

LEAF BLOWERS



Addressing the Impacts of Gas-Powered
Leaf Blowers in Seattle, WA

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City of Seattle

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STATEMENT OF POSITIONALITY

We, the consulting team (Evans Consultants), are second-year graduate students in the Masters of Public Administration program at the University of Washington's Daniel J. Evans School of Public Policy & Governance. We believe it is important to acknowledge our positionality, as it informs our perspective on the issues we will be discussing in this report. No researcher is entirely objective, and by presenting our positionality, we highlight the possible biases we bring to this work.

We are inherently privileged to be men and women currently located in higher education. Three of the authors were born and raised in the United States, with one author born and raised in China while also having spent significant time in the United States. While we are all greatly interested in environmental policy, we began this project with limited applied experience in this field, especially in the area of environmental justice. Moreover, we acknowledge our limited familiarity with the systemic inequities faced by Black, Indigenous, and people of color (BIPOC) as well as the many differences between people and societies of diverse cultures and ethnicities within the Puget Sound region. As this research engages with issues of equity, we believe this is important to note.

We also acknowledge and honor that the City of Seattle, the primary focus of this research, is located on the traditional territories of the Coast Salish people. We honor the people, both past and present, who belong to this place.

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Finally, we would like to thank our friends, partners, roommates, parents, siblings, colleagues, coworkers, and pets – especially Cleo the puppy – for supporting us through this process.

This report would not exist without you all; thank you.

GLOSSARY

Acronyms and Abbreviations

AAA: American Automobile Association

ANC: Advisory Neighborhood Commission

BIPOC: Black, Indigenous, and people of color

CAA: Clean Air Act & 1990 Clean Air Act Amendments; Title 42 USC (US Code), Ch 85—Air Pollution Prevention and Control

CARB: California Air Resources Board

CFM: Cubic feet per minute; this metric informs users of the volume of air that flows through a tube in a minute

CLCA: California Landscape Contractors Association

CO: Carbon monoxide

CO₂: Carbon dioxide

CPS: Current Population Survey

dB: Decibel

DCSEU: D.C. Sustainable Energy Utility

DMV: Department of Motor Vehicles

DOEE: Washington, D.C.'s Department of Energy and the Environment

EJ: Environmental Justice

ELB: Electric leaf blower

EPA: United States Environmental Protection Agency

FTP: Federal Test Procedure

HAV: Hand-Arm Vibration Syndrome

GPLB: Gas-powered leaf blower

GLGE: Gas-powered lawn and garden equipment

GHG: Greenhouse gas

mph: Miles per hour

MSL: Maximum Sound Level

NALP: National Association of Landscaper Professionals

NGO: Non-governmental organization

NO_x: Nitrogen oxide

O₃: Ozone

OLCA: Oregon Landscape Contractor's Association

OSE: City of Seattle Office of Sustainability and the Environment

PM: Particulate matter

GLOSSARY, con.

PM 2.5: Particulate matter around 2.5 micrometers in diameter

PM 10: Particulate matter around 10 micrometers in diameter

PM 30: Particulate matter around 30 micrometers

PPE: Personal Protective Equipment

PSCAA: Puget Sound Clean Air Agency

QC: Quiet Clean

QCDC: Quiet Clean D.C.

QCPDX: Quiet Clean PDX (Portland, OR)

QCS: Quiet Clean Seattle

SCL: Seattle City Light

SEPA: State Environmental Policy Act

SDOT: Seattle Department of Transportation

SLI: Statement of Legislative Intent

SORE: Small off-road engine

SPR: Seattle Parks and Recreation Department

SPU: Seattle Public Utility

USBLS: United States Bureau of Labor Statistics

UW: University of Washington

VOC: Volatile Organic Compound

WALP: Washington Association of Landscape Professionals

WHO: World Health Organization

WMBE: Women and Minority-Owned Businesses

ZEE: Zero-Emission Equipment

Definitions

Distributional Equity: Realized when programs and policies result in fair distribution of benefits and burdens across all segments of a community, prioritizing those with the highest need

Fugitive Dust: Very small particles that are suspended in the air (see also: Particulate Matter)

Gardening: Involves tending to and cultivating a garden

Gray Literature: Non-academic technical literature

Landscaping: Involves making a garden or an area of land more attractive by changing its existing designs, planting trees and shrubs, and adding decorative elements

GLOSSARY, con.

Procedural Equity: Inclusive, accessible, authentic engagement and representation in the process to develop or implement programs or policies

Smog-Forming Emissions: Includes nitrogen oxide, non-methane organic gases, carbon monoxide, particulate matter, and formaldehyde

Greenhouse Gases: Gases that absorb solar radiation and trap heat inside the atmosphere

Particulate Matter: Small airborne particles that are made up of a combination of liquid and solid droplets (see also: Fugitive Dust)

Purposive Sampling: a non-probability sampling technique where the researcher relies on their discretion to choose variables for the sample population

Snowball Sampling: a method in which researchers recruit initial subjects to be in a study and then ask those initial subjects to recruit additional subjects to be in the study.

Clarifications

1. We choose to use the terms “landscaping” and “landscapers” rather than “gardening” or “gardeners” throughout the body of our report because landscaping is more all-encompassing of what different businesses do (see definitions above). Gardening as a term typically only denotes caring for the plants within a space, whereas landscaping denotes caring for the plants, soil, aesthetics, and non-natural features as well.

2. There are many colloquial terms that describe people of Latin American and Spanish cultural and/or ethnic identity. There is not currently consensus among those who identify as Latino/Latinx/Hispanic around a specific term denoting their race/ethnicity. We have chosen to use “Hispanic” and “Latino” when referencing data from the Current Population Survey, the US Bureau of Labor Statistics, and the Washington Association of Landscape Professionals because these are the terms used in their demographic surveys. In other places throughout our paper, we use the term “Latinx” in an attempt to be more gender-inclusive, as the “o” in “Latino” references the male gender. Moreover, we stayed away from the use of “Hispanic”, as that term is often believed to be a nod to Spanish colonialism of Latin America (Rodriguez, 2019).

EXECUTIVE SUMMARY

Gas-powered leaf blowers (GPLBs) have become a standard tool for landscapers over the past 50 years, yet they pose several significant public health issues. These include toxic emissions, greenhouse gases (GHGs), particulate matter, noise, and vibration. They are a nuisance to residents and a danger to operators, many of whom are low-income and/or people of color. Accordingly, many municipalities and larger regions, including the state of California, have begun to phase out and ban the use of GPLBs.

This report's purpose is to study the potential policy actions the City of Seattle can take to mitigate the impacts of GPLBs. Seattle City Councilmember Alex Pedersen commissioned the Evans Consultants to answer the following question with this report:

How can the Seattle City Council best implement a policy to phase-out and/or ban GPLBs considering challenges related to procedural and distributional equity, public health impacts, enforcement capability, cost, administrative feasibility, and time to implementation?

Methodology

To investigate how Seattle might best address the main research question, we conducted a literature review to compile known information on the impacts of GPLBs, availability of alternatives, and evidence of policy action against blowers. We also interviewed government employees and residents in jurisdictions around the United States that have implemented bans on gas-powered equipment and discussed matters of jurisdiction and potential barriers with employees at the City of Seattle and King County. Finally, we surveyed landscapers based in the city to understand their usage of leaf blowers and sentiments about a potential ban.

Recommendations

Through our research, we determined that GPLBs pose a public health risk, particularly to operators who are disproportionately people of color. To mitigate these impacts, we developed seven recommendations for the Seattle City Council to consider. These include:

1. A resolution to indicate the position of the Council on GPLBs
2. Outreach to stakeholders, such as landscapers and the environmental justice community
3. A workgroup composed of stakeholders to build equity directly into the process

4. An expansion of charging infrastructure for electric vehicles and power equipment
5. An ordinance phasing out and eventually banning the sale and use of GPLBs based on a noise threshold within city limits
6. A rebate program to ensure a just transition to electric leaf blowers (ELBs)
7. A community education program to inform landscapers of available alternatives to GPLBs and potential incentive programs to transition to ELBs

There are multiple ways to implement these recommendations. Our recommended implementation Pathway (Pathway 2) involves all seven of the above recommendations. Through analysis of several other Pathways (see Chapter 5), we found this approach would best address equity because of the inclusion of a workgroup and greater involvement of stakeholders throughout the process. Moreover, the involvement of landscapers in the decision-making process may increase buy-in to any resulting ordinance, thus reducing the need for enforcement. The potential higher rate of compliance due to stakeholder buy-in may subsequently contribute to greater public health improvements.

Overall, this pathway prioritizes the equity and public health concerns identified in our research and is imperative for the successful implementation of a GPLB phase-out. Findings from our literature review, interviews, and survey are included below to justify this choice.

Pathway 2: Workgroup-Led Process

- Resolution
- Outreach to Stakeholders
- Workgroup
- Charging Infrastructure Expansion
- Ordinance
- Rebate Program
- Community Education

Findings

Literature Review

In our review of academic and gray literature, we identified the impact of GPLBs on the environment, public health, and equity.

GPLBs release one-third of their fuel into the atmosphere unburnt, which contains harmful chemicals such as carbon monoxide, volatile organic compounds, and nitrogen oxides. Leaf blowers also churn up fugitive dust from the ground through their use, increasing particulate matter concentrations in the air. These changes to air quality around an active GPLB are associated with several respiratory and cardiovascular impacts that affect operators and nearby residents.

GPLBs also emit high levels of noise, often exceeding recommended levels set by Washington State and the World Health Organization (WHO). Extended exposure to the high-decibel output of GPLBs can result in hearing damage. Even when not in the immediate vicinity, GPLBs pose a nuisance to nearby residents due to their low-frequency sound, which can travel long distances.

Over 100 cities in the US have banned or restricted the use of GPLBs due to noise, health, and environmental concerns. California is in the process of phasing out all small off-road engines (SOREs), including GPLBs, due to their air quality impacts. Washington, D.C. has recently implemented a ban on GPLBs using a noise threshold to restrict their use, as well as a four-year phase-out period and a rebate program to incentivize the uptake of ELBs. Multnomah County, OR is currently using a stakeholder workgroup to design a county-wide policy to phase out GPLBs. These three jurisdictions served as case studies for our interviews, as outlined below.

Interviews

Qualitative coding of our interview notes revealed major themes and key considerations for policy implementation. A key theme discussed across all interviews was barriers, which included topics such as capacity constraints, policy opposition, cost, and the need for electrification infrastructure to support ELBs. Concerns related to environmental and public health were also mentioned, as the pollution and noise associated with GPLBs can harm operators and nearby residents. Interviewees also often emphasized the importance of equity in the phase-out of GPLBs.

From our interviews with case study cities, we identified best practices in the implementation process. This included a workgroup to co-create an equitable policy design, financial incentives for landscapers, and a community education program.

Survey Results

The analysis of our survey results revealed common barriers associated with a transition to ELBs. The vast majority of survey respondents indicated concerns over the lack of comparable technology, the need for adequate charging infrastructure, and the relatively high-cost burden placed on small companies. Landscapers also mentioned that a switch to ELBs would lower productivity, as they must adjust to lower air velocity output and the time required to charge the batteries. Respondents highlighted the need for a buffer period to provide time for businesses to replace their GPLB fleet and emphasized the importance of financial incentives in the transition.

CHAPTER 1: INTRODUCTION

1.1 Project Purpose

Gas-powered leaf blowers (GPLBs) are common tools used in gardening, landscaping, and construction. However, they cause air and noise pollution that negatively impacts operators and the residents of communities in which they are used.

Many residential complaints have been filed against GPLBs in Seattle due to their noisiness and toxic emissions. City of Seattle Councilmember Alex Pedersen recognized the importance of phasing out GPLBs, but multiple stakeholders (e.g., Seattle Parks and Recreation Department and community organizations like Quiet Clean Seattle) raised concerns related to equity, cost, efficacy of electric leaf blowers (ELBs), and enforcement. Councilmember Pedersen tasked the Evans Consultants with developing a specific implementation plan for phasing out GPLBs in Seattle that identifies and addresses the corresponding challenges.



1.2 Research Questions

Given the current opportunity Seattle has for phasing out GPLBs, it is crucial to determine the most equitable and effective path to implementation. Our project is centered around the following research questions:

1.2.1 Primary Research Question

How can the Seattle City Council best implement a policy to phase-out and/or ban GPLBs considering challenges related to procedural and distributional equity, public health impacts, enforcement capability, cost, administrative feasibility, and time to implementation?

1.2.2 Supporting Research Questions

To support our primary research question, we consider the following:

1. What extant barriers prevent the passing of legislation in Seattle to phase-out and/or ban GPLBs?
2. Who in Seattle would support a GPLB phase-out/ban, and who would have concerns about one?
3. What jurisdictions like Seattle have successfully implemented a ban/phase-out of GPLBs?
 - a. Based on their experiences, what are the most effective and equitable ways to implement policy to phase out and eventually ban GPLBs in Seattle?
4. What are alternative technologies to GPLBs, and how do they measure up in terms of cost, effectiveness, availability, etc.?
 - a. Why have GPLBs been used more than ELBs and other similar equipment?
5. What are the impacts of GPLBs on humans, the environment, and on Seattle's greenhouse gas and smog-forming emissions?
6. What costs do landscaping companies face to replace their fleet of GPLBs?
7. Could Seattle implement a buy-back or rebate program for GPLBs?

1.3 Background

Leaf blowers are used in Seattle by residents, landscapers, and city departments and organizations such as the Seattle Department of Transportation (SDOT), Seattle Public Utility (SPU), Seattle City Light (SCL), and Seattle Parks and Recreation (SPR) to move and clean debris, primarily fallen leaves and other small materials.

Leaf blowing prevents flooding and storm drain blockage, keeps walkways clear of debris, and maintains public spaces. Cities that have banned leaf blowers have done so from a noise pollution and toxic emissions perspective.

The City of Seattle (the City) first attempted to move toward regulation of GPLBs in 2014 with Statement of Legislative Intent (SLI) 70-1-A-1 (Sugimura, 2014). The 2014 SLI did not result in legislation from the City. However, extensive information was gathered during the process. From this, the City developed an educational resource that encourages Seattle residents to apply best practices when using GPLBs. Best practices include courteous usage, following noise ordinances, and considering alternative methods of completing the same work (Torgelson, 2014).

In November 2021, Councilmember Alex Pedersen submitted SLI OSE-003-B-001, requesting the Seattle Office of Sustainability and the Environment (OSE) to “develop a plan to phase out the use of gas-powered leaf blowers”. SLI OSE-003-B-001 builds on the 2014 SLI and incorporates information gathered from other jurisdictions that have implemented bans on GPLBs (Pedersen, 2021).

1.4 Report Overview

To help us answer the above research questions, this report includes the following chapters:

Chapter 1

Chapter 1 provides background information on GPLBs, the policy context in Seattle, and a list of preliminary research questions.

Chapter 2

Chapter 2 provides an in-depth review of the history of GPLBs, alternative technologies, health and environmental impacts, past policy responses from other cities, and equity concerns.

Chapter 3

Chapter 3 outlines our research methods and design, including sample and case study selection criteria, interview questions, survey questions, and limitations of our approach.

Chapter 4

Chapter 4 provides analysis and visualization of the qualitative research data we collected from interviews and surveys of stakeholders.

Chapter 5

Chapter 5 provides detailed implementation pathways for the phase-out of GPLBs in Seattle. Each pathway is evaluated against seven criteria, such as public health impacts. Final recommendations are given.

CHAPTER 2:

LITERATURE REVIEW



2.1 Introduction

To provide a solid foundation for our methodology, analysis, and recommendations, we summarize existing literature on GPLBs. This review examines the scarce academic literature and comparatively abundant gray literature generated by government agencies, local advocacy groups, industry members, and investigative journalists on GPLBs. Relevant topics include GPLB history, features, impacts on the environment, impacts on health, and impacts on equity.

Due to the uneven availability of literature, our understanding of crucial impacts is dense in some areas and sparse in others. For example, there are few studies involving GHG emissions and particulate matter (PM) suspension from GPLB use. More studies are needed to expand on the chemical and biological contents of leaf blower-driven PM suspension, PM dose toxicity to humans (specific to leaf blower suspension), length of time ultrafine PM is suspended, and GHG contributions from GPLBs. There are also few studies on the impacts of vibration from leaf blowers. However, there is ample literature on the impacts of noise and toxic chemical pollution^[1] from GPLBs, as well as information on the demographics of GPLB operators, the approximate number of units in use, and the available technologies for shifting away from gas-powered to electric leaf blowers or manual operation.

[1] These are the impacts of chemical emissions, as opposed to the harmful impacts of particulate matter stirred up by leaf blowers.

2.2 Brief History of Gas-Powered Leaf Blowers

Leaf blowers were first invented in the late 1800s and were akin to chemical sprayers. In 1931, leaf blowers began to resemble modern devices and portable, backpack versions were developed in the 1940s. The devices became commercialized in the 1950s, but they still included the chemical-spraying function of previous versions. GPLBs powered by two-stroke engines, and without the chemical-spraying function, were developed by the 1970s. Sales expanded during and after a period of drought in California in 1976 when the Los Angeles city government recommended leaf blowers as an alternative to the garden hose for yard work (Boykoff, 2011).

By 1990, domestic annual sales reached up to eight hundred thousand units, and by 1998, sales were up to two million (Boykoff, 2011). Today, GPLBs are ubiquitous throughout the United States and are primarily used in landscaping, gardening, and construction (California Air Resources Board, 2000). In 2009, almost 5 million leaf blowers were purchased in the United States (Boykoff, 2011). There are limited statistics available on leaf blower use, as they are usually included in larger categories of off-road engines. The literature would benefit from an inventory of leaf blowers currently in use, including their share of the landscaping economy, how much fuel they use, and other, similar metrics.

The gas-powered leaf blower is used in both residential and commercial settings by individual residents and landscaping companies. Annual residential use of leaf blowers was around 10 hours per individual in 2015 and has increased since then. Commercially, employees of landscaping companies each used GPLBs for an average of 282 hours per year. That is equivalent to over 7 weeks of full-time (40 hr/week) work spent using leaf blowers, a significant amount of their workload. Other gas-powered lawn and garden equipment (GLGE), such as lawnmowers, hedge trimmers, and string trimmers, are also used widely throughout the US residentially and commercially. There are more than 120 million GLGE nationwide, and of those, 9% are leaf blowers (Banks 2015).

However, GPLBs and other GLGE have come under fire recently for their outdated and inefficient two-stroke engines, which release as much as one-third of their fuel as unburnt emissions into the environment and emit noise at unhealthy levels. As awareness regarding the negative environmental and health consequences of two-stroke engines increased in the 1990s and early 2000s, governments worldwide began banning the use of two-stroke engines in larger, passenger vehicles, but not in small, off-road equipment such as GLGEs (Fallows, 2019).

GLGEs have been excluded from climate conversations because they represent a smaller proportion of overall GHG emissions nationwide than does transportation (Fallows, 2019; The Best Leaf Blowers, 2022). Yet action has begun at local levels of government, especially in the US. Over 100 cities in the US have banned or restricted the use of GPLBs due to noise, health, and environmental concerns (Fallows, 2019).

Over 100 cities in the US have banned or restricted the use of GPLBs due to noise, health, and environmental concerns (Fallows, 2019).

ELBs appear to be the next technological step in leaf-moving, as they do not use combustion engines and therefore pollute less and are less disruptive to operators and their surroundings. As they are also quieter, they are often exempt from leaf blower bans, although not in all cases. However, when they are plugged in and charging, they can have an indirect GHG

emission impacts depending on the source of their energy supply (Jones, 2017). In cities like Seattle where renewable energy constitutes a majority of energy generation, this impact is significantly mitigated or even eliminated (Smith, n.d.). As more utilities pursue carbon neutrality due to the climate crisis, any GHG impacts associated with electric equipment will decrease.

2.3 Use of Leaf Blowers

Many landscape professionals, construction workers, and homeowners argue that leaf blowers are essential to performing their work and keeping their workplaces and homes clean and safe. Leaf blower work includes cleaning parking lots, stadiums, and parks; clearing out gutters; clearing the sidewalks of slippery leaves; removing flammable or dangerous debris; and collecting debris from construction sites (TBLB, 2022; California Landscape Contractors Association, 2019). Proponents maintain that leaf blowers are more effective than other tools, such as rakes and brooms, in terms of time and labor. While rakes and brooms create fewer emissions and less air disturbance (particulate matter), they are generally considered more labor-intensive and can more easily cause physical injuries to the operator (TBLB, 2022; CLCA, 2019). More studies are needed to understand the trade-offs involved between rakes and leaf blowers.

2.4 Types of Leaf Blowers

There are a few different types of leaf blowers, including gas-powered two-stroke and four-stroke engine versions, GPLBs with noise reduction technology, and fully electric leaf blowers (CLCA, 2019). Leaf blowers usually come in three main types regardless of their fuel source, each varying in price, weight, and performance: handheld, backpack, and wheeled. Handheld and backpack versions are more widely used as they are lighter and easier to maneuver than wheeled leaf blowers (A., 2022). We will omit wheeled leaf blowers from our analysis both due to their infrequency of use and the lack of an available electric alternative.

Viable alternatives to GPLBs include electric versions that are either corded or cordless with a battery (CARB, 2022). Corded ELBs are the most lightweight option, as they do not include a battery, but they tend to be inconvenient, in that they must be used within the range of a power outlet (A., 2022). Our analysis will focus on cordless ELBs as they have better mobility.

The effectiveness of leaf blowers depends on their air velocity output, which is measured in cubic feet per minute (CFM). This metric informs users of the volume of air that flows through the tube in a minute. Higher airflow equates to a better ability to move leaves and debris. Typical GPLBs move 300–700 cubic feet of air per minute, at speeds of 150–280 miles per hour (mph) at the nozzle (CARB, 2000).^[2] Nozzle speed is dependent on the size of the nozzle. Some ELBs, depending on the type and brand, blow air at slower speeds than GPLBs – even with variable nozzle sizes – and therefore may be less effective than gas-powered versions (Table 1). Handheld cordless electric blowers are nearly as effective in terms of air velocity and some models are less costly than gas-powered versions, although the evidence is mixed. The technology is changing quickly for ELBs, impacting air speeds, power (in CFM), and price. On average, ELBs are lighter and quieter than gas-powered versions (Jones, 2017).

Table 1: Comparison between Leaf Blowers (Leaf Blower Guide, n.d.)

Blower Type	Max Yard Size	Airflow/Speed	Weight	Price
Gas Handheld	1/2 Acre	300 – 650 CFM 115 – 250 mph	10 lbs.	\$75 – \$250
Gas Backpack	1 Acre	360 – 1,110 CFM 145 – 270 mph	22 lbs.	\$200 – \$800
Cordless Handheld	1/2 Acre	80 – 765 CFM 75 – 200 mph	4–8 lbs.	\$60 – \$400+
Cordless Backpack	1/2 – 1 Acre	350 – 800 CFM 120 – 200 mph	8–16 lbs.	\$100 – \$700+

[2] For reference, hurricane wind speeds measure 117 mph and above. GPLBs move air fast in ways that, much like a hurricane, move dirt, leaves, and debris easily (CARB, 2000).

Many models of cordless ELBs have issues with the battery itself. Recharging one battery takes about 25 minutes if connected to a power source, which can be difficult to find for commercial landscapers or construction workers on a jobsite. In comparison, filling up a gas tank usually takes a few minutes or less, and extra fuel tanks can be carried onsite. Thus, landscapers who use ELBs often resort to bringing multiple batteries with them to power their leaf blower throughout the day, which many have cited as costly and inconvenient. There are also cases of workers bringing a gasoline-powered generator to charge the batteries, which defeats the purpose of using an ELB. (TBLB, 2022).

While the initial cost of purchasing an ELB is comparatively higher than purchasing a GPLB, a study by the University of Arkansas found that the lifetime costs of comparable electric and gas-powered leaf blowers are much lower for ELBs. The savings are largely attributable to the relatively lower cost of recharging batteries compared to purchasing gasoline. Moreover, the study found that lifetime maintenance costs of ELBs were lower than that of gas-powered versions (Jones, 2017). Estimates of service lifetime range from 5 to 10+ years, and limited early evidence suggests ELBs can last for much longer (Garden Tool Expert, 2022).

The lifetime costs of comparable electric and gas-powered leaf blowers are much lower for ELBs. (Jones, 2017)

2.5 Health & Environmental Concerns

GPLBs pose several health concerns: damaging noise levels, toxic emissions, PM suspension, greenhouse gas (GHG) emissions, and harmful vibrations. The sections below discuss each at length.

2.5.1 Noise Pollution

Two-stroke engines present in most GPLBs emit a sound that often exceeds the acceptable decibel (dB) thresholds set by the World Health Organization (WHO), the United States Environmental Protection Agency (EPA), and Washington State (Walker & Banks, 2017). The WHO and EPA recommend a maximum of 55 dB of environmental noise to prevent nuisance and distraction in residential areas. Similarly, they state that environmental noise above 70 dB will lead to hearing loss (Suter, 1991; Walker & Banks, 2017).

There are also Maximum Sound Levels (MSL) deemed appropriate for different localities. In Washington, residential areas have a 60 dB MSL, while commercial dining areas, retail businesses, and other recreation areas have a MSL of 65 dB. Finally, in industrial operations, manufacturing, and agriculture areas, the MSL is 70 dB (Washington State Legislature, 2000). In contrast, GPLBs produce sound at an average decibel level for the operator between 88 and 101.3 dBs (CARB, 2000). Some higher quality GPLBs with noise reduction technology produce noise of around 85 dBs, but mid-range and low-quality GPLBs emit sound at up to 112 dBs for the operator (TBLB, 2022).

The health effects of the high-decibel output of GPLBs range from mild to serious. Longer exposure to the use of GPLBs increases the likelihood of hearing damage and hearing loss; on average, landscapers use GPLBs for 2.1 hours per day, which equates to long exposure (CARB, 2000). Sound at 85 dBs or above can cause irreversible damage to the inner ear. Exposure to GPLB noise also interferes with communication, disturbs sleep, and causes various psychological phenomena (e.g., annoyance, behavior change, stress), for operators and those nearby (CARB, 2000; Fallows, 2019). Moreover, a study by Quiet Communities states that GPLBs produce low-frequency sound waves that travel far and penetrate barriers, walls, and many types of hearing protection (Fallows, 2019). Residents inside nearby homes and GPLB operators are thus not entirely immune to the noise.

ELBs are quieter than GPLBs and emit sound at frequencies that are less penetrative and travel shorter distances. A study done by QCS demonstrated that ELBs emit sound between 40 - 75 dBs, never quite reaching 80 dBs. Moreover, GPLBs were audible over further distances, and inside houses, while ELBs blended in better with ambient noise. ELBs do not have the same low sound frequencies as GPLBs, so they do not as easily travel far or through buildings, windows, and walls. ELBs are thus less damaging not only to the hearing of the operator but also to nearby residents (Garden Tool Expert, 2022).

2.5.2 Toxic Chemical Pollution

GPLBs emit high levels of localized pollutants (Banks, 2015). Two-stroke engines use a combination of gasoline and oil, of which only two-thirds is combusted. The other third of the fuel is emitted directly into the air surrounding the operator. These emissions contain high levels of carbon monoxide (CO), nitrogen oxides (NO_x), and volatile organic compounds (VOC). These pollutants are dangerous to human health and contribute to climate change (CARB, 2000; Baldauf, 2006; Banks, 2015). VOCs combine with NO_x and sunlight to form airborne particles and ground-level ozone (O₃), which is a main component of smog (CARB, 2000). Each of the pollutants come with their own set of health concerns. See Figure 1 for a full description of the health impacts of these pollutants.

Figure 1: Analyzing toxic chemical emissions of two-stroke engines

Carbon monoxide

Exposure can cause headaches, dizziness, weakness, nausea, nervous system dysfunction, and (in rare cases) death (CARB, 2000). In an EPA-led Small Engine Exposure Study, operators of GLGE, including GPLBs, experienced elevated levels of CO. In certain scenarios (depending on operator activity, environmental conditions, and hours of operation), the level of carbon monoxide exceeded National Ambient Air Quality Standards (Baldauf et al, 2006).

Nitrogen oxides

Can cause irritation to the nose, eyes, throat, and lungs, which can lead to coughing and nausea. In low-exposure situations, nitrogen oxides cause a buildup of fluid in the lungs. In high-exposure situations, common side effects include swelling in the respiratory tissues, reduced oxygenation throughout the body, and even death (Agency for Toxic Substances and Disease Registry, 2002). No current research examines GPLB operator exposure to NOx.

VOCs

These are emitted by two-stroke engines and include hydrocarbons, such as formaldehyde, acetaldehyde, benzene, and 1,3-butadiene. Hydrocarbons like the ones listed are carcinogens. VOCs interact with NOx in the lower atmosphere to form O₃, commonly referred to as ozone. This is localized, often inundating the GPLB operator with high levels of ozone (CARB, 2000).

Ground-Level Ozone

A strong irritant that can cause airway constriction, coughing, shortness of breath, sore throat, aggravate respiratory diseases, increase the susceptibility of the lungs to infection, cause permanent damage to the airways, and can lead to death (CARB, 2000; United States Environmental Protection Agency, 2021a & b).

Two estimates exist for the range of emissions from a single GPLB—one from the California Air Resources Board (CARB) and the other from Edmunds.com. CARB “is the lead agency for climate change programs and oversees all air pollution control efforts in California to attain and maintain health-based air quality standards” (CARB, 2022). Edmunds.com is a car review website experienced in assessing vehicles. CARB ran tests on the “best-selling commercial leaf blower” in the latter half of the 2010s and determined that 1 hour of operation emits the same level of smog-forming pollution (VOC and NOx) as driving from Los Angeles to Denver (1,100 miles) in a 2017 Toyota Camry (CARB, n.d.).

The other estimate was conducted by the engineering editor at Edmunds.com. Utilizing the industry standard federal test procedure (FTP) 75 emissions cycle test^[3] and an American

[3] To quote the editor himself: “The FTP 75 cycle is one of the primary yardsticks in the U.S. certification of light-duty vehicle emissions and fuel economy. It consists of – stay with us here – three major sub-tests called phases, each of which is defined by a specific pattern of speed versus time. Phase 1 is a 505-second cold-start cycle and is followed by Phase 2, which is a “stabilized” test that lasts 864 seconds. Phase 3 is a repeat of the Phase 1 test, the only difference being that it is performed when the engine is fully warmed” (Kavanagh, 2011).

1 hour of [leaf blower] operation emits the same level of smog-forming pollution as driving from Los Angeles to Denver. (CARB, n.d.)

Automobile Association (AAA) emissions facility, they compared a 2011 Ford Raptor and a 2012 Fiat 500 to both a 2-stroke and 4-stroke leaf blower engine. Edmunds.com results found considerably more pollution than CARB—they equated 30 minutes of 2-stroke engine leaf blower use to driving the Raptor 3,887

miles, or the distance between Northern Texas and Anchorage, AK. These results accounted for current ambient air quality, so the contributions from the leaf blower and the Raptor were isolated from the surrounding conditions. The 4-stroke engine fared better, releasing only 36 times the non-methane hydrocarbons compared to the nearly 300 times response from the 2-stroke (both relative to the Raptor). Finally, the researchers idled the 2-stroke engine for 10 minutes, which was equivalent to driving the Raptor 235 miles with regular stopping and starting of the engine every 8.4 minutes (Kavanagh, 2011).

While the estimates vary, even the lower bound identified by CARB – which used a more recent type of engine subject to stricter regulations – showed significant toxic and smog-forming emissions relative to the amount of use. The localization and concentration of air pollutants during the use of GPLBs leads to worse health outcomes for those in the close vicinity of the device, relative to those not exposed (Banks, 2015). As such, operators experience most of the health-related consequences from the use of GPLBs. In public places where GPLBs are frequently used, such as parks and schools, GPLBs can also impact those in the vicinity (Banks, 2015).

GPLBs are part of a larger category of equipment called small off road-engines (SOREs). SOREs include “garden equipment as well as other outdoor power equipment and specialty vehicles” (CARB, n.d. b). Smog-forming emissions from all SOREs in Southern California are estimated by CARB to exceed those from passenger vehicles soon, and are set to “be more than twice those from passenger cars” by 2031 (CARB, n.d. a).

2.5.3 Particulate Matter Suspension

Leaf blowers of all kinds stir up PM when used. Particles remain in the air for varying amounts of time based on their size and are correlated with increased risk for several health issues. Studies by CARB indicate that fugitive dust (another term for PM) often contains location-dependent substances, including – but not limited to – the following: fecal matter, fertilizers, pesticides, pollen, animal dander, and toxic metals (arsenic, chromium, lead, mercury) (CARB, 2000).

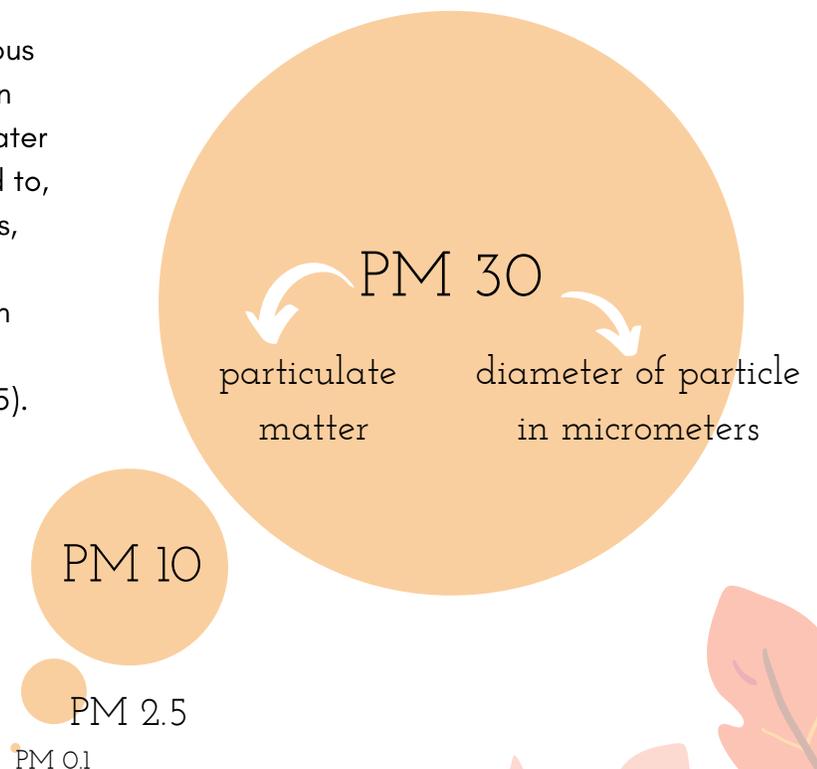
There are multiple categories of PM, organized by diameter (see Figure 2). The first category of particles are between 10–30 micrometers in diameter. They are known as PM 10 – PM 30, where the number references the diameter of the particle in micrometers. Leaf blowers stir up PM 30 particles, but they usually fall back to the ground within minutes, occasionally lasting for over an hour under high wind conditions. PM 10 particles are categorized as “coarse” and can remain suspended in the air for several days. One estimate in California attributed 0.2 tons of PM 10 particles per day to leaf blowers, statewide (CARB, 2000).

PM 2.5, or “fine” particulate matter, can remain suspended in the air for up to a week (CARB, 2000). These fine and ultrafine (PM 0.1) particles easily slip deep into human and animal respiratory and circulatory systems, and the smallest particles can pass into the bloodstream. Some studies have demonstrated that the levels of PM 2.5 in the air after leaf blower use range from minimal (Health Science Associates, 2017) to exceeding National Ambient Air Quality Standards under specific contexts (Baldauf, 2006).

In general, coarse and fine PM concentrations in leaf blower dust are raised 1.6–1.7 times above ambient air quality conditions and remain there for several minutes (Costa-Gomez, 2020). Not only do coarse and fine PM concentrations remain elevated for a few minutes after being lifted by the leaf blower, but ultrafine particles remain in the air for much longer and accumulate into dangerous concentrations (Health Science Associates, 2017). While PM poses risks for all who breathe it in, it is particularly dangerous for leaf blower operators without adequate personal protective equipment (PPE), like N95 masks (Green Livable Environment for Everyone, 2016; Banks, 2015).

Figure 2: Relative sizes of particulate matter

All PM categorizations are linked to numerous health issues, although smaller particles can travel deeper into the lungs and cause greater concerns. These include, but are not limited to, cardiovascular disease, respiratory diseases, cancer, neurological conditions, asthma, chronic obstructive pulmonary disease, birth defects, and early death (Green Livable Environment for Everyone, 2016; Banks, 2015). Literature on the exact length, dose, and composition of fugitive dust that operators and bystanders are exposed to is scarce; more studies are needed in this area.



2.5.4 Greenhouse Gas Emissions

Climate change is a serious and worsening global crisis that causes rising sea levels, increased weather-related destruction, and habitat loss, amongst other wide-ranging impacts. There have been several attempts to quantify the GHG contributions of leaf blowers to climate change, though literature is lacking and inconclusive. The EPA estimates the total carbon dioxide (CO₂) emissions from SOREs contribute to 4% of the nation's total carbon emissions (Banks, 2015). Thus, reducing or eliminating GPLB use across the nation, alongside those of other SOREs, can reduce US GHG contributions up to 4%. A phase-out in Seattle would produce a small fraction of that benefit. Information on Seattle's emissions from SOREs can be found in Chapter 4 (Section 4.2.6).

2.5.5 Vibrations

A less studied and rare impact of using GPLBs is Hand-Arm Vibration Syndrome (HAV), an incurable condition that affects power tool users. Its symptoms include tingling sensations, numbing, and loss of dexterity - all in the hand. HAV attacks involve the fingers turning white, last from 5-15 minutes, and are painful enough to wake those with the condition from sleep. It occurs relatively frequently and is highly prevalent amongst power tool users; 20-50% of users are documented as suffering from HAV in the US (Acquisition Safety, 2016).

A 2019 study by Gabasa et al. found that commonly-used GPLBs create significant levels of vibrations for operators.^[4] Given the health guidelines issued by the European Directive 2002, over 5 hours of use per day under these conditions exceed the identified exposure action value, which is the level of safe use listed by these standards (Gabasa, 2019). As mentioned previously, operators use leaf blowers on average for just over two hours a day but can use them for significantly longer on select days.

HAV is due to the vibrations of GPLB engines, so we assume it would be less of an issue for ELBs. However, there is a severe lack of research into this condition, and the Gabasa et al. study does not mention the vibratory impacts on operators of ELBs.

2.6 Policy Responses

In response to the consequences of GPLBs, over 100 cities across the nation have instituted policies limiting or banning them from use (Fallows, 2019). The restrictions on the use of leaf blowers include noise ordinances, absolute bans, and phase-outs (HD Supply Solutions, 2022). Enforcement of bans or phase-out plans seems to be the most difficult barrier once a policy is implemented. The following paragraphs will discuss policy responses based on the location in which they have occurred.

[4] Specifically, the study measured median weighted Wh vibration magnitudes to the hand between 1.71 and 2.91 m/s² r.m.s. acceleration for operational and idle modes.

2.6.1 California

The first GPLB bans occurred in California in 1975 and 1978 and were noise-related. By 1990, there were five bans in place in California (CARB, 2000). Now there are GPLB bans in 24 cities in California mainly based on noise and nuisance, and 5 of these also place restrictions on ELBs (HD Supply Solutions, 2022). California has a large proportion of the US's leaf blower bans because the State has unique authorities under the federal Clean Air Act (CAA). When the CAA passed in 1970, California had the most stringent air pollution standards in the nation. Therefore, California was granted the privilege and authority to continue to set its own ambient air quality standards without jurisdiction from the EPA. Under the legal principle of pre-emption, every other state must relinquish this standard-setting authority to the EPA (Fallows, 2019).

In 2021, CARB regulators approved a measure banning the sale of GLGE by 2024 and the sale of portable generators by 2028 for all operators, including those in residential and commercial positions. The phase-out came in response to the following: Governor Gavin Newsom's executive order in 2020 that mandates the transition to zero-emissions equipment and off-road vehicles by 2035; and, the passing of Assembly Bill 1346,^[5] which mandated the state to adopt new prohibitions against SOREs (California Legislature, 2020). The measure approved by CARB in 2021 does not restrict existing gas-powered equipment, nor its use (Willon, 2021). However, the lifetime of GPLBs is around 5 years, so the phase-out is anticipated to be effective in a short time frame, depending on the state of landscapers' equipment (Jones, 2017).

About 15.4 million GLGEs currently operate in California, emitting around 141 tons of smog-forming pollutants every day. California allocated \$30 million to help the transition to electric equipment, but it is unclear how these funds will be distributed. Many landscape companies have concerns about the transition because replacing equipment will be "prohibitively expensive" for them and will lead to less efficient and unsuccessful maintenance work. Some say that the costs of transitioning will be high enough to put small companies out of business. Others are supportive of the policy in theory but consider the timeline to be unrealistically ambitious (Willon, 2021). The veracity of these claims has not been established.

While the banning of GPLBs is expected to reduce GHGs and toxic emissions, they have not always been effective. Enforcement tends to be the most difficult barrier. Examples in Los Altos, CA showed ineffectiveness when gardeners used portable gas-powered generators to charge their ELBs (Henricks, 2017).

[5] Bill 1346 can be found through this link: <https://openstates.org/ca/bills/20212022/AB1346/>

2.6.2 Multnomah County, OR

In 2021, Multnomah County and the City of Portland each passed a resolution phasing out the use of GPLBs. The resolutions intend to reduce toxic emissions and protect GPLB operators (Board of County Commissioners for Multnomah County, 2021).

The resolutions have several parts. First, they require a transition to ELBs in county-owned facilities by 2025. The resolutions also include a plan to expand charging infrastructure throughout the county for ELBs and methods for increasing communication and outreach to residents about the harms of GPLBs. Finally, the resolutions mandate the creation of a city-county-stakeholder workgroup that will pursue the implementation of an eventual countywide phase-out (Gonzalez, 2021).

The Oregon Landscape Contractors Association (OLCA) have been invited to join the workgroup to discuss their concerns with transitioning to ELBs. OLCA stated that leaf blowers are an essential tool not only for landscaping but also for construction work to clean up job sites. However, OLCA also noted that they are in the process of testing ELBs to work out issues with batteries and charging (Gonzalez, 2021).

2.6.3 Washington, D.C.

In 2022, a ban on leaf blowers went into effect in Washington, D.C. The ban in D.C. started with an Advisory Neighborhood Commission (ANC) putting pressure on councilmember Mary Cheh to introduce a bill banning GPLBs (Fallows, 2019). Quiet Clean D.C. (QCDC), a residential advocacy group, was also involved in bringing the issue to the attention of the Council. Both QCDC and the ANC came together on the platform of noise pollution caused by GPLBs. Landscapers in D.C. never mounted a big lobbying effort against the bill; most people in the industry acknowledged that GPLBs would likely be phased out soon due to the acceleration of new battery technologies (Fallows, 2019).

The implementation plan gave landscape workers four years to switch to ELBs and provided income-based subsidies to help companies to transition. Given that the bill was centered around noise pollution, the ban is primarily enforced through noise complaints, which are handled by the Office of Consumer and Regulatory Affairs. Owners of GPLBs are fined if found in violation (Council of the District of Columbia, 2018).

2.7 Equity

The U.S. Bureau of Labor Statistics (USBLS) publishes public data on the general demographics of employed persons in the US in each industry, based on data from the Current Population Survey (CPS). The CPS is a monthly survey collected from approximately 60,000 US

households (US Census Bureau, 2022). Based on the most recent data, the demographic distribution of the landscaping service industry is summarized in the table below. Out of 1,395 people identified to be in this field, 9.9% are women; 86.6% are White; 7.5% are Black/African American; 1.3% are Asian; and 45.7% are Hispanic/Latino, which is significantly higher than 18% of Hispanic workers from the overall workforce (US Bureau of Labor Statistics, 2022). Note that Hispanic/Latino is treated as an ethnicity, and participants were asked to self-identify as such separately of the racial categorization question.^[6]

Table 2: Demographic Distribution of Landscaping and the Overall Workforce (USBLS, 2022)

	Total Employed (millions)	Women	White	Black/African American	Asian	Hispanic/Latino
Total Workforce	152,581	47%	77.5%	12.3%	6.6%	18%
Landscaping Services	1,395	9.9%	86.6%	7.5%	1.3%	45.7%

The National Association of Landscape Professionals (NALP) Foundation conducted a demographic workforce survey in 2021. With over 300 responses, the results indicate that 49% of workers are between the ages of 25–44; 61% are Hispanic, Latino,^[7] or Spanish in origin; 92% are men. Compared to the workforce at large, landscapers are slightly younger and are predominantly Hispanic and male. Only the Hispanic ethnicity is reported as this high, and other minorities are lower relative to the overall workforce. The NALP survey shows similar trends to the USBLS data (National Association of Landscape Professionals, 2021).

Historically, leaf blower regulations have experienced push-back from landscapers. The Los Angeles leaf blower ban in 1998 inspired a hunger strike from Latinx gardeners, who argued their already-low wages and long hours would be negatively impacted by a ban (Purdum, 1998). The landscapers cited that less effective tools would make it more challenging to get the same amount of work done in one day, which would lower their profits and possibly cause bankruptcy. Strikers decried the focus on banning gardeners from using GPLBs rather than pressuring the industry to build quieter machines. A more recent example indicates that the Latinx gardeners in Palm Springs, California felt they were brought into the political process too late, resulting in a lack of trust between the gardeners and the city government (Lopez, 2019). With the ban in place, they are likely to work in other regions or cities without GPLB regulations.

A ban on the sale of GLGEs has important equity considerations. People in low-income communities and communities of color are exposed to the highest levels of pollutants, precipitating high levels of pollution-related illnesses (Bullard, 2007). By banning GPLBs,

[6] Due to this, racial and ethnic categories in Table 2 do not sum to 100%

[7] This is how it is asked on the Census, elsewhere in the report we will use the more modern and inclusive Latinx.

those exposed to the highest concentration of air pollution from them will likely experience the largest reductions in potential pollution exposure; i.e., operators will benefit by using cleaner equipment.

As landscapers are often part of communities of color, banning GPLBs and other GLGEs will directly reduce the pollutants they are exposed to. However, these workers express both antipathy and support for GPLBs, indicating caution in assuming that banning GPLBs will be widely accepted in the landscaper community. We are not making the assertion that reduction in pollution exposure to landscapers, especially BIPOC landscapers, is preferable to losing out on productivity-enhancing technology like GPLBs for landscapers. Further work is needed here to understand the full range of sentiments that landscapers hold on GPLBs; we begin to do this with our analysis in this report but believe that more work is needed due to significant gaps in the data.

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CHAPTER 3:

METHODS

3.1 Introduction

This chapter outlines our research design and methodology. We approached this work with a post-positivist mindset, defined as presenting knowledge as objective but potentially containing context-specific error. This paradigm allowed us to consider our findings as objective and potentially transferable or generalizable to Seattle’s context while acknowledging that context may also shape the information and perspectives shared with us through our research strands. Essentially, this means we consider what information gained is most applicable to Seattle and what might be context-specific to the case studies we examined.

To answer our research questions, we built a mixed methods research design consisting of three components: a literature review, interviews (our qualitative strand), and surveys (our quantitative strand).



3.2 Literature Review

In Chapter 2, we analyzed previous literature and articles regarding the environmental and health impacts of GPLBs. We also reviewed articles outlining previous policies regarding GPLBs to understand what policies have worked for other cities. The information gained from the literature review informed our interview protocols and survey instrument, as well as our analysis and final recommendations.

The literature review was not systematically conducted due to the informal nature of most information on leaf blowers and the high ratio of gray literature relative to academic literature. Through citation databases, such as Web of Science and Google Scholar, we located academic literature. Google searches using key phrases such as “leaf blower health impacts,” “gas-powered leaf blower policies,” etc. helped us identify our initial literature sample. The sample included, but was not limited to, industry websites and papers, newspaper articles, academic papers, policy databases, and personal blog posts. Our client also provided a trove of internal emails, internal memos, and external news articles gathered by the City.

We mined the citations of initial sources to gather additional ones until data saturation, where no additional insight was being gained from newly identified sources. The final literature review cannot be considered systematic due to the lack of a methodical process or bounds on times, sources, or search terms; however, the literature review is appropriate and comprehensive due to the data saturation threshold being met. The findings from the literature are also supplemented by our other qualitative and quantitative research strands.

3.3 Sampling Methodology

Due to the many stakeholders involved in a potential Seattle policy, as well as the need to examine other cities’ implementation paths, our study uses multiple sampling methods to build out the needed samples for our qualitative research strand. Each is identified in its own section below.

Purposive Sampling: a non-probability sampling technique where the researcher relies on their discretion to choose variables for the sample population.

Snowball Sampling: a method in which researchers recruit initial subjects to be in a study and then ask those initial subjects to recruit additional subjects to be in the study.

3.3.1 Case Studies

To inform Seattle's policy and learn lessons from other jurisdictions, we researched cities, counties, and states who have successfully banned or are in the process of phasing out GPLBs. We analyzed recent bills, resolutions, and ordinances restricting the use of GPLBs within the last five years, as well as public sentiment, to determine which methods had the potential to be successful in Seattle.

We then selected city and county governments to conduct interviews with key employees in the policy process. To build our sample, we purposively selected jurisdictions with demographics similar to Seattle in terms of population, political partisan composition, and recency of policy action. We also took each jurisdiction's physical climate into consideration but treated it as a secondary criterion. Climate considerations were important, as landscaping and gardening work can change depending on precipitation levels, weather patterns, and ecosystem characteristics.

Using these selection criteria, we identified Oakland, CA; Washington, D.C.; and Multnomah County, OR as our case study locations. We excluded jurisdictions with bans or phase-out plans for GPLBs that have smaller populations, such as Beverly Hills, Santa Barbara, and Palo Alto. We considered these types of jurisdictions as being insufficiently like Seattle to be informative for this study's purposes. Unfortunately, we were only able to conduct interviews for Multnomah County and Washington, D.C. To partially substitute for the inability to include Oakland, we spoke to officials at CARB, who had recently begun implementing state-level legislation phasing out SOREs.

3.3.2 Landscaping Service Professionals

We created a survey to send to landscaping businesses to gather the perspectives of those who use GPLBs daily. We used business license data from the City of Seattle to locate a preliminary population of local landscaping businesses and identified a list of over 900 organizations. Using this list and an additional one from the Women and Minority Business Enterprise (WMBE), we randomly selected businesses to sample by phone and email.

Surveys were completed over the phone if possible; if a business or individual communicated interest in taking the survey but did not have time, we followed up with them by emailing them both an English and Spanish survey. We left voicemails containing our contact information for businesses we were unable to reach. We also identified a team of landscapers at the University of Washington (UW) and reached out to the Washington Association of Landscape Professionals (WALP) and Casa Latina, a local Latinx hiring service, to further build our sample of gardening service employees. Unfortunately, conversations with WALP and Casa Latina did not result in action.

We acknowledge the selection bias present in the listed organizations above, as landscaping companies have to actively self-report to such platforms. To counter the selection bias and to improve the inclusiveness of our sample, we decided to look for community-based landscapers from bulletin boards in neighborhoods, Facebook community groups in neighborhoods around the city, Bark.com, Yelp, Yellow Pages, and other media that would allow us to reach smaller and family-owned businesses. This resulted in a final sample of 150 businesses that operate in Seattle; however, we only heard back from 13 individuals despite repeated attempts.

3.3.3 Other Key Stakeholders: City of Seattle Employees and Citizen Advocates

Our process engaged stakeholders within and outside of the City of Seattle government. We utilized a snowball sampling strategy, starting with sources provided by the client, to gain insight into the policy process and legislative barriers related to GPLBs. We also identified citizen advocates to understand how GPLBs impact local communities and residents' views of GPLBs. One group is Quiet Clean (QC), a decentralized network of residential advocacy groups located in many of the cities that have passed or are considering these policies. Members of Quiet Clean are generally interested in ending or limiting leaf blower use due to noise and air pollution concerns; they have brought these concerns to policymakers to push legislation forward on the issue. Employing more snowball sampling, we identified members involved with Quiet Clean Seattle (QCS), Quiet Clean D.C. (QCDC), and Quiet Clean PDX (QCPDX) from initial contacts at each organization.

3.4 Interviews

We used a semi-structured interview approach to collect insight into the policy process and the barriers associated with GPLB policy. This format allowed for flexibility and open-ended responses, while still having a set of questions to guide the conversation. Using similar interview questions for each interview "set" ensured the collected information was relatively comparable between interviews.

We developed three sets of interview questions: one targeting policy analysts and bill sponsors from case study jurisdictions, one targeting City of Seattle and King County employees, and one targeting residential advocates. Some of these templates required adjustment on a per-interview basis due to the wide variety of interviewees required for this study. A full list of our interview questions is provided in Appendix A.

3.5 Survey

We surveyed landscape employees in Seattle to obtain their view on the importance of leaf blowers to their work and any potential impacts they would feel from a ban. A survey instrument was developed on Google Forms and distributed via email to these businesses. The survey includes a Likert scale, yes/no questions, and open-ended questions to allow for quantitative and qualitative data collection. The survey was developed in both English and Spanish, as we learned from the literature review that a large percentage of landscapers are of Latinx origin. We contacted 150 landscaping businesses; if there was no response, we reached out a second time. A full copy of our survey instrument is provided in Appendix B.

3.6 Data Analysis

We conducted a qualitative and quantitative analysis of our interview and survey results, to identify similar themes. While interviews did not generate transcripts (as many respondents were uncomfortable with being recorded), extensive notes were taken during meetings. Therefore, our analysis focused on the content and not the wording of answers to interview questions or frequency of themes.

A codebook was developed inductively based on the notes from all interviews, regardless of stakeholder. The themes, subthemes, and codes identified all pertain to the research question, focusing on aspects of implementation paths for a bill such as barriers, opponents, allies, process, policy details, and key figures. Multiple coders were used on each piece of data (i.e., interview transcripts or notes) to ensure intercoder reliability.

Survey data was analyzed using qualitative and quantitative methods. Responses to open-ended questions on the survey were analyzed using a similar process to the interview notes. Numerical survey data were graphed; these visualizations – as well as measures of central tendency and outliers – were analyzed alongside coded interviews and qualitative survey responses to identify commonalities and connections between them, as well as points of difference. Results of all analyses are outlined in our analysis (Chapter 4) and were used to inform our policy design and implementation path recommendations (Chapter 5).

3.7 Limitations

Our samples were built out of purposive and snowball sampling, increasing internal validity but reducing generalizability. Sample sizes were small due to the difficulty of reaching target populations, especially local stakeholders such as residents and landscaping companies. Response bias likely impacted the results of our interviews and surveys, as many may have not replied due to lack of interest or capacity.

Language barriers also limited our results, though we attempted to reduce this by providing the survey instrument in both English and Spanish. The lack of full interview transcripts inherently colors our findings, as they are based entirely on interview notes, reducing content integrity. The comparison of key themes between our interview and survey data was also limited in scope, given the differences in questions asked and the informal nature of the interviews.

10 lbs

CHAPTER 4: ANALYSIS

4.1 Introduction

Chapter 4 lays out the results of our interviews, survey responses, and a site visit to the Densmore SPR facility. Throughout the interviews, we kept extensive notes and used these to identify major themes and subthemes, discussed in 4.2, pertinent to the research questions. In section 4.3, we discuss the results of our survey. Finally, in Section 4.4, we synthesize the findings of our interviews and survey responses to find common themes and differences, noting the limitations of this approach.

We interviewed the following individuals and groups: Seattle City government officials; the main organizer of QCS; government officials from Washington, D.C., Multnomah County, OR, and Oakland, CA; officials from CARB; representatives from QCPDX, a member of 350 Seattle, King County staff, and Puget Sound Clean Air Agency staff. These interviews provided us with evidence that both affirmed and expanded what we found in our literature review, and provided varied examples of how a ban or phase-out of GPLBs can be done at the city or county level.



4.2 Key Themes from Interviews

This section will dive into the overlapping themes and subthemes identified across our interviews. We interviewed a wide variety of stakeholders across our case study jurisdictions and Seattle. The analysis below synthesizes the results of coding these interviews for themes. Here is the full list of themes identified through our analysis:

1. Barriers: obstacles that prevent stakeholders from transitioning, or passing policies to transition, away from GPLBs.

- a. **Capacity constraints:** the time and energy available to stakeholders to engage with the GPLB issue
- b. **Cost:** the financial burden of transitioning for governments, organizations, and individuals
- c. **Education:** lack of knowledge on key issues related to leaf blowers
- d. **Electrification:** the need for more robust electric infrastructure
- e. **Enforcement:** issues related to ensuring a policy is being implemented and landscapers and residents are not still using GPLBs
- f. **Policy opposition:** opposition from people against leaf blower regulation in the political arena
- g. **Technology:** the lack of affordable and efficient ELBs creates operational challenges for professional landscapers and gardeners

2. Goals and Actions: ways in which jurisdictions and organizations are attempting to limit the use of GPLBs in their communities through policy and goal-setting.

3. Outreach: a government or organization's efforts to involve the community, politicians, and landscapers in their plans to phase-out or ban GPLBs.

Figure 3: Major themes and subthemes from interviews

4. Perception: the ways a landscaping organization conceptualizes leaf blowers

- a. **Personal vs. Organizational Desires:** harmony or dissonance between the goals and/or desires of individuals within the organization and those stated by the organization as a whole
- b. **Openness to Compromise:** the flexibility of the organization to compromise with opponents of gas-powered leaf blower regulations
- c. **Crew reflection:** how crew members feel about the use of ELBs vs. GPLBs and conditions for a smoother transition

5. People: The roles individual actors play in the process of passing GPLB regulations

- a. **Key Proponents:** individuals who play a role in advocating for GPLB policies, excluding landscapers^[8]
- b. **Collaboration:** the process of stakeholders working together to develop and inform policy decisions

6. Public Health: the impact of GPLBs on the health and wellness of operators, residents, and those nearby to GPLB use.

7. Disruption: the interruptive and distractingly noisy nature of GPLBs disturbs people's daily lives.

8. Equity: public policy should involve and compensate people based on their different circumstances

- a. **Procedural Equity:** how inclusive, accessible, authentic, and representative stakeholder engagement is during the policy development stage
- b. **Distributional Equity:** policy outcomes that promote fair distribution of benefits and burdens across all segments of a community, and prioritize those with the highest need

9. Jurisdiction: the legal authority certain jurisdictions have to pass legislation, set emissions guidelines, monitor and regulate pollutants, or provide public health guidance.

[8] Landscapers' perspectives are considered through our survey instrument (see section 4.3)

The following nine sections explore each theme and subtheme in detail throughout our interviews.

4.2.1 Barriers

Barriers constitute the different issues residents, landscapers, and government have faced during the transition from GPLBs to ELBs. It is a broad category, including political, technological, and psychological barriers. Below, sub-themes of barriers are identified and explored through the results of our interviews.

Barriers: obstacles that prevent stakeholders from transitioning, or passing policies to transition, away from GPLBs.

Capacity Constraints

a. Capacity constraints: the time and energy available to stakeholders to engage with the GPLB issue

Finite-time and energy impose capacity constraints on actors in any situation, and this presents a barrier to many stakeholder groups in the context of the ELB transition. Residential groups, landscapers, and government agencies all expressed how scarce capacity has been a barrier to the transition.

For organizations such as QCS or QCPDX, the involvement level of their members has directly led to the different outcomes each organization has seen. For QCS, whose members expressed having limited time and energy to focus on the GPLB issue, the number of active members and their mailing list is relatively small when compared to QCPDX. In Portland, QCPDX has multiple highly-active members in leadership roles which have resulted in increased levels of outreach. Given the role of witness testimony from residents in passing a GPLB ordinance in Washington, D.C. – which came from Quiet Clean D.C. – capacity constraints amongst residential interest groups like QCS have an impact on the feasibility of passing GPLB legislation in Seattle.

For both individual landscapers and larger businesses, capacity is a constraint in terms of applying person-hours to researching, testing, and purchasing new equipment. As battery technology has evolved quickly, landscapers noted that it is difficult to keep up with the latest technology that can help them make the transition away from GPLBs. CARB noted they attempted to address this specific capacity constraint by bringing trial electric equipment to landscapers to test out via roadshows. This is an ongoing process with promising early results in terms of exposing landscapers to available technology they might have to transition to given a GPLB ban or phase-out.

Finally, staff at the City of Seattle noted that capacity is a constraint for both politics and process. Policy windows provide a time when political capital can be spent on promoting an issue. Yet numerous attempts at escalating the GPLB issue (2014 and 2021) have seen little interest from city agencies, including when directed to research the issue from an SLI in 2021. In discussions with representatives from these agencies, they expressed that the issue was a lower priority for them, given their wide range of responsibilities. This extends to the work that might be necessary to conduct in the policy process, such as a stakeholder workgroup (see Chapter 5). The agency charged with drafting an ordinance would need additional capacity to manage this workgroup.

Cost

b. Cost: the financial burden of transitioning for governments, organizations, and individuals

The financial cost of transitioning to ELBs was cited by many of our interviewees as a barrier to transitioning away from GPLBs. Landscapers were concerned about the financial impact of purchasing an entirely new fleet of leaf blowers. In particular, the high cost of batteries (around \$500/battery)[9] was concerning, as several batteries are currently needed to keep one ELB running for a work period. As many landscaping and gardening businesses operate on thin profit margins, any additional costs can be burdensome. Policy analysts in Washington, D.C. estimated that the cost to each private business for the transition to ELBs would come out to roughly \$3,000.

For those in municipal government, expectations around cost as a barrier varied. While SPR and parks and recreation departments in D.C. and Portland expressed reservations about cost, their concerns are mostly that efficacy of ELBs is lower than that of GPLBs for the cost - so financing is less of a concern than the new technology. SPR and OSE indicated they would both need additional funding for any transition to cover labor, technology, and electrification infrastructure, as well as to fund enforcement measures. OSE has requested \$75,000 for two additional hires to proceed with policy enforcement and other logistics. Any potential buyback or rebate program (see Chapter 5) would also require funding.

The current funding for SPR comes from the City's General Fund, Seattle Park District fund, Seattle Park District property tax, Real Estate Excise Tax, and revenue from grants, user fees, rental charges, etc. The total appropriations proposed for 2022 is \$283,475,864 where \$187.6 million is allocated for department support and \$95.8 million for capital support (Aguirre, 2022). This is based on the assumption that participation and funding are restored to the pre-pandemic level. Many projects were cut or delayed in 2020 and 2021 due to insufficient funding; not all projects can be restored and SPR aims to prioritize the use of their funding on equity (Aguirre, 2022).

[9] This amount was brought up to us during the interviews and does not reflect current market price for batteries, which are in flux as the market matures.

Education

c. Education: *lack of knowledge on key issues related to leaf blowers*

The full range of harmful impacts that are associated with leaf blowers is not widely known, even among policymakers.

The lack of knowledge was a barrier to QCPDX's initial influence, as decision-makers were not as well-informed on the public health issues related to GPLBs and other SOREs as QCPDX was. The organization also had to help public decision-makers understand they had the budget, power, and public health responsibility to electrify leaf blowers and

other SOREs. While QCS have not yet had a similar experience, they have also conducted less outreach than QCPDX. Regardless, both organizations have attempted to proactively address any public lack of knowledge by including a large amount of literature on the health impacts of GPLBs on their websites.

As mentioned previously, landscapers have limited capacity to investigate electric alternatives to their current gas-powered equipment. Familiarity with the most cutting-edge technologies ranges from one landscaper to another, representing a gap between perceptions and reality that could be addressed by more intentional paths of education.

Electrification

d. Electrification: *the need for more robust electric infrastructure*

One significant barrier to a transition to ELBs is the lack of charging infrastructure in crucial spots. While batteries allow ELBs to be portable, those batteries must be charged. Given the short time they hold a charge, they either must be charged frequently, or many batteries must be kept on hand. As battery costs are relatively high, especially for the ones with the largest capacity, having the ability to charge while on a job is vital.

Unfortunately, much of SPR's current infrastructure, including work sheds and work vehicles, does not have the ability to charge many batteries. SPR employees revealed that a small number of batteries can be charged in the few offices the maintenance facilities have, with very limited capacity to charge more. There are also few parking spots for electric vehicles at SPR facilities. As vehicles would be the primary method of charging batteries in the field, this would limit how long a crew can be out on jobsites before having to return to the facility.

Densmore Site Visit

Image 1: Densmore Maintenance Shed Front View



Image 2: Electric Charging Station (two spots)



Image 3: Tool Sheds

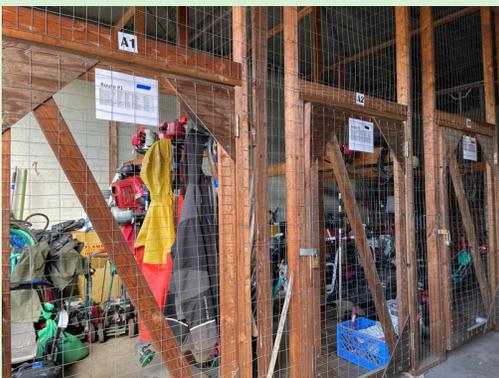


Image 4: Battery Charging Location (Densmore Crew Chief Office)



We were able to tour the Densmore facilities and see these issues in-person. There is only one small office inside the building, which is used to charge the batteries. The equipment is kept outside, locked up inside chain-link fence stalls, with no electric infrastructure in the stalls. There are two parking spots with charging stations for electric vehicles, but both were in use (for more photos, refer to Appendix C). The current electric vehicles SPR has are also too small to carry the landscaping equipment nor do they have the ability to charge batteries. SPR indicated that the Densmore facility was representative of the other facilities around Seattle, although we did not tour those in-person.

SPR suggested solutions, such as procuring electric trucks, more charging stations for batteries, and an overall expansion of electric infrastructure (see Chapter 5). However, they also noted that funding is usually put towards public-facing projects, instead of improving the internal workspace.

Enforcement

e. Enforcement: *issues related to ensuring a policy is being implemented and landscapers and residents are not still using GPLBs*

The issue of ensuring compliance with a GPLB ban was discussed by government employees in D.C., Seattle, and Multnomah County, OR. Enforcement is difficult to carry out, as many jurisdictions do not have the authority to enforce much beyond noise thresholds, and noise complaints must be followed up promptly to be enforced. However, as air quality is typically the purview of the federal or state governments, cities and counties have turned to noise ordinances to institute GPLB bans. Only California has the authority to regulate SORE usage based on air quality, due to their CAA waiver.

D.C. has managed the issue of compliance by hiring for two positions that enforce noise complaints as well as banning the sale and use of GPLBs. We discuss this at length in Chapter 5, as it forms part of our policy recommendations. In Seattle, discussions with SPR and budget analysts indicated that should GPLBs be banned, enforcement responsibility would likely be given to the OSE. OSE is a small office with limited capacity for enforcement, especially enforcement of the involved measures necessary to follow up on complaints. OSE will likely require additional staff to expand its capacity.

A city-level ban on sales of GPLBs is not as effective for ending residential or landscaper use because people can travel outside Seattle to purchase them, a barrier that all our case studies acknowledged without proposing any specific solution from an enforcement perspective. However, this did lead individuals in both case studies to consider or implement the concurrent ban on use.

Policy Opposition

f. Policy opposition: *opposition from people against leaf blower regulation in the political arena*

Bans on GPLBs, while popular among residents, do face some external and internal issues at the municipal level. All our case studies indicated that people in the landscaping industry were especially concerned about a potential ban. Local parks and recreation departments also gave pushback to GPLB bans internally. Both are unsurprising; landscapers and parks department workers are the primary users of GPLBs professionally and they more directly recognize barriers to a transition to ELBs.

Further pushback in Oregon came from conservative politicians, although this was primarily constrained to the state legislature. QCPDX initially petitioned the state for action before

turning to the local level. There, the Oregon Outdoor Power Equipment Company represented the most vocal lobbying opposition; they sell electric equipment and want to retain the ability to sell GPLBs as well.

In D.C., landscaping companies such as the Apartment and Building Operators Association opposed a ban and solicited testimony at public hearings; however, a lack of significant lobbying effort weakened the bill. City staff mentioned that many people in the landscaping industry acknowledged that GPLBs would likely be phased out in the near future due to the acceleration of new battery technologies. Landscape workers supported the bill if it included a significant transition period to allow time to switch to ELBs (Fallows, 2019).

Technology

g. Technology: *the lack of affordable and efficient ELBs creates operational challenges for professional landscapers and gardeners*

While battery technology is improving, ELBs still pose many issues from a technological standpoint. Cordless ELBs are easy to carry around and lighter than GPLBs, but the battery life is significantly shorter than what can be achieved with a tank of fuel. Backup batteries or readily available charging stations are thus required. The use of corded ELBs depends on the available number of outlets, which is especially challenging for larger areas.

Both the City and landscaping companies acknowledge that the operational challenges of ELBs represent one of the most significant barriers to their uptake. SPR staff believe existing ELB models are insufficient in assisting workers with their workload. While they noted battery technology is improving, ELBs are still not comparable to GPLBs in terms of efficiency (wind speed), length of use for one charge/tank of gas, or cost. Particularly, SPR employees stated that in situations where large amounts of compacted wet leaves need to be cleared, ELBs are incapable of performing at the same level as GPLBs. Transitioning to ELBs would likely mean increased work hours due to the difference in tool capacity. Manual alternatives such as rakes, which SPR staff view as more comparable to GPLBs in terms of their efficiency of clearing wet leaves, pose a much-increased risk of back injuries and take even longer than ELBs at accomplishing the same tasks.

It is unclear whether these beliefs about the limits of ELBs are formed based on the most recent technology or on past experiences since the technology is constantly evolving. However, it is important to recognize that all parties identified technology as a limiting factor to their use of ELBs.

4.2.2 Goals and Actions

During our interview process, we discovered there are many ways in which jurisdictions and organizations are attempting to limit the use of GPLBs in their communities through policy and goal setting.

Goals and Actions: ways in which jurisdictions and organizations are attempting to limit the use of GPLBs in their communities through policy and goal-setting.

SPR aims to replace 50% of its GPLBs with ELBs by 2026, and there is a limited budget set aside for this gradual transition (Aguirre, 2021).

To work towards a more ambitious goal of entirely phasing out City GPLBs in the same timeframe, cost would be a significant barrier. SPR is also working on front-end designs of public spaces to limit the use of GPLBs. For example, they are considering changing the types of trees planted to limit the amount of fallen leaves. They are also improving

the designs of garden beds to ensure that falling leaves land in the garden beds and break down naturally, rather than on concrete, grass fields, or other areas that would require clean up.

Washington, D.C.'s implementation plan to phase out GPLBs provided landscape workers with a four-year transition period to switch to ELBs. To alleviate the costs associated with ELBs, D.C.'s city government also provided income-based subsidies to help private companies transition. The rebate program is run through D.C. Sustainable Energy Utility (DCSEU), an organization that operates under a performance-based contract with the district's Department of Energy & Environment (DOEE). The program's funding does not come from the City's budget, but instead from the fees collected by DCSEU. The D.C. GPLB ban is primarily enforced through noise complaints, which are handled by the Office of Consumer and Regulatory Affairs. Owners of GPLBs are fined if found in violation. Council staff noted that staffing limitations present a challenge to enforcement.

Portland and Multnomah County have passed resolutions to phase out the internal use of GPLBs by 2025 and build adequate charging infrastructure for ELBs. The resolutions also aim to increase education about the health and environmental impacts of GPLBs. Finally, the resolutions mandate the development of a City-County-Stakeholder Workgroup to explore the possibility of an equitable phase-out of GPLBs throughout the county and city. Because GPLBs produce noise at a level that risks public health, government officials are considering using Multnomah County's Health Department to justify a GPLB phase-out on the grounds of the

noise being harmful. Enforcing a phase-out of GPLBs county-wide will be discussed and decided upon in the workgroup. Staff predicts the County will come to put a ban on the sale of GPLBs as part of the phase-out rather than relying on residents filing complaints. Previous compliance systems around wood smoke in Multnomah County that rely on resident reports are inordinately slow in turnaround and have not been very successful. Similar ordinances have been passed in Seattle but the compliance systems have also not been successful.

QCPDX has made many inroads with local communities and elected officials. The Portland and Multnomah County resolutions were crucial victories for QCPDX in their fight against GPLBs, and much of their backing came after strong and persistent outreach efforts throughout several years.

CARB is also going to form a workgroup with landscapers in the latter half of 2022 to hear about their experiences with the transition to electric equipment and to help them better understand the regulations. The workgroup would also help clear up misconceptions and ensure landscapers are aware of existing financial incentives (detailed discussions of incentives are in section 4.2.8). This differs from the Multnomah workgroup in that it will be created after legislation has been passed, as opposed to the Multnomah group's stated purpose of informing and drafting the legislation.

4.2.3 Outreach

Implementing GPLB legislation required bringing together different stakeholders in influential positions in the case studies we examined. Other forms of outreach among NGOs have also proved influential in moving forward legislation on this issue. The following paragraphs describe the ways in which we noted types of outreach occurring within the efforts of groups we interviewed.

Outreach: a government or organization's efforts to involve the community, politicians, and landscapers in their plans to phase-out or ban GPLBs.

City of Seattle staff noted that certain key outreach efforts should be taken on prior to policy development and implementation. The City should engage with local communities by informing them of the phase-out and getting their feedback. Seattle should also

engage local landscapers by informing them of possible policy implementation, listening to their concerns, and assessing their financial ability to make the transition away from GPLBs.

The Quiet Clean organizations typically rely on citizen support and testimony to back their proposals to local governments. The QCS organizer discussed at length a disinterest in a petition or a mailing list as an end goal, citing websites such as change.org that rarely move the needle on important issues. Specifically, when someone signs a petition, it is not clear if they have any knowledge or consideration for the actual text of the petition. Thus, QCS is looking to sign people up for a specific effort, whether that is talking to their council members

or offering testimony. The organizer mentioned that the topic was under discussion amongst QCS leadership. In the interim period, they are focused on building up their emailing list to 5,000–10,000 members. The goal is to demonstrate the public’s passion and interest in a bill to the council, increasing positive feedback for potential legislation.

QCPDX conducted outreach towards local politicians, landscapers, and the public. For politicians, QCPDX members contacted councilmembers and commissioners to find people sympathetic to their cause at those levels. Moreover, QCPDX has reached out to people at the state level to inform them of their desire to ban GPLBs and gained considerable visibility from this. After the unfortunate passing of one of their most valuable champions of the issue at the City of Portland, QCPDX pivoted to continuous outreach to local councilmembers that were the least interested. QCPDX members have conducted extensive outreach to build long-lasting relationships with different landscapers. Moreover, many landscapers have reached out to QCPDX to discuss the issue through a directory on the QCPDX website. The organization hopes to build testimony from landscaping companies that have switched completely to electric tools. QCPDX has found success with the public via small campaigns: letters to the editor, radio talk shows, and other public avenues. Because of QCPDX’s extensive outreach, they are particularly important in helping build out Portland and Multnomah County’s workgroup.

CARB also leads significant outreach while enforcing the state’s regulations on all SOREs. Their efforts are in three stages: prior, during, and after passing regulations. CARB staff attended many landscaping expos prior to the regulations to help get landscapers on board and inform them of the coming rules. CARB also runs the Zero Emission Roadshow that displays zero-emission SOREs and lets landscapers test the effectiveness of electric equipment, like ELBs. Throughout these events, CARB was able to gather user information about landscapers’ views on electrification of their equipment. There is a public comment period during the rulemaking process, during which the public has 45 days to comment on the proposed regulations. The stated opinions and proposals are to be taken into consideration when finalizing rules. Now that the regulations have been passed, CARB will form a workgroup with landscapers in the latter half of 2022 to discuss issues related to the regulations.

4.2.4 Perception

This section compiled how the interviewees and their organizations perceive the use of leaf blowers. It is further broken down into three subsections including personal vs. organizational desires, openness to compromise, and SPR crew reflection.

Perception: the ways a landscaping organization conceptualizes leaf blowers

Personal vs. Organizational Desires

a. Personal vs. Organizational Desires: *harmony or dissonance between the goals and/or desires of individuals within the organization and those stated by the organization as a whole*

All interviewees expressed negative personal feelings towards the use of GPLBs, especially the residential representatives. QCS and QCPDX initially tackled this issue by focusing on reducing noise pollution in their neighborhoods. QC organizations have since learned of the various health and environmental impacts that leaf blowers and other SOREs pose to operators and residents. This resulted in a slight difference in goals and views between the individual members of the organization and their consensus opinions. For example, the organization is only focused on leaf blowers while some members would like to expand to all SOREs due to their associated emissions and air quality impacts, following California's policies.

SPR is aware a transition to ELBs is inevitable, but are concerned with how this would effect the crew's ability to get work done. SPR currently has an internal goal to transition 10% of their GPLBs to ELBs every year, reaching 50% ELBs by 2026. While they personally would love to expedite the transition, they must consider a reasonable transition timeline based on existing tool efficiency, and more importantly, infrastructure capacity.

Charging infrastructure for ELBs is nonexistent throughout the city except for at maintenance facilities, which impacts how long a crew can be out on job sites before having to return to the facility to charge ELB batteries. SPR mentioned that the City has been trying to get electric trucks with the ability to charge batteries for ELBs, but that they are unsure how many they will receive and when. SPR noted that if they had electric trucks to charge batteries in the field, it would make the transition more feasible for crewmembers because they would not have to return to work sheds to exchange and charge batteries.

Openness to Compromise

b. Openness to Compromise: *the flexibility of the organization to compromise with opponents of gas-powered leaf blower regulations*

QCS noted that while members' goals may include further legislation, they are open to limited use of leaf blowers, gas-powered or otherwise, if some situations require them. Thus, their position is not rigid and can be flexible given the context of what is achievable. QCS is currently trying to outline their exact position on all the relevant issues, further illustrating commitment to deliberation and compromise internally.

Crew Reflection

c. Crew reflection: *how crew members feel about the use of ELBs vs. GPLBs and conditions for a smoother transition*

During our maintenance shed visit, the district chief noted the general feeling towards ELBs among crewmembers in their district was negative because ELBs are just not as effective as GPLBs for anything other than small parks during dry periods. ELBs last around 45 minutes on one charge, whereas GPLBs last one hour to one and a half hours on one tank of gas. This impacts crew efficiency throughout the day, during which they work on many jobsites.

SPR has done a pilot run of using ELBs in a few districts around Seattle in 2019. Crews liked ELBs' lightweight quality and their lower noise level but have trouble with their short duration and limited effectiveness to complete required work. For smaller-sized parks and places with larger concrete areas, ELBs are effective at maintenance. For example, the Seattle downtown maintenance crew uses mainly battery-powered leaf blowers, but crew staff still need to use GPLBs to clean up any wet, compacted leaves during autumn.

4.2.5 People

This section compiled how the interviewees and their organizations perceive the use of leaf blowers. It is further broken down into three subsections including personal vs. organizational desires, openness to compromise, and SPR crew reflection.

People: The roles individual actors play in the process of passing GPLB regulations

Personal vs. Organizational Desires

a. Key Proponents: *individuals who play a role in advocating for GPLB policies, excluding landscapers*

Our interviews with QC advocates highlighted the importance of key actors leading efforts to bring the topic of GPLBs to the policy agenda. In D.C., residents were the most vocal about their support for legislation to phase out GPLBs. Neighborhood associations campaigned on the platform of noise pollution and its disruptive effects on local neighborhoods and sat in on public hearings to make their voice heard. This ultimately helped spearhead efforts to ban GPLBs and push a bill forward through D.C. legislation.

Community support for GPLB legislation is also robust in Multnomah County and Portland. QCPDX has been organizing for more than four years and has garnered support from several hundred community members. Members have been vocal about their support for GPLB regulations and have provided public testimony at local hearings. Multiple environmental

groups also support regulatory action on GPLBs. While residents, environmental justice (EJ) groups, and community-based BIPOC organizations in all cities discussed dislike for GPLBs, many said banning them is often not a top priority.

Collaboration

b. Collaboration: *the process of stakeholders working together to develop and inform policy decisions*

QCPDX and QCS emphasized the role of collaboration in the policymaking process. QCPDX has leveraged their large membership by having each member fill a different role in the organization. This includes (but is not limited to) a newsletter editor, a technical presenter, and a researcher. Most work was on outreach to the different groups and elected officials in their network. Outreach has been an issue with QCS, as they have a smaller membership and thus lower capacity to fill needed roles.

At the governmental level, collaboration is also key when developing policy. To determine the best path toward a GPLB phase-out, Multnomah County has collaborated with local landscaping companies. The County has a standing contract with the OLCA, which has helped identify landscaping contractors and businesses. The County has also made efforts to work with culturally-specific organizations, particularly Latinx organizations. Staff found the best way to interact with and involve landscaping companies and employees is to reach out to community-based organizations.

King County Staff noted there have been a few examples of city-county collaboration. The staff mentioned collaboration between the Seattle-King County Public Health Department and the Puget Sound Clean Air Agency (PSCAA) to distribute box fans to filter out wildfire smoke to the community. Staff said that similar collaboration to transition to ELBs may be a viable option if there is the capacity to do so, although there are jurisdictional limits. Collaboration across City departments has been difficult, however. Staff at SPR noted a lack of communication between departments and a disconnection between policymakers and on-site staff.

4.2.6 Public Health

Public health was another key theme across interviews. The impacts of GPLBs on the health of operators and residents was mentioned in each interview, even if it was rarely a focal point.

Public Health: the impact of GPLBs on the health and wellness of operators, residents, and those nearby to GPLB use.

Residential groups acknowledged that health effects of GPLBs are a problem

for operators and those nearby. Both QCPDX and QCS emphasized the toxic emissions and

fugitive dust from GPLBs and other gas-powered lawn equipment. D.C.'s policy advisor noted that QCDC also acknowledged public health concerns; however, advocates decided to focus on noise pollution rather than emissions because of the limited jurisdictional ability to regulate based on emissions.

In Seattle, OSE calculates emissions data every few years. The most recent report said that GPLBs only represent less than 1% of SPR's GHG emissions. However, OSE acknowledged the output of fine PM was likely significant, although no specific data was provided. King County staff noted that pollutants emitted from GPLBs directly impact operators as well as nearby residents, making this a public health issue. Transitioning to ELBs in a way that protects the health of landscapers and reduces emissions, while also avoiding shifting disproportionate cost burdens onto small landscaping companies, is important to King County staff. CARB advisors mentioned they have reviewed preliminary data on the health exposure of SORE users and the results showed an uneven distribution among demographics. We were not shown the final numbers from CARB's analysis; refer to Section 2.7 for demographic information.

4.2.7 Disruption

This section talks about the disruptive nature of leaf blowers. The noise and nuisance aspect of GPLBs was one of the main drivers for QC organizations to pursue legislation on this issue.

D.C. residents were the most vocal about their support for the bill, and they campaigned

Disruption: the interruptive and distractingly noisy nature of GPLBs disturbs people's daily lives.

on the platform of noise pollution and its disruptive effects in local neighborhoods. QCDC and neighborhood associations – such as the ANC – sat in on public hearings and helped push the bill forward.

Likewise, the organizers of QCS and QCPDX were spurred to action after discovering how disruptive leaf blowers were to their day-to-day ability to focus at home. The QCS organizer started working from home in 2019 (prior to the COVID-19 pandemic), and the sound of leaf blowers at all hours of the day interrupted their ability to concentrate and focus. Although the organizer recognized that others have different abilities to “tune out” loud noise, it seemed likely that there were others facing the same issue. This led to the organizer posting about the issue on NextDoor, a neighborhood-based social media app and website, and subsequently receiving messages from others interested in taking action. A series of meetings slowly developed over the next three years that led to the establishment of QCS.

4.2.8 Equity

Equity was discussed in nearly every interview. For jurisdictions that have passed regulations to transition away from GPLBs, staff identified two equity considerations in different stages of the

Equity: public policy should involve and compensate people based on their different circumstances

policy-making process. One aspect is procedural equity, which emphasizes inclusion and collaboration in policy development. Another is distributional equity, which focuses on the policy outcomes and whether the policy fairly distributes the benefits and burdens across all who are affected.

Procedural Equity

a. Procedural Equity: *how inclusive, accessible, authentic, and representative stakeholder engagement is during the policy development stage*

Staff from case study jurisdictions described how they engaged stakeholders during the policy process. D.C. Council staff acknowledged that equity was not explicitly incorporated into their bill-making process, although they did consider impacts on distributional equity (see the section on distributional equity below). Multnomah County staff said the resolutions passed by the County and Portland incorporate ideas from Multnomah County's 2018 EJ Resolution. This resolution stated that the communities most impacted by policy decisions should be centered and included in the discussions around said policy decisions. The Portland and Multnomah County resolutions have embodied the EJ initiative through the workgroup, which is currently meeting. City and County officials are working in a collaborative process with landscaping and gardening companies, environmental organizations, and other key stakeholders who might be negatively impacted by the emissions and noise of GPLBs and/or financially impacted by a ban or phase-out of GPLBs in Portland and Multnomah County.

Distributional Equity

b. Distributional Equity: *policy outcomes that promote fair distribution of benefits and burdens across all segments of a community, and prioritize those with the highest need*

Staff from 350 Seattle raised an important concept: Just Transition values. They define a societal-level "Just Transition" as "moving away from an economy that treats people and the planet as objects to a cyclical economy that values people and the world as things we are dependent on" so that no one is left behind. The transition must first prioritize those who have been shut out of the current economy and wealth building. A question to keep in mind is, "How can a policy that is about transitioning away from

"How can a policy that is about transitioning away from fossil fuels also create wealth and help BIPOC and lower income communities get access to good, living wage, union jobs?"

fossil fuels also create wealth and help BIPOC and lower-income communities get access to good, living wage, union jobs?” This ties in with the core values of distributional equity and helps policymakers prioritize those with the highest need.

King County staff emphasized the importance of a policy that phases-out GPLBs in a way that protects the health of landscapers and reduces emissions, while also avoiding disproportionate cost burdens on small landscaping companies. We discuss ways to do this in Chapter 5.

Both Multnomah County and CARB have reviewed preliminary data on the health exposure of GPLB and SORE users. The results indicated an uneven distribution among demographics. The essentiality of GPLBs to employees’ everyday work puts losing GPLBs akin to losing some peoples’ livelihoods if there is not an affordable and broadly accessible alternative offered (CLCA, 2019). Multnomah staff believe most garden and landscape companies employ a disproportionate number of BIPOC employees, who are already more likely to be disadvantaged financially in Portland and Multnomah County (Mechling, 2020). CARB has also considered the high price of equipment replacement for landscapers, leading them to promote the necessity of a slower transition and incentives.

Incentives are critical for businesses to transition because of the high up-front cost that disincentivize switching to electricity. In California, each air district imposes its own style of incentives. For example, the South Coast Air district has a large incentive program for landscapers that are funded through a US EPA grant; Santa Barbara funded their incentive program through Department of Motor Vehicle (DMV) fees; the Bay Area funded their incentive program through penalties they have collected, etc. The CA government provided a \$30 million fund per a legislature request for small landscaping companies to buy new electric equipment without them trading in their gas-powered equipment. The \$30 million governmental fund has not been fully implemented yet, so there is no evaluation of whether it is sufficient for supplementing small businesses.

While D.C. did not incorporate equity considerations during the bill-making process (i.e., procedural equity), they did consider the equity of outcomes. To manage this, they developed a system of income-based subsidies, a rebate program, and a four-year phase out period. These were implemented with the intent to relieve the cost burden placed on landscaping companies when switching to ELBs. Additionally, community outreach was conducted to inform landscapers and residents about the upcoming policy change. Information about alternatives to GPLBs was also provided during outreach to encourage a smooth transition to ELBs.

4.2.9 Jurisdiction

The authority an agency has to make legislation banning GPLBs – or what element of GPLB impacts they were able to regulate – was a repeated theme throughout our interviews with policy advisors in D.C. and Multnomah County, as well as with Seattle and King County staff. There are different degrees of authority across city, county, and state jurisdictions. This section discusses the ways jurisdiction came up throughout our interviews.

Seattle City Staff mentioned that GPLBs can be regulated through many mechanisms

Jurisdiction: the legal authority certain jurisdictions have to pass legislation, set emissions guidelines, monitor and regulate pollutants, or provide public health guidance.

due to their noise, public health, and climate impacts. The City could likely regulate GPLBs from a noise and nuisance standpoint. It will be difficult to proceed with a policy from a public health standpoint because the City does not individually regulate public health. Public health is coordinated jointly with King County. The City nor the County have the ability to directly regulate equipment from an emissions standpoint, due to limitations in the CAA. We note that a full legal opinion has not been provided to us by the City, and further legal analysis is required here to note if there are specific other mechanisms that can regulate the sale or use of GPLBs.

PSCAA monitors pollutants and outdoor air quality and has the regulatory authority to enforce standards set by the state. A state action would first need to be taken to regulate GHG emissions and PM from GPLBs, SOREs, or GLGEs before the PSCAA could enforce anything, however. King County staff also discussed the County's Climate Action Plan, which is centered around reducing GHG emissions with specific emphasis on emissions from the building and transportation sector.

In D.C., there were also jurisdictional constraints with public health and the federal preemption of emissions-related issues. However, the D.C. Council had authority over noise and nuisance, so set noise pollution regulations around GPLBs.

Multnomah County staff considered the regulatory power available to them and other local jurisdictions. The County has the legal authority to regulate public health, whereas the City of Portland only has legal authority over noise and nuisance. Addressing the leaf blower issue from both a public health and noise and nuisance standpoint thus requires action from both jurisdictions. Staff believes that would provide the best chance at legally banning or phasing out GPLBs. Staff said that banning the sale of GPLBs makes it easier to track compliance within the county. Yet, as a ban would not extend outside the county, businesses could purchase GPLBs outside of the jurisdictional boundaries of Multnomah County and not be penalized. Thus, methods for compliance have not been fully established yet.

In California, many cities have banned the use of GPLBs or all SOREs. The recently adopted state-level regulations on all SOREs will go into effect in 2024 and will be implemented by CARB. While there is no coordination between state, county, and city-level efforts, CARB staff have not experienced any friction between different jurisdictions. Municipal regulations usually revolve around the use of equipment, whereas CARB regulations affect the manufacturing of new equipment. To some degree, local and state regulations bolster one another and make enforcement easier.

4.3 Seattle Landscaping Worker Survey

We reached out to 150 landscaping companies and workers via email, phone, and in-person conversations. Our outreach efforts resulted in 13 responses. 12 of the individuals reported using GPLBs for their work.

Out of the 12 respondents, nine work in residential areas; one works on school properties; one works on commercial landscaping; and one works in multiple areas. On average, respondents use GPLBs three to five days a week for two hours or less during peak season (fall and winter). Their work includes clearing walkways, landscaping/mowing, maintenance work, cleaning up unwanted debris for easier pickup, dust removal from installation work, and snow removal. Most indicated their working grounds are mainly on concrete surfaces. Eight out of the 12 respondents view GPLBs as very essential to their work. The

results are significantly skewed (Figure 2). However, respondents' personal feelings towards the use of GPLBs are more evenly distributed with three exhibiting negative feelings, four neutral responses, and five exhibiting positive feelings (Figure 3).

Figure 2: Essentiality of GPLBs (n = 12)

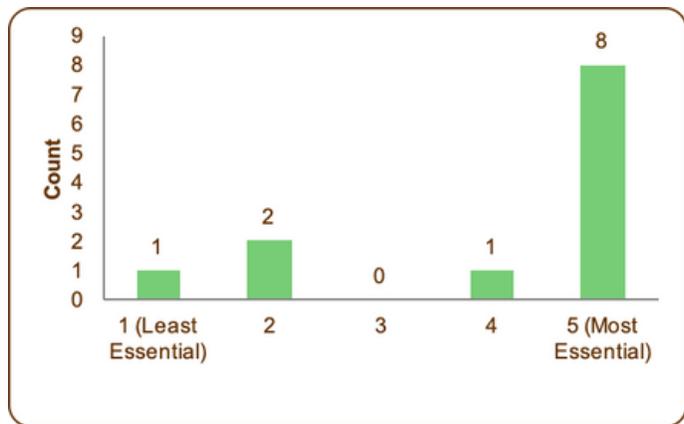


Figure 3: Personal Feelings Toward GPLBs (n = 12)

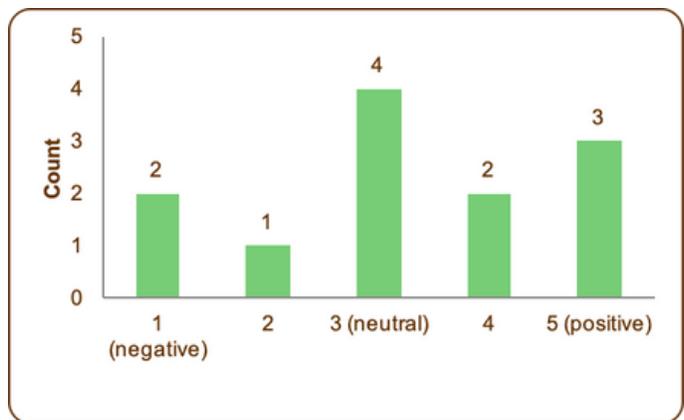
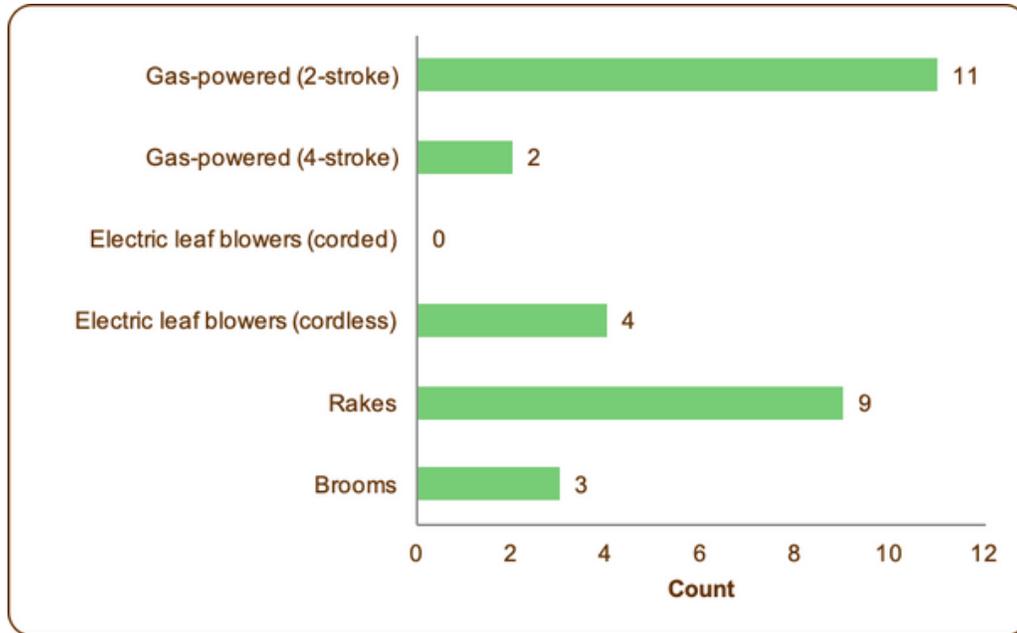


Figure 4: Types of Equipment Used for Work (n = 12)



The respondents use a variety of leaf-moving equipment for work, including gas-powered (2-stroke), gas-powered (4-stroke), ELBs (cordless), rakes, and brooms. The most common equipment used are gas-powered (2-stroke) and rakes (Figure 4). Out of the equipment that they use, nine respondents prefer to use 2-stroke GPLBs, two prefer cordless ELBs, and one prefers to use brooms.

For those who have not used ELBs before, nine respondents have considered transitioning, while three have not. Respondents who have not considered switching to ELBs expressed concerns over tool efficiency and battery power. One company also expressed that their existing GPLB turnover period is long, and they are not currently considering purchasing new leaf blowers. Overall, most companies have considered making the transition internally.

The last question on the survey instrument was open-ended, collecting landscapers' thoughts on a potential city-wide policy that phases out or bans the use of GPLBs. The respondents' concerns included the following seven themes:

1. **Alternatives are not comparable.** ELBs have a short battery life. Their batteries are not powerful enough for ELBs to move as many leaves as GPLBs, especially during fall season.
2. **Longer work period.** Due to ELBs' lower horsepower, it takes longer to complete the same amount of work.

3. **Higher cost burden.** As mentioned, ELBs have a short battery life. A top-rated ELB lasts up to 75 minutes. If a crew works on 15–20 lawns per day, it would require 4 or more batteries per crew to sustain their workload. This may force the company to raise their service prices to afford higher wages.

4. **Charging availability.** There are limited-to-no outdoor charging stations available to recharge their batteries during work in the field.

5. **Transition timeline.** Some respondents expressed concerns over the timeline of the transition. They would prefer a longer transition period.

6. **Financial incentives.** One response mentioned the necessity of a buyback program due to the high-cost burden on small companies. Another response asked for a financial incentive for switching to ELBs.

7. **Environmental concerns.** There are environmental concerns related to the production, recycling, and disposal of batteries.

4.4 Common Themes: Synthesizing Interviews, Surveys, and Documents

Comparisons between interview and survey data were limited in scope, given the differences in questions asked. Survey questions were solely focused on GPLB usage and potential barriers associated with a transition to ELBs, while interviews were informal and covered a wide range of topics. However, common themes emerged that we discuss below.

Across both interviews and surveys, similar barriers were identified, including the lack of comparable technology, the need for adequate charging infrastructure, and the high cost burden placed on small companies. Both methods also identified equity concerns over the transition timeline. Respondents and interviewees acknowledged that a transition to ELBs would require a buffer period to help businesses replace their current fleet and emphasized the importance of financial incentives to alleviate the financial burden. Transitioning to ELBs would also lower landscaper productivity, as they must adjust for the lower air velocity outputs of ELBs and the time and planning required to charge the batteries.

Environmental concerns related to GPLB usage were also mentioned in the survey responses and throughout our interviews; however, they differed in content. Interviewees often mentioned environmental concerns related to air pollution and public health, while survey respondents focused on the environmental harm caused by production and disposal of ELB batteries.

CHAPTER 5: RECOMMENDATIONS & CONCLUSIONS

5.1 Introduction

Our recommendations are based in the principles of fairness, equity, and avoiding harm. Through our literature review, interviews, and survey, we determined that GPLBs pose a significant harm to communities throughout Seattle. A significant amount of this harm falls on GPLB operators who, in the landscaping industry, are disproportionately BIPOC. While these impacts are nuanced and require dialogue with those impacted to uncover the best solutions, we believe that this issue is important enough to justify the City of Seattle taking action to remove GPLBs from use within city limits.

We begin this chapter by discussing the jurisdictional considerations that the City of Seattle faces when attempting to regulate GPLBs. Then, we present seven recommendations that are subsequently bundled into policy pathways. We suggest three policy pathways for the City's consideration and analyze them based on seven selected policy criteria. Our final recommended pathway is given after the analysis.



5.2 Jurisdictional Considerations

The City has clear and direct regulatory authority to set noise pollution standards. It does not have similarly clear and straightforward authority regarding air quality, GHG emissions, or public health.

The City should consider the strongest legal basis for any regulation of GPLB equipment. We suggest that noise and nuisance provide the most direct basis for city action. D.C. has had success regulating GPLBs based on noise. Regulating GPLBs based on their noise nuisance level is exempt from the State Environmental Policy Act (SEPA), as seen in section 12d of WAC 197-11-800, which lists as a categorical exemption “any action undertaken by an agency to abate a nuisance or to abate, remove, or otherwise cure any hazard to public health or safety” (Washington State Legislature, 2019). We recommend this nuisance approach to the City Council.

5.3 Detailed Recommendations

Our recommendations are split into seven components, each of which presents multiple options for the City Council to consider as part of an implementation path bundle. They include a resolution, outreach to stakeholders, a stakeholder workgroup, expanded charging infrastructure for SPR landscapers, a city ordinance phase-out of sales and/or use of GPLBs in the City based on noise and nuisance impacts, a rebate program for new ELB purchases, and a community education program.

5.3.1 Resolution

Unlike ordinances, resolutions are not legally binding; however, they are firm policy recommendations and are often the precursors to ordinances. A resolution could be drafted to start a workgroup, educate legislators and council members, and spread the news about a potential future GPLB phase-out. A resolution is also likely easier to pass than legislation, as it is not legally binding, and would slow the policy process down around GPLB regulation. An extended timeline for getting GPLBs phased out is likely to have more supporters, as we have learned that the parks and recreation departments and landscaping companies in other cities find a fast-paced phase-out or ban to be the biggest barrier to supporting an implementation plan or ordinance.

5.3.2 Outreach to Stakeholders

We recommend right after the passing of a resolution, or during the drafting process, that the Seattle City Council tries to connect with all relevant stakeholders, including landscapers,

QCS, community-based environmental and EJ organizations, community-based organizations supporting BIPOC communities, and residents. It is imperative to establish clear lines of communication so that stakeholders are aware of council actions, can give feedback to the council if necessary, and can provide testimony to the city about their use of GPLBs and ELBs. There needs to be an accumulation of testimony from landscapers and organizations who have successfully made the switch to ELBs to support an ordinance, as well as from residents focusing on how they are impacted. The city needs to be responsive to constituents and all those who might be affected by a potential ban or phase-out of GPLBs. This outreach could take the form of online open forums, holding town hall meetings, and establishing a newsletter updating stakeholders of council proceedings regarding ELBs.

5.3.3 Workgroup

We recommend the creation of a city-led stakeholder workgroup, as Multnomah County and Portland have done, to improve equity in the process and outcomes of a policy on GPLBs. The workgroup should include residential advocates (QCS), Landscape Association representatives, City Council members, OSE, SPR staff, and other relevant stakeholders. The City should invite the County, Seattle-King County Public Health, and PSCAA to participate as those entities have different authority and geographic reach that may provide fruitful paths for action.

This workgroup could 1) meet before legislation is passed to engender trust, ensure collaboration, and facilitate open communication between departments and stakeholders in the development of the policy; and 2) meet throughout the implementation process to ensure equity considerations are addressed. A workgroup would increase equity throughout the process of creating a ban or phase-out as well as expand the regulatory possibility of the legislation. It will also improve collaboration with other regulatory authorities.

Two different types of entities can be tasked with forming and maintaining the workgroup, depending on who is charged with drafting the legislation: City Council Staff or City departments such as OSE or SPR. The most feasible option for instituting a workgroup is through the City's departments. This is due to the limited staff capacity of Council staff and the time-intensive nature of managing a workgroup. We recommend hiring 1-2 additional staff to manage the workgroup if it is formed. It may cost \$75,000 as OSE proposed.

5.3.4 Charging Infrastructure Expansion

We recommend an expansion of charging infrastructure both within the SPR department and citywide, similar to what Multnomah County committed to in their resolution. Charging infrastructure improvements are necessary for the use of ELBs and would increase the ability of landscapers to transition with minimum loss to efficiency or effectiveness of their work.

The SPR infrastructure expansion is two-fold: increase maintenance buildings' charging capacity and purchase electric trucks that are equipped with the technology required for charging ELBs.

The SPR infrastructure expansion is two-fold: increase maintenance buildings' charging capacity and purchase electric trucks that are equipped with the technology required for charging ELBs. First, the City must upgrade SPR's maintenance buildings to increase their charging capacity. Our outreach results indicated that most maintenance sheds are

outdated and have limited outlets for charging ELB batteries. For example, the Densmore Shed currently owns a total of three ELBs including one handheld blower and two backpack blowers. All batteries are charged inside the Chief's office (Appendix C photo 10). There is no secured area with charging ability for more ELBs within the shed. Furthermore, maintenance buildings should also expand their charging stations for electric vehicles.

This leads to the second point—purchasing an adequate number of electric trucks, meaning enough to replace the number of gas trucks that are currently used for daily landscaping work. SPR employees have long working hours, and the short battery life of ELBs is one of the main barriers to using ELBs in the field. Electric trucks with the ability to charge batteries are a key factor in the transition to electric equipment for SPR. If landscapers can charge batteries in their vehicles, they do not need to make multiple trips to their shed or public charging stations, which may have security or technical issues.

Seattle City Light (SCL) is currently working with SPR to accelerate electrification. Their recent collaboration on a charging pedestal project is now operational at Denny Park, with more to come (Thaler, 2022). The initial aim of the project was to reduce the use of gas-powered generators in powering food trucks, but the pedestal also has the ability to charge ELB batteries. SPR and SCL can find ways to expand the pedestal application for both uses or coordinate with food trucks' operational times to co-use the charging pedestals. More pedestals would also make it easier for non-SPR landscapers to make the transition to ELBs.

SPR is also undergoing electrification of its fleet of vehicles. SPR has the goal of purchasing Ford F150 Lightning and Rivian electric trucks, which both have onboard plugs to charge outdoor equipment. SPR should work closely with other departments in the City of Seattle and SCL during the electrification process, as electric trucks are a key component of a smoother internal transition to ELBs. Meanwhile, SPR should include funds for a charging station into their budget and/or discuss potential financial support with SCL. The costs of charging infrastructure such as pedestals or charging stations and the electric vehicle transition do not count towards the leaf blower policy budget as they would be undertaken regardless.

5.3.5 Ordinance: GPLB Sales and Use Phase-Out

The above recommendations culminate in an ordinance passed by the City Council. The ordinance would phase out the sale of new GPLBs via a noise threshold over a multi-year period, culminating in a ban. This would operate similarly to the four-year phase-out recently finished in D.C. taking effect January 1, 2022. The phase-out timeline would maintain equity and ensure the transition is practical and possible for individuals, especially BIPOC landscapers who are more likely to face additional barriers beyond cost.

We have learned through our interviews with both D.C. and Multnomah County that the best mechanism for enforcement is a ban on the sale of leaf blowers. In order to ensure a smooth transition to ELBs, the City would ban the purchase of GPLBs within SPR first, accelerate the existing transition in SPR through additional funding, and then expand to private businesses and individuals within the city after a period of outreach and education. If a workgroup is implemented, stakeholders will agree on the phase-out timeline. If the council-led pathway is chosen, we believe that a four-year phase-out period (from the date of passing an ordinance), is most feasible in terms of ending the use of GPLBs in a timely fashion while simultaneously managing equity concerns. This timeline is based on the success D.C. has seen so far with their timeline.

The City can also consider a combination of a sales ban and a ban on use, as was done in D.C. By setting the noise threshold at 70 dB, D.C. effectively banned all GPLBs, given that their output regularly exceeds 80 dB. This threshold was applied to GPLBs in use and for sale, not allowing any leaf blower that was rated above 70 dB to be sold or used in the city limits; this encourages individuals to switch to ELBs since most styles emit sound below 70 dB. Strict noise pollution regulations allow the City to ban the use of GPLBs and enforce the policy through noise complaints. Banning use also prevents residents from purchasing GPLBs outside city limits and using them within the city.

Regulations that ban GPLB use can be difficult to enforce, given that enforcement relies solely on noise complaints from residents. Therefore, a ban on use must be combined with a sales ban to improve enforcement capabilities. This policy combination prohibits retailers from selling GPLBs within city limits and prevents individuals from using them. Given the enforcement concerns around use, we recommend prioritizing a sales ban over a use ban, although they are more potent combined. To adequately enforce the ban, we recommend fining offending parties based on identified use of banned leaf blowers from residential complaints. The fine could be similar to the \$500 fine set in D.C.; official fine levels should be determined by the Council or workgroup.

5.3.6 Rebate and/or Buyback Program

We propose a rebate program to facilitate the equitable transition from gas-powered to electric equipment in line with Just Transition values (see Section 4.2.8). The program design contained here is one suggestion for structuring the rebates based on the one currently active in D.C. and contains two city-wide subprograms:

Table 3: Commercial ELB rebate program

City-Wide Gas-Powered Leaf Blowers Phase Out Cost Estimation Commercial				
Buy-Back Program Total Cost:		\$118,797.60	Buy-Back Value:	30%
Rebate Program Total Cost:		\$60,000	Rebate Amount:	\$75
Leaf Blower Model	Number of LB Owned/Purchased	Average Cost/LB	Buy-Back Cost	Rebate Cost
Handheld GPLB	200	\$179.99	\$10,799.40	
Backpack GPLB	600	\$599.99	\$107,998.20	
Total Buy-Back Cost			\$118,797.60	
Handheld ELB	200	\$199.00		\$15,000
Backpack ELB	600	\$269.99		\$45,000
Total Replacement Cost:				\$60,000

Table 4: Residential ELB rebate program

City-Wide Gas-Powered Leaf Blowers Phase Out Cost Estimation Residential				
Buy-Back Program Total Cost:		\$118,797.60	Buy-Back Value:	30%
Rebate Program Total Cost:		\$40,000	Rebate Amount:	\$50
Leaf Blower Model	Number of LB Owned/Purchased	Average Cost/LB	Buy-Back Cost	Rebate Cost
Handheld GPLB	200	\$179.99	\$10,799.40	
Backpack GPLB	600	\$599.99	\$107,998.20	
Total Buy-Back Cost			\$118,797.60	
Handheld ELB	200	\$199.00		\$10,000
Backpack ELB	600	\$269.99		\$30,000
Total Replacement Cost:				\$40,000

*Parameters in yellow cells are placeholders. They are used as an example to show how the spreadsheet works and can be modified. A detailed introduction of the budget table can be found in the Leaf Blower Regulation Budget Model.xlsx spreadsheet.

The two subprograms would be administered separately and use different rebate levels. The difference in rebate amounts is based on the necessity of leaf blowers to the landscaper profession, while residential leaf blowers are used less often and on personal property. DCSEU provides rebate amounts of \$75 per commercial ELB and \$50 per residential ELB. In the workgroup-led process, stakeholders would help define rebate levels. Otherwise, we would recommend the amounts DCSEU chose, based on D.C.’s success with their rebate program.

Both programs would require proof of receipt with date of sale. Residents would be limited to one leaf blower per year per Seattle address, verified through mail or other means. The D.C. program is administered through the local utility, funded by excess utility fees, and limits customers to one rebate per utility account. This could be a model for the Seattle City Council

through a partnership with Seattle City Light. The rebate could also be funded through the City's general budget, although this would require additional appropriations in any ordinance for this program.

The Commercial ELB rebate program would be more complex and allow for up to five products per year to receive a rebate. DCSEU limits total rebates to \$50,000 per business and fiscal year. This is likely due to other rebate programs offered by DCSEU and indicates that Seattle would need to consider similar limitations if there are multiple rebate programs a business could apply to. The D.C. program also requires a copy of a D.C. business license/license number and a signed W9 to confirm business eligibility. We are concerned about the impacts of this certification process on smaller and BIPOC-owned businesses in Seattle, as it is not clear if all are registered with the City, and this may prove to be an additional undue burden. Communicating any eligibility requirements effectively with the landscaper community would be essential to ensuring that all eligible applicants could receive rebates.

For both subprograms in the DCSEU program, only ELBs purchased from October 2021 (three months before the implementation of the ban) to October 2022 are eligible, limiting the window for the transition. We suggest extending this window to encompass the entirety of the phase-out period stipulated in the ordinance (See section 5.3.5), as this would allow more time to communicate and help transition all landscapers equitably.

Finally, the rebate programs would require a multilingual and accessible portal to apply for a rebate. The DCSEU website^[10] is an example of how this can look, including resources for landscapers to identify the best models of ELBs on the market. Full cost information for the rebate program can be adjusted and examined based on parameters in our included budget spreadsheet [Leaf Blower Regulation Budget Model.xlsx].

The City may also consider a buyback program in lieu of a rebate program. The main benefit of a buyback program is that it would remove GPLBs from circulation, whereas a rebate program would just incentivize the uptake of ELBs. However, we do not recommend this approach due to the logistical complexities of a buyback program relative to a rebate program, such as requiring the City to dispose of GPLBs for businesses and residents.

We estimate the replacement cost of SPR's GPLBs using an equipment inventory provided by SPR (Table 5). This table contains the number of GPLBs owned by SPR districts based on the inventory list, excluding GPLBs older than 15 years. The equipment includes handheld GPLB, backpack GPLB, wheeled GPLB, handheld ELB, and backpack ELB. We used the current market price for each piece of equipment by searching the model ID provided in the inventory list. The compiled prices are used to estimate the inventory value and rebate costs.

[10] Found here: <https://www.dcseu.com/homes/electric-lawn-care>

Table 5: SPR Rebate Cost Estimation

SPR Gas-Powered Leaf Blowers (GPLB) Inventory Value and Rebate Cost				
	Leaf Blower Type	Number of LB Owned	Inventory Value	GPLB Replacement Cost (w/ Electric)
Total SPR Inventory	Handheld GPLB	32	\$6,114	\$8,960
	Backpack GPLB	305	\$182,997	\$82,347
	Wheeled GPLB	47	\$84,308	N/A
	Handheld ELB	14	\$3,434	N/A
	Backpack ELB	11	\$2,970	N/A
	Total		\$279,822.94	\$91,306.63

The rebate cost is the amount of money needed to replace all GPLBs with ELBs, excluding wheeled GPLBs due to the unavailable technology of wheeled ELBs. The cost is calculated by multiplying the number of GPLBs that need to be replaced with ELBs by the current ELB market prices and the determined rebate rate, which is currently set at 100%. The rebate rate can be modified based on the City's available budget. The estimated value may be different than the actual amount spent by SPR but can be used as a reference to inform the rebate program.

5.3.7 Community Education

The City of Seattle's response to the 2014 SLI was to build educational resources outlining best practices for reducing the harmful effects of lawn equipment, focused on leaf blowers. As the Council moves forward, outreach and education will continue to be important strategic elements to increase compliance, trust, and equity in the process. Multiple types of outreach can be effective here. The City can visit landscaper expos, drive around trucks with electric equipment for landscapers to try in the field, and send out informational flyers to residents and landscapers.

Landscaping expos are exhibitions of the most recent technology among landscaping professions. They allow landscapers to try out new equipment and provide feedback. The City, including potential workgroup organizers, SPR, or an outside consultant, can attend landscaping expos held by WALP or other organizations prior to the regulation as CARB has done. This would allow them to keep up with the most updated technology. The City would also learn about landscapers' feedback on their transition or goals for transitioning to electric equipment, as well as their view on regulation.

CARB runs the Zero-Emission Equipment (ZEE) roadshow by putting together a trailer that contains readily available zero-emission equipment for lawn and gardening work for the landscaping companies to test out prior to their investment. The City of Seattle can follow CARB's example and put together a stationery show with current electric equipment, so those who are unable to visit the expos still have a chance to try out the new equipment.

After passing the resolution and ordinance, landscapers and residents – depending on whether there was a workgroup or not – will require varying levels of information during the transition. An informational flyer that’s available in different languages is a key step to bridging the gap. It would be crucial for them to learn about different available technology, the buyback and/or rebate plan, the transition timeline, how to file a noise complaint, and other logistics. This could also be communicated on government websites or through a newspaper piece.

5.4 Potential Implementation Pathways

The following briefly describes the three implementation pathways that are available to the City Council. They each involve multiple recommendations, which were described in detail in Section 5.3. Each pathway is primarily led by a certain group of individuals—GPLB operators (“users”), a stakeholder workgroup, and the Seattle City Council.

Pathway 1 User-Led Process

- Status Quo
- Landscaping professions decide on their own actions
- SPR’s current goal
- Charging infrastructure expansion

Pathway 2 Workgroup-Led Process

- Resolution
- Outreach to stakeholders
- Workgroup
- Charging infrastructure expansion
- Ordinance
- Rebate program
- Community education

Pathway 3 Council-Led Process

- Resolution
- Outreach to stakeholders
- Charging infrastructure expansion
- Ordinance
- Rebate program
- Community education

5.5 Policy Criteria

Each pathway proposed in this report is measured against the policy criteria below. A visual of the matrix is provided in Table 6.

- **Procedural Equity:** How inclusive, accessible, authentic, and representative is stakeholder engagement during the policy development stage.
- **Distributional Equity:** If the policy outcomes promote fair distribution of benefits and burdens across all segments of a community, and prioritize those with the highest need.
- **Public Health Impacts:** The extent to which the policy impacts public health outcomes, including the well-being of landscapers and residents.

- **Enforcement Capability:** The degree to which the policy can be enforced by City of Seattle officials.
- **Cost:** The estimated amount (in USD) that the proposed policy option will cost the City of Seattle.
- **Administrative Feasibility:** The degree to which the policy is supported by key participants in the City of Seattle and their legal power to implement all aspects of the policy.
- **Time to Implementation:** How long it will take the City to implement the recommendation.

5.6 Analysis of Pathways

5.6.1 Procedural Equity

Procedural Equity: *How inclusive, accessible, authentic, and representative is stakeholder engagement during the policy development stage.*

Pathway 1 scores lowest on procedural equity because the city currently does not engage with landscapers while making policy. Pathway 3 without the workgroup also has low procedural equity. While outreach to stakeholders will still occur under Pathway 3, they are not directly involved in policy creation. Thus, the ordinance might lack several important perspectives, which could lead to greater pushback during implementation.

Pathway 2 has much higher estimated procedural equity than Pathways 1 and 3 because of the creation of the workgroup. Forming a workgroup right after passing a resolution ensures that stakeholders are involved in all parts of the policy process. Stakeholder input, priorities, perspectives, and needs would inform the structure of the ultimate ordinance. This does, however, create an extra burden on stakeholders because participation in the workgroup would take time and energy away from their more necessary work.

5.6.2 Distributional Equity

Distributional Equity: *If the policy outcomes promote fair distribution of benefits and burdens across all segments of a community, and prioritize those with the highest need.*

Pathway 1 concentrates the burdens of the public health effects of GPLBs onto users, most

often (BIPOC) landscapers. GPLBs are still allowed to be used and purchased, so the status quo will disproportionately impact the health of landscapers.

We estimate Pathway 2 to have medium-ranked distributional equity. The workgroup allows stakeholders' voices to be heard, so the ultimate ordinance will likely include higher benefits for the users of GPLBs, often BIPOC individuals. Pathway 3 has lower distributional equity because it lacks a workgroup. If stakeholders' voices are not heard, outcomes are less likely to lead to an equitable distribution of benefits and burdens.

Pathway 2 does not score higher on distributional equity because, despite the workgroup, banning the sale and use of GPLBs can lead to a very high financial burden for landscapers and residents. The rebate program is the key component that increases distributional equity in both Pathways 2 and 3. It lessens the financial burden for landscapers and residents by subsidizing the switch to ELBs.

Despite the workgroup and the rebate program, any ordinance that bans GPLBs places the highest-burden on landscapers and residents as they must switch out their equipment regardless.

5.6.3 Public Health Impacts

Public Health Impacts: *The extent to which the policy has on public health including the wellness of landscapers and residents.*

Pathway 1 would not lead to a decrease in the number of GPLBs; the emissions associated with GPLBs would remain the same and would continue to impact public health in the City. Both Pathways 2 and 3 would improve public health outcomes for LB operators and residents, given that both would lead to a transition to ELBs; this would eliminate the emission of harmful particulate matter from GPLBs.

5.6.4 Enforcement Capability

Enforcement Capability: *The degree to which the policy can be enforced by the City of Seattle officials.*

All Pathways except for Pathway 1, which involves no new policy implementation, have significant enforcement considerations. The enforcement of an ordinance that phases out GPLBs is admittedly difficult. A ban on the use of GPLBs would have low enforcement capability, as it would require residents to report to the city any GPLB use they observe. Staffing shortages and slow response time to complaints would make it very difficult to

actually catch a person using a GPLB. Banning the sale of GPLBs, however, is relatively easier to enforce. People would not be able to buy GPLBs within the City of Seattle. While people could still leave city jurisdictional limits to purchase a GPLB, we do not presume everybody desiring a leaf blower would do so. It is easier to monitor compliance if the City can track the types of leaf blowers sold and purchased within its limits.

The creation of a workgroup has the potential to increase compliance and thus raises our estimation of Pathway 2's enforcement capability slightly. Because some landscapers and WALP would likely be involved in the creation of the ordinance in the workgroup, it is possible that landscapers in the city would be more willing to abide by the ordinance. Including the perspectives of landscapers in the drafting of an ordinance, if done equitably, creates a space for them to be heard. This increases the potential for an ordinance that reflects their perspective and needs.

5.6.5 Cost

Cost: *The estimated amount (in dollars) that the proposed policy option will cost the City of Seattle.*

Pathway 1 does not place any additional cost burdens on the City. It relies on residents, landscaping businesses, and city departments like SPR to phase out GPLB at their own pace. However, the City would not have control over the rate of the phase-out. The cost of the city-wide electrification process, present in all three pathways, is not included in our budget for SPR, as it is a part of a larger pre-existing City effort to reach Seattle's climate goals.

The rebate program is one of the most expensive elements of our recommendations. To transition all SPR handheld and backpack GPLBs into electric versions, the estimated cost is \$91,307 based on current SPR inventories (Leaf Blower Regulation Budget Model.xlsx). We did not include the leaf blowers used by other city departments such as SDOT, SPU, or SCL, but the SPR budget spreadsheet can be applied to other departments. The city-wide residential and commercial rebate costs may vary regarding the rebate values, which would be finalized by the city council or the proposed workgroup. For example rebate budget sheets, refer to section 5.3.6 (Table 3; Table 4).

Pathway 2 would be more expensive than Pathway 3 due to the requirement of additional staff for leading the workgroup. The new hires would cost around \$75,000 based on OSE estimates. Other incentives for workgroup membership may be required to encourage people's participation; however, Portland did not provide any financial compensation to workgroup members. Relative to the proposed 2022 appropriations of \$283,475,864, Pathway 2 (excluding a city-wide rebate program, other city departments' rebate amount, or infrastructure expansion) costs \$166,307 (0.06%); Pathway 3 costs \$91,307 (0.03%), which is a relatively small portion of SPR's total budget.

5.6.6 Administrative Feasibility

Administrative Feasibility: *The degree to which the policy is supported by key participants in the City of Seattle and their legal power to implement all aspects of the policy.*

Pathway 1 is the most administratively feasible, as it does not require further action to be taken. Pathway 2 is less administratively feasible comparatively, as it will require buy-in from either OSE or SPR. The creation of the workgroup will also require collaboration and buy-in from key stakeholders. Pathway 3 is more administratively feasible compared to Pathway 2 because it does not require the creation of a workgroup, which likely necessitates involving other city departments and hiring staff. However, this option still requires the capacity to get an ordinance passed and work with departments to implement electrification infrastructure and educational outreach measures, which lowers feasibility when compared with the status quo.

5.6.7 Time to Implementation

Time to Implementation: *How long it will take the City to implement the recommendation.*

Pathway 1 would not require further time to be spent toward determining an implementation path, and thus ranks highest in its time to implement. Pathway 2 requires a significant increase in time needed for implementation, as building and running a workgroup will likely take six months or more to complete. Given the length of time a workgroup requires, Pathway 2 ranks lowest for this criterion. Exclusion of the workgroup creates a quicker path to implementation but still requires time to collaborate across departments to pass an ordinance. Therefore, Pathway 3 ranks medium in this section.

5.7 Conclusion

Out of the three policy bundles, we recommend the City follow Pathway 2, the workgroup-led process. As seen in the policy matrix below (Table 6), Pathway 2 scores highest on equity overall, which we believe to be instrumental to any good policymaking. Moreover, enforcement capability is slightly higher in Pathway 2 than in Pathway 1, as the workgroup could encourage non-SPR landscapers to abide by an ordinance. The higher rate of compliance due to stakeholder buy-in would also lead to greater public health improvements.

The two drawbacks of Pathway 2 are the length of time to implement and the need to involve other departments. A workgroup would slow the policy process down, as all perspectives would be taken into account and policy would be debated for longer. However, as we prioritize equity over other policy criteria, these drawbacks are overshadowed by the benefits to equity. Pathway 2 would increase.

Note for interpreting the policy matrix (Table 6):

Many of the designations on the policy matrix were made using best judgement in analyzing the pathway, due to the inability to quantifiably measure concepts such as forms of equity. Additionally, criteria like public health impacts lack data around the prevalence of GPLBs in the Seattle area to be able to quantify any specific health impact level. Cost was the one element that could be projected numerically, although cost numbers represent a minimum, given that the full cost of a buy-back or rebate program could not be estimated. For more information on the rationale behind each designation below, see section 5.6 above.

This matrix is best interpreted as a relative guide between the advantages and disadvantages, both within and across pathways.

Table 6: Policy Recommendation Matrix

Criteria	Pathway 1: User-Led Process	Pathway 2: Workgroup-Led Process	Pathway 3: Council-Led Process
Procedural Equity	Low	High	Medium-Low
Distributional Equity	Low	Medium	Medium-Low
Public Health Impact	Harmful	Less Impact	Less Impact
Enforcement Capability	N/A	Medium	Medium-Low
Cost	\$0	\$166,307+	\$91,307+
Administrative Feasibility	High	Low	Medium
Time to Implementation	No Time	Most Time	Less Time



APPENDICES

Appendix A: Interview Questions

Portland Policy Advisor

- How did you get involved in passing the policy (to ban/phase-out GPLBs)?
 - What was your role?
 - Did your role shift or change over time?
- What is the structure/details/summary of the bill/resolution?
 - What were the reasons behind pushing the bill forward
- Has the city considered a buyback program?
- What did the process of getting this bill pass look like? How do you plan to incorporate equity into the resolution? Did you focus on incorporating equity in the bill/resolution?
Environmental justice resolution: center communities most impacted
- How long did it take?
- Was this the first time it had been attempted?
- How did Multnomah reach out to landscapers, and get in touch with landscapers?
- Was there support for the bill?
 - Who was most vocal in their support?
 - Who was crucial to passing the bill?
- Were there any concessions necessary to get the bill passed?
 - Would you change anything about the bill now that it has been implemented?
 - Any financial incentives?
- What financial costs did you incur? Cost of electric leaf blowers and replacing the fleet of GPLBs? Do you anticipate financial costs being a barrier? Tradeoffs with other priorities?
Was it worth it? Was that an issue in popularity?
- How are you ensuring compliance with the ban/phase-out?
- Do you know anything about the different types of LBs? Their relative air velocities? Can electric versions do the same amount of work? Is the tech comparable?
- How do you grapple/incorporate equity?

Washington D.C. Legislative Director

- How did you get involved in passing the policy (to ban/phase-out GPLBs)?
 - What was your role?
 - Did your role shift or change over time?
- What is the structure/details/summary of the bill/resolution?
 - What were the reasons behind pushing the bill forward?
- What did the process of getting this bill pass look like? How long did it take? Was this the first time it was attempted?

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- Was there support for the bill? Who was most vocal in their support? Who was crucial to passing the bill? Can you tell us about these people's roles?
- Was there opposition to the bill?
 - What did the opposition look like (if yes)?
 - Can you tell us about how these people/groups opposed the bill?
 - How effective was the opposition?
- Were there any concessions necessary to get the bill passed?
 - Would you change anything about the bill now that it has been implemented?
 - Any financial incentives?
- What financial costs did you incur? Tradeoffs with other priorities? Was it worth it? Was that an issue in popularity?
- Did you focus on incorporating equity in the bill/resolution?
- How are you ensuring compliance with the ban/phase-out?

California Air Resources Board

- What is your role at CARB, and have you worked on regulating SOREs before?
- What is the relationship between city restrictions on SOREs, and the state-level efforts to regulate SOREs?
- How important are leaf blowers and SOREs overall in the state's inventory of GHG emissions? How do you calculate emissions from SOREs?
- Why did you choose to not ban existing GPLBs? What effect does the ban on manufacturing have on stores selling merchandise?
- How has CARB managed or considered equity in this process?
- Can you tell us about the buyback program? What kind of budgetary concerns does AB 1346 bring up?
- Can you describe the process of getting AB 1346 passed and implemented?
 - Who supported it and who opposed it?
- What is CARB/the state doing for outreach to landscapers and the public?

Seattle Central Staff

- What has been your role in dealing with leaf blowers/how involved are you on this topic?
- What is your view on the GPLBs? What is happening at the legislative level?
- Barriers to the passing of the prior bill?
- What issues do you anticipate with the Parks Department? Are there ways to bring them on board with policy changes?
- Enforcement issues? Potential Solutions? How do you anticipate the ban/policy being enforced? Any potential complications?
- Any other examples of tech being banned within city limits and phasing it out?

APPENDICES

- Where does the OSE requested \$75,000 come from?
- What's the Mayor's position on this topic/do they have any?
- Any ideas for how to contact landscaping/gardening companies? / Do you have any contacts or does the Parks Department have contractors that we can get contacts for?
- If this bill was to be drafted and passed, what are the steps in that process? What kind of "hoops" does it need to jump to?
- What kind of budgetary room does the City have, post-COVID, for policies like a buyback program or changing over the Park Department's fleet of leaf blowers?
- For Sidewalks, do they have to clear sidewalks of leaves?
- Is there anyone else we should talk to?

City Budget Office - Budget Analyst

- Tell us a bit about yourself.
- Have you worked on anything related to GPLBs? If so, what is your role and how are you involved?
- What is your view on GPLBs?
- When you worked there, do you remember if the Parks department had any contractors to do landscaping work? What were these companies and do you have access to their contacts?
- What would be the best strategy to get the Parks Department on board? Who are the biggest opponents / can you give us their contact information?
- Have the Parks Department attempted to use any alternative tools? What are the biggest barriers to switch to ELBs for the Parks Department?
- What is the budget for leaf blowers currently for the Parks Department? Are we able to have access to budgetary information? For our project, we eventually need a budget estimation spreadsheet. Is there space within the Parks budget to do this for leaf blowers? What other initiatives may take precedence? What do you think of this?
- You mentioned they're going to replace 50% of LBs by 2026. Is that money set aside?
- Is there an inventory of existing leaf blowers e.g. models and numbers
- Has the city ever funded an initiative using funds generated from fees or other unorthodox funding methods? We heard of D.C. funding their rebate program using fees from a Sustainable Energy Utility and were wondering if Seattle could explore (or has already explored) a similar partnership with an entity like Seattle City Light?
- Toby mentioned that a bill to ban/phase-out GPLBs would likely need to happen as a budget item. What do you think of this?
- Can a bill still affect the budget?

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- We are thinking about modeling our recommendations after what Portland and Multnomah County have done. We are thinking of first drafting a resolution to phase-out GPLBs internally, expanding charging infrastructure, and then creating a city-county-stakeholder Workgroup to design legislation to phase out GPLBs throughout the entire city of Seattle, not just internally. How will Parks respond to Multnomah's style of slow-moving?
- Is there anyone else we should talk to?

Seattle Parks and Recreation – Sustainability Advisor

- Tell us a bit about yourself.
- Have you worked on anything related to GPLBs? If so, what is your role and how are you involved?
- What is your view on GPLBs?
- Does the Parks department have any contractors to do landscaping work? If so, what were these companies, and do you have access to their contacts?
- What are the biggest barriers as you see them to replacing the gas-powered fleet of leaf blowers that the park has? Have the Parks Department attempted to use any alternative tools?
- What would be the best strategy to get the Parks Department on board?
- We learned that the SPR is going to replace 50% of LBs by 2026, can you elaborate?
- Is there an inventory of existing leaf blowers (e.g. models and numbers)?
- We are thinking about modeling our recommendations after what Portland and Multnomah County have done. We are thinking of first drafting a resolution to phase-out GPLBs internally, expanding charging infrastructure, and then creating a city-county-stakeholder Workgroup to design legislation to phase out GPLBs throughout the entire city of Seattle, not just internally. How will Parks respond to Multnomah's style of slow-moving?
- Equity within city ground staff?
- The state has been trying to cut down emissions. But there's been a lot of action, has any of that trickled down financially to Seattle or Parks? Weatherization, or changing fleet
- How often do they use ELBs?
- We heard that some companies have battery packs that work with multiple pieces of equipment. Is that something they are looking into?
- Is there anyone else we should talk to in the Parks Department? Is there any way we can see these maintenance sheds/meet with a worker?

County Staff

- What does your role at the County involve?
- What is your understanding of and interest in the GPLB issue? Do you view this as a climate issue?

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- Has the County been looking at the GPLB issue? If so, does the County Executive support reduction in the use of GPLBs, and what actions have the county considered taking?
- How can the county support a city-scale policy like this from a public health/climate standpoint? Any examples of cross-collaboration?
- Do you see the county collaborating with the city and also phasing out the blowers? Could it be implemented as part of the climate action plan the county adopted in 2021?
- What kind of jurisdiction does the county have for regulating emissions?
- What is the threshold level of emissions that GPLBs would need to meet to be regulated by public health?
- What are the chances of getting support from the county if the city council starts pushing for a resolution at the city?

350 Seattle Staff

- Given your experience as a landscaper, what are the barriers landscapers face to transitioning to electric leaf blowers?
- As you are a former landscaper, do you have contacts with landscaping/gardening companies who might be willing to take a survey for us?
- What can you tell us about Seattle's Green New Deal? What does it involve? Is there a timeline? Where is it in the legislative process?
- What does Just Transition mean? How do you see it being implemented in Seattle's Green New Deal?
- Do you know much about the emission from GPLBs in Seattle?
- Do you see NGOs like 350 Seattle supporting a policy restricting GPLBs? In what ways?

Quiet Clean Seattle Leader

- How are gas-powered leaf blowers involved in your work? What is your interest in leaf blowers? What is the reason behind your work on opposing the use of GPLBs?
- Is QCS focused on leaf blowers only? Or SOREs in general too? For what reasons?
- What attempts have you made to raise this issue to the city council?
- Who are the allies and opponents to your work?
- Do you have any contact with landscaping/gardening companies? Do you have any contacts?

Quiet Clean Portland Leader

- How are gas-powered leaf blowers involved in your work? What is your interest in leaf blowers? What is the reason behind your work on opposing the use of GPLBs?
- Is QCPortland focused on leaf blowers only? Or SOREs in general too? For what reasons?
- What attempts have you made to raise this issue with the city and county? How have you been involved with the resolutions?

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- What do you think would work best to now get a bill/ordinance passed in Portland / Multnomah County phasing out gas-powered leaf blowers, going forward?
- Who are the allies and opponents to the resolution and any potential legislation?
- Can you describe the workgroup Multnomah County is building?
- Have you contacted/worked with landscaping/gardening companies? Do you have any suggestions for how to reach them?
 - What have you learned from them?
- How are you imagining enforcement/compliance with a phase-out?
- What can Quiet Clean Seattle learn from Quiet Clean Portland?
- How big is Quiet Clean Portland?
 - What makes you so effective at garnering community support?

Appendix B: English Leaf Blower Survey

Section 1 of 7

Seattle Leaf Blower User Survey

Hello and welcome to the Seattle Leaf Blower User Survey! As students at UW, we are currently conducting research on leaf blower use by gardening professionals throughout the city.

This survey will take roughly 2-5 minutes to complete and will ask questions related to how often and for how long you or your business uses leaf blowers in your work. By filling out this survey you give us permission to use this data in the final report; however individual responses will remain confidential and anonymous in all publications resulting from this survey. Only survey-wide results will be reported. Please respond to all questions, but you may also skip any questions you do not wish to answer.

If you have any questions or comments, please direct them to jgrandbo@uw.edu, ajin96@uw.edu, krist32@uw.edu, and/or sophia28@uw.edu.

After section 1 Continue to next section

APPENDICES

Section 2 of 7

Seattle Leaf Blower User Survey

Filtering Question

Does you or your business use leaf blowers for your work? If not, you do not need to complete this survey. Clicking no will take you to the end of the survey. *

Yes

No

After section 2 Continue to next section

Section 3 of 7

Seattle Leaf Blower User Survey Questions

Individual answers will remain confidential and for research purposes only. Results will be published without identifying information in our final report.

1. Where do you do most of your work?

Residential

City

School

Business

Other...

APPENDICES

2. On average, how many days a week do you or your employees use a leaf blower?

1. 1
2. 2
3. 3
4. 4
5. 5
6. 6
7. 7

3. On average, how long do you use leaf blowers each day that they are used?

1. less than 1 hour
2. 1-2 hours
3. 2-3 hours
4. 3-4 hours
5. 4-5 hours
6. 5-6 hours
7. 6-7 hours
8. 7-8 hours
9. 8+ hours

APPENDICES

4. What do you use leaf blowers for?

Long answer text

After section 3 Continue to next section

Section 4 of 7

Seattle Leaf Blower User Survey Questions

Individual answers will remain confidential and for research purposes only. Results will be published without identifying information in our final report.

5. How essential are leaf blowers to your work? (Answer on a scale from 1-5)

Non-essential 1 2 3 4 5 Essential

6. What are your personal feelings about using leaf blowers? (Answer on a scale from 1-5)

Negative 1 2 3 4 5 Positive

APPENDICES

7. Which type of leaf-moving equipment do you use for work? (Select all that apply)

- Gas-powered (2-stroke)
- Gas-powered (4-stroke)
- Electric leaf blowers (corded)
- Electric leaf blowers (cordless)
- Rakes
- Other...

8. Which of the equipment that you use do you prefer to use for a regular lawn care job?

Answer this question only if you selected multiple answers for the previous question.

- Gas-powered (2-stroke)
- Gas-powered (4-stroke)
- Electric leaf blowers (corded)
- Electric leaf blowers (cordless)
- Rakes
- Other...

APPENDICES

Section 5 of 7

Seattle Leaf Blower User Survey Questions

Individual answers will remain confidential and for research purposes only. Results will be published without identifying information in our final report.

9. If you use any gas-powered leaf blowers for work, have you considered or attempted switching to electric leaf blowers?

Yes

No

After section 5 Continue to next section

Section 6 of 7

Seattle Leaf Blower User Survey Questions

Individual answers will remain confidential and for research purposes only. Results will be published without identifying information in our final report.

9a. Why haven't you considered or attempted switching to electric leaf blowers?

Long answer text

Section 7 of 7

Seattle Leaf Blower User Survey Questions

Individual answers will remain confidential and for research purposes only. Results will be published without identifying information in our final report.

10. The City of Seattle is exploring the idea of limiting or phasing out GPBLs. What would be your biggest concerns about a policy like this?

Long answer text

APPENDICES

Appendix C: SPR Maintenance Facility Site Visit Photos

The facility was very old, as the Sustainability Advisor had told us in their interview. There is one office inside the building, and it barely has enough room for one person to work in. The equipment is kept outside, locked up inside chain-link fence stalls. There has been a robbery at this facility once this year, and other facilities have had equipment stolen as well. There are many trucks that are used to transport crews and equipment, and there are two plug-in electric small vehicles. There is one backpack electric leaf blower at this facility, and two handheld electric leaf blowers. The batteries for the ELBs were being charged in one of the few power outlets in the Chief's office.

Photo 1: Densmore Maintenance Shed Front View



Photo 2: Densmore Maintenance Shed Main Gate



Photo 3: Office Building



Photo 4: Electric Charging Station (Two)



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Photo 5: Tool Shed



Photo 6: Tool Shed Entrance



Photo 7: Tool Shed Inner View



Photo 8: Backpack GPLB



Photo 9: Backpack ELB (Left); Handheld ELB (right)



Photo 10: Battery Charging Location (Densmore Crew Chief Office)



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