

VIII Technology Validation

VIII.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 enable an industry commercialization decision by 2015. Technology validation will test, demonstrate and validate total system solutions and use the results to refocus hydrogen R&D 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 2013, validate an integrated biomass/wind or geothermal electrolyzer-to-hydrogen system to produce hydrogen for \$2.25/gge at the plant gate (untaxed).
- 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 \$2.00-\$3.00/gge (untaxed), and safe and convenient refueling by trained drivers.

FY 2005 Technology Status

The Learning Demonstration in 2005 began to provide data for evaluating the technology status with respect to fuel cell durability, driving range and production cost of hydrogen, and the power park demonstrations in 2005 began to evaluate stationary fuel cell and electrolyzer subsystem performance.

FY 2005 Accomplishments

Hydrogen Learning Demonstration

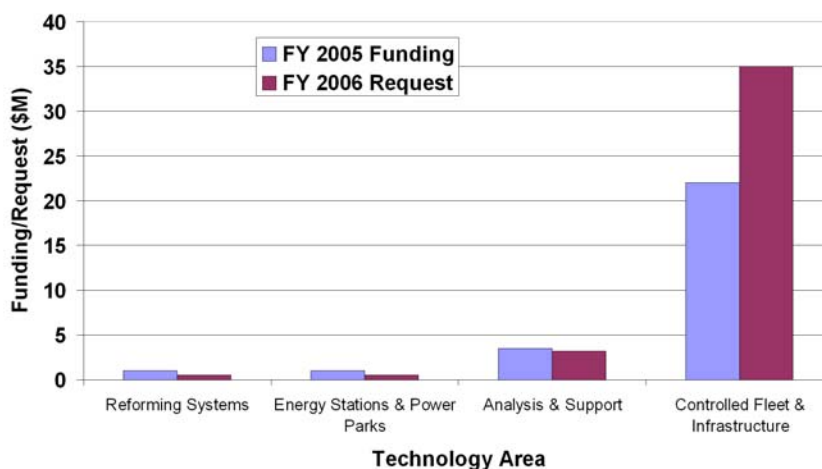
- In FY 2005, generation 1 vehicles were delivered to customers, and data began to flow to the Hydrogen Secure Data Center at the National Renewable Energy Laboratory.
- All teams have submitted safety plans for the demonstration project.
- Hydrogen fueling stations have opened at the LAX Airport (electrolyser); Southfield, Michigan (power park); and Chino, California (reformer).

Hydrogen Power Parks

- In FY 2005, electrolyzers and fuel cells were installed and operated in Arizona and Michigan at utility sites.

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 2006 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 2006 Plans

In FY 2006, Technology Validation will continue to add vehicles and refueling stations to the project. Data will continue to be collected to support the overall target of 2000-hour fuel cell durability, 250+ mile vehicle range and hydrogen cost of \$3.00/gge in 2009. In 2006, the Validation Demonstration will complete 1000 hours operation and testing of natural-gas reformer systems to support \$3.00/gge hydrogen production costs and the Learning Demonstration will 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 composite results from the learning demonstration will be presented to the public. In FY 2006, power parks will be operated and utility business cases will be developed.

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