Report in Support of the Leaf Blower Regulation Amendment Act of 2017, Bill 22-234
DC Council of the Whole
Jamie Banks, PhD, MS, Executive Director, Quiet Communities, Inc.

This report elaborates on my oral testimony on July 2, 2018 at the Committee of the Whole hearing. In it, I will review the problem of gas leaf blowers (GLB), the impact of noise on health and well-being, the impact of GLB vs battery leaf blower (BLB) noise on communities, and the viability of commercial BLB technology.

I am the Founder and Executive Director of Quiet Communities, Inc., an independent non-profit organization. Our mission is transition landscape maintenance to low noise, zero emissions alternatives to protect workers, children, the public, and the environment. We conduct research, educate, and work with businesses, communities, and government agencies on positive alternative solutions.

Before focusing on environmental issues, I worked with consultancies and legal organizations in health outcomes, economics, and policy employing scientific, evidence-based approaches. In my work with Quiet Communities, I co-authored a study on national emissions from lawn and garden equipment, conducted in collaboration with the US Environmental Protection Agency as well as peer-reviewed publications relating to noise and emissions from gas-powered lawn and garden equipment that have been presented at scientific conferences including those of the Institute of Noise Control Engineering and Children's Environmental Health Network. My master's degrees are from MIT and Dartmouth Medical School, and my PhD is from the University of Kent in the UK.

Executive Summary

Commercial grade gas-powered leaf blowers emit noise orders of magnitude higher than levels deemed safe. In addition to the loudness, GLB noise is able to travel over long distances and penetrate through windows because of a strong low frequency component that differentiates it from BLB noise. This low frequency component was found in the recent acoustic study conducted by Arup, Inc. and confirms the findings of two previous studies of GLB noise. ***Because of this low frequency component, GLB noise affects many times more homes within a neighborhood compared with a BLB of the same noise rating.***

GLB noise can damage not only hearing but causes or contributes to heart disease, psychological problems, sleep disturbance, cognitive and learning problems, and endocrine abnormalities. Low frequency noise is especially harmful. Children, seniors, people with certain chronic conditions, and workers who operate the equipment are at greatest risk.

Approximately 170 municipalities have enacted regulations on GLB.

BLB are low noise and zero-emissions. Today, they are practical and cost-effective to use for commercial scale work. Approximately 140 landscape companies in the US offer maintenance with electric and manual tools. Municipalities, campuses, and even golf courses are making the transition. However, without legislation, this transition could take decades to evolve across the country. Legislation can greatly accelerate this trend and improve health, environment, and quality of life for workers and citizens.

In enacting legislation, DC would be joining the many other municipalities that have expressed their commitment to improving the health, environment, and quality of life for workers and citizens.

Overview

Today, gas-powered equipment is available for all tasks once done manually on lawn and gardens. In combination with dramatic growth of the landscape maintenance industry, valued around $74 billion currently (First Research, 2018), gas-powered equipment is pervasive in communities across the country.

The GLB is perhaps the most egregious, causing much citizen distress and prompting 170 communities to enact legislation to ban or restrict the use of this one particular tool; recent examples include Palm Beach, FL; Palm Springs,

CA; Sonoma, CA; Maplewood, NJ; Newton, MA; Beaconsfield and Westmount in Quebec, Canada.

While GLB emit all manner of unhealthy pollutants, this report focuses on the noise they emit. The information presented in this statement is evidence-based and fully referenced, drawing on the scientific literature as well as on the recent acoustic study from Arup USA, Inc.("Arup") comparing the characteristics of GLB and BLB noise.

Environmental Noise and its Effects on Health

Noise emitted from GLB is part of the cumulative environmental noise in which we all live. Today, large numbers of people are involuntarily exposed to levels that are harmful to both hearing health and general health. Increasing concerns about environmental noise levels have earned it the label, "The New Secondhand Smoke" (*Washington Post*, May 12, 2018).

Health organizations are increasingly concerned with environmental noise and its potential health effects, as listed below. These organizations have explicitly called out GLBs as a source of harmful environmental noise. A couple of examples are provided in **Appendix A**.

Concerned with GLB Noise

- American Speech-Language-Hearing Association
- Children's Environmental Health Center
- Children's Environmental Health Network
- State Medical Societies
  - New York
  - Massachusetts
- National Institutes of Health
  - NIDCD
  - NICHD
- The National Academy of Engineering/Sciences
- US CDC
- US EPA
- World Health Organization

CDC: Centers for Disease Control; EPA: Environmental Protection Agency; NICHD: National Institute of Child Health and Human Development; NIDCD: National Institute for Deafness and other Communication Disorders

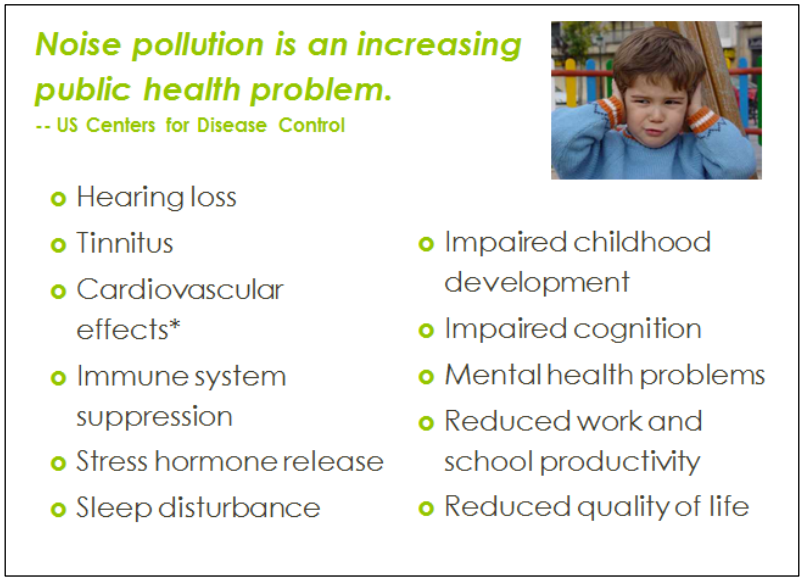
The statement below is excerpted from a report of the Massachusetts Medical Society's Committee on Environment and Occupational Health (CEOR) in support of its resolution on GLB enacted in 2017.

Excerpt from Massachusetts Medical Society: Committee Report in Support of Its GLB Resolution

The noise pollution generated by GLBs constitutes a health hazard for both machine operators and bystanders. The World Health Organization recommends an outdoor noise level less than 55 decibels (dB); the risk of hearing damage is increased at noise levels above 75 dB. GLBs produce noise levels of 70–75 decibels at 50 feet and can reach up to 100 decibels at the operator's ear.4 Furthermore, the Occupational Safety and Health Administration requires machine operators to utilize hearing protection for noise above 85 dB, but many operators wearing hearing protection are not adequately protected due to improper fit or because they do not wear protection continuously. Excessive noise pollution leads to impaired quality of life. According to the Environmental Protection Agency (EPA), "noise degrades quality of life by impairing communication and social interaction, reducing the accuracy of work, particularly complex tasks, and creating stressful levels of frustration and aggravation that last even when the noise has ceased."

Source: Massachusetts Medical Society. CEOH Report A-17 A-3.

However, noise not only has consequences for hearing, but also for non-hearing health. Extensive evidence from the medical and scientific communities show that exposure to loud and/or persistent noise causes or contribute to disorders ranging from heart disease and hypertension, to sleep disturbance, to psychological, cognitive, and learning issues, as well as annoyance (Basner, 2014; Munzel 2018).



An excerpt from a recent article on the cardiovascular effects of noise is below (Munzel, 2018).

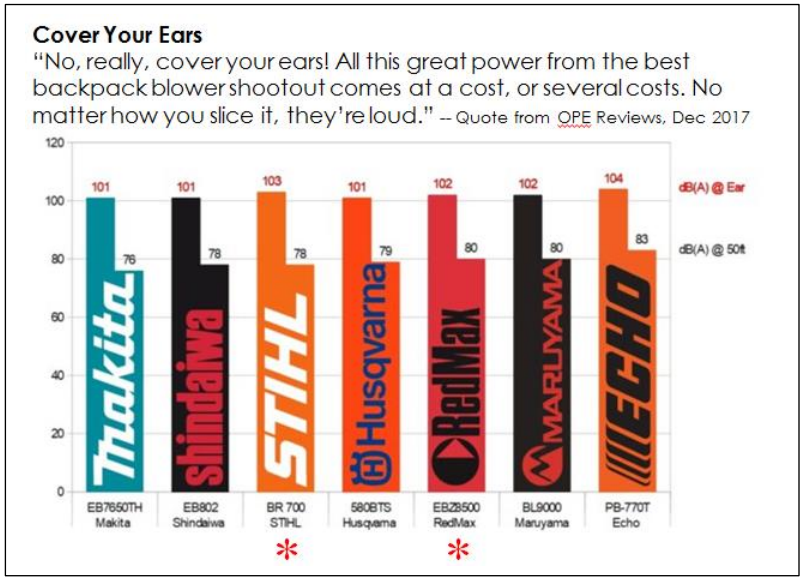
The Most Vulnerable

The effects of excessive noise are particularly acute for children, seniors, people with hearing disorders and neurological conditions like autism and sensory deficit disorders – and those who are arguably among the most exposed – approximately ***1.6 million landscape workers***, over half of whom are Hispanic and Latino (Campbell, 2016; Pew Research, 2016; US Bureau of Labor Statistics, 2016).

Gas Leaf Blower Noise

Grounds maintenance workers are exposed regularly to high levels of noise from GLB and other gas equipment, placing them at risk for hearing, heart disease, and other health problems (Balanay, 2016; PLANET, 2012; WorkSafeBC). The hearing conservation program of the National Association of Landscaping Professionals (formerly known as PLANET) states that most of their equipment exceeds the Occupational Safety and Health Administration's safe standard of 85 decibels – some ***more than 1000 times*** as shown below.

In a December 2017 article in the trade publication, *OPE Reviews*, sound from popular models of commercial gas leaf blowers may exceed 100 dB at the operator's ear and up to 83 dB at 50 feet. (Two of those GLB indicated by a red asterisk [*] are among the GLB tested in the Arup acoustic study).



Low Frequency Sound from GLB

The acoustics study carried out by engineers from Arup, Inc., comparing leading GLB and BLB models, identified low frequency sound as the factor responsible for carrying GLB sound over long distances and through windows, and distinguishing it from BLB sound. Other studies have found these same results in GLB (Pasanen, 2004; Walker, 2017); it is a characteristic shared with other internal combustion engines (Committee on Technology, 2010; I-INCE, 2015).

What this means is that even when rated at the same decibel level at 50 feet, the sound from a GLB carries further and penetrates windows to a greater extent than the sound from BLB and has a substantially greater impact on communities. See section on Community Impact of GLB, below.

Low frequency noise is of special concern to health, as stated below in the WHO Guidelines on Community Noise from the World Health Organization (Berglund, 1999). Evidence from animal studies show that low frequency sound substantially damages body tissues, including fibrosis and thickening of cardiovascular vessels, relating to cardiac and digestive disorders. (Fonseca, 2012; Artunes 2013)

From World Health Organization Guidelines on Community Noise

If the noise includes a large proportion of low-frequency components, values even lower than the guideline values will be needed, because low-frequency components in noise may increase the adverse effects considerably.

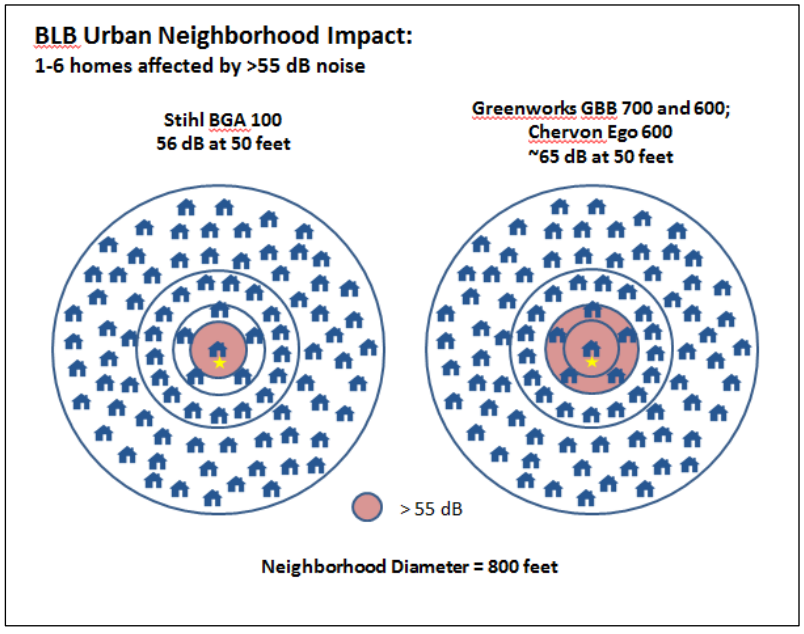
Berglund B, Lindvall T, Schwela DH (Eds). Guidelines for Community Noise. Geneva, Switzerland: World Health Organization, 1999.

Community Impact of GLB

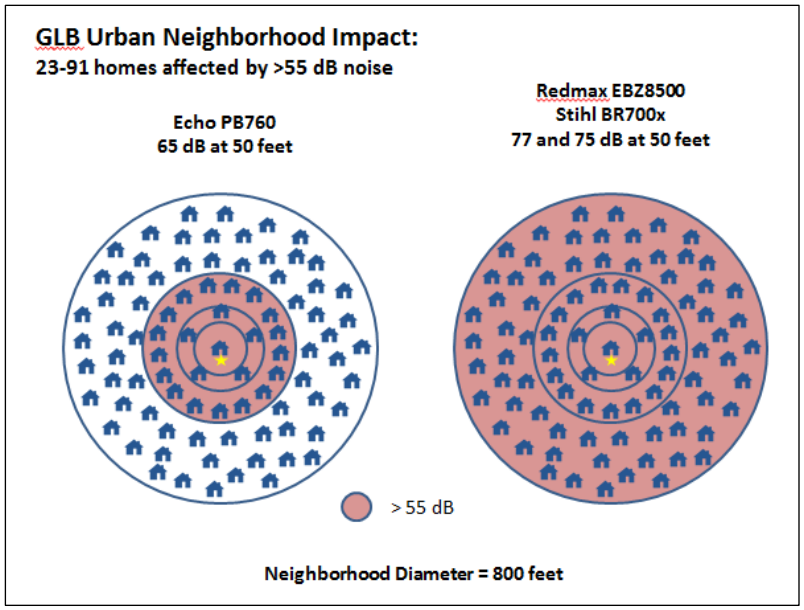
To examine the community impact of gas and battery blower noise, we considered a hypothetical urban neighborhood with 1/8 acre zoning (~5,500 square feet), focusing on an 800 feet diameter circle around the residential lot where a GLB was being used. With this configuration, the circle would encompass ninety-one homes.

The noise levels for the seven blowers at 50, 100, 200, 400 and 800 feet measured in the Arup acoustic study (4 BLB, 3 GLB), were applied to calculate the number of homes impacted by noise over 55 decibels from each of these blowers operating at the center of the circle. Fifty-five (55) decibels was chosen because it is designated as harmful to health by organizations, including the World Health Organization and US EPA (Berglund, 1999; Information on Levels, 1974).

Here are the results.



The BLB affects between 1 and 6 homes.



The quietest GLB affects 23 homes.

The more powerful GLB affect all 91 homes.

In everyday terms, this means that unhealthy noise from a single gas blower can intrude into an area encompassing more than 90 homes, and presumably any outdoor playgrounds, parks, and schools in the neighborhood. This situation is exacerbated when more than one GLB is used on a property and/or when several properties in the neighborhood are being maintained.

Note that the GLB rated at 65 decibels according to the ANSI standard used by the industry has a much wider impact on the neighborhood than the BLB rated at 65 decibels by the same industry standard. The industry claim that they have produced GLB that are just as quiet as BLB is simply not true. In fact, the National Academy of Engineering/National Academy of Sciences (Committee on Technology, 2010) and International Institute of Noise Control Engineering (I-INCE, 2015) have stated that the decibel metric used to rate machinery with strong low frequency components does not sufficiently represent their impact.

Battery-Powered Blowers Offer a Practical Alternative to GLB

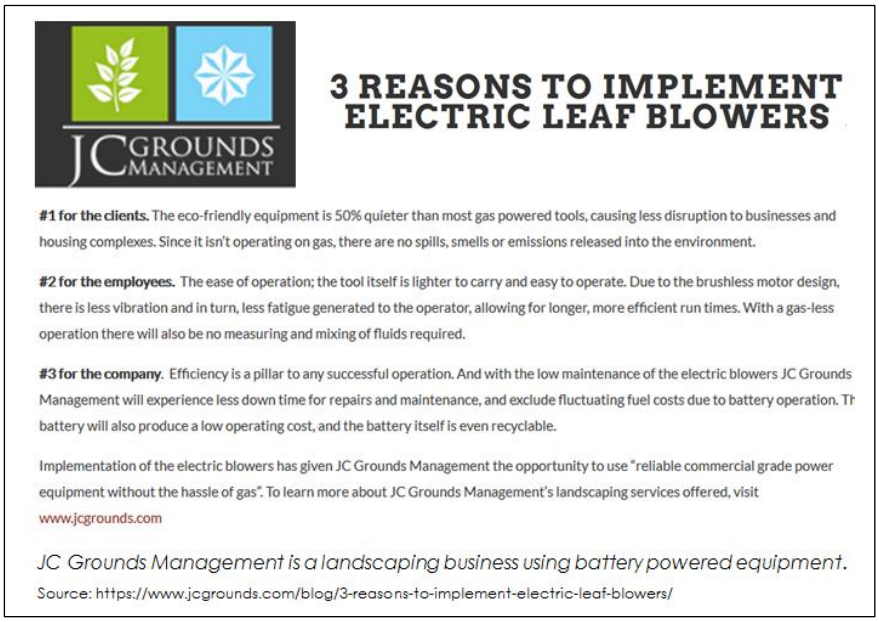
BLB are much quieter and have zero emissions. They offer a practical and cost-effective alternative to GLB. Industry associations recognize the emergence of battery-powered tools as viable alternatives.

- The National Association of Landscape Professionals named battery powered equipment among its top trends for 2018 stating that:
  - ***"Many lawn mowers, leaf blowers and similar equipment feature low or no emissions, are battery-powered, and are quieter."***
- The Outdoor Power Equipment Institute, the industry organization that testified on July 2nd, has a committee and is developing standards for battery electric equipment.

Nationwide, businesses, municipalities, and schools are making the switch.

- Big-campus universities including Harvard, Yale, Florida State, NC State, Cal State, and U TX Austin are making the transition to BLB and other battery powered equipment.
- In 2016, South Pasadena, CA became the first city in the nation to maintain all municipal lands and its golf course, year round with battery-powered equipment. The Town of Southampton, NY is doing the same as are other towns in the Eastern US.
- More than **140 companies** in the US now operate with battery-powered equipment and manual tools at competitive prices. Two of those companies testified at the July 2nd hearing.

Below is a blog piece from another company in Massachusetts, JC Grounds (Danvers, MA). Statements from 3 other companies using only battery-powered and manual tools are included in **Appendix B**.



JC GROUNDS MANAGEMENT

3 REASONS TO IMPLEMENT ELECTRIC LEAF BLOWERS

#1 for the clients. The eco-friendly equipment is 50% quieter than most gas powered tools, causing less disruption to businesses and housing complexes. Since it isn't operating on gas, there are no spills, smells or emissions released into the environment.

#2 for the employees. The ease of operation; the tool itself is lighter to carry and easy to operate. Due to the brushless motor design, there is less vibration and in turn, less fatigue generated to the operator, allowing for longer, more efficient run times. With a gas-less operation there will also be no measuring and mixing of fluids required.

#3 for the company. Efficiency is a pillar to any successful operation. And with the low maintenance of the electric blowers JC Grounds Management will experience less down time for repairs and maintenance, and exclude fluctuating fuel costs due to battery operation. Th battery will also produce a low operating cost, and the battery itself is even recyclable.

Implementation of the electric blowers has given JC Grounds Management the opportunity to use "reliable commercial grade power equipment without the hassle of gas". To learn more about JC Grounds Management's landscaping services offered, visit www.jcgrounds.com

JC Grounds Management is a landscaping business using battery powered equipment.

Source: https://www.jcgrounds.com/blog/3-reasons-to-implement-electric-leaf-blowers/

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Appendix A.
Examples of Statements by Leading Health Organizations on Gas Leaf Blowers

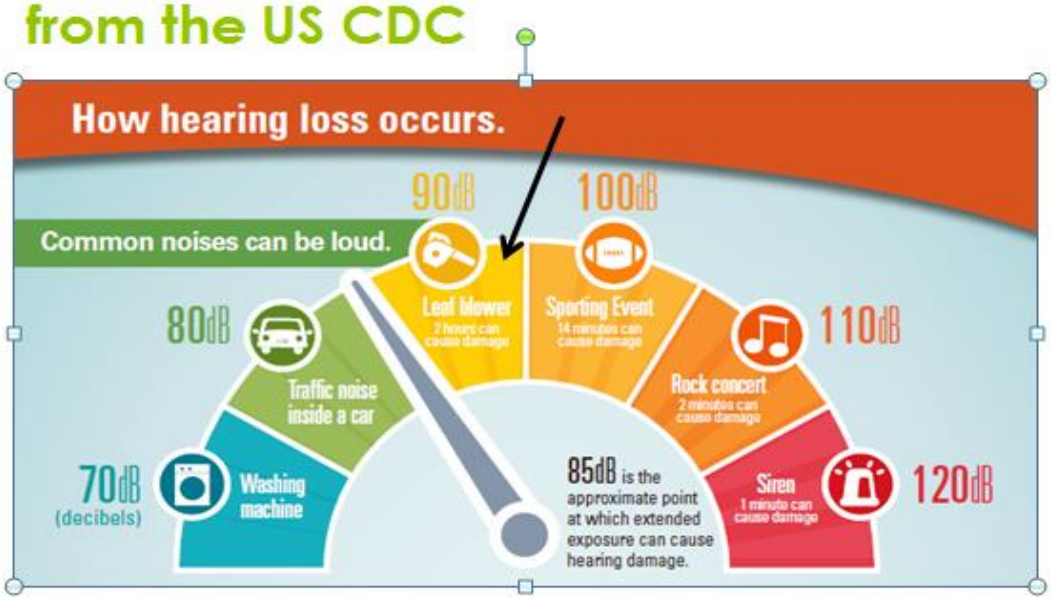
Statement from Children's Environment Health Center, Mount Sinai Hospital, New York, NY

Internal combustion power tools and leaf blowers ("equipment") pose multiple hazards to human health.

Noise is a second hazard associated with much of this equipment. Manufacturer estimates of noise levels from leaf blowers for bystanders 50 feet away are about 70 dB and, of course, the noise is louder if residents are closer. The World Health Organization recommends general daytime outdoor noise levels of 55 dB or less. Noise may affect quality of life by impairing communication, reducing accuracy of complex tasks, and increasing stress. The intense, high frequency noise that leaf blowers generate can cause loss of hearing in the workers who operate these machines and can also affect hearing in children and other persons. **The ears of infants and young children are especially vulnerable to the high intensity noise that leaf blowers produce** because their auditory systems are undergoing rapid growth and development, and these developmental processes are easily disrupted.

Excerpt from letter to the Town of Eastchester, NY in support of leaf blower regulation, April 22, 2010.

Common Sources of Harmful Noise from the US CDC



Source: US Centers for Disease Control and Prevention. *Too Loud, Too Long*, February 7, 2017

Appendix B.
Statements from Businesses Offering Battery-Powered Electric Landscaping Services

1. Dan Delventhal, Owner, MowGreen LLC, Fairfield, CT 06824

My name is Dan Delvental. I am the owner of MowGreen, a full service landscaping company. We perform landscape maintenance work using only battery powered and manual tools – no gas tools. The battery powered tools include battery powered mowers, blowers, trimmers, hedgers, chain saws, sprayers, pruners, aerators and even snow blowers. The manual tools include reel mowers, hand hedgers, aeration forks, loppers, axes, picks, etc.

We only used a gas-powered tool once – a rolling gas-powered lot sweeper, but we sold it to a home owner. We use battery powered equipment because it is cleaner and quieter. We use this equipment on properties ranging from ⅕ acre to 12 acres in size.

The battery-powered blowers have been adequate for moving leaves and other surface debris effectively, efficiently, and cost-effectively. Our clients are satisfied and like the quiet and zero emissions. Our employees like them because they are quieter, easier to maintain and use, and produce no fumes. The electric battery powered blowers have paid off. They are inexpensive (only $150 for effective units), and the batteries they need function across all of our gear. The investment has also paid off in terms of customer satisfaction and retention, and growth; more and more people want the quiet and zero emission "conscious cleanups". Mulch mowing with battery powered mowers has improved blowing efficiency and fed lawns, so those who want better environment and healthier soil love the combination.

We are one of very few companies structured to do all our work with electric power and we are getting more and more government attention, press and public awareness. Recently, Bedford NY passed an ordinance to outlaw using gas blowers while still allowing electric. We had some influence on that ordinance.

Our prices are competitive, but a little higher than market because of the extra up-front investment in newer more powerful electric gear and batteries. Most people seem to be okay with a 5 to 10% premium. We typically charge a 5%-10% premium for those living near our headquarters. There are others within 30 miles who value our service and cooperate and form groups to purchase our services. When we travel 15 to 30 miles to other neighborhoods there is still a huge environmental gain (travel up to 60 miles to avoid the emissions equivalent of 3000 auto miles). In those cases we may charge as much as a 15% premium.

The competition often lowers prices for mowing services because it is a crowded market and they are afraid of losing to eco-options. Some competitors are getting wind of the green movement and investing in electric beginning with blowers and trimmers. Equipment suppliers are making more electric options than ever before and prices have come down a bit. Clients seem to be more aware of the pollution and noise from gas equipment as well as of other sound lawn care management practices, like organic treatments and mulch mowing and composting on site.

Landscaping companies dedicated to electric should be rewarded and helped to grow and continue providing clean, quiet services. This would help them attain the scale needed to increase their efficiency and profitability.

2. Adam Hawley, Manager , Pumpkin Brook Organic Gardening, Shirley, Ma

My name is Adam Hawley. I work as a manager with Pumpkin Brook Organic Gardening in Massachusetts. We do not use gas-powered equipment for maintenance work, but rather battery-powered and manual tools. I used gas-powered blowers for many years (20+ years) in my professional work and am happy to have switched to battery powered blowers.

We perform maintenance work for properties ranging in size from 1/16 acre to 10+ acres. For all our properties, the battery blowers have been effective in moving the leaves and other surface debris. We supplement this with manual tools. For instance, in heavy leaf season, we pick up wet, heavy leaves with scoops and then blow the drier material into a pile that can be removed with tarps.

The performance of the equipment has been excellent and our workers and clients are very pleased. Our customers especially appreciate the low noise associated with the battery powered blowers. Our workers appreciate everything the blowers have to offer, (reduced weight, size, noise, work) no fuel mixing and filling.

Electric equipment has improved greatly over time. The battery blowers available today have much more strength and battery life. The market trend has been very positive. More and more companies are offering electric options and want to invest in future products with even greater improvements in battery strength and life.

For our company, working with battery powered blowers and equipment has been beneficial. There are many points of savings, as well as benefits in time, equipment, labor, health, environment, and pollution.

3. George P Carrette, Founder and owner of Ecoquiet Lawn Care LLC, Concord, Massachusetts

EcoQuiet Lawn Care uses electric equipment for landscape maintenance work. We maintain mainly smaller residential properties. The smallest yard is 7000 square feet and the largest is around 2.5 acres.

All of the maintenance activity is performed using only electric and manual tools. The only place where we use gasoline or diesel equipment is in new installations of landscapes, masonry, and large tree removal jobs that require a wood chipper. We have never used gasoline powered blowers.

Being an all-electric landscaping company is a key marketing advantage and a huge reason we are able to grow our business. Low noise is an important factor in gaining clients apart from environmental mindedness. It doesn't matter what street you live on. No one likes to listen to gas machines. The only reason they do is because only a small number of landscape companies are currently providing alternative services.

Yes, I have posted fair profits on the lawns that I operate on. The main issue was fall cleanings in New England. With leaf plowing and proper tarp use I am able to charge $40 to $60 dollars per hour depending on conditions.

Landscaping work is a hard. However we have never gotten a complaint about the noise of our machines. Some workers are not particularly fond of weed whacking because of the weight of the battery backpack however using smaller batteries solves this problem.

My company has been profitable every year of operation, even while we were aggressively purchasing equipment. Because we are known for being all electric, we don't spend money on marketing and have more customers then we can handle. The people love my business and actively try to find us more customers.

We have been able to raise our prices because our services are in demand. We started off charging $35 an hour which is very cheap. Because our services are quieter and less polluting we are able to charge around 10% more than the competition.

Apart from leaf blowers and weed whackers, electric hedge trimmers are becoming common place. These are far better than gasoline trimmers. They perform just as well and have a longer operation time per battery compared to gasoline, and create almost no noise. We are also starting to see more electric riding mowers on the market. With more competition, we hope equipment prices will come down further.