

VII.10 California State University Los Angeles Hydrogen Refueling Facility Performance Evaluation and Optimization

David Blekhman
California State University Los Angeles (CSULA)
Los Angeles, CA 90032
Phone: (323) 343-4569
Email: blekhman@calstatela.edu

DOE Managers
Jason Marcinkoski
Phone: (202) 586-7466
Email: Jason.Marcinkoski@ee.doe.gov
James Alkire
Phone: (720) 356-1426
Email: James.Alkire@go.doe.gov

Contract Number: DE-EE0005890

Subcontractor:
Hydrogenics, Mississauga, ON, Canada

Project Start Date: October 1, 2012
Project End Date: September 30, 2016

Overall Objectives

Technical Objectives

- Test, collect data, and validate hydrogen refueling architecture deployed at CSULA and its individual components in a real-world operating environment
- Provide the performance evaluations data to the Hydrogen Secure Data Center (HSDC) at the National Renewable Energy Laboratory (NREL)
- Contribute to the development of new industry standards
- Develop and implement fueling station system performance optimization

Educational objectives:

- Conduct outreach and training activities promoting the project and hydrogen and fuel cell technologies
- Provide a living-lab environment for engineering and technology students pursuing interests in hydrogen and fuel cell technologies

Fiscal Year (FY) 2013 Objectives

Design and install data collection system for the station and its major components (Figure 1).

Technical Barriers

This project addresses the following technical barriers from the Fuel Cell Technologies Office Multi-Year Research, Development, and Demonstration Plan:

Hydrogen Production

- (B) Operations and Maintenance (O&M)
- (E) Control and Safety

Technology Validation

- (D) Lack of Hydrogen Refueling Infrastructure Performance and Availability Data

Contribution to Achievement of DOE Hydrogen Production and Technology Validation Milestones

This project will contribute to achievement of the following DOE milestones from the Fuel Cell Technologies Office Multi-Year Research, Development, and Demonstration Plan:

Hydrogen Production

- Milestone 2.6: Verify the total capital investment for a distributed electrolysis system against the 2015 targets using H2A. (Q2, 2016)
- Milestone 2.7: Verify 2015 distributed hydrogen production levelized cost target through pilot scale testing coupled with H2A analysis to project economies of scale cost reduction. (Q3, 2017)

Technology Validation

- Milestone 3.4: Validate station compression technology provided by delivery team. (4Q, 2018)

FY 2013 Accomplishments

This is the first year of the project with its accomplishments listed as follows:

- Reviewed existing instrumentation and equipment for data acquisition available at the station
- Designed enhancements for data acquisition that will enable station performance evaluation
- Procured equipment according to the design





FIGURE 1. CSULA Hydrogen Fueling Facility, from left to right: storage tanks, PDC 350-bar compressor, two Hydro Pac 700-bar compressors, and Quantum chiller.

INTRODUCTION

The CSULA hydrogen station deploys the latest technologies with the capacity to produce and dispense 60 kg/day, sufficient to fuel 15-20 vehicles. The station utilizes a Hydrogenics electrolyzer, first- and second-stage compressors enabling 350- and 700-bar fueling and 60 kg of hydrogen storage. The station is grid-tied and to be supplied by 100% renewable power.

Coupling the station and the academic background of the research team presents a strong partner for DOE and NREL in conducting a hydrogen refueling facility performance evaluation and optimization project. This also includes multiple activities and subprojects listed in the objectives section.

APPROACH

To enable effective data collection on the station performance, the team utilizes some of the sensors already available at the station and introduces a number of additional meters for completed system. A software package is being developed to achieve maximum automation in data collection and processing per NREL requirements.

As data are collected and analyzed for a period of time, the station performance will be evaluated for potential optimization and other technical enhancements. The goals would be to reduce maintenance cost, reduce hydrogen costs and improve user experience.

RESULTS

As stated in achievements, this is a new project that in a short time evaluated current station design, specified data acquisition enhancements and procured additional equipment. The equipment will be installed and software developed for data acquisition.

CONCLUSIONS AND FUTURE DIRECTIONS

This is a new project that is well underway. The research team looks forward to collaborating with DOE and NREL in evaluating the station performance and contributing to the development of a robust and economically viable hydrogen infrastructure.