VII.8 Station Operational Status System (SOSS) 3.0 Upgrade

Ben Xiong (Primary Contact), Nico Bouwkamp
California Fuel Cell Partnership (CaFCP)
3300 Industrial Blvd., Suite 1000
West Sacramento, CA 95691
Phone: (916) 371-2870
Email: bxiong@cafcp.org

DOE Manager
Jason Marcinkoski
Phone: (202) 586-7466
Email: Jason.Marcinkoski@ee.doe.gov

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Project End Date: May 31, 2015

Overall Objectives

- Increase fuel cell electric vehicle (FCEV) customer satisfaction and thereby station demand by consistently providing relevant station status information so that end users can better assess hydrogen station availability

Fiscal Year (FY) 2015 Objectives

- Improve user interface and data quality
- Increase data transmission interval from stations (once every 15 min at minimum) and data sharing capabilities

Technical Barriers

This project addresses the following technical barrier from the Technology Validation section of the Fuel Cell Technologies Office (FCTO) Multi-Year Research, Development, and Demonstration (MYRDD) Plan:

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

Contribution to Achievement of DOE Technology Validation Milestones

This project will contribute to achievement of the following DOE milestone from the Technology Validation section of the FCTO MYRDD Plan:

- Milestone 2.3: Validate fuel cell electric vehicles achieving 5,000-hour durability (service life of vehicle) and a driving range of 300 miles between fuelings. (4Q, 2019)

FY 2015 Accomplishments

- Achieved CaFCP member agreement on customer focused criteria
- Implemented code changes on CaFCP's SOSS server
- Improved SOSS interface to better display status information
- Completed integrating SOSS 3.0 at five of eight of the current hydrogen stations
- One new station is publicly open and has SOSS 3.0 implemented at the site

INTRODUCTION

Argonne National Laboratory/DOE are continuing partners in the California Fuel Cell Partnership. Funds are used to accomplish the goals of the partnership and to provide critical information and data necessary for the DOE to determine the status and prospects for commercialization of fuel cell technology. The partnership supports the Station Operational Status System (SOSS), a mobile web application (Figure 1) [1] that provides status information about each of the available hydrogen stations in California and the National Renewable Energy Laboratory's (NREL's) station in Golden, Colorado.

APPROACH

FCEV customer satisfaction, and thereby station demand, will be increased by consistently providing relevant station status information so that end users can better assess hydrogen station availability. This is accomplished through the SOSS by each station sending a message to CaFCP's server every few minutes, to report on the station operational status (online or offline), available fuel, and available pressures, as well as the station address, contact number, and the Global Positioning System coordinates.

The SOSS 3.0 upgrade creates consistency in timing of data collected and content displayed from hydrogen stations. It also improves the user interface (Figure 1), increases the frequency of operational status updates, and increases data sharing capabilities. Newly built hydrogen stations are solicited to participate in SOSS.

RESULTS

Code changes for SOSS 3.0 have been completed, implemented and tested in the development environment.

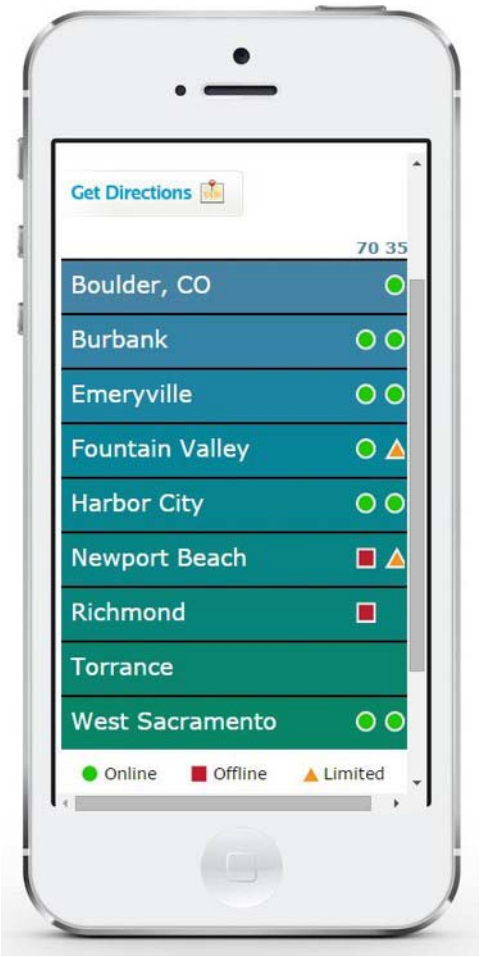

FIGURE 1. SOSS 3.0 interface

Software testing has been performed and the code changes have been implemented on the production environment. The SOSS 3.0 version is being implemented at current stations. Development work is in progress to allow for multiple outgoing feeds to be transmitted from the CaFCP server.

Status of implementation at current stations:

- Burbank (H2 Frontier) development and testing was completed.
- West Los Angeles (Shell/Hydrogenics) was decommissioned.
- Emeryville (Linde) had no upgrade/workaround.
- Fountain Valley (Air Products and Chemicals, Inc. [APCI]) development was completed.
- Boulder, Colorado (NREL) was put on hold.
- Newport Beach (Shell/Powertech) development was completed.
- Torrance (Shell/APCI) development was completed.
- Harbor City (APCI) development was completed.
- H2 Frontier has completed implementation of upgrading their system to be SOSS 3.0 compliant at the Burbank station. Testing has also been completed.
- Linde does not plan to upgrade the Emeryville station to SOSS 3.0. The Linde station does not have separate signals for H35 and H70. When one pressure becomes unavailable, fueling is unavailable for both pressures. This station currently reports in 15-minute intervals.
- APCI has completed initial implementation of upgrading the Fountain Valley station to be SOSS 3.0 compliant. Testing is still in progress to ensure that the station is reporting accurately.
- NREL is considering moving resources from the Boulder, Colorado, station to Golden, Colorado. This would mean no upgrade at the Boulder station, but the Golden station would be developed with SOSS 3.0 capabilities.
- Shell/Powertech has completed implementation of upgrading the Newport Beach station to be SOSS 3.0 compliant. Testing is still in progress to ensure that the station is reporting accurately.
- APCI has completed initial implementation of upgrading the Torrance station to be SOSS 3.0 compliant. Testing is still in progress to ensure that the station is reporting accurately.
- APCI has completed initial implementation of upgrading the Harbor City station to be SOSS 3.0 compliant. Testing is still in progress to ensure that the station is reporting accurately.

Status of implementation at new stations:

- West Sacramento (Linde) development and testing was completed.
- California State University, Los Angeles (Cal State LA) is in progress.
- Diamond Bar (South Coast Air Quality Management District/APCI) has no funding for an upgrade.
- Chino (H2 Frontier/ITM Power) planning is complete.
- Anaheim (Air Liquide) planning is complete.
- Palo Alto (Air Liquide) planning is complete.
- Los Angeles International Airport (LAX) (Air Liquide) planning is complete.
- Linde and Quantum have completed integrating SOSS 3.0 at the West Sacramento station. Testing has been completed and the site is live.
- Cal State LA has completed implementation of SOSS 3.0 at the Cal State LA station. Testing has been postponed. Cal State LA is focused on getting the station to an "open" status.

- APCI and Engineering, Procurement and Construction, LLC, have upgraded the capabilities to program, integrate, and confirm successful communication between station and SOSS that were previously deployed at earlier APCI stations. The station implementers' proposal to procure funding to move forward with implementation has been completed.
- CaFCP continues to be in communication with ITM Power, H2 Frontier, Air Liquide, and First Element to implement SOSS at the Chino, Anaheim, Palo Alto, and LAX stations and other stations not implemented yet.

CONCLUSIONS AND FUTURE DIRECTIONS

Delayed station implementation/rollout has been a barrier for new stations participating on SOSS. Despite the delays, station operators, developers, automakers, and other stakeholders agree that SOSS is critical for customer satisfaction in an early market launch of fuel cell vehicles. Initial proposal of future improvements to SOSS include the following.

- Solicit new hydrogen stations to participate on SOSS
- Implement user interaction and feedback system
- Research mobile native app capabilities and implement if applicable
- Implement backup system
- Implement real-time reporting
- Implement a mobile map interface

REFERENCES

1. (Current) SOSS web interface for FCEV users: http://www.m.cafcp.org/