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 H₂ FC Vehicles and Infrastructure in Parallel
- Identify Current Status of the Technology
  - Assess Progress Toward Technology Readiness
  - Provide Feedback to H₂ 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**

<table>
<thead>
<tr>
<th>Fuel Cell Vehicles</th>
<th>77</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen Stations</td>
<td>12</td>
</tr>
<tr>
<td>Fuel Cell Efficiency</td>
<td>53 - 58%</td>
</tr>
<tr>
<td>Range</td>
<td>103 - 190 miles</td>
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<tr>
<td>Durability</td>
<td>1200 hrs (max) (~36,000 miles)</td>
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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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