

VIII.A.4 Controlled Hydrogen Fleet and Infrastructure Demonstration and Validation Project

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Contract Number: DE-FC36-04GO14284

Partners:

Shell Hydrogen, LLC, Houston, TX

U.S. Army, Ft. Belvoir, VA

Quantum Technologies, Inc., Irvine, CA

Viewpoint Systems Inc., Rochester, NY

NextEnergy, Detroit, MI

State of Maryland, Annapolis, MD

Start Date: October 1, 2004

Projected End Date: September 30, 2009

Objectives

General Motors and energy partner Shell Hydrogen, LLC, to deploy a system of hydrogen fuel cell vehicles integrated with a hydrogen refueling infrastructure to operate under real world conditions

- Demonstrate progressive generations of fuel cell technology
- Demonstrate multiple approaches to hydrogen generation and delivery for vehicle refueling
- Collect and report operating data
- Collaborate with key partners to execute the project

Technical Barriers

This project addresses the following technical barriers from the Technology Validation section of the Hydrogen, Fuel Cells and Infrastructure Technologies Program Multi-Year Research, Development and Demonstration Plan:

- A. Vehicles
- B. Storage
- C. Hydrogen Refueling Infrastructure
- D. Maintenance and Training Facilities
- E. Codes and Standards

Contribution to Achievement of DOE Technology Validation Milestones

This project will contribute to achievement of the following DOE Technology Validation Milestones from the Technology Validation section of the Hydrogen, Fuel Cells and Infrastructure Technologies Program Multi-Year Research, Development and Demonstration Plan:

- Demonstrate fuel cell vehicles that achieve 50 percent higher fuel economy than gasoline vehicles
- Demonstrate (on a vehicle) compressed and cryogenic storage tanks achieving the 2005 energy and mass density targets
- Validate fuel cell demonstration vehicle range of approximately 200 miles and durability of approximately 1,000 hours
- Validate vehicle refueling time of 5 minutes or less
- Validate fuel cell vehicles with 250 mile range, 2,000-hour fuel cell durability, and a hydrogen cost of \$3.00/gge (based on volume production)
- Five stations and two maintenance facilities constructed with advanced sensor systems and operating procedures
- Validate \$2.50/gge hydrogen cost

General Motors accomplished the following project milestones:

- All Phase 1 hydrogen fuel cell vehicles have been deployed
 - All Phase 1 maintenance sites are operational
 - All Phase 1 support personnel received technical & safety training
- Nation's first retail hydrogen refueling station opened
- All compressed hydrogen fuel cell vehicles of current fleet are equipped with 700 bar compressed hydrogen storage system and are the first fuel cell vehicles to receive certification for using a 700 bar system
- Safety procedures for emergency responders distributed
- Vehicle data collection systems are defined and initiated
- Infrastructure data collection systems are defined and initiated
- Baseline testing for dynamometer facility is complete
- Agreements with key General Motors partners are concluded
- Resources are assigned and project team is operational

Approach

Demonstrate a total of 40 fuel cell vehicles spanning 2 generations of fuel cell system technology

- Next generation to deliver more power, enhanced durability, and a simpler design

Set up operations in three regions of the U.S.

- Test fuel cell vehicles in various terrains, under a variety of driving conditions, and different climates including cold weather
- Establish service facilities and maintenance operations
- Train personnel in maintenance, service, refueling, technical support, and safety procedures
- Establish hydrogen refueling for vehicle operations
- Set up five retail refueling sites including three nodes of unique East Coast corridor
- Provide additional refueling capability as needed, e.g., at maintenance sites

- Ensure refueling availability for both liquid and compressed hydrogen vehicles
- Explore hydrogen generation and delivery options such as electrolysis and implement where feasible

Generate and report data required by DOE Learning Demo

- Run vehicle on-road and dynamometer test protocols and collect data
- Capture hydrogen infrastructure production and refueling operation data
- Complete National Renewable Energy Laboratory data reporting templates

Document codes and standards learnings

- NextEnergy to develop codes and standards permitting templates and experience database
- General Motors and Shell to collect codes and standards learnings and input to database