PUSH MOWERS: FOR A BETTER TOMORROW

Georgian Bay Earth Day Celebration

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EXECUTIVE SUMMARY

Findings from the Ministry of the Environment-Canada, Environmental Protection Act, various studies, and scientific data all conclude that gas-powered mowers contribute substantially to greenhouse gas emissions, cause several times more pollution than gas-powered vehicles, and are a health hazard that contributes to a host of related health ailments. The replacement of gas mowers with non-motorized mowers would spare the air and our health.

The use of off-road gasoline and diesel engines is a major contributor to air pollution. The reality is that emissions from off-road gasoline and diesel engines contribute more particulate matter (PM), volatile organic compounds (VOC) and carbon monoxide (CO) than any other mobile sources.

The purposes of the report are to (1) determine the health and environmental implications of the gas mower, (2) describe the Green House Gas (GHG) fuel consumption implications, (3) provide examples of other jurisdictions pursuing similar initiatives/bans, and (4) finally, promote alternatives.

INTRODUCTION

Gas-powered weed trimmers cause several times more pollution than vehicles; the engines in yard tools are not very fuel-efficient. Gas-powered combustion is a source of smog-causing pollutants and greenhouse gases. In fact, according to the Ministry of the Environment, running an old gas-powered lawn mower for one hour can produce as much air pollution as driving a new car 550 kilometers (25, April, 2006).

Gas mowers which have unregulated emissions until very recently, emit high levels of carbon monoxide, volatile organic compounds, and nitrogen oxides. Studies conducted by the U.S. Environmental Protection Agency (EPA) reveal that a traditional gas powered lawn mower produces as much air pollutants as 43 new cars, each being driven 12,000 miles. As well, it is estimated that using a push mower instead of a gas power unit helps to reduce carbon dioxide emissions by almost 37 kg, annually. (2 May, 2011)

The importance of this report goes beyond education; moreover, it serves as a factual overview that has the potential to influence legislation and promote bans to protect the Earth, air quality, and the health of present and future generations. It further summarizes the data of the gas vs. the push mower on related health and environmental implications.

The Gas Mower vs. The Push Mower

The Gas Mower

The EPA states that 17 million gallons of fuel, mostly gasoline, are spilled each year while refueling lawn equipment (n.d.). That amount is more than all the oil spilled by the Exxon Valdez, in the Gulf of Alaska. In addition to groundwater contamination, spilled fuel that

evaporates into the air and volatile organic compounds spit out by small engines make smog-forming ozone when cooked by heat and sunlight. Recurring gas costs are on the rise.

The Push Mower

A push reel mower actually cuts your grass better. Instead of tearing the grass, like a gas mower does, it nicely snips the grass like a pair of scissors. Also, using a push mower is a great form of exercise.

The new models have sharp blades and will outperform and outlast the reel mowers previous generations pushed around as children. Furthermore, a properly adjusted reel mower makes the cleanest cut of the grass, which allows the grass to heal more quickly. Most significantly, no harmful emissions are released, no money is spent on fuel or repairs and noise pollution is eliminated.

Health Impacts and Air Pollution/Environmental Implications

Fact: Gas mowers emit (i), Nitrogen oxides, (ii) Carbon monoxide, (iii) Hydrocarbons, (iv) Particulate Matter, (v) Volatile Organic Compounds, and (vi) contribute to air and noise pollution. Listed below is a detailed explanation of the toxins emitted, and the health and environmental impacts.

(i) Nitrogen Oxides

Nitrogen oxides are a group of gases that are composed of nitrogen and oxygen.

They are formed when nitrogen (N2) and oxygen (O2) are combined at high temperatures and pressure during the combustion of fuel. All fuels, such as gasoline, diesel, biodiesel, propane, coal, and ethanol, emit NOx when burned.

The EPA estimates that 49% of NOx emissions come from on-road and off-road vehicles, 27% from power generation (electric utilities) and the remaining 24% from industrial, commercial and residential sources (EPA,1991).

Due to the many compounds that are a part of NOx (predominantly nitrogen dioxide and nitric oxide), the pollutant contributes to an extensive variety of health and environmental problems. NOx is also a major component of ground-level ozone and contributes to global warming.

Since the passage of the Clean Air Act in 1970, all primary air pollutants have decreased - except NOx, which has increased by 10%. Due to its serious health and environmental impact, the reduction of NOx in our atmosphere has now become a major focus in the fight against air pollution. One further step is to consider the elimination of the gas mower.

Health Impact of NOx

➢ Causes respiratory problems such as asthma, emphysema and bronchitis
➢ Aggravates existing heart disease
➢ Damage to lung tissue
➢ Premature death
Environmental Impact of NOx
➢ Component in ground-level ozone and smog
➢ Contributes to acid rain
➢ Combines with particles to reduce visibility
➢ Is a greenhouse gas that contributes to global warming and climate change
➢ Leads to oxygen depletion in bodies of water, upsets chemical balance to aquatic wildlife, creates acidic lakes and streams
➢ May contribute to biological mutations

(ii) Carbon Monoxide

Carbon monoxide is a colourless, odourless and tasteless gas which is slightly lighter than air.

(CO) is produced due to the incomplete oxidation of carbon during the process of combustion when any fuel is burned. Diesel, biodiesel, gasoline, propane, natural gas, oil, wood and coal all produce carbon monoxide when burned.

In the United States, 60% of CO emissions are from vehicle exhaust. In congested urban areas, up to 95% of CO emissions can be attributed to on-road and off-road vehicles. Other sources of CO emissions are industrial boilers and incinerators, or defective gas heaters and heating appliances (EPA, n.d.)

Health Impact of Carbon Monoxide Poisoning
➢ Fatigue
➢ Headache
➢ Dizziness
➢ Nausea
➢ Vomiting
➢ Disorientation
➢ Loss of consciousness
Environmental Impact of Carbon Monoxide
➢ Contributes to global warming
➢ Component of smog

(iii) Hydrocarbons

Hydrocarbons are a compound of hydrogen and carbon.

Health Impact of Hydrocarbons
➢ Acute respiratory symptoms
➢ Headaches
➢ Dizziness
➢ Vomiting
➢ Reduced cardiovascular function
➢ Arrhythmia
➢ Brain Damage
➢ Coma
➢ Premature death
Environmental Impact of Hydrocarbons
➢ Precursor to ground-level ozone
➢ Major component of smog

They are released into the atmosphere as a result of incomplete combustion of fossil fuels, as well as fuel evaporation. According to the EPA, 47% of hydrocarbon emissions in the atmosphere can be attributed to on-road and off-road vehicles (n.d.). The strong odor associated with diesel emissions is due to the presence of hydrocarbons.

When hydrocarbons combine with NOx and sunlight, ozone is created. This is a serious form of air pollution and a key component of smog. The brown haze of smog that plagues many urban areas causes irritation and damage to eyes, skin and lungs. It dries out the protective membranes of the nose and throat, interfering with the body's

ability to fight infection. Some hydrocarbons are also considered toxic, causing serious health problems such as cancer or death.

(iv) Particulate Matter

Particulates, alternatively known as particulate matter (PM) or fine particles and also called soot, are tiny subdivisions of solid or liquid matter suspended in a gas or liquid.

Health Impact of PM
➢ Irritant to eyes, throat and lungs
➢ Contributes to breathing problems
➢ Lung disease
➢ Heart attack
➢ Reduces capacity to resist infection
Environmental Impact of PM
➢ Corrosion, soiling and damage to vegetation
➢ Reduced visibility
➢ Major component of air pollution

(v) Volatile Organic Compounds

VOC compounds have significant vapour pressures and can affect the environment and human health. VOCs are numerous, varied, and ubiquitous.

The human health effects of exposure to Green House Gas emissions and smog-laden air are well known, and include inflammation and damage to lungs, increased risk of asthma attacks, and lowered levels of oxygen in the bloodstream, which can aggravate heart conditions. The old adage for automobile trends must apply to lawn mowers too.

Health impact of VOC
➢ Reduce lung function
➢ Cause respiratory problems
Environmental impact of VOC
➢ Contribute to the formation of smog

(vi) Air Pollution

Consider the following stats based on statistical data (18 April, 2008):

- A gasoline-powered lawn mower running for an hour puts out about the same amount of smog-forming emissions as 40 new automobiles run for an hour. (California Environmental Protection Agency, 1999).
- A typical 3.5 horsepower gas mower can emit the same amount of VOCs – key precursors to smog – in an hour as a new car driven 340 miles (540 km), say industry experts. (South Coast Air Quality Management District, 1996).
- Each weekend, about 54 million Americans mow their lawns, using 800 million gallons of gas per year and producing tonnes of air pollutants. Garden equipment

engines, which have had unregulated emissions until very recently, emit high levels of carbon monoxide, volatile organic compounds and nitrogen oxides, producing up to 5% of the nation's air pollution and more in city areas.

- A conventional lawn mower pollutes as much in an hour as 40 late model cars for an hour. Source: EPA statistics for Replacing Gas Power Lawn Mowers
- A gasoline-powered lawn mower creates as much pollution (NOx, CO, VOC) as a late model car driven 550 kms. (California Air Resources Board, n.d.).

Green House Gas/Fuel Consumption Implications

According to the Environmental Protection Agency, Americans burn 800 million gallons of gas each year trimming their grassy yards. One gas mower running for an hour emits the same amount of pollutants as eight new cars driving 55 mph for the same amount of time, according to the Union of Concerned Scientists (n.d.)

The crisis: small engines such as the gas mower emit disproportionately large amounts of carbon monoxide, volatile organic compounds and nitrogen oxides that contribute to smog and further, global climate change.

(Taken from the Environmental Protection Agency's Non-Road Emissions Model, a gas mower used for 25 hours will emit the following each year):

87 pounds of CO2 — The greenhouse gas Carbon Dioxide
48 pounds of CO — The poison Carbon Monoxide
5.6 pounds of VOC — Volatile Organic Compounds
0.25 pounds of NO x — Nitrogen Oxides
0.02 pounds of SO 2 — Sulfur Dioxide
0.02 pounds of PM — Particulate Matter linked to heart disease and lung cancer

These statistics indicate a drastic need for reduction based on the present GHG trends. By replacing a gas mower with a push mower, money is saved, and a cleaner environment and a reduction in health problems are ensured.

Push reel mowers produce zero emissions. The current GHG trends shown indicate a critical need to make immediate changes.

The replacement of every 500 gas mowers with non-motorized mowers would spare the air:

- 212 pounds of hydrocardons (smog ingredient)
- 1.7 pounds of nitrogen oxides (smog ingredient)
- 5.6 pounds of irritating particles
- 1,724 pounds of carbon dioxide

Jurisdictions Pursuing Similar Initiatives/Bans

Mayor David Miller (Municipality of Toronto)

- Mayor David Miller made a push to gradually rid Toronto of polluting chainsaws, leaf blowers and lawn mowers. Mayor Miller launched the "Cut It Out" program to encourage residents to get rid of their gas guzzlers by various offering incentives.
- The city estimates that by replacing its own equipment, smog-forming emissions will be reduced by 49,500 tonnes and greenhouse gases by 133,600 kilograms (Hanes, 2009).

In Toronto, Eco cut: Toronto's new alternative in lawn care and the first of its kind, is dedicated to zero-emissions and clean renewable power from Bullfrog Power.

The State of California

- California's legislation to ban gas mowers is considered a template for national legislation. In the process of banning small gas guzzlers, California's rules may go national.
- California has passed their own regulations to tighten small engine emission requirements in order to eliminate tonnes of smog-forming chemicals in the air.

ALTERNATIVES

Reel Mower: the greenest choice is the mower that runs on a good exercise regimen: the human powered reel mower. It is now much lighter than those of the past (16-30 pds.), produces zero emissions and requires no fuel.

Solar mowers: solar-powered lawnmowers produce no emissions, are significantly quieter, have few associated energy costs, and save money by avoiding the upkeep of a conventional motor.

For a healthier planet, plant a drought resistant garden and lawn (zeriscape), sow fescue grass seeds that are native to the area and require minimal mowing. Adjust the blade on your push mower to cut the grass higher, conserve water and reduce harmful emissions.

Consider Georgian Bay Earth Day Celebration's youth program to hire youth to cut homeowners grass. The youth will bicycle from one home to the next to make this project truly a zero waste emission effort.

CONCLUSION

Georgian Triangle Earth Day Celebration is committed to helping our community, province and country in eliminating the gas mower scourge that contributes substantially to our pollution/greenhouse gas crisis.

Ontario's Environmental Bill of Rights is meant to allow for the democratic participation in reviewing government decisions and proposing new regulations and policies. Georgian Triangle Earth Day Celebration will immediately proceed by asking a Minister to review the need to the banning of the gas lawn mower in Ontario.

Through hands on action and education, Canadians can eliminate the use of all gas mowers. We can give youth employment that keeps them fit and outside in the fresh air while they improve the quality of their community and infuse in their peers and all generations a greater respect for the planet.

We are pleased to announce this May, 2011 that homeowners in Collingwood, Ontario are now hiring youth through our push mower program. It is not only youth who will benefit by the push mower initiative. We have found that sixty plus year old people are very interested in purchasing a reel mower so they can stay fit and do not contribute to the noise and pollution of gas or electric mowers.

Our push mower initiative helps us all. Truly green actions such as ours, creates the incentive for other possible actions such as eliminating lawn mowers altogether, furthermore, this creates a more sustainable, self-sufficient and localized food production right in our own backyard.

REFERENCES

Cobb, D. (1991). Application of Selective Catalytic Reduction (SCR) Technology for NOx Reduction From Refinery Combustion Sources, *Environmental Progress*, 10, pg. www.efdsystems.org

Bollwitt, R. (18 April, 2008). The Green Web: Mow Down Pollution with The Clean Air Foundation. *Clean Air Foundation*. (12 December, 2010), www.miss604.com

Hanes, A. (9 September, 2009). Hall Monitor, *National Post*. Retrieved January 21, 2011, from www.nationalpost.com

Ministry of the Environment (25, April, 2006) Ontario Government Mows Down Pollution, *Newsroom,* (29, October, 2010), www.news.ontario.ca/archive

U.S. Environmental Protection Agency (n.d.) Retrieved December12, 2010, from www.cleanairsys.com

U.S. Environmental Protection Agency (4 February, 2005) (6 December, 2010), www.epa.gov

U.S. Environmental Protection Agency (n.d.) Retrieved January 21, 2010, from www.peoplepoweredmachines.com

U.S. Environmental Protection Agency (n.d.) Retrieved January 21, 2010, from www.epa.gov