U.S. DEPARTMENT OF ENERGY

Technology Validation

John Garbak

2007 DOE Hydrogen Program
Merit Review and Peer Evaluation Meeting

May 17, 2007

Outline

- Goal and Objectives
- Budget
- Challenges
- Progress
  - Accomplishments/Status
- Future Plans
- Technology Validation Overview

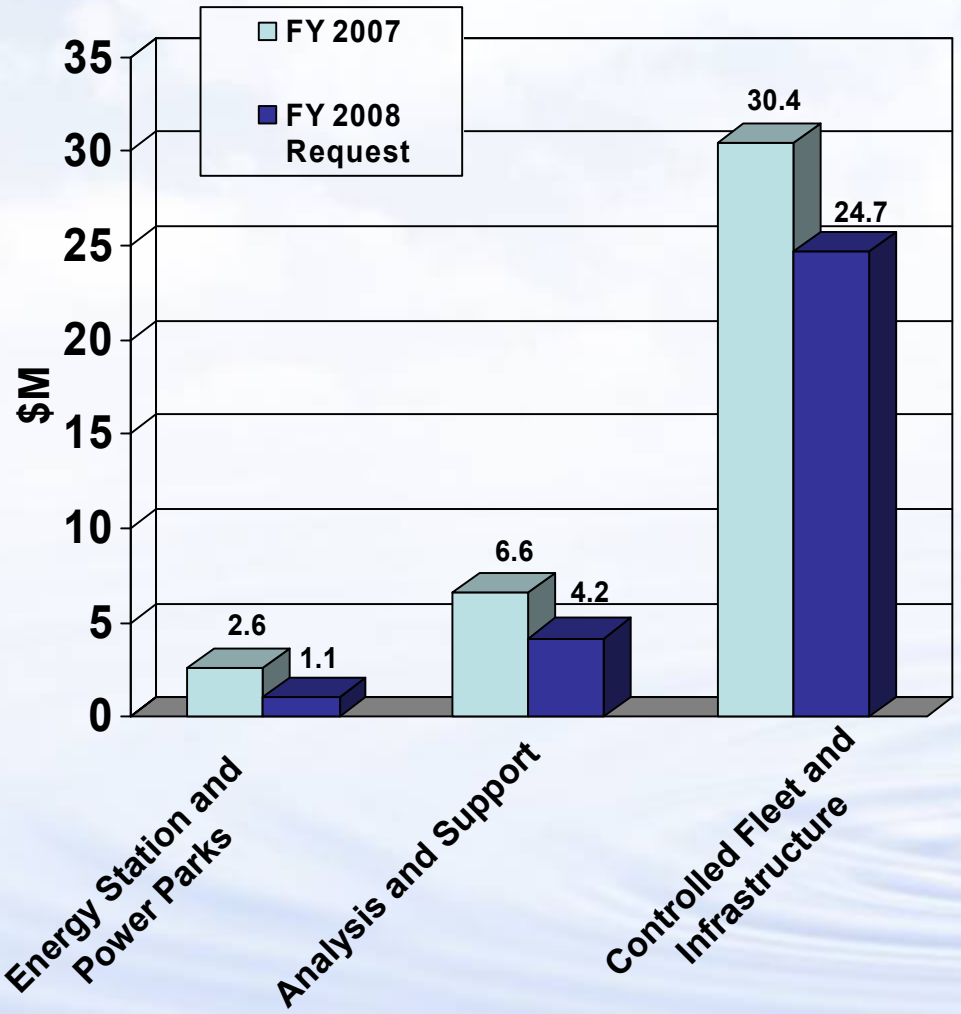
Goals and Objectives

Technology Validation: Validate complete systems of integrated hydrogen and fuel cell technologies for transportation, infrastructure and electricity generation applications under real-world operating conditions

- Validate H_2 FC Vehicles and Infrastructure in Parallel
- Identify Current Status of the Technology
  - Assess Progress Toward Technology Readiness
  - Provide Feedback to H_2 Research and Development

Technology Validation

FY 2008 Budget Request = $30.0M
FY 2007 Appropriation = $39.6M



FY 2008 Emphasis:

- All Gen 2 vehicles and fueling stations in operation using advanced technology hardware to meet program objectives.
- Continue analysis to verify 2,000 hour fuel cell durability target by 2009
- Install equipment and collect data to meet $3.00/gge by 2009
- Collect vehicle operational and maintenance data and conduct dynamometer testing to evaluate fuel cell performance and range

FY 2008 Budget Plan:

Demo – Infrastructure	$10.2M
Demo - Vehicle	$14.5M
Other Industry/Lab	$ 5.3M
Total	$30.0M

Challenges

- Lack of fuel cell vehicle performance and durability data
- Lack of refueling infrastructure performance and availability data
- Need to assess fuel cell start-up and operation in 3 different climatic conditions
- Determine fuel cell vehicle and infrastructure interface issues that need to be addressed

Generation 2 Vehicles Being Delivered in 2007

Progress

DOE Vehicle/Infrastructure Demonstration:

- **Four teams in 50/50 cost-shared projects:**
  - General Motors/Shell
  - Ford/BP; Ballard
  - Hyundai/Chevron; UTC Power
  - DaimlerChrysler/BP; Ballard

Current Status/Data

Fuel Cell Vehicles	77
Hydrogen Stations	12
Fuel Cell Efficiency	53 - 58%
Range	103 -190 miles
Durability	1200 hrs (max) (~36,000 miles)

DOT is demonstrating fuel cell buses and providing data to DOE for analysis.

- Eight buses in California, Massachusetts, New York, South Carolina, and Washington, DC

Future Plans

- Continue testing and operating generation 1 and generation 2 fuel cell vehicles
- Verify
  - 2,000 hour fuel cell durability
  - 250 mile range
  - $3.00/gasoline gallon equivalent
- Build and operate a biomass energy station
- Build and operate a power park in Hawaii

Technology Validation Overview

- Controlled Hydrogen Fleet and Infrastructure Demonstration and Validation Project
  - ✓ Klaus Bonhoff, DaimlerChrysler
  - ✓ Greg Frenette, Ford
  - ✓ Dan Casey, Chevron
  - ✓ Roz Sell, GM
- Controlled Hydrogen Fleet and Infrastructure Analysis, Keith Wipke, NREL
- Validation of an Integrated Hydrogen Energy Station- Dan Tyndall, APCI
- California Hydrogen Infrastructure Project – Ed Heydorn, APCI
- Cryogenic Capable Pressure Vessels for Vehicular Hydrogen - Salvador Aceves, LLNL
- Fuel Cell Bus Evaluations – Leslie Eudy, NREL

Technology Validation Overview

Poster Session

May 17 6- 8 PM

- Geographically Based Hydrogen Infrastructure Scenario Analysis – Margo Melendez, NREL
- Quantifying Consumer Sensitivity to Hydrogen Refueling Station Coverage – Corey Welch, NREL
- Policy Options for Hydrogen Vehicles and Infrastructure – Stefan Unnasch, TIAX
- Power Parks System Simulation - Andy Lutz, SNL
- Hydrogen Filling Station - Rick Hurt and Yitung Chen, UNLV
- Florida Hydrogen Initiative – Ed Levine, Florida Hydrogen Initiative
- Hawaii Hydrogen Center – Richard Rocheleau, Hawaii Natural Energy Institute

For More Information

Technology Validation Team

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