The *Lotus Live* Guide to ***Lawn Care***

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Table of Contents

Introduction

- This guide is your source for information about responsible lawn care, discussing the environmental, social, and economic impacts of taking care of your lawn, and providing best practices for responsible lawn care. As Lotus Live's knowledge base increases, and as new resources are created, this guide will be updated. The most recent version of this guide can be found here.

Executive Summary

Chart: Comparison of Gasoline, Electric, and Manual Mowers

	Conventional	***Electric***	***Manual***
Capital Cost	$200 to $500 (Rear Bag)	$150 to $300 (Cord) $300 to $350 (Charge)	$90 to $175 (Reel)
Average Fuel Cost	$10.50/yr	$3.00/yr	Negligible
Carbon Emissions	26.4 kg/yr	22.8 kg/yr	Negligible
Air Pollution	Local, Lightly Regulated, Inefficient Combustion	Central, Heavily Regulated, Efficient Combustion	Negligible
Noise Pollution	95 dB (Motorcycle)	75 dB (Washing Machine)	~ 60 dB (Conversation)
Maintenance	Sharpening, spark plugs, air filters, tune-ups	Sharpening (Cord) Battery replacement (Charge)	Blade sharpening
Startup	Heavy exertion	Push a button	Start walking
Health Effects	+Exercise - Heavy, Local Pollution	+Exercise - Light, Central Pollution	+ Exercise
Acute Injuries	Dangerous		A bit safer

Lawn Statistics: Why Lawn Care Matters

Lawn Area

- 50,000 sq. miles (0.5% of total land area) of America is covered with lawns.[1]

How Many Lawns are Mown?

- According to the EPA, 54 million Americans mow their lawn each weekend.[2]

Analysis: Conventional Gasoline Lawn Mowers

Capital Cost

- Conventional gasoline mowers models range from $200 to $500.

Fuel Use and Cost

- Conventional lawn mowers average around 15 gal/acre-year. For the average American lawn, this is 3 gallons per year, $10.50/year at $3.50/gallon.[3]

Carbon Emissions

- Overall, American lawn equipment sucks up 800 million gallons of gasoline per year, and emits 7 million metric tons of CO_2 per year.[4]
- For the average lawn mown with a conventional mower, 26.4 kg CO_2/yr is emitted.[5] These emissions will likely never change - gasoline is gasoline.

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[1] Terrapass - *Power Your Lawnmower with Milk and Bananas* & CIA World Factbook - *United States*

[2] People Powered Machines - *Mowing Emissions and Clean Air Alternatives*

[3] University of Vermont - *Fuel Efficient Lawns and Landscapes* & Grounds Magazine - *Lawn Size*
15 gal/acre-yr * 0.2 acre/average lawn * $3.50/gal

[4] People Powered Machines - *Mowing Emissions and Clean Air Alternatives* & EPA - *Carbon Emissions from Gasoline*

[5] University of Vermont - *Fuel Efficient Lawns and Landscapes* & Grounds Magazine - *Lawn Size* & EPA
15 gal/acre-yr * 0.2 acre/average lawn * 8.8 kg CO2/gal

Air Pollution

- **Combustion Emissions:** Per hour operated, a lawn mower emit 40 times more air pollution (excluding CO_2) than a car.[6] Per gallon of gasoline, a lawn mower releases 93 times more air pollution from gasoline than a car would.[7] Lawn mowers emits high levels of NO_x, CO, and VOCs, and account for up to 5% of U.S. air pollution (more in metropolitan areas).[8] These might be somewhat cleaned up by future regulation, but it will likely always be the dirtiest option.

- **Gas Can Emissions:** In California alone, 87 tons per day of smog-forming reactive organic gases are emitted from portable gas cans - equal to the heat-trapping emissions of 1 million cars.[9] In the United States, 17 million gallons of fuel per year (more than the Exxon Valdez oil spill) are spilled from portable gas cans.[10]

Noise Pollution

- Conventional lawn mowers are loud, around 95 dB, as loud as a motorcycle.[11] In addition to being obnoxious to the neighbors, this can be injurious to hearing - prolonged exposure to anything above 85 dB can cause hearing loss, and one should not be exposed to 95 dB for more than one hour a day.[12]

Maintenance

- Conventional mowers need oil changes, spark plug and air filter replacements, and tune-ups.[13]

Startup

- Conventional lawn mowers can be extremely hard to start, especially when they get old.[14]

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[6] People Powered Machines - *Mowing Emissions and Clean Air Alternatives*, EPA - *Carbon Emissions from Gasoline*

[7] Terrapass - *Power Your Lawnmower with Milk and Bananas*

[8] People Powered Machines - *Mowing Emissions and Clean Air Alternatives*, EPA - *Carbon Emissions from Gasoline*

[9] Mother Earth News - *Cordless Electric Lawn Mowers*

[10] People Powered Machines - *Mowing Emissions and Clean Air Alternatives*

[11] It should be noted that dB is not an absolute unit - however, dB is commonly assumed (as it is here) to mean decibels relative to 20 μPa, the threshold of human hearing.

[12] Mother Earth News - *Cordless Electric Lawn Mowers*

[13] Mother Earth News - *Cordless Electric Lawn Mowers*

[14] From personal experience, having to pull the cord as hard as possible about ten times each time I have to mow the lawn.

Health Effects

- The health effects of an gasoline mower are largely negative - it gives you exercise, but spews out localized pollution. When you mow the lawn conventionally, you are directly breathing in carcinogens.[15] As mentioned before, a lawn mowers emissions are 40 times dirtier than your car's, and you stand right behind it when you mow.

Acute Injuries

- 80,000 injuries a year in the Unites States are attributed to lawn mower accidents, largely due to cuts on feet and fractured toes from flying debris.[16]

Analysis: Electric Lawn Mowers

Capital Cost

- Corded lawn mowers are cheaper, costing $150 to $300. Battery lawn mowers cost $300 to $350, plus the possible cost of battery replacements if you have a large lawn that you mow frequently, or if you are a gardener.

Fuel Use and Cost

- Electric mowers use about 40 kWh per year to mow the average lawn, costing an average of $4 per year.[17]

Carbon Emissions

- For the average lawn mown with an electric mower, 22.8 kg CO_2/yr is emitted.[18] As renewables replace fossil fuels on the power grid, this will decrease.

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[15] Green Grass Cutters - *Lawn Mower Pollution*

[16] Landscape Management - *80,000 Injuries a Year...* Other injuries include: "running over an extremity (hand or foot), servicing mowers that were turned off (often while replacing motor blades), servicing mowers that were running (such as clearing brush from the mower), tripping over a stored mower, sustained physical stress from mowing, touching hot surfaces on the mower, falling on slippery surfaces while mowing."

[17] Power House - *Electric Lawn Mowers* & Madison Gas and Electric - *Manual and Electric Lawn Mowers* & Grounds Magazine - *Lawn Size*

[18] EIA - *Average Electricity Prices 2007* & EIA - *Greenhouse Gas Emission Coefficients 2000*
$4 / $0.1061/kWh * 0.606 kg CO2/kWh = 22.8 kg CO2/kWh

Air Pollution

- For electric mowers, there is air pollution at the power plant level, but it is less due to more efficient combustion with regulated pollution controls. As the power grid becomes cleaner, this will decrease.

Noise Pollution

- Electric lawn mowers average around 75 decibels (the same as a washing machine), a safer, less obtrusive level of noise.[19]

Maintenance

- Corded electric mowers only require blade sharpening. Battery electric mowers require sharpening, and possibly battery replacement if it is heavily used.[20]

Startup

- Electric lawn mowers start at the push of a button.[21]

Health Effects

- The health effects of an electric mower are both positive and negative - exercise in in addition to generalized pollution from the electricity.

Acute Injuries

- Switching to an electric mower would not significantly reduce or increase your risk of injury, though it would significantly reduce your risk of chronic health issues.

Analysis: Manual Lawn Mowers

Capital Cost

- If cost is your primary concern, manual mowers are by far the cheapest. The average cost of manuals ranges from $90 to $175, depending on where you're shopping.

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[19] Mother Earth News - *Cordless Electric Lawn Mowers*

[20] Mother Earth News - *Cordless Electric Lawn Mowers*

[21] Madison Gas and Electric - *Manual and Electric Lawn Mowers*

Fuel Use and Cost

- Not strictly zero - depends on how much your food costs. However, this human fuel cost is a) not unique to manual mowers, and b) significantly less than the cost of electricity or gasoline fuels.

Carbon Emissions and Air Pollution

- Not strictly zero, depends on embodied energy in food and in the construction of the mower, but comparatively negligible - see above.

Noise Pollution

- Manual lawn mowers are not silent, but they will not wake anyone up - they probably run around 60 dB, the same as a conversation between you and a neighbor.

Maintenance

- The blades will need to be sharpened, at an interval that could range from few times a year to every 10 years depending on the mower and usage.[22]

Startup

- Startup is as easy as starting to walk with the mower held in front of you.

Health Effects

- The health effects of a manual mower are positive - exercise.

Acute Injuries

- Switching to an manual mower might slightly reduce (but not eliminate) your risk of injury, but it would most definitely reduce your risk of chronic health issues.

[22] People Powered Machines - *Compare Push Reel Mowers*

About this Guide

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If you have any ideas, suggestions, or corrections you would like to contribute to this guide on Lawn Care, please send us an email at buildings@lotuslive.org.

Feel free to make use of any of the information in this guide for any purpose--we simply ask that you credit us and our predecessors, and link to us.

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