
VI.1 Technology Validation Sub-Program Overview

Introduction

The Technology Validation Sub-Program element is focused on conducting learning demonstrations that emphasize co-development and integration of hydrogen infrastructure in parallel with hydrogen fuel cell-powered vehicles to permit industry to assess progress towards technology readiness. Technology validation will test, demonstrate and validate total system solutions and use the results to provide feedback to the Hydrogen Program as appropriate.

Goal

Validate the status of meeting program targets for integrated hydrogen and fuel cell technologies for transportation, infrastructure and electric generation under real-world operating conditions for both the transition and mature market periods.

Objectives

- By 2008, validate an electrolyzer that is powered by a wind turbine at a capital cost of the electrolyzer of \$600/kWe and 68% efficiency including compression to 5,000 psi when built in quantities of 1,000.
- By 2009, validate hydrogen vehicles that have greater than 250-mile range, 2,000 hours fuel cell durability and hydrogen infrastructure that results in a hydrogen production cost of less than \$3.00/gge (untaxed), and safe and convenient refueling by trained drivers.
- By 2014, validate \$1.60 (at the plant gate) hydrogen cost from biomass gasification and \$ 3.10/kg for central wind based electrolysis at the plant gate.
- By 2015, validate hydrogen vehicles that have greater than 300 mile range, 5,000 hours fuel cell durability and hydrogen infrastructure that results in a hydrogen production cost of \$2.50/gge (untaxed), and safe and convenient refueling by trained drivers.

FY 2006 Technology Status

The Learning Demonstration in 2006 provided data for evaluating the technology status with respect to fuel cell durability, and driving range, and power park demonstrations in 2006 evaluated stationary fuel cell and electrolyzer subsystem performance.

FY 2006 Accomplishments

Hydrogen Learning Demonstration

- In FY 2006, generation 1 vehicles were delivered to customers, hydrogen refueling stations were installed and operated, and data was provided to the Hydrogen Secure Data Center at the National Renewable Energy Laboratory. Twenty six composite data products were generated from the data including fuel cell efficiency, fuel economy, fuel cell durability and facility operation incidents.
- All teams have submitted safety plans for the demonstration project.
- Hydrogen fueling stations have opened at Washington, D.C. (delivery), LAX Airport (electrolyser); Southfield, Michigan (power park); Oakland, California (reformer); Chino, California (reformer); San Francisco, California (delivery); and Sacramento, California (delivery). In addition, temporary refueling sites have been in operation in Taylor, MI and Jamestown, FL since early FY 2006.

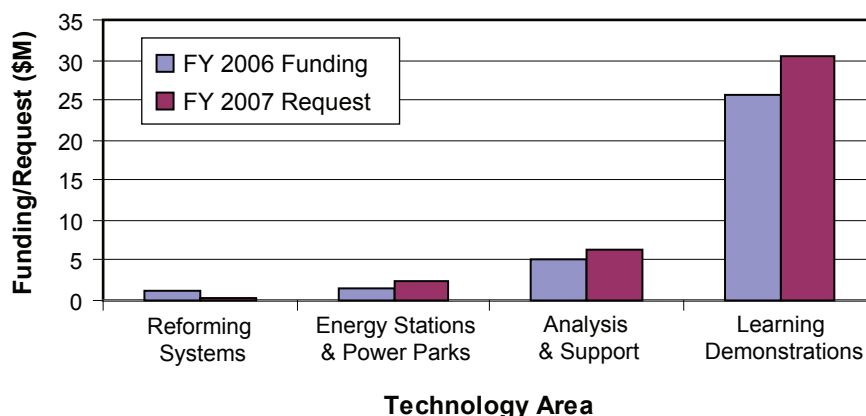
Hydrogen Power Parks

- In FY 2006, electrolyzers and fuel cells were installed and operated in Arizona and Michigan at utility sites. Data on fuel cell durability and efficiency, and electrolyser efficiency were provided. Lifetime issues were addressed for both components.

- In FY 2006, an energy station design was completed with competitive expectations for the production of hydrogen and electricity.

Budget

The funding portfolio for Technology Validation addresses the need to validate integrated hydrogen and fuel cell technologies for transportation, infrastructure, and electric generation in a systems context under real-world operating conditions. The FY 2007 funding profile (subject to Congressional appropriation) addresses key aspects of the Hydrogen Program mission, the cross-cutting issues identified in the National Academies' Report, and system integration activities for both fleets and their infrastructure, and for distributed generation systems.



FY 2007 Plans

In FY 2007, Technology Validation will continue to add vehicles and refueling stations to the project. In 2006, the Validation Demonstration did complete 1,000 hours operation and testing of natural-gas reformer systems to support \$3.00/gge hydrogen production costs and the Learning Demonstration did operate the fleet of vehicles to determine the fuel-cell durability through the analysis of voltage degradation data. After data from all four teams have been submitted, the first complete set of composite results from the learning demonstration will be presented to the public in early 2007. Early second generation fuel cell vehicles will be deployed in FY 2007. Data will be collected to support the overall target of 2,000-hour fuel cell durability, 250+ mile vehicle range and hydrogen cost of \$3.00/gge in 2009. In FY 2007, a power park will be installed and operated in Hawaii and utility business cases will be developed.

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