

## IX.6 H2L3: Hydrogen Learning for Local Leaders

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Subcontractors:

- Public Technology Institute (PTI), Washington, D.C.
- Schatz Energy Research Center, Humboldt State University, Arcata, CA

Project Start Date: October 2008

Project End Date: August 2011

(D) Lack of Educated Trainers and Training Opportunities

### Contribution to Achievement of DOE Education Milestones

The H2L3 project will directly address the following milestones of the Education sub-program:

- **17:** Hold “Hydrogen 101” seminars. (4Q, 2008 through 4Q, 2012)
- **18:** Develop end-user workshop materials for use at events. (4Q, 2009)
- **30:** Evaluate knowledge and opinion of hydrogen technology of key target audiences and progress toward meeting objectives. (4Q, 2012)

The H2L3 project directly contributes to achieving these milestones by conducting education workshops with hundreds of local and state officials from across the country and by training motivated local officials to replicate the workshops in their own communities. By fostering and using the H2L3 team’s existing network of national associations of local and state government officials, the reach and the credibility of the outreach will be substantially and uniquely strengthened. This network will continue to support the goals of the DOE beyond the three-year life of this project by establishing institutional relationships that will enable on-going and expanding opportunities for hydrogen and fuel cells outreach through the national associations representing local and state officials.

### Fiscal Year (FY) 2011 Objectives

- Create presentation materials tailored to effectively communicate with state and local government leaders. Relate hydrogen to their interests and spheres of responsibility.
- Establish pathways for working with national associations of state and local officials as a route for disseminating information about hydrogen. Set pattern for on-going information flow.
- Launch learning sessions by conducting initial workshops for local and state officials at national gatherings. Achieve nationwide reach.
- Provide market analysis around the fuel cell infrastructure. The report produced will establish an improved understanding of the current state of production, distribution, storage, and the use of hydrogen, which is a critical fuel for the fuel cell industry.

### Technical Barriers

This project addresses the following technical barriers from the Education section of the 2009 Fuel Cell Technologies Program Multi-Year Research, Development and Demonstration Plan:

- (A) Lack of Readily Available, Objective, and Technically Accurate Information
- (B) Mixed Messages
- (C) Disconnect Between Hydrogen Information and Dissemination Networks

### FY 2011 Accomplishments

- Core Curriculum
  - Comprehensive, basic presentation developed to communicate with state and local officials.
  - Curriculum trimmed or modified for specific audiences as needed.
- Advisory Committee of Local and State Officials
  - Established an advisory committee comprised of Public Technology Institute members (local) and National Association of State Energy Officials members (state) to review the curriculum and provide input.
- Peer Presenters
  - Identified four different peer presenters who have been or will be utilized to help spread the information in the curriculum to other local leaders.
- Hydrogen 101 Workshops
  - Held three workshops at annual national meetings of the Public Technology Institute and National Association of State Energy Officials.

- Reached over 100 local leaders who have been individually identified, 700+ counted and several thousand reached so far (radio and online) with educational materials.
- U.S. Market Report: Hydrogen and Fuel Cells
  - Completed research covering 57 different sectors of the hydrogen and fuel cell industries.
  - Peer reviewed, endorsed by the National Hydrogen Association (NHA), published [www.hydrogenassociation.org/marketreport](http://www.hydrogenassociation.org/marketreport).
  - Over 70,000 downloads of the report so far.
  - Data and charts used by DOE in annual reports and presentations.
- Hydrogen Learning for Local Leaders Breakfast at NHA Conference with the California Fuel Cell Partnership
  - Informal networking breakfast targeted to southern California local leaders.
  - Used an unconventional, non-presentation-based approach by mingling experts with local leaders to create intimate conversations.
  - Very successful. Allowed questions to emerge organically and multiple future opportunities.
- Hydrogen Business Solutions Forum at the NHA Conference
  - Peer-to-peer series of presentations presented by current users of fuel cells for current and potential users of fuel cells.
  - [www.hydrogenconference.org/h2fcForum.asp](http://www.hydrogenconference.org/h2fcForum.asp)
- 2010 Hydrogen Student Design Contest
  - Challenged teams of university students from around the world to plan and design the basic elements of a hydrogen community in Santa Monica, CA.
  - Thirty-two teams registered, 12 submitted designs from four countries: United States, Canada, Bangladesh, Ukraine.
  - Three winning teams presented designs at NHA Hydrogen Conference and Expo in Long Beach, California; Grand Prize: Missouri University of Science and Technology; Honorable Mentions: University of Waterloo and the National University of Kyiv (Ukraine).
  - Grand-prize winning team presented at the World Hydrogen Energy Conference in Essen, Germany.
- 2011 Hydrogen Student Design Contest
  - Challenged teams of university students from around the world to plan and design a residential hydrogen fueling system.
  - Fifty-four registered universities (a new record) from 19 countries, including seven of the top 20 engineering schools in the world.

- Grand Prize: University of Waterloo (5-time winner); Honorable Mentions: Imperial College London, University of California, Riverside.
- Eighty-nine percent of survey respondents say they would participate in the contest again; other 11% would consider, depending on theme.



## Introduction

Increasing education about hydrogen and fuel cells is key to enable widespread commercialization. This project began with the goal of educating local leaders. As the project progressed, tactics broadened to include additional paths to local leaders and new audiences to provide educational and information tools that increase knowledge about hydrogen and fuel cells.

## Approach

Activities include Hydrogen 101 in-person presentations, webinars, the creation of a market report that features industry data not published before, the creation of a business solution forum for existing and potential hydrogen customers, and a student contest to engage university students to design a hydrogen community in southern California.

Going forward, the approach will include a series of webinars. The electronic format should allow us to reach more local leaders with reduced cost to allow the remaining resources to be stretched further

## Results

Following is a summary of select results:

Partnered with the Public Technology Institute and the National Association of State Energy Officials to provide Hydrogen 101 presentations. Local leaders have been engaged from the following areas:

- Cincinnati Health Department
- City of Boston Environment Department
- City of Carlsbad, California
- City of Cincinnati, Ohio
- City of Culver, California
- City of Dayton, Ohio
- City of Des Moines, Iowa
- City of Fort Wayne, Indiana
- City of Fort Worth, Texas
- City of North Kingstown, Rhode Island
- City of Orlando, Florida
- City of Phoenix, Arizona

- City of San Diego, California
- City of Santa Monica, California
- City of South Sioux City, Nevada
- City of Wilmington, North Carolina
- City of Winston-Salem, North Carolina
- Washington, D.C.
- Fairfax County Dept. of Vehicle Services, Virginia
- Los Angeles County, California
- Regional Governmental Services of California
- San Diego County, California

#### Feedback from attendees Hydrogen 101:

- “Very understandable.”
- “For the first time, I understood what hydrogen is.”
- “This was really good.”
- “Really informative.”
- “Showing the number of fueling stations made it real. I thought hydrogen was more of an impossibility before.”

The U.S. Market Report: Hydrogen and Fuel Cells includes 57 different research areas. The full report and eight-point brief (see Figure 1) can be viewed and downloaded from: <http://tcorp.com/2011/pdf/marketReport.pdf>. The report has become the most popular download on the NHA Web site and has been downloaded over 70,000 times to date.

#### Accolades for the U.S. Market Report: Hydrogen and Fuel Cells

- It’s outstanding and will be a very useful resource for the community. NHA should be proud to put our logo on your work.... Thanks for the chance to review this impressive document. –Ken Schultz, Operations Director, Energy Group, General Atomics.
- Lot of great data. I had no idea that there are so many renewable projects. –Sandy Thomas, former President, H2Gen Innovations.
- A really good report. I think the front sections will make a great reference tool on the hydrogen industry generally and I already learned a few things!-Lisa Calaghan Jerram, Fuel Cell Today.
- This is an excellent report. I think it is very useful.- Dr. Finis H. Southworth, Chief Technology Officer, AREVA NP Inc.
- I am working on a hydrogen study for the University of Colorado and the Reliability and Sustainability Energy Institute (RASEI). Your US Market report on Hydrogen is great.
- Excellent reports - some of the most salient data & information out there, and very well presented.–From Randy Cole, CEO at Renewable Opportunities, Inc, via LinkedIn.

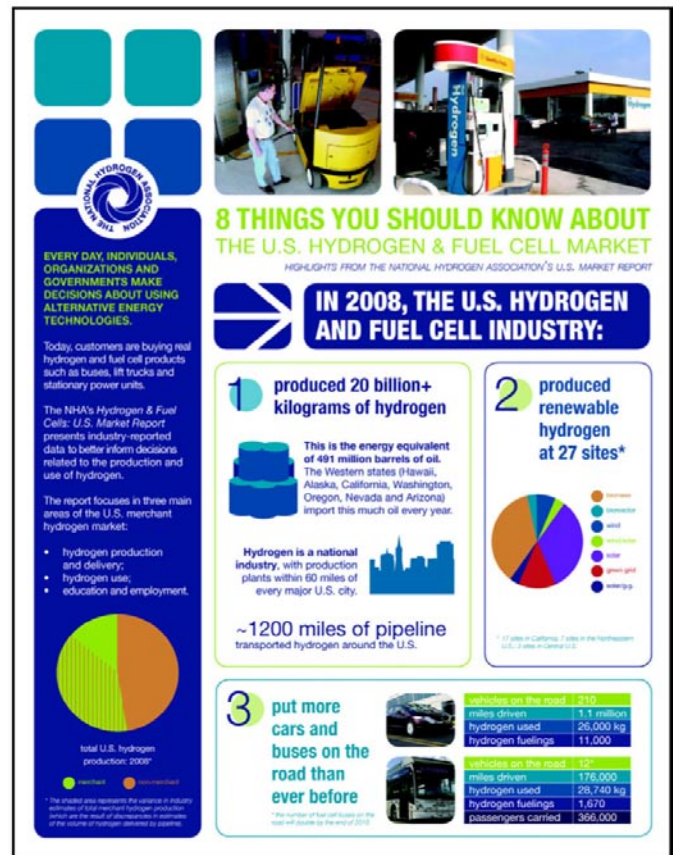


FIGURE 1. The 8-point brief of the U.S. Market Report: Hydrogen and Fuel Cells <http://www.tcorp.com/marketReport/brief.pdf>

- Love the 8-point brief. Succinct and direct. Thanks for drawing our attention to it. - Tom Sperrey, Chief Executive Officer (CEO), UPS Systems plc, via LinkedIn.
- The brief version is my kind of report! The full version looks very useful; many thanks for sharing the link. - Graham Cooley, CEO at ITM Power Plc, via LinkedIn.
- Very well done and very much needed! -Bay Elliott, EVP, Partner, Executive Recruiter, The Farwell Group, via LinkedIn.
- Is it possible to obtain a copy of your report in a non-pdf format? I would like to utilize some of the graphs and figures regarding H2 Energy in an internal slide presentation. If not the whole study, specifically pages 26-37. –from an industrial gas supplier (obviously a significant compliment if they’re happy using this information internally).
- These are very nice reports. I circulated them within Proton. –Mark Schiller, Vice President of Business Development, Proton Energy Systems.
- You and your team did an excellent job. Congratulations! - Patricia Irving, Ph.D., President & CEO, InnovaTek, Inc.
- This looks really, really nice. Thank you. I’ve started teaching the graduate course at Wayne State University



in alternative energy, and I plan to share this report with my class, as well as working it into my thinking about price and market position. Thank you again, and good luck with your work. - Robert Buxbaum, President, REB Research & Consulting.

The 2010 Hydrogen Student Design Contest challenged teams of university students from around the world to plan and design the basic elements of a hydrogen community in Santa Monica, California. They were asked to design one scalable hydrogen fueling station; identify renewable hydrogen sources in the community; and identify customers for early market hydrogen applications.

University teams from the United States, Canada, Bangladesh, and the Ukraine submitted contest entries. These entries were evaluated across ten different categories by a team of judges from government and industry.

The team from Missouri University of Science and Technology was declared the Grand Prize winner (see team photo, Figure 2). Teams from the University of Waterloo and the National University of Kyiv received Honorable Mention awards. Winning designs can be viewed at [www.HydrogenContest.org](http://www.HydrogenContest.org).

The 2011 Hydrogen Student Design Contest challenged teams of university students from around the world students to plan and design a residential hydrogen fueling system. As a part of their entry, teams developed a technical design; conducted an economic analysis; and developed business, marketing, and public education plans for their systems.

University teams from 19 countries and seven of the top 20 engineering schools in the world competed. These entries were evaluated across ten different categories by a team of judges from government and industry.

The team from the University of Waterloo was declared the Grand Prize winner. This Grand Prize marks the fifth award for the University of Waterloo in the six-year history of



**FIGURE 2.** The Hydrogen Student Design Contest's 2009-10 grand-prize winning team: Missouri University of Science and Technology, <http://www.hydrogencontest.org/>.

the Contest (see team photo, Figure 3). Contest newcomers Imperial College London and University of California, Riverside were awarded honorable mentions. The 2011 Contest was sponsored by the U.S. Department of Energy, Praxair, Honda, and Proton Energy Systems. Winning designs can be viewed at [www.HydrogenContest.org](http://www.HydrogenContest.org).

## Conclusions and Future Directions

The feedback we have received about this project has been overwhelmingly positive. Where improvements have been suggested, adjustments have been made to improve the experience for any audience. Going forward, we recommend continuation of the Hydrogen 101 presentations using a webinar format, an expansion of the Market Report to include the next year's data to show trends (reinforced by at least one reviewer at the Annual Merit Review) and future Hydrogen Student Design Contests.

## FY 2011 Publications/Presentations

1. NCSL short Hydrogen Overview for states, October 2010, <http://www.ncsl.org/?tabid=21289>.
2. Three papers on the topic "Hydrogen Student Design Contest 2011: Residential Refueling Station," presented at Fuel Cell and Hydrogen Energy 2011, February 2011, <http://hydrogencontest.org/previous.asp>.
3. Seven papers on the topic "Hydrogen Student Design Contest 2011: Residential Refueling Station," published on the Hydrogen Contest website, February 2011, <http://hydrogencontest.org/previous.asp>.
4. "Local Leaders Create Fuel Cell Success Stories: Spotlight on Leading Local Companies" webinar held May 17, 2011, <http://ttcorp.com/2011/webinars.asp>.



**FIGURE 3.** Five-time award winner presents Grand Prize design to industry professionals at Fuel Cell and Hydrogen Energy 2011 conference The Grand Prize winning team from the University of Waterloo at the 2011 Fuel Cell and Hydrogen Energy Conference in Washington, D.C., <http://www.hydrogencontest.org/>.

5. “The Top 5 Fuel Cell States: Why Local Policies Mean Green Growth” webinar held June 21, 2011, <http://ttcorp.com/2011/webinars.asp>.

6. “Where the Jobs Are: Hydrogen Fuel Cells in Your Area” webinar held July 19, 2011, <http://ttcorp.com/2011/webinars.asp>.

7. “Go Local: Maximizing Your Local Renewable Resources With Fuel Cells” webinar held August 16, 2011, <http://ttcorp.com/2011/webinars.asp>.