

California Hydrogen Infrastructure Project

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Project ID
#TV007

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Overview

Timeline

- Start – Aug. 2005
- End – Dec. 2011
- 100% Complete

Budget

- Total project funding
 - DOE \$5.5 million share
 - Contractor \$5.4 million share
- Funding received in FY11: \$0
- Funding for FY12: \$0

Barriers

- Cost of delivered hydrogen

Partners

- Various collaborators and funding groups including:
- South Coast AQMD
 - OEM's
 - UC Irvine
 - Energy Companies
 - FuelCell Energy, Inc.

Objectives - Relevance

- **Demonstrate a cost effective infrastructure model in California for possible nationwide implementation**
 - **Design, construct and operate five 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 users' fueling experience**

Project Tasks

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

University of California, Irvine

UCI 350/700 Bar Station

- 25 kg/day capacity, liquid hydrogen supply
- Actual demand higher, regularly approaching 50 kg/day
- 350 and 700 bar fueling capability
- Excellent operating performance
- Station to be expanded to 100 kilograms per day (California Energy Commission)
- Over 8,000 fills since station start-up (August 2006)



The UC Irvine Fueling Station operated by the National Fuel Cell Research Center (NFCRC)
photo by Lorin Humphries.

Torrance Pipeline

Torrance Pipeline Station

- 48 kg/day capacity, pipeline hydrogen supply
- 350 and 700 bar fueling capability
- Greenfield station, retail-like design
- Expandable with additional compression to 96 kg/day
- In fully deployed hydrogen economy, pipeline-supplied stations can dispense hydrogen at \$4.50-5.00 per kg
- Funding support by Shell Hydrogen and South Coast Air Quality Management District
- Over 2,000 fills since April 2011



Fountain Valley Renewable Hydrogen

Fountain Valley Station

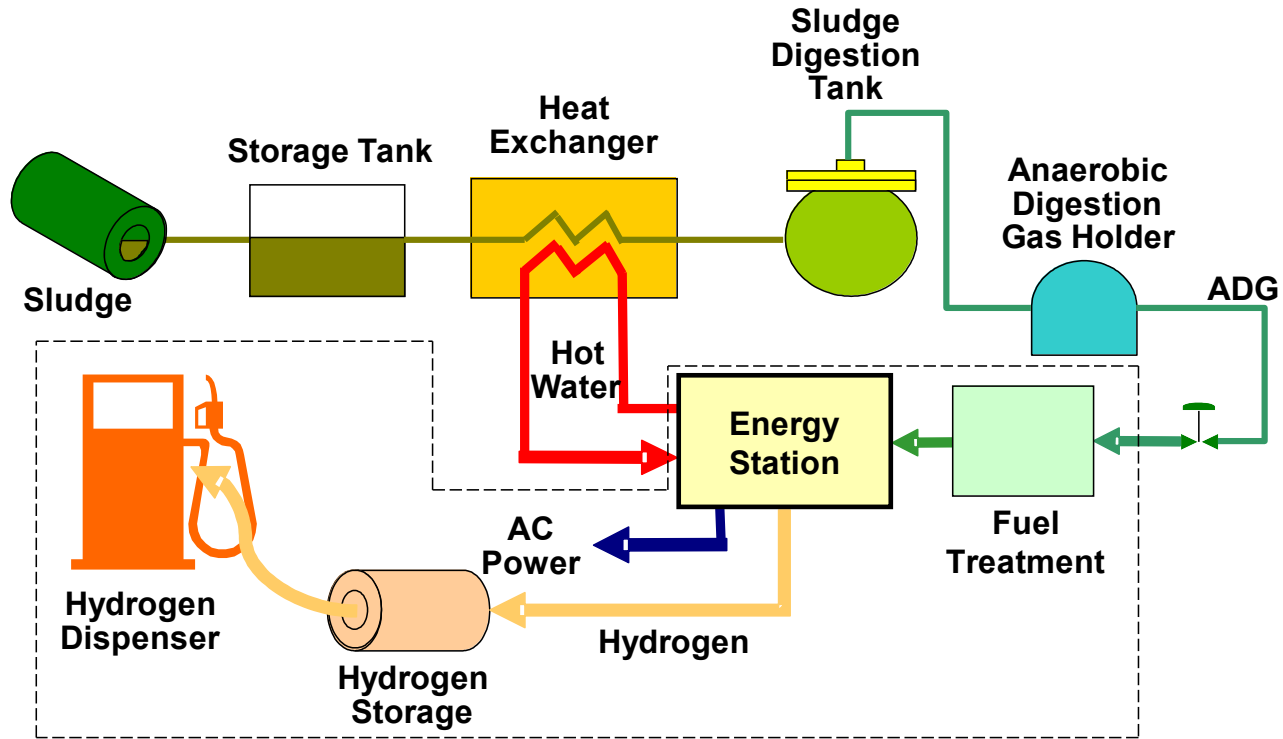
- 100 kg/day capacity
- 350 and 700 bar fueling capability
- SAE TIR-J2601 compliant
- Host site: Orange County Sanitation District
- Co-located with existing CNG dispenser
- Renewable hydrogen production using Hydrogen Energy Station
- Scope includes design/procurement of ADG fuel treatment system

New H₂ Dispenser



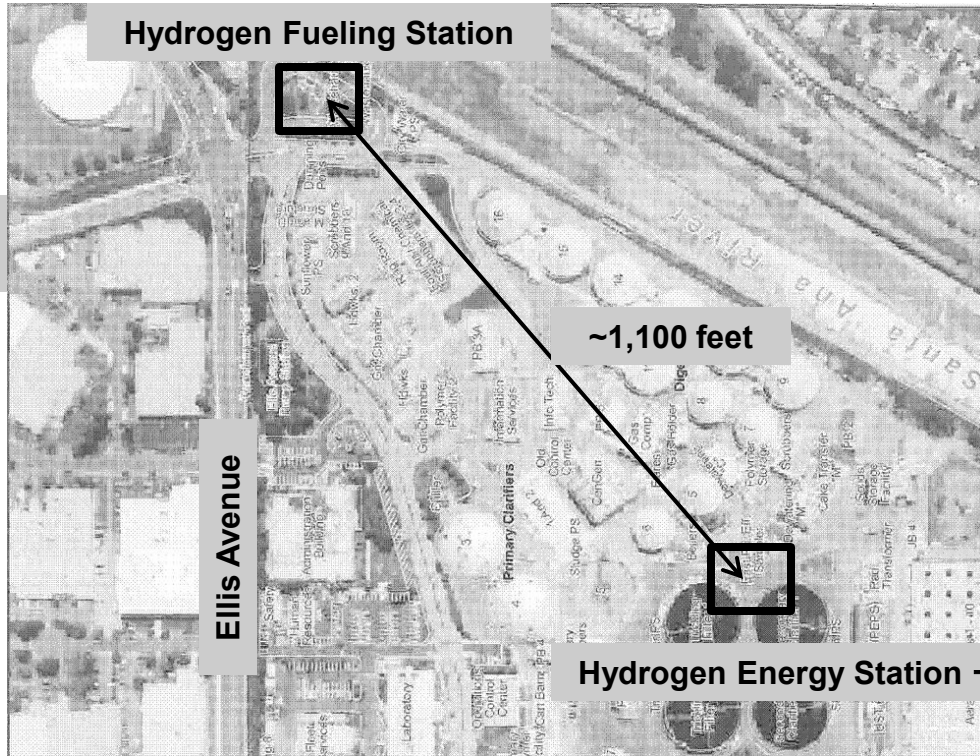
H₂ Equipment Pad

Hydrogen Energy Station

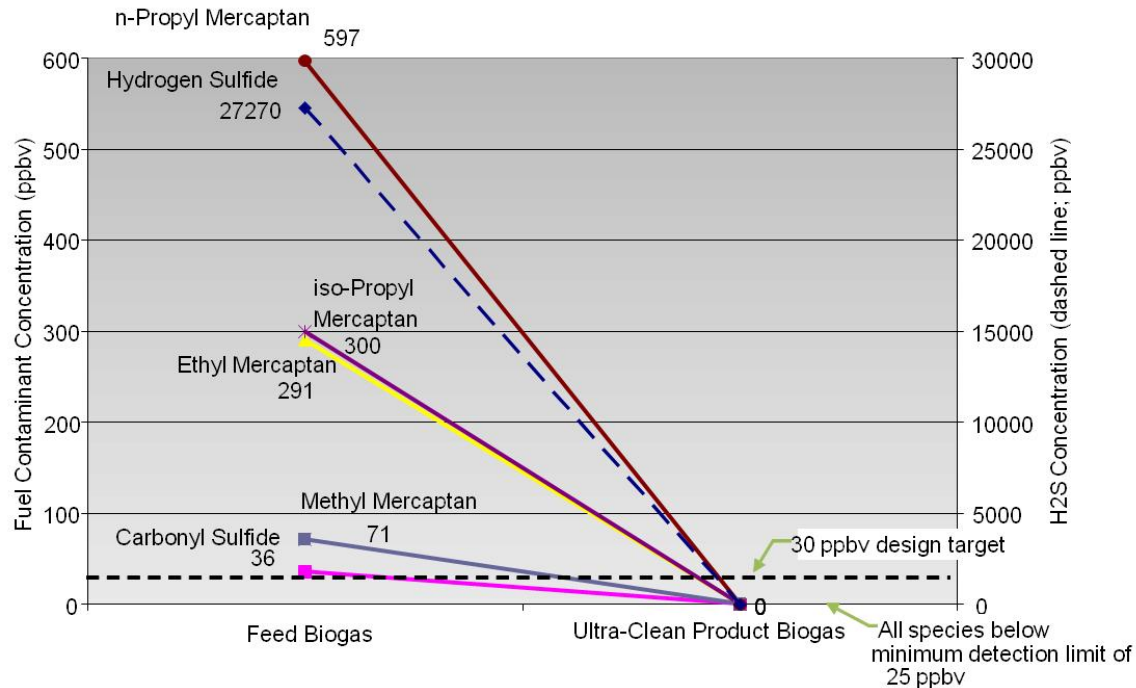


- Technology developed under second DOE Cooperative Agreement (No. DE-FC36-01GO11087)
- Continuing operation until 31 May 2014 under sponsorship of California Air Resources Board and South Coast Air Quality Management District

Orange County Sanitation District Site



Hydrogen Energy Station Operation on Anaerobic Digester Gas



- Clean-up system commissioned May 2011
- No breakthrough of contaminants detected



Commissioning of Hydrogen Fueling Station



- **November 2010: Mechanical completion of hydrogen fueling station**
- **08-10 March 2011: Initial test fills of fuel cell vehicles**
- **Current Status: One automaker under agreement, two others finalizing fuel payment agreement**

Collaboration

- **University of California, Irvine**
 - **Host site and operator, UCI Fueling Station**
 - **Operations support and data analysis, Fountain Valley Renewable Station**
 - **Completed subcontract: Life Cycle Assessment (LCA) of Hydrogen Infrastructure and Fuel Cell Vehicle Technologies (2008 co-presenter at AMR)**

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**
 - **Two mobile CHIP stations (HF-150) (Long Beach, Placerville)**
 - **New Delivery Concept (NDC) trailer deployed**
 - **Infrastructure Data Reporting at each station**
 - **First pipeline supplied hydrogen station in operation in Torrance**
 - **Renewable-supplied hydrogen station in operation in Fountain Valley**

Thank you

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Acknowledgement & Disclaimers

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