

DOE Funded Hydrogen Technology Validation Projects

Margo Melendez, NREL

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Technology Validation Strategy

- To conduct learning demonstrations that emphasize co-developing hydrogen infrastructure in parallel with hydrogen fuel cell-powered vehicles to **allow a commercialization decision by 2015.**
 - Test, demonstrate, and validate optimum system solutions
 - Refocus Hydrogen R&D Program as appropriate

Controlled Fleet Performance Targets

(From solicitation RFP, Appendix C)

- 2008 Performance Targets
 - FC Stack Durability: 2000 hours
 - Vehicle Range: 250+ miles
 - H2 cost at station: \$3.00/kg

To verify progress toward 2015 targets
- 2015 Performance Targets
 - FC Stack Durability: 5000 hours
 - Vehicle Range: 300+ miles
 - H2 cost at station: \$1.50/kg

Subject of subsequent projects to validate 2015 targets

Controlled H2 Fleet & Infrastructure Solicitation: General Information

- Five year project 2004 – 2008
- Government/industry cost shared co-operative agreement
- \$150M –\$240M Government share subject to the appropriations process
 - \$190M announced last week
- Data from project to help refocus R&D projects
- 2 Generations of vehicles
- Cold climates to be included by 2nd generation
- Must include renewable feedstock for H2 generation
- Codes, Standards and Education integral to the success of the project
- Stationary facilities that co-produce electricity and hydrogen are encouraged



Project Safety – Key Part of Project

- Solicitation bidders required to include in their proposal:
 - Preliminary Failure Modes and Effects Analysis (FMEA) on the project
 - Brief example of safety assessment
 - Detailed outline of Risk Mitigation Plan
 - Description of how safety performance will be measured and monitored
 - Detailed outline for Communication Plan, including reportable accidents, management response, and independent reviews
- Safety accounted for 20% of proposal evaluation score
- RFP included “Guidance for Safety Aspects of Hydrogen Projects” for reference

Controlled H2 Fleet & Infrastructure Solicitation: Teaming

- An automobile manufacturer and an energy company;
- A hydrogen supplier;
- A fuel cell supplier;
- Utility and/or gas company
- A fleet operator of vehicles (private, local, state, or federal fleets);
- System and component suppliers;
- Small businesses;
- Universities, educational, and outreach organizations;
- State, local, and federal governments.

The automobile manufacturer or the energy company will be the prime

Successful Teams Announced This Week

- Ford Motor Co./BP
- FC: Ballard
- Stations in
 - Detroit, MI
 - Orlando, FL
 - Sacramento, CA

- General Motors/Shell
- FC: GM
- Stations in
 - Washington, DC/Fort Belvoir, VA
 - New York, NY
 - Los Angeles, CA

- DaimlerChrysler/BP
- FC: Ballard
- Stations in
 - Los Angeles, CA
 - Detroit, MI
 - Sacramento, CA

- Texaco Energy Systems/Hyundai
- FC: UTC Fuel Cells
- Stations in
 - Chino, CA
 - Pomona, CA
 - UC Davis

- Air Products, Conoco-Phillips, Toyota, Honda, Nissan, BMW
- FC: UTC, others
- Stations in
 - Northern CA
 - Southern CA
 - Las Vegas, NV

Performance Measures

Data Collected

- **Vehicle Performance Measures**
 - **Operations**
 - Fuel economy
 - Range
 - Vehicle refueling time
 - **Vehicle Fuel Cell Systems and Components**
 - Durability
 - Efficiency
 - H2 tank cycle life
 - **Performance**
 - Top speed, Acceleration
 - Gradeability
 - Minimum/maximum temperature
 - Cold drive-away
 - Emissions
 - **Safety**
 - Unplanned failures,
 - Fuel tank release,
 - Grounding, sensor, and passenger compartment alarm

Performance Measures Data Collected

- Infrastructure Performance Measures
 - **Site**
 - Purity of hydrogen from storage tank
 - **Fueling System**
 - Durability
 - Hydrogen production and delivery, refueling rate
 - **Safety**
 - Release of hydrogen from fueling connector
- Fuel cell co-generation facility (Optional)
 - Cost of co-generation
 - Fuel cell durability
 - Electrical efficiency of fuel cell
 - **Safety**
 - Electrical overload
 - Ground short
 - Alarms

Future Work

Controlled H2 Fleet & Infrastructure Project

- Remainder 2004
 - Industry/government kick-off meetings
 - Discussions on data collection methods, codes and standards, and education
 - Begin quarterly Validation Assessment Reports
- 2005 and beyond
 - Complete *first generation* vehicle & infrastructure demonstration
 - Compare technical progress to program objectives
 - Actively feed findings from project back into HFCIT program R&D activities (“learning demonstration”)
 - Implement *second generation* systems to meet 2008 targets