

California Hydrogen Infrastructure Project

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Overview

Timeline

- Start – Aug. 2005
- End – Dec. 2010
- 70% Complete

Budget

- Total project funding
 - DOE \$5.5 million share
 - Contractor \$5.4 million share
- No funding received in FY08 and FY09

Barriers

- Cost of delivered hydrogen

Partners

- Various collaborators and funding groups including:
- SCAQMD
 - OEM's
 - UC Irvine
 - Energy Companies

Objectives

- **Demonstrate a cost effective infrastructure model in California for possible nationwide implementation**
 - **Design, construct and operate seven hydrogen fueling stations**
 - **Collect and Report Infrastructure Data**
 - **Document permitting requirements and experiences**
 - **Validate expected performance, cost, reliability, maintenance, and environmental impacts**
- **Implement a variety of new technologies with the objective of lowering costs of delivered hydrogen**

Approach

- **Work with OEM's to determine vehicle usage needs and general station equipment requirements**
- **Work with OEM's and others to determine preferred locations/areas for fueling station deployment**
- **Select potential Station Operators and work to locate suitable sites**
- **Initiate and complete required agreements, determine and address specific site issues including liability, billing, etc.**
- **Complete detailed Station Design, permits, installation, operation, and maintenance of stations**
- **Collect and report Infrastructure Data to the DOE once stations put online**
- **Monitor and collect feedback which can be incorporated to improve station user's fueling experience**

Project Tasks

- **Station Installation**
 - **UCI Fueling Station**
 - **Long Beach Mobile Fueler (HF-150)**
 - **Torrance Pipeline Fueling Station**
 - **Northern California Mobile Fueler (HF-150)**
 - **Fountain Valley Renewable Station**
- New Delivery Concept (NDC)
- Infrastructure Data Acquisition, Analysis and Delivery (includes eRAM)
- Hydrogen Infrastructure Study (UC Irvine)

Operating Stations - UCI

UCI 350/700 Bar Station

- 25 kg/day capacity, liquid hydrogen supply
- 350 and 700 bar fueling capability
- Excellent operating performance
- Station usage tripled since early 2007
- Lessons Learned to date:
 - Component listing, especially 700 bar
 - Maintenance requirements for compression systems



Operating Stations – Long Beach

Long Beach Station

- Gaseous hydrogen supply
- 350 bar fueling capability
- Limited OEM usage in 2008
- Station removed in March 2009
- Lessons Learned:
 - Contractual requirements for access by equipment and users
 - Costs for hydrogen at low demand



Planned Stations – Torrance Pipeline

Torrance Pipeline Station

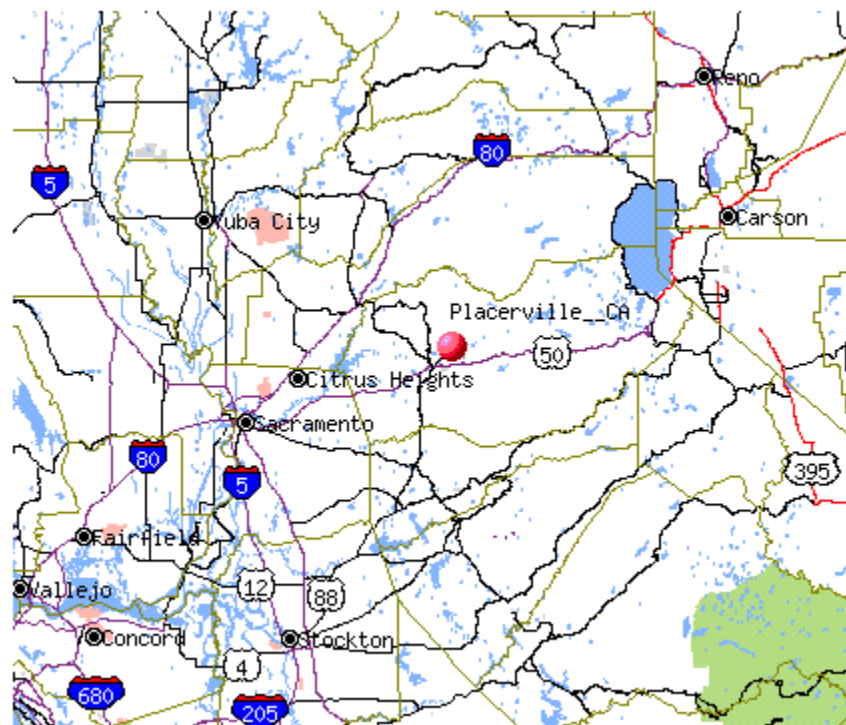
- 48 kg/day capacity, pipeline hydrogen supply
- 350 and 700 bar fueling capability
- Greenfield station, retail-like design
- Potential expansion:
 - 96 kg/day
 - Capability to perform simultaneous fuelings
- Currently in permitting phase
- Anticipated onstream early 2010



Planned Stations – Northern California

Placerville Station

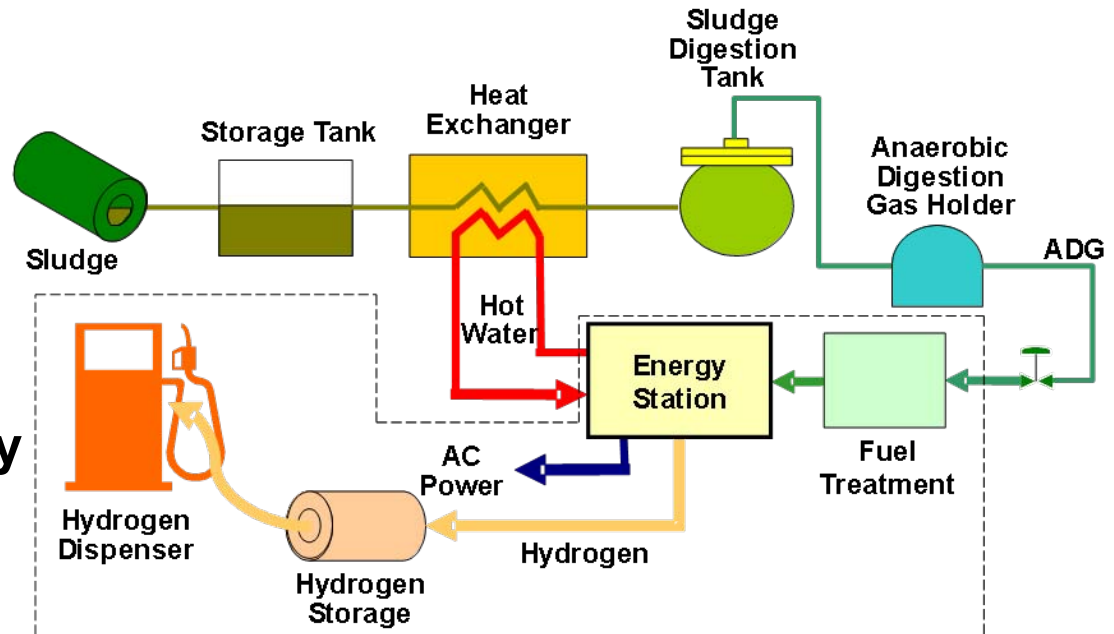
- Gaseous hydrogen supply
- 350 bar fueling capability
- Host site: U.S. Forest Service, Eldorado National Forest
- Planned 6 month deployment
- Seeking second 6 month operation in South Lake Tahoe area



Planned Stations – Fountain Valley Renewable Hydrogen

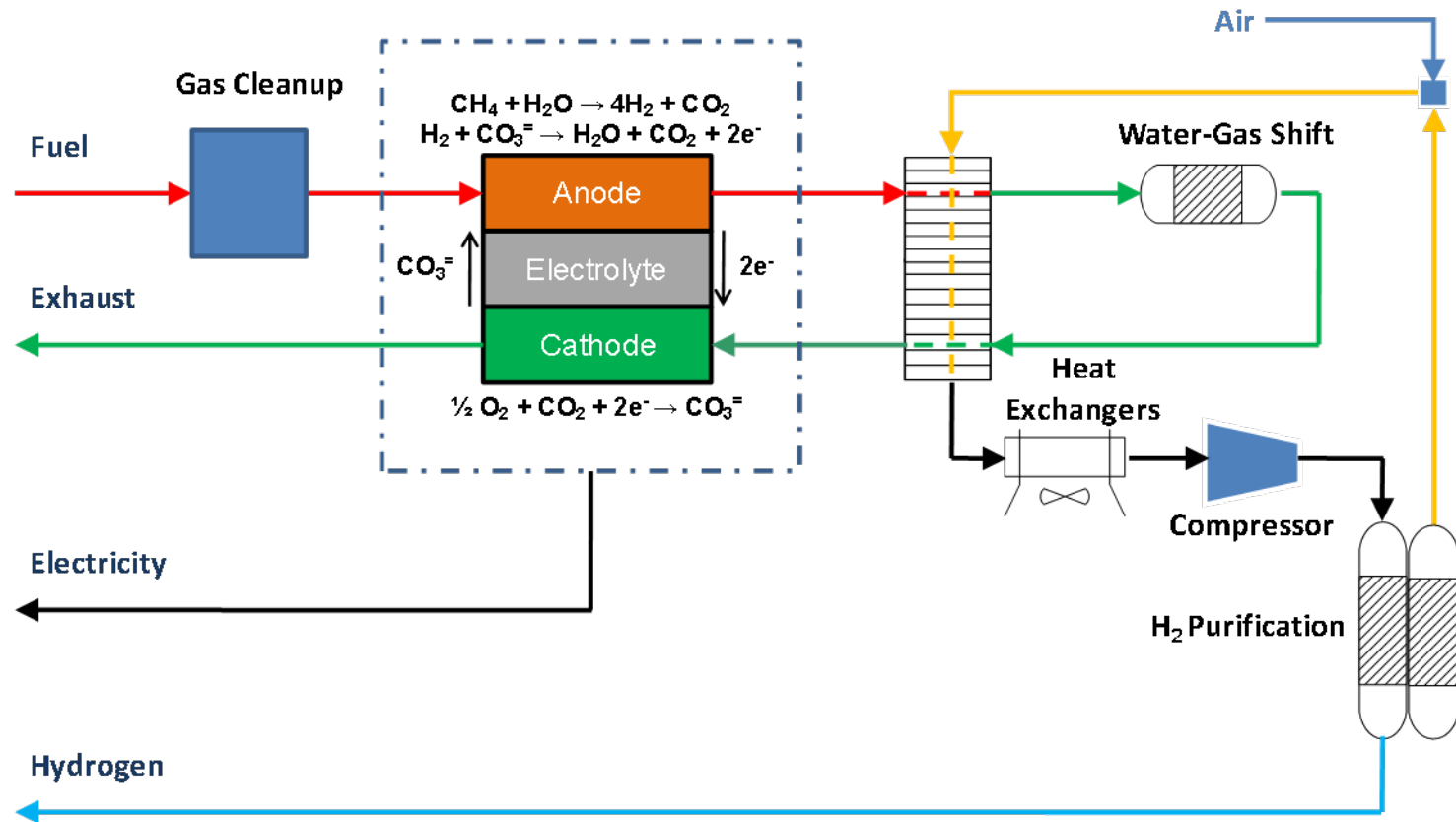
Fountain Valley Station

- 100 kg/day capacity, renewable hydrogen supply
- 350 and 700 bar fueling capability
- Host site: Orange County Sanitation District
- Anaerobic digestion of municipal wastewater
- Hydrogen production using Hydrogen Energy Station
- Selected for funding by California Air Resources Board
- Anticipated onstream December 2009



Hydrogen Energy Station

(Developed under DOE Cooperative Agreement No. DE-FC36-01GO11087)



Renewable hydrogen – for onsite requirements or regional distribution

Future Work

- **UCI Fueling Station – Continue operation**
- **Torrance Pipeline Fueling Station – Install and commission both 350 and 700 bar systems**
- **Fountain Valley Renewable Station – Install and commission both 350 and 700 bar systems**
- **Hydrogen Fuelers (HF-150) – Operations in Northern California**
- **Infrastructure Data Acquisition, Analysis and Delivery – Report Data to DOE**
- **Hydrogen Infrastructure Study by UCI – Complete scope of work**

Summary

- **Demonstrate a variety of options for delivery of low-cost hydrogen in the deployment of hydrogen Infrastructure**
 - First permanent CHIP station (350 and 700 bar gaseous hydrogen) in operation at UCI
 - First mobile CHIP station (HF-150) in Long Beach
 - New Delivery Concept (NDC) trailer deployed
 - Infrastructure Data Reporting at each station
- **Near Term Activities**
 - First pipeline supplied hydrogen station in permit phase
 - Renewable-supplied hydrogen station under development
 - Mobile CHIP station (HF-150) in Northern California
- **Completing Hydrogen Infrastructure Study at UCI**

Thank you

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Acknowledgement & Disclaimers

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