

FAQ Health Hazards of Gas Leaf Blowers

Introduction: The health hazards associated with gas leaf blowers (GLBs) have been recognized for more than 20 years: for instance, in reports from the California Air Resources Board (2000) and from two grand juries ([Orange County](#) [1999] and San Luis Obispo [2010]). More recently, additional peer reviewed scientific studies, special reports, and government data continue to focus on health issues related to GLBs (as well as other gas lawn and garden equipment).

These studies have been used by boards of various communities (e.g., Cambridge, MA; Newton, MA; Maplewood, NJ; Washington, DC; Village of Chevy Chase, MD) to support enactment of local ordinances and by state medical societies in New York and Massachusetts to publicize the health risks. The findings of studies have been viewed by hundreds of physicians and scientists.

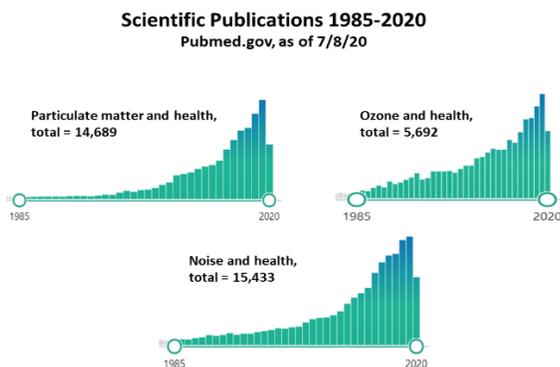
It is noteworthy that while the landscape industry may push back on regulation, it has never successfully pushed back on the science. We actually witnessed this firsthand at the Washington DC City Council meeting in 2018, where we gave [testimony](#) (J Banks, D Fink, C Pollock). In fact, our testimony on GLB noise and its health impacts was uncontested by representatives of the Outdoor Power Equipment Association and the National Association of Landcare Professionals.

With that introduction, here are responses to commonly asked questions.

1. What would you identify as the 3 strongest sources of scientific evidence of the health impacts of GLBs? (specific studies, journal articles, etc.)

A. Emissions

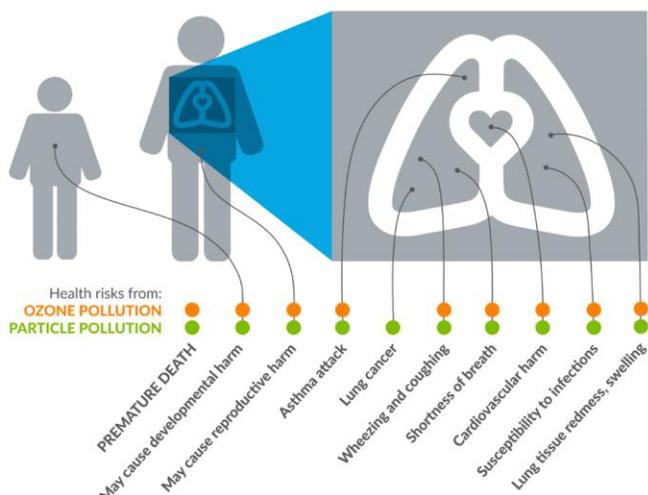
GLBs produce high levels of ozone-forming exhaust (including volatile organic compounds [VOCs]), particulate exhaust, and noise, as discussed in the subsections below. The scientific literature on the health hazards of the combustion products and noise is **vast**, representing decades of research and literally tens of thousands of studies (see exhibit below). Searches of the National Library of Medicine using key words “particulate matter” and “ozone,” each in combination with the word, “health,” yields more than 20,000 scientific articles published between 1985 and 2020, with dramatic growth in recent years due to increasing concerns with these forms of pollution.



The following is a list of key findings and summaries with respect to those types of emissions.

- The US EPA has put together extensive syntheses (integrated science assessments) of studies on [particulate matter](#) (1,967 pages) and [ozone](#) (1,468 pages) with much of the content devoted to adverse health effects.
- The VOCs -- benzene, formaldehyde, and 1,3 butadiene -- produced by GLBs and other lawn and garden equipment, are among the [leading carcinogenic air pollutants](#). The US Department of Health and Human Services specifically warns the public against exposure to [benzene](#).
- The American Lung Association warns against the health hazards of [particulate](#) and [ozone](#) pollution from gasoline combustion and provides the following graphic on its [State of Air website](#).

Air pollution remains a major danger to the health of children and adults.



- The American Heart Association and American Stroke Association’s flyer, [Danger in the Air](#), describes the hazards of ozone and particulate pollution to cardiac and cerebrovascular health. For example:

Short-Term PM Exposure			
Cause of Death	% of Total Deaths	Cause-specific ↑ per 10 µg/m ³ ↑ in PM _{2.5}	Approximate % of excess deaths due to PM exposure
All cause	100%	1.0%	100%
Respiratory	8%	0.5-1.5%	12%
Cardiovascular	45%	0.5-1.5%	68%

Long-term Exposures: CV-mortality RR ↑ by 10-76%

Source: C. Arden Pope III, as quoted by Robert D. Brook, *Air pollution and cardiovascular disease*. Available at http://www.epa.gov/agingepa/pdfs/press/AHA_PMtalk_Brook_12_11.pdf

- The World Health Association’s [International Agency for Research in Cancer](#) designates outdoor air pollution in general and PM in particular as **human carcinogens**.

In addition, scientific reviews and meta-analyses synthesize the field as a whole. Here are just a few examples of quotes from the literature.

We conducted meta-analyses of studies examining the relationship of exposure to PM_{2.5} and PM₁₀ with lung cancer incidence and mortality... The results of these analyses, and the decision of the IARC Working Group to classify PM and outdoor air pollution as carcinogenic (Group 1), further justify efforts to reduce exposures to air pollutants that can arise from many sources. [Hamret et al. Environ Health Perspect 2014](#)

Decades of research has converged on an understanding that all combustion-derived particulate matter (PM) is inflammatory to some extent in the lungs and also systemically, substantially explaining a significant portion of the massive cardiopulmonary disease burden associated with these exposures. In general, this means that efforts to do the following can all be beneficial: reduce particulates at the source... [Wu et al. J Allergy Clin Immunology 2018](#)

Clinical and epidemiological studies demonstrate that short- and long-term exposure to air pollution increases mortality due to respiratory and cardiovascular diseases. Given the increased industrialization and the increased sources of pollutants (i.e., cars exhaust emissions, cigarette smoke, industry emissions, burning of fossil fuels, incineration of garbage), air pollution has become a key public health issue to solve. [Fiordelisi et al. Heart Fail Review 2017](#)

Regarding specific levels of emissions from GLBs and other lawn and garden equipment, here are some key studies.

(i) [This study](#) (National Emissions from Lawn and Garden Equipment) was done in collaboration with the EPA and presented at an international conference in San Diego, CA in 2015. It is available on the EPA's website. It quantifies the amount of annual emissions from gas lawn and garden equipment by type of equipment and describes the adverse health effects of those emissions, namely cancer, heart disease, stroke, premature death, heart attack, stroke, congestive heart failure, asthma, chronic obstructive pulmonary disease, and developmental and neurological conditions. Key findings are:

- Handheld tools (powered by 2-stroke engines) account for the vast majority (approx. 90%) of fine particulate emissions from lawn and garden equipment.
- Gas lawn and garden tools are significant contributors to nonroad emissions of VOCs from non-road as well as **ALL sources**, including vehicles, power plants, agriculture, and industry. For instance, gas lawn and garden equipment accounts for **8% of ALL benzene** emissions; benzene is a human carcinogen.

Note: This is particularly significant since emissions from gas handheld tools are generated in close proximity to airways.

The results of this study are widely quoted, even among landscape publications – for instance, [this article](#) from the American Society of Landscape Architects. It is noteworthy that sub-analyses of this original study have been presented at annual meetings of the American Public Health Association and Children's Environmental Health Network Conferences.

(ii) [This report](#) from the Massachusetts Medical Society was the basis of the resolution it passed on GLBs in 2017. It concludes that the emissions and noise produced by GLBs threaten the health of workers and the public; the report specifically links emissions from GLBs to worsened asthma, chronic obstructive pulmonary disease, malignancies, heart attacks, and hearing damage. It recommends “maximum feasible reduction of all

forms of air pollution, including particulates, gases, toxicants, irritants, smog formers, and other biologically and chemically active pollutants.”

(iii) [This article](#) from [FairWarning](#), a nonprofit investigative news organization, describes the findings of a technical report from Health Science Associates, an industrial hygiene consultancy, measuring concentrations of ultrafine particulates from GLBs and other equipment. Ultrafine particles are a subset of fine particle pollution most dangerous to health. They found that concentrations of ultrafine particulates from several brands of commercial grade GLBs were up to 54 times higher around the user than concentrations found in heavily trafficked intersections in Los Angeles.

NB: When new regulations are put in place for small gas engines like lawn and garden tools, they are accompanied by impact reports that detail the benefits of those regulations. Here is an example of a statement from the Federal Register about the latest set of such regulations:

...these emission reductions will prevent 230 PM-related premature deaths, between 77 and 350 ozone-related premature deaths, approximately 1,700 hospitalizations and emergency room visits, 23,000 work days lost, 180,000 lost school days, 590,000 acute respiratory symptoms, and other quantifiable benefits every year. The total annual benefits of this rule in 2030 are estimated to be between \$1.8 billion and \$4.4 billion... Federal Register, October 8, 2008

B. Noise

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.” Extensive scientific evidence shows that exposure to loud and/or persistent noise causes or contribute to [auditory and non-auditory disorders](#) including hearing impairment, [hypertension](#), [coronary heart disease](#), annoyance, sleep disturbance, cognitive impairment, and diminished school performance.

The World Health Organization (WHO) recommends an [outdoor noise level](#) below 55 decibels. Anything above 60 decibels [increases the risk of heart disease](#) and levels above 75 decibels increase the risk of hearing damage.

[Leading commercial brands of GLBs](#) are 100+ decibels at the source and as high as 83 decibels at 50 feet. Industry training materials to protect workers hearing state that noise levels from most of today’s gas equipment is **1000x or higher** than safe occupational levels and acknowledge the danger to hearing as well as heart health. (*Note: the decibel scale is logarithmic meaning each 10-decibel difference is a 10-fold difference in sound energy.*)

(i) [This report](#) from the Massachusetts Medical Society was the basis of the resolution it passed on GLBs in 2017. It describes the health hazards from GLB noise and recognizes it as a worker and a public health problem.

(ii) [This testimony](#) from Daniel Fink, MD, entitled *Gas Powered Leaf Blower Noise is Hazardous to the Auditory and Non-Auditory Health of Residents of the District of Columbia*, describes the various reasons why GLB noise is hazardous to health.

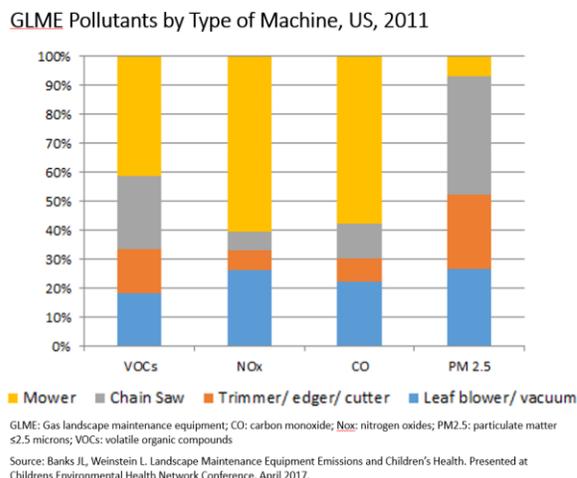
(iii) [This study](#) compares the noise characteristics of leading commercial models of gas and battery electric blowers. It found that GLB noise is louder than electric blower noise and able to carry harmful levels of noise over long distances and penetrate through windows because of a strong low frequency component that differentiates it from electric battery blower noise. Because of this, GLBs affect many more homes in a given

area than battery blowers. The study discusses the health hazards of regular exposure to loud and/or persistent noise and explains the ability of low frequency noise to considerably exacerbate those effects (and as described by the World Health Organization’s [Community Noise Guidelines](#)). It also describes populations most vulnerable, like workers, children, seniors and people with sensory and neurological problems.

(iv) [This study](#), which was conducted in conjunction with a researcher from the Harvard School of Public Health, found the GLB noise far exceeds safe standards and includes a strong low frequency component that enables it to travel over long distances. It discusses the ability of this type of noise to cause auditory and non-auditory problems, including heart disease and stroke. The study was presented at annual conferences of the American Public Health Association and Children’s Environmental Health Network. It too found that a strong low frequency component enabled the noise to travel over long distances.

2. Is it possible to separate out the health impacts of pollution from GLBs from pollution due to all landscape maintenance equipment as well as from that due to all sources?

Yes. The National Emission Inventory Data base allows us to calculate both. The exhibit below was presented at the Children’s Environmental Network annual meeting in 2017.



3. Is there any way to characterize the health/pollution impacts locally of GLBs?

Yes. Rates of toxic and carcinogenic emissions as well as greenhouse gases are available and allow calculations of emissions by type of equipment that can then be translated to health risks. A preliminary study done by the [California Air Resources Board](#) found the use of gas chain saws, leaf blowers, and other handheld tools increased the risk of cancer and other disorders in workers. The experimental design was very limited in scope, however, and was not meant to reflect what goes on in an actual neighborhood. For example, it did not account for the percentage of households in any town that use commercial services nor did it account for how these machines are used in routine settings (e.g., several at a time). Since commercial services are more likely to be employed in more affluent towns, the health/pollution impact is likely to be even greater in towns like Westport, CT.

4. Is there any way to demonstrate the impact that restricting use of GLBs would have on a town's Net Zero commitment (or conversely the impact of not restricting their use)?

Yes. Just as above for other emissions, we can calculate carbon dioxide (CO₂) emissions based on inventories of municipal (and/or business) landscape maintenance practices. In Lexington, MA, for example, we ([Quiet Communities, Inc](#) [QCi]; American Green Zone Alliance [[AGZA](#)]) calculated that municipal landscape maintenance alone, generates 34 tons of CO₂ each year. Keep in mind that this does not account for the additional emissions from commercial landscapers. If given access to a particular town's data, we would presumably be able to do a similar calculation.

5. Is it true that technology advances have resulted in significantly reduced exhaust emissions by GLBs, as the industry claims?

Yes, but none of the regulations have eliminated the underlying health problems related to GLBs.

Starting in the 1990s, gas lawn and garden equipment went through 3 phases of regulation. In the latest round of regulation (Phase 3), the EPA concluded that exhaust emissions for handheld tools like leaf blowers and string trimmers could not be reduced further due to technical limitations. As a result, the new regulation applies only to evaporative emissions (i.e., passive emissions from fuel tanks and hoses). Therefore, the projected overall reductions in emissions are coming from lawn and garden equipment **other than handheld tools**. The end result is that GLBs are still very polluting, especially as they get older and/or are not properly maintained.

6. If the health risks are so bad, then why are landscapers still using GLBs?

Part of the problem is that, although many people complain about the noise from GLBs, they are unaware of the other health risks, one of the most notable being the link between fine particulate matter and cancer. In addition, the landscaping industry has lobbied hard to avoid regulation, claiming—incorrectly—that they cannot work without GLBs. The truth is that hundreds of landscape companies across the country operate with only battery electric and manual tools or are transitioning away from fossil fuels. These companies are able to charge competitive prices. We are familiar with many, including those that certified by [AGZA](#). [This recent article](#) describes two companies – one in South Carolina, the other in Illinois – that use electric tools and are operating profitably.

[Testimony provided by a landscaper](#) at the Washington, DC City Council hearing in 2018 also covers many of these topics. While it is true that battery powered blowers are more expensive and require sufficient battery power to achieve the same level of work productivity, the avoided fuel and lower maintenance costs help offset the incremental upfront expense of these tools over time. In addition, economies can be realized by sharing batteries among a suite of handheld tools (e.g., blowers, trimmers, saws). Our colleague, Dan Mabe, president of AGZA, along with QCi, has conducted ROI (return on investment) for battery electric tools under differing scenarios. Lastly, because they produce no emissions, electric tools can be used on ozone alert days, providing another source of increased revenues.

Here are common arguments put forth by companies that are resistant to change—along with our responses:

- A. *Without a GLB, it will take more time to do the same work.* This argument assumes that every minute of GLB use is necessary, when much of time they are used it is “make work,” namely performing unnecessary tasks during the contracted amount of time. This is commonly seen in the summer and winter when operators spend hours blowing dust and debris off hard surfaces, grass clippings off of lawns, topsoil off

of soil, snow dust off of cars and sidewalks, etc. At best, these practices have temporary cosmetic effect; at worst, they diminish soil health and disrupt fragile eco-systems, all at the cost of loud noise and toxic emissions. If customers insist on removing dust or grass clippings from surfaces, brooms, rakes, or electric blowers can be used.

And, even for Fall and Spring cleanups-- when every minute of work is arguably necessary--there are other alternatives to consider. For example, mulching leaves so that their nutrients can be absorbed back into the soil (recommended by Earthplace in Westport, the Aspetuck Land Trust, and other horticultural and environmental organizations).

- B. *Seasonal GLB restrictions will hurt landscapers economically.* In all the towns where seasonal restrictions (and even year-round bans) have been instituted (many in Westchester County and in California) there is **no evidence** of any diminishment in business suffered by the landscaper industry. In fact, abandoning GLB use in the summer and winter will allow landscapers to save on the cost of fuel and maintenance.

- C. *Landscapers will have to charge customers more money.* Again, there is no evidence to suggest this is the case. This is a highly competitive industry. In fact, many electric service landscapers state explicitly, in marketing materials and media profiles, that their prices are competitive with gas companies or that they are able to charge a premium because their customers value quiet, clean services. In some cases, customers have simply asked their landscapers to stop using GLBs and have not been charged higher prices. A regulation levels the playing field for all companies. Prices will be determined by the competitive marketplace.

Sincerely,

Jamie Banks, PhD, MSc
Founder and Executive Director