

PROJECT facts

Fuel Cells

11/2002

U.S. DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY



PRIMARY PROJECT PARTNER

FuelCell Energy, Inc.
Danbury, Connecticut

MAIN SITES

Headquarters
Danbury, Connecticut
Manufacturing
Torrington, Connecticut
Eastern Region
Washington, DC
Western Region
Rocklin, California

COST SHARING

Product Design Improvement
DOE \$134,712,131
Non-DOE \$77,967,200

CUSTOMER SERVICE

800-553-7681

STRATEGIC CENTER FOR NATURAL GAS WEBSITE

www.netl.doe.gov/scng



DEVELOPING HIGH EFFICIENCY, LOW-COST, CLEAN ELECTRICITY GENERATORS — FUELCELL ENERGY, INC.

Description

FuelCell Energy, Inc. (FCE) is a world leader in the development of fuel cell generators for stationary applications – a power-generating technology that is among the cleanest and most efficient available for the 21st century. FCE-first generation products range from 250kW to 2MW. Mature products will have correspondingly higher performance. FCE is also developing fuel cell/turbine ultra-high efficiency (targeting 75%) hybrid power plants. These products are based on the internally reformed, large area direct carbonate fuel cell stacks (DFC[®]). The DFC[®] offers higher fuel-to-electricity efficiencies than fuel cell systems currently available. An additional advantage is that they are expected to have significantly lower capital costs, are quiet and virtually pollution-free.

FCE's carbonate fuel cell system features a unique Direct Fuel Cell[®] concept, which eliminates auxiliary equipment and simplifies the power system. Fuel cell technology is modular, lending itself well to distributed power generation. The DFC[®] target markets include hospitals, universities, prisons, hotels, data centers, office/shopping center, and industries such as waste water, telecommunication, food and beverage, agricultural, chemical, etc.

FCE is validating the commercial cell and stack designs as part of a shared cost program with the Department of Energy's Office of Fossil Energy. In parallel with commercial design validation, FCE has initiated a commercial field trial program. Sub-megawatt (250kW) field trials are in progress at the Mercedes-Benz car production site in Tuscaloosa, Alabama, and at the Los Angeles Department of Water and Power. The field trials and sub-megawatt FCE stacks have also been underway in Germany.

Goal

These field trials coupled with continued efforts for performance improvement, manufacturing improvement and cost reduction, will maintain the United States' position as a world leader in advanced fuel cell technology.

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Benefits

Fuel cells have emerged as one of the most promising new power-generation technologies for the 21st century. Endorsed by the Administration's Climate Change Action Plan, fuel cells are an environmentally clean, quiet, and highly efficient method for generating electricity and heat from natural gas and, potentially, other fuels. Direct Fuel Cell technology is increasingly attractive because it offers several advantages over conventional power plants, as well as today's market entry fuel cell systems:

- Fuel-to-electricity efficiencies can approach 50% in single cycle systems, well above efficiencies of today's conventional power plants and of low temperature fuel cells (up to 40%). When the waste heat is utilized, total thermal efficiencies can approach 80%.
- Direct FuelCell/Gas Turbine hybrid systems have been evaluated which target efficiencies of up to 75%, while maintaining the attractive features of FCE's technology (unpressurized operation, internal reforming).
- Higher operating temperatures (approximately 650°C compared with 200°C for first-generation systems) make the carbonate fuel cell a good candidate for cogeneration applications, allowing efficient heat transfer and the ability to produce intermediate pressure steam.
- The projected cost of the technology is competitive.
- The technology exceeds all current and envisioned environmental regulations producing water and carbon dioxide as virtually the only emissions (the amount of carbon dioxide released per unit of electricity is considerably less than current power generating technologies, because of the higher efficiencies.)

CONTACT POINTS

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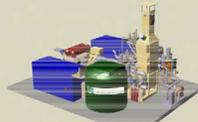
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FuelCell Energy Products

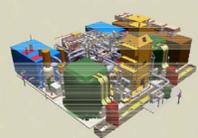
Small DG



DFC® 300



DFC® 1500



DFC® 3000

Large DG



DFC/T®



Specialty



Marine/Diesel DFC®

Distributed Energy Generation

MO2579
2901



FuelCell Energy