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R E P O R T

GREEN

GREEN SEALS
Choose

LAWN CARE EQUIPMENT



The average gasoline mower tested by the EPA emits in 1 hour of operation the same amount of hydrocarbons that a 1992 Ford Explorer emits over 23,600 miles!



The average gasoline mower emits over 9000 times more hydrocarbons than its electric equivalent!



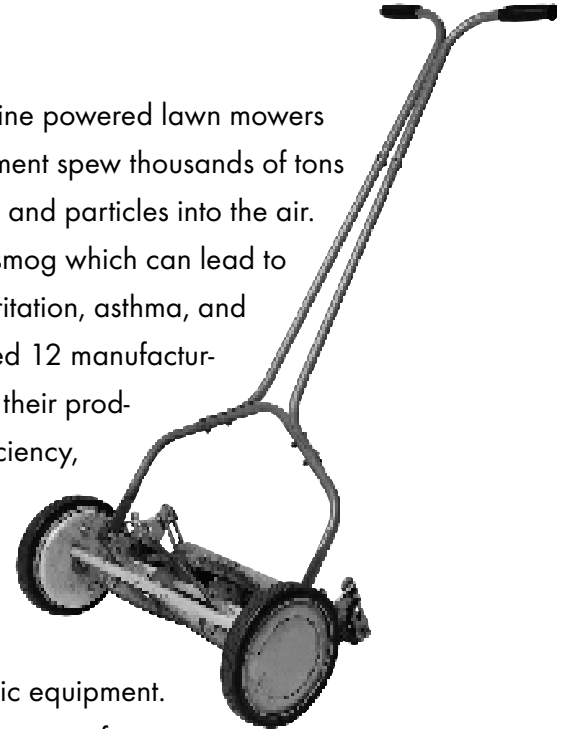
If just 20% of US homeowners switched to electric mowers 84,000 fewer tons of carbon monoxide would be emitted into the air each year!



An electric mower would save the average user 73% in total energy costs!

Each year aging gasoline powered lawn mowers and lawn care equipment spew thousands of tons of polluting chemicals and particles into the air.

These pollutants create urban smog which can lead to chronic illnesses such as eye irritation, asthma, and headaches. Green Seal™ reviewed 12 manufacturers on the following aspects of their products: power supply, engine efficiency, cut size, emission reduction methods, product features and overall costs. The equipment is divided into gasoline powered equipment and electric equipment. Within each section there is a variety of some of the following: riding mowers, walk behind mowers, grass trimmers and brush cutters. Overall, electric equipment is the best purchase decision based on our criteria and although battery powered equipment may not fit every need, it is an excellent choice when possible.



In Praise of Electric

Electric equipment certainly has an environmental advantage. On average the pollutant emissions from an electric lawn mower can be 5 to 9000 times less than the respective emissions from a gasoline powered mower. Owning an electric mower can also have other clear benefits such as one touch starting and less noise! Because much of the smaller handheld gasoline equipment contains 2-cycle engines, electric is an especially wise choice. Two-Cycle engines are run and lubricated by a mixture of gasoline and oil. While the engines are extremely powerful for their size, they are inefficient in their use of the fuel mixture. Approximately 25%-35% of the fuel escapes from these engines unburned. This allows an excess of hydrocarbons to be released into the atmosphere, contributing to illnesses and environmental problems. One 1996 study by the Electric Power Research Institute (EPRI) showed that the average hydrocarbon emission from a 2-cycle engine is 48.04 grams per

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COMPARE POLLUTION EMISSIONS

	Gasoline mowers Grams/year	Electric mowers Grams/year
Hydrocarbons	1475.0	0.8172
Carbon Monoxide	11425.0	4.572
Carbon Dioxide	24075.0	21240.0
Nitrogen Oxides	50.0	11.28

hour, that is about one quarter of a pound of hydrocarbons for every two hours of use from just one small machine!

Electric mowers do not eliminate pollution, however, they do significantly reduce the emissions overall. As shown in the above box, gasoline mowers emit more pollutants per hour of use under average conditions than the electric mowers under the same conditions. One hour of use of a 3.5 horsepower gasoline mower under average load conditions is compared with one hour of use of a 3.5 horsepower electric mower which draws 12 amperes of current. When calculated, the average growing season is estimated at 25 weeks with one mow per week. The pollutants from the electric mowers are emitted at one source, the power production facility, in grams of pollutant per year. The energy production facilities are under strict guidelines by the EPA to limit their emissions through advanced technology. Clearly it is much easier to limit the pollu-

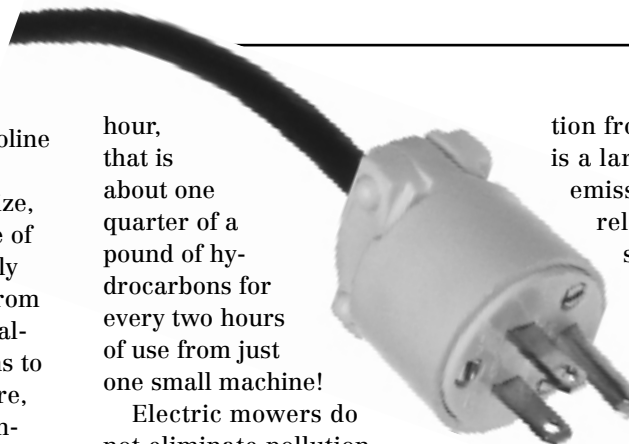
tion from one source, even if it is a large one, than to limit the emissions from thousands of relatively unregulated small sources.

Recent technology has added features to these new mowers

without burdening the consumer with too much extra weight. For example, many electric mowers now have various collection and mulching options, wheel height adjustments, small turning radii and the extremely popular benefit of one touch starting.

As anyone who has walked behind a gasoline mower knows, the noise can be both annoying and damaging to your ears. The average lawn mower is at least

100 decibels; anything over 90 can cause ear damage. While noise levels are only monitored



Look for:

1. Electrical equipment with:

- adjustable heights
- mulching options
- batteries (if area is small)

OR

2. Gasoline equipment with:

- a 4-cycle engine
- overhead valves
- meets CARB standards
- mows at adjustable heights
- mulching options

and enforced in Europe, noise pollution is a growing concern in North America. Buying an electric mower, not only allows you to mow at almost any hour of the day but also spares your ears, and limits noise pollution. In fact, electric lawn mowers cut noise emissions by 50% to 75%.

The electric mowers of years past operated with long extension cords which were often a safety hazard or a nuisance. Today much of the smaller handheld garden equipment is powered by an extension cord. However, most of the new electric mowers operate with a rechargeable battery pack of two batteries. These

batteries run for approximately 45 to 90 minutes, depending on mowing conditions, before needing to be recharged. Many of the mower batteries can be partially recharged in one hour and completely recharged overnight. The battery pack costs approximately \$140 and needs to be replaced about every 5 years. Consumers have voiced their concerns about battery life and the industry is responding by trying to extend battery life as much as possible.

These batteries contain heavy metals and therefore must be disposed of properly. Most retailers will handle safe battery disposal if you return them.

As great as these mowers sound they do have some limitations. Currently readily available electric mowers are smaller walk behind models ranging in cutting width from 18" to 33". To finish a mowing job in one charge, the cutting area should be no larger than 1 acre, the grass should not be wet and the height should not be more than 2" taller than your intended cut length. In other words, these mowers are ideal only for small businesses or residential sites. For this reason we have included guidelines for purchasing gasoline mowers. We primarily encourage purchasing electric equipment, however, due to their limitations we have outlined those mowers which have higher efficiencies. The mower industry expects technology to overcome the problems with electric mowers. For those with a mowing area greater than 1 acre, industry expects electric technology to jump to riding mowers in the near future.

Gasoline

Instead of developing electric mowers, many companies are re-designing their current gasoline lawn care equipment for maximum efficiency and minimum pollution. California has 8 of the 10 cities with the worst air pollution in the country. For this reason, the EPA has allowed the California Air Resources Board (CARB) to set higher standards for small non-vehicle engines. Currently, manufacturers must immediately reduce their emissions by at least 30%. A new requirement by CARB mandates that all small "handheld" engines, defined as 0-60 cubic centimeters of engine displacement, must reduce their

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MAINTAINING YOUR LAWN OR GARDEN

Several simple techniques can improve the overall quality of your lawn and garden area and help to maintain your local environmental quality.

- Have your county agricultural board type your soil and make suggestions about the appropriate type of grass for your climate and soil pH.
- Cut grass no lower than 2.5". Crab grass is choked out the most effectively at 3.5". Taller grasses can have deeper roots and are less susceptible to erosion, drought and pests.
- Water your lawn just before sunrise or after dark to cut down on evaporation.
- Leaving your lawn clippings on the lawn provides extra nutrients for the soil to absorb, rather than extra bags for the garbage truck to carry.
- Ask your lawn service to use organic fertilizers. They provide longer lasting results because they degrade much more slowly.
- Ask your lawn service to consider natural pest control. This reduces costs for commercial pesticides as well as the impacts associated with spraying highly toxic chemicals on your property. In 1997, the U.S. Geological Survey found that 95% of stream samples taken from across the country contained at least one widely used lawn pesticide.



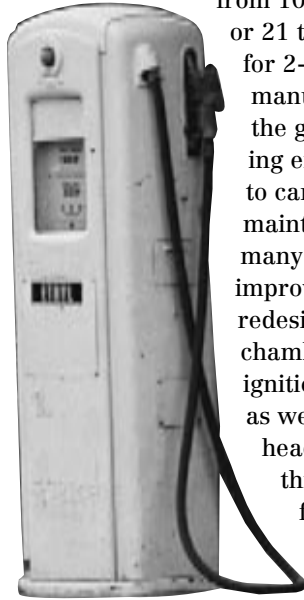
Gasoline
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hydrocarbon and nitrogen oxide emissions 74% by the year 2010. For engines over 60 cubic centimeters, manufacturers must reduce uncontrolled emissions of hydrocarbons and nitrogen oxides by 67%. These same strict standards are likely to be adopted across the country.

Most manufacturers have switched to the more efficient 4-cycle engine for larger machinery. The 4-cycle engine has become known as a cleaner and a more efficient engine. Some manufacturers are adapting their designs of the 2-cycle engine to run as much as 30% more efficiently than previous models.

Clearly, more stringent emis-

sions standards are causing large advances in engine efficiency. EPRI found that, depending on maintenance, engines can operate with a large emissions range. For example, gasoline 4-stroke engines can range in hydrocarbon emissions from 10 to 147 grams/hour or 21 to 107 grams/hour for 2-stroke engines. The manufacturers can reduce the gray area by designing engines to be easier to care for and cheaper to maintain. Recognizing this, many manufacturers are improving their product by redesigning the combustion chamber, re-calibrating the ignition and fuel chambers as well as changing to overhead valves. Even something as simple as an oil filter will improve the overall running quality of the product, while at the same time reducing the product's environmental impact.



What to do with your old mowers

Utilities across the country have set up incentive programs for businesses and homeowners to trade in their old gasoline powered lawn mowers and lawn care equipment for discounts on the new electric equipment. These discounts range from \$50 to \$150 and often the retail stores will also offer lower prices on the new units. Programs have been supported by utilities in cities such as Sacramento, New York City, and Washington DC. Contact your local utility company to inquire about future programs for disposal of your old gasoline equipment and for incentives for the newer electrical equipment.

YOU COMPARE!

In 1996 the Electric Power Research Institute conducted a study, "The Environmental and Energy Benefits of Cordless Electric Lawn Mowers." This study compared uses of electric and gasoline mowers and tested the engines for various pollutants under average load conditions. These conditions limited the stresses put on the engine to what was deemed as common usage conditions. Below you find the yearly costs of either a 4-stroke, 3.5 horsepower gasoline mower or a comparable electric mower. You will see that a gasoline mower costs twice as much over a ten year period. (Assumed is an average US growing season of 25 weeks with a one hour long mow per week.)

**TYPICAL
GASOLINE POWERED MOWER**

Initial Cost: \$160
Gas Cost: \$7/year
Oil Cost: \$2/year
Yearly tune up: \$65/year

10-Year Cost: \$835

**TYPICAL
ELECTRIC MOWER**

Initial Cost: \$340
Electricity Cost: \$5/year

10-Year Cost: \$390



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UNITED STATES POSTAL SERVICE

During the summer of 1997 the United States Postal Service began a test project to review electric lawn care equipment. Offices in North and South Carolina were selected to receive the equipment which included lawn mowers, grass trimmer, and hedgers. The USPS initially looked at electric equipment as a way to cut down on storage of flammable materials, however, the USPS has discovered at the same time that the equipment is light weight, easy to use and easy to care for. Tim Houston of the Columbia district of the USPS states that “the initial



results were so encouraging that we issued a recommendation to proceed nationwide”. The Postal Service has now entirely cut out the costs of maintenance, gasoline and oil, saving each office on average \$50 to \$75 per piece of equipment. Although the Postal Service can receive a government discount on the equipment, the discount is similar to those rebates offered by utility companies across the country.