

VII.9 Stationary Fuel Cell Evaluation

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Project End Date: Project continuation and direction
determined annually by DOE

- Validate stationary fuel cell operation of multiple fuel cell technologies such as polymer electrolyte membrane, solid-oxide, molten carbonate, and phosphoric acid
- Assess stationary fuel cell performance domestically and internationally



Approach

The analysis of stationary fuel cell operation includes systems providing prime, continuous, or regular power to a site. Without a separately-funded stationary fuel cell deployment in technology validation, a key step in this project is the identification of locations and end users operating stationary fuel cells, as well as stationary fuel cell developers. The leading stationary fuel cell developers cover multiple fuel cell technologies and power plant sizes. Building relationships with these developers is based on past experience, industry meetings, and individual communications. The highest concentration of stationary fuel cell end users is in a few states; some of these states have dedicated collaboratives for fuel cell installation and operation. An organization such as the California Stationary Fuel Cell Collaborative (CaSFCC) provides a strong partnership for NREL because it involves multiple developers, end users, fuel cell technologies, and fuel cell system sizes.

The data collection plan builds on other technology validation activities. Data (operation, maintenance, and safety) are collected on-site by the project partners for the fuel cell system(s) and infrastructure. NREL receives the data quarterly and stores, processes, and analyzes the data in NREL's HSDC (Figure 1). The HSDC is an off-network room with access for a small set of approved users. An internal analysis of all available data is completed quarterly and a set of technical Composite Data Products (CDPs) is published every six months. The CDPs present aggregated data across multiple systems, sites, and teams in order to protect proprietary data and summarize the performance of hundreds of fuel cell systems and thousands of data records. A review cycle is completed before the publication of CDPs. The review cycle includes providing Detailed Data Products (DDPs) of individual system and site performance results to the individual data provider. DDPs also identify the individual contribution to CDPs to provide context of system performance back to the developer. The NREL Fleet Analysis Toolkit (NRELFAT) is an internally developed tool for data processing and analysis structured for flexibility, growth, and simple addition of new applications. Analyses are created for general performance studies as well as application- or technology-specific studies.

Fiscal Year (FY) 2012 Objectives

- Establish partnership(s) within the stationary fuel cell industry and with end users
- Create data templates for stationary fuel cell data collection
- Leverage the Hydrogen Secure Data Center (HSDC), analysis experience, and tools from other fuel cell technology validation activities

Technical Barriers

This project addresses the following technical barriers from the Technology Validation section (3.6) of the Fuel Cell Technologies Program Multi-Year Research, Development and Demonstration Plan:

- (B) Lack of Data on Stationary Fuel Cells in Real-World Operation
- (E) Codes and Standards
- (H) Hydrogen and Electricity Co-Production

Technical Targets

This project is in the initial set-up stage, establishing partnerships, data templates, and methods to analyze operation data from stationary fuel cell systems operating under real-world conditions. These analyses will:

- Validate stationary fuel cell durability and efficiency against targets of 40,000 hours and 40% efficiency lower heating value (2014)

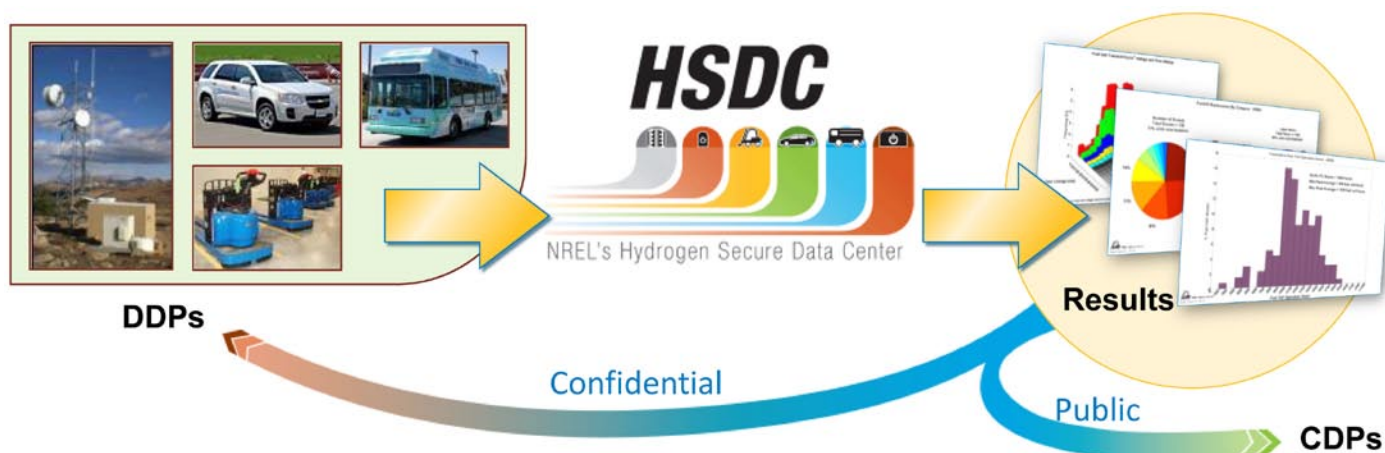


FIGURE 1. HSDC Data Flow Diagram

FY 2012 Accomplishments

- NREL/FAT was expanded to include stationary fuel cell processing and analysis capabilities for preparation of the first data analysis cycle. (New work)
- Data templates were created for consistent and complete data sharing. The data templates include site overview, operation, maintenance, and summary. Key targets that will be validated with these data include durability and efficiency. (New work)
- A partnership has been established with the National Fuel Cell Research Center (NFCRC) and the CaSFCC. This partnership includes validation of stationary fuel cell systems using different technologies and approximately 40 MW installed capacity. (New work)
- On-going communications have occurred with several organizations, including state and regional fuel cell organizations and developers, to establish agreements for sharing data. (New work)

Future Directions

- Establish partnerships with end users, state collaborations, and fuel cell developers to create data sets of stationary fuel cell systems operating in real-world conditions
- Receive first delivery of data from NFCRC and CaSFCC
- Publish first set of CDPs for stationary fuel cell operation in Fall 2012