

Backup/Peak Shaving Fuel Cell Systems - Design and Development of the GenCore™ II (New FY 2004 Project)

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Objectives

- Develop a cost-reduced, polymer electrolyte membrane (PEM) fuel cell stack tailored to hydrogen fuel use
- Develop an advanced electrical energy storage system
- Develop a modular, scalable power conditioning system tailored to market requirements
- Design a scaled-down, cost-reduced balance of plant (BOP)
- Certify design to Network Equipment Building Standards (NEBS), Underwriters Laboratories (UL) and European Conformity (CE) requirements

Technical Barriers

This project addresses the following technical barriers from the Fuel Cells section of the Hydrogen, Fuel Cells and Infrastructure Technologies Program Multi-Year R,D&D Plan:

- E. Durability
- G. Power Electronics
- H. Start Up Time

Approach

Plug Power Inc. is conducting a 30-month project to advance the state-of-the-art of fuel cell technology with the development of a new generation of commercially viable, stationary, back-up/peak-shaving fuel cell systems.

The GenCore™ II (GCII) backup fuel cell system, to be designed, developed and tested by Plug Power in this project, will be the first mass-manufacturable implementation of Plug Power's GenCore (GC) platform targeted for battery and small generator replacement applications in the telecommunications, broadband and uninterruptible power supply markets. The GCII will be a

standalone, H₂-in-DC-out battery and small generator replacement system.

In designing the GCII specifically for the telecommunications market, Plug Power's efforts will be greatly enhanced by our teaming arrangement with BellSouth Telecommunications, Inc., a leading industry end user.

The final GCII system, to be fielded in 2005, will represent a market-entry, mass-manufacturable and economically viable design. Phase I of the project employs Plug Power's Technology Delivery Process to develop the technology initiatives of the design. This structured process uses rigorous testing and evaluation methods in order to minimize the risks

inherent in bringing new technologies into commercial designs. The technology development effort for the GCII has two major tasks that essentially run in parallel: system technology development and module technology initiatives. As module technology innovations are completed, they will be integrated and verified in the system. Phase II uses Plug Power's New Product Delivery process to introduce the technology initiatives as hardware modules for integration. Phase III also employs the New Product Delivery Process to bring the hardware from a set of technology modules to an integrated system through field-testing and certification. Phase III culminates in the system demonstration at DOE. The project will follow the schedule below:

- Q3, 2003 – Q4, 2004: Collect field data for GenCore II development on certification testing and field deployment of prototypes
- Q2, 2004 – Q1, 2005: Design and develop GenCore II
- Q4, 2004: Build confirmation and life test systems
- Q2, 2005 – Q1, 2006: Conduct field testing with BellSouth and NEBS, UL and CE testing
- Q4, 2005 – Q1, 2006: Demonstrate GenCore II at DOE's Argonne National Laboratory