New Propane-Fueled Generators Provide Reliable Heat and Power

Electricity from Propane: Available Anywhere, Anytime

Power outages illustrate Americans' reliance on electrical appliances. Yet day-to-day activities do not have to be interrupted by grid failures and natural calamities. Propane-fueled generators and new cogeneration products provide consumers with clean, reliable off-grid energy that significantly reduces electrical and heating expenses.

Cogeneration systems, also known as combined heat and power (CHP), recover waste heat from internal combustion engines and use more than 90 percent of fuel energy to produce both heat and power. For the first time, propane dealers can offer CHP products of remarkable design, efficiency, performance, and durability. Marathon Engine Systems (MES) estimates that propane generators could increase annual propane sales by more than 375 million gallons.

In 2002, MES designed and developed propane-fueled generators and micro-cogenerators for the U.S. and world markets. Support from the Propane Education & Research Council (PERC) has enabled MES to finalize development and optimize a propane-fueled, remote power electric generator and micro-cogeneration product line.

Project Description

After more than 15 years of development, and with support from PERC through *Program Finalization for Electric Power Generator* (**Docket 10646**) and *Conversion and Demonstration of Ecopower Micro-CHP to U.S. Utility Grid Configuration* (**Docket 10967**), MES adapted the Marathon 5K engine to use propane as a fuel for the following new products:

- Marathon Minotaur 2.5.
- ecopower microCHP.
- ecoisland microCHP.

Docket 10646's objectives included the following:

- Develop a remote power electric generator and micro-cogeneration product line.
- Commercialize to the U.S. market through distributed generation (DG) channels.

Docket 10967's objectives included the following:

- Convert the ecopower microCHP to the U.S. electric standard.
- Convert existing European certifications to U.S. standard.

Marathon 5K Engine

Originally developed with significant investment by the Gas Research Institute, the Marathon 5K engine is the heart of the remote power electric generator and micro-cogeneration product lines.

Benefits of this engine:

- Long life (40,000 hours).
- Low maintenance (4,000 hour service interval).
- Total efficiency greater than 90 percent (fuel recovered energy; includes thermal and electrical).
- Low exhaust emissions.

Marathon Minotaur 2.5

Typical Applications

- Village power.
- Remote residences.
- Agricultural.
- Telecommunications.

Project Implementation

The **Marathon Minotaur 2.5**, which produces 2.5 kilowatts of electric power, has successfully completed field tests charging a bank of batteries in combination with photovoltaic panels.

The **ecopower microCHP** 4.7 kilowatts performed well in field tests and is now available for purchase in the United States. The unique heating and power source is ideal for residential and light commercial use. Among its features:

- High overall efficiency.
- Low greenhouse gas emissions.
- A power modulation feature that ensures it always produces the exact amount of energy needed and gives owners the option to send any unused electricity back to the utility for rate credits (where net metering is allowed).

MES has also developed a new version of the **ecopower microCHP** for grid-independent use, called the **ecoisland microCHP**. Among its features:

- Can be used in fully off-grid applications or for backup residential power supply.
- Has been developed and installed for testing in MES's demonstration showplace.

Docket 10646 Status: Complete

Micro-cogeneration products are available, and MES will continue to optimize and develop new product lines.

Docket 10967 Status: Complete

Conversions to U.S. standards have been completed, as have development and demonstration efforts on the micro-CHP units.

The ecopower microCHP: Modern Energy Supply

The ecopower microCHP product is a combined micro-cogeneration appliance powered by the Marathon 5K engine. It offers homeowners a reliable heating and electricity source in locations previously compromised by the absence of gas mains and reliable power grids. It will help the propane industry balance seasonal demand variations, and it is intended to displace heating oil as a fuel source.

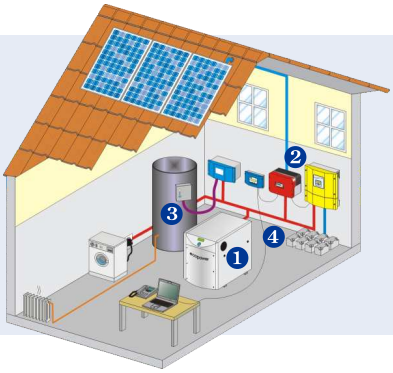
- Generates up to 4.7 kilowatts electrical power.
- Up to 90 percent total electric and thermal efficiency.
- Quiet operation (less than 56 decibels; no louder than a refrigerator).
- Basic maintenance required about once a year.
- Long life.
- Variable engine speed of 1,700 to 3,600 rpm.

The ecopower microCHP is appropriate for use in residential and small industrial applications, such as the following:

- Single-family and multi family homes.
- Schools and daycare centers.
- Lodges and small hotels.
- Agriculture and greenhouses.
- Car washes.
- Sports centers and swimming pools.

Next Steps

MES will continue to test and refine its product line in preparation for widespread commercialization. MES will also develop and implement a strategy to market its systems to the propane industry.



ecoisland microCHP

The grid-independent ecoisland unit starts with the ecopower appliance (1) coupled with an electronics and battery package (2). Heat is stored in a buffer tank (3) for use throughout the building. The electric output from the generator in ecopower is complemented by the battery group (4). The system can also be augmented by a solar package and monitored and controlled on the Internet or a local computer.

Courtesy of Marathon Engine Systems

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For More Information:

Propane Education & Research Council
Gregory Kerr
Director of Research and Development
1140 Connecticut Avenue, Suite 1075
Washington, DC 20036
(202) 452-8975

www.propaneresearch.com
www.usepropane.com

Project Partner:

Marathon Engine Systems
Mike Cocking
MES Sales and Marketing
2050 Energy Drive
East Troy, WI 53120
(262) 642-6436
mike.cocking@marathonengine.com