



Program Fact Sheet

COAL-BASED MULTI-MW SOFC DEVELOPMENT

PROGRAM OBJECTIVES

The overall objective of the three-phase DOE SECA program is to develop a cost-competitive, highly efficient, multi-MW solid oxide fuel cell (SOFC) power system using coal-derived synthesis gas with near zero emissions. The Coal-Based SOFC power plant development project focuses on SOFC cell and stack size scale-up and optimization, stack manufacturing capacity development and MW class module engineering design and development. Power plant engineering and designs will be conducted for proof-of concept (POC) 10-15MW and baseline multi-MW (>100MWe) power plants that operate efficiently on coal derived syngas with near zero emissions. Power block and balance of plant cost reduction, performance enhancement and efficiency improvements will be required to achieve the program cost objectives. POC power plant demonstration will be conducted at FutureGen or other suitable SECA selected site. Successful development of the technology will provide low-cost, highly efficient multi-MW SOFC power plants that operate on coal syngas with near zero emissions.

PROGRAM PLAN

- Phase I of the program focuses on cell and stack development including scale-up of existing SOFC cell area and stack size and performance improvements. Preliminary engineering design and analysis for multi-MW power plant systems will also be conducted. The Phase I deliverable is the demonstration of a SOFC stack building block unit representative of a MW-class module operating with simulated coal syngas fuel.
- Phase II focuses on modularization of the Phase I stack building block units into a MW-size module. Detailed design engineering and analysis for multi-MW power plant systems will be conducted. The Phase II deliverable will be the test demonstration of a MW-size representative SOFC stack module on simulated coal syngas.
- Phase III will focus on design and fabrication of a proof-of-concept multi-MW power plant including a turbine for high efficiency and CO₂ separation for low emissions. The Phase III deliverable is long-term testing of a multi-MW size power plant at a DOE selected site.

PARTICIPANTS

FuelCell Energy, Inc. – Danbury, CT (Prime Contractor)

Versa Power Systems, Inc. – Golden, CO

Versa Power Systems, Ltd. – Calgary, Canada.

Gas Technology Institute - Des Plaines, IL

Worley Parsons, Inc – Reading, PA

Nexant, Inc – San Francisco, CA

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