottawa,

-Canada's Capital Region—The National Capital Commission (NCC) is banning the use of gas-powered small tools (leaf blowers, line trimmers, hedge trimmers and small chainsaws) on NCC lands and became the first jurisdiction in Canada to enact such a blanket policy.

California

California passed a bill banning the sale of gas-powered landscape equipment, which includes lawn mowers, chainsaws, leaf blowers, pressure washers and generators, by Jan. 1, 2024.

Miami,

Miami Beach's Mayor and City Commission adopted regulation to phase out gasoline-powered leaf blowers as part of the city's commitment to achieve carbon neutrality by 2050.

Bans previously passed in Ontario:

- 1976 Ontario's seatbelt law came into effect.
- 2004 Ontario restricted the use of lawn chemicals.
- 2006 smoking indoors became illegal
- 2009 a ban was passed on cosmetic pesticides.

Why 143-year-old technology of a 2 stroke gas-powered leaf blowers (GLBs) is unhealthy.

The advantage of a two stroke leaf blower is a high power-to-weight ratio, with few moving parts. During one revolution of the crankshaft. the end of the combustion stroke and the beginning of the compression stroke happen simultaneously, with the intake and exhaust functions occurring at the same time.

But a major disadvantage of this inefficient, 143-year-old technology is its high exhaust emissions. The system feeds into the combustion chamber more of the fuel/oil mixture than is necessary. **This results in 30% or more of a fuel/oil mixture of incomplete, unburned, combustion fumes, exhausting into the air we breathe.**

The pollutants spewing from a two-stroke engine are a major source of harmful pollutants including **ozone-forming** chemicals**, carbon monoxide, and fine particulate matter (referred to as PM2.5).** The adverse health effects of PM2.5 and ozone are well researched.

The mixture of **hydrocarbons** and **carbon monoxide,** an unburned toxic mix of **Benzene, Formaldehyde, Butadiene, Ozone and Methane** are all carcinogenic components in gasoline**.**

The harmful exposure from the emitted smog forming chemicals of the exhaust of a gas powered **leaf blower is 8 times higher** than an automobile and **300 times the amount of pollutants as a pickup truck.**

In the air of a workplace in Ontario, the Short-Term Exposure Limit (STEL) for any 15-minute period of **Benzene,** must be no more than **2.5 ppm,** To pass the Ontario emission test, an automobile exhaust must be less than **250ppm** VOCs (1.3% of a GLB exhaust).

An operator with a GLB on his back exhaust's fumes within 2 feet of his face. The **Benzene** in the gas he breathes is **15 times higher** than the Short-Term Exposure Limit (STEL) of 2.5 ppm in the OHSA regulation.

Residents who smell fumes from a GLB have also ingested the **Benzene** at a level above the exposure limit.

The health-harm to workers who use gas powered leaf blowers.

Landscape workers and others in close proximity to airways of gasoline powered leaf blowers, have elevated exposure to toxic air pollutants that can cause lung disease and dementia and are exposed to **noise** at levels that could cause hearing loss. The noise from gas leaf blowers is extremely hazardous to workers and those in the vicinity of the blowing.. After weeks to years of excessive noise, the damage progresses to the point where hearing loss occurs Speech comprehension is not usually affected and so the hearing loss goes unnoticed by the individual. Eventually, with continued exposure, the hearing loss spreads to the lower pitches necessary to understand speech. At this point, the impairment has proceeded to the level of a handicap and is quite noticeable. The damage is not reversible and is only poorly compensated for by hearing aids. The Centers for Disease Control and Prevention (CDC) lists leaf blowers as a common cause of hearing loss in the U.S. The CDC notes that operating a leaf blower for as little as two hours without noise protection can cause permanent damage to the ear.

How Noise Affects Us

Hearing loss is pervasive. It is also preventable. Exposure to loud noise damages the tiny little hairs in our inner ear that detect sound. More exposure will result in more damage. The result is permanent hearing loss that cannot be corrected through surgery nor with medicine. Short-term exposure to loud noise can also cause a temporary change in hearing (your ears may feel stuffed up) or a ringing in your ears (tinnitus). These short-term problems may go away within a few minutes or hours after leaving the noisy area. However, repeated exposures to loud noise can lead to permanent tinnitus, hearing loss, or both.

Noise from leaf blowers

The noise emanating from leaf blowers is damaging to the surrounding community, as well as the environment. The low frequency of GLB noise penetrates walls and windows. The noise evokes the flight or fight response raising cortisol levels. Toronto urban noise levels average 63 dBA (24-hour average), with a range from 50 to 78 dBA at specific sites as reported by Toronto's Medical Officer of Health in the 2017 report, Health Impacts of Environmental Noise.

Recommended ambient noise limits to prevent health effects:

- 55 dBA (Leq 16 hours) average through the day and evening, and 40 dBA (Leq 8 hours) at night - *World Health Organization.* (50 dBA average at night. *Ontario Ministry of Environment and Climate Change)*

The Ontario noise limit for workplaces is 85 dBA over 8 hours. A study of occupational noise exposure for leaf blower and grass cutter workers using gasoline powered equipment found that most had daily exposures above this limit.

https://www.researchgate.net/figure/Summary-of-occupational-noise-exposure-among-leaf-

Type of engine	Distance from leaf blower	
	5 feet	50 feet
Gasoline powered	**82 to 100** dBA	65 to 80 dBA
Battery powered	70 to 85 dBA	57 to 67 dBA

Fugitive dust or harmful airborne particle pollution is toxic

1. Gas powered leaf blowers are a huge source of dust in residential neighbourhoods. Disbursed air from a leaf blower travels at **200-250 km per hour** pulverizing what it hits into very fine dust, finer than the dust found in nature. It can stay airborne for days.
2. During use, all leaf blowers create copious quantities of airborne, surface particulate matter that anyone in the area will inhale. Much of this fog-dust is less than 10 microns in diameter which gets past the protective cilia in our airways and lodges in our lungs. These are all potentially detrimental to our respiratory system and general health. Some of this pollution is fine particulate matter which has respiratory and cardiovascular effects, even with short term exposure (month or less).
3. Particulate dust from yard cleanup operations contains animal feces, manure, moulds, bacteria, fungus, fertilizer and pesticides
4. Lawn mowing contractors who blow clippings off the lawn and down the street, kick up even more dust. Street dust contains asbestos from brake pad wear and carbon black from tire residue and heavy metals. These materials are carcinogens in our lungs.
5. City workers use leaf blowers to clean up paved surfaces. Contractors use leaf blowers on construction sites instead of brooms or vacuum cleaners, introducing other toxic materials like silica from masonry and stone cutting which causes **silicosis,** an incurable disease. This material gets broadcast into surrounding neighbourhoods.

U.S. Environmental Protection Agency (2019) Integrated Science Assessment for Particulate Matter-Final Report, EPA/600/R-19/188

What happens when a person complains about leaf blowers in Toronto?

On 311 calls, the phone operator may acknowledge your complaint with courtesy, but will not register the complaint on a service report. The reason given is, as there is no prohibiting bylaw, complaints are not documented.

Because there is no bylaw prohibiting high decibel noise level for leaf blower's, 311 complaints are not recorded by the Municipal Licensing and Standards Department (MLS). Leaf blower noise is considered acceptable construction noise, like jack hammers.

The MLS has an online compliant process which does not accept complaints about gas powered leaf blowers. When you enter on the form, a noisy leaf blower complaint, it states**:** "Sorry talk to your neighbour."

At their July 19th Toronto Council meeting, Councillors were not informed of the hundreds of phone attempts and reports from citizens in their neighbourhoods, who complained of the excessive noise and pollution from two stroke gas powered leaf blowers.

Report on noise caused by leaf blowers was submitted to the Economic and Community Development Committee (ECDC) from the Municipal Licensing and Standards (MLS), "Supplementary Report Decision History" on "**Outstanding Noise Directives on Leaf Blowers**," presented to Toronto City Council, July 19th

The submitted report noted; *"*compared to other noise categories, such as amplified sound, complaints from leaf blowers and other power devices remain relatively low.*"*

Conclusion

That two-stroke engine garden equipment; including lawn mowers, backpack blowers and trimmers are an environmental and health hazard. The science is strong that the toxic nature of chemicals emulsions is deadly. We accept the banning of the professional use by landscape companies of this environmentally hazardous equipment requires a period of transition so the public has time to adjust. There will always be resistance to change that purports to improve society, such as occurred with; asbestos, coal in plants in Ontario, lead water pipes, lead in gasoline, catalytic converters on cars, smoking and seat belts.

With the cooperation of the various governing bodies in our society we trust there are solutions and transitions we can come up with together.

GASBUSTERS TORONTO

OCTOBER 1, 2022

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Gasbusters consist of nearly 500 citizens, across Toronto and Gail Bebee, (Bayview Village Association), Harold Smith, (Lytton Park Residents Association) , John Watt, Dundee Staunton, Chris Keating (Deer Park Residents Group). The campaign to ban gas powered leaf blowers, is based on scientific, evidence-based facts, to demonstrate the potential harm to the health of the Toronto community at large.

Our Partners

-Climate Fast
- Green Neighbours Network
-Lakeshore Environmental Gardening Society
-Toronto Environment Alliance

Resident Associations supporters of Gasbusters

-Bayview Village Association

-Bedford Park Residents Organization

-Church Wellesley Neighbourhood Association

- Deer Park Residents Group

-Eglinton Park Residents' Association

- Friends of Farquharson

-Grange Community Association

-High Park North Residents Association

-Lytton Park Residents' Organization

- North Rosedale Residents Association

- Rathnelly Area Residents Association

- Republic Residents Association

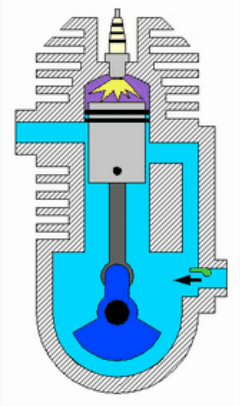
-South Armour Residents Association

-South Eglinton Davisville Residents Association

-West Willowdale Neighbourhood Association

- Wychwood Park Residents Association

Additional information on two-stroke engines



Animation of a two-stroke engine

A number of mainstream automobile manufacturers have used two-stroke engines in the past, including the Swedish Saab and German manufacturers The Japanese manufacturers Suzuki and Subaru did the same in the 1970s.[5] **Production of two-stroke cars ended in the 1980s in the West, due to increasingly stringent regulation of air pollution.**

Invented 143 years ago in 1879, a **two-stroke** (or **two-stroke cycle**) **engine** is a type of internal combustion engine that completes a power cycle with two strokes (up and down movements) of the piston during one power cycle, this power cycle being completed in one revolution of the

crankshaft. In a two-stroke engine, **the end of the combustion stroke and the beginning of the compression stroke happen simultaneously, with the intake and exhaust functions occurring at the same time.**

History of two-stroke engines

On 31 December 1879, German inventor Karl Benz produced a two-stroke gas engine, for which he received a patent in 1880 in Germany. The first truly practical two-stroke engine is attributed to Yorkshireman Alfred Angas Scott, who started producing twin-cylinder water-cooled motorcycles in 1908.[4]

Two-stroke gasoline engines with electrical spark ignition are particularly useful in lightweight or portable applications such as chainsaws and motorcycles. In a two-stroke engine, the exhaust gases transfer less heat to the cooling system , which means more energy to drive the piston. Two-stroke engines have a high power-to-weight ratio and they have fewer moving parts than four-stroke engines.

Emissions from two-stroke engines

Oil is mixed in with their petrol fuel beforehand, in a fuel-to-oil ratio of around 32:1**. This oil then forms emissions, either by being burned in the engine or as droplets in the exhaust, resulting in more exhaust emissions, particularly hydrocarbons,** than four-stroke engines of comparable power output. The combined opening time of the intake and exhaust ports in some two-stroke designs can also **allow an amount of unburned fuel vapors to exit in the exhaust stream**.

Two-stroke gasoline engines are preferred when mechanical simplicity, light weight, and high power-to-weight ratio are design priorities. By mixing oil with fuel, they can operate in any orientation as the oil reservoir does not depend on gravity.

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Particularly in developed countries, pollution regulations have meant the use for many of these applications for two stroke engines is being phased out. Honda ceased selling two-stroke off-road motorcycles in the United States in 2007.

Due to their high power-to-weight ratio and ability to be used in any orientation, two-stroke engines are common in handheld outdoor power tools including leaf blowers, chainsaws, and string trimmers.