

STUDENT ORGANIZATION SUSTAINABILITY INITIATIVE PROPOSAL FORM

Part I- General Information:

Name of Student Organization	Hahn Horticulture Garden - Student Maintenance Staff
Contact/Responsible Person	Joe Mills
Contact Office Held/Title	Student Gardener
Contact Email Address	joem96@vt.edu
Contact Telephone Number	571-345-6792

Part II- Project Cost Information

Estimated Cost of this Proposal See III.C. below

Estimated Savings - See III.D. below

Net Cost of this Proposal =

Part III- Supporting Information

A. Please describe your sustainability initiative and attach supporting documentation.

This proposal is the first step to begin to transition the garden from gas powered maintenance equipment to electric equipment through the purchase of a battery-powered blower. The use of a battery-powered blower for daily operations (clearing leaves and grass clippings from paved areas) would reduce fuel consumption, engine emissions, and noise pollution levels. While the more powerful gas powered blower may still be necessary in the fall to clear the massive leaf drop from the trees, it is overkill for a majority of year. The current gas backpack blower (Stihl BR600) is very noisy and disruptive to visitors; its 75 dbA sound rating is significantly louder than the proposed battery powered unit (Stihl BGA56) at 63 dbA. A change of 10 decibels equates to a doubling of relative loudness, so the change to electric would dramatically reduce the noise levels for garden guests.

We could not identify exact numbers on the emissions released by the 2-cycle engine in the leaf blower; however, it is well documented that 2-stroke engines are significant polluters due to the use of an oil/gas mix to keep the engine lubricated. The burning of the gas-oil mix results in more emissions than a 4-stroke engine, the type of engine found in cars and trucks. A study published on the Edmunds.com website (link included below) tested a 2-stroke blower against a 2011 Ford F-150 Raptor pickup truck. Per the author, Jason Kavanagh, the blower released "23 times the CO and nearly 300 times more NMHC than the crew cab pickup. Let's put that in perspective. To equal the hydrocarbon emissions of about a half-hour of yard work with this two-stroke leaf blower, you'd have to drive a Raptor for 3,887 miles, or the distance from Northern Texas to Anchorage, Alaska."

A July 2017 study by the University of Arkansas Office for Sustainability (charts and link attached), which compared a Stihl BR 450 backpack blower to a Stihl BGH100 battery powered blower, provided estimates on carbon emissions over a 5-year service life. They estimated the gas-powered blower at 1926 pounds of carbon emitted versus 1098 pounds for the power generation required to operate the Stihl battery blower. That is a reduction of 828 pounds. The student workers see this is a significant opportunity to begin to reduce the carbon footprint of the garden. The garden staff see this as an initial test of battery powered equipment, with hopes of continuing to transition to other battery powered equipment in the future, if this test goes well.

B. How does this initiative help to achieve the goals of the Virginia Tech Climate Action Commitment Resolution and Sustainability Plan?

This proposal would help to reduce greenhouse gas emissions (Item 3 on the sustainability plan), see above for explanation.

C. What is the cost of your proposal? Please describe in adequate detail the basis for your cost estimate.

The cost of the blower will be \$200.

D. Will your proposal produce cost savings for the University? If so, how much? Please describe in adequate detail the basis for your savings estimate.

This proposal would result in cost savings from the purchase of gasoline and oil mix and lower maintenance service requirements, with the only additional cost being the purchase of electricity to recharge the batteries. Long-term savings should be even higher due to reduced maintenance costs on the electric equipment (no tune-ups, spark plugs, air filters, etc.). Based on the July 2017 study by the University of Arkansas Office for Sustainability (attached), which compared a Stihl BR 450 backpack blower to a Stihl BGH100 battery powered blower, there was a \$190 dollar reduction in yearly costs with the battery-powered blower (\$329/yr gas versus \$139/yr battery). Using the \$190 per year figure from the University of Arkansas study, this purchase would pay for itself in less than two years. That results in a potential savings of \$950 over the 5-year service life of the equipment (as estimated in the study).

E. Is this funding request for a One-Time need or an Ongoing need (please check one)?

One-time

Ongoing

F. Is funding available for this request from another source? If yes, describe the funding (source, amount, etc.)

Not at this time

STUDENT ORGANIZATION SUSTAINABILITY INITIATIVE PROPOSAL FORM (Continued)

Part IV- Requestors/Reviewers

Joe Mills 11/13/18

Prepared By (Name of Contact for Student Organization)

Date

Scott Douglas

Reviewed By (Name of Appropriate University Official)

Date

Denny Cochrane

Reviewed By (Name of Office of Energy and Sustainability Representative)

Date

Links to items requested for purchase:

Stihl BGA 56 Blower

https://blacksburgpower.stihldealer.net/products/blowers-and-shredder-vacs/battery-blowers/bga56/?sku=bga56&_ga=2.143114997.1548168771.1541686632-1774230067.1540307325



Stihl AK 20 Lithium-Ion Battery

<https://blacksburgpower.stihldealer.net/products/batteries-and-accessories/batteries/ak20/>

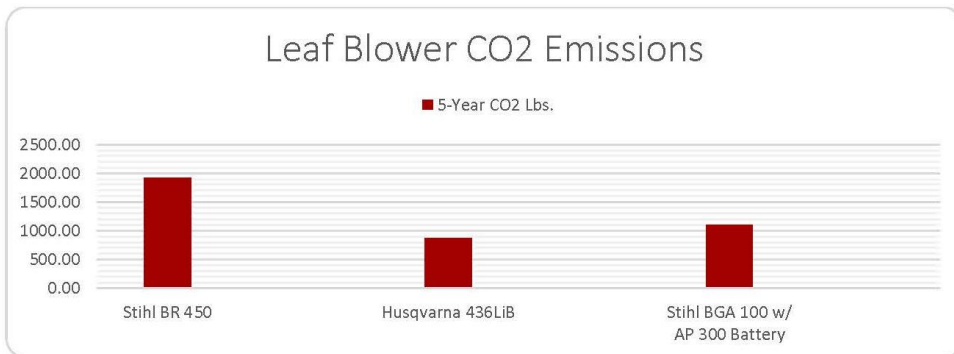


Table 3: Decibel Changes, Loudness, and Energy Loss

Sound Level Change	Relative Loudness	Acoustic Energy Loss
0 dBA	Reference	0
-3 dBA	Barely Perceptible Change	50%
-5 dBA	Readily Perceptible Change	67%
-10 dBA	Half as Loud	90%
-20 dBA	1/4 as Loud	99%
-30 dBA	1/8 as Loud	99.9%

Source:

https://www.fhwa.dot.gov/Environment/noise/regulations_and_guidance/polguide/polguide02.cfm



Source: University of Arkansas study on gas versus electric equipment
https://sustainability.uark.edu/_resources/publication-series/project-reports/reports-electric_power_tools_ua-2017-ofs.pdf

Link to Edmunds article comparing leaf blower to a car and truck:
<https://www.edmunds.com/car-reviews/features/emissions-test-car-vs-truck-vs-leaf-blower.html>