

## VII.9 Data Collection and Validation of Newport Beach Hydrogen Station Performance

Michael J. Kashuba

California Air Resources Board  
1001 I Street, P.O. Box 2815  
Sacramento, CA 95812  
Phone: (916) 323-5123  
Email: mkashuba@arb.ca.gov

### DOE Managers

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

Jim Alkire  
Phone: (720) 356-1426  
Email: James.Alkire@ee.doe.gov

Contract Number: DE-EE0005889

### Subcontractor

Hydrogenics Corporation, Torrance, CA

Project Start Date: October 2012

Project End Date: March 2015

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

(F) Centralized Hydrogen Production from Fossil Resources

### 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 Fuel Cell Technologies Office Multi-Year Research, Development, and Demonstration Plan:

- Milestone 3.2: Validate novel hydrogen compression technologies or systems capable of >200 kg/day that could lead to more cost-effective and scalable (up to 500 kg/day fueling station solutions for motive applications. (4Q, 2014)

### FY 2014 Accomplishments

- Specified 16 pieces of instrumentation to effectively increase data collection
- Researched and applied experience gained from installation of a similar suite of sensors at a nearby electrolyzer station to this station in order to plan a more streamline installation



### Overall Objective

- Specify and install correct instrumentation to increase the amount of data collected
- Validate new data and conduct initial analysis
- Increase overall station/equipment up time
- Reduce non-scheduled maintenance visits
- Make component optimization recommendations
- Check/validate station optimization

### Fiscal Year (FY) 2014 Objectives

- Specify and install correct instrumentation to increase the amount of data collected
- Validate new data and conduct initial analysis

### Technical Barriers

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

### INTRODUCTION

The hydrogen fueling station located at 1600 Jamboree Road in Newport Beach, CA was designed and built to refuel light-duty fuel cell electric vehicles (FCEVs). The station features the onsite generation of hydrogen through a small-scale natural gas steam methane reformer (SMR). All the hydrogen related equipment was added to an existing retail gasoline/diesel station. The station is an early demonstration of what the footprint and equipment arrangement of a retail onsite SMR facility might look like (Figure 1).

Only a few hundred FCEVs are on the road in California. As a result, hydrogen throughput is relatively low at the few early pre-commercial hydrogen stations that are currently open. As a result the stations are underutilized. This project aims to collect additional data to allow the operator to potentially adjust various station component and operational parameters in order to improve the overall efficiency of the station and lower operation and maintenance costs and to help improve air quality and reduce greenhouse gas emissions.

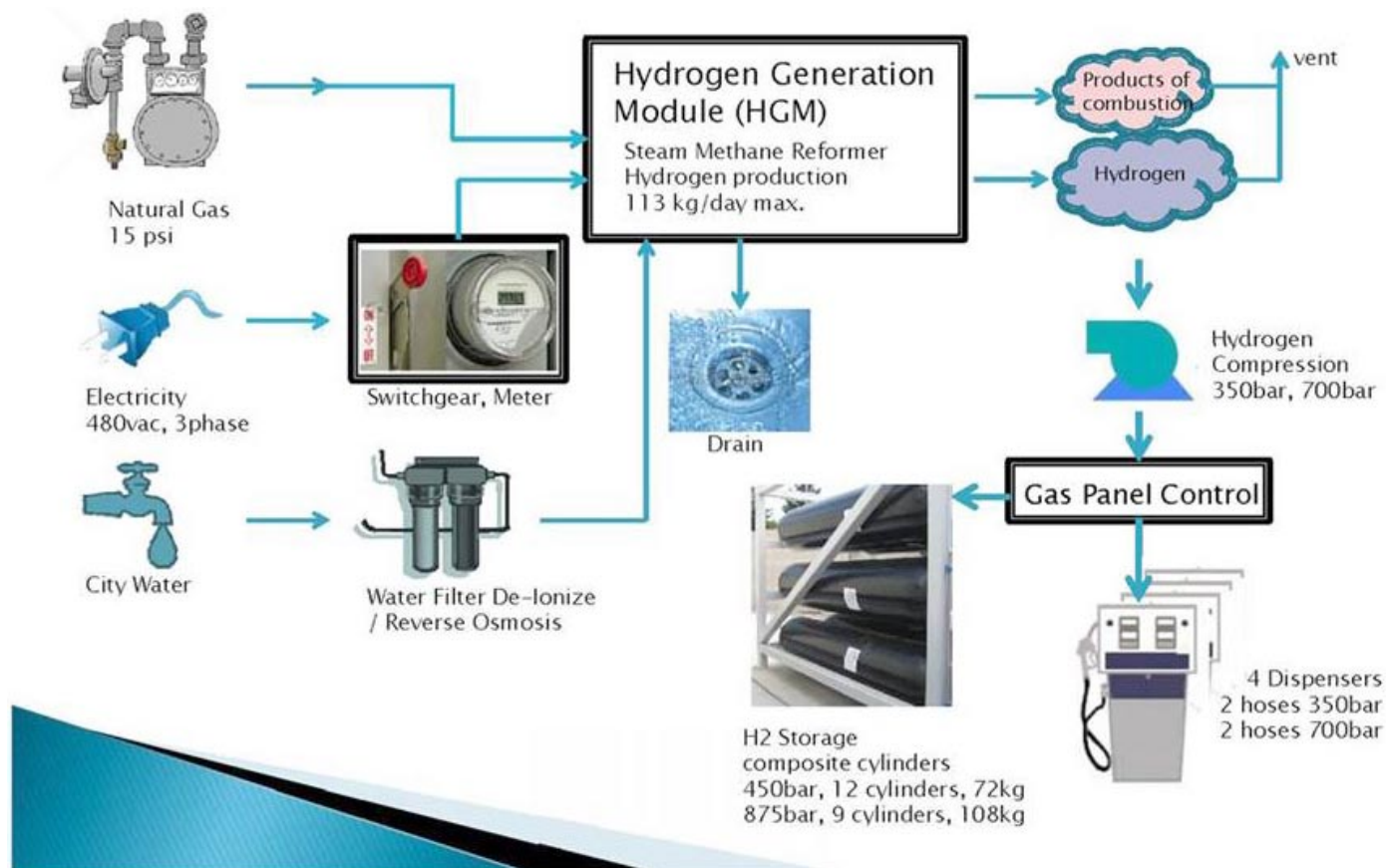


FIGURE 1. Newport Beach Hydrogen SMR Station Simplified Process Diagram

## APPROACH

The first phase of the project involves specifying and installing the correct instrumentation to increase the amount of data collected. This involves installing three mass flow meters, two hour meters, nine power meters, and two water flow meters. The new data collected will be validated and the initial analysis will be conducted (Figures 2 and 3).

The second phase of the project aims to improve the efficiency of the station. The intent is to increase the overall station and equipment up time and reduce non-scheduled maintenance visits. The data collected will be used to make recommendations on how to optimize discrete station components. The recommendations will be acted upon, and continually monitored to validate the optimization of the station.

## RESULTS

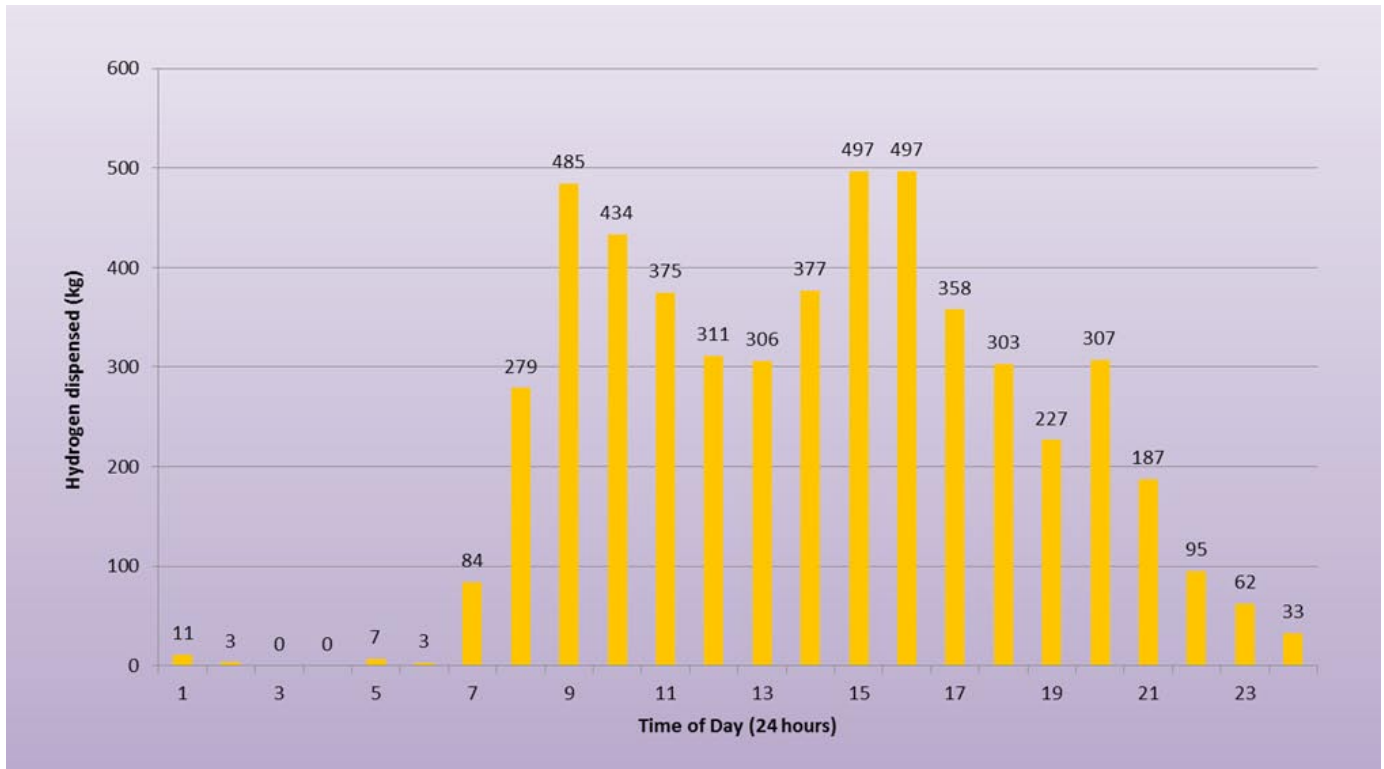
The results of this project have yet to be derived.

## CONCLUSIONS AND FUTURE DIRECTIONS

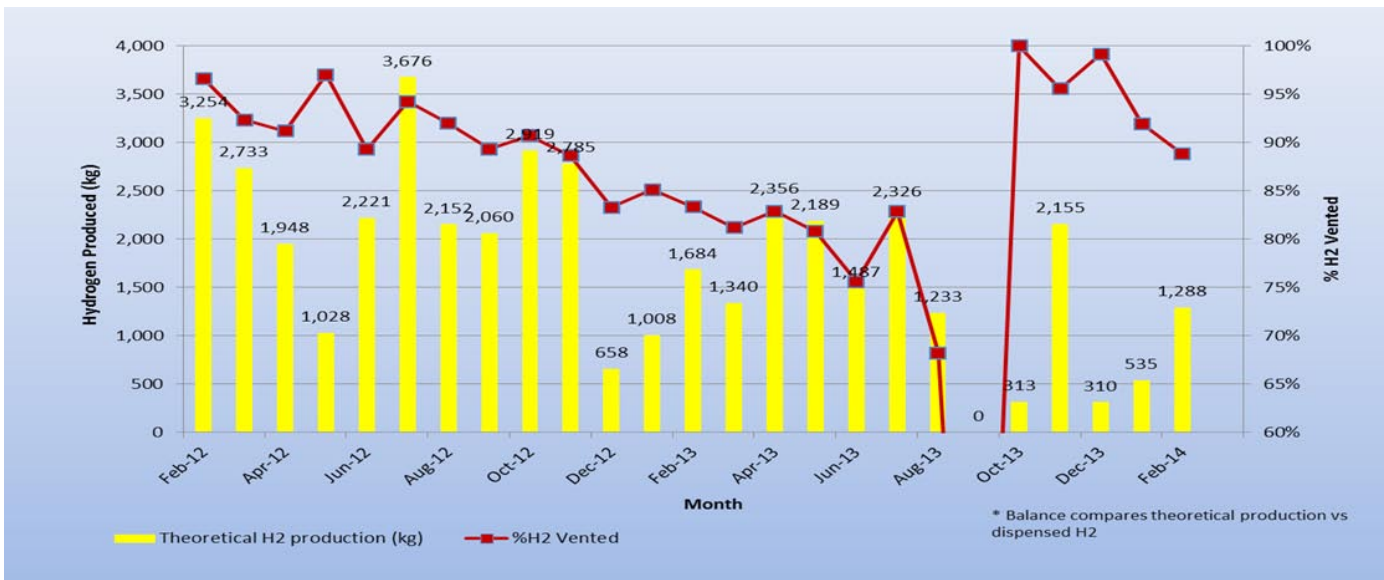
Data collection will begin in the third quarter of 2014. Research is expected to continue as planned until 2015.

## FY 2014 PUBLICATIONS/PRESENTATIONS

1. 2014 DOE Annual Merit Review “Newport Beach Hydrogen Station Key Performance Indicators, Project ID # TV023, Michael J. Kashuba, California Air Resources Board.



**FIGURE 2.** Data showing fueling patterns at the Newport Beach Hydrogen station show a similarity to the typical “double peak” that traditional fuel stations experience. Units are in cumulative kilograms dispensed per period over the history of the station. This information will be used to optimize the SMR, and compression operation.



**FIGURE 3.** Mass balance comparing kilograms produced at the station plotted against percent vented due to a combination of relative lack of demand and overproduction.