Mitigating the Health, Environmental, and Quality of Life Impacts of Gas Leaf Blowers

Scarsdale Conservation Advisory Council
December 2020

Executive Summary

The use and regulation of leaf blowers has been a topic of discussion in Scarsdale for many years due to environmental, health, and quality of life concerns. In 1994, Scarsdale enacted regulations limiting the use of gas-powered leaf blowers to certain months of the year. In the ensuing years, the topic has been revisited to discuss the continued negative impact of gas leaf blower use on residents, the environment, and landscapers who use them for long periods of time. The onset of Covid-19, necessitating many residents to work from home and students to attend school from home, has created a heightened awareness of the negative effects of gas blowers and has caused increased requests from the community to address their use. The Scarsdale Conservation Advisory Council (CAC) has studied this issue and drafted this report with the CAC's findings and recommendations.

The CAC's key findings are:

1. Gas leaf blowers pollute the air, negatively impact landscapers' health, and have excessive noise levels that negatively impact the quality of life for residents, including students attending school remotely, people working from home, and residents trying to enjoy their time at home and in the community.

2. Electric leaf blowers address many of the downsides of gas leaf blowers since they are zero emissions and produce significantly less noise.

3. There are electric leaf blowers currently on the market which are cost-effective and sufficient for personal and professional use throughout the majority of the year. During leaf season (October through December), however, gas leaf blowers are currently the most viable option for professional landscapers.

4. Enforcement of the current gas leaf blower regulation, in effect from June 1 to September 30, and any amendment expanding the regulation, needs to be addressed by the Board to more fully support such regulation.

Given the above key findings, the CAC has developed the following three options to address the concerns and impacts of gas leaf blowers. The CAC strongly recommends Option 1, which will have the most positive impact for our community:

Option 1 - "Quiet days" Saturday - Monday during leaf season and shift to electric leaf blowers for spring: Extend the current gas leaf blower regulation to begin in January (currently the regulation begins in June), and during leaf season limit gas leaf blower use to Tuesday through Friday. Electric leaf blowers would continue to be allowed any day throughout the year.

Option 2 - "Quiet days" Saturday - Monday during leaf season and extend gas leaf blower regulation to include May: Extend the current gas leaf blower regulation to begin in May (currently the regulation begins in June), and during leaf season limit gas leaf blower use to Tuesday through Friday. Electric leaf blowers would continue to be allowed any day throughout the year.

Option 3 - "Quiet days" Saturday and Sunday during leaf season and extend gas leaf blower regulation to include May: Extend the current gas leaf blower regulation to begin in May (currently the regulation begins in June), and during leaf season limit gas leaf blower use to Monday through Friday. Electric leaf blowers would continue to be allowed any day throughout the year.

The CAC also recommends that golf courses, which are currently fully exempted from the regulations, not be allowed to use gas leaf blowers within 100' of a residence.

I. Current Regulations in Place for Gas-Powered Leaf Blowers in Scarsdale

Scarsdale currently prohibits the use of gas leaf blowers from June 1 to September 30.[1] During other times of the year gas leaf blowers are allowed to be used Monday through Friday from 8:00 a.m. to 5:00 p.m., and on Saturdays and Sundays from 10:00 a.m. to 5:00 p.m. Exempted from the regulations are golf courses, municipal properties, and schools.[2] There are also exemptions for storm and emergency-related cleanups.

II. Gas-Powered Leaf Blowers: Noise and Air Pollution

Gas leaf blowers used by landscapers are extremely noisy, pollute the air, and can have negative health impacts, especially when used for long periods of time. Gas leaf blowers used by landscapers have 2-stroke engines[3] which are an inefficient engine design that results in more pollution than other engines, such as those used in cars. In spite of the significant negative impacts of gas leaf blowers, they continue to be in widespread use even though there

[1] https://ecode360.com/6438742

[2] The Village of Scarsdale and Scarsdale Public School District mulch mow leaves on their properties in an effort to limit blower use and employ sustainable landscaping practices.

[3] There are very few 4-stroke gas backpack blowers which exist, and they are rarely used by landscapers because when compared to 2-stroke engines they are less powerful, heavier, and more expensive. 4-stroke gas blowers mainly are used as push blowers, however push blowers are not always useful due to their weight, size and lack of maneuverability.

are viable alternatives. While gas leaf blowers provide a continuous amount of power and range, the CAC does not believe that the significant negative impacts of gas leaf blowers should be ignored when considering their use in our community.

A. Noise Pollution. Gas leaf blowers produce noise levels that negatively affect the quality of life for residents and can have serious health consequences for those using them day in and day out (e.g. hearing loss).

The negative quality of life impacts of gas leaf blowers have been highlighted by the current pandemic, with many residents working and attending school from home. Since the noise from gas leaf blowers carries long distances and can also be heard from the inside of homes, there have been many resident complaints about what feels like a constant engine noise coming into their home. During leaf season, when landscapers often use multiple gas leaf blowers at the same time and for longer periods of time on each property, the noise is even louder and travels farther which increases the number of residents and households impacted.

More than just an annoyance, noise pollution from gas leaf blowers has been shown in studies to increase public health problems such as hearing loss, ability to concentrate due to impaired cognition, increased stress, and immune system suppression.[4] Gas blowers' negative impact on the health of landscapers is also an important factor when considering the benefits of additional regulations.[5]

Given that leaf blowers are a desired tool of landscapers, the CAC sought to answer the question of whether electric leaf blowers are preferable to gas leaf blowers in terms of sound. To this end the CAC sought a sound testing and analysis of comparable gas and electric blowers. Fortunately, a study was conducted in 2018 by Arup, an acoustical consulting firm, which tested comparable and commonly used gas leaf blowers and electric leaf blowers, to answer the question of which has more noise impact and why.[6] The study clearly finds that gas leaf blowers have significantly more noise impact, even when the decibel levels are the same as an electric blower. This is due to characteristics of the deep rumbling noise emitted by gas engines. Such low frequency noise travels farther and can penetrate into homes. This results in noise that cannot be easily mitigated even at lower decibel levels. More details about the study can be found in Appendix A.

B. Air Pollution. Gas leaf blowers also pollute the air as they emit a significant amount of fumes from their gas engines. Gas leaf blowers utilize 2-stroke engines, where 30% of the fuel mixture fails to undergo complete combustion, and as a result, the engine emits harmful pollutants (fumes) directly into the air.[7] The emitted air pollutants from gas leaf blowers

[4] Basner M, Babisch W, Davis A, Brink M, Clark C, et al. (2014) Auditory and non-auditory effects of noise on health. Lancet 383: 1325–1332
[5] https://www.salon.com/2017/10/08/noisy-but-that-is-not-all_partner/
[6] https://www.quietcleanpdx.org/wp-content/uploads/2019/07/ARUP-Leaf-Blower-Noise-Testing.pdf
[7] https://www.tandfonline.com/doi/pdf/10.1080/027868290910224

include carbon monoxide, which contributes to ground-level ozone; nitrous oxides, which contribute to smog formation; and hydrocarbons, which can be carcinogenic.[8] The environmental impact of gas leaf blowers cannot be underestimated—in fact, one study showed that under normal usage conditions, a gas leaf blower two-stroke engine emits nearly 93 times the hydrocarbons of a pickup truck and 300 times the hydrocarbons of a sedan. Using a two-strike gas leaf blower for only half an hour is the equivalent of driving a pickup truck for 3,900 miles.[9] The emissions from gas leaf blowers have also been shown to impact the health of those using the machinery; such health concerns include chronic respiratory conditions, allergies, asthma, dizziness, headaches, heart and lung disease, cancer and dementia.[10]

Those gas leaf blowers currently on the market that offer quieter and cleaner-burning engines are not commercial grade equipment and do not provide the power needed for landscapers. Even these models, with their limited power, still have more noise and pollution impacts compared to commercial grade electric blowers. The only viable options to make a material impact in these areas would be to limit the use of gas leaf blowers and/or switch to electric leaf blowers.

III. Alternative to Gas Leaf Blowers: Electric Leaf Blowers

Electric leaf blowers are a better alternative to gas leaf blowers. In addition to being a viable alternative in terms of air power, electric leaf blowers have several advantages over gas leaf blowers. They are significantly quieter and less disturbing to residents than gas leaf blowers.[11] Moreover, electric leaf blowers are zero emissions at the point of use and emit no harmful fumes around the user and into the environment. They do not need to be filled with gas and oil, and do not require regular maintenance since they do not have an engine. Along with all of these benefits, commercial electric leaf blowers still create sufficient airflow to efficiently handle yardwork most of the year. See Appendix B - electric leaf blower overview - for detail.

The main disadvantage of electric leaf blowers is battery life. Batteries may need to be recharged during the day or multiple batteries may be required. While these issues do not have a major impact most of the year, during leaf season electric leaf blowers are likely to be cost and operationally prohibitive to most landscapers due to the number of batteries that would be needed.

[8] https://sustainability.wustl.edu/rethinking-lawn-equipment/

[9] https://www.edmunds.com/about/press/leaf-blowers-emissions-dirtier-than-high-performance-pick-up-trucks-says-edmunds-insidelinecom.html

[10] https://www.wsj.com/articles/leaf-blowers-are-loud-ugly-and-dangerous-1539903772

[11] As discussed in this report, this is because the sound generated by electric leaf blowers is at a higher frequency, which only travels short distances. Their high frequency also makes it difficult to penetrate windows and therefore get into homes. This is in stark contrast to the noise from gas blowers which is at a low frequency, therefore making the sound both travel far and penetrate into homes.

Due to the difference in usage time, electric leaf blowers need to be looked at in two categories: those that are sufficient for use by a homeowner on a single property and those meant for professional use on multiple properties for a full work day.

A. Electric Leaf Blowers for Professional Use

During non-leaf season, commercial landscapers can successfully use most types of professional grade electric leaf blowers. There are electric leaf blowers which have battery life and air power sufficient to handle landscaping during non-leaf season. Evidence of this is that there are currently landscapers, including those that service Scarsdale, who are successfully using electric leaf blowers during non-leaf season.

During leaf season, however, there are limited electric leaf blower options that can reasonably handle fall leaf season.[12] This limitation is due to the air power as measured in Cubic Feet per Minute (CFM) and battery life. These electric leaf blowers are listed in Appendix B. None of the current electric leaf blowers on the market have CFMs that compare to the CFMs of gas leaf blowers. This alone would not be a barrier because a landscaper could have multiple batteries for a unit and still complete the job. However, for a full workday a landscaper would need to have several batteries per electric leaf blower, which at the current cost per battery, would make the option of using an electric leaf blower during leaf season cost prohibitive.

Due to the added expense and operational constraints which come into play during leaf season, the CAC recommendation at this time is to continue to allow gas blowers during leaf season. To address quality of life concerns, however, the CAC recommends that their usage be limited to Tuesday through Friday in order to create "quiet days" in our community on Saturday through Monday. Currently, due to the many different landscaping companies in operation in Scarsdale, there are often landscapers using blowers in an area at most times of the day during leaf season. Consolidating use to Tuesday through Friday would give residents the benefit of having 3 days per week when they do not have to listen to gas leaf blowers. Electric leaf blowers would continue to be allowed Saturday through Monday (and throughout the entire week) since they are quieter. This allowance would also incentivize landscapers to shift towards electric leaf blowers when feasible.

As electric blowers are currently sufficient for use during non-leaf season, the CAC recommends that the gas blower regulation be extended to begin on January 1 (currently it starts on June 1), thereby giving residents a respite from the noise during the non-leaf season when gas leaf blowers are not necessary.

The CAC also recommends that the use of gas blowers on golf courses, which are currently fully exempted from the regulation, not be allowed within 100' of a residence.

[12] Note: There currently is no electric push blower available on the market.

B. Electric Leaf Blowers for Homeowner Use

There are two types of electric leaf blowers that can be used by a homeowner for home use--corded and cordless. Either type of blower can be utilized by a homeowner for use on a single property; however, the cordless blowers are more convenient in terms of mobility. Within the cordless category there are several models that a homeowner can easily obtain locally and operate easily. These models generally run in the $200-$300 range (including the battery and charger). Electric blowers are often preferred by homeowners as they are quieter and lighter weight than gas blowers, do not need to be filled with oil and gas, do not require maintenance, and are zero emissions. The batteries available for cordless leaf blowers are sufficient for use on most single properties.

For homeowners who work during the week, electric leaf blowers can be used throughout the year including on weekends. This allows residents who manage their own properties to comply with any expansion of the current Village regulation that may be put into place.

IV. Enforcement

Enforcement of Scarsdale's current leaf blower regulation is handled through the Scarsdale Police Department. Police may ticket those using gas leaf blowers during prohibited times. Police either see the gas leaf blower usage during their patrols or are notified by a resident.

The current enforcement situation can be improved. First, it is not ideal to ask residents to call the police on their neighbors, and many will understandably not want to do this – even if they do want the blowing to stop. Second, when the police officer arrives at the scene the blowing may have already ended or the landscapers may have simply turned off their machines. Third, this is not a good use of police time and resources.

Given these issues with enforcement, the CAC concludes and recommends:

1. It is more important than ever to shift to electric leaf blowers. By expanding the current regulations, the Village will further encourage landscapers to switch to electric blowers. Such a shift will lessen enforcement issues as Scarsdale allows electric blowers.

2. Ticketing of those that break the current gas leaf blower regulation needs to be tracked so that fines are increased with subsequent violations. Currently, for landscapers, the fines seem to be viewed as a cost of doing business. If fines are increased for repeated offenses, compliance with the regulations will hopefully improve. In addition, first violations should receive only a warning in order to support education and awareness of the regulations.

3. Landscapers using gas leaf blowers should be required to wear protective noise reduction devices (e.g. ear plugs and ear muffs worn together[13]). Landscaping companies should be required to provide such devices to employees at no expense to the employees.

Improvements in enforcement would support the health, environmental and quality of life benefits of our regulation as well as uphold the regulation's intent.

Recommendations

Based on the findings stated in this report, the CAC recommends that the Board of Trustees adopt one of the following three changes to the current leaf blower law, with the CAC strongly recommending the adoption of Option 1:

Option 1 - "Quiet days" Saturday - Monday during leaf season and shift to electric leaf blowers for spring: Extend the current gas leaf blower regulation to begin in January (currently the regulation begins in June), and during leaf season limit gas leaf blower use to Tuesday through Friday. Electric leaf blowers would continue to be allowed any day throughout the year.

Option 2 - "Quiet days" Saturday - Monday during leaf season and extend gas leaf blower regulation to include May: Extend the current gas leaf blower regulation to begin in May (currently the regulation begins in June), and during leaf season limit gas leaf blower use to Tuesday through Friday. Electric leaf blowers would continue to be allowed any day throughout the year.

Option 3 - "Quiet days" Saturday and Sunday during leaf season and extend gas leaf blower regulation to include May: Extend the current gas leaf blower regulation to begin in May (currently the regulation begins in June), and during leaf season limit gas leaf blower use to Monday through Friday. Electric leaf blowers would continue to be allowed any day throughout the year.

The CAC believes that the future of leaf blowing lies with electric blowers. The noise, environmental, and health benefits are both compelling and significant. The current Covid-19 pandemic, causing residents to work and attend school from home, has further highlighted the negative effects of gas blowers and the need to take action in the near-term to help the community. The recommendations in this report would bring a marked improvement to the quality of life of our community, the environment, and landscaper and resident health. The CAC finds that the current cost and effectiveness of electric blowers makes them viable for year-round use except for fall leaf season. The CAC's Option 1 recommendation would allow electric blower use throughout the year and limit gas blower use to the fall leaf season. This

[13] See https://www.acadiainsurance.com/hearing-protection-proper-use-noise-reduction-devices/ regarding the need for utilizing both ear plugs and ear muffs to effectively reduce the decibel level of typical gas leaf blowers.

proposal would create “quiet days”, which would give an important quality of life benefit to residents. Any expansion of the leaf blower regulation would also positively support the landscaping industry shift to electric blowers – a shift that is urgently needed. Based on its findings, the CAC urges the Board to enact Option 1 so as to maximally strengthen Scarsdale’s current gas leaf blower regulations.

Sincerely,

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Appendix A: Noise Pollution Studies

The CAC looked at the leaf blower noise study of Arup, an acoustics consulting firm, dated July 16, 2018.[14] The study found that gas leaf blowers are significantly louder than electric leaf blowers - even when compared to electric blowers which have the same decibel level and air flow.

Following are the key findings from the study:

- The sound characteristics of gas leaf blowers have a significantly greater low frequency sound component in comparison to electric leaf blowers.
- The low frequency sound energy of gas leaf blowers transmits more readily over longer distances making them more audible and of greater sound impact.
- The low frequency sound energy of gas leaf blowers transmits more easily through home windows and glass doors and sound louder indoors than electric leaf blowers.

The following is a summary of the Arup study answer to the question of why gas leaf blowers have a greater noise impact compared to electric leaf blowers and what makes the noise impact so significant.

Leaf blowers are often rated based on their airflow rate in cubic feet per minute (CFM), which is the amount of air being pushed or blown per minute. Leaf blowers also have decibel levels representing the level of sound that they emit. The grouping of leaf blowers used in the Arup study aimed to capture commercial leaf blowers used in the industry, with a specific focus on commercially used gas and electric blowers with similar CFMs and decibel levels.

From the measured data in the study, it was observed that the gas leaf blowers all exhibited a significant amount of sound energy in the low frequency bands at all distances. For electric leaf blowers, the sound energy that was observed was mainly in the high frequency range of sound energy.

The conclusions regarding the effect of the low frequency band of gas blowers versus the high frequency band of electric blowers were twofold.

First, it was concluded that gas leaf blowers have a greater audibility over larger distances. All of the gas leaf blowers tested were either clearly audible or audible at an 800' distance, while all of the electric leaf blowers were not distinguishable above the ambient community sound levels at that distance. The conclusion drawn from this test is that the character of the sound from gas leaf blowers travels over greater distances and is more audible than with electric leaf blowers.

[14] https://www.quietcleanpdx.org/wp-content/uploads/2019/07/ARUP-Leaf-Blower-Noise-Testing.pdf

Second, it was concluded that audibility within houses is greater with gas leaf blowers due to their low frequency sound. Low frequency noise requires heavy construction or materials to stop the sound from transmitting. This is very clear when it comes to windows and glass doors in houses, where any low frequency sound transmits easily through windows. With gas leaf blowers, the low frequency components of the their sound are what is most easily transmitted, and was shown by Arup to transmit into houses very easily. In addition, their testing showed that the sound levels of gas leaf blowers as measured inside the house, were significantly above those of the electric leaf blowers.

The CAC also looked at a separate University of Maryland study to learn about the effect of decibel (dB) level increases. This study found that actual sound levels increase exponentially with each dB of increase.[15] Thus, an increase of 10 dBs is perceived to be twice as loud. An increase of 20dBs is four times as loud. And an increase of 40dBs is perceived to be sixteen times as loud. This study is useful in interpreting the dB information in Appendix B, as the chart shows some gas leaf blowers which come close to the dBs of electric leaf blowers. This study explains why a 5 or 10 dB increase is, in fact, exponentially louder than a 1:1 increase as it would seem in a face value dB comparison.

[15] https://trace.umd.edu/docs/2004-About-dB

Appendix B: Commonly Used Gas Leaf Blower and Electric Leaf Blower - Listing and Details

(see attached spreadsheet)

Brand	Category	Model	Type	Motor	MAX CFM in pipe	MAX AIR VEL in mph*
GAS POWERED BLOWERS:						
Echo	Professional Backpack	PB8010H	Gas	2 stroke	1071	211
Stihl	Professional - Backpack	BR-800X	Gas	2 stroke	912	239
Husqvarna	Professional - Backpack	580BTS	Gas	2-stroke	908	206
Echo	Homeowner - Backpack	PB-265LN	Gas	2 stroke	375	158
BATTERY POWERED BLOWERS:						
Husqvarna	Professional - Backpack	550iBTX	Battery/cordless	brushless	452	120
Greenworks	Professional - Backpack	GBB 700	Battery/cordless	brushless	690	160
Ego Power	Pro / Homeowner - Backpack	LB6003	Battery/cordless	brushless	600	145
Ryobi	Homeowner - Backpack	RY40440	Battery/cordless	brushless	625	145
Ryobi	Homeowner - Handheld	RY40470VNM	Battery/cordless	brushless	550	125
CORDED ELECTRIC BLOWERS:						
Ryobi	Homeowner Handheld	RY421021	Corded	brushless	440	135

MSRP	Rated dB(A)	Run Time per Battery
$600	80	NA
$599	78	NA
$550	112	NA
$329	65	NA
$449 + Battery	73	60 min High for 950x / 30 Min high for 550x
$329 + Battery	70	33 min High w/ single battery 65 min w/ 2 batteries
$399	70	22 min High
$239	59	~20 - 30min High
$199	59	~20 - 30min High
$40	65	NA

Notes

$599 on Leafblowers Direct #2 on LBD in Commercial Gas Backpacks
$569 at Ace Hardware
$569 on Leaf Blowers Direct and Rated #1
$329 on Leafblowers direct

2 battery options: 1) BLi950X, 31Ah, $918 Battery Pack 2) BLi550X, 15Ah, $573
$299 / Battery. Blower can accept 2 batteries simultaneously, run time 65min w/ 2 batteries
Includes 1 battery and Charger, extra battery is $159 @ Home Depot
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Corded no battery required