COMMON COUNCIL ORDINANCE COMMITTEE
REGULAR MEETING
JULY 18, 2023

ATTENDANCE: Lisa Shanahan, Chairperson; David Heuvelman; Joshua Goldstein, Nora Niedzielski Eichner, Edwin Camacho, James Frayer, Bryan Meek

STAFF: Brian Candela, Corporation Counsel

OTHERS: Larry Manzi, Dr. Sarah Evans, Jenn McMurrer, Pedro Mata, Valerie Jacobs, Jen McMurr

1. ROLL CALL

Ms. Shanahan called the meeting to order at 7:01 pm. and called the Roll.
A Quorum was present.

2. PUBLIC HEARING - LEAF BLOWER ORDINANCE

Ms. Shanahan provided opening remarks. During the pandemic the council received numerous calls regarding leaf blower complaints. This prompted the committee to research the possible hazards gas power leaf blowers posed and what steps other state municipal governments have undertaken to mitigate these concerns. The committee was stunned to learn from physicians and scientists the following facts. 15 to 20 minutes of unprotected ear exposure can cause hearing loss. Leaf blowers are a major source of toxic emissions and pollutants, including known carcinogen Benzene. Leaf blowers produce fine particulate matter which is linked to lung cancer. Running a gas-powered leaf blower for 30 minutes produces the same amount of smog as driving a Ford 150 truck from Texas to Alaska. Once the committee was educated on the risks of gas-powered leaf blowers, we turned our attention to researching products and realistic time tables for a less noise and air polluting alternative. We met with local landscapers who have made the transition and with those who have not. We met with Mayor's office to determine what programs or grants might be available to help our local landscapers find funds to replace their equipment. We met with DPW and Parks & Recs department to understand their work needs, the time it would take to transition, and appropriate budgetary response for taxpayers.

Ms. Shanahan briefly outlined the ordinances main provisions.

- Operators of gas-powered leaf blowers wear ear and respiratory protection effective immediately.
- Starting in year 2027, gas-powered leaf blowers may not be used on parcels of 2 acres or less.

- **Starting in year 2028, gas-powered leaf blowers may not be used on parcels greater than 2 acres. (This rule will apply to the City and recreational properties).**
- **Seasonal restriction on the use of gas-powered leaf blowers from June 1st to October 15th. (Electric leaf blowers can be used at any time under our ordinance on impervious surfaces).**

3. PUBLIC HEARING DISCUSSION

Ms. Shanahan proceeded to open the meeting up to the public for comments.

4. PUBLIC COMMENTS

1. Marty Devaney: He noted the three choices, gas backpacks, electric backpacks that you plug in, or battery backpacks. Gas backpacks are the best ones for getting the job done. The electric plug-in for a condominium complex of 5 acres will never work. The battery-operated ones seem like the best choice. However, as of July 3rd, 2023, there have been 114 fire investigations with lithium-ion batteries, 74 injuries, 13 deaths in the U.S. alone. In 2022 6 deaths and in 2021 4 deaths. More deaths in Chinatown on June 12, 2023 due to lithium battery accident in a bike repair shop. He noted Laura Cavanaugh, the FDN commissioner called the Lithium-ion batteries incredibly deadly. Stephen Kerber of the Fire Safety Research Institute claims the more batteries that surround us, the more incidents there will be. Mr. Devaney emphasized the technology is not there yet. There is an issue with storage as well. You need to store the equipment above 32 degrees and below 80 degrees. He also noted his shop is 70% underground storage with a doggie day care above, and he wouldn't want the liability.

2. Podium Speaker Unidentified: The ordinance committee has selectively targeted the landscape industry. She questioned how will you enforce other companies that use this equipment such as the State of CT, utility, tree care, masonry industry paving. The landscaping industry struggles to make a living wage and has many single owner businesses many with no business name or logo on truck; how will you enforce this. She noted that there has been zero outreach. The ordinance should be tabled until the winter time.

3. Tysen Canevari: As a lifelong resident of Norwalk, I am disgusted with this. He noted that commercial equipment is not purchased from Home Depot. Covid is over most people are not working from home anymore. He questioned what local landscapers were included in the discussions as most are in the audience. Battery operated equipment is garbage and it does not work. Where he rents the space to store his equipment, the landlord won't allow for storing battery operated equipment. He questioned how will it be enforced. To mandate mask wearing is ridiculous. There is a Director of Equity Inclusion for $130,000 a year why has she not reached out to this community. This is all ridiculous and a waste of time.

4. Kevin Palinkas: A Norwalk resident owner of Connecticut Lawn Equipment. He noted that he has had the longest landscape business in the City of Norwalk. This idea is not in touch with the real world. Gasoline is not the most efficient way; however, it is the best way we have now. This ordinance will cause a gigantic financial hardship and cause business to go out of business. This potential ordinance should go to a referendum for all the people who pay taxes in the city and not just to a small group. From my experience, I'm not selling battery operated equipment in my shop. There is no safe way to store them. I won't be responsible. The manufacturers have federal government regulated mandates that the equipment must pass a certain level of emissions and decibels. He questioned how will it be policed.

5. Podium Speaker Unidentified: Speaking as a resident of Norwalk, I just found out about this meeting today. He questioned if the committee is passionate about the Transit Station, school buses, the new school on Meadow Street with industry businesses. The ordinance reads like the leaf blower is an assault weapon. As a land owner and tax payer, we maintain our property and care about wildlife. We should embrace the landscapers they do a job done quickly. I have watched the city develop every square inch and it amazes me how we are targeting leaf blowers. Please wait for the technology to catch up.

6. Joe: I represent the younger generation and for green technology. I use electric equipment on a tenth of an acre and I am constantly changing batteries. To require businesses to convert will put them out of business. The technology is not there yet. Table the ordinance.

7. Martin: Questioned how this ordinance will be enforced. Will there be a call-in number where neighbors complain on neighbors. Please don't misuse government power.

8. Tom: Serving Norwalk & Fairfield County for the past 41 years. This is not the first time we have been down this road. We fought this fight before in Greenwich. Our rider mower cost $14,000 with a Kawasaki Engine. If we switch to an electric riding mower it will cost $35,000. We make properties beautiful. Our cost will go up 50 to 70%. Please reconsider until the technology gets better.

9. Nicole on behalf of Friends of Animals: We support this ordinance and wish to see it effective sooner than later.

10. Kevin Moses: 13-year resident. Opposes the ordinance and urges the Commission to vote No.

11. Louise Washer: Speaking on behalf of the Norwalk River Watershed Association. Urges the commission to vote Yes.

12. Kathryn Sellschop: Personally, we have chosen a lawn provider that uses organic material. Our landscaper uses electric equipment due to our demand for it. As a result, they have a growing business. Urges the commission to vote Yes.

13. AJ Landscaping: We have been doing business in town for 22 years. The electric equipment is not sufficient enough. Wesport banned backpack blowers only; You are trying to ban all blowers. We start in March now and go until December 30th. I will not purchase electric equipment and keep it in my truck due to fire hazard. The fire department is not equipped to put out these fires in my opinion.

14. Diane Lauricella: Thanked the committee and staff for this conversation and supports this ordinance. She recommended a special meeting or workshop for the landscapers. Please ask the Fire Marshall to speak about the truth of Lithium batteries. Landscapers deserve financial help. Reduce the amount of time, don't wait five years.

15. Donna: Surprised that the Edmund Study is being cited. The margins are not high in landscaping. We should not be depriving these people of a business. She does not support this ordinance. The ordinance is not enforceable.

16. Anne Magnon: A resident of Norwalk for over 30 years. Founder of skip the plastic. There is no planet B.

17. Margo & David Epprecht: The blowing has gotten out of hand. In favor of time restrictions. In support of the ordinance.

18. Chris: In business for over 23 years. Not opposed to something better for humanity. If this is going to be imposed, we need to be thought of and included in the plan for us.

19. Diane CeCe: Recommends the committee tables the ordinance and further considers more public outreach with the actual business owners. Enforcement is an issue. It will create neighbors vs. neighbors.

20. Chris Smith: I didn't know about this meeting until a couple of hours before. It's unfair and sneaky. Recommends tabling the ordinance.

Brian Candella presented written comments. (Emails and attachments will be provided).
Written Comments:
21. Nick Canter – In support of the ordinance

22. Jeff – Opposes the ordinance.

23. Peggy Lynn – Supports the ordinance. It's noisy and concerned what it's doing to the environment.

24. Joe – In favor of restricting the use of gas leaf blowers.

25. Bob Welch – In support of the ordinance

26. Andrea Lite – In support of the ordinance

27. William Wrenn– In support of the ordinance.

28. Ashley – In support of the ordinance

29. Mary – In support of the ordinance

30. Audrey – In support of the ordinance

31. Greg's Landscaping – Does not support the ordinance

32. Michael Cohen – Recommends limiting to properties less than 10 acres. This a regulatory over-reach.

***Mr. Candella reiterated all written public comments are available on the website, and can be emailed upon request.**

Ms. Shanahan introduced Dr. Sarah Evans, assistant professor of environmental medicine and public health at the icon School of Medicine at Mount Sinai as expert testimony. Ms. Shanahan noted that Dr. Evans spoke before as this is the fourth hearing on this ordinance.

Dr. Evans presented a presentation on the "Health Impacts of Leaf Blowers".

Ms. Shanahan introduced Valerie Jacobs, member of the Quiet communities. Ms. Jacobs worked with the town of Westport to help prep their ordinance.

Ms. Jacobs presented a presentation on the "The Problems with Gas-Powered Leaf Blowers.

Ms. Shanahan asked two people who have made the transition to green landscaping. She introduced Dan Delventhal.

Mr. Delventhal presented a presentation of his company "MOW Green" Emission Free Landscaping Equipment – Avoiding tons of Pollution, Noise, & Toxins.

Jeff Cordulack discussed how he has been running a company with just battery powered for 5 years. He highly recommends people go electric. The lithium battery always has a concern for explosion. He uses residential blowers and charges with small chargers on site. There are no major issues. Mr. Cordulack is willing to participate in a workshop to share what he knows.

Committee Discussion:

Mr. Meek is not in favor of this ordinance.

Mr. Candella on behalf of Pedro Mata there are two programs that would work for small businesses for a 0% loan. There are also grants through innovation program. More information provided at www.norwalkforbusiness.org. Ms. Niedzielski Eichner noted Norwalk is offering no interest loans of up to $15,000. Repayment period from 24 to 36 months. There are options.

Nora Niedzielski-Eichner thanked the public for coming out and speaking. We are looking to set a goal that helps move the industry forward. We want to hear how we can support you. Our Kiva program has placed more loans than any other city in the country. In favor of a workshop opportunity. If there are gaps in the technology, then that is an opportunity to say the ordinance is not ready.

Mr. Goldstein noted this is a valued industry in Norwalk. The ordinance doesn't take effect until 2027. If were at 2026 and the technology isn't there yet, then we should advocate to push it out till the technology does keep up. He thanked the community for coming out.

Mr. Frayer noted changes are coming and this landscaper group can get out in front of this change and make your industry stronger. We have to reconcile the safety and the cost benefit analysis gas versus electricity.

Mr. Camacho noted the ordinance doesn't go into effect in 2028 – he noted the time will come when everything does have a battery. He has no doubt that gas power equipment is not healthy or good for the environment. The city of Norwalk and other municipalities would need to start switching as quickly as possible and to lead by example. Mr. Camacho doesn't think the time is now and will vote no on this ordinance. However, if the burden is on the council to ensure the technology and cost is feasible by 2026, he would be in favor.

Mr. David Heuvelman thanked the public for coming out. He is concerned with the safety factor of the lithium battery and the gasoline factor. I do believe if we don't move things like

this forward, we won't see change. The committee spent a lot of time discussing this ordinance and we have to start somewhere.

Jen Mc Murrer – asked if the experts talked about the environmental impact of the lithium batteries. Secondly the challenges about enforcing this.

Ms. Shanahan said they spent 15 months looking into this situation. The idea of a workshop is a good idea. We need to put a flag in the ground and force the industry to do better. We have been fiscally responsible with options for loans. We appreciate the public coming out.

Mr. Heuvelman is concerned with the actual time usage and the seasonal band. He suggested having to revisit this as the industry is not there yet. Take a step back and restructure.

Mr. Camacho recommended revising the language to include the burden on us if the technology isn't there yet.

Ms. Niedzielski-Eichner provided proposed language. Add to "Subsection 3 Shall only take effect only if the council has affirmatively voted by majority vote as of September 1, 2026 to implement Subsection XX-3.

**** MS. NIEDZIELSKI-EICHNER MOTIONED TO MOVE ORDINANCE AS AMENDED TO COMMON COUNCIL FOR CONSIDERATION**
**** THERE WAS NO SECOND**
**** 6 VOTED IN FAVOR, MR. MEEK VOTED NO**

****MR. GOLDSTEIN MOTIONED TO ADJOURN**
****MOTION PASSED UNAMIOUSLY**

The meeting was adjourned at 10:18 pm.

Respectfully Submitted,

Michele Watson
Telesco Secretarial Services

Candela, Brian

From: Nicholas Kantor <nskantor@gmail.com>
Sent: Tuesday, July 18, 2023 10:14 AM
To: Candela, Brian
Subject: Re: Leaf Blower Ordinances

Hi Brian - I was hoping you could read my email - updated from the last time - into the record tonight?

Best,

Nick

On Tue, Jun 20, 2023 at 1:39 PM Nicholas Kantor <nskantor@gmail.com> wrote:
Thank you!

On Tue, Jun 20, 2023 at 2:19 PM Candela, Brian <bcandela@norwalkct.gov> wrote:

Nick,

Thank you for your comments. I will read your email into the record at tonight's meeting. If you do not wish to have your email read, please respond before the meeting begins (6:30 p.m. start time). Thanks, be safe and enjoy the week.

Brian Candela

From: Nicholas Kantor <nskantor@gmail.com>
Sent: Tuesday, June 20, 2023 2:05 PM
To: Candela, Brian <bcandela@norwalkct.gov>
Subject: Leaf Blower Ordinances

Brian,

I am writing **in support** of the leaf blower ordinance. I was surprised to learn that "using a commercial gas leaf blower for an hour produces emissions equal to driving from Denver to Los Angeles" (https://www.usatoday.com/story/news/nation/2023/04/30/gas-leaf-blower-mower-bans-spread-us-fight-climate-change/11746893002). In 2018 the US EPA - "National Emissions from Lawn and Garden Equipment" went into these effects in detail including "Commercial gas landscape maintenance equipment (GLME) is a source of high levels of localized emissions that includes hazardous air pollutants, criteria pollutants, and carbon dioxide (CO2)." (https://cms6.revize.com/revize/highlandparkil/government/boards_and_commissions/docs/Final%20Leaf%20Blower%20Report%20DRAFT%209-28-22.pdf)

In today's fight against climate change, doing everything to reduce carbon emissions ought to be considered. Norwalk ought to be a leader in this space. The recent air quality issues will continue to get worse NOT better. These leaf blowers add to ground level ozone levels which quickly impact the air we breathe. Home Depot's Chief Sustainability officer is pushing the transition to election, noting " a plan to drastically cut emissions from its outdoor lawn equipment, the biggest contributor to the company's carbon footprint." (https://www.politico.com/newsletters/the-long-game/2023/07/12/the-home-improvement-executive-pushing-electric-leaf-blowers-00105845)

There also seems to be considerations to help the landscape companies transition. Though I am not sure the details, I would support that as well since many landscapers are small business owners. I appreciate Council taking action here.

Nick Kantor
25 Hawthorne Drive
(writing on behalf of myself, but I am a Planning and Zoning Commissioner)

USA TODAY

NATION Climate Change Add Topic

Gas leaf blowers and lawn mowers are shockingly bad for the planet. Bans are beginning to spread.

Advocates say using a commercial gas leaf blower for an hour produces emissions equal to driving from Denver to Los Angeles.

Trevor Hughes
USA TODAY

Published 5:00 a.m. ET April 30, 2023 | **Updated 7:24 a.m. ET May 1, 2023**

DENVER – Your lawn may be the next climate change battleground. And parks. And playgrounds.

Regulators and clean-air advocates are increasingly eyeing the pollution emitted by small gasoline engines used to power lawn mowers and leaf blowers as they seek to blunt climate change. Environmentalists say using a commercial gas leaf blower for an hour produces emissions equal to driving from Denver to Los Angeles.

Among cities and states with bans or limits: California; Burlington, Vermont; and Washington, D.C. Vancouver, British Columbia, also has restrictions in place.

While many critics first attacked the small engines for the noise they make, experts say these small, two-stroke engines release shockingly large amounts of pollution – two problems that modern and increasingly affordable electric-powered equipment solves.

The absence of noisy leaf blowers is already being felt in Washington. "You used to hear them all day, everywhere you went. And now you don't," said Susan Orlins, who helped pass the district's toughest-in-the-nation ban on gas-powered leaf blowers.

What states and cities have moved to ban gas lawn equipment?

California has already taken the biggest step in banning the engines, which are formally known as "small off road engines," or SOREs. California's ban phases in next year and prohibits the sale of new small gas engines. People can keep using the ones they already own and can resell used ones.

Washington, D.C., has a much stricter ban, barring the use of gas-powered leaf blowers by anyone within the district as of Jan. 1, 2022, and levying $500 fines for violators, unless they're on federal property. The ban also allows anyone who sees or hears a gas-powered leaf blower to file a complaint – they don't need a city inspector to witness it.

Denver-area regulators are considering restrictions that primarily target large commercial and municipal users but provide exemptions for homeowners. The Denver-area ban is focused on reducing ozone pollution, which causes breathing difficulties and contributes to climate change.

The residential retail market is already responding, and most hardware and big-box stores now sell electric equipment.

“For the majority of residents who own single family homes, it’s going to be all electric, all day long," said Daniel Mabe, founder and president of the American Green Zone Alliance. AGZA advises organizations and governments on best practices to adopt when transitioning to electric equipment but doesn't take a position on bans or restrictions.

Why is gas lawn equipment being banned?

Experts say lawn and garden equipment represents about 85% of all SOREs in operation today nationally, and those engines are typically manufactured without the pollution controls used on cars.

NATURAL GAS: Appeals court overturns California city's attempt to ban new natural gas hookups

GAS STOVE BANS EXPLAINED: Are natural gas stoves actually a 'hazard'? Why are they suddenly controversial?

Virtually all small engines are two-stroke, which burn a dirtier fuel mix than vehicles do. Advocates say that in addition to the climate-changing emissions released by the engines, workers are exposed directly to their exhaust and rarely wear filters to protect their lungs.

Other people complain about the noise they make, especially when so many suburban residents now work from home.

"Transitioning to battery-powered landscaping equipment is a more sustainable alternative that would move us closer to meeting climate action goals and reduce harmful health effects," said the California-based group San Diegans for Sustainable, Equitable & Quiet Equipment in Landscaping.

What's the downside of electric lawn equipment?

Critics say battery-powered machines aren't as strong as gas-powered ones, and some people also worry about having to buy new equipment, which is generally more expensive.

Mabe says someone starting a small landscaping business could buy the necessary gas-powered equipment for about $6,000, but the electric equivalents could cost three times that.

He adds that organizations switching to electrics will need more space to store and charge batteries and may also have to upgrade their electricity service to meet overnight charging demand.

Advocates say that having a big state like California switch to electric equipment will create a marketplace that international manufacturers can count on, lowering prices overall as other states and cities enact similar bans. Like the District of Columbia, California is giving grants to small businesses that replace gas-powered equipment with electric.

What if I want to keep my gas lawn mower or leaf blower?

Most existing proposals would only limit the sale of new gas-powered equipment, allowing people to keep using what they already own.

But clean-air advocates say the transition to electric equipment is inevitable as the United States works to limit emissions of greenhouse gases and air pollution. Orlins said she loaned her lawn care workers money so they could switch to battery-powered equipment.

"We decided we had to take that first step, and we are all so pleased," she added.

Regional Leaf Blower Working Group

Final Report

Village of Deerfield

Deerfield Park District

City of Highland Park

Village of Glencoe

Village of Glenview

Go Green Wilmette

Illinois Landscape Contractors Association

Village of Kenilworth

Village of Lake Bluff

City of Lake Forest

Mariani Landscaping

Village of Lincolnshire

Village of Northbrook

Scopelliti Landscaping

Village of Wilmette

Village of Winnetka

Submitted October 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 these devices.

The Working Group recognizes that the circumstances of participating municipalities are different and thus this report does not indicate whether a community should or should not 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. Municipalities which 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 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 & Quiet Communities, 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

A complete list of Working Group members can be found in Appendix A.

Executive Policy Summary-

Reasonable Policy Options for Consideration

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

- A seasonal gas-powered leaf blower ban from May 15 through September 30
  - This is the most common timeframe for regional municipalities, including Working Group participants, who currently have gas-powered leaf blower regulations.

- An 8-week window during the fall clean-up season and 4-week window 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.

- 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

The American Green Zone Alliance (https://agza.net/) 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 which can provide the efficacy of gas required during fall clean-up nor are these alternatives economically viable for landscapers during the fall season. Alternatively, the Working Group recommends three scenarios for consideration:

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 which 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
- Require signage on landscaping vehicles to assist with enforcement

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.

Go Green has provided template communications with information that can be tailored to specific municipal regulations and for different audiences such as residents or landscapers (see Appendix B).

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

The issue of noise is the most common complaint received from community members regarding gas-powered leaf blower usage. 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 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.

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 sounds 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 C.

Appendix D 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 includes 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 Gasoline-powered lawn and garden equipment air pollutants and promote non-polluting alternatives.*

Reducing the usage of leaf blowing in general (gas or battery), through public education and commercial education, is the most sustainable solution to protect native habitats and reduce noise pollution.

Technology Considerations

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 CFM
MPH	142 - 170	206

For industry leading battery-operated equipment, with battery backpack, the tool will generally operate for up to one hour and ten minutes 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:

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.

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 which include:

- Municipal property
- Golf courses and/or large properties over a certain size
- Homeowners conducting maintenance on their own property
- Roof gutter cleaning

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

Battery 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.

The Working Group investigated rebate programs from varying governmental organizations across the country. Items for consideration include:

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 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 gas-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 battery-operated 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- Arup Report on Leaf Blower Noise dated July 16, 2018

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

Appendix E- Municipal Research and Resources

Leaf Blower Regulations Regional Working Group

Members

7 January 2022

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

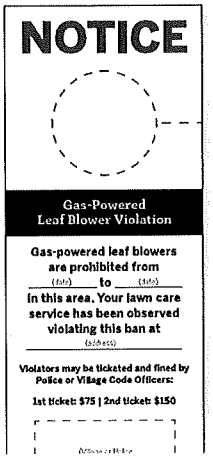
Go Green Wilmette

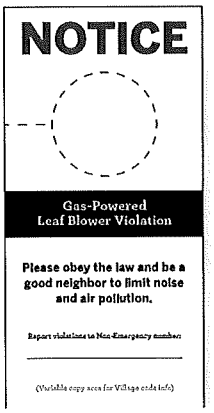
Gas-powered leaf blower awareness and education campaigr

June 26, 2022

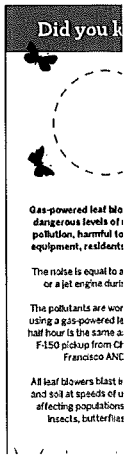
Door Hangers (2-sided)

ENFORCE



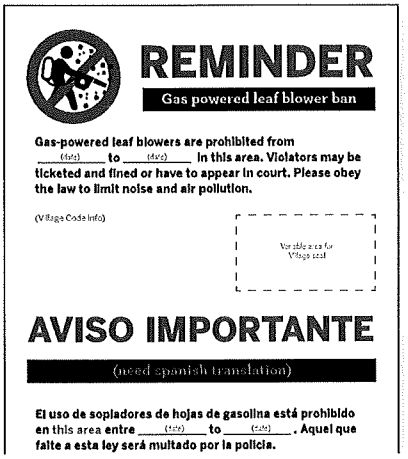


EDUCATE



Flyers (1-sided)

YARD CREWS



REMINDER

Gas powered leaf blower ban

Gas-powered leaf blowers are prohibited from ____(date)____ to ____(date)____ in this area. Violators may be ticketed and fined or have to appear in court. Please obey the law to limit noise and air pollution.

(Village Code info)

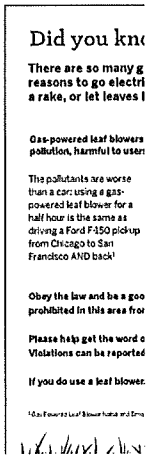
Variable area for Village seal

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 policía.

RESIDENTS



Did you kn

There are so many g reasons to go electri a rake, or let leaves l

Gas-powered leaf blowers pollution, harmful to usen

The pollutants are worse than a car using a gas-powered leaf blower for a half hour is the same as driving a Ford F-150 pickup from Chicago to San Francisco AND back[1]

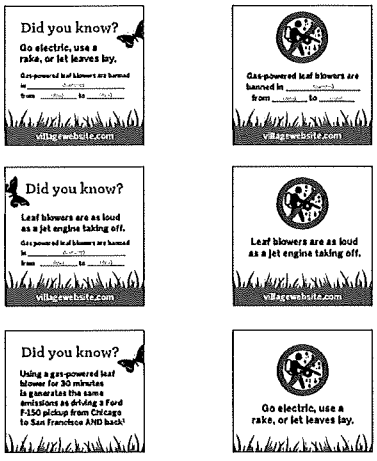
Obey the law and be a goo prohibited in this area fror

Please help get the word o Violations can be reported

If you do use a leaf blower.

[1]Gas Powered Leaf Blower Noise and Emis

Social Media Posts



Appendix C

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

Technical Note

261937-00 July 16, 2018

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.

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}

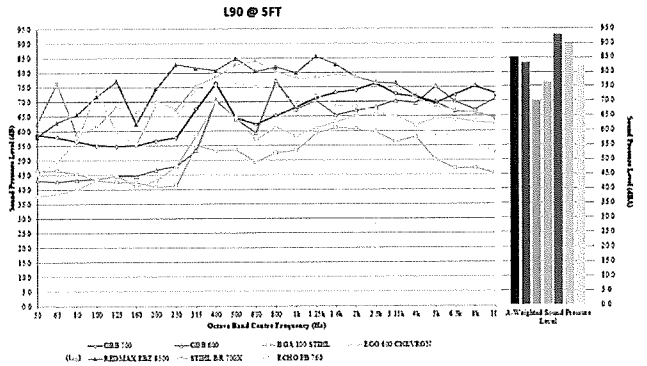
Sound levels are variations in sound pressure. The decibel scale (dB) is the commonly used metric for sound pressure levels, which is a log scale because the number value of sound pressure varies very widely. For the purposes of the data analysis, dB levels of 20-30 are a quiet bedroom or whisper, dB 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

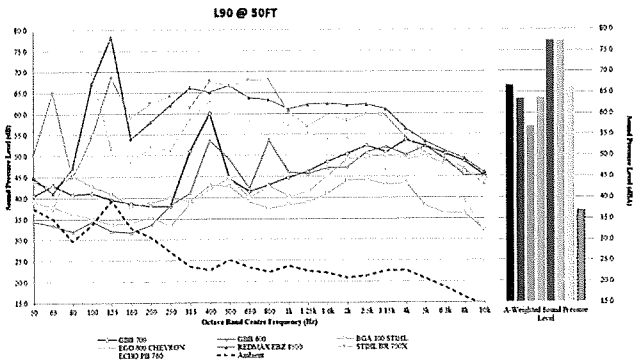


Figure 3: Sound Pressure Levels measured at 100 feet

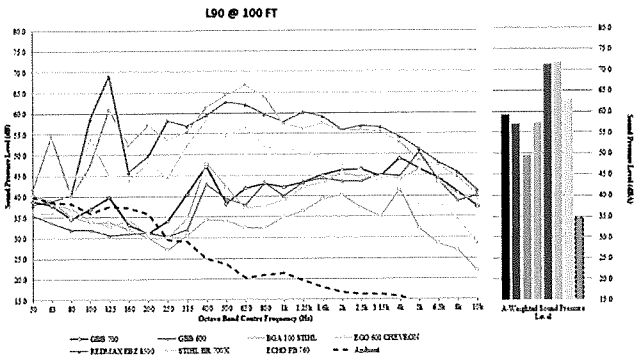


Figure 4: Sound Pressure Levels measured at 200 feet

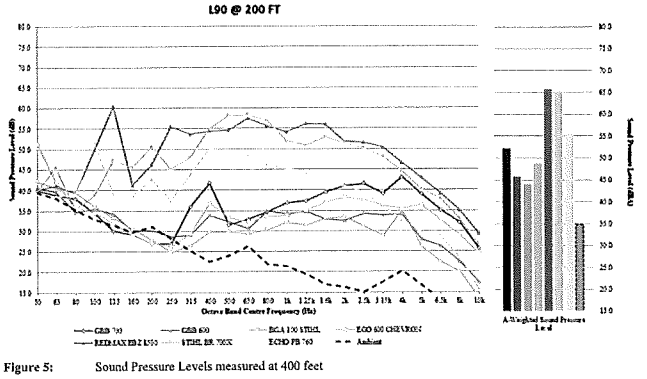


Figure 5: Sound Pressure Levels measured at 400 feet

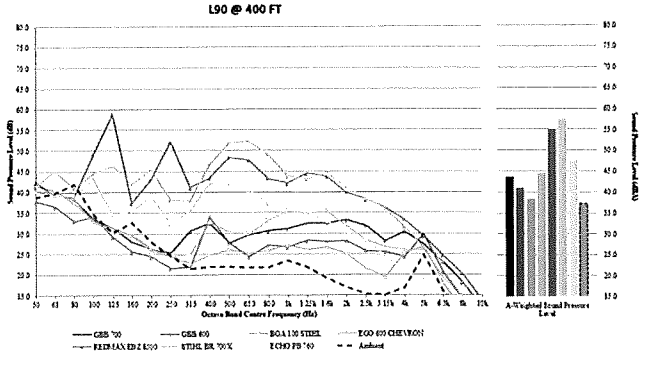


Figure 6: Sound Pressure Levels measured at 800 feet

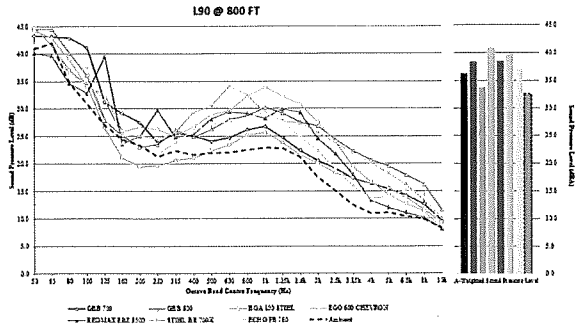
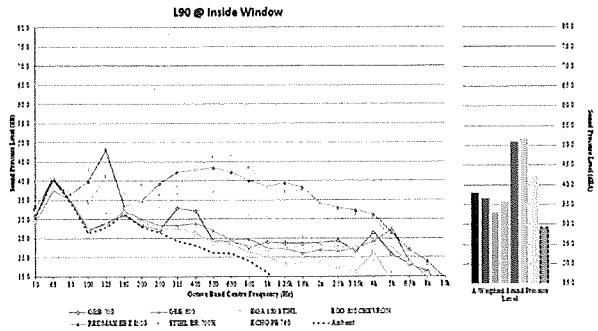


Figure 7: Sound Pressure Level measured inside a residence with leaf blowers 50 feet from the window



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

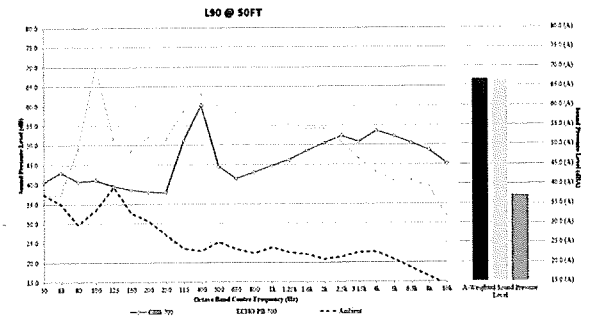
During the oral testimony of Chris Pollock on July 2, 2018, calibrated audio demonstrations of gas and battery powered leaf blowers were presented. It is important to note that the audio was played to replicate the level of the sound at the listening positions of Chairman Mendelson and Councilmember 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.

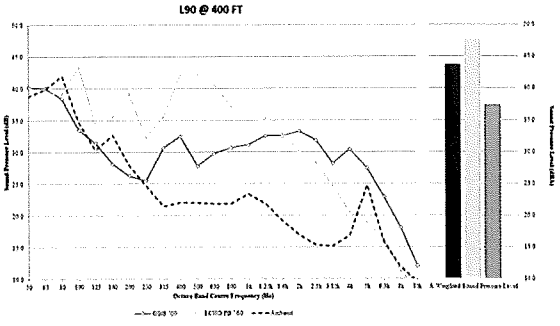
Figure 8: Audio demonstration 1 – equivalent gas and battery leaf blowers at 50 feet



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.

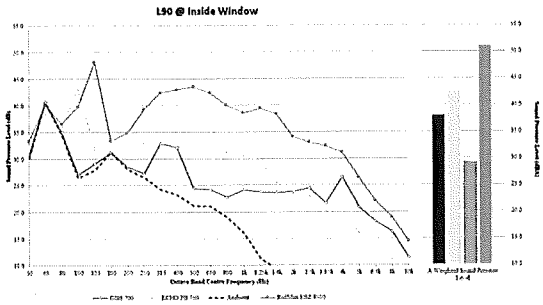
Figure 9: Audio demonstration 2 – equivalent gas and battery leaf blowers at 400 feet



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

Appendix D

National Emissions from Lawn and Garden Equipment

Jamie L Banks, PhD, MS*

Quiet Communities, Inc., PO Box 533, Lincoln, MA 01773

Robert McConnell, Environmental Engineer

US Environmental Protection Agency, Region 1, 5 Post Office Square, Boston, MA 02109

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.

*Corresponding Author: jamie@quietcommunities.org

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.

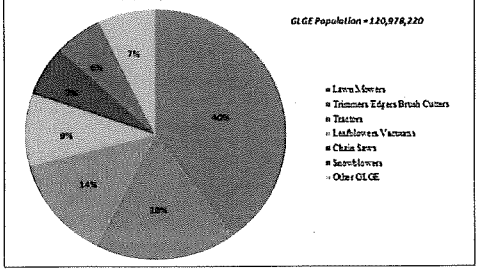
Other factors also influence the combustion related exhaust emissions from nonroad engines, such as fuel type, ambient temperature, and deterioration of equipment with age and use. The reader is referred to the EPA web-site (http://www.epa.gov/otaq/nonrdmdl.htm) for additional information on these topics.

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.

Figure 1. GLGE population, US, 2011



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.

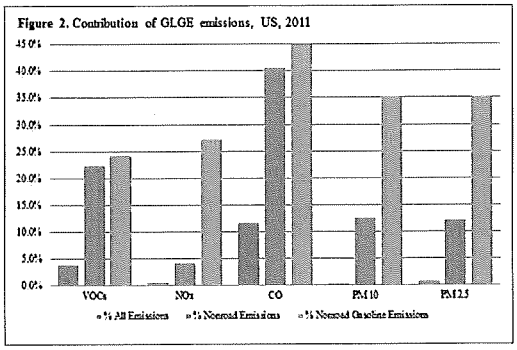
All Nonroad Emissions account for a substantial percentage of All Emissions of benzene (25%), 1,3 butadiene (22%), CO (29%), PM10 (2%), and PM2.5 (5%). Because of the relatively small contribution of GLGE CO2 to All Emissions (0.3%), it is not further considered in this report.

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

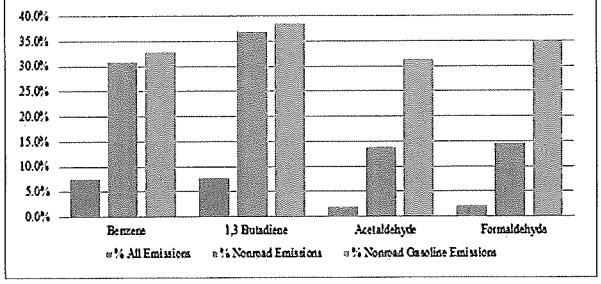
(**FIGURE 2**). GLGE fine PM emissions constitute a fraction of a percent of All Emissions of fine PM, but is a major Nonroad source, accounting for nearly 13% of All Nonroad Emissions of fine PM and more than one-third of Gasoline Nonroad Emissions of fine PM.

Figure 2. Contribution of GLGE emissions, US, 2011



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.

Figure 3. Contribution of individual VOC emissions from GLGE, US, 2011



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

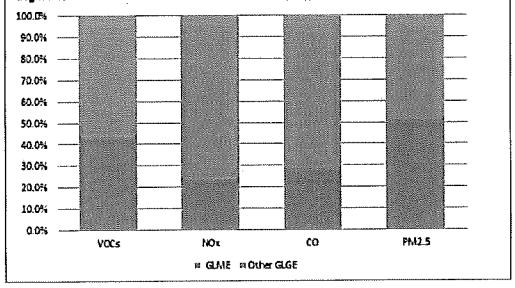
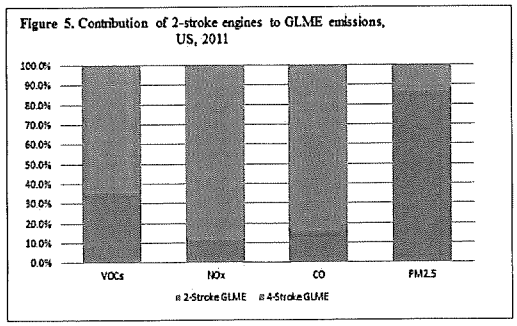


Figure 5. Contribution of 2-stroke engines to GLME emissions, US, 2011



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.

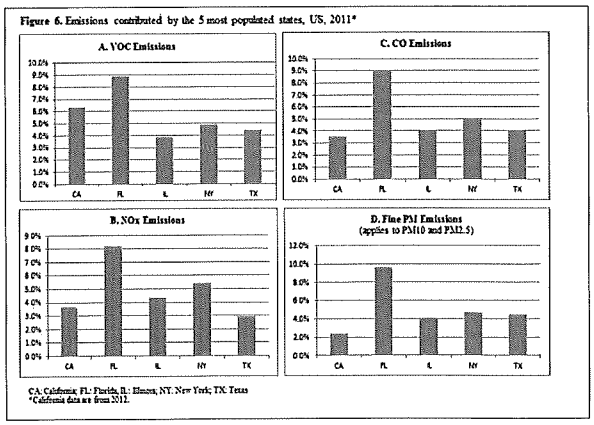
Table 5: Estimated Change in GLGE Emissions, 2018 vs 2011

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*

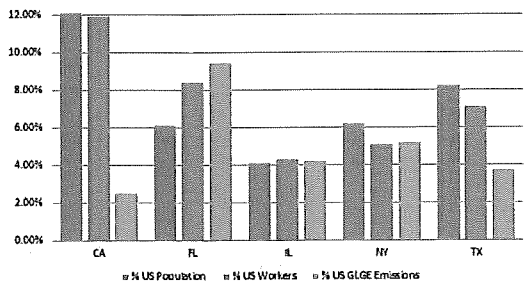


CA: California; FL: Florida, IL: Illinois, NY: New York; TX: Texas
*California data are from 2012.

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 Hilmette 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:
  Hilmette, Evanston, Glencoe, Winnetka, Lincolnwood, Kenilworth, and Highland Park.

LEAF BLOWER REGULATIONS REGIONAL WORKING GROUP
MUNICIPAL RESEARCH AND BEST PRACTICES SUBCOMMITTEE REPORT
AUGUST 16, 2022

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 electric 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. 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. 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. A dedicated code enforcement officer (not a Police Department employees) issues a fine to the landscape company, not the employee of the company using the device. The citation is voided if the company provides proof they have purchased an electric or battery operated device. Multiple violations result in fines.

Winnetka. The Village of Winnetka has a noise and leaf blower 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 starting at $100 for the first violation and increasing for repeat offenses.

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.

APPENDIX A

Survey of Municipal Leaf-Blower Regulations (Excel Spreadsheet)

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. 24-33(c) (nuisances)	May 15th - September 15th, December 15th - March 15th	Police	Discretionary	Discretionary
Highland Park, IL	Sec. 55-041(Q)(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-$750
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 Offence	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																

Time of Day Restrictions

East Hampton, NY	
Montclair, NJ	
Summit, NJ	

Sundays & Holidays Permitted Hours (non-commercial)

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																

The home improvement executive pushing electric lawn mowers

By **JORDAN WOLMAN** | 07/12/2023 12:01 PM EDT

VERBATIM

Ron Jarvis is out in front of The Home Depot's most ambitious sustainability pledge to date: a plan to drastically cut emissions from its outdoor lawn equipment, the biggest contributor to the company's carbon footprint.

The company announced a plan last month to have more than 85 percent of its sales of lawn mowers, leaf blowers and trimmers run on rechargeable batteries instead of gas by the end of fiscal year 2028 — a move it estimates will reduce more than 2 million metric tons of greenhouse gases annually. It comes as California is set to implement a ban on gas-powered landscaping equipment starting next year.

Now Jarvis, Home Depot's chief sustainability officer, has to figure out how to execute the plan — and sell it to the general public.

This conversation has been edited for length and clarity.

How long has this announcement been in the works?

We've been working with our suppliers to bring battery-operated lawn maintenance equipment in for about 10 years. And as that process evolved, and the technology got better, today when you buy an electric mower and you push it into the weeds and the dandelions and everything else, it rips it apart and leaves a beautiful trail behind it, just like the gas-powered does. So we wanted to get to that type of technology before we moved forward with rolling this out.

We've probably been working for about a year and a half on how quickly can we transition this industry and how fast can we and should we move on this. We're pretty excited. We see the transition party happening in many, many markets. We see the technology being there.

A lot of times when consumers move from a product to an environmentally friendlier product, they feel like they're taking a step backwards — it doesn't work as well, it doesn't last as long. There's usually some give-and-take with that. But we found with these products that they're just as powerful. They have just as much torque. They do the jobs in the adequate time that's needed for the batteries. And customers aren't giving up anything. They're gaining. They're gaining a quieter, cleaner, greener yard and helping the environment through the whole process.

How does this announcement help you from a business perspective?

We will have customers coming in demanding electric and battery-operated lawn equipment. So we've done a lot to educate the customers, we've done a lot to make sure that the products are worthy of them making the transition. This isn't incremental business. We're not bringing in a new line of widgets that's incremental sales. This is replacing sales.

But what we do know and what we do think is to our advantage is to be a leader and to get ahead of this. If we think that American yards need battery-operated mowers, then let's do it for them. Let's not have the customer stand in the aisle and have to choose between "Do I want to do something good for the environment or something good for my wallet?" So now we have opening price points. We have price points that are equal to the gas-powered. And when you look at the long-term maintenance of the products, when you're not buying gas

every week, you don't have to buy the oil spark plugs, you don't have those issues with battery-operated engines.

What role is policy playing in this announcement, if any? Have policies like California's ban on gas-powered lawn equipment nudged you in this direction?

No, it hasn't nudged us. We were headed down this path long before any policy came out. We're putting this in the markets where there is no policy or legislation. We think it's the right thing to do. And we would have done it even if there wasn't policy or legislation.

How will you get to these big goals in five short years?

We have a plan in place. We have been transitioning some stores, we've been piloting stores, where you can't buy gas equipment. We've been watching the sales of those, listening to the customers, getting feedback, spending time with the suppliers in the aisles of those stores, hearing what the customers are saying. And as we do, we bring the battery-operated products into a store — usually slowly, we'll take three or four units, switch those out to battery. That lets customers see that we have battery-powered equipment and then slowly wean over 12, 24, 36 months to where when a customer comes into a store they're going to be buying battery-operated lawn maintenance equipment.

Do you see this being a particularly challenging transition for landscapers, for instance?

It's definitely easier if you have a smaller yard. A lot of these last, depending on the torque and the height of the grass, 30 minutes to 45 minutes to an hour, some of them longer. What we're hearing landscapers do is to buy multiple batteries and have some type of charging system in their truck. So they just switch those [batteries] out. And it's the great thing about technology: This will continue to get better. The batteries and the battery power, whatever the equipment is today, it's a ton better than it was 10 years ago. And it'll be much better than it is five years from now. So I have a tremendous amount of confidence in innovation in technology that is going to continue to get better. Contractors will just have the adequate equipment that they need to do the bigger jobs.

How big of a difference will there be in price?

We've been able to keep those pretty much at parity. If we had an opening price point of $299 on the gas, then that's the opening price point of battery. And they work great. I have a battery-operated leaf blower, trimmer, chainsaw, push mower that I use a lot. I'm very happy with the technology in terms of the performance of those products.

Will Home Depot support the right to repair for these battery-powered products?

We're all for this. We support the right to repair. There will be companies — small cottage industries that pop up that specialize in battery-operated lawn equipment just as they've done in gas-powered as that demand gets greater. I would assume that the small engine repair store that's down the street will still be doing small engine repair for electric.

So you have no problem opening your book so to speak to the small repairman to fix a Home Depot battery-powered lawn mower?

We'd be all for that. We want people to repair products, and longevity of these products is important to us.

YOU TELL US

GAME ON — Welcome to the Long Game, where we tell you about the latest on efforts to shape our future. We deliver data-driven storytelling, compelling interviews with industry and political leaders, and news Tuesday through Friday to keep you in the loop on sustainability.

Team Sustainability is editor Greg Mott, deputy editor Debra Kahn and reporters Jordan Wolman and Allison Prang. Reach us all at gmott@politico.com, dkahn@politico.com, jwolman@politico.com and aprang@politico.com.

Want more? Don't we all. Sign up for the Long Game. Four days a week and still free!

WHAT WE'RE CLICKING

— A United Nations-affiliated panel is holding talks this week that could determine the fate of **efforts to mine the world's seabeds**. Bloomberg has the story.

— The Associated Press takes a look at whether **cities' plans for coping with heatwaves** are keeping pace with global warming.

— **Thinking about installing a wind turbine** on your home? The Washington Post has a first-person account from someone who tried.

Follow us on Twitter

Debra Kahn @debra_kahn
Greg Mott @gwmott
Jordan Wolman @jordanwolman
Allison Prang @AllisonPrang

FOLLOW US

Candela, Brian

From: Jeff Sisk <jsiskjsisk@gmail.com>
Sent: Tuesday, July 18, 2023 4:36 PM
To: Candela, Brian
Subject: ordinance meeting

Mr. Candela, I seriously oppose this ordinance regarding gas powered leaf blowers. This is just another unnecessary regulation. Not only should which type of blower being used be left up to the individual or company, but it is really all about eliminating something that operates on fossil fuel. If anything I feel the public needs to be better informed of this meeting and possible change. The fact that I live in a condo complex I seriously doubt that the landscaping company has been notified of this meeting and it's potential impact on my common charges once enacted. I feel that if others in my complex wish that the landscaper switch from gas to electric then they will have the management company say so to them and if they refuse they will find another landscaper. There;s no need for a citywide ordinance.
Personally I wish those things were never invented, but the real fact of the matter here is about government overreach. We the citizens can decide for ourselves. I'm sure the city government can find much more important things to tackle than leaf blowers. If they really want to go through with banning them then ban ALL of them with no exceptions and put the proposal on the ballot in November.

Thank you,
Jeff Sisk

Candela, Brian

From: Peggy Lynn <lynn_peggy@yahoo.com>
Sent: Tuesday, July 18, 2023 6:32 PM
To: Candela, Brian
Subject: Leaf blower ordinance

I'm afraid I only learned about this meeting this afternoon and I don't think I will be able to participate tonight. I have taken more videos than you can imagine of the workers in our neighborhood carrying packs on their back and walking up and down the street literally just blowing leaves around. It is noisy, obnoxious, and I am so concerned about what this is doing to our environment. I do not blame these men, this is their job, and this is what they are paid to do, however, the price of perfection is not worth the cost to our environment and the assault on our senses. My fear is that all those who have financial resources to have their yards taken care of will vote against stopping the leaf blowers. My husband and I do all the work in our own yard and find it very demoralizing that peoples expectations of perfectly manicured yards is out weighing everything else.
Sent from my iPhone

Candela, Brian

From: Joe <saltpork@earthlink.net>
Sent: Tuesday, July 18, 2023 3:42 PM
To: Candela, Brian
Subject: restrict gas blowers

Dear Mr. Candela,

My wife and I are in favor of restricting the use of gas leaf blowers to 2 months in the spring and two months in the fall. That's actually more than enough time to clean yards.

The commercial companies have been exploiting our neighborhoods and causing too much noise by overusing blowers so they can hit more lawns per day.

Norwalkers need to start doing their own lawns and make their lazy kids help them.

Sincerely,
Joe and Sable Roesch
108 W Norwalk Rd

Candela, Brian

From: Bob Welsh <rlw14@yahoo.com>
Sent: Tuesday, July 18, 2023 3:41 PM
To: Lisa Shanahan; Candela, Brian
Subject: RE: Leaf Blower Ordinance
Attachments: Ordinance Legal Notice 7.18.23.pdf

Please read my comments in support of the attached leaf blower ordinance into the record.

Gas powered leaf blowers and the noise and pollution they emit have been a blight on our community for far too long. This is especially so for Norwalkers who have multiple neighbors, and therefore hear a racket most days of the week. I support limiting blower use to key months, as well as transitioning to electric, as soon as possible. Please pass this ordinance.

Best,

Bob Welsh
81 Wolfpit Ave. #E2

----- Forwarded Message -----
From: Lisa Shanahan <lisashan@msn.com>
To: Bob Welsh <rlw14@yahoo.com>
Sent: Friday, July 14, 2023 at 04:15:55 PM EDT
Subject: Leaf Blower Ordinance

Candela, Brian

From: ANDREA LIGHT <alight32@aol.com>
Sent: Tuesday, July 18, 2023 2:57 PM
To: Candela, Brian
Subject: Support for Banning Gas Powered Leaf Blowers within Norwalk

Dear Sir:

I'm writing to express my support for an ordinance banning gas powered leaf blowers in the City.

They are insufferably noisy and disruptive to my quality of life. In addition, the machines contribute to air pollution which is damaging to all of us.

Thank you.

Andrea Light
7 Greenwood Place
Norwalk

Candela, Brian

From: Bill Wrenn <wmwrenn@aol.com>
Sent: Tuesday, July 18, 2023 2:11 PM
To: Candela, Brian
Cc: Shanahan, Lisa; wmwrenn@aol.com
Subject: Video of leaf blower noise on a summer Sunday

Dear Mr. Candela and members of the Common Council,

My wife and I have endured years of unacceptable noise and pollution produced by gas powered leaf blowers. While the roar and stench were once something we endured only in the spring and fall, leaf blowers are now a year round nuisance.

Please watch this video for a taste of the horror show many Norwalk residents have to put up with even on summer weekends.

https://youtu.be/fkIgyQSDAXM

We greatly appreciate the Common Council addressing this issue.

Regarding the proposed ordinance, we strongly believe that the timetable for the ban on summer blowing should be September 2023, rather than 2024. We also believe that the total ban on gas powered blowers should become law in 2025 rather than 2027 and 2028. The electrically powered leaf blowers are already powerful enough for professional lawn care and provide cleaner, quieter and safer alternatives to using gas powered devices.

We also believe that the ban should not exclude blowing imperious surfaces as described in XX-5 B. Blowing a driveway or sidewalk produces the same noxious noise and pollution as blowing a lawn so should also be probited.

Thank you for your consideration,

William Wrenn
67 Weed Avenue
Norwalk, CT 06850

Candela, Brian

From: Michael Cohn <michaelscohn@gmail.com>
Sent: Tuesday, July 18, 2023 11:54 AM
To: Candela, Brian
Subject: Suggested Modifications to the Proposed Leaf Blower Ordinance: Comments to be read into the Public Record

I am a resident of Norwalk residing at 406 Silver Creek Lane in Norwalk. I recommend the following modifications to the proposed Leaf Blower Ordinance. Firstly, I would limit its application to properties of less than 10 acres. The reason for doing so is the scale required to care for properties of a larger size and the impracticalities of maintaining a large fleet of electric leaf blowers with constant need of recharge. Additionally, there are risks at the point of charging that mostly relate to fire hazard for large scale lithium battery recharge. More needs to be considered than just the procurement of new equipment. Time needs to be allowed for new technology to develop in safe battery storage and charging.

These risks are substantially mitigated for single small properties requiring at most 1 leaf blower but for larger properties seems very impractical and potentially dangerous along a different vector for larger landscapers servicing the large properties. We can substantially win as a community by winning on single lot residences but like Westport which recognized a need to exempt itself over use in its own parks and recreational facilities relating to the cost and complexity we should recognize that applying this to larger properties imposes risks as well and is just not practical.

I would strike entirely the section on the allowable times of the year for use. This seems to be regulatory overreach. There are often good reasons to use a leaf blower during the summer months. Bear in mind that many also operate in reverse and collect garden debris. Think this is a step too far.

Michael Cohn

§ XX-3. Prohibition on the operation of Internal Combustion Leaf Blowers. Effective January 1, 2027, for individual properties of two acres or less, and January 1, 2028, for individual properties of more than two acres **but less than 10 acres**: A. No Person shall operate an Internal Combustion Leaf Blower in the City of Norwalk. B. No owner of real property, tenant in possession of real property, or Person in control of real property shall allow the operation of an Internal Combustion Leaf Blower on such real property in the City of Norwalk. C. No Person who owns or operates a gardening, landscape maintenance, or similar service shall allow an employee or agent of that service to operate an Internal Combustion Leaf Blower in the City of Norwalk.

~~§ XX-5. Prohibition of the operation of Leaf Blowers during certain months and hours of the day. A. Lawns, Gardens and Other Landscapes. A Leaf Blower, whether it be an Internal Combustion Leaf Blower (prior to their absolute prohibition) or an Electric Leaf Blower, may only be operated on lawns, gardens, parks, woodlands, playing fields, and other landscapes in the City of Norwalk during the following periods of the year: (1) April 1 through June 1; and (2) October 15 through December 15.~~

Candela, Brian

From: Ashley Gulyas <ashley.elizabeth.snyder@gmail.com>
Sent: Friday, July 14, 2023 10:34 PM
To: Candela, Brian
Subject: leaf blower ordinance statement

I would very much be in favor of a ban/restriction in Norwalk on gas-powered leaf blowers, effective ASAP. They are terrible for the environment and cause a great deal of unwanted noise in our neighborhood.

Thanks,
Ashley Gulyas (she/her)
5 Cliffview Drive, Norwalk

Candela, Brian

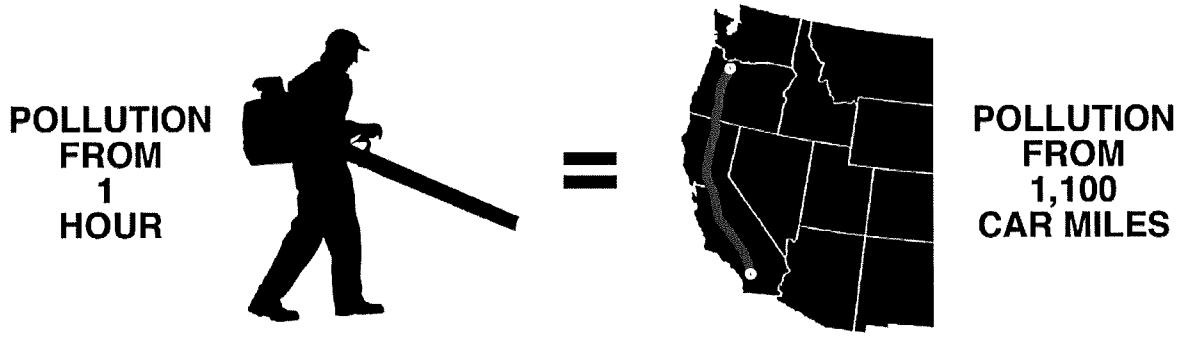
From: Mary Verel <maryverel@gmail.com>
Sent: Monday, July 17, 2023 5:13 PM
To: Candela, Brian
Subject: Leaf blower ordinance

Hello,
Here are some scientific facts on leaf blowers.
Please include this in the record. Given the unprecedented climate change we are experiencing, we need to do everything in our power to reduce the things that are contributing. There are alternative ways for landscapers to deal with leaves.
Thank you ,
Mary Verel
Norwalk resident of 48 years.

https://l.facebook.com/l.php?u=https%3A%2F%2Fwww.quietcleanpdx.org%2Fleaf-blowers-dangers-pollution%2F%3Ffbclid%3DIwAR3hg_DDT8XnYW0_jlUThHZvwOr3m7IuxxUDA1NXu7G67IuLW0uFDwxu31s&h=AT225MPr9xZzdIqe8scMNucMdc5BhftBsv8izc2zwDNUPkvGPyegTaxjnlqHi8rI6kCwGx1CSD-aZiEUvAerqZgcEkwMjOd3UQJaoHkHwyQpsYF393naig1UfLpxcEdOxw&s=1

QC/PDX

[https://www.quietcleanpdx.org/wp-content/uploads/2019/05/Dangers-01-1.png]



Source: California Air Resources Board [https://ww3.arb.ca.gov/msprog/offroad/sm_en_fs.pdf?_ga=2.57772970.1807115685.1562651154-1700486834.1557971923]

MORE POLLUTING THAN CARS

QC/PDX

Gas powered leaf blowers create high intensity, low frequency noise that impacts nearby homes, schools and parks, disturbs wildlife, and consistently violates Portland's noise ordinance. Operating a gas leaf blower can cause permanent hearing loss in 2 hours and can impact 90 nearby homes. The low frequency noise of gas blowers travels further than the noise from electric blowers and penetrates through windows more readily. Gas blowers create much more noise impact than electric blowers.

HEALTH RISKS

Emissions from gas leaf blowers create high levels of formaldehyde, benzene, fine particulate matter and smog forming chemicals, which are known to cause dizziness, headaches, asthma attacks, heart and lung disease, cancer and/or dementia.

Blowers also kick up unhealthy clouds of dust and debris that can include pollens, animal feces, fertilizers, pesticides, lead, asbestos, fine particulate matter, and more. Inhaling these substances in large quantities and with such velocity can have serious and insidious health consequences.

ENVIRONMENTAL HAZARDS

Re-fueling spills contaminate soil and waterways. Maintenance of gas powered leaf blowers produces toxic waste like fuel filters and contaminated air filters. Blowers erode, compact and dry out soil and harm plants, microorganisms and pollinators.

In addition to smog-forming emissions and toxic fumes, gas powered leaf blowers create CO2 emissions that contribute to the climate crisis.

MOST AT RISK

Operators of the equipment are most at risk, but the exhaust and dust is a danger to the general population – especially children, the elderly, people with chronic asthma and people exercising. Gas blowers are often used in

QC/PDX

[https://www.quietcleanpdx.org/wp-content/uploads/2019/11/The-Case-Against-Leaf-Blowers-by-Singer.jpg]

Cartoon thanks to **Andy Singer [https://www.andysinger.com/]**

Quiet Clean PDX

Candela, Brian

From: Audrey Cozzarin <audreyyogini@gmail.com>
Sent: Monday, July 17, 2023 5:26 PM
To: Candela, Brian
Subject: Thank you for reading my statement into the record, 7/18
Attachments: Audrey Cozzarin Statement July 18 2023.docx

Hi Brian!
Lisa Shanahan asked me to send to your attention my attached statement which I would like read into the record tomorrow evening at the CC Ordinance Committee meeting, July 18. It is in response to the agenda time about a ban on gas-powered leaf blowers.

Thank you so much! I appreciate this since I am not able to attend the meeting.
Audrey
--

Audrey Cozzarin + Serafino Carri
19 Kendall Court, Norwalk, CT 06850
203-838-3332
audreyyogini@gmail.com
scarri2@snet.net

July 18, 2023
Audrey Cozzarin
19 Kendall Court
Norwalk, CT 06850

Thank you, Ordinance Committee Madame Chair Lisa Shanahan, for reading my statement into the record tonight.

I implore the Ordinance Committee to ban leaf blowers for the following reasons:

1. Gas-powered leaf blowers (along with mowers and other lawn equipment) pollute the air;
2. Gas-powered leaf blowers cause noise pollution for both humans and wildlife;
3. Gas-powered leaf blowers are toxic and dangerous for workers using them for the above 2 reasons;
4. Leaves do not need to be removed in many cases. Leaves can be left on the ground in many more areas according to current environmental stewardship practices as they provide nutrients for the soil and shelter for wildlife;
5. **And,** both gas-powered and electric leaf blowers cause harm and death to insects and small animals and THAT is where I draw the line.

The planet is cooking and flooding. Perhaps the "lowly" leaf blower seems a small-fry for the Common Council to discuss, but the stakes for the Earth which includes human beings are exceedingly high and we need change on **all levels.** Leaf blowers and other landscaping machines might get the job done faster, but at what cost? What about using rakes which are quiet, effective, and provide a healthy workout? Is a machine always the best answer?

As St. Augustine said, "Nature is God's first Bible." Leaf blowers are so outside of the natural world—as are so many facets of our modern life—that we are barely connected to God's creation and are now reaping disastrous results. Extreme heat is blamed on the burning of fossil fuels. Let's ban gas-powered leaf blowers **now,** not years from now.

Thank you for your courage tonight in doing the right thing.

Candela, Brian

From: gregslandscaping860@comcast.net
Sent: Monday, July 17, 2023 11:24 PM
To: Candela, Brian

i dont think this is good for lawn and property maintenance company people who hire lawn company should have to go through back ground check or something

Candela, Brian

From: Liz Conti <lizconti@rocketmail.com>
Sent: Wednesday, July 19, 2023 11:19 AM
To: Candela, Brian
Cc: Meek, Bryan
Subject: Gas powered leaf blower ban proposed for Norwalk | Nancy on Norwalk

CAUTION: EXTERNAL Email: Don't open links or attachments from untrusted senders

Mr. Candela, please include my comments in the letter that was published today in the Nancy on Norwalk publication As you move the ordinance approval to common counsel for consideration. Please reply that you have received this request and will include my comment.

Liz Conti
Norwalk CT resident and Taxpayer since 1997

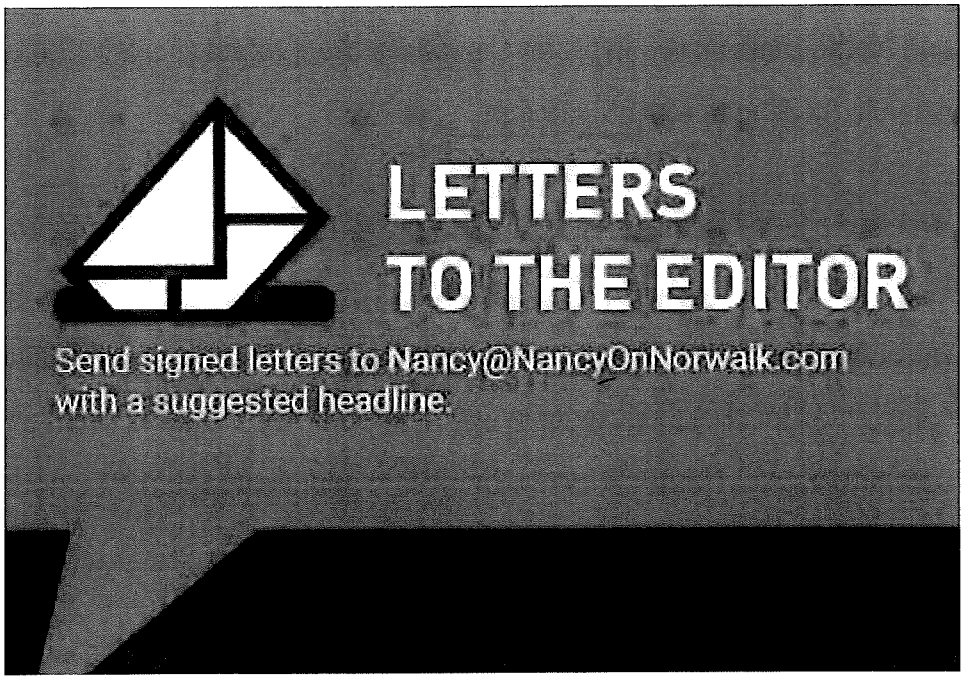
https://www.nancyonnorwalk.com/gas-powered-leaf-blower-ban-proposed-for-norwalk/

Sent from my iPhone

Letters

Gas powered leaf blower ban proposed for Norwalk

By Liz Conti | July 19, 2023 at 4:59 AM EDT



Listening to the public hearing as I write this, regarding the ordinance proposed banning the use of gas-powered blowers completely by 2027/2028 and in part as soon as September 2024.

There are a lot of landscapers and homeowners that were uninformed about this until yesterday when it was published that there would be a public hearing. At

plus amounts of time to orate about unrealistic and fanatical statistics that were highly suspect and exaggerated.

It seems that this town's woke leadership live in a fantasy world; most of the appointees have likely never got their hands dirty at work, like the crews of landscapers who take care of keeping this town looking so manicured.

This is also an outright attack on civil liberties and on the small business owner who is literally being raked through the coals by a woke liberal mob or climate loons. Next, they are coming for our gas powered stoves and grills. Our freedoms are being taken away daily as this town lives in an alternative reality that benefits a select few and jeopardizes the livelihood of the working class who is being subjected to increasing costs that are so burdensome, little is left to eat and clothe themselves and their families in the interest of a less than proven science relating to climate change.

We need change in Norwalk, but what kind of change are we willing to tolerate? The kind that neglects the working class in order to support special interests with no regard for simple common sense? Here is a thought, how about working "with" small local businesspeople and residents. Try including them on these Committees, not treating them with disdain and giving them little notice to come and speak out against these crazy proposals.

Make sure your VOTE is heard in November. Vote out these crazies that show disdain for the public! That is the change we need in Norwalk, not eliminating leaf blowers for God's sake!

Liz Conti

Leave a Reply

You must Register or Login to post a comment.

Popular Stories

Two arrested in South Norwalk home invasions

Mayoral campaigns report second quarter fundraising totals

McMurrer changes mind, will run for Council reelection – with Murray, not Kydes

Does turning the air conditioning off when you're not home actually save energy? Three engineers run the numbers

Recent Comments

Bill Waters on OHPA's $650K good fortune inspires scrutiny of Authority's loan
July 18, 2023

A deal is a deal. When we renegotiated the debt in 2019, Mayor Rilling, Tom Livingston, Greg Burnett and we...

Michael Ditkih on Proposed plans for former YMCA unveiled
July 18, 2023

Harry and whoever else running next election cycle should run on the slogan "Make Norwalk Stamford", because that's all that...

John O'Neill on OHPA's $650K good fortune inspires scrutiny of Authority's loan
July 18, 2023

IF it doesn't effect the long term success of Oak Hills, it might be a nice gesture to pay down...

Bryan Meek on Norwalk tax dept software conversion problems hit some taxpayers with late, inaccurate bills
July 18, 2023

Is it that difficult to report the fact that this was a no bid contract with no scope of work...

Arthur Quinn on Norwalk tax dept software conversion problems hit some taxpayers with late, inaccurate bills

Follow us

About this site

NancyOnNorwalk.com was conceived as the place to go for Norwalk residents to get the real, unvarnished story about what is going on in and around their city. NancyOnNorwalk does not intend to be a traditional print newspaper online; rather, we exist to pull the curtain back and shine a nonpartisan spotlight on how Norwalk is run and what is happening regarding which issues and decisions have the deepest impact on taxpayers' lives, pocketbooks and safety. As an independent, nonprofit site news service NancyOnNorwalk's first and only allegiance is to the reader.

Get the Daily Newsdown!

The Daily Newsdown is NancyOnNorwalk.com's daily email newsletter. First thing in the morning, seven days a week, you'll receive a rundown of the latest news stories on NancyOnNorwalk.com. You'll also get breaking news alerts, but only when it's really news. We will never share your email address with anyone else. Sign up now to get the most from NancyOnNorwalk.com! See previous editions.

Email Address *

Subscribe

Comment Guidelines | Privacy Policy | Disclaimer

The Problems with Gas-Powered Leaf Blowers (GLBs)

Prepared for Norwalk
July 15, 2023

Valerie Seiling Jacobs, JD
valerieseilingjacobs@gmail.com
860.490.7800

4 Categories of Health and Environmental Problems

2.
DANGEROUS NOISE

3.
DISPERSION OF DANGEROUS MATERIAL

(battery blowers do this too)

1.
TOXIC EMISSIONS AND POLLUTANTS

4.
FUEL SPILLAGE

1. TOXIC EMISSIONS AND POLLUTANTS

GLBs are a major source of toxic emissions and pollutants:

- **Hydrocarbons and VOCs**, including:
  - Benzene
  - 1,3-Butadiene
  - Formaldehyde
- **Carbon Monoxide**
- **Fine Particulate Matter** (“**PM2.5**”)
- Nitrogen oxide, which combines with **VOCs** and sunlight to form ground-level **Ozone**

Known Carcinogens!

Health Risks from GLB Emissions Include:

- Cancer
- Lung Disease, including worsened asthma, COPD, acute respiratory infection
- Heart Disease &Heart Attacks
- Strokes
- Developmental and reproductive harm

Studies indicate that ambient PM2.5 is **carcinogenic** and increases the risk of death for those with **lung cancer**

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5920433/

PM2.5 particles are so tiny that they can pass right through a cloth mask. To block PM2.5, you need an N95 mask or PM2.5 filter.www.cleanairresources.com

The Magnitude of the Ozone & PM2.5 Problem

Connecticut—and Fairfield Co. in Particular—Already Have Extremely Poor Air Quality

- During the summer of 2022, we **exceeded the EPA recommended ozone level** on 23 days
- During the summer of 2021, we exceeded the EPA ozone level on 21 days
- On many of those days, Westport had the **highest ozone levels in CT**
- Our PM2.5 levels are also high (even without the fires in Canada).....

On unhealthy days (AQI >100) our actions matter even more!

It is important to limit emissions and reduce ozone by...

- Avoiding the use of small gasoline-powered engines like:
  - –leaf blowers
  - –lawn mowers
  - –string trimmers
  - –chain saws
  - –power-washers
  - –air compressors
- Using public transportation
- Reducing electricity usage
- Setting your AC to a higher temp
- Turning off lights, TVs, & computers

GLBs Produce Copious Amounts of Pollution

Running a GLB for 30 minutes produces the same amount of smog-forming pollution as driving a Ford F-150 truck from Texas to Alaska

Running a GLB for one hour produces the same amount of smog-forming pollution as driving 1,100 miles in a 2017 Toyota Camry

- A *single* GLB can produce 30 million micrograms of **PM2.5** every hour, which can stay suspended in the air for a week or longer
- Concentrations of **PM2.5** near GLB **operators** were up to 54 times higher than concentrations measured at a busy intersection in LA
- California estimates that the pollution from gas-powered gardening equipment now exceeds that produced by vehicles in that state

GLB Emissions Directly Affect the Environment

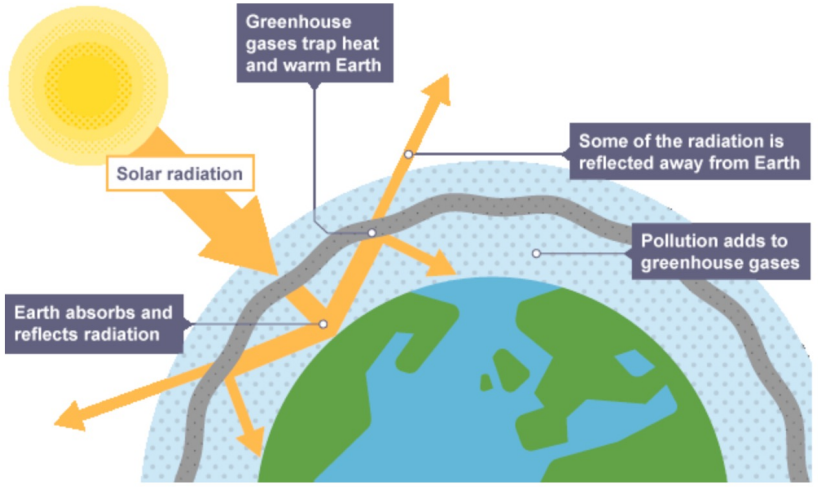
- Ozone **damages plants**
- Ozone is also **harmful to animals**, esp. **small migratory birds** like sparrows, warblers, and finches, which make up 86% of all North American landbird species

[Cornell Lab: June 25, 2021]

"Ground-level ozone causes more damage to plants than all other air pollutants combined." **US Dept of Agriculture**

Source: Yale Environment 360: https://e360.yale.edu/features/ground_level_ozone_harming_plants_humans

GLB Emissions Indirectly Affect the Environment

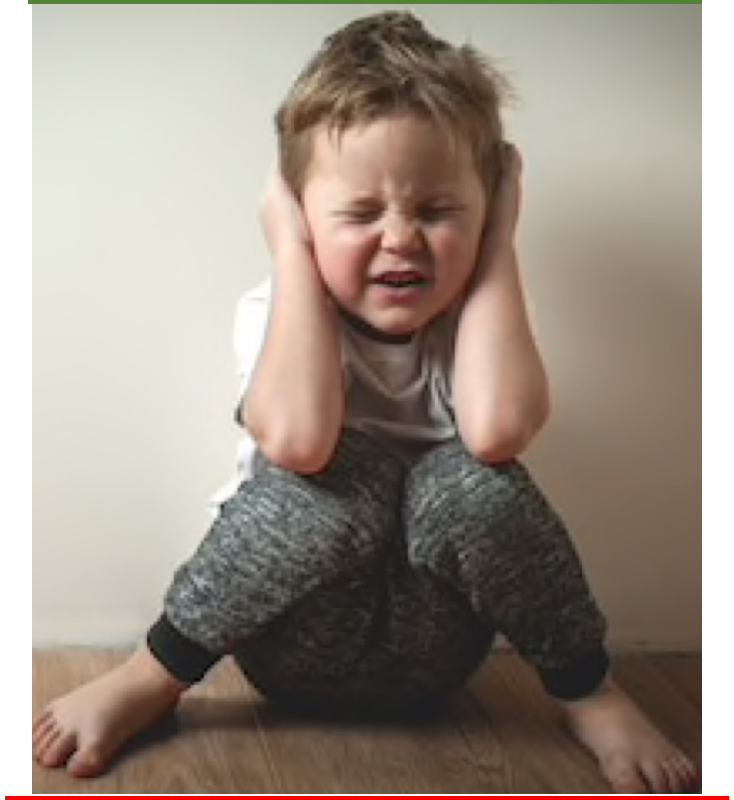


The greenhouse effect

https://www.bbc.co.uk/bitesize/guides/z8fn2p3/revision/2

As a greenhouse gas, ozone **traps heat i**n the atmosphere, raises temperatures, and contributes to **climate change**.

2. DANGEROUS NOISE



Loud noise is especially problematic for children, seniors, those with neurological conditions, & landscape workers

GLBs are typically 95-115 decibels (dB) at the source and are loud even 50 feet away. The maximum recommended exposure to this level of noise is 15 minutes—yet landscapers **use them for hours** and often **in groups**, exposing themselves & the public to chronic levels of harmful noise

Humans:

Noise increases the risk of:

- **Hearing loss, tinnitus**
- **Stress, sleep disturbance**
- **Hypertension, heart disease**
- **Metabolic disturbances**
- **Psychological problems**
- **Learning and concentration issues in children**
- **Work productivity losses in adults**

Animals:

Noise:

- **Disrupts animal communications and habitats**
- **Has negative impacts on the health and vitality of wildlife populations**
- **Contributes to loss of biodiversity**

3. DISPERSION OF DANGEROUS MATERIAL

(All blowers do this)

The high velocity air jets on blowers disperse dangerous material (200 mph!)

- Aerate dust, pesticides, herbicides, heavy metals, animal feces, etc.
- Blow away topsoil
- Desiccate soil, pollen, sap and other natural plant substances
- Contribute to loss of vegetation
- Can injure or destroy birds, small mammals, and beneficial insects (including pollinators) that live in leaf litter

4.
FUEL SPILLAGE

An estimated **17 million gallons** of fuel is spilled **into the soil and storm drains** <u>every year</u> in the US during the refilling of gas-powered gardening equipment

BTW: that's 50% more than that spilled by the Exxon Valdez off the coast of Alaska!

Spilled gasoline:

- seeps into groundwater and waterways
- affects drinking water
- harms worms, insects, fish, amphibians, and plants (even in small amounts)
- impairs feeding and swimming of marine animals
- harms mammals & plants

"A single gallon of gasoline can contaminate 750,000 gallons of water."

https://www.the71percent.org/water-contamination-how-far-do-pollutants-reach/

MowGreen®

Clean & Serene, No Gasoline!™

Emission Free Landscaping Equipment

Avoiding Tons of Pollution, Noise, & Toxins

Dan Delventhal,
Founder, MowGreen LLC

MOW Green®

MOWGreen®

Clean & Serene, No Gasoline!™

Zero Emission Lawn Gear: Costs, Benefits & Considerations

- **Pollinator Pathway**
- **Norwalk River Watershed Assoc.**
- **Land Trusts**
- **Quiet Yards**

Town of Greenwich Conservation Commission Since 1964

This Property is on the Pollinator Pathway · Pesticide-Free Native Plants

HEALTHY YARDS

Aspetuck Land Trust

Rethink Lawns · Plant Natives · Avoid Pesticides

Green Corridor Partner

Sustainne

where sustainability prospers

Wilton Go Green

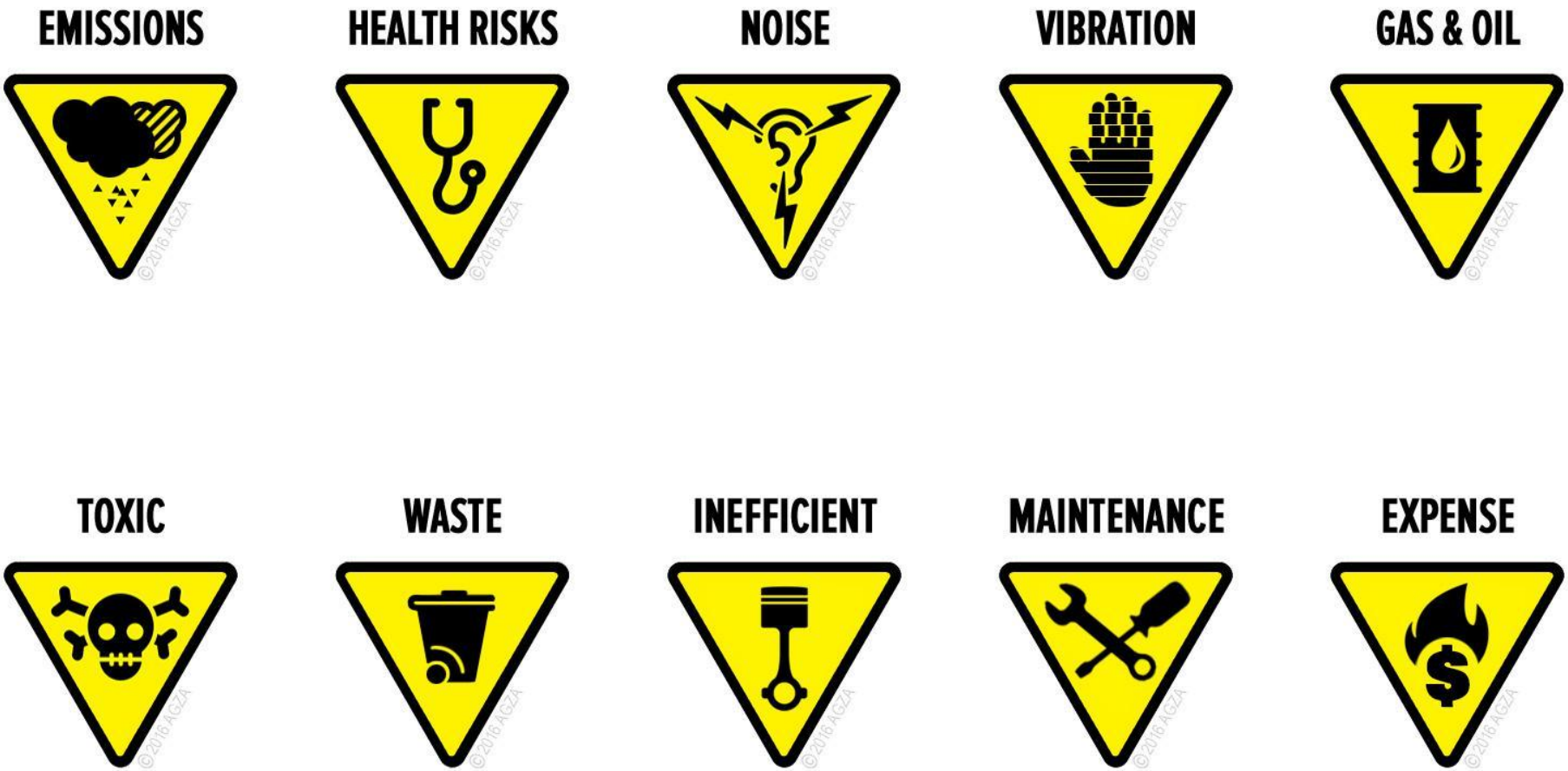
LIVE GREEN

Organic Land Care NOFA organiclandcare.net Accredited Professional

AGZA American Green Zone Alliance Certified Service Pro Low Noise Zero Emissions

QCi

Ten Worst Problems With Gas



MowGreen®

Clean & Serene, No Gasoline!™

Zero Emission Lawn Care

Serene!

- MowGreen Battery Electric Gear is 50% quieter than gas-powered gear.
  - GLBs – Low Frequency & High Decibel Noise into Homes
  - Examples:
    https://www.instagram.com/tv/CGQ_K0ags8o/?igshid=oc729fapz76n
    Quiet Aerating & Dethatching

- Human powered tools when practical (2012)
  - Reel Mowing Video

MOWGreen®

Clean & Serene, No Gasoline!™

Zero Emission Lawn Care

Reducing Air & Noise Pollution

- 5-10%+ USA Problem
  - Gas gear 10-20x more polluting than cars
  - *Get the Gas off the Grass!*
  - Ave. Yard with gas gear = 5 mTons = 1 Car

Gas Leaf Blowers (2-stroke) are the worst

https://www.instagram.com/tv/B-P6sDMlEZV/?igshid=f2e2i4q49aaw

Blower Video

QCi

MowGreen®

Clean & Serene, No Gasoline!™

Zero Emission Lawn Care

MowGreen Mowing Evolution

2006, Reel mowers, 2010, Reel2Reel gang kits, 2011 Hydrogen …

MOWGreen®

Clean & Serene, No Gasoline!™

Zero Emission Lawn Care

Reel2Reel™ Double/Triple Push Gang Kit

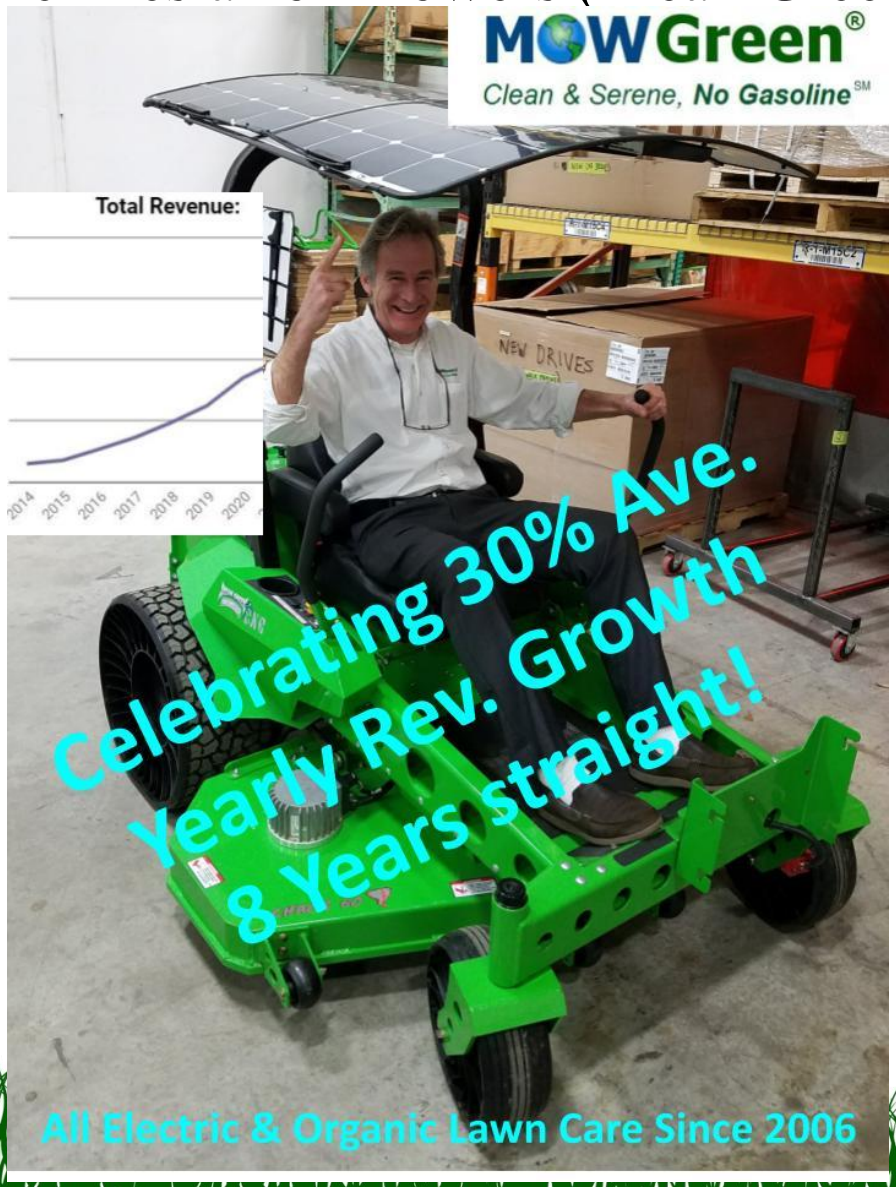
MOWGreen®

Clean & Serene, No Gasoline!™

Zero Emission Lawn Care

The "Tesla" of Mowers (Mean Green)

2013-Small electric,
2015-Medium electric,
2017-Large electric



AGZA
AMERICAN GREEN ZONE ALLIANCE
CERTIFIED
SERVICE PRO
LOW NOISE ZERO EMISSIONS

MOWGreen®

Clean & Serene, No Gasoline!™

Mission Zero Emission

Mowers, hedgers, edgers, trimmers, chainsaws, pruners, aerators, de-thatchers, sprayers, spreaders, snow blowers & leaf blowers all electric! EGO, MEANGREEN (Some Worx trimmers).

MOWGreen®

Clean & Serene, No Gasoline!™

Zero Emission Lawn Care

- All battery Electric gear
- Batteries charged with Solar or
- Batteries charged with 100% elected renewable
- Carbon Credits purchased for vehicle gas
- Zero Noxious Fumes!

SMOGATHON

TOWNVIBE green awards

ORGANIC LAND CARE NOFA organiclandcare.net NATURALLY BEAUTIFUL

AGZA AMERICAN GREEN ZONE ALLIANCE CERTIFIED SERVICE PRO LOW NOISE ZERO EMISSIONS

Green America's PEOPLE & PLANET AWARD

MOWGreen®

Clean & Serene, No Gasoline!™

Electric Lawn Gear

Air pollution avoidance & Norwalk Lawn Care Market

- 25,000 + lawns
- >100,000 mTons of Carbon/GHG's
- >25,000 Cars running all year
- 2.5 Billion Auto Mile Equivalent Emissions - 1 Year
  - 10,000 trips around world

$50 MM market

MOWGreen®

Clean & Serene, No Gasoline!™

Electric vs. Gas Gear

Pricing: 2 to 1,

Power: Mow-par / Blow-closing in

Maintenance/Fuel: 1 to 7, 1 to 4

Maintenance: Electric Advantage

Cost Benefit Analysis: New Gear, Training - Savings, Health, Business Growth, Client & Employee Retention, Compliance (blower bans).

Total Cost of Ownership: Electric Advantage

Return on Investment: (M)10-25% +health + quiet

(B) (debateable-**process changes** needed) 10-50%

MOWGreen®

Clean & Serene, No Gasoline!™

Healthy Yards

Practices – Watering, Clean up

- Watering: 1 inch once/ Week (x2 for 85F deg.+)
- Clean up Spring sticks, mulch leaves, less heavy raking/ no core aerating. Hold off on beds.
- Mulch: May (after insects & birds done), color up existing leaves, leaf mulch, use less
- Fall: Mulch mowing leaves reduces bulk, feeds soil, supplies beds. Keep Some whole in beds, excess mulched or **Swept**

MOWGreen®

Clean & Serene, No Gasoline!™

Mulch Mow, Sweep, Blow Less

MOWGreen®

Clean & Serene, No Gasoline!™

Electric Blowers - “Prosumer” vs Commercial

MOWGreen®

Clean & Serene, No Gasoline!™

750 CFM - Electric Blower with Extra Batteries & Chargers

3 hrs/Day 8 mos.	Cost/hour	Hours/Season	Cost/Season	Savings	Cost Unit	Added Cost
Eblower	$0.25	516	$129	$387	$1,250	-$750
Gblower	$1.00	516	$516		$500	
ROI						
Investment:	-$750					
Savings/Year	$387					
Year 1 ROI	**52%**				**5 Foot riding Mower:**	
3 hrs/Day 7 mos.	Cost/hour	Hours/Season	Cost/Season	Savings	Cost Unit	Added Cost
Emower	$1	452	$452	$2,709	$25,000	-$12,500
Gmower	$7	452	$3,161		$12,500	
ROI						
Investment:	-$12,500					
Savings/Year	$2,709					
Year 1 ROI	**22%**					

MOWGreen®

Clean & Serene, No Gasoline!™

Quiet Tow Behind

MOWGreen®

Clean & Serene, No Gasoline!™

Electric Top Dressing, Aeration, Dethatching & Bag Mowing for Overseeding

MOWGreen®

Clean & Serene, No Gasoline!™

Vendors

Mean Green	**EGO**	Worx
Makita	**Stihl**	Husqvarna
Greenworks	Ariens	**Gravely**
Graze	Echo	Ryobi
Milwaukee	Honda	Black & Decker

AGZA
AMERICAN GREEN ZONE ALLIANCE
CERTIFIED
SERVICE PRO
LOW NOISE ZERO EMISSIONS

MOWGreen®

Clean & Serene, No Gasoline!™

Future Considerations

Gas - Price hikes possible, Ill health impacts, Noise nuisance, bad investment (compared to electric), anti gas gear laws

Electric - Density of power in lithium improving, charge speeds improving, more renewable power resources (solar, wind) coming

Charging, Runtimes, Emissions

MOWGreen®

Clean & Serene, No Gasoline!™

Invest in Lawn Care that Combats Climate Change

"The Time is always right, to do the right thing"

-Rev. Dr. Martin Luther King Jr.

MowGreen®

Clean & Serene, No Gasoline!™

Tending the ave. lawn with gas emits tons of green house gases per year; like a car driving 12,000 miles, as gas lawn gear is 10 to 20 times more polluting per gallon than in a car. Lawn Care is over 5% of US air pollution. MowGreen cuts grass without gas. **Over 800 metric tons of air pollution are avoided annually - over 10,000 acres mowed without gas, avoiding 9 MILLION auto-mile equivalent emissions since 2006 (like 360 car trips around the world).** MowGreen® is a carbon neutral company, focused on sustainable lawn care technologies and services.

***Values**: Reduction, Ecology, Ethics, Life sustaining, & Respect, Effectiveness, Efficiency, Lasting value (REEL).*
***Missions**: Get the Gas off the Grass! More Food Growing, Less Lawn Mowing! No Invasives, Let's Plant Natives! No synthetics, Go Organic!*
***Vision**: National Network of locally managed and centrally supported eco-friendly gardening & lawn care.*

MOWGreen®

Clean & Serene, No Gasoline!™

The Electric Organic Native (EON) Alliance

Electric Organic & Native Pioneers Partnering across Territories to Meet Missions

Alliance Attributes:

- Referrals or Subcontracting among Allies across territories
- Sharing best practices, equipment and staffing as necessary
  - Less travel time, by localizing service routes and resources
  - Less traffic
  - Improved quality and continuity of service
  - Better profitability for members
  - More buying power as a group
  - Less competition by territory
  - Supports specialization for better customer results

Contact

- https://MowGreen.com
- **Dan@MowGreen.com, 203-254-9999**

Health Impacts of Gas-Powered Leaf Blowers

Norwalk, CT
July 18, 2023

Sarah Evans, PhD MPH

Assistant Professor **of** Environmental Medicine and Public Health
Icahn School of Medicine at Mount Sinai

Icahn School of Medicine at Mount Sinai

Acknowledgements

Icahn School of Medicine at Mount Sinai

Institute for Exposomics and Environmental Health

PEHSU Pediatric Environmental Health Specialty Units

The Mount Sinai Environmental Health Sciences (EHS) Core Center
(P30ES023515)

National Center for Advancing Translational Sciences (NCATS) Clinical and Translational Sciences Award (CTSA) Program Translational Science Hub
(UL1TR001433)

New York State Children's Environmental Health Centers

Air Pollution from 2-stroke engines

Benzene*
Formaldehyde*
1,3-butadiene*
Hydrocarbons/PAHs
Acetalaldehyde
Particulate matter**
NO_2**
CO**
Ozone**
CO_2

*Known human carcinogen
**Criteria Air Pollutant

=

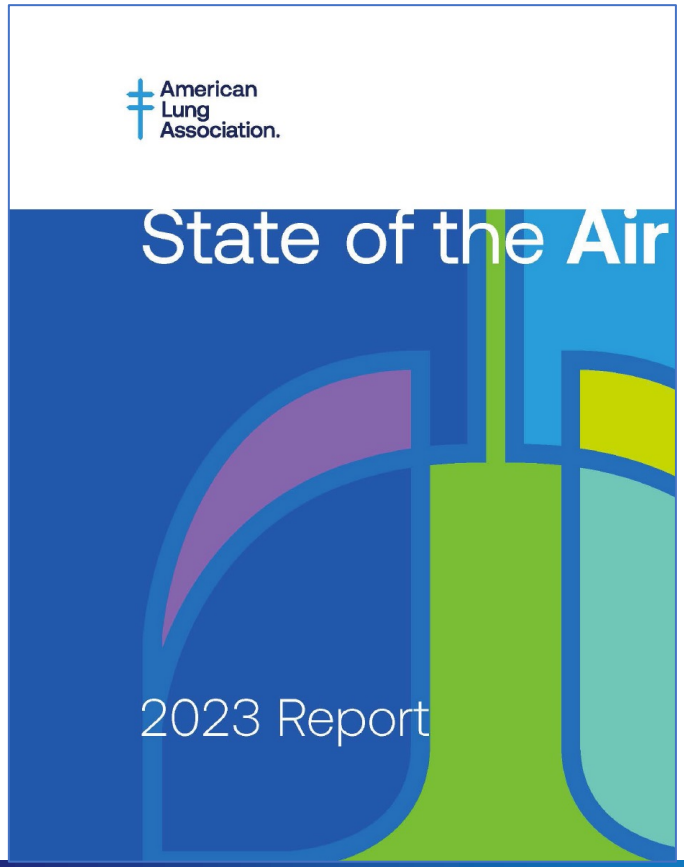
1 hour

15 hours/1100 miles

https://ww2.arb.ca.gov/resources/fact-sheets/sore-small-engine-fact-sheet

150.4 million Americans owned a leaf blower in 2020

Fairfield County: the Dirtiest Air in the State

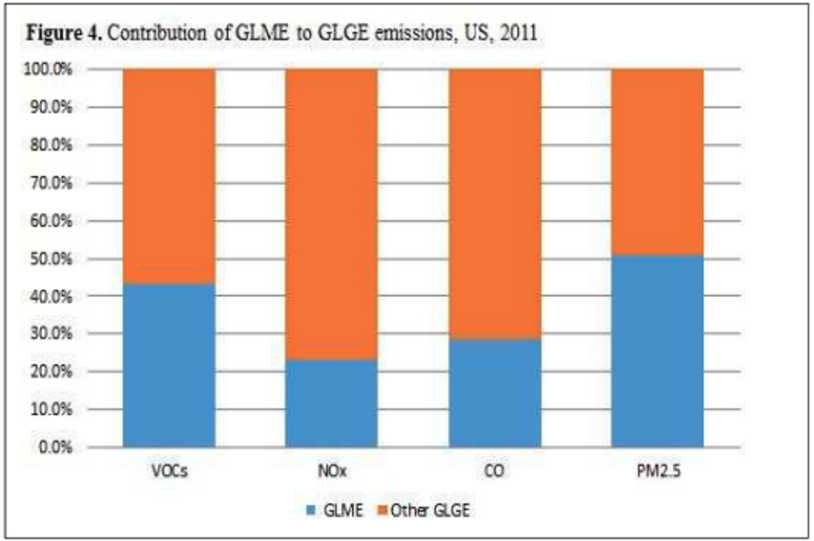


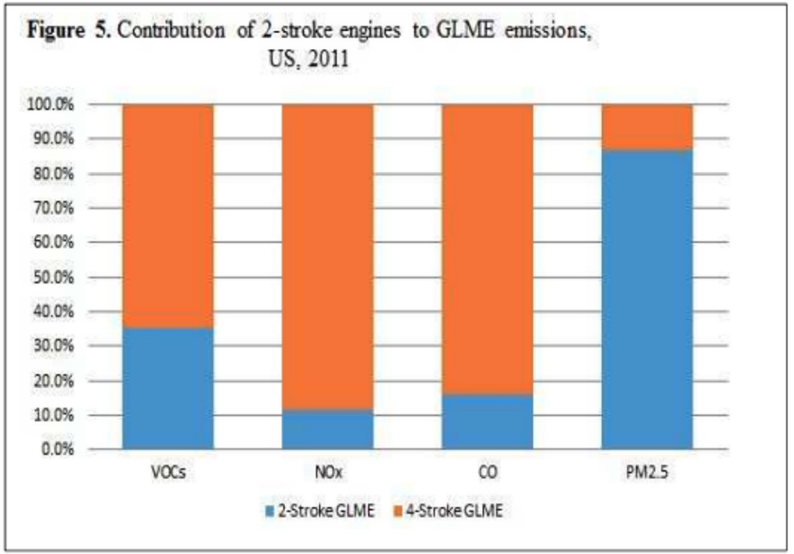
State of the Air: Fairfield County

Ozone	Particle Pollution	
	24-Hour	Annual
F	C	Pass
38 Orange Days Unhealthy for sensitive groups 9 Red Days Unhealthy	6 Orange Days Unhealthy for sensitive groups	

Two-stroke nonroad engines: a major source of air pollutants

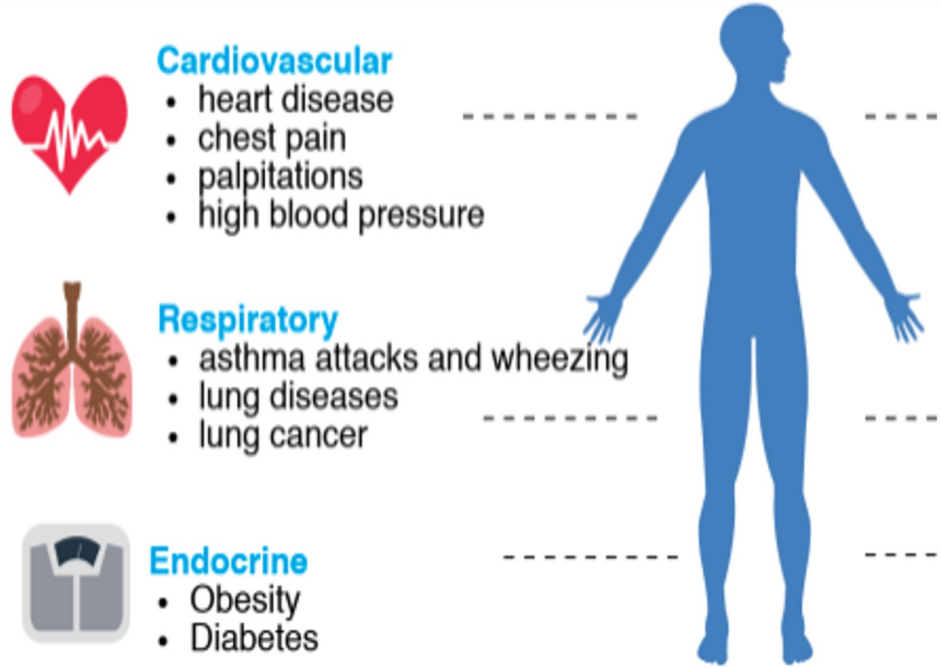
27M tons of pollutants emitted by 121M lawn and garden equipment items (GLGE)





Banks and McConnell 2015 National Emissions from Lawn and Garden Equipment
https://www.epa.gov/sites/default/files/2015-09/documents/banks.pdf

Health Effects of Air Pollution



Cardiovascular
- heart disease
- chest pain
- palpitations
- high blood pressure

Respiratory
- asthma attacks and wheezing
- lung diseases
- lung cancer

Endocrine
- Obesity
- Diabetes

Brain Function
- impaired brain development
- increased autism risk
- mental health issues
- neurodegenerative disorders

Pregnancy
- preterm birth
- low birth weight
- asthma in infants

Mortality
- Lower life expectancy

6.5M deaths/year globally
200,000 deaths/year US

https://mountsinaiexposomics.org/learning-hub/

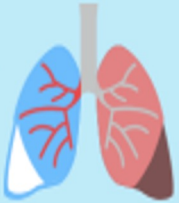
Who is Most Affected?

People who work outdoors

Jobs where there is high exposure to contaminated air

People with pre-existing conditions

Respiratory issues, cardiovascular, & mental health



Frontline Communities

Low-Income, communities of color are disproportionately exposed to air pollution

Pregnant women

Infants and young children

Older adults & the elderly

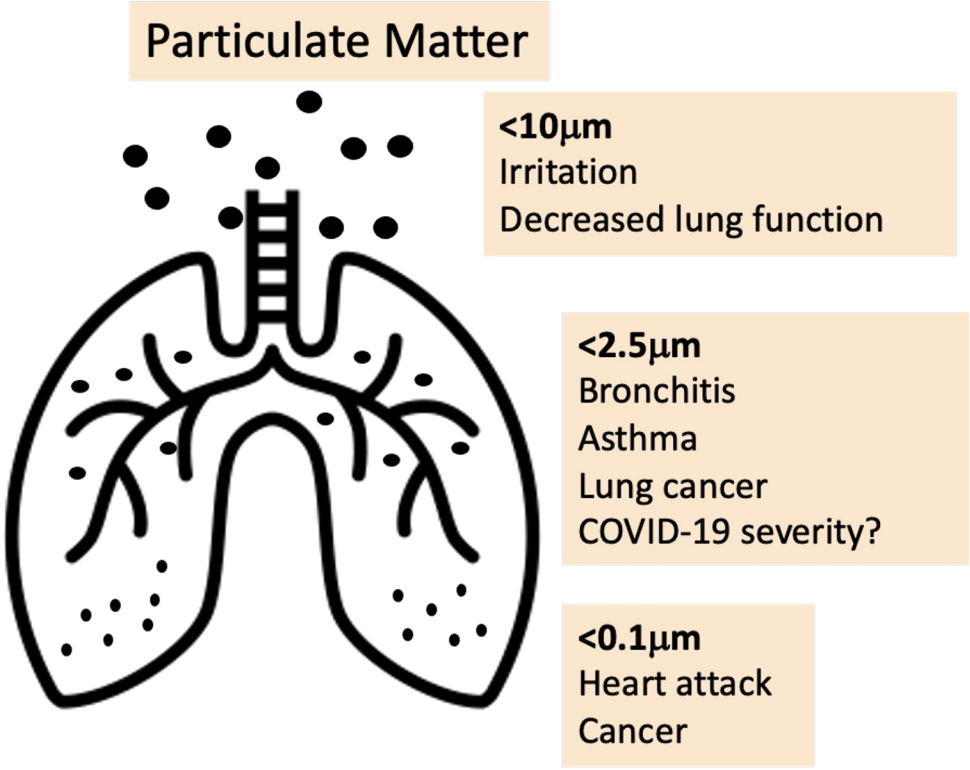
https://mountsinaiexposomics.org/learning-hub/

Air Pollution and Children's Health

- Contributes to **1 in 10 deaths** of children under 5 years
- Leads to impaired **brain development** and cognition
- Impaired **lung function**

Joint effects of ambient and household air pollution contribute to:

- **600K deaths** in children under 15
- **50% of lower respiratory infections** in children under 5



Small non-road sources of pollution impact health

Of 100,000 deaths attributed to PM2.5 from human activity each year **1,400 are attributed to lawn and garden equipment** use.

Thakrar et al. 2020 Reducing Mortality from Air Pollution in the United States by Targeting Specific Emission Sources. Environ. Sci. Technol. Lett. 2020, 7, 639−645.

Personal air monitoring showed **operator exposures above National Ambient Air Quality Standards** for PM2.5 and CO (EPA Small Engine Exposure Study)

Baldauf et al. 2006 Air contaminant exposures during the operation of lawn and garden equipment. J. Exp. Sci. and Environ. Epi (2006) 16, 362–370

Workers using 2-stroke chain saws are exposed to carcinogens (e.g. benzene, 1,3-butadiene) at **levels that may increase cancer risk**.

Frank N. Dost. Toxicology and potential health risk of chemicals that may be encountered by workers using forest vegetation management options. Part I, Risk to workers associated with exposure to emissions from power saws.

Air Pollution & Older Populations

Exposure to low levels of $PM_{2.5}$, ozone, and nitrogen dioxided associated with **pneumonia, heart attack, stroke, AF in elderly**

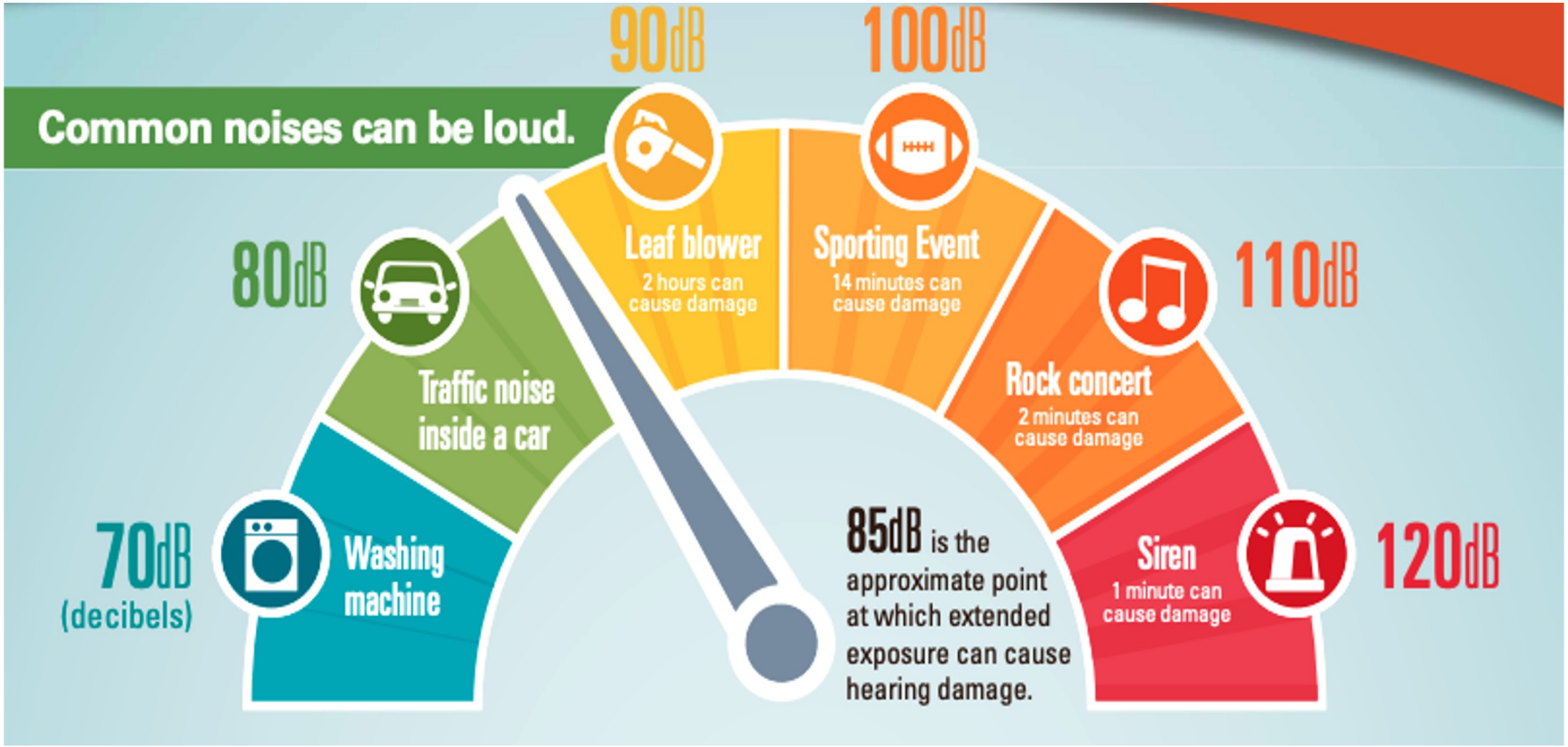
Yazdi et al. 2021. Long-Term Association of Air Pollution and Hospital Admissions Among Medicare Participants Using a Doubly Robust Additive Model. April 20, 2021 Circulation. 2021;143:1584–1596. DOI: 10.1161/CIRCULATIONAHA.120.050252

Short-term exposure to $PM_{2.5}$ increases stroke risk in patients with pre-existing conditions (AF, hypertension, high cholesterol)

Meng et al. 2022. Short-term effect of PM2.5 on stroke in susceptible populations: A case-crossover study.Int. J. of Stroke. Vol. 18. Issue 3 https://doi.org/10.1177/1747493022111

$PM_{2.5}$ and NO_2 are associated with **increased risk of dementia and AD**.

Shi et al. 2021. A national cohort study of long term air pollution exposure and incident dementia in older adults in the US. Nature Comm. 12: 6754.



https://www.cdc.gov/vitalsigns/pdf/2017-02-vitalsigns.pdf

APHA

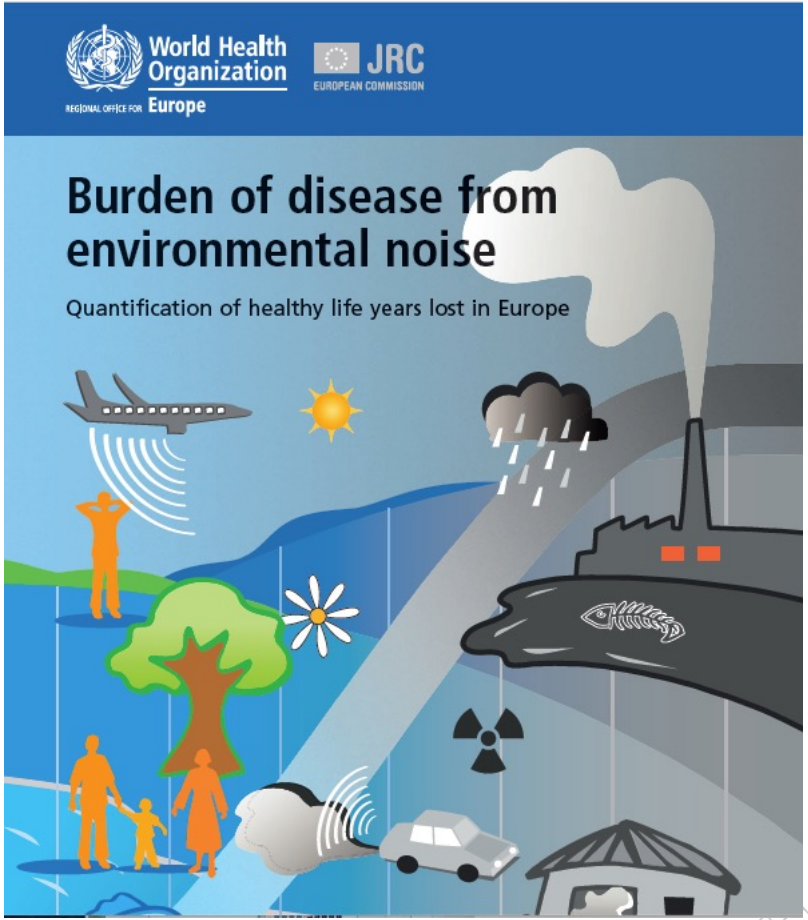
AMERICAN PUBLIC HEALTH ASSOCIATION

For science. For action. For health.

Noise as a Public Health Hazard

Date: Oct 26 2021 | Policy Number: 202115

Key Words: Occupational Health And Safety, Environment



Noise is Pollution

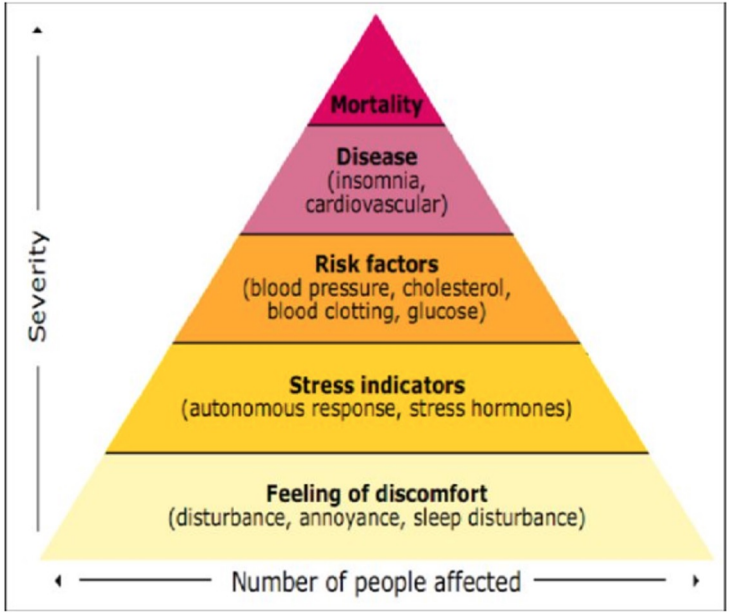
Annually:

- 1-1.6M healthy life years (DALYs) lost due to health effects of noise
- 45,000 DALYs lost due to cognitive impairment in children

Vulnerable groups: pregnant women, infants, children, workers, elderly

Health outcomes:

- Hearing loss
- Impaired balance
- High blood pressure & CVD
- Stress
- Anxiety & depression
- Impaired focus and learning
- Sleep loss

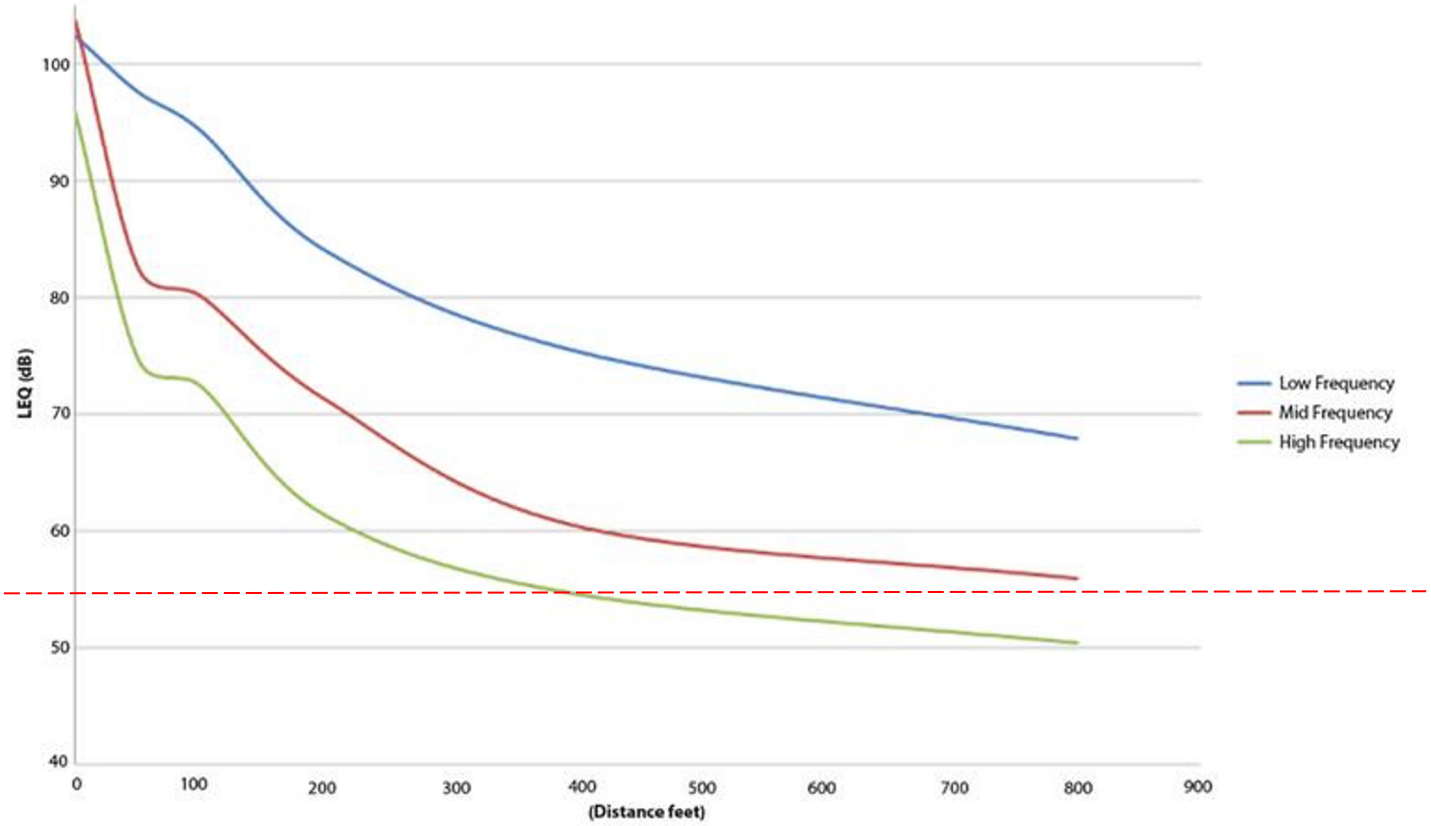


Wolfgang Babisch. The Noise/Stress Concept, Risk Assessment and Research Needs. Noise Health. 2002;4(16):1-11.

Charlotte Clark and Katarina Paunovic. Int. J. Environ. Res. Public Health 2018, 15, 285; doi:10.3390/ijerph15020285

WHO Burden of Disease from Environmental Noise, 2011. https://www.euro.who.int/__data/assets/pdf_file/0008/136466/e94888.pdf

Low frequency noise from GLBs travels long distances

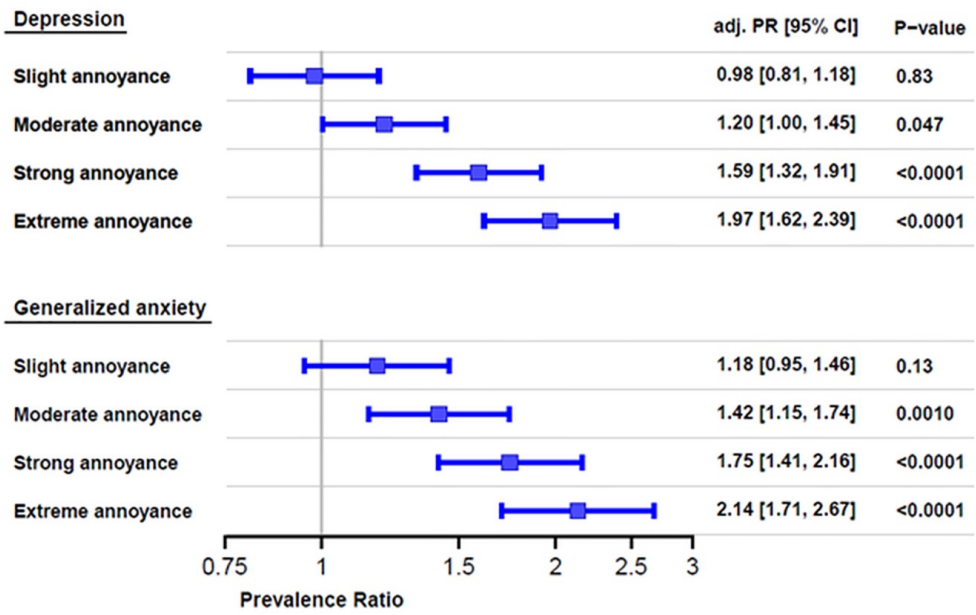


Walker & Banks , J environ Toxicol Stud. 2017 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6707732/

Noise and Mental Health

Gutenberg Health Study
N=15K
Validated likert scale for annoyance

Strong noise annoyance is associated with **2x prevalence of depression and anxiety**



Beutel ME et al. 2016 Noise Annoyance Is Associated with Depression and Anxiety in the General Population- The Contribution of Aircraft Noise. PLoS ONE 11(5): e0155357.
https://doi.org.eresources.mssm.edu/10.1371/journal.pone.0155357

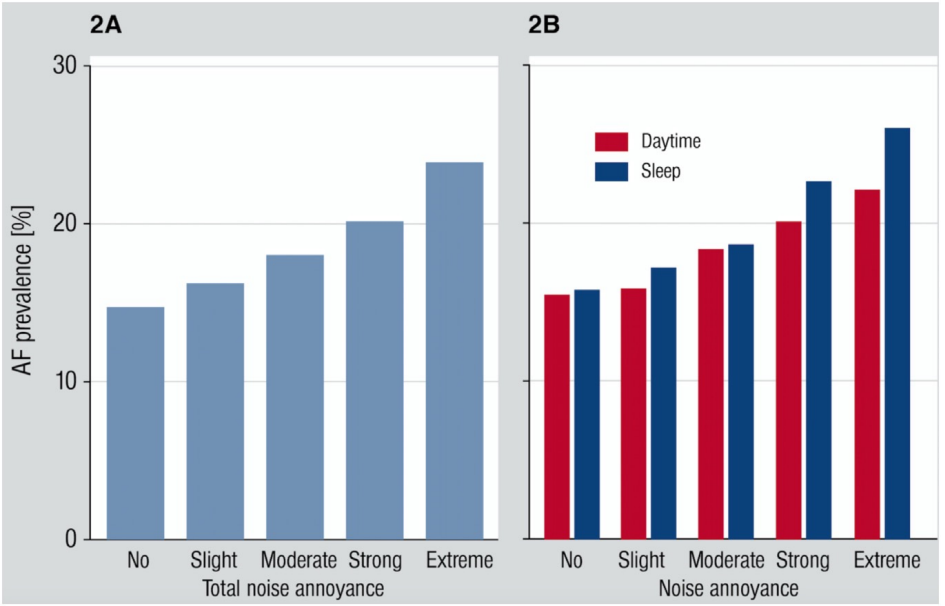
Tortorella et al. 2022. New determinants of mental health: the role of noise pollution. A narrative review. International Review of Psychiatry, 34:7-8, 783-796, DOI: 10.1080/09540261.2022.2095200

Noise and Cardiovascular Health

Gutenberg Health Study
Annoyance from daytime neighborhood noise associated with **increased risk of atrial fibrillation.**

Chicago Health & Aging Study
A 10dbA increase in noise associated with 1mmHg **increase BP and 20% increased risk of Rx-resistant hypertension.**

Mass General Imaging Study
Noise > 55dB associated with increased stress activity in the brain and **major adverse cardiovascular disease event**



Hadad et al. 2018 Annoyance to difference noise sources is associated with atrial fibrillation in the Gutenberg Health Study. Int. J. of Cardiology. 264:79-84.
https://doi.org/10.1016/j.ijcard.2018.03.126

Noise

↓

Stress Response
HPA Axis

↓

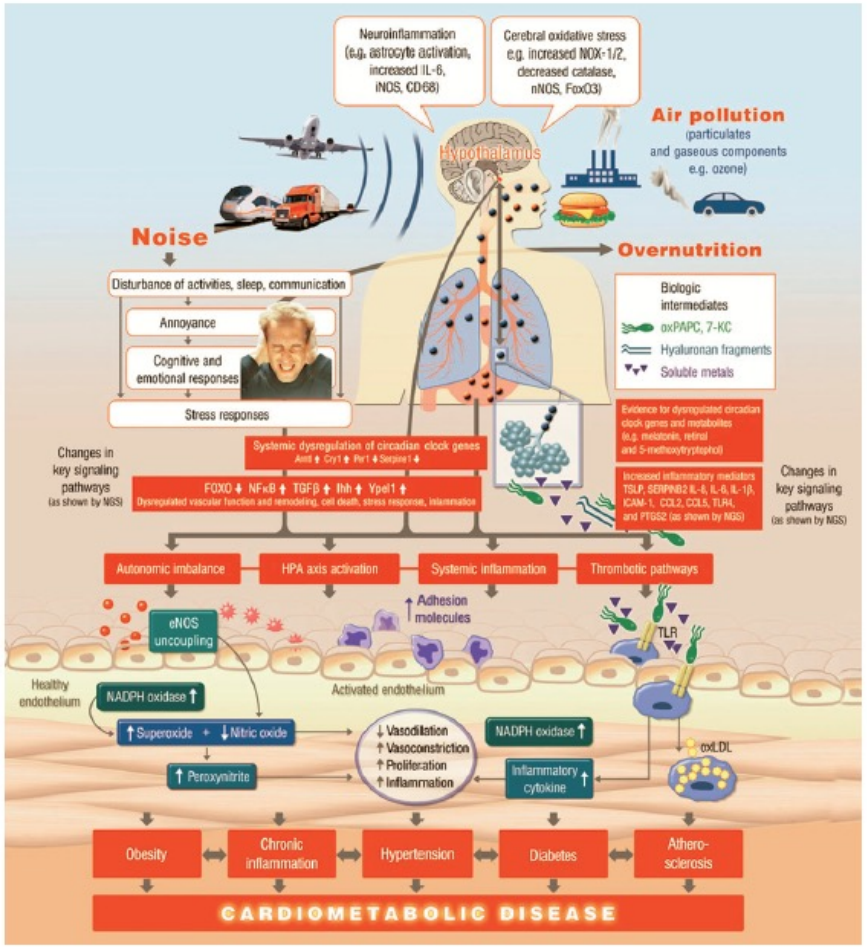
Vascular remodeling,
Cell death

↓

Inflammation
Vasoconstriction
BV lining alterations

↓

CVD



Munzel 2020 Environmental Factors Such as Noise and Air Pollution and Vascular Disease. Aintioxidants & Redox Signaling. Vol 33, No. 9 2020. DOI: 10.1089/ars.2020.8090

Noise and Older Populations

Chicago Health & Aging Project

- N=5227 >65
- Community noise was associated with worse global cognitive performance
- 10dBA increase in noise associated with:
  - **36% increased odds of mild cognitive impairment**
  - **29% increased odds of Alzheimer's disease**

Weuve et al. 2020. Long-term community noise exposure in relation to dementia, cognition, and cognitive decline in older adults https://doi.org/10.1002/alz.12191

2022 Meta-analysis on noise & dementia

9 studies show dose-dependent association between noise and dementia

Meng et al. Chronic Noise Exposure and Risk of Dementia: A Systematic Review and Dose-Response Meta-Analysis. Front Public Health. 2022; 10: 832881.doi: 10.3389/fpubh.

PRescription for Prevention

Noise

Did you know?

Noisy environments can impact a child's learning. Very loud noises can lead to permanent hearing loss.

Action Plan

- ☐ Avoid loud volumes on portable electronic devices, especially when using headphones.
- ☐ Choose toys that have a volume control. Tape over the speakers of very loud toys.
- ☐ Don't use firecrackers.
- ☐ If using a white noise machine to help your infant sleep, do not place it near the baby and play it at a low volume.
- ☐ Use hearing protection for you and your family at events with loud music.
- ☐ Create a quiet environment for your child to read and do homework.

more →

Signature _____ Date _____

Resources

Worried about your child's hearing? Speak to your child's pediatrician.

For tips on how to protect your child's hearing from the American Academy of Pediatrics, visit healthychildren.org and search "Protect Hearing."

For local resources concerning loud noises:

New York City	To make a complaint about noise coming from the street or sidewalk, call 311 or visit portal.311.nyc.gov and search "noise complaint" to make a complaint about noise coming from the street or sidewalk
New Jersey	While New Jersey does not have a Noise Control Program to investigate complaints, there are options for residents with specific types of noise concerns: visit nj.gov/dep and search "Noise Information and Complaints"

For more information, visit icahn.mssm.edu/research/pehsu/information

PEHSU Pediatric Environmental Health Specialty Unit Region 2: NJ | NY | PR | USVI

ICAHN.MSSM.EDU/PEHSU
PEHSU@MSSM.EDU

Version: October 2021

https://mountsinaiexposomics.org/about/

https://nyscheck.org/pehsurx/

Health effects: climate change

Extreme heat increases risk of illness and dehydration.

Poor air quality due to increased pollutants and pollen worsen asthma and other breathing and heart problems.

Warmer temperatures promote the growth of bacteria, viruses, and insects.

Extreme weather causes injuries, missed work and school, and mental health issues.

Food supply problems cause malnutrition.

Pollinator & biodiversity loss impacts human health through loss of:

- Food
- Medicine
- Building materials and shelter
- Carbon sinks

Icahn School of Medicine at Mount Sinai

Learn More

@SinaiExposomics
@R2PEHSU
@NYSCHECK

Learning Hub

https://mountsinaiexposomics.org/about/

Prescriptions for Prevention

https://nyscheck.org/pehsurx/

Thank you

Icahn School of Medicine at Mount Sinai