



**CITY OF KIRKLAND**  
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## **MEMORANDUM**

**To:** Kurt Triplett, City Manager

**From:** Carly Joerger, Management Analyst  
Noelle Johnson, Program Assistant  
Erika Mascorro, DEIB Manager  
Diana Hart, Government Affairs Manager

**Date:** March 23, 2023

**Subject:** ELECTRIC LEAF BLOWER INITIATIVE

### **RECOMMENDATION:**

That the City Council discuss the goals and key milestones listed in the draft Resolution R-5585 launching the Electric Leaf Blower Initiative (Att-2). The Electric Leaf Blower Initiative adopts a multi-year phased approach to sunsetting gas powered leaf blowers by December 31, 2025, while addressing the equity impacts of the legislation with education and incentives, culminating in an ordinance adopted by the Council in 2025. Staff will incorporate the Council's input and bring the Resolution back for Council action at the April 18, 2023 Council meeting.

### **BACKGROUND DISCUSSION:**

The City's proposed Electric Leaf Blower Initiative and Resolution R-5585 provides initiative goals, three-year phased approach with key milestones, and areas for further exploration and creative problem-solving for the Council to consider and provide feedback to staff. The initiative was designed with the intended outcome of the eliminating gas-powered hand-held and backpack leaf blowers in the city to improve safety for the user and a cleaner environment, and in anticipation that the State may soon drive similar change. This initiative reflects the Council's interest in sustainability and protecting staff and community health and safety. The three-phased approach is based on research on the environmental impacts of both gas and electric equipment, survey of other leaf blower legislation, and initial stakeholder engagement with City staff and Kirkland landscaping businesses.

Staff's proposed high-level milestones of the three-year plan include:

- 2023: Piloting, evaluating, developing, and implementing a thoughtful transition plan for the City's equipment; engaging key stakeholders
- 2024: City rolls out incentive program to support private sector and resident transition to electric equipment; continued City transition to electric leaf blowers and stakeholder engagement
- 2025: Council considers an Ordinance sunsetting hand-held and backpack gas-powered equipment city-wide; continued City transition and stakeholder engagement

Present and ongoing in all three phases is intentional and targeted engagement with landscaping businesses, manufacturers, and Kirkland's federal and state legislative delegations on areas for collaboration and information-sharing, including lessons learned from the City's pilot and transition plan. Following Council action on Resolution R-5585 and prior to adoption of an ordinance in 2025

would be a public information campaign through broad outreach on the City's email listservs and social media, as well as targeted outreach to community and neighborhood groups explaining the Council's decision.

Staff seek Council direction on next steps for the Electric Leaf Blower Initiative and feedback on Resolution R-5585.

### **Policy Framework**

Staff has developed the Electric Leaf Blower Initiative proposal at the direction of City Council and in support of the goals set forth in the Sustainability Master Plan (SMP) and 2023-2024 budget. On December 8, 2020, the Kirkland City Council adopted Resolution R-5457 approving Kirkland's [Sustainability Master Plan](#). The SMP establishes environmental goals for the City in several focus areas and 200 actions for the City to take to meet these goals. Within the Sustainable Governance focus area, Council approved Goal S-1, to "integrate sustainability into every major decision the City makes." One of the actions under this goal is SG-1.10, which states that the City will "explore [the] reduction of or elimination of gas-powered landscaping equipment in City operations".

On December 22, 2022, the City Council adopted the [2023-2024 biennial budget](#). This budget reaffirmed the City's commitment to meet SMP goals by allocating funding to sustainability projects, services, and programs. The City Council Goal of "Sustainable Environment" prioritizes "Protect[ing] our natural environment through sustainable goals and practices to meet the needs of community members for a healthy environment and clean energy without compromising the needs of future generations." To help advance this goal, the Council approved the allocation of \$500,000 in American Rescue Plan Act (ARPA) Coronavirus Local Fiscal Recovery Funds (CLFRF) towards a citywide transition to electric leaf blowers. This initiative would result in hand-held and backpack leaf blowers and potentially other two stroke gas and diesel engine equipment in the city being converted to electric motors in 2025.

Finally, and most recently, on February 21, 2023 the Council adopted Resolution R-5578 Adopting the 2023-2024 City Work Program which includes a work plan item to "prioritize climate justice and continue to fund Sustainability Master Plan actions to further equity, energy efficiency, public health, and a clean energy economy that promotes a sustainable and resilient environment to further the Sustainable Environment goal".

To support the Council in considering the various elements of this initiative, the following sections of this memorandum provide an overview of the negative environmental and health impacts of gas-powered landscaping equipment, environmental impacts of electric equipment, legislation in other areas of the United States regarding gas-powered leaf blowers, and insights gained from discussions with City staff and Kirkland landscaping businesses on the potential impacts of this initiative. Finally, this report details key milestones proposed in Resolution R-5585 (Att-2) and includes a set of questions as a starting point for Council discussion and feedback.

### **Health and Environmental Impacts and Trade-offs of Gas-Powered vs. Electric Equipment**

This section provides an overview of the environmental and health impacts of gas-powered leaf blowers, along with the potential trade-offs between the use of gas-powered and electric leaf blowers. Gas-powered leaf blower equipment emits chemicals that can lead to negative health outcomes for operators and the broader community. The burning of fossil fuels, and the extraction of these natural resources, is known to be a significant contributor to the warming of Earth's atmosphere and to land degradation. However, there are also notable trade-offs when replacing gas-powered leaf blowers with electric leaf blowers as a strategy for environmental preservation.

While an electric blower may not burn fossil fuels, producing, recycling, and disposing batteries also has an impact on the environment and global community members that is important to recognize.

The use of gas-powered equipment has demonstrated negative health impacts on operators and the broader public. A major concern with the use of gas-powered leaf blowers is the noise pollution and potential hearing damage caused by this equipment. The low frequency sound emitted by this equipment may lead to hearing loss for operators, especially for those operators that use gas-operated leaf blowers daily<sup>i</sup>. This sound can also permeate into buildings easily – up to 90 surrounding homes may be impacted by the sound from a gas-powered leaf blower<sup>ii</sup>. It is important to note that while the noise of gas-powered leaf blowers is of great concern to users and the surrounding neighbors, it does appear that the current higher capacity electric leaf blowers emit noise at a comparable level to the gas-powered leaf blowers. However, electric leaf blowers have more potential to become much quieter as the technology continues to develop. The emissions from gas-powered leaf blowers can also lead to negative health outcomes. When operated, these devices can emit chemicals such as formaldehyde, benzene, and fine particulate matter<sup>iii</sup>. These chemicals, along with the fuel emissions, can cause the operator to have short-term symptoms such as dizziness, headaches, and asthma attacks. Long-term impacts of repeated exposure include heart and lung disease, cancer, and dementia<sup>iv</sup>.

It is known that racial and ethnic minority groups sometimes experience a disproportionate burden of preventable disease, death, and disability compared with non-Hispanic White people. Results from studies conducted by [Science Advances](#) indicate that emission sources disproportionately expose people of color, Blacks, Hispanics, and Asians higher than average in comparison to Whites. Whites are exposed to lower-than-average concentrations from emission sources. For these reasons, converting to electric equipment will benefit the health of everyone and the environment. Although this initiative will not solve all air quality issues caused by emissions, it will have a positive impact.

Additional research on the harmful environmental impacts of gas-powered leaf blowers, as well as the impacts of battery production and recycling on the environment is detailed in Att-1. In summary, the research presents an environmental trade-off of converting from gas to electric equipment. While electric equipment reduces harmful emissions in our immediate community, the battery production and recycling process still creates an environmental harm. Acknowledging the broader national and international movements towards electrification, staff are hopeful that some of the unresolved issues with battery mining, production, and recycling will improve in the coming years as the industry grows and demand for more green products and equipment increases. On balance, transitioning electric hand-held and backpack equipment in place of hand-held and backpack gas-powered equipment in Kirkland is a relatively better policy option than the status quo and supports the Council's stated policy position of considering strategies that reduce emissions for Kirkland residents and protects the local environment. This transition aligns with other electrification goals outlined in the SMP, including goals to reduce emissions from vehicles by 2030 (ES-4) and to reduce fossil fuel emissions from all buildings in Kirkland (ES-5).

### **Survey of Leaf Blower Legislation**

Policymakers in various parts of the country are acting to sunset gas-powered equipment as a strategy to reduce emissions. California is set to ban the sale of gas-powered leaf blowers by 2024, and many cities in California have already implemented bans ahead of the state requirement. Bans are also in place in other parts of the United States, including in the District of Columbia. The Washington State Legislature has introduced several pieces of legislation related to a ban on gas-powered equipment in recent years.

Staff examined the strategies used in leaf blower legislation across the country to inform the structure of the proposed Kirkland initiative included in this staff report. The following sections summarize the legislation from California, District of Columbia, Multnomah County, City of Seattle,

other neighboring cities, and the Washington State Legislature. These serve as key examples that influenced the proposed project plan with key themes of adopting a phased approach, providing financial incentives, and considering equity impacts of the legislation.

### *California*

California Governor Gavin Newsom signed Assembly [Bill No. 1346](#) on October 9, 2021 which places a ban on small off-road engines (SOREs) with a gas engine under 25 horsepower. Starting on January 1, 2024, the sale of new gas-driven SOREs will be banned. Any new equipment being sold on or after that date in California must be zero-emission. However, existing gas-powered equipment may still be used on or after January 2024. To assist Californian landscaping businesses transition to electric equipment, the California Air Resources Board has allocated \$27 million in funding to its Clean Off-Road Equipment Voucher Incentive Project (CORE). This funding was allocated from the FY 2021-2022 Greenhouse Gas Reduction Act and from the Air Pollution Reduction Fund<sup>v</sup>. Manufacturers of zero emission equipment will apply to have their equipment approved for CORE certification. Once approved, professional landscaping businesses will use CORE vouchers to purchase approved electric equipment. CORE vouchers are calculated by each CORE certified device make and model. Electric leaf blower vouchers range from \$90 to \$400.

### *San Rafael, California*

Many cities in California have existing partial or full bans on leaf blowers, and others have recently adopted ordinances regulating the use of leaf blowers in reaction to the state-wide ban. For example, the San Rafael City Council adopted [Ordinance No. 2014](#) on July 18, 2022 that prohibits the use of gas-powered leaf blowers within city limits. The ordinance also established permitted times for electric leaf blower use based on residential or non-residential use. CMO staff met with the San Rafael Public Works department to gain insight into their transition process, and to incorporate lessons learned from San Rafael's transition into the proposed plan for Kirkland.

### *District of Columbia*

The District of Columbia City Council approved [Bill 22-234](#) in 2018, which banned the use and sale of gas-powered leaf blowers in DC. The legislation included a three-year transition period for residents and local businesses to transition from gas-powered to electric leaf blowers. As a result of the bill, the Washington DC Sustainable Energy Utility created a rebate program to support businesses and households transitioning to electric powered equipment<sup>vi</sup>. Businesses are eligible for a \$1,000 rebate on electric riding lawn mowers and a \$100 rebate on electric push lawn mowers, limited to 5 products per business per year. DC residents are eligible for a \$500 rebate on electric riding lawn mowers and a \$75 rebate on electric push lawn mowers, limited to one product per utility account per year.

### *Multnomah County, Oregon*

In December 2021, the Multnomah County Board of County Commissioners approved [Resolution No. 2021-094](#), signaling the Board's intent to phase out the County's gas-powered leaf blowers before 2025. In the resolution, the Board of County Commissioners also approved infrastructure updates to make adequate charging infrastructure available for electric equipment, the implementation of awareness campaigns about the negative impacts of gas-powered leaf blowers, and the development of a work group to explore an equitable countywide transition to electric leaf blowers.

### *City of Seattle*

The City of Seattle adopted [Resolution 32064](#) on September 6, 2022 which states the Council's intent to phase out gas-powered leaf blowers in City departments by 2025 and in the general public

by 2027. The proposed work program, timeline, and budget is expected to be presented to the City Council's Sustainability & Renters Rights Committee in the upcoming months.

### *Other Nearby Cities*

City staff are aware of other nearby cities exploring a potential transition to electric maintenance equipment, including electric leaf blowers. The Redmond City Council, for example, adopted [Resolution 15550](#) in November 2021, which adopted the City's Operations Zero Carbon Strategy. One of the actions included in the Operations Zero Carbon Strategy is "evaluat[ing] the impact of gas-powered leaf blowers and explore zero emissions alternatives." Additional nearby cities are in an initial exploratory phase of the process and anticipate action by their Council later this year.

### *Washington State Legislature*

Both the Washington State House of Representatives and Senate introduced bills to incentivize the purchase of zero-emission landscaping equipment during the 2022 legislative session. Despite receiving bipartisan support, neither of the bills presented passed out of the State legislature. [Senate Bill 5543](#), known as "Cash for Clunkers", proposed that retailers selling discounted new all-electric lawn equipment would receive a business and occupation tax credit. [House Bill 1918](#) proposed that electric outdoor power equipment be exempt from sales and use taxes through January 1, 2033. Sellers of equipment would be encouraged to notify customers of the exemptions. The proposed end date for the exemption was January 1, 2033. No legislation related to electric landscaping equipment was introduced in the 2023 legislative session.

## **Opportunities and Challenges Identified by Kirkland Departments and Landscaping Businesses**

In addition to researching environmental impacts and other governments who passed legislation to sunset gas-powered equipment, City Manager's Office (CMO) staff and representatives from Public Works and Parks & Community Services departments met in early 2023 to discuss the initiative, how staff are currently using electric equipment, and challenges and opportunities of a complete transition to electric equipment. Public Works and Parks & Community Services departments have a combined total of nearly 70 gas powered leaf blowers and use the Stihl 600 and Stihl 800 backpack and handheld models. The departments have a combined total of 18 backpack and handheld electric leaf blowers that work well in a variety of use cases. Many crew members keep an electric leaf blower in the cab of their truck for easy clean ups, they are often used by arborists to avoid exposure to harmful fumes while in a bucket truck for extended periods of time, and crew members with shoulder injuries find the push-start on electric equipment is easier than a pull-start.

Additionally, CMO staff hosted a focus group with Kirkland landscaping businesses to gather insights on how the transition to electric hand-held and backpack leaf blowers would impact their businesses. Over 200 landscaping businesses, all of whom had a Kirkland business license, were invited to a virtual focus group to discuss the initiative. 10 businesses joined and were issued \$25 of [Kirkland Ca\\$h](#) to thank them for their attendance. In accordance with the goals outlined in the DEIB 5-Year Roadmap, translation services were available for all communication with landscaping businesses. The presentation to landscaping businesses was also made available in Spanish.

At the meetings, City staff received the following insights. For ease of review, staff has categorized the feedback as challenges or opportunities with the initiative on the following page.

## CHALLENGES

1. Commercial grade electric equipment currently on the market is less powerful than commercial grade gas-powered equipment
2. Availability of charging capacity in facilities, and/or limited mobile charging capability that doesn't rely upon gas powered vehicles/generators
3. Heavier weight of electric leaf blowers may create an ergonomics concern for users
4. High cost to acquire commercial electric devices compared to gas-powered, including cost of batteries, may be a barrier
5. Increased cost to customers (some jobs may take longer with less powerful electric equipment)
6. Available electric units do not resolve sound pollution concerns
7. Batteries: environmental impact, quantity needed for a full day's job, effectiveness in cold vs warm weather, high cost
8. Enforcement methods to ensure effectiveness and equity
9. Disposal or recycling processes for gas-powered equipment and used electric batteries
10. As the electric equipment is new on the market, there are questions around longevity of electric equipment vs gas-powered equipment
11. Will require new technical skills to maintain electric equipment
12. Electric equipment not currently designed for professional use or transportation, concern about theft
13. Replacing all gas-powered units at one time is inconsistent with current staggered procurement policies

## OPPORTUNITIES

1. Less emissions, improved health outcomes for users
2. Being an early adopter and leader in the use of electric equipment
3. Electric equipment starts reliably and requires less maintenance
4. Getting hands-on experience with new equipment
5. Easier to start electric equipment as many devices have a push-start mechanism
6. Some clients already asking businesses to only use electric equipment
7. Injured crews can use devices without risking further injury (button to turn on electric device vs pull start of gas-powered device)
8. Established familiarity with older models of electric equipment
9. Upcoming equipment expos to learn about new electric equipment
10. New Public Works buyer to facilitate equipment purchases
11. Interest in piloting equipment during the summer months
12. Units on the market now are sufficient to do the average single-home yard
13. Batteries may be interchangeable with other electric yard maintenance equipment allowing the transition of additional gas-powered equipment at the same time
14. Higher end electric leaf blower models have better ergonomics for users compared to lower end models
15. Ability to store electric equipment in vehicle cab since there is no fuel in the equipment

The principal concern raised by both groups was that the market does not currently provide a commercial-grade electric leaf blower that is as powerful as current gas-powered models. This is a particular concern for groups managing large areas like parks and multifamily properties especially during the fall and winter months when there are large amounts of wet accumulated leaves. This is compounded with the fact that lithium batteries are less effective in cold weather. Landscaping businesses noted that less power may result in needing more time to complete the same level of work, which may result in an increased cost to customers. In the case of City staff, this could result in decreased levels of service as current tasks take longer to accomplish. These stakeholders also provided the insight that the use of these devices for longer periods of time may also result in increased sound pollution for the community since the current models on the market are not quieter than gas-powered equipment. Finally, both groups acknowledged that depending on the unit,

whether hand-held with the battery in unit, or backpack with the battery centered on the user's back, can either be a benefit or a burden. Generally, battery-powered units are heavier and, since the current models are less powerful and require use over a longer period, the ergonomics of electric equipment may lead to overuse injuries for the user. Conversely, some businesses shared that some of the electric backpack models they had were more ergonomic than previous gas-powered or other electric units they had utilized as the battery was centered on the users back with a much lighter handheld unit.

While both groups presented various concerns about the potential transition, they also presented many opportunities. Beginning a transition to the electric equipment before many cities in the region would provide Kirkland with the opportunity to be an early adopter in this space and potentially push the market to produce powerful, quieter, commercial grade electric equipment. Both groups acknowledged that the electric equipment was easier to use, eliminated the pull-start that can cause fatigue and injuries, and eliminated user exposure to harmful emissions. Businesses identified a demand for the use of electric equipment-only from select customers. They also noted that certain models of electric yard maintenance equipment have a battery that can be swapped between devices. This functionality would support the transition of additional gas-powered equipment in the community. Additionally, businesses shared that electric leaf blower models currently on the market are sufficient for residential use, and that high end models of electric leaf blowers have better ergonomics compared to lower end models. City staff identified several opportunities that would support that the exploration and potential acquisition of new equipment, including upcoming equipment expos, a new buyer to facilitate purchases, and an interest in piloting new equipment in the summer months. Electric leaf blowers can be in the vehicle cab without the risk of spilling gas.

There are notable opportunities and challenges tied to a citywide transition from gas-powered to electric leaf blowers. The City will need to consider how to mitigate any negative impacts that this switch may have on local businesses, and how to incorporate the goals of the Diversity Equity Inclusion Belonging (DEIB) 5-Year Roadmap into each step of the transition. Particularly, the issue of enforcement has potential equity implications, as lower income residents and small businesses may be disproportionately impacted by the cost of fines in addition to other implementation and logistical challenges. Other concerns that will need to be addressed in the City's initiative include the power of devices, cost of devices, charging infrastructure, battery recycling, disposal of gas-powered units, and ensuring that service levels are not significantly impacted by the transition.

### **Electric Leaf Blower Initiative Goals and Key Milestones**

Based on the Sustainability Master Plan, insights gathered from research, stakeholder engagement, equity considerations, and survey of other approaches across the country, staff set four goals for the Kirkland initiative that are listed in Section 1 of Resolution R-5585:

1. Sunset the use of gas-powered hand-held and backpack leaf blowers in Kirkland by December 31, 2025
2. Reduce negative health impacts caused by gas emissions
3. Ensure a responsive transition that reduces the burden and maximizes the potential benefit to Kirkland landscaping businesses and residents
4. Be proactive in anticipation of potential State decisions to sunset gas-powered equipment

To accomplish these goals, staff prepared a three-phased approach to sunset gas-powered hand-held and backpack leaf blowers for Council consideration and discussion.

Phase 1 2023:

- Piloting, evaluating, developing, and implementing a pragmatic transition plan for the City's equipment, and
- Stakeholder engagement with staff, landscaping businesses, manufacturers, and Kirkland's congressional delegation on potential collaboration and/or grant opportunities.

#### Phase 2, 2024:

- Evaluating, developing, and implementing financial incentives to businesses and residents to support their conversion to electric equipment, incorporating the lessons learned from the City's pilot,
- Seek federal and state funding to support transition to electric leaf blowers
- Continued phase-out of the City's hand-held and backpack gas equipment, and
- Continued engagement with Kirkland's legislative delegation and equipment manufacturers.

#### Phase 3, 2025 – Propose an ordinance sunsetting gas-powered leaf blowers by December 31, 2025:

Phase 3 represents the culmination of the lessons learned over the first two phases with a draft Ordinance for possible Council adoption that would sunset use of gas-powered, hand-held and backpack leaf blowers for the entire City by December 31, 2025. This phase would involve thoughtful, continued stakeholder engagement and analysis of policy and enforcement options, including applying an equity lens. Phase 2 and Phase 3 provide financial support for the transition of the private sector as some landscaping businesses are very small operations owned by minority members of the community and may experience a disproportionate economic impact by not having sufficient funds to switch their gas-powered leaf blowers to electric. In addition, depending on how it is decided to enforce an ordinance, small minority owned companies that do not have the means to purchase the electric leaf blowers and proceed to work in Kirkland, may incur fines or other consequences that would impact the livelihoods of their business. The Council may also want to consider financial incentives to encourage resident adoption of electric equipment.

After City Council decides the direction of this initiative, staff will initiate plans to communicate to all stakeholders on the outcome of these decisions. This educational campaign plan will include strategies to reach businesses including small minority owned businesses, as well as residents with information that will be relevant to both owners and renters, and City staff. The campaign may utilize different methods to engage with stakeholders such as informational meetings, focus groups, informational mailouts, website and social media, as well as using neighboring governmental entities and community partners. Access to information will be taken into consideration and provide options for language access.

### **Council Discussion**

Staff suggest the following set of questions as a starting point for Council discussion on the initiative and draft Resolution R-5585:

1. Does the timeline and key milestones of the three-phased approach set forth in Resolution R-5585 align with the Council's expectations for an initiative that would sunset gas-powered leaf blowers in Kirkland?
2. Is the Council supportive of the following methods proposed in the Resolution?
  - a. Providing financial incentives to support transition for business owners and residents?
  - b. On-going stakeholder engagement with landscaping businesses, manufacturers, and members of Kirkland's legislative delegation to shape the development of a future Ordinance, share insights, and encourage the market to better meet the demands of users?
3. Is Council interested in considering expanding the scope of the initiative or having staff identify opportunities for future initiatives to address other gas-powered landscaping equipment or gas-powered equipment more broadly?



## **Council Action Requested**

Staff recommends Council discuss the proposed Electric Leaf Blower Initiative, the goals, milestones, and areas for creative problem solving included in Resolution R-5585 and provide feedback to staff. Council's input will be incorporated into Resolution R-5585 for Council to consider adopting at the April 18, 2023 Council meeting.

### List of Attachments

Att-1 Research on Harmful Environmental Impacts of Gas-powered Leaf Blowers and Battery Recycling and Production Processes

Att-2 DRAFT Resolution R-5585 City of Kirkland's Electric Leaf Blower Initiative

## **REFERENCES**

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<sup>i</sup> Steele, Nancy L.C., et al. "Health and Environmental Impacts of Leaf Blowers." *California Air Resources Board*, California Environmental Protection Agency Air Resources Board, Feb. 2000, <https://ww2.arb.ca.gov/sites/default/files/2018-11/Health%20and%20Environmental%20Impacts%20of%20Leaf%20Blowers.pdf>.

<sup>ii</sup> "Leaf Blowers - Dangers - Pollution - Health." Quiet Clean PDX, 14 Mar. 2020, <https://www.quietcleanpdx.org/leaf-blowers-dangers-pollution/#:~:text=Gas%20leaf%20blowers%20create%20high,lung%20disease%2C%20cancer%20and%20dementia>

<sup>iii</sup> "Leaf Blowers - Dangers - Pollution - Health."

<sup>iv</sup> "Leaf Blowers - Dangers - Pollution - Health."

<sup>v</sup> "California Air Resources Board." Clean Off-Road Equipment Voucher Incentive Project | California Air Resources Board, <https://ww2.arb.ca.gov/our-work/programs/clean-off-road-equipment-voucher-incentive-project/about>.

<sup>vi</sup> More information about the rebate program can be found here: <https://www.dcseu.com/homes/electric-lawn-care>

## **Att-1 Summary of Negative Environmental Impacts of Gas-Powered Equipment and Battery Production and Recycling**

This attachment provides additional information on the harmful environmental impacts of gas-powered leaf blowers and the battery production and recycling process required to support electric equipment. There is an environmental trade-off of replacing gas-powered equipment with electric that is important to recognize as the Council considers how to advance an electric leaf blower initiative. While electric equipment use reduces emissions that harm users and our environment, the process of acquiring materials for lithium-ion batteries and the battery recycling and disposal process has notable negative environmental impacts. Both gas-powered and electric leaf blowers may require plastic and metal to produce and paper or plastic products in packaging. Depending on where units are manufactured or from where parts are sourced, there will be varying degrees of environmental impacts to assemble and transport new units.

### *Negative Environmental Impacts of Gas-Powered Equipment*

Emissions from fossil fuels are known as one of the main contributors to the current climate crisis. When fossil fuels, such as oil and coal are burned, carbon dioxide is released into the atmosphere. With increased levels of carbon dioxide (CO<sub>2</sub>) in the atmosphere, the Earth's surface air temperatures increase<sup>[i]</sup>. The warming of the Earth contributes to the melting of Arctic Sea ice, decreased snow cover during warm winter, and increased water vapor<sup>[ii]</sup>. These results further increase the Earth's temperature. According to the US Department of Energy, lawn and garden maintenance in the United States emit 15 million tons of CO<sub>2</sub> annually<sup>[iii]</sup>. Emissions generated from landscaping, therefore, significantly contribute to the heating of the Earth's atmosphere, and the ongoing climate crisis.

The extraction of fossil fuels also poses significant environmental concerns, including land degradation and water pollution<sup>[iv]</sup>. Fossil fuel companies use large portions of land to extract and process the fossil fuels<sup>[v]</sup>. After the sites have extracted the resources, the damage to the land is irreversible. There is also significant risk of the land becoming hazardous and being categorized as a Superfund<sup>[vi]</sup> site. For example, mining in the Coeur d'Alene River Basin has resulted in the largest Superfund site in the United States<sup>[vii]</sup>. Mining dating back to the 1800s resulted in lead contamination in the water and sediment of this river basin<sup>[viii]</sup>. The Superfund site in the Coeur d'Alene River Basin demonstrates that extracting fossil fuels, which are used to power gas-powered leaf blowers, has negative long-term impacts on the environment and the health of residents.

Of importance to the residents of Washington is the impact of fossil fuels on ocean acidification. The ocean absorbs almost a fourth of the world's carbon emissions<sup>[ix]</sup>. As carbon is absorbed in the ocean, it becomes acidic<sup>[x]</sup>. This increased acidity breaks down the minerals needed for lobsters, shrimp, coral reefs, and oysters to create their shells<sup>[xi]</sup>. The WA Department of Ecology states that the impacts of ocean acidification are already being felt by shellfish farmers in the Puget Sound, and to compensate, local oyster hatcheries now must add sodium carbonate to hatcheries waters<sup>[xii]</sup>. This is not a lasting solution, as sodium carbonate levels will continue to drop as acidification increases

Washingtonians will continue to contribute to the negative impacts of ocean acidification on local businesses and the negative environmental impacts on the Puget Sound ecosystem.

### *Negative Impacts of Battery Production and Recycling Process*

There are a range of lithium-ion batteries in use today, but common metals that may be used in the batteries include cobalt, nickel, iron, manganese, and aluminum<sup>[xiv]</sup>. These metals are in high demand, as lithium-ion batteries are the power source for electric vehicles, cell phones, laptops, and electric landscaping equipment<sup>[xv]</sup>. Most of the world's lithium is produced outside of the United States. The major producers of lithium include countries in the "Lithium Triangle" (Argentina, Bolivia, and Chile), China, and Australia<sup>[xvi]</sup>. These countries have experienced the loss of biodiversity, significant loss of water, increased salinity of rivers, and soil contaminated by toxic waste<sup>[xvii]</sup>. There is also an ongoing effort to expand lithium mining in the US. The [Thacker Pass mine](#), operated by Lithium Americas, is a highly contested open pit mine opening in Nevada. The mine is expected to consume 3,224 gallons of water per minute and may cause groundwater contamination with metals such as antimony and arsenic<sup>[xviii]</sup>. The Thacker Pass project will create hundreds of millions of cubic yards of mining waste that may contain radioactive uranium and is expected to deteriorate close to 5,000 acres of habitat for native plants and animals<sup>[xix]</sup>.

Cobalt is another important component of lithium-ion batteries. The Democratic Republic of Congo (DRC) is the country that produces the highest amount of cobalt (around 70% of the world's supply)<sup>[xx]</sup>. Cobalt is often collected as a by-product of existing copper mines. However, because the country's copper mines cannot keep up with the international demand for cobalt, unregulated "artisanal" mining is now a major source of cobalt production in the DRC<sup>[xxi]</sup>. The artisanal mining industry is severely damaging to the environment and has been repeatedly highlighted as a danger to the Congolese people due to its human rights violations, particularly its use of child labor<sup>[xxii]</sup>. A study conducted by Northwestern University found that cobalt mining in the DRC resulted in increased violence, substance abuse, food and water insecurity, and impacts on health<sup>[xxiii]</sup>. This mining also has resulted in Congolese residents traveling across the border to Zimbabwe to purchase food, as their land has been destroyed by mining and can no longer produce crops<sup>[xxiv]</sup>. Cobalt is now increasingly being replaced by Manganese in lithium-ion batteries, which is a more ethical and potentially more environmentally friendly option (although it still requires mining)<sup>[xxv]</sup>.

Lithium-ion battery recycling poses another complexity to the use of electric equipment. The process of recycling these batteries is expensive and complicated. Due to the reactive nature of lithium, and the high risk of combustion if not disposed properly, lithium-ion batteries must be disposed of at certified processing sites<sup>[xxvi]</sup>. At these sites, technicians disassemble batteries into modules and assess which cells still have enough health for reuse in other applications and which need recycling<sup>[xxvii]</sup>. If the cells can be recycled, they go through the 'smelting' process, where the metals are burned to remove impurities<sup>[xxviii]</sup>. Because of the high demand for cobalt, nickel, and copper, these metals are typically recovered. Lithium is often lost in the smelting process and becomes part of the waste (referred to as 'slag')<sup>[xxix]</sup>. It is sometimes possible to recover this lithium from a secondary extraction process<sup>[xxx]</sup>. Initial research into battery recycling processes has illustrated a limited investment in lithium-ion battery recycling across

the world. However, the Bipartisan Infrastructure Law includes significant investments in developing America's lithium-ion recycling processes. With considerable recent federal investment into battery recycling, the lithium-ion battery recycling process may improve in the future.

## REFERENCES

- [i] "Basics of Climate Change." EPA, Environmental Protection Agency, <https://www.epa.gov/climatechange-science/basics-climate-change#:~:text=As%20the%20earth%20warms%2C%20the,temperatures%20rise%2C%20sea%20ice%20retreats.>
- [ii] "Basics of Climate Change."
- [iii] "Gas Powered Leaf Blower Noise and Emissions Factsheet." Quiet Clean PDX, 2019, <https://www.quietcleanpdx.org/wp-content/uploads/2019/11/Gas-Powered-Leaf-Blower-Emissions-Factsheet-11.12.pdf>.
- [iv] Denchak, Melissa. "Fossil Fuels: The Dirty Facts." National Resource Defense Center, 1 June 2022, <https://www.nrdc.org/stories/fossil-fuels-dirty-facts>.
- [v] Denchak, Melissa.
- [vi] The Comprehensive Environmental Response, Compensation and Liability Act (informally referred to as 'Superfund') is legislation that gives the Environmental Protection Agency (EPA) authority to clean up contaminated sites and hold parties responsible for the contamination.
- [vii] "Chapter 11" Superfund and Mining Sites, National Academies Press, Washington, DC, 2005, pp. 412–427.
- [viii] "Chapter 11" Superfund and Mining Sites.
- [ix] "The Ocean – the World's Greatest Ally Against Climate Change." United Nations, United Nations, <https://www.un.org/en/climatechange/science/climate-issues/ocean>.
- [x] "Ocean Acidification." National Oceanic and Atmospheric Administration, <https://www.noaa.gov/education/resource-collections/ocean-coasts/ocean-acidification#:~:text=Because%20of%20human%2Ddriven%20increased,the%20ocean%20becomes%20more%20acidic.>
- [xi] "Understanding Ocean Acidification." NOAA Fisheries, NOAA, <https://www.fisheries.noaa.gov/insight/understanding-ocean-acidification#:~:text=For%20good%20reason%2C%20ocean%20acidification,health%20is%20also%20a%20concern.>
- [xii] "Acidification in Puget Sound." Washington State Department of Ecology, <https://ecology.wa.gov/Water-Shorelines/Puget-Sound/Issues-problems/Acidification>.
- [xiii] "Acidification in Puget Sound."
- [xiv] Pistilli, Melissa. "6 Lithium-Ion Battery Types." INN, 29 July 2022, <https://investingnews.com/daily/resource-investing/battery-metals-investing/lithium-investing/6-types-of-lithium-ion-batteries/>
- [xv] "Lithium Mining: What You Should Know about the Contentious Issue." Volkswagen Konzern Startseite, 26 Jan. 2022, <https://www.volkswagenag.com/en/news/stories/2020/03/lithium-mining-what-you-should-know-about-the-contentious-issue.html>
- [xvi] Skidmore, Zachary. "Growing the Supply Base of Lithium." Mining Technology, 28 June 2022, <https://www.mining-technology.com/features/supply-base-lithium-growth/>
- [xvii] Simpkins, Laura Grace, and Matja Krivic. "The Side Effects of Lithium Mining." Wellcome Collection, Wellcome Collection, 23 Sept. 2021, <https://wellcomecollection.org/articles/YTdnPhIAACIAGuF3>
- [xviii] Penn, Ivan, et al. "The Lithium Gold Rush: Inside the Race to Power Electric Vehicles." The New York Times, The New York Times, 6 May 2021, <https://www.nytimes.com/2021/05/06/business/lithium-mining-race.html>
- [xix] Penn, Ivan, et al.
- [xx] "Profiling the World's Largest Cobalt-Producing Countries." NS Energy, 22 Feb. 2021, <https://www.nsenerybusiness.com/features/top-cobalt-producing-countries/>

[xxi] Person, and Andy Home. "Column: Cobalt, Congo and a Mass Artisanal Mining Experiment." Reuters, Thomson Reuters, 13 May 2021, <https://www.reuters.com/business/energy/cobalt-congo-mass-artisanal-mining-experiment-andy-home-2021-05-13/>

[xxii] Philipp, Jennifer. "The Effects of Cobalt Mining in the DRC." The Borgen Project, Jennifer Philipp <https://Borgenproject.org/Wp-Content/Uploads/Logo.jpg>, 5 Nov. 2021, <https://borgenproject.org/cobalt-mining-in-the-drc/>

[xxiii] December 17, 2021 |By Amanda Morris. "Understanding Cobalt's Human Cost." Northwestern Now, 3 Jan. 2023, <https://news.northwestern.edu/stories/2021/12/understanding-cobalts-human-cost/>

[xxiv] "Understanding Cobalt's Human Cost." ScienceDaily, ScienceDaily, 17 Dec. 2021, <https://www.sciencedaily.com/releases/2021/12/211217113232.htm>

[xxv] Perras, Rene. "Manganese Is Replacing Cobalt: How This Mineral Is Saving the Future of the Electric Vehicle Industry." Entrepreneur, Entrepreneur India, 17 Sept. 2021, <https://www.entrepreneur.com/en-in/news-and-trends/manganese-is-replacing-cobalt-how-this-mineral-is-saving/386143#:~:text=Manganese%20is%20vastly%20more%20affordable,and%20reducing%20end%20user%20cost>

[xxvi] "Used Lithium-Ion Batteries." EPA, Environmental Protection Agency, <https://www.epa.gov/recycle/used-lithium-ion-batteries>.

[xxvii] Gemeš, Nikola. "The Truth About Lithium Ion Battery Recycling." GreenCitizen, 12 Jan. 2023, <https://greencitizen.com/blog/lithium-ion-battery-recycling/>.

[xxviii] Hanjiro Ambrose Former, et al. "A Quick Guide to Battery Reuse and Recycling." The Equation, 10 Dec. 2021, <https://blog.ucsusa.org/hanjiro-ambrose/a-quick-guide-to-battery-reuse-and-recycling/>.

[xxix] Hanjiro Ambrose Former, et al.

[xxx] Hanjiro Ambrose Former, et al.