Regional Leaf Blower Working Group
Final Report

Village of Deerfield

Deerfield Park District

Village of Glencoe

Village of Glenview

Go Green Wilmette

City of Highland Park

Illinois Landscape Contractors Association

Village of Kenilworth

Village of Lake Bluff

City of Lake Forest

Village of Lincolnshire

Mariani Landscape

Village of Northbrook

Scopelliti Landscaping

Village of Wilmette

Village of Winnetka

Submitted December 15, 2022

Purpose

The Regional Leaf Blower Working Group (referred to as the "Working Group") was formed in late 2021 to evaluate the need and impact of leaf-blower regulations to be considered by each participating municipality. The Working Group was tasked with studying the impacts of gas-powered leaf blowers, alternative technologies and how communities could mitigate the impacts of this equipment.

The Working Group recognizes that the circumstances of participating municipalities are different and thus this report does not indicate whether a community should prohibit the use of gas-powered leaf blowers. Instead, the report identifies best practices to consider should it be determined that gas-powered leaf blower regulations are appropriate in a particular community.

The information in this report has been compiled to assist each community's discussions and consideration of leaf-blower regulations*. In an effort to standardize regulations, municipalities that determine that new or expanded leaf-blower regulations are appropriate for their community are encouraged to work together on drafting of ordinances to ensure uniformity of regulations throughout the North Shore.* Because landscapers work across municipal boundaries, such cooperation will greatly enhance the effectiveness of and compliance with any policy.

Working Group Composition

To ensure a balanced and thoughtful report, the Working Group is comprised of:

- Elected officials
- Appointed officials (i.e. Sustainability Commission members)
- Professional municipal staff (Municipalities and Park Districts)
- Representatives of the landscape industry

The Working Group utilized consultants, the American Green Zone Alliance (AGZA) (https://agza.net/) & Quiet Communities (https://quietcommunities.org/)[1], to assist with technical components of the report and to review a draft of the final report.

The Working Group created three subcommittees to conduct research and consider various policy components which have informed this report. The subcommittees include:

- Municipal Research and Best Practices
- Impact of Gas-Powered Leaf Blowers
- Alternative Equipment/Technology

[1] AGZA is an organization "committed to improving quality of life for communities, working conditions for operators and best practices for the landscape maintenance industry working to create cleaner air, quieter spaces, and more harmonious and sustainable communities."
Quiet Communities is a "nonprofit 501C3 dedicated to helping communities reduce health and environmental harm from noise and pollution."

Executive Policy Summary

Reasonable Policy Options for Consideration

For communities considering expanding gas-powered leaf blower policies, as well as those considering new regulations, the following policy options are presented:

- Status Quo/Monitoring
    - For communities without existing gas-powered leaf blower regulations, the individual characteristics of their community may warrant no change to regulations with continued monitoring of leaf blower technology
- A seasonal gas-powered leaf blower ban from approximately May 15 through September 30
    - This is the most common timeframe for regional municipalities, including Working Group members, with gas-powered leaf blower regulations
- An 8-week window during the fall clean-up season (October 1-November 30) and 4-week window (April 1 – April 30) during the spring clean-up season when gas-powered leaf blowers may be utilized
    - Gas-powered leaf blowers would be banned during the summer and winter months when their efficacy is less needed to meet customer expectations
    - Given that the start of the spring clean-up season can vary each year due to weather conditions, it would be appropriate for regulations to contemplate allowance of an administrative extension to the 4-week window
- A 10-month gas-powered leaf blower ban from December through September
    - This policy would prohibit the use of gas-powered leaf blowers during the annual spring clean-up season
    - None of the Working Group members, nor any nearby communities, have experience prohibiting the use of gas-powered leaf blowers during spring clean-up and the impact on spring operations is unknown at this time
    - Depending on customer expectations, use of battery-operated technology during spring clean-up may not be economically viable for landscapers
    - This option is not supported by the Illinois Landscape Contractors Association due to the volume of debris during spring clean-up which requires the efficacy of gas-powered leaf blowers and the compressed time period for spring clean-ups. Spring clean-up leaf volumes can be further exacerbated by late leaf drops during the fall season which further justifies the need for powerful leaf blowing equipment.

The American Green Zone Alliance does not recommend 12-month gas-powered leaf blower bans for communities along the North Shore due to the robust tree canopy and need for high-powered equipment to adequately complete fall clean-up. As of the date of this report, there are no electric or battery alternatives to gas-powered that can provide the efficacy required during fall clean-up nor are these alternatives economically viable for landscapers during the fall season.

Recommended Best Practices

Policy Implementation, Enforcement & Public Education

Policy Implementation

Whether a community is considering implementing gas-powered leaf blower regulations for the first time, or extending a seasonal ban to a 10-month ban, phasing of the regulations is important for the following reasons:

- Allows additional time for technology advancements as blower strength and battery power continues to improve for alternative equipment
- Reduces the economic impact on service providers and customers
- Provides sufficient time for public education

Examples of phasing timelines include:

- 5-year phase out (recommended by the Illinois Landscape Contractors Association)
- 3-year phase out
- 1-year phase out

The appropriate phase out period may vary by each community's circumstances. For example, a community with a 6-month ban currently in place may require a shorter phase out period than a community without any current regulations.

Enforcement

Enforcement of leaf blower regulations can be challenging for the municipality and frustrating to homeowners who encounter violations of leaf blower ordinances. Regulations limiting noise to specific decibel thresholds can be particularly difficult to enforce as compared to blanket prohibitions. Consideration as to how municipalities will enforce any such regulations is essential when contemplating new or expanded policies.

Enforcement approaches vary by community and the following are best practices that have been recommended by individual Working Group participants based on experience:

- When staffing allows, proactively enforce the ordinance with a dedicated employee(s) rather than respond reactively to complaints
- Seek compliance prior to issuing citations
    - Issue citations after failing to comply to warnings
    - Revoke citations if a landscaper provides evidence they have purchased an electric- or battery-operated leaf blower
- Issue citations to the landscaping companies, not the individual employees or homeowners
- Require landscapers to be licensed in order to communicate regulations and provide the ability to revoke a license for continued violation of ordinances.

    - Communities that do not currently license landscapers but intend to should consider the impacts upon small businesses as well as staffing impacts to administer a licensing program.
- Require identifying information on landscaping vehicles to assist with enforcement
- Document voluntary compliance with regulations by identifying and recognizing companies which use alternative technology
- Other ideas not currently implemented by Working Group members but suggested for consideration include: 1) Develop an intake process where violations may be reported through the use of video or photos. Gas-powered equipment is used in short bursts making it difficult for law or code enforcement officials to catch violators in the act; 2) For communities which do not currently license landscapers, allow for reciprocal acceptance of landscape licenses (accept a license from another community) which may ease the administrative burden of implementing a new licensing program

Public Education

Public education is critical to the success of any leaf blower regulation and to ensure native habitats are properly maintained. Residents play an important role in reducing the impacts of gas-powered leaf blowers in the community and in making transitions to alternative equipment more economically viable for landscapers. Understanding the problems associated with gas-powered leaf blowers, impacts of any type of blowing/disturbance to the natural environment, and then using that knowledge to educate landscapers and homeowners is essential to the success of leaf blower regulations.

Template communications can be found in Appendix B with information that can be tailored to specific municipal regulations and for different audiences (landscapers, homeowners) or circumstances (Education or enforcement via social media, flyer, door hanger).

The Working Group recommends that communications utilize accessible, understandable language to reach the broadest possible audience.

Workforce Education and Training

Workforce education and training are critical to equitably and adequately resourcing leaf blower regulations. Battery electric technology is a different technology platform with its own operational and safety issues. It is essential to ensure electric tools are operated, handled, stored, and charged properly and safely, and that batteries are repurposed or recycled at the end of their useful lives. Safe and proper use of tools, batteries, and chargers also extend product life and optimize return on investment.

Environmental, Technology, Cost, & Other Considerations

The Working Group's best practices are based on an extensive review of the environmental impacts of gas-powered leaf blowers, current technology for alternative equipment and the cost to transition to more sustainable equipment.

Environmental Considerations

Environmental considerations regarding leaf blowers including noise and air pollution are discussed below. Ultimately, reducing the usage of leaf blowing in general (gas- or battery-powered), through public education and commercial education, is the most sustainable solution to protect native habitats and reduce noise and air pollution.

Noise Pollution

The issue of noise is one of the most common complaints received from community members regarding gas-powered leaf blower usage and the Occupational Safety and Health Administration (OSHA) requires ear protection for users of gas-powered leaf blowers. When measured at 50 feet away (the American National Standards Institute (ANSI) standard for measuring noise)):

- Average battery-operated blowers range from 52 - 65 dB
- Average low decibel gas-powered leaf blowers range from 60-64 dB
- Average gas-powered leaf blowers range from 75 - 83 dB

For reference, each 10 dB increase in sound is twice as loud as heard by the human ear. Refer to Appendix C for a chart from Purdue University to provide context for these decibel ranges.

A study commissioned by the City of Washington D.C. in 2018 and conducted by acoustic engineers from Arup, an international engineering firm, and Quiet Communities, found that for the commercial blowers that were tested:

- *The sound from the gas leaf blowers has a strong low frequency sound component absent from battery operated leaf blowers*
- *The low frequency component of the gas leaf blower sound carries loud sound over longer distances resulting in a greater noise impact on the surrounding community*
- *The low frequency component of gas leaf blower sound enables it to more easily penetrate through home windows and glass doors*

The report from Arup can be found in Appendix D.

While the noise from battery and electric operated leaf blowers is not as impactful as noise from gas-powered leaf blowers, they do still generate noticeable noise and none of the policy options on page two of this report will eliminate such noise in its entirety.

Air Pollution

Appendix E is a report from the US Environmental Protection Agency and Quiet Communities titled “National Emissions from Lawn and Garden Equipment”. The report finds that:

- *Commercial gas landscape maintenance equipment (GLME) is a source of high levels of localized emissions that include hazardous air pollutants, criteria pollutants, and carbon dioxide (CO2)*
- *Routine use of GLME in the vicinity of residential neighborhoods, schools, parks, and other public spaces may be exposing the public to unnecessary and preventable health risks*
- *Communities and environmental, public health, and other government agencies should create policies and programs to protect the public from gas-powered lawn and garden equipment air pollutants and promote non-polluting alternatives.*

The US EPA report referenced above was completed in 2015 and technology improvements since that time are likely to have reduced pollution emanating from gas-powered leaf blowers. However, air pollution impacts remain and the 2015 report is the most reputable and comprehensive report available to the Working Group at this time.

For reference, OSHA does not require the use of a respirator to operate gas-powered leaf blowers.

<u>Technology Considerations</u>

Currently, gas-powered leaf blowers are significantly more powerful than electric blowers. The most common way to measure the power of a leaf blower is to determine its Cubic Feet per Minute (CFM) and Miles per Hour (MPH).

CFM measures the volume of air leaving the blower. MPH measures the speed of air leaving the blower. CFM moves *more* debris while higher MPH moves heavier, wet debris.

The following table compares the operational capabilities of battery- and gas-powered commercial equipment:

Maximum Outputs	**Industry Leading Battery-Operated Leaf Blower**	**Industry Leading Gas-Powered Leaf Blower**
CFM	600	941
MPH	142 – 170	206

For industry leading battery-operated equipment, with battery backpack, the tool will generally operate for approximately one hour on maximum power (setting most likely used during fall leaf clean-up). This requires a substantial back-up battery supply for each blower in use by a landscape company.

Cost Considerations

Per AGZA and Quiet Communities, the cost to replace gas-powered leaf blowers with battery electric technology is dependent on the intensity of leaf blower usage, which is directly correlated with the expectations of customers.

The table below compares the upfront cost for a landscape business to purchase two leaf blowers per crew in Illinois:

Conventional Use (Highly manicured lawn)		**Transitional Use (Less formal aesthetic)**		**Ecological (Ecological aesthetic)**	
Battery	**Gas**	**Battery**	**Gas**	**Battery**	**Gas**
$11,225	$1,125	$7,825	$1,125	$4,350	$1,125
Requires 6 backpack batteries (3 per tool)		Requires 4 backpack batteries (2 per tool)		Requires 2 backpack batteries (1 per tool)	

**The above figures do not include the additional cost for safe and adequate battery charging infrastructure, which can range from $600 for a four plug system to $1,400 for an eight plug system.*

The above figures are based on Stihl equipment as follows (pricing example is based on Conventional Use):

2 Tools (BGA 200 blower):	$411.99 each
6 Backpack batteries (AR 3000L):	$1,499.99 each
2 Fast chargers (AL500):	$162.95 each
4 Standard chargers (AL300):	$99.99 each
Total (w/ IL sales tax):	$11,225 to outfit one landscape crew

Because it may not always be practical or effective to charge equipment on a worksite and thus a sufficient number of batteries must be on hand throughout the workday, as well as equipment to fully charge the tools overnight.

Per AGZA and Quiet Communities, aesthetic expectations appear to be the most important driver of investment required in battery electric equipment. Relaxing customer aesthetic expectations (through public education) and modifying landscape company practices can result in a more efficient ROI for battery electric equipment. So long as customers seek a highly manicured aesthetic, a substantial upfront investment in batteries and chargers is required, which is likely to be passed onto customers in the form of higher service prices.

Other Considerations

Exemptions

The Working Group reviewed exemptions to existing gas-powered leaf blower bans. These fall into two categories – those who use equipment in the scope of their jobs and those who use equipment to service their own properties.

Professional users:

- Municipal/government owned property
    - Some local Park Districts have expressed concern with their ability to provide service without the use of gas-powered leaf blowers
- Golf courses
- Landscape and tree care professionals
- Related trades such as gutter cleaning, driveway resurfacers, etc.
- Private land owners who use in-house landscape professionals (colleges, universities, conservation districts, public gardens, large estates, etc.)

Residential users:

- Homeowners conducting maintenance on their own property

The Working Group recommends that municipalities considering new or amended leaf blower regulations consult their maintenance staff, Park Districts (if applicable), School Districts, and other large landowners such as private golf courses to determine whether exemptions are appropriate or necessary.

Battery Charging, Recycling, and Safety

While battery-powered leaf blowers are preferable over gas-powered leaf blowers, there are environmental and safety concerns associated with large-scale adoption of battery-operated landscaping equipment. The Working Group recommends municipalities consider partnering with professional recycling firms to coordinate safe and proper disposal of lithium batteries. The Working Group has local resources available to municipalities interested in hosting lithium battery recycling programs.

While fires stemming from battery devices are rare, they have occurred, and Fire Departments and businesses should be familiar with lithium battery fire prevention and extinguishing lithium battery fires.

Financial Incentives

Under current market conditions, the upfront cost of battery-operated blowers compared to gas-powered equipment may create a disproportionate burden on low-income residents and small landscaping businesses. For this reason, buy-back programs and other financial incentives could become crucial strategies to advance the goal of phasing out gas-powered lawncare products.

Municipalities considering implementation of financial incentive programs may wish to consult with the American Green Zone Alliance who has experience developing and managing such programs across the country. The Working Group investigated rebate programs from varying governmental organizations across the country and recommends the following items for consideration in the development of financial incentive programs:

1) Funding mechanisms

- Regional rebate programs have used grant monies in the past to facilitate trade-in of similar types of lawncare equipment (such as the EPA grant for the Diesel Emissions Reductions Act, awarded to the Metropolitan Mayors Caucus in early 2000s to administer sub-grants to12 Chicagoland municipalities)
- In the absence of regional grants, municipalities could allocate money to rebate programs in their jurisdiction or through regional partnerships

2) Eligible equipment

- A “best practice” observed from existing rebate programs requires evidence that new equipment meets the most recently updated EPA standards for allowable air and noise emissions levels
- Some existing programs partner with garden centers or hardware stores to provide vouchers to purchase alternative equipment at lower cost
- Equipment eligible for rebates can vary from leaf blowers only to various types of battery-powered lawn equipment such as lawnmowers, blowers, chainsaws, string trimmers, brush cutters, leaf vacuums, as well as accessories for alternative technology, such as additional batteries and chargers

3) Eligible rebate participants

- Consider preference to minority-owned businesses and/or low-income individuals to promote equitable adoption of alternative equipment. For example, a program run through Montgomery County, Maryland includes a statement that preference will be given to minority-owned businesses and/or low-income residents. In California, the South Coast Air Quality Management District provided funding for outreach and education of small minority-owned businesses, and for substantial subsidies (70% of retail price) to offset the upfront cost of commercial battery electric toolkits (tool plus 2 – 3 batteries and chargers per tool)
- While some programs are for residential equipment replacements only, others provide incentives to landscaping companies who are either based in the community or do business in the community

4) Retired equipment turn-in required

- A “best practice” is to require the retirement of gas-powered equipment with proof of destruction or by facilitating a turn-in program to ensure such equipment is not repurposed

Future Study & Analysis

Given the rapidly changing technology for leaf blowers, municipalities participating in this study should consider reconstituting the Working Group over time to review technology advancements and the impact such advancements may have on leaf blower regulations.

Appendices

Appendix A- Working Group Members

Appendix B- Public Education Materials

Appendix C- Purdue University Chart Regarding Decibel Ranges

Appendix D- Arup Report on Leaf Blower Noise dated July 16, 2018

Appendix E- US Environmental Protection Agency and Quiet Communities report on air pollution titled “National Emissions from Lawn and Garden Equipment”.

Appendix F- Municipal Research and Resources

Leaf Blower Regulations Regional Working Group

Members

1. Co-Chair Phil Kiraly, Glencoe Village Manager
2. Co-Chair Ghida Neukirch, Highland Park City Manager
3. Co-Chair Mike Braiman, Wilmette Village Manager
4. City of Highland Park, Councilmember Anthony Blumberg
5. City of Lake Forest, Superintendent of Parks and Forestry Chuck Myers
6. Deerfield Park District, Executive Director Jeff Nehila
7. Go Green Wilmette, Beth Drucker
8. Illinois Landscape Contractors Association, Executive Director Scott Grams
9. Mariani Landscape, Fred Wacker
10. Scopelliti Landscaping, Guy Scopelliti
11. Village of Deerfield, Justin Keenan, Assistant to the City Manager
12. Village of Glencoe, Hall Healy, Sustainability Task Force
13. Village of Glenview, Joe Kenney, Deputy Director of Public Works
14. Village of Kenilworth, Trustee Alison Winslow
15. Village of Lake Bluff, Sustainability and Community Enhancement Ad Hoc Committee Co-Chair Brian Render
16. Village of Lake Bluff, Village Administrator Drew Irvin
17. Village of Lincolnshire, Management Analyst Sam Barghi
18. Village of Northbrook, Trustee Heather Ross
19. Village of Northbrook, Sustainability Coordinator Tessa Murray
20. Village of Wilmette, Environmental & Energy Commissioner Karen Glennemeier
21. Village of Winnetka, Former Village Trustee and Go Green Winnetka Member King Poor
22. Village of Winnetka, Police Chief Marc Hornstein

Did you know?

Variable area for
Village seal

There are so many good reasons to go electric, use a rake, or leave the leaves.

Gas-powered leaf blowers produce dangerous levels of noise and air pollution, harmful to users of the equipment, residents, children and wildlife.

All leaf blowers blast insects, habitat and soil at hurricane-force winds (up to 220 mph) affecting birds and beneficial insects like butterflies and pollinators. The use of leaf blowers eliminates essential habitat, harms soil health and leads to erosion and stormwater runoff.

Obey the law and be a good neighbor to all. Gas-powered leaf blowers are prohibited in this area from _____(date)_____ **to** _____(date)_____

Please help get the word out to your lawn crew and any you see in your area. Violations can be reported to this non-emergency number: _____(phone)_____

If you do use a leaf blower, consider using it less often and on a lower setting.

(Variable copy area for sponsor info)

Sample Social Media Posts

Sample Flyer for Landscape Companies

REMINDER

Gas-powered leaf blower ban

Gas-powered leaf blowers are prohibited from _____(date)_____ to _____(date)_____ in this area. Violators may be subjected to fines. Please obey the law to limit noise and air pollution.

(Village Code info)

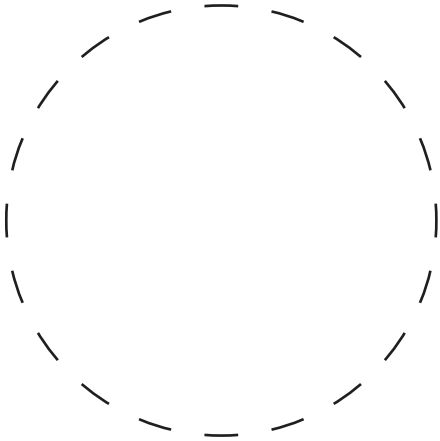
Variable area for Village seal

AVISO IMPORTANTE

(need spanish translation)

El uso de sopladores de hojas de gasolina está prohibido en this area entre _____(date)_____ to _____(date)_____ . Aquel que falte a esta ley será multado por la policia.

NOTICE



Gas-Powered Leaf Blower Violation

Gas-powered leaf blowers are prohibited from _____(date)_____ **to** _____(date)_____ **in this area. Your lawn care service has been observed violating this ban at**

_____(address)_____

Violators may be ticketed and fined.

(Village or Police Department logo)

Did you know?

Gas-powered leaf blowers produce dangerous level of noise and air pollution, harmful to users of the equipment, residents, children and wildlife.

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The use of leaf blowers eliminates essential habitat, harms soil health and leads to erosion and stormwater runoff.

(Variable copy area for sponsor info)

Obey the law and be a good neighbor. Gas-powered leaf blowers are prohibited from

(date) **to** (date)

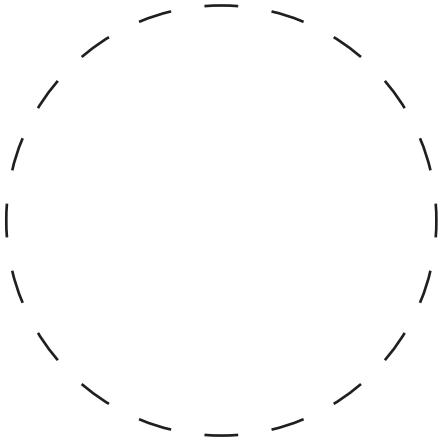
Please help get the word out to any crews in your area. Violations can be reported to this non-emergency number:

(phone)

Variable area for Village or Police Dept. logo

(Variable copy area for sponsor info)

NOTICE



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Violators may be ticketed and fined.

(Village or Police Department logo)

Noise Source	Decibel Level	Comment
Jet take-off (at 25 meters).	150	Eardrum rupture.
Aircraft carrier deck.	140	
Military jet aircraft take-off from aircraft carrier with afterburner at 50 feet (130 dB).	130	
Thunderclap; chain saw; Oxygen torch (121 dB).	120	Painful, 32 times as loud as 70 dB.
Steel mill; auto horn at 1 meter; turbo-fan aircraft at takeoff power at 200 feet (118 dB); riveting machine (110 dB); live rock music (108-114 dB).	110	Average human pain threshold; 16 times as loud as 70 dB.
Jet take-off (at 305 meters); use of outboard motor; power lawn mower; motorcycle; farm tractor; jackhammer; garbage truck; Boeing 707 or DC-8 aircraft at one nautical mile (6,080 feet) before landing (106 dB); jet flyover at 1,000 feet (103 dB); Bell J-2A helicopter at 100 feet (100 dB).	100	8 times as loud as 70 dB; serious damage possible in 8 hours exposure.
Boeing 737 or DC-9 aircraft at one nautical mile (6,080 feet) before landing (97 dB); power mower (96 dB); motorcycle at 25 feet (90 dB); newspaper press (97 dB).	90	4 times as loud as 70 dB; likely damage 8 hours exposure.
Garbage disposal; dishwasher; average factory; freight train (at 15 meters); car wash at 20 feet (90 dB); propeller plane flyover at 1,000 feet (88 dB); diesel truck 40 mph at 50 feet (84 dB); diesel train at 45 mph at 100 feet (83 dB); food blender (88 dB); milling machine (85 dB); garbage disposal (80 dB).	80	2 times as loud as 70 dB; possible damage in 8 hours exposure.
Passenger car at 65 mph at 25 feet (77 dB); freeway at 50 feet from pavement edge 10 a.m. (76 dB); living room music (76 dB); radio or TV-audio, vacuum cleaner (70 dB).	70	Arbitrary base of comparison; upper 70s are annoyingly loud to some people.
Conversation in restaurant or office; background music; air conditioning unit at 100 feet.	60	Half as loud as 70 dB; fairly quiet.
Quiet suburb; conversation at home; large electrical transformers at 100 feet.	50	One-fourth as loud as 70 dB.
Library; bird calls (44 dB); lowest limit of urban ambient sound.	40	One-eighth as loud as 70 dB.
Quiet rural area.	30	One-sixteenth as loud as 70 dB; very quiet.
Whisper, rustling leaves.	20	
Breathing.	10	Barely audible.

[modified from http://www.wenet.net/~hpb/dblevels.html] on 2/2000. SOURCES: Temple University Department of Civil/Environmental Engineering (http://www.temple.edu/departments/CETP/environ10.html), and *Federal Agency Review of Selected Airport Noise Analysis Issues*, Federal Interagency Committee on Noise (August 1992). Source of the information is attributed to *Outdoor Noise and the Metropolitan Environment*, M.C. Branch et al., Department of City Planning, City of Los Angeles, 1970.

Technical Note

ARUP

1120 Connecticut Avenue NW
Washington DC 20036
United States of America
www.arup.com

Project title	Leaf Blower Noise	Job number	261937-00
cc	D.C. Council's Committee of the Whole	File reference	
Prepared by	Chris Pollock, PE, LEED AP, WELL Advisor Geoffrey Sparks	Date	July 16, 2018
Subject	**Bill No. B22.234, the Leaf Blower Regulation Amendment Act of 2017 - Written Statement by Arup**		

1 Executive Summary

Arup tested 7 commonly used leaf blowers, 3 gas and 4 battery powered, to help answer the question of what makes which type have more noise impact. The following written statement summarizes the testing procedure, results, and oral testimony presented by Arup to the D.C. Council's Committee of the Whole on July 2, 2018.

In summary Arup's testing indicates:

- The sound characteristics of gas leaf blowers measured have a significantly greater low frequency sound component in comparison to battery leaf blowers measured
- The low frequency sound energy of the gas leaf blowers measured transmits more readily over longer distances making them more readily audible and of greater noise impact to the community
- The low frequency sound energy of gas leaf blowers measured transmits more easily through home windows and glass doors, meaning they sound louder indoors than the battery leaf blowers measured

2 Sound Testing Methodology

2.1 Gas and Battery Leaf Blowers

The big question Arup was asked to help answer in this testing is what makes which type have a greater noise impact? This study did not investigate the noise level at the operator ears relative to exposure, but rather the impact on people and the community surrounding the leaf blowers as they are being used. Leaf blowers are often rated based on air flow rate, or the amount of air being pushed or blown per minute. The grouping of leaf blowers used aimed to capture commercial leaf blowers used in the industry, with a specific focus on commercially used similar flow rate units for both gas and battery powered blowers.

2.2 Testing

In order to answer the question above, a set of tests were designed to allow the capture of side by side noise levels for various leaf blower types. It was arranged for 7 commonly used blowers to be used, all were either new or in a well maintained working order with 3 being gas leaf blowers and 4 being battery leaf blowers.

Table 1: Leaf blowers used for testing

Manufacturer	Model	Power Source
Greenworks	GBB 700	Battery
Greenworks	GBB 600	Battery
Stihl	BGA 100	Battery
Ego	600 Chevron	Battery
Redmax	EBZ8500	Gas
Stihl	BR 700X	Gas
Echo	PB760LN	Gas

On the morning of June 17, 2018, in Lincoln, Massachusetts, the leaf blowers were set up in an open driveway entrance road, and parking lot of the Lincoln Department of Public works. This is a quiet location without close proximity to sound reflecting surfaces, where noise measurement locations were marked off at 5, 50, 100, 200 and 400 feet from the location where each of the 7 leaf blowers were operated. To simulate measurements at a greater distance we also measured at 800 feet, which was located across another street in an Audubon park.

Each blower was operated for at least 30 seconds for every measurement at full throttle and the nozzle at least 2 inches (50 mm) above the ground. At the 50 foot distance, measurements at 8 locations (at 45 degree increments) around each blower were measured as outlined in American National Standards Institute for Outdoor Power Equipment – Internal Combustion Engine-Powered Handheld and Backpack Blowers and Blower Vacuums – Safety Requirements and Performance Testing Procedures/OPEI B175.2-2012.

Technical Note

261937-00 July 16, 2018

Measurements were made with a calibrated type 1 sound level meter with a wind screen installed and mounted on a tripod at 5 feet (1.5 meters) above the ground. The sound level meter was a Brüel & Kjaer 2250, as is common for advanced sound measurements in the acoustics industry. This meter captures one-third octave band sound levels in real time, and provides statistical time based averaging for L_{90}, L_{EQ}, L_{10} and other filtered results to best ensure that extraneous noise from the community was not a significant impact on the results. The L_{90} measurements are used for purposes of discussion and review as that metric captures the steady state noise level of the leaf blower in use while also filtering out other extraneous site noise events including intermittent traffic. This is a conservative approach in reviewing the data and a method that is widely accepted within the acoustic consulting industry. Other metrics that are commonly used including the L_{EQ} and L_{50}, will indicate higher noise values than the data presented here as L_{90} values. See the Appendix at the end of this note for definitions of L_{EQ}, L_{50}, and L_{90}

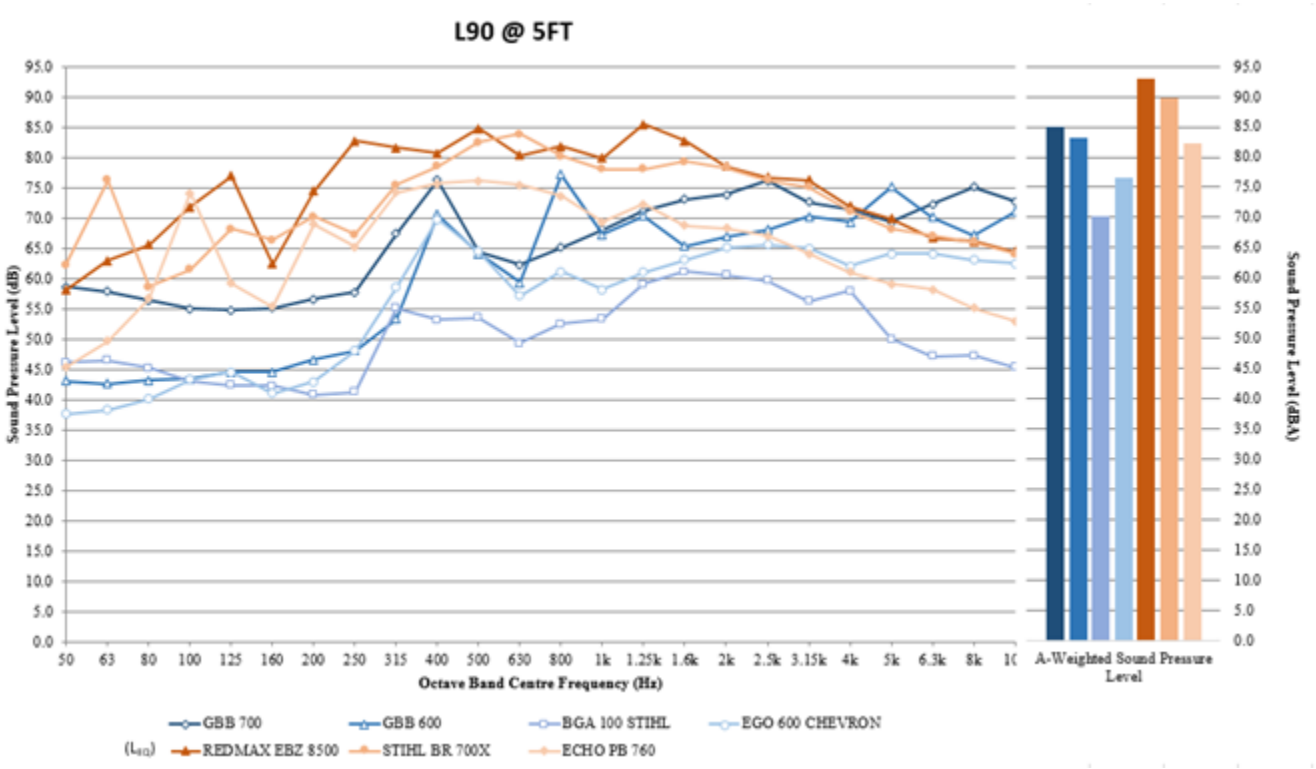
Sound levels are variations in sound pressure. The decibel scale (dB) is the commonly used metric for sound pressure levels, which is a log scale because the number value of sound pressure varies very widely. For the purposes of the data analysis, dB levels of 20-30 are a quiet bedroom or whisper, dB levels in the 40-60 range are a normal conversation, dB levels above 70 are a loud voice or busy street traffic, and sound levels above 80-90 dB would be loud music. Human hearing filters sound in a specific way, meaning that we are very attuned to voice frequencies and less attuned to low frequency sounds. For this reason, we often us an ‘A’ weighting scale, as a single number for the perceived overall loudness of a sound. These values are shown as dB(A) sound pressure levels.

3 Results

3.1 Graphs

The following graphs summarize the measured data of the 7 leaf blowers. Battery powered leaf blowers are shaded in blue and gas-powered leaf blowers are shaded in orange. The horizontal axis of the chart shows frequency, with the left side being very low frequency ‘rumble’ sounds, and the right side being high frequency ‘hissing’ sounds. The vertical axis shows increasing sound pressure level as you go up the chart. Most outdoor measurements of noise, in locations with any distant traffic will have more low frequency than high frequency noise, and the ambient sound in this case of this character also.

Figure 1: Sound Pressure Levels measured at 5 feet



Note: the L_{EQ} reading was used for the Redmax EBZ 8500 due to an elongated measurement period with the blower idling which influence the L_{90} result.

Figure 2: Sound Pressure Levels measured at 50 feet

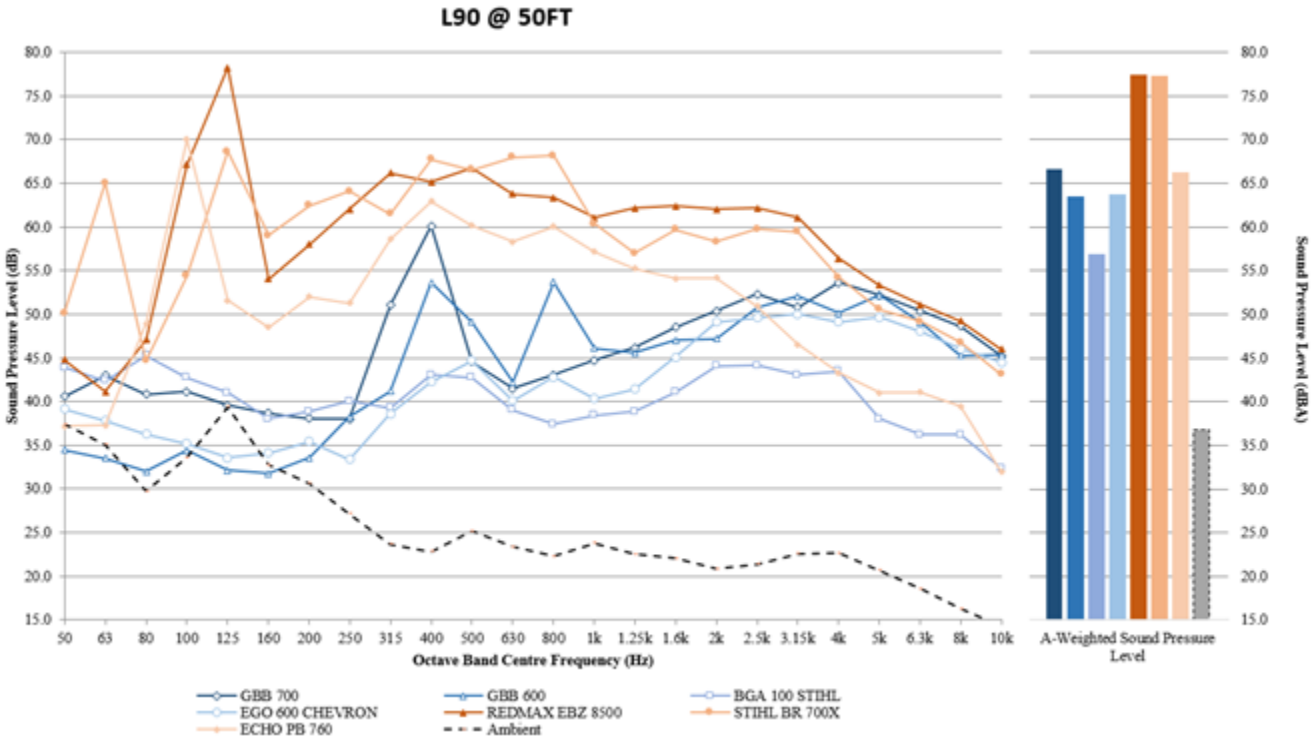


Figure 3: Sound Pressure Levels measured at 100 feet

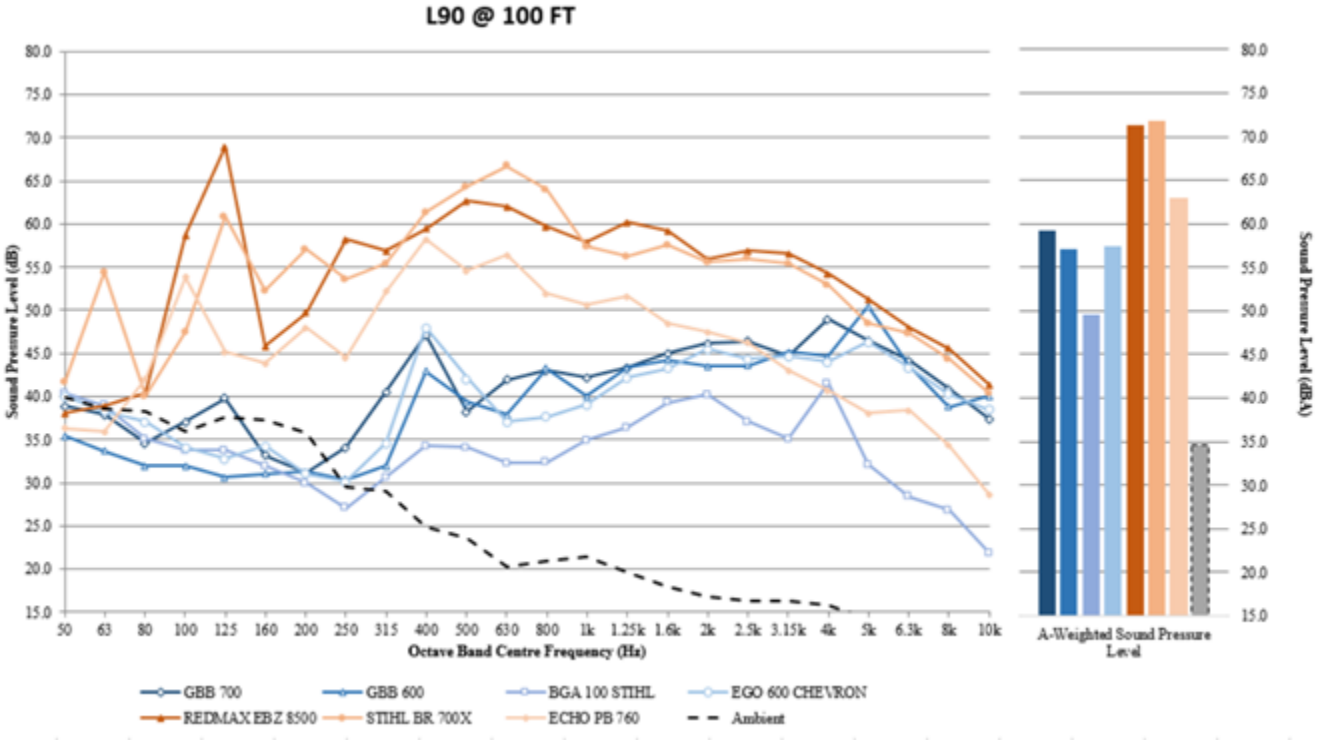


Figure 4: Sound Pressure Levels measured at 200 feet

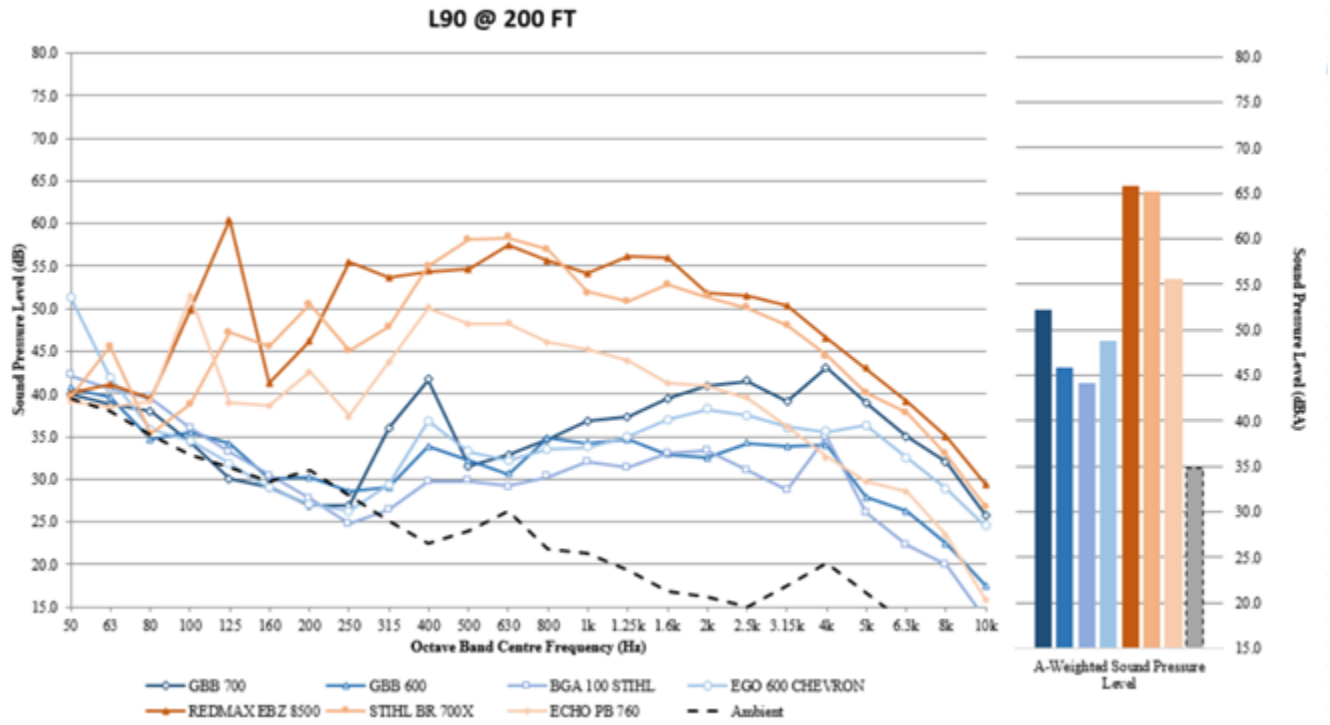


Figure 5: Sound Pressure Levels measured at 400 feet

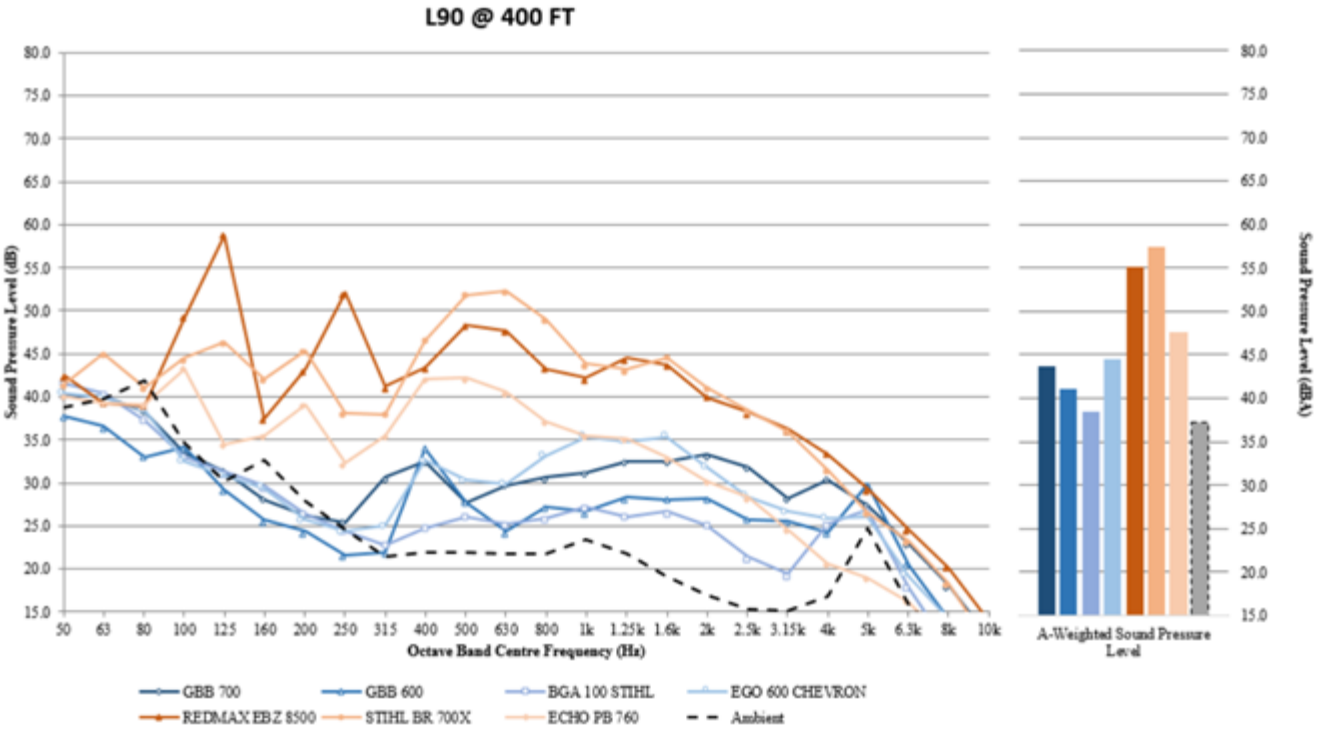


Figure 6: Sound Pressure Levels measured at 800 feet

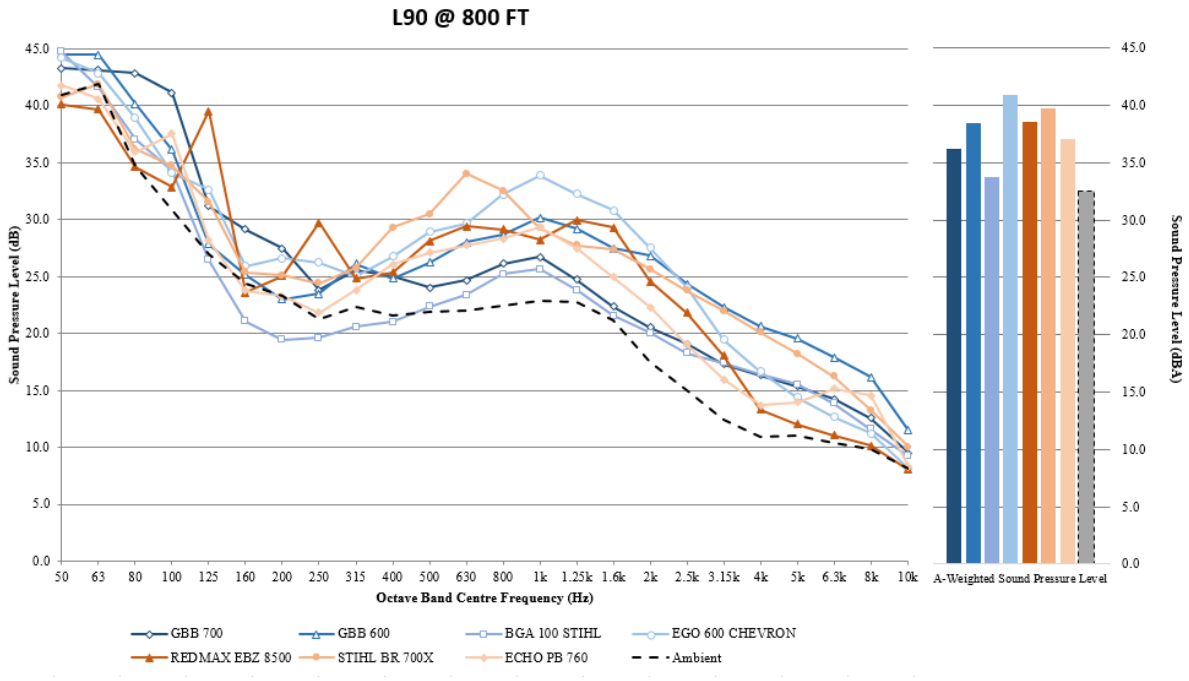
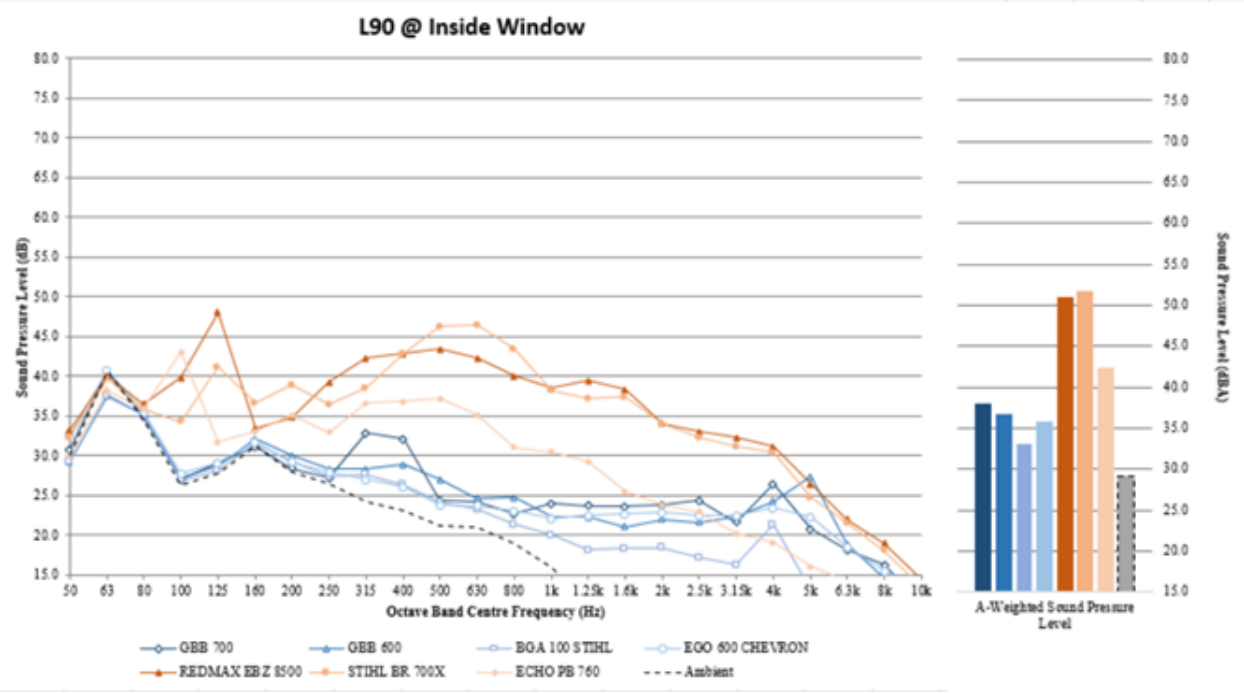


Figure 7: Sound Pressure Level measured inside a residence with leaf blowers 50 feet from the window



3.2 Discussion

From the measured data graphed above, it is observed clearly that the group of gas leaf blowers (shaded in orange) all exhibit a much higher level of sound energy in the low frequency bands at all distances. In a number of cases, this engine noise is a peak at 100 to 125 Hz. This low frequency energy is quite distinctly different for the gas leaf blowers than the battery powered leaf blowers.

Audibility over larger distances: The chart above shows that at only the peaks of low frequency engine sound were prominently above the ambient noise measured. Based on the experience of measuring sound, Arup witnessed that the three gas powered leaf blowers at an 800 foot distance were audible, two being clearly audible and the third being noticeable, while all of the battery powered leaf blowers were not distinguishable above the ambient community sound levels at that distance. Since these peaks on the chart do not occur with the battery powered leaf blowers it can be concluded that this is the character of the sound that travels over greater distances and is more audible throughout a community.

Audibility within Houses: One of the challenges with low frequency noise is that it requires heavy construction or materials to stop the sound transmitting. This is very clear when it comes to windows and glass doors in houses. The heavy drywall or brick walls of a house may do a very good job at blocking noise from outside, but any low frequency sound transmits easily through the lighter weight windows. This is a common issue with the drone of road traffic or aircraft overhead, and a number of states and federal programs provide funding to upgrade housing in impacted areas. With leaf blowers, the low frequency components of the gas leaf blowers are what is most easily transmitted, and this is clearly seen in Figure 7 at 100-125 Hz as well as in the air ‘whooshing’ frequencies up to around 500 Hz which also transmits into the house very easily. These sound levels of gas powered leaf blowers as measured inside the house, are significantly above those of the battery powered leaf blowers.

4 Audio Demonstrations

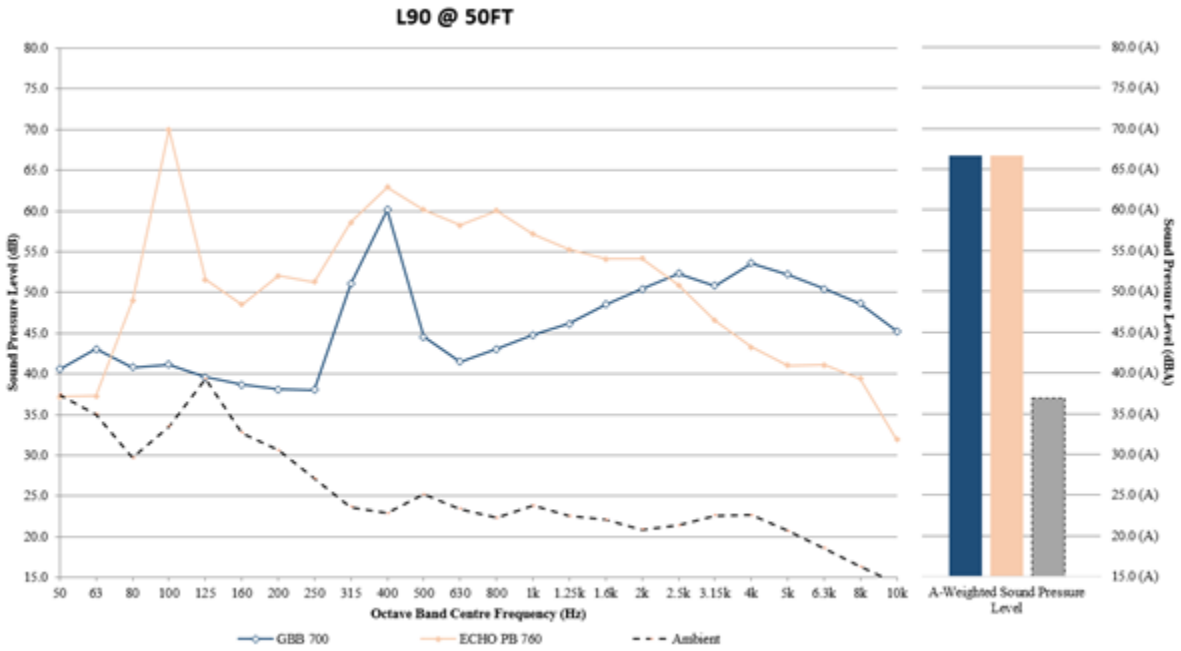
During the oral testimony of Chris Pollock on July 2, 2018, calibrated audio demonstrations of gas and battery powered leaf blowers were presented. It is important to note that the audio was played to replicate the level of the sound at the listening positions of Chairman Mendelson and Councilmember Cheh. The demonstrations were audible to members of the audience in the room and on the internet; however, the experience and levels perceived by the audience was not calibrated for their listening position.

The following three scenarios were experienced by Chairman Mendelson and Councilmember Cheh:

4.1 Demonstration 1

The first sample was a comparison of a gas and a battery blower with the same dB(A) from the manufacturers standardized testing. The important comparison is that while the overall loudness may be the same, the acoustic qualities of each and the character of the sound are totally different – the gas leaf blower generating much more low frequency noise.

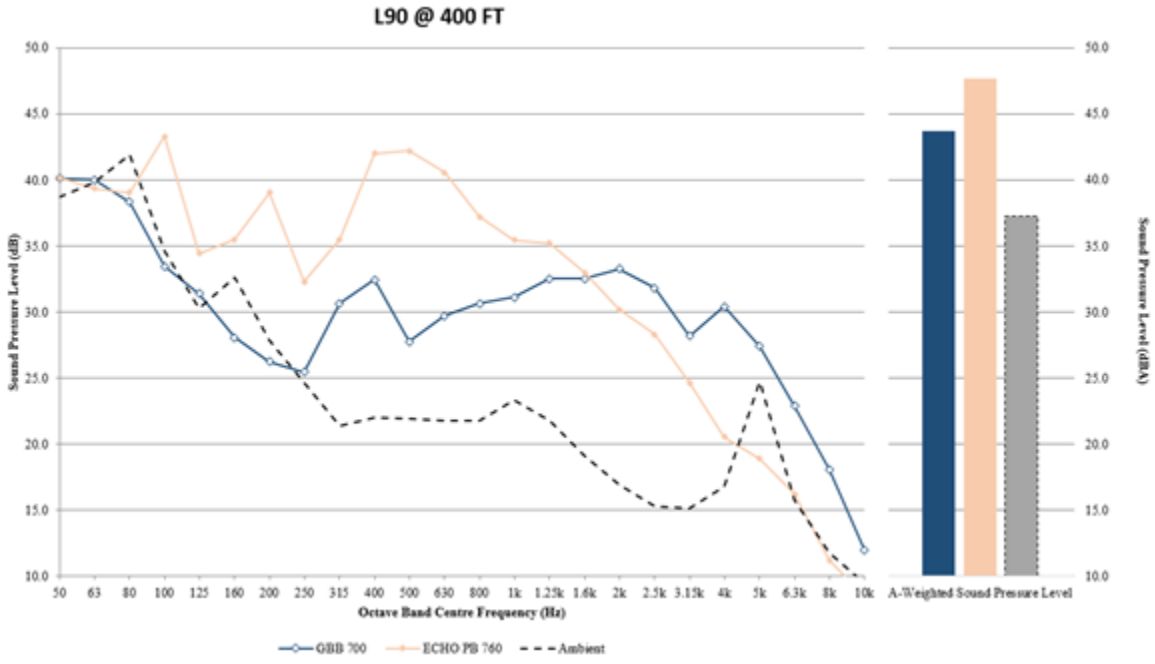
Figure 8: Audio demonstration 1 – equivalent gas and battery leaf blowers at 50 feet



4.2 Demonstration 2

The second demonstration presented in the proceedings was relative to the same two equally noise rated blowers, one gas (Echo PB 760) and one battery (Greenworks GBB 700) at 50 feet. This demonstration indicates that while rated the same overall noise level at 50 feet, the same gas blower has a significantly greater noise impact at 400 feet because the low frequency content of its noise transmits more easily over the 400 foot distance. This demonstration indicates what the community hears around operating blowers, highlighting that the low frequency components of the gas engines is part of the increased impact of gas blowers.

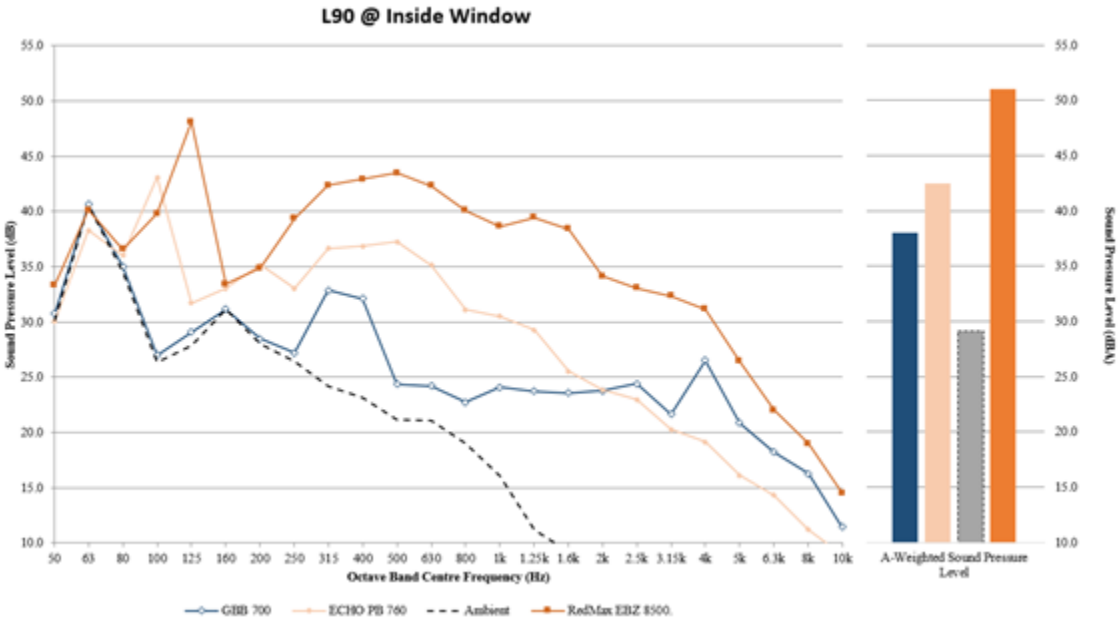
Figure 9: Audio demonstration 2 – equivalent gas and battery leaf blowers at 400 feet



4.3 Demonstration 3

Our third and final demonstration is three leaf blowers as measured inside an adjacent house (Greenworks GBB 700, Echo PB 760 and the Redmax EBZ 8500), with the leaf blowers operating at 50 feet from the windows, behind a typical insulated glass window. The audio results indicated that the two gas leaf blowers, the two orange lines in the graph below, were significantly above the battery blower in almost all frequency bands.

Figure 10: Audio demonstration 3 – gas and battery leaf blowers inside a house



5 Conclusions

Based on our measurements we conclude the following key points from our review of the results:

- The gas powered leaf blowers tested all generated more low frequency noise than the battery powered leaf blowers tested
- The low frequency noise of the gas leaf blowers transmitted over greater distances and was more readily audible over the longer 400 and 800 foot measurement distances
- The low frequency noise of the gas leaf blowers transmitted into a residential house more easily and were louder inside than the battery leaf blowers tested

6 Technical Glossary

L_{10}- The level of sound in deciBels that, for a given time period of interest, is exceeded 10 % of the time.

L_{EQ} – The equivalent continuous sound level. The preferred method to describe sound levels that vary over time, resulting in a single deciBel value which takes into account the total sound energy over the period of time of interest.

L_{50} - The level of sound in deciBels that, for a given time period of interest, is exceeded 50 % of the time.

L_{90} - The level of sound in deciBels that, for a given time period of interest, is exceeded 90 % of the time.

7 About Chris Pollock, PE

Chris Pollock, PE is an acoustical consultant with Arup with 20 years of experience measuring noise and designing buildings and spaces for acoustics on projects in the USA and around the world. He has an Honors degree in Mechanical Engineering from the University of Canterbury an is a Professional Engineer in the Commonwealth of Virginia. Chris has been published in articles in the field of acoustics in Architectural Record, contributed to the Architectural Graphic Standards and has been interviewed by various media outlets regarding acoustics and noise and serve on a number of panels and committee on topics related to acoustics and noise.

End of Written Statement

National Emissions from Lawn and Garden Equipment

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Abstract

Background: The contribution of gasoline-powered lawn and garden equipment (GLGE) to air pollutant emissions in the United States has not been extensively studied. Goal: Our goal is to provide annual US and state-level emissions estimates of volatile organic compounds (VOC): criteria pollutants (carbon monoxide [CO], nitrogen oxides [NOx], particulate matter [PM] <10 microns, including PM < 2.5 microns [PM 10, PM2.5]; and carbon dioxide (CO2) from GLGE, with a focus on 2-stroke engines. Methods: Pollutant emissions data were extracted from the Environmental Protection Agency's (EPA) 2011 and 2018 modeling platform (version 6), for GLGE (Source Code Classifications 2260004021−2265004071), and equipment population data were obtained from the EPA's nonroad model. Data were sorted by equipment type and characteristics. Aggregate and equipment-specific emissions were calculated and compared with emissions from all gasoline-fueled nonroad equipment. Results are presented as descriptive statistics. Results: In 2011, approximately 26.7 million tons of pollutants were emitted by GLGE (VOC=461,800; CO=5,793,200; NOx=68,500, PM10=20,700; CO2=20,382,400), accounting for 24%−45% of all nonroad gasoline emissions. Gasoline-powered landscape maintenance equipment (GLME; leaf blowers/vacuums, and trimmers, edgers, brush cutters) accounted for 43% of VOCs and around 50% of fine PM. Two-stroke engines were responsible for the vast majority of fine PM from GLME. State data (California, New York, Texas, Illinois, and Florida), 2018 projections, and additional comparisons are presented. Methodological issues are discussed. Conclusions: GLGE accounts for a major portion of US nonroad gasoline emissions. Two-stroke engines are an important source of VOCs and criteria pollutants.

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INTRODUCTION

Gasoline-powered lawn and garden equipment (GLGE) ranging from string trimmers to stump grinders and tractors is a source of high levels of localized emissions that includes hazardous air pollutants, criteria pollutants, and carbon dioxide (CO2).[1-4] Workers using commercial equipment are exposed when they are close to the emitting sources several hours each day, several days a week in seasons of use. Other members of the public, including children, may also be exposed to high levels of emissions from commercial landscape maintenance equipment (GLME) such as leaf blowers, trimmers, and mowers, used routinely around residential neighborhoods, schools, parks, and other public spaces. The commercial landscape maintenance industry has experienced strong growth over the last 15 years and depends largely on gasoline-powered equipment for most tasks once performed manually. These factors are raising concerns about the health impacts of GLGE emissions on workers and the public.

Extensive evidence exists on the adverse health effects of exhaust emissions and other fine particulates which include cardiovascular disease, stroke, respiratory disease, cancer, neurological conditions, premature death, and effects on prenatal development.[5-13] Short term and long term exposures are implicated. However, GLGE as a source of these emissions has received little attention. Understanding the characteristics of GLGE and GLME emissions can help estimate potential health impacts of these close-to-the-source emissions.

The goal of this study was to characterize annual emissions from GLGE at the national level and in selected states and to estimate the contribution of GLME to those emissions. Special attention is paid to 2-stroke GLME engines. The emissions contributions from the four of the five most populated states are derived from the NEI, and for California, from the emissions inventory of the California Air Resources Board (CARB).

METHODS

Study Design

The GLGE emissions analyzed are total volatile organic compounds (VOC) and individual VOCs (benzene, 1,3 butadiene, acetaldehyde, formaldehyde); criteria pollutants (carbon monoxide [CO], nitrogen oxides [NOx], particulate matter [PM] <10 microns, including PM < 2.5 microns [PM 10, PM2.5]); and carbon dioxide (CO2). Equipment pollutant data were extracted from SCC summary reports from the EPA's 2011 and 2018 modeling platform (version 6), and equipment population data were obtained from the Nonroad model. GLGE included the equipment in **TABLE 1** and identified by Source Code Classifications 2260004021−2265004071. The GLME subset is defined as leaf blowers/vacuums; trimmers/edgers/brush cutters; and mowers. Groupings of equipment, eg, leaf blowers/vacuums, were predefined by the NEI.

"All Emissions" are defined as all emissions from stationary and mobile sources, excluding biogenic and naturally occurring emissions. "All Nonroad Emissions" are defined as all emissions from the equipment types accounted for within the Nonroad model; note that this does not include emissions from commercial marine, rail, and aircraft sources. "Gasoline Nonroad Emissions" are defined as emissions from gasoline fueled equipment accounted for within the Nonroad model. National emissions were analyzed by type of equipment and engine configuration as shown in **TABLE 1**. All results are presented as descriptive statistics.

Table 1. Categorization scheme for analysis of GLGE emissions

Type of Equipment	**Engine Configuration**
GLME	
Leaf Blowers/Vacuums	2 stroke, 4 stroke
Trimmers/Edgers/Cutters	2 stroke, 4 stroke
Mowers	4 stroke
Other GLGE	
Chain Saws	2 stroke, 4 stroke
Rotary Tillers	2 stroke, 4 stroke
Snowblowers	2 stroke, 4 stroke
Turf Equipment	2 stroke, 4 stroke
Chippers/stump grinders	4 stroke
Tractors	4 stroke
Shredders	4 stroke
Other	4 stroke

Analyses

All analyses except for the 2018 projections represent 2011 estimates.

Equipment Populations

The national populations of all types of GLGE were obtained from the Nonroad model. The contribution of each type to the whole population was determined.

Contributions of All Nonroad and GLGE Sources

All Nonroad Emissions were compared to All Emissions. GLGE emissions were then calculated and compared with All Nonroad Emissions and All Emissions.

Contribution of Landscape Maintenance Equipment to GLGE Emissions

GLME emissions and their contribution to GLGE and All Nonroad Emissions were analyzed. Additional analyses were conducted to examine the relative contributions of 2-stroke GLME engine emissions.

Projected Growth of GLGE Emissions: 2011−2018

GLGE emissions projected for 2018 were obtained from the EPA's 2018 modeling platform, version 6, and compared with 2011 emissions.

GLGE Emissions in the Five Largest States

State level emissions data from the five most populated states (US Census) – California, Florida, Illinois, New York, and Texas – were extracted and analyzed. Estimates of GLGE emissions for Florida, Illinois, New York, and Texas were based on 2011 data from the EPA's 2011 modeling platform, version 6. Estimates of GLGE emission for California were based on data from the CARB's OFFROAD2007 Model and estimated for 2012. No adjustments were made for potential differences in annual emissions between 2011 and 2012 California data. The program structure of the OFFROAD2007 Model provides a general overview of the methodology used to estimate emissions from off-road sources (http://www.arb.ca.gov/msei/offroad/pubs/offroad_overview.pdf).

Each state's contribution to national GLGE Emissions was calculated and compared with its contributions to the US landscape maintenance labor force and the US population. Labor force statistics were sourced from the Bureau of Labor Statistics, May 2013 reports (www.bls.oes) and population data from the 2011 US Census.

Nonroad Air Emissions Model

EPA developed a nonroad air emissions model in the 1990s to provide estimates of emissions from most types of nonroad equipment, including construction equipment, recreational marine vessels, and lawn and garden equipment (LGE). The model is referred to simply as the "Nonroad" model, and it has been updated a number of times since its creation. Documentation for the model exists as a number of technical reports available on EPA's website (http://www.epa.gov/otaq/nonrdmdl.htm). Total emissions are determined by summing the exhaust and evaporative emission components.[14, 15] The preponderance of emissions from Nonroad equipment occurs as exhaust emissions due to the combustion of fuel. The methodologies for determining exhaust emissions are summarized below.

Exhaust Emissions from Nonroad Engines

The Nonroad model uses the following equation to calculate exhaust emissions from nonroad engines (ref: Median):

Emissions = (Pop) x (Power) x (LF) x (A) x (EF)

Where Pop = Engine population

Power = Average Power (hp)

LF = Load factor (fraction of available power)

A = Activity (hrs/yr)

EF = Emission factor (g/hp-hr)

The derivation of the default model data for each factor from the above equation is discussed below.

a. Equipment populations and average power (horsepower)

The technical report titled "Nonroad Engine Population Estimates"[16] indicates that equipment population data for most types of equipment were obtained from Power Systems Research, an independent marketing research firm, although in some instances other data source were used. Of interest for this analysis, for many LGE categories EPA used sales data obtained from equipment manufacturers during the development of its Phase 1 emission standards for small (less than 25 hp) gasoline fueled nonroad engines. This was done for the following LGE categories: lawn mowers, trimmers/edgers/brush cutters, leaf blowers/vacuums, and chainsaws. The report notes that an equipment population base year of either 1996 or 1998 was used for the LGE types.

Once estimates of equipment populations were derived, information obtained by the state of California was used to divide the equipment between the residential and commercial sectors. This step was needed because of the large difference in usage patterns between these two sectors. **TABLE 2** below contains an extract of data from Table 3 of the Nonroad Engine Population report mentioned above, and illustrates how the split between residential and commercial equipment was apportioned for a number of LGE types.

Table 2. Percentage split between residential and commercial equipment

SCC code	Application	Horsepower categories	Residential (% of equipment population)	Commercial (% of equipment population)
22xx004010 22xx004011	Lawn mowers	All	96.3	3.7
22xx004025 22xx004026	Trimmers/edgers/cutters	0-1 hp	100	0
		1-3 hp	85.3	14.7
		> 3 hp	0	100
22xx004020 22xx004021	Chainsaws	0-1 hp	100	0
		1-3 hp	97.0	3
		> 3 hp	0	100
22xx004030 22xx004031	Leaf blowers/vacuums	0-1 hp	100	0
		1-3 hp	92.5	7.5
		> 3 hp	0	100

i. Geographic allocation of residential LGE Populations (except snowblowers)

The Nonroad model uses US Census data on one and two unit housing to allocate national equipment populations to the county level. The population documentation report mentioned above notes that other variables are likely to also affect the distribution of LGE population, such as average yard size. However, no consistent, reliable data surrogates could be found to apportion the national level equipment populations based on these alternative factors, and so the model relies solely upon US Census data on one and two unit housing to allocate national LGE population data to the county level.

ii. Geographic allocation of commercial L&G Equipment Populations (except snowblowers)

The Nonroad model uses the number of employees in the landscaping services industry to disaggregate national level LGE population data to the county level. This was accomplished using data from the North American Industry Classification System (NAICS); specifically, for NAICS code 561730, landscaping services.

iii. Equipment population projections

The Nonroad model enables the user to obtain estimates of emissions for years other than the base year used for equipment populations. This is accomplished by the development of processes to handle the growth in equipment populations due to the purchase of new equipment as years pass, and adjustments made to account for the scrappage of old equipment. The reader is referred to the EPA technical reports "Nonroad Engine Growth Estimates,"[17] and "Calculation of Age Distributions in the Nonroad Model – Growth and Scrappage"[18] for further information on these topics. Both of these reports are available on the EPA website (http://www.epa.gov/otaq/nonrdmdl.htm).

b. Activity levels and load factors.

Equipment populations and horsepower levels alone are not sufficient for determining emissions from nonroad equipment; assumptions about frequency and patterns of use must also be made. The EPA report, "Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling"[19] describes how the Nonroad model assigns default activity levels, in hours per year, and

load factors in performing its calculations. Load factors are needed to account for the fact that equipment is not typically used at full power 100% of the time; load factors reflect that and are presented in terms of average percent of full power for the equipment as it is used. The activity levels and load factors for small (< or = to 25 hp) spark-ignition engines for many LGE types was taken from data supplied to EPA during the comment period for the regulation of these engines. **TABLE 3** below contains an extract of the default activity data, in annual hours of equipment use, and load factor data, expressed as fraction of full power, taken from Table 6 of the above mentioned report.

Table 3. Example default activity levels and load factors for LGE

Equipment type	Use	Activity level (Annual hours)	Load factor (fraction of full power)
Lawn mowers	Residential	25	0.33
	Commercial	406	0.33
Trimmers/Edgers/Cutters	Residential	9	0.91
	Commercial	137	0.91
Leaf blowers\Vacuums	Residential	10	0.94
	Commercial	282	0.94
Chainsaws	Residential	13	0.70
	Commercial	303	0.70

c. Emission factors

EPA's documentation for the source of the emission factors used within the Nonroad model are contained in the following two reports: "Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling: Compression-Ignition"[20] and "Exhaust Emission Factors for Nonroad Engine Modeling: Spark-Ignition." [21] Information pertaining to LGE contained in the latter report is discussed below.

Emission factors for spark-ignition engines rated at less than 25 hp were segregated into 5 engine classes based on primary use of the engine (handheld vs. non-handheld), and engine size according to engine displacement. Beginning in 1997, engines designed for both handheld and non-handheld applications became subject to several phases of regulation geared towards reducing fuel consumption (expressed in terms of brake-specific fuel consumption [BSFC]) and producing fewer air emissions in the combustion process. **TABLE 4** below contains an extract of information from Table 1 of the Exhaust Emissions 2010 report, and shows the impact of EPA's regulation on one such class of engines: small, hand-held, gasoline fueled two-stroke engines.

Table 4: Impact of regulation on small*, hand-held, gasoline fueled two stroke engines

Engine Tech Type	HC (g/hp-hr)	CO (g/hp-hr)	NOx (g/hp-hr)	PM (g/hp-hr)	BSFC (lb/hp-hr)
Baseline	261.00	718,87	0.97	7.7	1.365
Phase 1	219.99	480.31	0.78	7.7	1.184
Phase 2 (with catalyst)	26.87	141.69	1.49	7.7	0.822

BSFC: Brake-specific fuel consumption; CO: carbon monoxide; HC: hydrocarbon; NOx: nitrogen oxides; PM: particulate matter

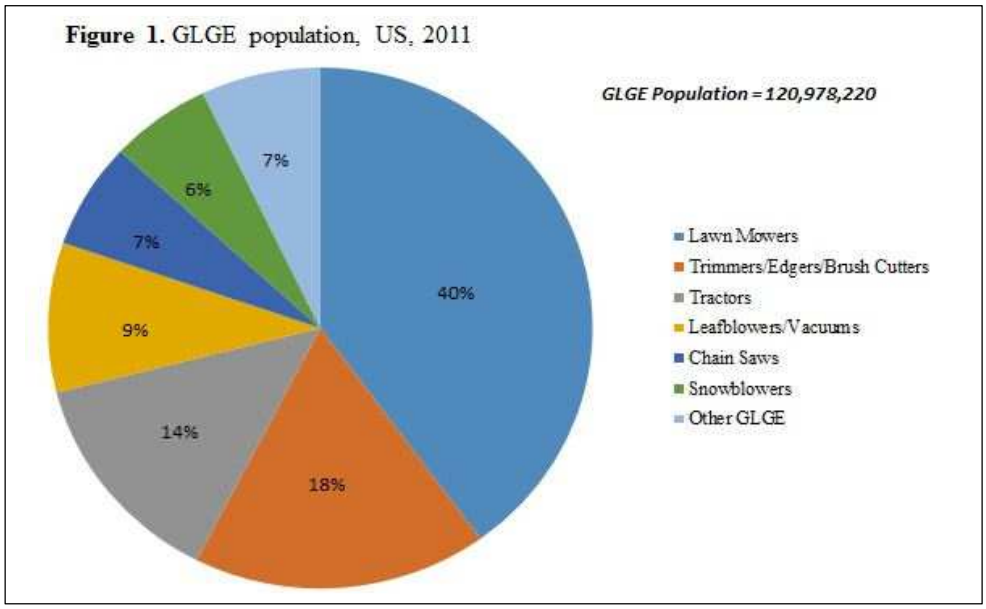
* These emission factors are for engines sized from 0 to 1 hp.

Other factors also influence the combustion related exhaust emissions from nonroad engines, such as fuel type, ambient temperature, and deterioration of equipment with age and use. The reader is referred to the EPA web-site (http://www.epa.gov/otaq/nonrdmdl.htm) for additional information on these topics.

RESULTS

Equipment Populations

Approximately 121 million pieces of GLGE are estimated to be in use in the United States (**FIGURE 1**). GLME accounts for two-thirds of all GLGE of which lawn mowers are the most numerous, followed by trimmers/edgers/ brush cutters, and then leaf blowers/vacuums. Projections from 2011 indicate a 13% increase across all equipment types after the combined effect of new equipment purchases and scrappage of old equipment are evaluated, resulting in an estimated 136 million pieces of GLGE in use by 2018.



Contribution of Nonroad Emissions to All Emissions

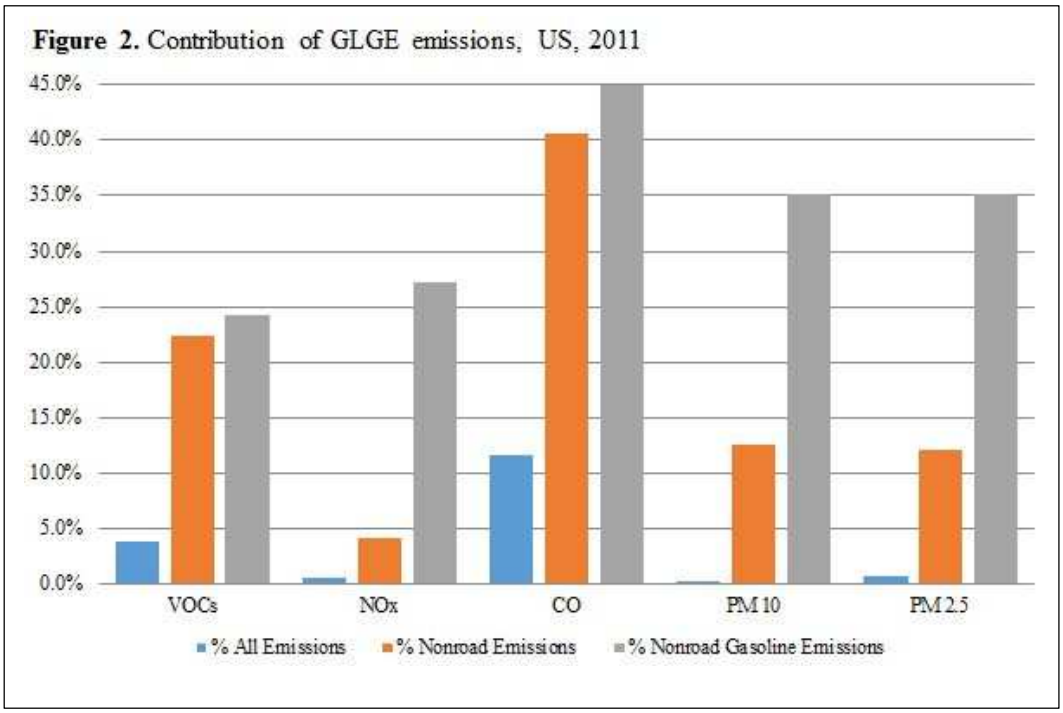
All Nonroad sources account for approximately 242 million tons of pollutants each year, accounting for 17% of all VOC emissions, 12% of NOx emissions, 29% of CO emissions, 4% of CO2 emissions, 2% of PM10 emissions, and 5% of PM2.5 emissions.

All Nonroad Emissions account for a substantial percentage of All Emissions of benzene (25%), 1,3 butadiene (22%), CO (29%), PM10 (2%), and PM2.5 (5%). Because of the relatively small contribution of GLGE CO2 to All Emissions (0.3%), it is not further considered in this report.

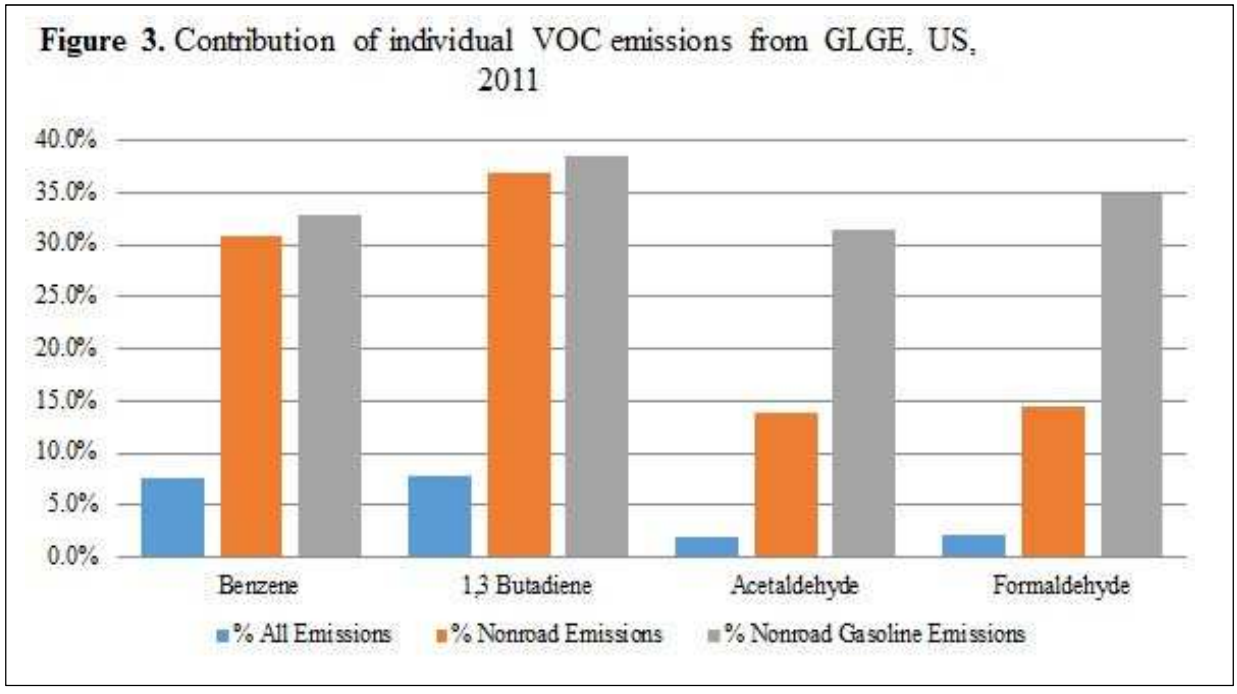
Contribution of GLGE to All Emissions and Nonroad Emissions

GLGE emitted approximately 6.3 million tons of VOCs (461,800) and criteria pollutants (CO=5,793,200; NOx=68,500, PM10=20,700 [19,000 of which is PM2.5]), and 20.4 million tons of CO2 in 2011. GLGE represented nearly 4% of All Emissions of VOCs and 12% of All Emissions of CO

(FIGURE 2). GLGE fine PM emissions constitute a fraction of a percent of All Emissions of fine PM, but is a major Nonroad source, accounting for nearly 13% of All Nonroad Emissions of fine PM and more than one-third of Gasoline Nonroad Emissions of fine PM.



Analysis of individual VOC emissions shows that GLGE contributes nearly 8% of All Emissions of both benzene and 1,3 butadiene (**FIGURE 3**). Within All Nonroad Emissions and Gasoline Nonroad Emissions, GLGE accounts for nearly one-third or more of benzene and 1,3 butadiene emissions, and also becomes a major source of aldehyde and formaldehyde emissions from Gasoline Nonroad sources.



Contribution of GLME to GLGE Emissions

Compared with the GLGE contributions of Nonroad Gasoline Emissions shown in **FIGURE 2**, contributions of VOCs and fine PM emissions from GLME are disproportionately high, and for NOx and CO, are disproportionately low (**FIGURE 4**). Small GLME engines account for more than 40% of VOC emissions and one-half of PM10 and PM2.5 emissions from GLGE. Close to 90% of fine PM emissions from GLME come from 2-stroke engines (**FIGURE 5**).

Figure 4. Contribution of GLME to GLGE emissions, US, 2011

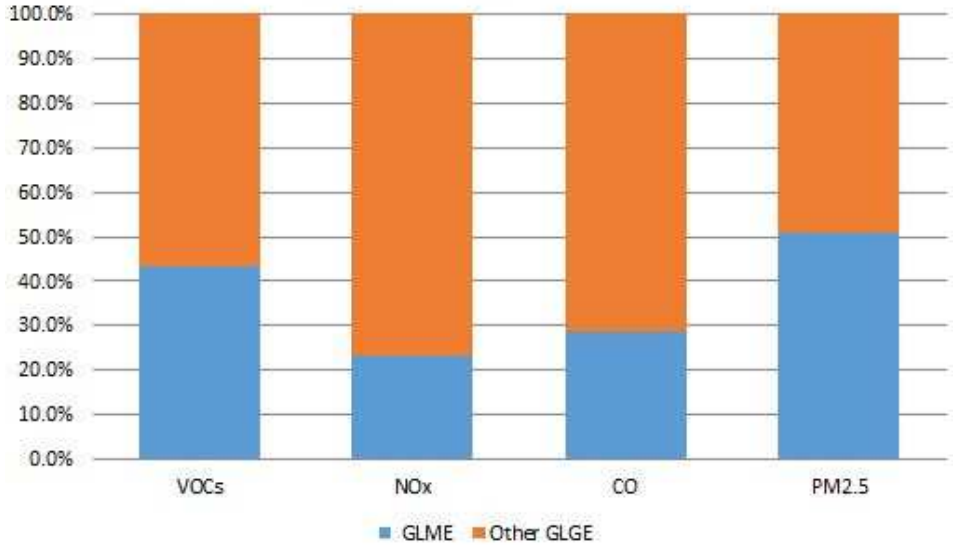
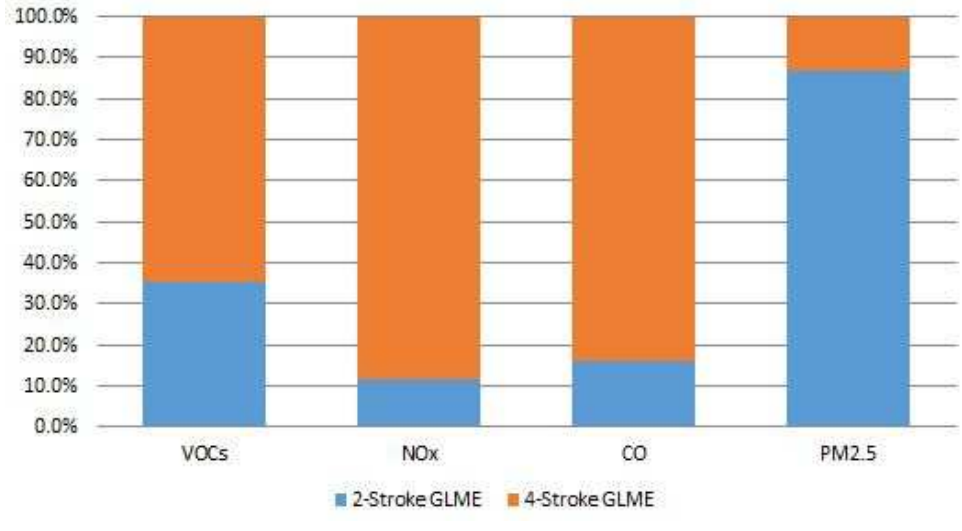


Figure 5. Contribution of 2-stroke engines to GLME emissions, US, 2011



Projected Growth of GLGE Emissions: 2011−2018

By 2018, the annual tonnage of ozone precursors, VOCs and NOx, emitted by GLGE is projected to decrease substantially from 2011, as more of the in-use fleet becomes represented by equipment built to meet EPA nonroad emission standards. CO emissions remain comparable to 2011 levels, while CO2 and fine PM emissions are projected to increase modestly.

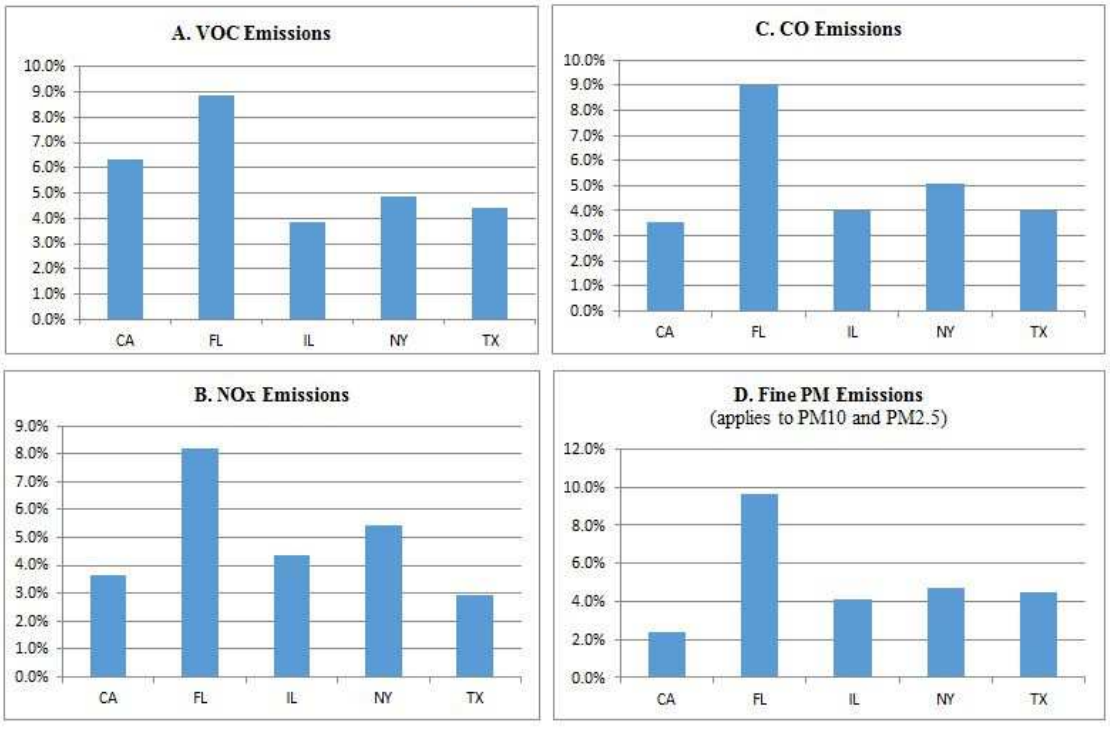
Table 5: Estimated Change in GLGE Emissions, 2018 vs 2011

Emissions	% Change
VOCs	-20.9%
NOx	-31.1%
CO	-4.9%
CO2	12.3%
PM 10	8.2%
PM 2.5	8.4%

GLGE Emissions in the Five Most Populated States

When considered together, GLGE emissions from California, Florida, Illinois, New York and Texas constitute approximately one-quarter of national GLGE emissions.

Figure 6. Emissions contributed by the 5 most populated states, US, 2011*

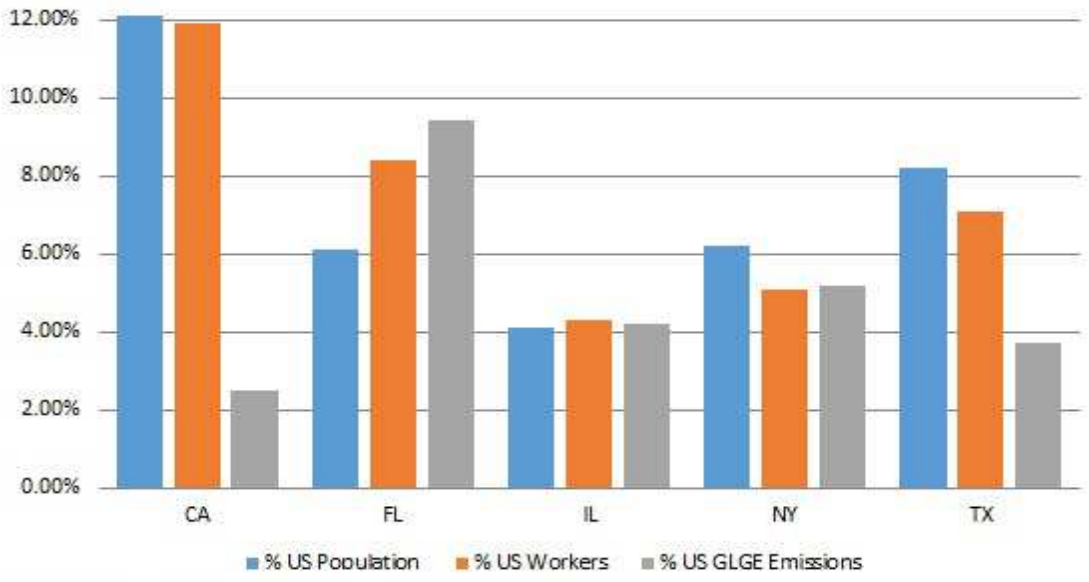


CA: California; FL: Florida; IL: Illinois; NY: New York; TX: Texas
*California data are from 2012.

Florida's GLGE emissions were 1.4 to 2.1-times higher compared with emissions in states having the next highest level of emissions in each GLGE pollutant category, and 2.2 to 4.4-times higher compared with emissions in states having the lowest level of emissions in each GLGE pollutant category (**FIGURE 6**).

For Florida, Illinois, and New York, state-specific contributions of GLGE emissions compared to the national total were relatively consistent with their contributions to the national population and the national grounds maintenance workforce. For California, its GLGE emission contribution was one-fifth that of its contribution to the national population and to the national grounds maintenance workforce. For Texas, its GLGE emission contribution was 40%−50% that of its contribution to the national population and to the national grounds maintenance workforce (**FIGURE 7**).

Figure 7. State contributions to US national population, grounds maintenance workforce, and GLGE emissions*



CA: California; FL: Florida; IL: Illinois; NY: New York; TX: Texas
*California data are from 2012 CARB estimates; all other state data are from 2011 NEI estimates.

DISCUSSION

The main findings of this study are: 1) GLGE is a prevalent source of toxic and carcinogenic emissions; 2) GLGE contributes substantially to nonroad emissions of benzene,1,3 butadiene, formaldehyde, CO, and fine PM; 3) GLME accounts for a disproportionately large share of VOC and fine PM emissions; 4) 2-stroke engines account for most fine PM emissions from GLME; 5) VOCs and NOx are projected to decrease substantially by 2018; CO emissions remain comparable to 2011 levels; and CO2 and fine PM emissions are projected to increase modestly; and 6) the GLGE emissions contributions from the the largest states are not always consistent with contributions to national population and national grounds maintenance workforce.

The large volume of emissions from GLGE found in this study is consistent with findings previously reported by the EPA[1] and from other studies.[2-4] The very substantial contribution of VOC, in particular benzene and 1,3 butadiene, deserves attention especially because of their localized nature.

While VOC emissions are expected decrease 21% on average by 2018, the rates of equipment replacement on which those projections are based are only approximated.

Adverse health effects from the GLGE emissions are well known. Benzene, 1,3 butadiene, and formaldehyde are listed among the four top ranking cancer-causing compounds.[22] They cause lymphomas, leukemias, and other types of cancer (International Agency for Research on Cancer, World Health Organization).[23, 24] Ground level ozone (formed by VOCs and NOx in the presence of sunlight) and fine PM cause or contribute to early death, heart attack, stroke, congestive heart failure, asthma, chronic obstructive pulmonary disease, and cancer.[5-11] Growing evidence suggests these pollutants also contribute to developmental and neurological disorders, including autism.[7-9, 12, 13] The mounting evidence on the dangers of short term exposure are especially concerning.[7, 9, 11]

The high levels of VOCs and fine PM from GLME are health risks for workers and other members of the public close to the emitting source. Although no studies of grounds maintenance workers were found, studies of gas station workers have shown that regular exposure to gasoline vapors can produce hematological and immunological abnormalities and elevate the risk of cancer.[25-27] In addition, children, seniors, and persons with chronic illnesses are especially vulnerable to the negative health impacts of GLME emissions.[28] Routine use of GLME in the vicinity of residential neighborhoods, schools, parks, and other public spaces may be exposing the public to unnecessary and preventable health risks. New equipment standards do not affect fine PM emissions; in fact, those emissions are expected to increase.

School buses represent another example of a close-to-emitting source in which children are subjected to increased exposure from diesel exhaust.[29] Tests of school buses found that diesel exhaust entering through the front door of the bus results in elevated levels of PM over time. When queuing, PM built up rapidly in the bus cabin when the front doors were open.

The variation in emissions levels observed among the five most populated states should be explored further. The reasons for the high emissions contribution from Florida and relatively low emissions contributions from Texas and California are not clear. Differences between CARB data and NEI data may account for some of the difference between California and other states. For example, the NEI baseline equipment population data are older compared with those of CARB. Other factors that may be involved include but are not limited to emissions estimation procedure, geographic and climate factors, regulations and their effectiveness, and efforts to promote cleaner alternatives.

This study has several limitations. Not all potentially harmful emissions were characterized; for example, polycyclic aromatic hydrocarbons. Other limitations concern the source data. Although the NEI is a comprehensive source of GLGE emissions data, the accuracy of the reported data is uncertain. Baseline equipment population data for the Nonroad model is 15−20 years old and does not account for growth of the commercial industry. This older population data supplies emission estimates to NEI, which in turn is used to create EPA's 2011 and 2018 modeling platforms. Although the residential and commercial CARB inventories and activity data are newer, they depend largely upon telephone survey data.[30, 31] Methodological weaknesses with the commercial survey data are discussed in the survey report.[31] For both data sources, the rates of replacement of older equipment by newer, cleaner equipment that meets the newer Phase 3 standards[32] can only be approximated.

CONCLUSIONS

GLGE is an important source of toxic and carcinogenic exhaust and fine particulate matter. Improved reporting and monitoring of localized GLGE emissions should be implemented. Medical and scientific organizations should increase public awareness of GLGE and GLME and identify GLGE as an important local source of dangerous air pollutants. Communities and environmental, public health, and other government agencies should create policies and programs to protect the public from GLGE air pollutants and promote non-polluting alternatives.

REFERENCES

1. Michaels H. "NONROAD Overview," Presented at the 2012 International Emission Inventory Conference of the US Environmental Protection Agency, Tampa, Florida, August 16, 2012.
2. Volckens J, Braddock J, Snow RF, et al. "Emissions Profile From New and In-Use Handheld, 2-Stroke Engines," Atmospheric Environment 2007;41:640-649.
3. Volckens J, Olson DA, Hays MD. "Carbonaceous Species Emitted from Handheld Two-Stroke Engines," Atmospheric Environment 2008;42:1239-1248.
4. Shipchandler R. *VOC Emissions from Gas Powered Leaf Blowers in the Chicago Metropolitan Region. Waste Management and Research Center Report*. Illinois Waste Management and Research Center, February 2008, TN08-093.
5. American Heart Association. Facts: Danger in the Air -Air Pollution and Cardiovascular Disease. Accessed 1/6/14 at http://www.heart.org/HEARTORG/Advocate/IssuesandCampaigns/Advocacy-Fact-Sheets_UCM_450256_Article.jsp
6. American Lung Association. State of the Air 2014.
7. *Integrated Science Assessment for Particulate Matter- Final Report*, US Environmental Protection Agency, December 2009, EPA/600/R-08/139F.
8. *Provisional Assessment of Recent Studies on Health Effects of Particulate Matter Exposure*, US Environmental Protection Agency, December 2012, EPA/600/R-12/056F,.
9. *Integrated Science Assessment for Ozone and Related Photochemical Oxidants*, US Environmental Protection Agency, 2013, EPA/600/R-10/076F.
10. *Air Pollution and Cancer*, K Straif, A Cohen, J Samet (Eds), Scientific Publication 161, International Agency for Research in Cancer, World Health Organization, Lyon Cedex FR:IARC, 2013.
11. Shah ASV, Lee KK, McAllister DA, et al. "Short Term Exposure to Air Pollution and Stroke: Systematic Review and Meta-Analysis," BMJ 2015;350:h1295.
12. Raz R, Roberts AL, Lyall K, Hart JE, Just AC, Laden F, Weisskopf MG. "Autism Spectrum Disorder and Particulate Matter Air Pollution Before, During, and After Pregnancy: A Nested Case-Control Analysis within the Nurses' Health Study II Cohort," Environ Health Perspect. 2015 Mar;123(3):264-70.
13. Power MC, Kioumourtzoglou M-A, Hart JE, et al. "The Relation Between Past Exposure to Fine Particulate Pollution and Prevalent Anxiety: Observational Cohort Study," BMJ 2015;350:h1111.
14. *Nonroad Evaporative Emission Rates*, US Environmental Protection Agency, July 2010, EPA-420-R-10-021, NR-012-d.
15. *Refueling Emissions for Nonroad Engine Modeling*, US Environmental Protection Agency, April 2004, EPA420-P-04-013, NR-013-b.
16. *Nonroad Engine Population Estimates*, US Environmental Protection Agency, July 2010, EPA-420-R-10-017, NR-006e.
17. *Nonroad Engine Growth Estimate*, US Environmental Protection Agency, April 2004, EPA420-P-04-008, NR-008c.
18. *Calculation of Age Distributions in the Nonroad Model: Growth and Scrappage*, US Environmental Protection Agency, December 2005, EPA420-R-05-018, NR-007c.
19. *Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling*, US Environmental Protection Agency, July 2010, EPA-420-R-10-016, NR-005d.
20. *Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling: Compression-Ignition*, US Environmental Protection Agency, July 2010, EPA-420-R-10-018, NR-009d.
21. *Exhaust Emission Factors for Nonroad Engine Modeling: Spark-Ignition*, US Environmental Protection Agency, July 2010, EPA-420-R-10-019, NR-010-f.
22. Loh MM, Levy JI, Spengler JD, et al. "Ranking Cancer Risks of Organic Hazardous Air Pollutants in the United States," Environ Health Perspect 2007; 115:1160–1168.

23. Baan R, Gross Y, Straif K et al on behalf of the WHO International Agency for Research on Cancer Monograph Working Group. “A Review of Human Carcinogens—Part F: Chemical Agents and Related Occupations,” Lancet Oncology 2009; 10:1143-1144.
24. Report on Carcinogens 13th Edition, 2014. US Department of Health and Human Services, Public Health Service, National Toxicology Program.
25. Lynge E, Andersen A, Nilsson R, et al. “Risk of Cancer and Exposure to Gasoline Vapors,” Am J Epidemiol 1997;145:445-458.
26. Tunsaringkarn T, Prueksasit T, Kitwattanavong M, et al. “Cancer Risk Analysis of Benzene, Formaldehyde and Acetaldehyde on Gasoline Station Workers,” Journal of Environmental Engineering and Ecological Science 2012, 1:1.http://dx.doi.org/10.7243/2050-1323-1-1.
27. Moro AM, Brucker N, Charão MF, et al. “Early Hematological and Immunological Alterations in Gasoline Station Attendants Exposed to Benzene,” Environ Res. 2015;137C:349-356.
28. *State of the Air*, 2014, American Lung Association.
29. Hill LB, Zimmerman NJ, Gooch J. *A Multi-City Investigation of the Effectiveness of Retrofit Emissions Controls in Reducing Exposures to Particulate Matter in School Buses*, Clean Air Task Force, January 2005.
30. *2012 California Survey of Residential Lawn and Garden Equipment Owners: Population and Activity*, California Air Resources Board.
31. *Acquisition and Analysis of Commercial and Institutional Lawn and Garden Population and Activity Data: Final Report*, August 8, 2006, Eastern Research Group, Inc. for the California Air Resources Board.
32. *EPA Finalizes Emission Standards for New Nonroad Spark-Ignition Engines, Equipment, and Vessels*, US Environmental Protection Agency, Office of Transportation and Air Quality, September 2008, EPA420-F-08-013.

LEAF BLOWER REGULATIONS REGIONAL WORKING GROUP

MUNICIPAL RESEARCH AND BEST PRACTICES SUBCOMMITTEE REPORT

AUGUST 16, 2022

Summary

The Leaf Blower Regulations Regional Working Group Municipal Research and Best Practices Subcommittee surveyed numerous Illinois municipalities to determine if and how they regulated leaf blowers (see ***Appendix A***). It was determined that most Illinois municipalities do not have ordinances that prohibit or restrict the use of gas-powered leaf blowers. However, certain municipalities including but not limited to Evanston, Kenilworth, Winnetka, and Wilmette have adopted gas-powered leaf blower regulations to reduce noise and air pollution.

The Subcommittee also surveyed municipalities nationwide to identify successful programs, policies, and best practices for the Regional Working Group to consider. We found California has several communities with gas leaf blower regulations which are highlighted in the "Best Practices" section of this memorandum, along with other noteworthy municipal attempts to limit air pollutants and reduce noise pollution.

Importantly, our research assessed the success of various regulatory and enforcement strategies used in Illinois municipalities. We found:

- Police departments are the most common enforcer of leaf blower regulations; complaints of this nature are typically treated as low priority. Other enforcement agencies include Code Enforcement, Public Works, or, in the case of Evanston, the Health Department.

- To limit noise, many communities have noise ordinances that consequently limit the hours of use of leaf blowers without completely banning their use. The following communities have noise ordinances but do not specifically include "leaf blowers" in their regulation: Barrington, Buffalo Grove, Deerfield, Elmhurst, Glen Ellyn, Glenview, Grayslake, Lake Forest, Lake Zurich, Libertyville, Lincolnshire, Mettawa, Morton Grove, Mount Prospect, Mundelein, Northbrook, Northfield, Park Ridge, Riverwoods, Skokie, and Vernon Hills.

- The following Illinois communities have partial or full bans on leaf blowers: Wilmette, Evanston, Glencoe, Winnetka, Lincolnwood, Kenilworth, and Highland Park.

Illinois Municipal Regulations

Many Illinois municipalities regulate leaf blowers indirectly through the use of noise and nuisance ordinances that effectively set the acceptable hours of operation without introducing a seasonal ban. These communities, primarily on Chicago's North Shore, have engaged in more extensive regulatory efforts.

Evanston. The City of Evanston has an ordinance that prohibits gas-powered leaf blowers between May 15th and September 30th (summer) and after the first Thursday in December until March 29th (winter). Evanston will ban all gas-powered leaf blowers starting April 1, 2023 including during the seasons listed. There are no seasonal restrictions on electric-powered leaf blowers. When leaf blowers are allowed, their use is limited to Monday through Friday from 7:00 a.m. to 9:00 p.m. and on Saturday, Sunday, and holidays from 9:00 a.m. to 5:00 p.m. The Evanston Health Department enforces their regulations through progressive discipline: a written violation letter is sent upon the first offense, a $100 fine for the second offense, a $150 fine for the third offense, a $200 fine for the fourth offense, and $250 fines for the fifth and subsequent offense(s).

Glencoe. The Village of Glencoe prohibits the use of gas-powered leaf blowers between May 15th to September 15th and from December 15th to March 15th. The ordinance restricts commercial lawn maintenance equipment use from 7:00 a.m. to 7:00 p.m. on weekdays and from 9:00 a.m. to 6:00 p.m. on Saturdays, and bans use entirely on Sundays and holidays. These restrictions do not apply to property owners conducting maintenance on their property. The Glencoe Police Department enforces these restrictions by issuing $250 fines to commercial landscape companies who are in violation, starting from the first offense (e.g. no warning).

Highland Park. The City of Highland Park prohibits the use of gas-powered leaf blowers between May 15th and October 1st, except for golf course maintenance or roof gutter cleaning (between May 15th and June 15th). When allowed, leaf blowers can be operated between 7:00 a.m. to 7:00 p.m. on weekdays and from 9:00 a.m. to 5:00 p.m. on Saturdays. The Highland Park Police Department and Community Development Department enforce this ban with fines ranging from $200 to $500.

Kenilworth. The Village of Kenilworth has a noise and leaf blower ordinance that prohibits the use of gas-powered leaf blowers between May 15th and September 30th. When allowed, leaf blowers can be operated Monday through Friday from 8:00 a.m. to 6:00 p.m. and on Saturday, Sunday, and holidays from 9:00 a.m. to 5:00 p.m. Gas or electric-powered leaf blowers must never exceed 75 decibels. The Kenilworth Police Department enforces this ordinance.

Illinois Municipal Regulations (continued)

Lincolnwood. The Village of Lincolnwood prohibits the use of gas-powered leaf blowers from May 15th to September 30th. When allowed, the leaf blower ordinance restricts use from 7:00 a.m. to 6:00 p.m. Monday through Friday; 7:00 a.m. to noon on Saturday; and bans use entirely on Sundays and holidays. The Lincolnwood Police Department and a Code Enforcement Officer issues violation notices upon the first offense and a citation upon the second offense. Fines are determined in court.

Wilmette. The Village of Wilmette introduced a ban on gas-powered leaf blowers between May 15th and September 30th beginning in 2006. The prohibition includes using an electric leaf blower powered by a portable gasoline generator, but not the use of electric leaf blowers plugged into permanently installed electrical outlets attached to a permanent structure. Exemptions to the gas-powered leaf blower ban include golf courses, public parks, Wilmette Park District property, for roof/gutter/downspout cleaning, and use in paving/repair/patching of public streets or related to asphalt seal coating on private property. Between October 1 and May 14, the Village permits the use of gasoline-powered leaf blowers, however, use is limited for to no more than 30 minutes in any three-hour period on lots of one-half acre or less. Enforcement is conducted proactively and citations are issued to the company violating the law, not individual employees. The fines for first time violators ($75) are typically waived upon providing evidence that a battery/electric-operated leaf blower has been purchased. Subsequent offenses have a fine of $150.

Winnetka. The Village of Winnetka has a nuisance ordinance that prohibits the use of gas-powered leaf blowers between June 1st and September 30th, except for golf course maintenance. From October 1st to May 31st, the use of gas-powered leaf blowers is limited to Monday through Friday from 8:00 a.m. to 7:00 p.m. and on Saturday, Sunday, and holidays from 9:00 a.m. to 6:00 p.m. The Winnetka Police Department enforces the ordinance and issues fines for $100 per offense. The fines do not escalate.

National Municipal Regulations - California

California has a history of strict air quality standards that resulted in leaf blower bans as early as the late 1970s. Some municipalities have banned both gas-powered and electric leaf blowers.

Hermosa Beach. Hermosa Beach, California directly references "leaf blowers" under "Prohibited Noises" in their noise ordinance, effectively banning leaf blowers since the early 1990s. The city issues notice to first-time violators, while the Police Department can "decide to issue a citation to the person who is caught using the leaf blower", enforcing the ban that way.

Laguna Beach. Since 1993, Laguna Beach, California has banned both gasoline-powered and electric leaf blowers. Fines are issued to users starting at $100 for the first violation, $200 for the second violation, and $500 for the third violation. Code Enforcement staff issue warnings and citations if they see someone using a leaf blower.

Santa Barbara. Santa Barbara, California has banned gas-powered leaf blowers since 1997. This ordinance is enforced through a complaint system: a District Inspector monitors an online complaint website where residents can register an online complaint as an air pollution complaint. The District Inspector determines if a complaint is a violation and can issue a citation. Every hour of violation is treated as a separate incident.

Santa Monica. Santa Monica, California bans the use of both gasoline-powered and electric leaf blowers within the city. Violators can receive citations from Code Enforcement. $500 fines are usually given to the operator of the leaf blower, but management companies, landscaping companies, or property owners can be cited. A court case in 2015 limited the scope of citations as a property owner claimed that the City could not prove that the owner knew that the leaf blower was being used on his property at the time of the citation.

In addition to municipal regulations, notably, the California Air Resources Board recently (December 2021) adopted administrative regulations that will effectively halt the sale of gas-powered leaf blowers, lawn mowers, and other landscaping equipment starting in model year 2024. Equipment manufactured prior to 2024 can continue to be legally sold and used after the effective date of these regulations.

National Municipal Regulations – Outside California

Burlington, VT. Burlington, Vermont's largest city, passed a phased-in ban that required compliance by May 2022. The ordinance bans the use of gas-powered leaf blowers from Memorial Day to Labor Day. The ordinance allows for year-round use of electric-powered leaf blowers that are below 65 decibels; when allowed, gas-powered leaf blowers must operate below 65 decibels. The use of any leaf blower is limited to Monday through Friday from 7:00 a.m. to 5:00 p.m., Saturdays from 8:00 a.m. to 5:00 p.m., and prohibited on Sundays and Holidays except for property owners from 9:30 a.m. to 5:00 p.m.

East Hampton, NY. East Hampton, New York, passed an ordinance prohibiting gas and diesel-powered leaf blowers from May 20th to September 20th. When allowed, leaf blower use is restricted to Monday through Friday from 8:00 a.m. to 6:00 p.m., Saturdays from 9:00 a.m. to 5:00 p.m., and prohibited on Sundays and Holidays except for property owners from 9:00 a.m. to 3:00 p.m. The East Hampton Town Ordinance Department enforces the ban with fines between $1,000 and $5,000 depending on the offense.

Montclair, NJ. Montclair, New Jersey passed an ordinance that restricts gas-powered leaf blower use, allowing for use only between March 15th and May 15th and between October 15th and December 15th. When allowed, leaf blower use is restricted to Monday through Friday from 9:00 a.m. to 6:00 p.m., Saturdays from 10:00 a.m. to 6:00 p.m. (8:00 p.m. for property owners), and Sundays and Holidays from 10:00 a.m. to 5:00 p.m. Additionally, the ordinance requires lawn care companies to provide safety protection for their employees. A Municipal Court Judge administers fines at their discretion; first-time violations start at $100 and recurring violators can be fined up to $2,000 and risk 90 days of community service or imprisonment.

Summit, NJ. Summit, New Jersey introduced a pilot program that temporarily banned gas-powered leaf blowers from June 1st, 2021, through August 31st, 2021. The ordinance adds on to existing use restrictions: Monday through Friday from 8:00 a.m. to 6:00 p.m. (8:00 p.m. for non-commercial use), Saturdays from 9:00 a.m. to 6:00 p.m., and on Sundays and Holidays from 9:00 a.m. to 6:00 p.m. for non-commercial use. The temporary ordinance was enforced by the Summit Police Department and/or the Department of Community Services through a progressive discipline system; first-time violators receive a notice, then incur increasing fines after subsequent violations, from $100-$500. The program/ban was not extended and there are currently only temporal restrictions on use.

Time of Day Restrictions

Community	Ord. Reference	When Prohibited	Enforcing Agency	First Offense	Subsequent Offense(s)
Wilmette, IL	Sec. 16-115(a) (nuisances)	May 15th - September 30th	Police	$80	$160
Evanston, IL	Title 8, Chapter 26	May 15th - September 30th, First Thursday in December - March 29th	City Health	Notice	$100, $150, $200, $250
Glencoe, IL	Sec. 24-38(c) (nuisances)	May 15th - September 15th, December 15th - March 15th	Police	Discretionary	Discretionary
Highland Park, IL	Sec. 95-001(O)(9) (nuisances)	May 15th - October 1st	Police, Community Development	$200-500	$200-500
Winnetka, IL	Sec. 9.16.020(21) (nuisances)	June 1st - September 30th	Police	$100	$100
Kenilworth, IL	Sec. 135-02(23) (nuisances)	May 15th - September 30th	Police	Discretionary	Up to $750
Lincolnwood, IL	Sec. 17-2-16(H) (noise)	May 15th - September 30th	Police, Code Enforcement	Notice.	Discretionary.

Time of Day Restrictions

Community	Ord. Reference	When Prohibited	Enforcing Agency	First Offense	Subsequent Offense(s)
Hermosa Beach, CA	Sec. 8.24.020(H) (noise)	Complete ban	Code Enforcement	$100	$200, $500
Laguna Beach, CA	Sec. 7.25.070(D) (noise)	Complete ban	Code Enforcement	$100	$200, $500
Santa Monica, CA	Sec. 4.08.270 (nuisances)	Complete ban	Code Enforcement	$500	$500
Santa Barbara, CA	Sec. 9.16.050 (noise)	Complete ban	Police, Santa Barbara County Air Pollution Control District	Discretionary	Discretionary
Burlington, VT	Sec. 21-14	Memorial Day (May) - Labor Day (September)	Police	$200-$500	$300-$500
East Hampton, NJ	Chapter 155	May 20th - September 20th	Town Ordinance	Up to $1,000	$1,500-$5,000
Montclair, NJ	Sec. 217-6 (noise)	May 15th - October 15th, December 15th - March 15th	Police	$100	Up to $2,000; community service; 90 days in jail
Summit, NJ	Sec. 3-8.1(b)(4) (noise)	June 1st - August 31st	Police, Community Services	Notice	$100, $250, $500

Time of Day Restrictions

Weekday Permitted Hours

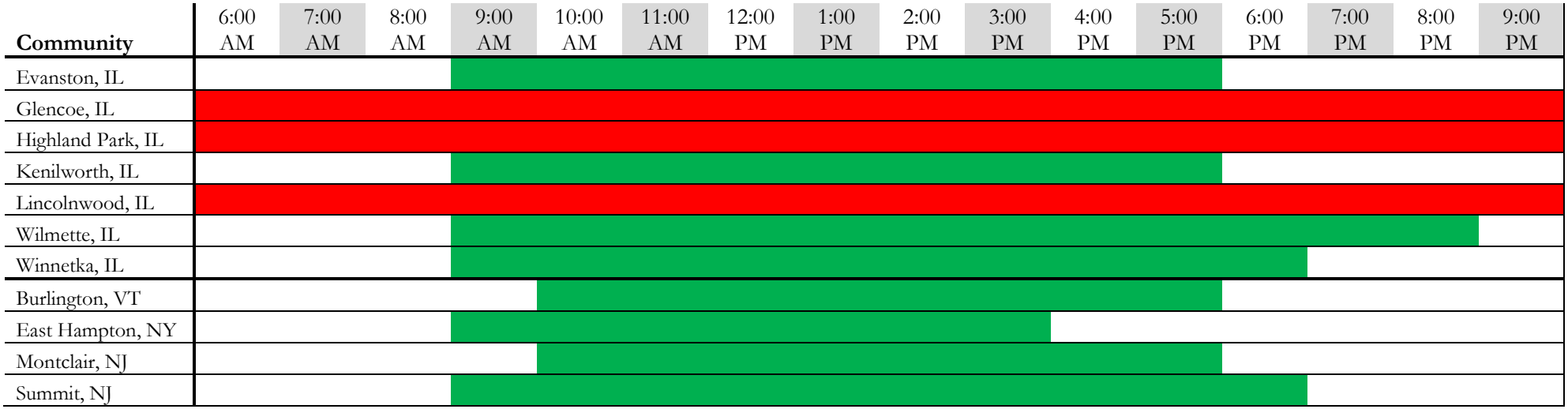
Community	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM
Evanston, IL		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Glencoe, IL		■	■	■	■	■	■	■	■	■	■	■	■	■		
Highland Park, IL		■	■	■	■	■	■	■	■	■	■	■	■	■		
Kenilworth, IL			■	■	■	■	■	■	■	■	■	■	■			
Lincolnwood, IL		■	■	■	■	■	■	■	■	■	■	■	■			
Wilmette, IL			■	■	■	■	■	■	■	■	■	■				
Winnetka, IL			■	■	■	■	■	■	■	■	■	■	■			
Burlington, VT		■	■	■	■	■	■	■	■	■	■	■				
East Hampton, NY			■	■	■	■	■	■	■	■	■	■	■			
Montclair, NJ				■	■	■	■	■	■	■	■	■	■			
Summit, NJ			■	■	■	■	■	■	■	■	■	■	■			

Saturday Permitted Hours

Community	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM
Evanston, IL				■	■	■	■	■	■	■	■	■				
Glencoe, IL				■	■	■	■	■	■	■	■	■	■			
Highland Park, IL				■	■	■	■	■	■	■	■	■				
Kenilworth, IL				■	■	■	■	■	■	■	■	■				
Lincolnwood, IL		■	■	■	■	■	■									
Wilmette, IL				■	■	■	■	■	■	■	■	■	■	■	■	
Winnetka, IL				■	■	■	■	■	■	■	■	■				
Burlington, VT			■	■	■	■	■	■	■	■	■	■				
East Hampton, NY				■	■	■	■	■	■	■	■	■				
Montclair, NJ					■	■	■	■	■	■	■	■	■			
Summit, NJ				■	■	■	■	■	■	■	■	■	■			

Time of Day Restrictions

Sundays & Holidays Permitted Hours (non-commercial)



APPENDIX A

Survey of Municipal Leaf-Blower Regulations (Excel Spreadsheet)

Communities	Ordinance? (Y = yes, N = no, U = unknown, P = pending)	URL to Gas Powered Leaf Blower ordinance	Enforcement Procedure	Rate your Effectiveness (1-5 scale) w/ 1 being least effective	Minutes of Regulation Discussion/Debate	Fine? (Y/N)	Fine amount?	Who is fined?	Notes
Buffalo Grove	No	N/A	N/A	N/A	No	N/A	N/A	N/A	Two people unsure when I called the village. "Leaf blowers are just like lawn mowers, so there are no restrictions."
Deerfield	No	N/A	N/A	N/A	No	N/A	N/A	N/A	No noise ordinance; no pollution ordinance. Landscapers fall under "maintenance," so they can work anytime, but the village encourages them to follow 7:30am-7pm M-F; 8:30am-5pm Saturday (called 5/14/19)
Barrington	No	N/A	N/A	N/A	No	N/A	N/A	N/A	Non-home rule community
Elmhurst	No	N/A	N/A	N/A	No	N/A	N/A	N/A	
Evanston	Noise + leaf blower ordinances	https://library.municode.com/il/evanston/codes/code_of_ordinances?nodeId=TIT8HESA_CH26LEBL	Health Department	N/A currenlty in the hiring process for position		First violation letter, but if second offense	2nd Offense $100, 3rd $150, 4th $200 5th and after $250	Person using leafblower - homeowner or worker	Prohibited May 16-Sept. 29 as well as after first Thursday in December until March 29. When allowed, M-F 7am-9pm and S/S/Holidays 9am-5pm
Glen Ellyn	Only nuisance regulation	N/A	N/A	N/A	No	N/A	N/A	N/A	Restricts the use of tools for home and lawn maintenance to between the hours of 7:00 a.m. and sunset. Arguably, a leaf blower would fall under that regulation.
Glencoe	Noise + leaf blower ordinances	http://library.amlegal.com/nxt/gateway.dll/Illinois/glencoe_il/zoningcode/articleititlean	Police Department. Generally a Community Service Officer.	2	Yes	Yes - no first warning	$250 each time	Landscaping company	Gas-powered leaf blowers permitted between March 15-May 15 and Sept. 15 - Dec. 15.
Glenview	Noise ordinance	N/A	Community Development (Code Enforcement); use construction hours; complaint-based	4	No	Yes - determined by police department	Determined by police department	Determined by police department	Noise ordinance exists.
Grayslake	No	N/A	Mostly the Police Department. Some assistance from Building and Zoning.	5	No	No	No	N/A	Police commander said if there is a nuisance complaint, abide by construction hours. Nothing explicit.
Highland Park	Leaf blower ordinance	de.com/search?stateId=13&clientId=13923&searchText=leaf%20blower&contentTypeId=CODES	Mostly the Police Department. Some assistance from Community Development..	3	No	Yes	Between $200 and $500	Landscaper company	Only electric leaf blowers allowed between May 15 and October 1 on M-F between 7am-9pm and Saturday between 9am-5pm. No leaf blowers allowed on Sundays.
La Grange	Noise ordinance only. No leaf blower prohibitions.		N/A	N/A	No				
Kenilworth	Leaf blower ordinance	https://codelibrary.amlegal.com/codes/kenilworth/latest/kenilworth_il/0-0-0-4257	Police Department	Unable to rate as 2022 will be the first year of actual enforcement.	No				Village's ban on gasoline-powered leaf blowers from May 15 - September 30. The ban includes electric leaf blowers connected to portable gasoline-powered electric generators. Until that time, residents may continue using their leaf blower between 8:00 a.m. and 6:00 p.m., Monday - Friday, and between 9:00 a.m. and 5:00 p.m.on Saturdays. Leaf blowers, regardless of power source, may not exceed 75 decibels when in use.
Lake Bluff	Noise Ordinance	https://www.stellngcodifiers.com/codebook/index.php?book_id=805	Police Department	2	Village Board Memo and Minutes	Yes	$25-$750	Contractor or company	M-F 8am-6pm; S/S/Holidays 9am-6pm.
Lake Forest	Noise Ordinance	com/nxt/gateway.dll/Illinois/lakeforest_il/cityoflakeforestillinoiscodeofordinances?f=templates$fn=default.htm$3.0$vid=amlegal:l	Police Officer must respond (in order to potentially issue citation); ordinance allows lawn maintenance equipment 7:30am-7:30pm M-F, 8a-5:30p Sat, 10a-5pm Sun and holidays;	4 (doesn't get that many calls)	extension://efaidnbmnnnibpcajpcglclefindmkaj/viewer.html?pdfurl=https%3A%2F%2Fcms9files.revize.com%2Fcityoflakefores	Yes	$10-$750 per offense	Determined by police department when citation is written - case by case basis	M-F 7:30am-7:30pm. Sat. 8:00am-5:30pm, Sun./Holidays 10am-5pm.

Lake Zurich	Noise Ordinance	N/A				N/A	N/A	N/A	N/A
Libertyville	N/A	N/A	Code Enforcement Officer (Jack Johnson) responds; complaint-based and enforce the costruction hours of 7a-6p M-F, 8a-6p Sat, noon-6p Sun		4 No	N/A	N/A	N/A	N/A
Lincolnshire	Noise Ordinance only for contactors, not homeowners	https://www.lincolnshireil.gov/sitemedia/documents/quick_links/village-code/title-5/code0501.pdf	Police Department responds; enforcing construction hours of 7a-7p M-F, 8a-6p Sat, not allowed on Sun/holidays; will typically respond to scene and issue a warning or a compliance ticket after one/multiple warnings	5 (don't have many of these types of complaints)	No	Stop work order and potential fine - ONLY contractors will get fined, homeowners can use leafblowers whenever (outside of any noise ordinance times)	Up to $500	Homeowners never fined - contract companies may be fined depending on police decision	Permitted 7am-7pm M-F; 8am-6pm Sat.; no work Sunday or holidays.
Lincolnwood	Noise + usage ordinances	https://ecode360.com/15325372?highlight=leaf%20blower,leaf%20blowers#15325372	Police Department or Code Enforcement Officer	N/A (no recent violations and tough to enforce as currently written)	No	Speak to contractor + homeowner, give violation notice. Second offense = citation.	Judge gives fine; village suggests fine	Contractor definitely - but also perhaps homeowner (both have been cited for breaking construction ordinances in the past, just not leaf blowers)	When permitted, can be used between 7am-6pm M-F or 7am-12pm Saturday. Not permitted between May 15 and September 30
Morton Grove	Noise ordinance	N/A	Handled by Police as a noise complaint. Officers are dispatched to speak with offending party trying to reach a mutually agreeable resolution. Tickets are a last resort trying to seek voluntary compliance.	4+	No	N/A	N/A	N/A	
Mount Prospect	Noise ordinance		Handled by Community Development Department (Environmental Health) although after-hours handled by Police; need okay from neighbors to start earlier than normal construction hours	5 (no issues, barely ever comes up)	No	Unclear	Unclear	Unclear	
Mundelein	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No ordinances for any landscaping practices
Northbrook	Yes - Noise ordinance	https://library.municode.com/il/northbrook/codes/code_of_ordinances?nodeId=Chapter%2016%20%E2%80%93%20NUISANCES	Complaint-based; Police Department enforces	2.5 (Only enforced when resident calls in. Complaint will come in when leaf blower is used outside of permitted times and the police will often address complaint when leaf blower use is over)	8.19.21 EQC Packet	Yes, if person refuses to comply with citation	Up to $750/day/offense	The person holding the leaf blower	Except temporarily in the case of urgent necessity to protect public health or safety, no person shall cause or permit the operation of any blower, fan, pump, or compressor, or engine or motor which emits noise of a continuous or penetrating nature that disturbs the comfort or response of any reasonable person of ordinary sensibilities occupying residential property within the area of audibility, if the sound level exceeds 63 dBA between 10:00 pm to 7:00 am or 68 dBA between 7:00 am to 10:00 pm in residential zones.
Northfield	No	N/A	N/A	N/A	COW February and March 2021 Packets	N/A	N/A	N/A	None
Oak Park	Noise + leaf blower ordinances	https://www.oak-park.us/newsletters/mayjune-2018/help-keep-oak-park-beautiful	Public works		1 Feb 2020 and June 2021 Village Board Meetings	Yes	Determined by judge	Homeowner if homeowner is operating; landscape company if worker is operating	The use of gas-powered leaf blowers emanating more than 65 decibels or failing to meet federal emission regulations is prohibited from June through October. The ban applies to both landscapers and homeowners. Gas-powered blowers that emanate fewer than 65 decibels and meet emission standards may be used during the ban if they have been tested and approved by the Village. Cannot be used June 1-October 1. Two complaints last year and residents were more concerned with noise and ordinance does not address the issue.

Park Ridge	Noise ordinance	http://www.parkridge.us/community_preservation_and_development/default1.aspx	Police Department	N/A	Community Health Commission 1.27.2022 Minutes	Yes, after warning	Determined by police	Unclear - case by case basis	Allowed on M-F 7am-7pm; Sat 8am-5pm
Riverwoods	Noise ordinance	mlegal.com/codes/riverwoodsil/latest/river	Police Department	1	No	Yes	$75-$750	Person holding leafblower.	Allowed between M-F 7am-7pm; Saturday 8:30am-5pm
Skokie	Noise ordinance	N/A	N/A	N/A	No	No	N/A	N/A	Can be used any day of the week between 9am-8pm. If someone using outside of that time frame, can call non-emergency police. No ticket guaranteed.
Vernon Hills	Noise ordinance	de.com/il/vernon_hills/codes/code_of_ord	Police Department addresses noise complaints	N/A	No	Unclear	Unclear	Unclear	Allowed between M-F 7am-7pm; Saturday 8:30am-5pm
Wilmette	Noise + leaf blower ordinances	https://www.wilmette.com/permits/community-development/code-enforcement/leaf-	Proactice through code enforcement; police will also respond to calls for service	Two years ago, 1; Currently, 4 w/ new proactive approach	Village Board Meeting Minutes	Yes	$75 first offense; $150 second offense	Company, not employee using the tool	Between May 15 and September 30, the Village of Wilmette prohibits the use of gasoline-powered leaf blowers. Between October 1 and May 14, the Village of Wilmette permits the use of gasoline-powered leaf blowers, however use of a gasoline-powered leaf blower during that time. is limited to 30 minutes or less
Winnetka	Noise + leaf blower ordinances	https://codelibrary.amlegal.com/codes/winnetka/latest/winnetkaords-res_il/0-0-0-225269	Code Enforcement & Police Department	3	Village Council Meeting Minutes	Yes	over mulitple offenses, but the police create the fines. At least $100.	Unclear - determined by police	Oct 1 - May 31, M-F 8-7; S/S 9-6. Can't use gas between June 1 and Sept 31

Community	Noise/Leaf Blower Ordinance	Hours of Operation	Source
Arlington, MA	The use of leaf blowers (gas-powered leaf blowers used for commercial or municipal purposes) are prohibited outside the hours of operation, except in accordance with the following restrictions, which shall not apply to the use of leaf blowers to perform emergency operations or for clean-up associated with storms, hurricanes and the like. No more than one leaf blower may be used on any lot of 6,000 square feet or smaller. One additional leaf blower may be used for each additional 6,000 square feet or portion thereof comprising one lot. Leaf blowers may be used for no more than 30 minutes at a time with shut down time of 15 minutes in between operation. At no time shall any leaf blower be used in such a way as to permit the distribution of leaves, dust, or other debris beyond the vertically extended lines of the proeprty on which the leaf blower is being used. Leaf blowers shall at all times be operated at the lowest possible practical speed necessary to accomplish the task for which they are being used. As of Juune 15, 2014, or one year after the effective date of this Bylaw, whichever is later, no commercial landscaper, commercial landscape company, or other entity engaged in the business of providing home and yard repair, clean-up, and maintenance services for a fee shall use any leaf blower within the Town in the exercise of that business unless manufacturer specifies that the sound emitted from said leaf blower is no greater than 74 dB(A) at 50 feet at full throttle. The restrictions set forth herein shall not apply to homeowners and residents using leaf blowers to perform private home and yard repair, clean-up, and maintenance on residential property they own or control.	September 16th through June 14th	Title V - Regulations Upon the Use of Private Property
Aspen, CO	The use of gas powered leaf blowers in Aspen was banned by City Council in 2003 in response to numerous noise complaints and a citizen petition requesting a ban. Electric-powered leaf blowers are allowed.	N/a	City of Aspen's Noise Ordinance
Belvedere, CA	It is unlawful for any person within the City limits at any time to operate any portable machine powered with a gasoline engine used to blow leaves, dirt and other debris off sidewalks, driveways, lawns or other surfaces	N/a	City of Belvedere Noise Code
Berkeley, CA	It shall be unlawful for any person, including any City employee, to operate any portable machine powered with a gasoline engine used to blow leaves, dirt, and other debris off sidewalks, driveways, lawns, or other surfaces within the City limits. This prohibition shall be posted in all stores selling such gasoline powered machines within the City limits.	N/a	City of Berkeley Community Noise Municipal Code
Beverly Hills, CA	It shall be unlawful for any person within the City to use or operate any portable machine powered with a gasoline engine used to blow leaves, dirt, and other debris off sidewalks, driveways, lawns, or other surfaces.	N/a	City of Beverly Hills Portable Gasoline Engine Powered Blower
Boulder, CO	Lawn mowers and leaf blowers may not be operated on any private property within one hundred feet of the boundary of any residential district outside the hours of operation.	7:00 am to 9:00 pm	City of Boulder's Noise Ordinance
Brookline, MA	Gas-powered leaf blowers are prohibited, electric-powered leaf blowers are permitted during the hours of operation	8:00 am to 8:00 pm, Monday through Friday and 9:00 am to 6:00pm on Saturdays, Sundays, and legal holidays	Town of Brookline's Leaf Blower Control
Cambridge, MA	The State of Massachusetts advised residents to stay at home and limit indoor gatherings. As citizens are urged to work from home, the City Council found the reduction of noise and emissions from leaf blowers to be a public purpose that protects the public health, welfare, and environment of the City of Cambridge and its citizens. The use of leaf blowers is prohibited between March 15 and June 15 and between September 15 and December 31 in any year. All leaf blowers may be used as long as they do not exceed a decibel level of 65 dBA. While City Council members and residents have expressed opposition against gas-powered leaf blowers, the City continues to follow the current leaf blower regulation.	8:00 am to 5:00 pm from Monday through Friday. 9:00 am to 5:00 pm on Saturday. Not permitted on Sunday or holidays.	Cambridge Leaf Blowers Restrictions
Carmel, CA	The operation of a combustion engine blower for the purpose of displacing, removing or blowing any materials from or about public or private property in a manner which allows the engine to be heard on public property or causes the materials to be blown into the air in a manner which allows them to settle on public property or on private property not belonging to the same owner of the property on which the blower is being operated is declared to be a public nuisance and unlawful.	N/a	Carmel-by-the-Sea Municipal Code Combustion Engine Blowe

Claremont, CA	**Requirements for use in residential areas:** No leaf blower shall be operated for more than fifteen minutes per hour on any one parcel. No leaves or other debris shall be blown into the street, sidewalk, or beyond the parcel property line. The full blower nozzle extension shall be used for maximum efficiency and to manimize the spread of dust. When leaf blowers are used in dusty conditions, surfaces shall be moistened prior to blowing or a mister used during blowing. After leaf blower use, debris shall be disposed in trash receptacles. Leaf blowers shall be in proper working order and all manufacturer's noise and dust control equipment on the leaf blower shall remain on the blower and be in operating condition. Leaf blower users shall operate the leaf blower with the least amount of noise and at the lowest speed possible and keep use time as short as possible. Commercial leaf blower operators shall have in their possession a Claremont business license available for inspection on site. **Prohibition of leaf blowers on City property:** Use of any type of leaf blower on any City owned or maintained property is prohibited. **Leaf blower use:** Leaf blowers powered by installed line current or by battery may be used in the City subject to the provisions of this chapter not withstanding the noise standards in Chapter 16.154 of this Code. Internal combustion engine (gasoline) powered leaf blowers shall be prohibited in the City after March 1, 1991;	7:00 am to 10 pm	Claremont Municipal Code
Del Mar, CA	It is unlawful for any person to use or operate within the City, any portable machine, powered with a gasoline engine or electric motor, to blow leaves, dirt and other debris off sidewalks, driveways, lawns, and other surfaces.	N/a	Del Mar Noise Regulations
Dobbs Ferry, NY	Any person violating the leaf blower law shall be guilty of an offense punishable by a fine of $50 for the first offense and $250 for each subsequenct offense in the same calendar year. A "person" includes the owner of the property and the operator fo the leaf blower.	**Gas-powered leaf blowers:** March 15th to May 1st and September 15th to December 15th from 8:00 am until 6:00 pm on Monday through Friday and 10:00 am until 5:00 pm on Saturday, Sunday, and holidays. **Electric leaf blowers:** From 8:00 am until 6:00 pm on Monday through Friday and 10:00 am until 5:00 pm on Saturday, Sunday, and holidays.	Dobbs Ferry Noise Provisions Resolution
Evanston, IL	Before April 1, 2023, gas-powered leaf blowers may be used during the hours of operation. There are no seasonal restrictions on the use of electric leaf blowers. The use of gas-powered leaf blowers is not permitted after April 1, 2023. Electric leaf blowers may continue to be used with no seasonal restrictions. The first offense is a written warning. The second offense is a $100 fine. The third offense is a $150 fine. The fourth offense is a $200 fine. The fifth and any subsequent offenses are a $250 fine.	March 30th to May 15th and October 15th to the first Thursday in December from 9:00 am to 5:00 pm, Monday through Friday; 9:00 am to 4:00 pm on Saturday; 12:00 pm to 4:00 pm on Sunday; and prohibited on all recognized City holidays.	City of Evanston's Use of Leaf Bowers Ordinance
Foster City, CA	No person shalluse or operate a leaf blower. Leaf blowers are defined as portable equipment that is powered by a salf-contained fuel engine and used in any landscape, maintenance, construction, property repair, or property maintenance for the purpose of blowing, dispersing or redistributing dust, dirt, leaves, grass, clippings, cuttings, and trimmings from trees, shrubs or other debris. Any person who uses or operates a leaf blower in a residential zoning district or in areas bordering a residential zoning district shall use a blower nozzle extension. No material or matter blown by leaf blowers in any portion of the city shall be blown upon neighboring properties or onto any portion of the public right-of-way, including but not limited to sidewalks, streets, storm drains, or lagoon without being immediately removed.	No person shall use or operate a leaf blower in a residential zoning district or within one hundred yards of a residential zoning district before 8:00 am or after 5 pm Monday through Friday, nor prior to 9:00 am or after 5:00 pm on Saturdays or at any time on Sundays or at any time on the following holidays: New Years Day, Presidents' Day, Memorial Day, 4th of July, Labor Day, Thanksgiving, Christmas.	Foster City Municipal Code: General Performance Standards: I
Farmingham, MA	All engine- or motor-powered garden or maintenance tools intended for repetitive use in residential areas, typically capable of being used by a homeowner is allowed.	7:00 am - 10:00 pm Sunday through Thursday. 8:00 am to 11:00 pm on Friday through Saturday.	Farmingham Nuisance Noise Ordinance
Hastings, NY	All leaf blowers are currently banned in Hastings from May 15 to October 15. Some exceptions apply. Leaf blowers cannot exceed the limiting noise levels set forth in the Village's performance standards code.	May 16 through October 14, 9:00 am to 5:00 pm	Hasting's Leaf Blower Law
Honolulu, HI	It i unlawful for any person to operate a leaf blower within a residential zone or within one hundred feet of a residential zone outside the hours of operation. A person may not sell, offer for sale, or operate a gas-powered leaf blower in the city. Beginning in January 1, 2023, possession by a person of a gas-powered leaf blower will be prima facie evidence that that person operates the gas-powered leaf blower. The first violation will be a $100 fine. The second violation within one year of the first violation will be $500. A fine of $1000 or forfeiture of the gas-powered leaf blower or a combination of forfeiture and a fine up to $1000 for the first of subsequent violation within one year of the first violation. Police officers enforce violations.	8:00 am to 6:00 pm pm any day except Sunday or a state or federal holiday, and between 9:00 am to 6:00 pm on Sunday or any state or federal holiday.	Honolulu Ordinance Relating to Gasoline-Powered Leaf Blowe
Houston, TX	***No ordinance for leaf blowers.*** **Residential property:** 65 dBA during daytime hours. 58 dBA during nighttime hours. **Nonresidential property:** 68 dBA at all times.	**Daytime hours:** 8:00 am to 10:00 pm. **Nighttime hours:** 10:01 pm to 7:59 am the following day.	City of Houston Noise and Sound Level Regulation
Indian Wells, CA	Indian Wells banned gas-powered blowers in 1998, except on golf courses.	N/a	You've Got Issues: Prohibit Noisy Leaf Blowers?
Key West, FL	It shall be unlawful for any person who operates a leaf blower within the City to allow any leaves, dirt, or other debris blown to enter the storm drain system. All leaves, dirt, or any other debris blown on to public property or in the public right-of-way must be cleaned up and removed.	N/a	Key West Leaf Blowers Ordinance
Laguna Beach, CA	The city of Laguna Beach banned leaf blowers (both gas and electric in 1993).	N/a	The price of a blown leaf

Lawndale, CA	The use of gasoline-powered mechanical blowers or vacuums is prohibited within the city of July 1, 1997. Mechanical blower or vacuum operations (for non-gasoline powered blowers) shall not cause debris to be blown or deposited on any adjacent or other parcel of land, lot, or public right-of-way/property other than the parcel, land, or lot upon which the mechanical blower or vacuum is being operated. Mechanical blowers or vacuums (for non-gasoline powered blowers) shall not be operated in close proximity to any operable window, door, or mechanical air-intake opening or duct of any building unless with the permission of the occupants of the	N/a	Lawndale Municipal Code: Mechanical blowers or vacuums
Los Altos, CA	Operating or permitting the operation of any lawn or garden tool (except portable gasoline engine powered blowers), or similar tools outside the hours of operation is prohibited. Portable electric powered blowers used to blow leaves, dirt and other debris off sidewalks, driveways, lawns, landscape areas or other surfaces outside of the hours of operation is considered a noise disturbance	Operation of any lawn or garden tool (except portable gasoline engine powered blowers), or similar tool: 8:00 am to 8:00 pm on Monday through Friday or between 9:00 am to 6:00 pm on Saturday and Sunday. Portable electric powered blowers can be used between 9:00 am to 5: 00 pm, seven days a week.	Los Altos: Prohibited Acts
Los Angeles, CA	No gas-powered leaf blower shall be used within 500 feet of a residence at any time. Both the user of such a blower as well as the individual who contracted for the services of the user if any, shall be subject to the requirements of and penalty provisions for this ordinance. Violation of the provisions of this subsection shall be punishable as an infraction in an amount not to exceed $100. The Lose Angeles Police Department has primary enforcement responsibility for this Ordinance.	N/a	Los Angeles Gas Powered Leaf Blower Notice
Malibu, CA	City of Malibu prohibits the use of leaf blowers, effective August 1, 2019.	N/a	Malibu Leaf Blower Notice
Mamaroneck, NY	When the use of leaf blowers is permitted, no more than one leaf blower may be operated at any time on property with an area of 5,000 square feet or less. No more than three leaf blowers shall be operated at any time on any property.	October 1 through May 14th from 8:00 am to 6:00 pm on weekdays and 100:00 am to 4:00 pm on Saturdays. Leaf blowers are prohibited on Sundays and holidays.	Mamaroneck Noise Regulation
Menlo Park, CA	Certified leaf blowers, or leaf blowers measured at 65 dB(a) or less at a distance of fifty feet by an independent laboratory per American National Standards Institute standard, as certified by the manufacturer, may be operated. Non-certified leaf blowers are prohibited. Electric blowers do not apply. Any person who uses or operates a leaf blower shall at all times use a full blower nozzel extension and earplugs. A person or entity in violation of the provisions shall be deemed guilty of an infraction and a written citation shall be issued and written notice shall be delivere or mailed to the property owner on which the violation occurred.	Mondays through Fridays from 8:00 am to 5:00 pm. Saturdays from 11 am to 3pm. Operation of leaf blowers is prohibited on Sundays, federal holidays, and on "Spare the Air" days as declared by the Bay Area Air Quality Management District.	Menlo Park Leaf Blower Ordinance
Mill Valley, CA	The use of gasoline-powered leaf blowers is prohibited by the Mill Valley Municipal Code in an effort to minimize air and noise pollution. Violators could pay as much as $500.	N/a	Mill Valley Gas Powered Leaf Blowers are Prohibited News Fla
Montclair, NJ	The Township of Montclair urges landscapers and residents to limit as much as possible their use of leaf blowers and other loud machines. The Township disseminated this message to landscapers working in the Township as broadly as possible.	March 15th through May 15th and October 15th through December 15th	Montclair Resolution Urging a Halt to the Use of Leaf Blowers
New Rochelle, NY	Leaf blowers shall not be operated outside of the dates of operation.	October 1st through May 31st on weekends between 8:00 am and 5:00 pm, on Saturdays between 10:00 am to 5:00 pm, and on Sndays between 10:00 am and 5:00 pm.	City of New Rochelle Unreasonable Noise
Oyster Bay, NY	Leaf blowers shall not be operated outside of the dates of operation.	8:00 am to 7:00 pm on weekdays and 9:00 am to 5:00 pm on weekends and national holidays.	Town of Oyster Bay Prohibited Acts - Noise
Palm Beach, FL	Leaf blowers shall not exceed a decibel level of 65 dBA as measured at 50 feet from the point of operation. It shall be unlawful to blow trash or clippings into the public street or storm drains.	May 1st until the Monday preceding Thanksgiving from 8:00 am to 5:00 pm. Prohibited on Saturdays, Sundays, and legal holidays.	Palm Beach Lawn Maintenance Ordinance
Palo Alto, CA	No person shall operate any leaf blower which does not bear an affixed manufacturer's label indicating the model number of the leaf blower and designating a noise level not in excess of sixty-five dBA when measured from a distance of 50 feet. No person shall operate any leaf blower without attachment of all mufflers and full extension tubes supplied by the manufacturer for that leaf blower. No person shall operate any leaf blower powered by an internal combustion engine within any residential zone after July 1, 2005. Commercial operators of leaf blowers are prohibited from operating any leaf blower within the city if they do not prominently display a certificate approved by the Chief of Police verifying that the operator has been trained to operate leaf blowers according to standards adopted by the Chief of Police.	**Residential zone:** Monday through Friday from 9:00 am to 5:00 pm and Saturday from 10:00 am to 4:00 pm. **Non-residential zone:** Monday through Friday from 8:00 am to 6:00 pm and Saturday from 10:00 am to 4:00 pm. Prohibited on Sundays and holidays. **Public streets, sidewalks, and parking lots in business districts and at the Municipal Golf Course:** 4:00 am to 8:00 am.	Palo Alto Noise Ordinance
Pelham, NY	Lawn maintenance equipment powered by internal-combustion engines, including, but not limited to, lawn mowers and leaf blowers, shall not be operated in the Village, except during the hours of operation.	March 15th through April 30th, inclusive, and October 15th and December 15th, inclusive, of each calender year on weekends between 8:00 am and 5:30 pm, Saturdays between 10:00 am and 5:00 pm, and Sundays and holidays between 12:00 pm and 4:00 pm.	Village of Pelham Lawn Maintenance Equipment Ordinance
Portland, OR	From March 1st through October 31st of each year, leaf blowers which are on the City's certified list of 65 dBA, or quieter, may be operated within the City of Portland. From November 1st through February 28th of each year, leaf blowers which are on the City's certified list of 70 dBA, or quieter, may be operated within the City of Portland. Leaf blowers that are on the certified list of 65 dBA, or quieter, may be operated within the City of Portland year round.	**Residential zone:** 7:00 am to 7:00 pm. **Other zones:** 7:00 am to 9:00 pm. After 9:00pm and up to 7:00 am, blower operators must meet the permitted sound levels established in the noise code and based on the specific zoning.	City of Portland Leaf Blower Regulations
Portsmouth, NH	***No ordinance for leaf blowers.*** Any provision violating the provisions of the Noise Ordinance shall be fined in an amount no exceeding $1000. Each day such violation is committed or permitted to continue shall constitute a separate offense and shall be punishable. Complaints may be brought by the Portsmouth Police or the Building Inspector of the City of Portsmouth or his agent.	N/a	City of Portsmouth Noise Ordinance
Rye, NY	Lawn mowers, leaf blowers, and outdoor vacuum cleaners shall have a permitted intensity of 85 db(A).	8:00 am to 8:00 pm on weekdays and 10:00 am to 6:00 pm on weekends and holidays.	City of Rye Noise Ordinance

Santa Barbara, CA	No person shall operate any leaf blower (gas, electric, or battery powered) within the City. A leaf blower is defined as any motorized tool (gas, electric, or battery powered) used to propel fallen leaves and debris for removal. Infractions will be punishable by substantial fines to property owners, property and landscape management companies, individual operators, and/or water customers.	N/a	City of Santa Barabara Leaf Blower Ban
Santa Monica, CA	No person shall operate any leaf blower (gas, electric, or battery powered) within the City. Violations can be reported using cell phone or online on City website, email, or telephone. Address, date, and time of day must be reported. Code Compliance staff (Planning Dept.) will promptly follow-up on all inquries.	N/a	Santa Monica Leaf Blower Ban
Sunnyvale, CA	It is unlawful for any person to operate a leaf blower on private property in or adjacent to a residential area. Effective January 1, 2000, all leaf blowers operated in or adjacent to a residential area shall operate at or below a noise level of sixty-five dBA at a distance of fifty feet, as determined by a test conducted by the American National Standards Institute or an equivalent. The dBA rating shall be prominently displayed on the leaf blower.	8:00 am to 8:00 pm	Sunnyvale Municipal Code: Noise or Sound Level
Scottsdale, AR	No person shall use a leaf blower to blow landscape waste into the public roadway	N/a	Scottsdale Municipal Code: Blowering landscape waste
Scarsdale, NY	Effective 2021, it is unlawful for any person, firm, corporation, or other entity to operate a gasoline-powered blower in the Village outside the hours of operation. Electric or battery powered blowers are not subject to these restrictions. Commencing in 2022, and in each calendar year thereafter, it shall be unlawful for any person, firm, corporation, or other entity to operate a gasoline-powered blower in the Village during the period from January 1 through	**Calendar year 2021:** October 1st through December 31st on Mondays and Fridays, but not on federal holidays. **2022 and each calendar year thereafter:** October 1st through December 31st on Tuesday through Friday, but not on federal holidays.	Scarsdale Noise Local Law
Tampa, FL	***No ordinance for leaf blowers. Provisions in the Noise Ordinance exempt sounds from blowers.***	N/a	Tampa Noise Ordinance: Exemptions
Tiburon, CA	**Gas-powered leaf blowers:** Use prohibited in all residential areas. Use only permitted in non-residential areas during hours of operation. **Electrically-powered leaf blowers:** Permitted during residential and non-residential hours of operation.	**Gas-powered leaf blowers in a non-residential area:** 9:00 am to 4:00 pm Monday through Friday, prohibited on holidays. **Electrically-powered leaf blowers in residential areas:** 9:00 am to 4:00 pm on any day, prohibited on holidays. **Electrically-powered leaf blowers in a non-residential area:** 9:00 am to 4:00 pm Monday through Friday, prohibited on holidays.	Town of Tiburon Leaf Blower and Hedge Trimmer Regulations
Toronto, CND	No person shall emit or cause or permit the emission of sound from a power device outside of the hours of operation.	7:00 am to 7:00pm, Monday through Friday. 9:00 am to 7:00 pm on Saturdays, Sundays, and statutory holidays	Toronto Municipal Code: Noise
Vancouver, BC	A manufacturer's decal must be attached to the leaf blower that certifies it is less than 65 dBA. Noise concerns can be reported on the City's website.	**Less than 50 m from a residence:** Monday through Friday, 8:00 am to 6:00 pm; Saturday, 9:00 to 5:00 pm; prohibited on Sundays and holidays. **More than 50 m from a residence:** Monday through Friday, 7:00 am to 10:00 pm; Saturday, 7:00 am to 10:00 pm; Sundays and holidays, 10:00 am to 10:00pm.	City of Vancouver: Leaf Blowers
Westchester County, N'	Gas-powered leaf blowers are prohibited. The Police Department and Public Works Department enforce this law via warnings to first time offenders and citations to repeat offenders.	N/a	Belvedere Gas-Powered Leaf Blowers Notice
West Hollywood, CA	Gas-powered leaf blowers are prohibited. Electric leaf blowers are permitted. Noise complaint can be reported to the Department of Public Works or the Code Compliance Division.	N/a	West Hollywood Noise Code Compliance Division
White Plains, NY	The use of has-powered leaf blowers are allowed only during the Spring and Fall clean-up period. Gas-powered leaf blowers that produce a sound level greater than 70 dBA are prohibited. Simultaneously operating more than one gas-powered leaf blower on property measuring 5,000 square feet or less is prohibited. Penalty may be a fine up to $250. Violations are reported to the Department of Public Safety.	March 15th through May 15th and October 1st through December 15th. Monday through Friday from 8:00 am to 6:00 pm. Saturday, Sunday, and legal holidays from 10:00 am to 6:00 pm.	City of White Plains Leaf Blower Ordinance
Yonkers, NY	Gas-powered leaf and garden blower is permitted during the hours of operation. During times of emergency caused by storm, the Commissioner of Public Works may declare a temporary moratorium on the operations of this provision.	October 1 through May 31st	City of Yonkers Leaves, Clippings and Grass Cuttings Code
State of California	California will outlaw the sale of new gas-powered lawn mowers, leaf blowers and chain saws as early as 2024 under a new law signed by Gov. Gavin Newsom. The law requires all newly sold small-motor equipment primarily used for landscaping to be zero-emission — essentially to be battery-operated or plug-in — by that target date or as soon as the California Air Resources Board determined it is feasible. New portable gas-powered generators also must be zero-emission by 2028, which also could be delayed at the discretion of the state agency.	N/a	Los Angeles Times' Article *California moves toward ban on gas*