



## Micro-CHP: Coming to a Home Near You?

Combined heat and power (CHP) systems now being purchased by homeowners in Europe, Japan, and North America are being used to generate part or all of a home's electrical and thermal requirements. So far, more than 12,000 "micro-CHP" systems sized below 10 kilowatts have been sold to households and small commercial energy users, mainly in continental Europe and Japan. However, a UK utility recently placed an order for 80,000 micro-CHP units, and although North American markets are currently underdeveloped, some manufacturers are selling products there, and others are working on systems designed specifically for North American applications.

These small distributed-generation systems may have a profound impact on utilities and heating equipment manufacturers. To help them identify and implement appropriate strategies, we conducted an in-depth study to examine emerging micro-CHP technologies and markets, and to explore the different positions utilities and heating companies are taking across the micro-CHP value chain. We also spoke with micro-CHP buyers to find out what motivated them to buy their systems and how the units have been working.

### Understanding the Products and Technologies

Five micro-CHP manufacturers are currently selling systems for residential applications. Some of them, along with other competing manufacturers, are also targeting small commercial energy users. The number of active competitors is likely to grow, with more than 25 other companies currently developing and testing micro-CHP products. Four different technologies are receiving most of the attention:

- Internal combustion engines
- Stirling engines
- Rankine cycle engines
- Fuel cells

Today's commercially available products are built around internal combustion engines and Stirling engines. Through all of the study deliverables, we assess the products, strategies, and activities of the developers, manufacturers, and vendors of micro-CHP systems. We also explain the technologies that are currently being used as well as the technologies that are now under development.

### Understanding Markets and Applications

We interviewed 24 homeowners and housing developers in Germany and Japan that had purchased micro-CHP systems. Through these guided interviews, we explored their purchasing decisions and their experiences with the systems. Almost all of the users said that they were satisfied with the operation of their units. Key motivators for purchasing a micro-CHP system included energy cost savings and, in many cases, environmental concerns.

The vast majority of micro-CHP vendors are installing units to be run on a heat-led basis. The generation of electricity is viewed as a by-product of system operation, but a small number of units are being installed to provide off-grid homes with electricity as well as heat. Some developers believe that their units will be deployed primarily to generate electricity, with heat viewed as a by-product. The summary report for our study evaluates the different ways of applying micro-CHP technologies, how these micro-CHP systems interface with the electrical and thermal demand of homes, the best prospective markets for micro-CHP these units, and the characteristics of existing and prospective micro-CHP markets.

**Micro-CHP Strategies**

Some utilities are already jumping into the micro-CHP value chain, shown below, seizing opportunities to sell systems to their customers or making equity investments in product developers.

**The Micro-CHP Value Chain**



Others hope to get involved soon and are currently field-testing products and preparing to enter the market. But the majority of utilities are watching from the sidelines. The strategies being embraced by heating equipment manufacturers are also diverse. Most are looking closely at micro-CHP opportunities, and some are already manufacturing systems. Our assessment of the different strategies being adopted in this emerging marketplace will help readers assess decide what their own company’s strategy should be.

**Deliverables**

Study subscribers will receive:

- Final report (105 pages):
  - Key Findings*
  - Study Overview*
  - Where and How Micro-CHP Systems Are Being Sold and Installed*
  - Why Customers Are Buying Micro-CHP Systems*
  - Regulatory Issues and Requirements*
  - Micro-CHP Markets and Economics*
  - Utility Approaches to Micro-CHP*
  - Strategies for Heating Equipment Manufacturers*
  - Technologies: Options and Market Readiness*
- Interview notebook (44 pages)
- Online library of micro-CHP developers and manufacturers (31 companies)
- Online library of utility micro-CHP case studies (8 companies)
- Micro-CHP economics evaluation tool
- Teleconference with report author and selected speakers

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