

but this takes additional time. We can no longer just assume that all of the fairway stations need to water at 15 minutes and all tees need 10. Each station needs to be set for the proper run time based on the evaluation of the system and the turf environment.

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really putting out. For the relatively small investment of time, corrected system water use rates, extrapolated out over the whole course and over a number of years, you would be surprised how much water and electricity you are using.



*E. Paul Eckholm, CGCS is a former golf course superintendent and is currently an irrigation specialist at Yamaha Golf and Utility. Paul has been working with numerous manufacturers of irrigation products for the past 15 years on product development related to water use reductions. Paul currently holds a number of certifications in irrigation technologies.*

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# *Alternative Fuels Offer Pro*

*Photo contributions Mark Linkletter*

## **A Guide to Alternative Fuel for Lawn Equipment**

*Information from the U.S. Department of Energy and the Minnesota Propane Association*

Powering commercial lawn service equipment with alternative fuels is an effective way to reduce petroleum use. A single alternative fuel commercial lawn mower can annually use as much gasoline or diesel fuel as a commercial work truck. Alternative fuels can also reduce pollutant emissions compared

with conventional fuels. Numerous biodiesel, compressed natural gas, electric, and propane mowers are now available to help keep the grass green and the nation clean.

Turfgrass is a fixture of the American landscape and the American economy. It is the nation's largest irrigated crop, covering more than 40 million acres.<sup>1</sup>

<sup>1</sup> Energetics Inc. 2009. Propane Reduces Greenhouse Gas Emissions: A Comparative Analysis. Washington, D.C.: Propane Education & Research Council.



## *mise Part II*

Legions of lawn mowers care for this expanse during the growing season. The annual economic impact of the U.S. turfgrass industry has been estimated at more than \$62 billion.<sup>2</sup>

Lawn mowing also contributes to the

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<sup>2</sup> Haydu, J.J.; Hodges, A.W.; and Hall, C.R. 2006. Economic Impacts of the Turf-grass and Lawncare Industry in the United States. Gainesville, Fla.: University of Florida IFAS Extension, <http://edis.ifas.ufl.edu/fe632>.

nation's petroleum consumption and pollutant emissions. Mowers consume 1.2 billion gallons of gasoline annually, about 1% of U.S. motor gasoline consumption. Commercial mowing accounts for 35% of this total and is the highest-intensity use. Large property owners and mowing companies cut lawns, sports fields, golf courses, parks, roadsides, and other grassy areas for 7 hours per day and consume 900 gal to 2,000 gal of fuel annually depending on climate and length of growing season. In addition to gasoline, commercial mowing consumes

more than 100 million gallons of diesel annually.

Alternative fuel mowers are one way to reduce the energy and environmental impact of commercial lawn mowing. They may also save on fuel and maintenance costs, extend mower life, reduce fuel spillage and fuel theft, promote a “green” image, and may not be subject to operational restrictions on ozone alert days. Alternative fuel commercial lawn mowers are a powerful and cost-effective way to reduce U.S. petroleum dependence and help protect the environment.

### **Biodiesel**

Biodiesel is a renewable alternative fuel produced domestically from a wide range of vegetable oils and ani-

mal fats. It is nontoxic and can reduce pollutant emissions when compared with petroleum diesel. It also improves engine operation by raising diesel fuel’s lubricity and combustion quality. Biodiesel blended with petroleum diesel can be used to fuel diesel vehicles without modifying the vehicles—20% biodiesel and 80% petroleum diesel (B20) is the most popular blend. B20 or other biodiesel blends are approved for use with some diesel-powered commercial lawn mowers without modification. Contact mower manufacturers to determine if B20 is approved for use in their diesel products.

### **Compressed Natural Gas (CNG)**

Virtually all natural gas consumed in the United States is produced in North America, and, compared with gasoline





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\*The engine horsepower and torque information are provided by the engine manufacturer to be used for comparison purposes only. Actual operating horsepower and torque will be less. Refer to the engine manufacturer's web site for additional information.

and diesel engines, natural gas engines can produce lower amounts of some harmful emissions and the greenhouse gas carbon dioxide. The cleaner-burning nature of natural gas may result in reduced maintenance requirements, such as less-frequent oil changes, and extended mower life. In addition, natural gas does not spoil or clog fuel systems in lawn equipment during seasonal storage, whereas liquid fuels can.

Natural gas must be compressed and stored at high pressure to enable adequate mowing time. This sealed and pressurized fuel-storage system has the advantage of eliminating evaporative

emissions and spillage, as well as the potential fuel theft sometimes associated with liquid-fueled lawn equipment. As of August 2010, there were more than 800 CNG fueling stations in the United States with stations in almost every state. Over the past decade, CNG has been the least expensive U.S. motor fuel.

### Electricity

Electric power is quiet, requires little maintenance, and produces no tailpipe emissions. Electric mowers connected to an electricity supply with a cord or powered with rechargeable batteries are popular for residential use, but the rigors of commercial mowing have

limited their use for this application to date. However, recent improvements in battery technology have resulted in new products with potential commercial application. Some mower models provide up to 80 minutes of continuous mowing time, enough to mow more than an acre.

## **Propane**

Also known as liquefied petroleum gas or LPG or auto gas, propane is the most widely available alternative transportation fuel in the United States. As of August 2010, there were 2,503 propane vehicle-fueling stations with locations in all 50 states. Most propane consumed in the United States is produced domestically, and compared with gasoline and diesel engines, propane engines can produce lower amounts of some harmful emissions and carbon dioxide, a greenhouse gas. The cleaner-burning nature of propane may result in reduced maintenance requirements, such as less-frequent oil changes, and extended mower life. Also, like CNG, propane does not spoil or clog fuel systems in lawn equipment during seasonal storage, which can be the case with liquid fuels.

Propane is stored as a liquid under relatively low pressure and becomes a gas at normal pressure (meaning it

enters the engine as a gas). The liquid storage gives it a high energy density, so a mower can run a long time on a tank of fuel, while the sealed and pressurized storage has the advantage of eliminating evaporative emissions and spillage as well as potential fuel theft.

There are two options in the propane arena: Buying an OEM propane mower, or converting a conventional one to run on propane. Both options have financial incentives available to encourage you to make the switch to propane:

1. National Propane Mower Incentive Program. PERC (Propane Education and Research Council) has a program that offers \$1,000 per mower, up to 10, for a company to buy new propane-powered mowers. Participants in the program provide feedback and performance data for one mowing season. A limited number of incentives are available. It's recommended that you apply for participation in the Propane Mower Incentive Program before you make a purchase of a qualifying mower or conversion kit. You will be notified shortly thereafter of your acceptance into the program. See testimonials from landscapers and fill out the application here: <http://www.auto-gasusa.org/mower-incentive>.
2. Minnesota Commercial Lawn

Mower Incentive Program. This program is designed for companies that use commercial size mowers on a daily basis, such as; lawn care professionals, landscape companies, golf courses, cities, universities, etc. The goal is to incentivize these companies or institutions to try propane as an off-road engine fuel. The program pays \$750 for the conversion of an existing gasoline powered mower to propane and \$1,500 for the purchase of a new factory-direct propane-powered mower. Full rules and details can be found by following this link, calling 763-633-4271, or emailing [mpga@mnpropane.org](mailto:mpga@mnpropane.org).

Companies can participate in both

programs, meaning you could receive \$2,500 towards the cost of a new propane-powered mower.

### Special Considerations

Some mower engines are designed to run on alternative fuels with little or no modification. Others are not. Using alternative fuels or fuel blends that are not specifically approved for your equipment can cause serious damage to the engine or significantly reduce performance. To ensure alternative fuel or fuel blend use won't damage your mower, be sure to consult your equipment's owner's manual or contact the manufacturer or dealer.



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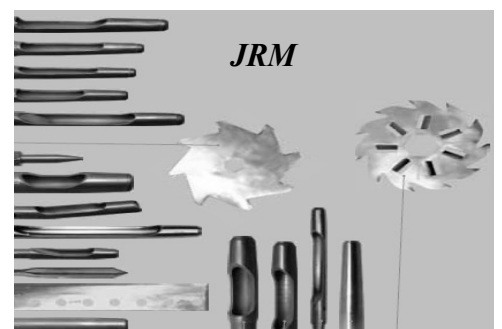
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# *Safe, sane and economical. Propane makes its debut at the U*



Superintendent Brent Belanger and Mechanic Chris Carpenter are thrilled with their conversion projects. Greener, cheaper to operate and easier on their engines are three no-brain reasons to make the switch.

“Sure, converting some of our equipment to propane last summer was the greener and more environmentally correct thing to do, but in all honesty, we are saving about \$1.50 per gallon of equally productive propane and we no longer have issues with the new boutique gasoline in the equipment we have changed over,” Brent Belanger, Superintendent at Les Bolstad Golf Club said during a brief visit to review his equipment a few weeks ago.



Belanger, in the industry for 15 years and Superintendent at the 84 year old University of Minnesota golf club, and his Mechanic Chris Carpenter have been wondering why the conversion hasn't taken off at other courses. Grant money provided by the state, combined with help from Rich Nordstrom of ACME Alternative Fuel Systems, allowed a simple alternative to gasoline in three pieces of their mowing arsenal; one rotary mower and two triplex mowers. All work was completed by Chris in his shop.

In the works are one truckster and several more pieces of mowing equipment next winter. The only cost to the club is based upon, "my time and effort", according to Carpenter. "Once you get the first one down it is full speed ahead on the next unit. The only drawback is that I am responsible for filling the vehicle tanks rather than allowing the summer staff access to the 'big tank'".

Getting the tanks of propane proved to be quite simple with the help of Russ Head from Quality Propane. His company simply dropped off a 1,000 gallon tank adjacent to the existing fuel tanks in the shop yard. Self contained, the big tank needs no 'containment system' and is quite safe and much more controllable than small 20 gallon units.

Is safety an issue? With a smile Brent exclaimed, "It is a whole lot safer than sitting upon a tank of gasoline operating a hot engine! We really like the green philosophy; exceptional money savings and the lack for need to winterize the equipment at the end of the season. Shut the valve, run the engine until it stops and forget about it until next spring."

Considering a change at your club? Chris and Brent plan to host at least one meeting at their course for a live demonstration. Contact Jack at [jack@mgcsa.org](mailto:jack@mgcsa.org) if you have any interest in this opportunity.

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