

## Technology Fact Sheet

Advances in micro-combined heat and power (micro-CHP) technology are creating new options for businesses looking for a reliable power source that can help reduce their energy costs and protect the environment.

Already popular in Japan and emerging in Europe, Yanmar's micro-CHP systems have been adapted to meet U.S. standards. The new 10-kilowatt Yanmar micro-CHP recovers heat for space and water heating as it reliably produces some or all of the power that a small commercial site needs. The performance of the propane engine and the unit's ability to recover waste heat combine to increase system efficiency and reduce energy costs.



Many businesses cannot afford to be without power for more than a brief period without significant loss of revenue, critical data/information, or operations.  
— EPA Combined Heat and Power Partnership



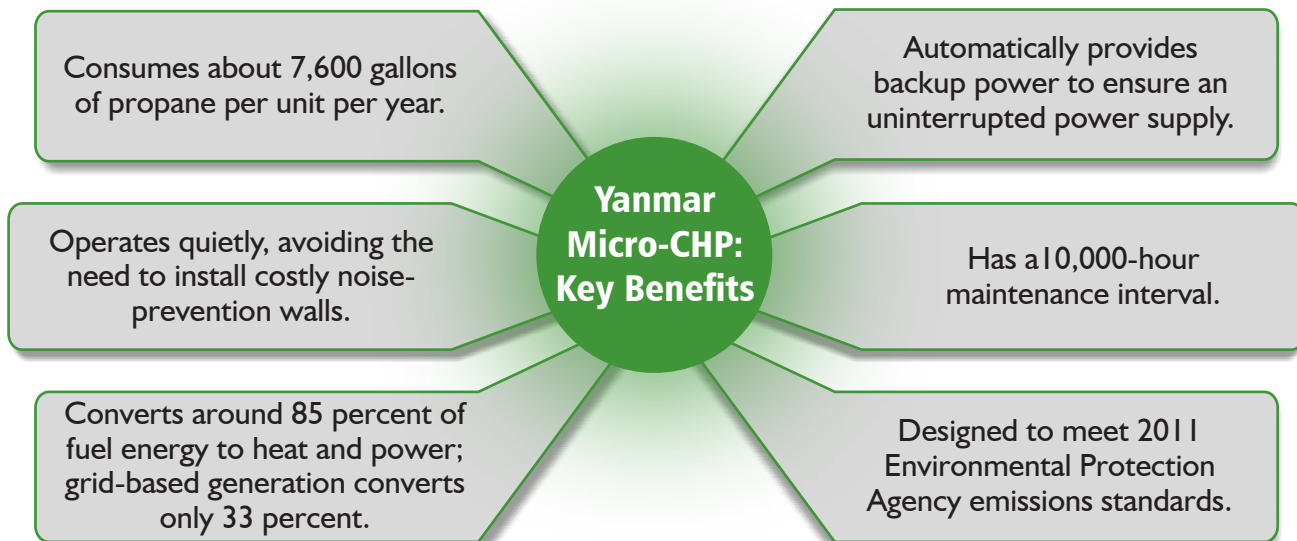
### Current Status: Demonstration Phase



- Certification efforts and long-term testing will conclude by the end of 2011.
- Demonstrations are expected to begin in 2011.
- Product commercialization is slated for early 2012.

### Technology Features

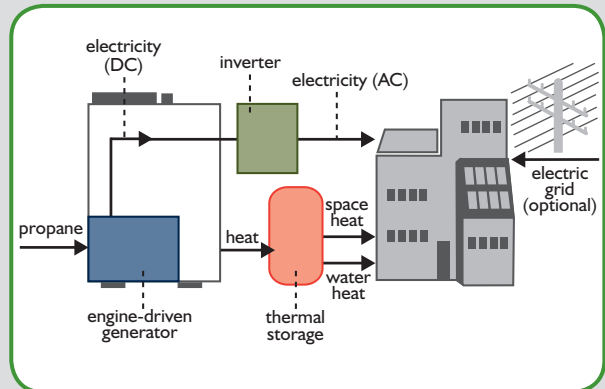
- Propane-fueled engine-driven generator.
- Heat exchanger.
- UL-listed inverters.
- 10-year/60,000-hour designed product life (with remote monitoring option).
- Compact, quiet design.



# A Closer Look

## Yanmar 10-kilowatt Micro-CHP: How It Works

- The Yanmar 10-kilowatt micro-CHP has a propane-fueled, lean-burn engine that drives an electric generator to efficiently produce power for a small commercial site.
- The unit can serve as a primary power source for the site or provide a portion of the site's power with the option of connecting to the grid to automatically provide backup power.
- Heat released through the generator's exhaust and jacket water is captured as hot water for space or water heating at the site.



### Projects:

Yanmar CHP Performance Testing and Evaluation ([Docket I 1866](#))  
Development/Commercialization of Yanmar Micro-CHP ([Docket I 6744](#))

### Partners:

Yanmar America Corp., Gas Technology Institute

## Research Process ( ✓ = completed; ➤ = in progress; ★ = upcoming)

### Development and Testing ➤

- Adapted a Japanese-model 5-kilowatt Yanmar micro-CHP to meet U.S. performance standards.
- Obtain an ETL listing for the 10-kilowatt unit and EPA emission certification for the propane engine.
- Conduct long-term (10,000 hours) durability testing of two 10-kilowatt units (one off-grid model, one grid-tied model) at Yanmar's facilities in Georgia.
- Conduct a one-year, 10-unit field demonstration of 10-kilowatt units with Yanmar partners in the Northeast and collect performance data with a remote monitoring system.

### Commercialization ★

- Develop an installation manual, a technical manual, and a technical training lesson for the 10-kilowatt micro-CHP.
- Conduct builder training and outreach activities, including developing a guide on the 10-kilowatt micro-CHP technology and its benefits.

## What's Next?

Yanmar will continue to pursue ETL listings and EPA certifications and run its long-term, two-unit test. After working with propane marketers to identify potential demonstration sites, Yanmar plans to launch the 10-unit demonstration of the 10-kilowatt micro-CHP system while pursuing early marketing efforts.

### FOR MORE INFORMATION:

**Propane Education & Research Council**  
Gregory Kerr, Director of Research and Development  
1140 Connecticut Ave. NW, Suite 1075  
Washington, DC 20036  
202-452-8975

[www.propanetechnology.com](http://www.propanetechnology.com)  
[www.usepropane.com](http://www.usepropane.com)

### PROJECT PARTNER:

**Yanmar America Corp.**  
George Woodcock  
101 International Parkway  
Adairsville, GA 30103  
770-877-9894

For inquiries: [es.marketing@yanmar.com](mailto:es.marketing@yanmar.com)

April 2011

