

## Alternative Fuel and Advanced Technology Commercial Lawn Equipment

*Lawn mowing contributes to the nation's petroleum consumption and pollutant emissions, consuming more than 1.2 billion gallons of gasoline annually and accounting for approximately 2% of U.S. motor gasoline consumption. Commercial mowers account for 35% of this total, and commercial lawn equipment in some industries, such as golf and turf, also consume large amounts of diesel fuel. A single commercial lawn mower can use as much gasoline or diesel fuel as a commercial work truck.*



Propane mowers are cleaner burning than most gasoline or diesel mowers and may have reduced maintenance requirements. Photo from Geoff Johnson, PERC, NREL 31752

Powering commercial lawn equipment with alternative fuels or advanced engine technology is an effective way to reduce U.S. dependence on petroleum, reduce harmful emissions, and lessen the environmental impacts of commercial lawn mowing. Numerous alternative fuel and fuel-efficient advanced technology mowers are available. Owners turn to these mowers because they may save on fuel and maintenance costs, extend mower life, reduce fuel spillage and fuel theft, and demonstrate their commitment to sustainability.

The U.S. Department of Energy's Clean Cities program produced this guide to help inform the commercial mowing industry about product options and potential benefits. This guide provides information about equipment powered by propane, ethanol, compressed natural gas (CNG), biodiesel, and electricity, as well as advanced engine technology. In addition

to providing an overview for organizations considering alternative fuel lawn equipment, this guide may also be helpful for organizations that want to consider using additional alternative fueled equipment.

### Alternative Fuels

The following sections provide information about alternative fuels that can be used to power commercial lawn

equipment, including propane, ethanol, CNG, biodiesel, and electricity. See manufacturer websites for available models and specifications, such as cutting deck size, manufacturer's suggested retail price, warranty details, and dealer locations.

### Propane

Also known as liquefied petroleum gas (LPG), propane is a widely available alternative transportation fuel. Most propane consumed in the United States is produced domestically. Compared with gasoline and diesel engines, propane engines can also produce lower amounts of some harmful emissions and greenhouse gases (GHGs). The cleaner-burning nature of propane may result in reduced maintenance requirements and extended mower life. Propane does not spoil or clog fuel systems in lawn equipment during seasonal storage.

Propane is stored as a liquid under relatively low pressure and becomes a gas at normal pressure. The liquid storage gives propane a high energy density, allowing a mower to run for about six to eight hours on a tank of



R&R Products sells the ReelMax line of mowers which can be powered by propane. Photo from R&R Products

## Propane Mower Manufacturers

Manufacturer	Manufacturer Website	Certified Propane Engine(s)
Ariens/Gravely	<a href="http://gravely.com">gravely.com</a>	Kawasaki, Kohler EFI
BigDog Mowers	<a href="http://bigdogmowerco.com">bigdogmowerco.com</a>	Kawasaki
BOB-CAT	<a href="http://bobcatturf.com">bobcatturf.com</a>	Generac
Dixie Chopper	<a href="http://dixiechopper.com">dixiechopper.com</a>	Generac
Exmark	<a href="http://exmark.com">exmark.com</a>	Kohler EFI
Ferris Industries	<a href="http://ferrisindustries.com">ferrisindustries.com</a>	Briggs & Stratton
Husqvarna	<a href="http://husqvarna.com">husqvarna.com</a>	Kawasaki
Hustler	<a href="http://hustlerturf.com">hustlerturf.com</a>	Kawasaki
John Deere	<a href="http://deere.com">deere.com</a>	Kawasaki
Kubota	<a href="http://kubota.com">kubota.com</a>	Kubota
R&R Products	<a href="http://rrproducts.com">rrproducts.com</a>	Kawasaki, Kubota, Briggs & Stratton
Scag Power Equipment	<a href="http://scag.com">scag.com</a>	Kohler, Kubota
Toro	<a href="http://toro.com">toro.com</a>	Kohler EFI
Ventrac	<a href="http://ventrac.com">ventrac.com</a>	Kubota
Walker	<a href="http://walkermowers.com">walkermowers.com</a>	Kohler EFI
Wright Manufacturing	<a href="http://wrightmfg.com">wrightmfg.com</a>	Kawasaki
Zipper Mowers	<a href="http://zippermowers.com">zippermowers.com</a>	Kawasaki

The propane mower industry is growing, and new propane-powered products are rapidly being introduced. For the latest list of available mowers, visit the Propane Education & Research Council (PERC) website at [propane.com/landing.aspx?id=13973](http://propane.com/landing.aspx?id=13973).

fuel, while the sealed and pressurized storage has the advantage of eliminating evaporative emissions and spillage. Propane mowers are equipped with either carbureted or electronic fuel injection (EFI) engine technology, with EFI providing greater fuel efficiency and significant emissions reductions.

The table above lists propane equipment manufacturers, their websites, and certified propane engines.

Many propane retailers offer a mower fuel tank exchange program and deliver replacement propane tanks directly to the customer. Local propane fueling stations may also have the ability to fill or exchange tanks. Use the AFDC Station Locator ([afdc.energy.gov/locator/stations](http://afdc.energy.gov/locator/stations)) to find propane stations

nearby. Alternatively, landscapers and fleets may choose to install an on-site propane fueling station. Contact your local Clean Cities coalition or a local propane retailer to discuss options.

Certain companies will convert conventional gasoline mowers to use propane. Whether you're purchasing a new mower or converting in-use equipment to run on alternative fuel, it's important to verify that the system is certified by the U.S. Environmental Protection Agency (EPA) or, in some cases, the California Air Resources Board (CARB). Ask the conversion company for a copy of the EPA certificate of conformity or CARB Executive Order. Additionally, verify that the system has full manufacturer warranty support.

### Certified Aftermarket Conversion Manufacturers

#### Blossman Services, Inc.

[blossmangas.com/services/commercial/lawn-care](http://blossmangas.com/services/commercial/lawn-care)

#### EnviroGard

[envirogard.com](http://envirogard.com)

#### Hendrix Industrial Gastrux

[propane-conversions.com](http://propane-conversions.com)

#### Metro Lawn

[gogreenmetrolawn.com](http://gogreenmetrolawn.com)





Powering commercial lawn equipment with alternative fuels, such as propane, can help reduce U.S. dependence on petroleum, reduce harmful emissions, and lessen environmental impacts. *Photo from Geoff Johnson, PERC, NREL 31748*

## Flex Fuel (E85)

Ethanol is a high-octane fuel that offers increased power and performance. It is also a renewable fuel that helps to reduce life cycle GHG emissions. Flex fuel engines can operate on E85, a high-level gasoline-ethanol blend containing 51% to 83% ethanol depending on geography and season. John Deere ([deere.com](http://deere.com)) offers a mower equipped with a Kohler flex fuel engine specially designed to use E85. Use the AFDC Station Locator ([afd.energy.gov/locator/stations](http://afd.energy.gov/locator/stations)) to find nearby E85 fueling stations.

## Compressed Natural Gas

Compressed natural gas engines can emit lower amounts of harmful pollution and GHG emissions compared to gasoline and diesel engines. The cleaner-burning nature of natural gas may result in reduced maintenance requirements, less-frequent oil changes, and extended mower life. CNG mowers require access to a CNG fueling station. Use the Alternative Fuels Data Center (AFDC) Station Locator ([afd.energy.gov/locator/stations](http://afd.energy.gov/locator/stations)) to find fueling stations near you. Currently, one CNG mower is available from Dixie Chopper ([dixiechopper.com](http://dixiechopper.com)).

## Biodiesel

Biodiesel is a renewable alternative fuel produced domestically from a wide range of vegetable oils and animal fats. It can reduce greenhouse gas and other pollutant emissions compared to diesel. It also improves engine operation by raising diesel fuel's lubricity and combustion quality. B20 or other biodiesel blends are approved for use with some diesel-powered commercial lawnmowers. Contact equipment and engine manufacturers to determine if B20 is approved for use in their diesel products.

## Electricity

Electric mowers are quiet, produce no tailpipe emissions, and require little maintenance because of fewer moving parts. Because electricity costs are generally low and tend to remain stable, electric mowers are also inexpensive to operate. They connect to an electricity supply with a cord or using rechargeable batteries. These mowers are currently more popular for residential use, and a number of models are available. Electric residential mowers offer at least 60 minutes of continuous mowing time on a single charge.

## Advanced Technology for Gasoline Engines

EFI technology provides an opportunity to save fuel and reduce emissions by improving the efficiency of gasoline mower engines. Kawasaki ([kawpower.com](http://kawpower.com)) uses open-loop EFI technology and Kohler ([kohlerengines.com](http://kohlerengines.com)) features closed-loop EFI technology. Other manufacturers who offer gasoline EFI mowers include Grasshopper ([grasshoppermower.com](http://grasshoppermower.com)), Jacobsen ([jacobsen.com](http://jacobsen.com)), and Schiller ([schillergc.com](http://schillergc.com)).

## Special Considerations

Some mower engines are designed to run on alternative fuels with little or no modification, but others are not. Using alternative fuels or fuel blends not specifically approved for your equipment can cause serious damage to the engine, significantly reduce performance, and possibly void any manufacturer warranty. Be sure to consult your owner's manual or contact the manufacturer or dealer.

Existing mowers can be "repowered" with new alternative fuel or advanced technology engines. Most manufacturers provide a complete factory



Contact your local Clean Cities coalition ([afdc.energy.gov/cleancities/coalitions](http://afdc.energy.gov/cleancities/coalitions)) to learn more about powering your commercial lawn equipment with alternative fuels.

warranty. Contact equipment manufacturers for more information.

## Laws and Incentives

Various financial incentives may be available for the purchase of alternative fuel mowers and their fuel. The Propane Education & Research Council (PERC) offers a \$1,000 incentive for new propane mowers and \$500 toward propane mower conversion. For more information, including

qualifying models, see PERC's Propane Mower Incentive Program page ([propane.com/commercial-landscape/programs-and-incentives/propane-mower-incentive-program](http://propane.com/commercial-landscape/programs-and-incentives/propane-mower-incentive-program)). Many state programs offer similar incentives. To learn more, contact your local Clean Cities coalition ([afdc.energy.gov/cleancities/coalitions/coalition\\_contacts.php](http://afdc.energy.gov/cleancities/coalitions/coalition_contacts.php)).

See the AFDC's Federal and State Laws and Incentives page ([afdc.energy.gov](http://afdc.energy.gov))

[gov/laws](http://gov/laws)) for more information about incentives that may apply to mowers or the fuel.

In addition to financial incentives, alternative fuel and advanced technology mowers are often exempted from state and municipal "ozone action days." When high ozone pollution levels trigger restrictions on operations of traditional mowers, alternative fuel mower operators have an advantage. ■

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