The Fuel Cell Testing at the Argonne Fuel Cell Test Facility

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Overview

Timeline

- Facility Planning: 1996
- Facility Commissioned: 1999
- End: Open - this is an ongoing activity to test/validate/document fuel cell performance as the technology continues to evolve and mature

Budget

- Planned FY2012: $150K

Objectives

- To provide DOE with an independent assessment of state-of-the-art fuel cell technology.
- To develop test procedures that could be used as part of an international standard, including accelerated aging protocols. These would be based on a comparison of protocols used in the US and in the EU.

Collaborations

- FCTES^{QA} – International consortium (EU, Japan, US, etc.) to develop standardized fuel cell test procedures.
- FCTestNet Task Force – International consortium (EU, Japan, US) to compare fuel cell test protocols.
- IEC/TC105 – Secretary for Work Group 11/ Single Cell Test Protocol.
- Fuel Cell and Hydrogen Energy Association.
- Institute for Energy (The Netherlands).

Approach

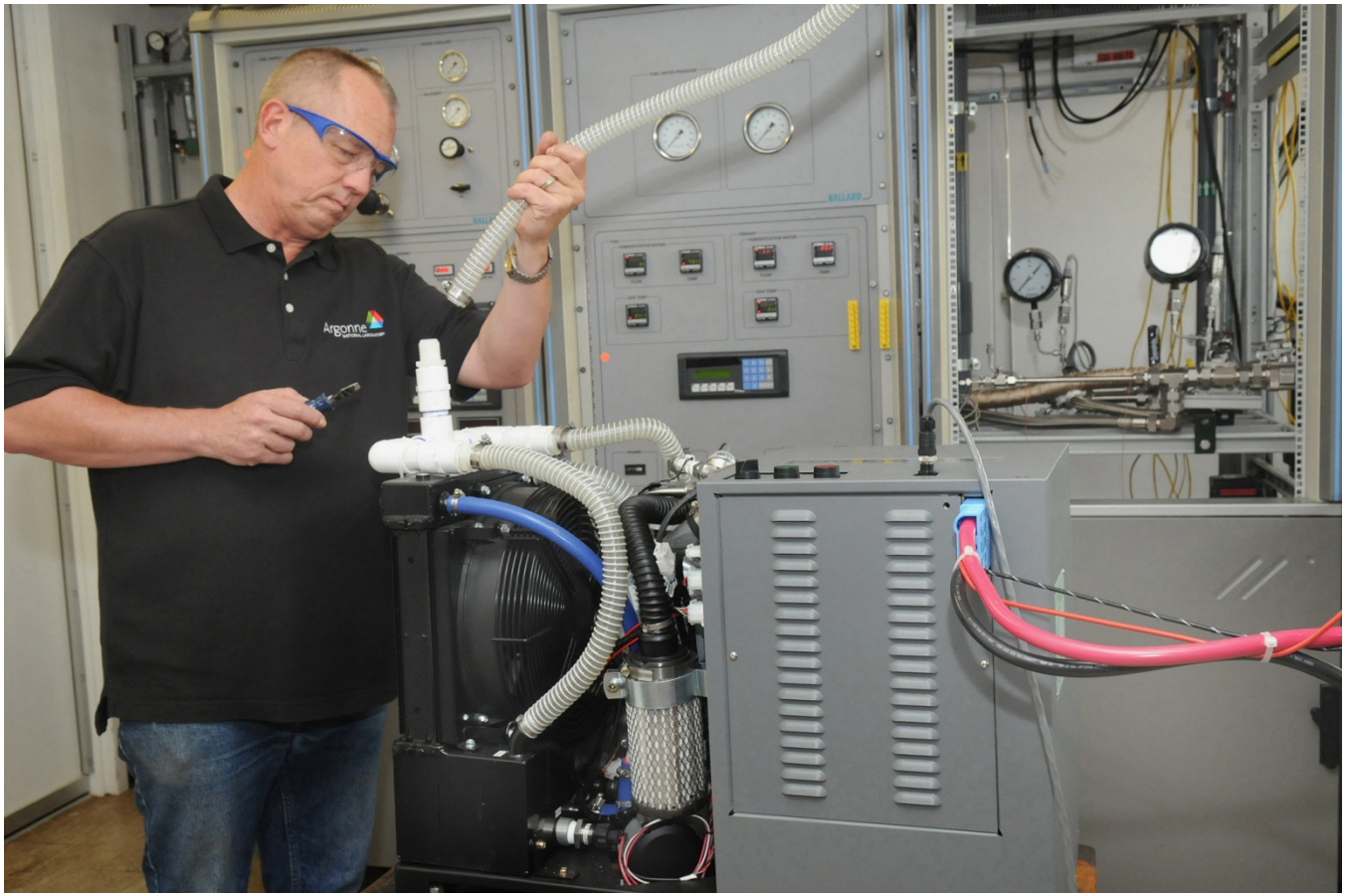
- Develop standardized test procedures for the evaluation of different stack technologies.
- Characterize stacks and systems in terms of:
  - Initial performance;
  - Durability: Accelerated aging tests to yield a reasonable projection of life in a reasonable amount of test time;
  - Cold start performance by pseudo-steady-state tests at increasing temperature steps from ambient conditions.
  - Adapt the Facility hardware and software as needed to accommodate the unique needs of different technologies and applications:
  - Automotive and stationary transients;
  - Operating temperatures and pressures;

Fuel Cell Systems and Components Tested

- Ballard 85-kW module
- PlugPower 30-kW stacks
- GM/SwRI® 7-kW stacks
- IFC 50-kW power plant (on-board gasoline reformer)
- Nuvera fuel processor
- Nuvera 12-kW power plant (gasoline powered)
- NedStack 12-kW stack
- Phoenix Analysis and Design Technologies air blower for a 75-kW stack
- UTC 15-kW power plant
- R&D Dynamics Company reformer air blower

- Most systems performed as well as, or better than, the developer's projections.
- Accelerated aging tests indicated systems are durable.
- Setup and testing of some systems identified stack and non-stack issues (e.g., controller issues).
- Inter-laboratory comparisons essentially duplicated performance results.

Fuel Cell System Being Readied for Testing



Summary

- Testing in the Facility is modeled after US protocols. International test protocols would facilitate data exchange and technology validation. The Facility is active in the proposal, evaluation, and adoption of standardized test methods.

- The testing can gauge the progressive development of fuel cell technology.

- The Facility capabilities are being continually upgraded (e.g., larger cooling capacity, fast gas transients, and low operating temperatures).

- The Facility can be used to characterize fuel cell performance and lifetimes for a variety of applications, such as:
  - Automotive (propulsion power, auxiliary power)
  - Battery range extender
  - Combined heat and power, and combined hydrogen, heat, and power