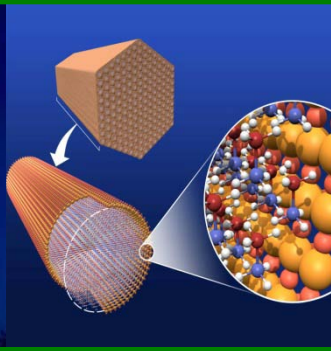
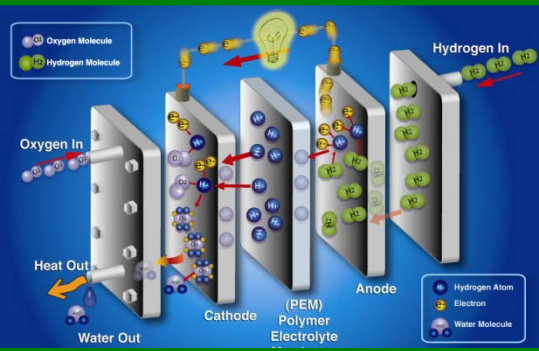




U.S. DEPARTMENT OF
ENERGY



Education

Carole Read

*2010 Annual Merit Review and Peer Evaluation Meeting
10 June 2010*

Educate key audiences about hydrogen and fuel cell technologies to facilitate near-term demonstration, commercialization, and long-term market acceptance

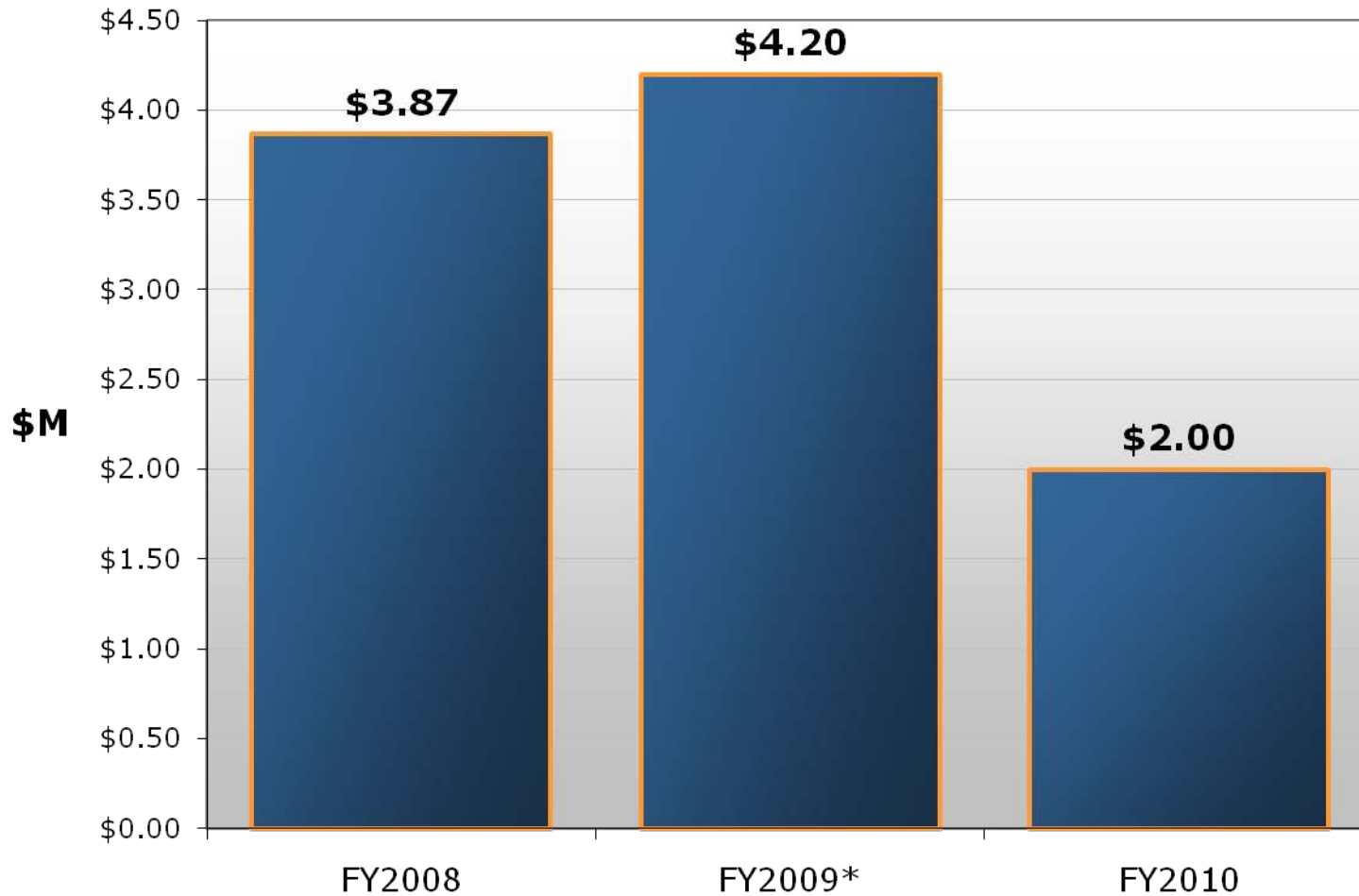
Audience	Rationale
First Responders	Must know how to handle potential incidents; their understanding can also facilitate local project approval
Code Officials	Must be familiar with hydrogen to facilitate permit process and local project approval
Potential End Users	Potential early adopters need information about near-term opportunities
State and Local Government Representatives	A broad understanding of hydrogen supports decision-making on current opportunities and lays the foundation for long-term change
Local Communities/ General Public	Will be more likely to welcome local demonstration projects when they are familiar with hydrogen
University Faculty and Students	Interest is high; graduates needed for research in government, industry, academia, and related green jobs
Other Teachers and Students	Interest is high; teachers looking for technically accurate information and usable classroom activities

Challenges

- **Resistance to change**
- **Lack of readily-available, objective, technically-accurate and “easily digestible” information**
- **Negative public perception**
- **Lack of hydrogen/fuel cell information available through existing training and education networks**
- **Lack of educated trainers and training opportunities**

Opportunities

- **Energy is part of today’s daily public conversation, providing opportunities to incorporate hydrogen and fuel cells into this discussion**
- **Demonstration and deployment is ramping up, particularly in early markets, providing opportunities for education and outreach**



*For one year, in FY2009, Education was part of the Vehicle Technologies Program

Safety and Code Officials

- Trained 66 students, from 14 states, in 3 advanced-level hands-on training courses enhanced with updated 2010 material
- Continuing to deploy web-based code course with new electric vehicle module (over 500 visitors since 2009 launch), in addition to in-person workshops

Schools and Universities

- Trained 8,000 middle school teachers through full-day workshops and conference sessions (cumulative, since 2004)
- Taught high school curriculum to more than 600 students; introduced 220 teachers to course materials, trained 19 teachers in professional development summer workshop
- Finalizing and teaching over 25 university courses and curriculum modules under development at 5 universities for general science and engineering programs and specialized hydrogen and fuel cell concentrations

State and Local Governments

- Conducted more than 40 workshops, seminars, and briefings across the country to help decision-makers understand, identify, and assess opportunities for fuel cell deployment

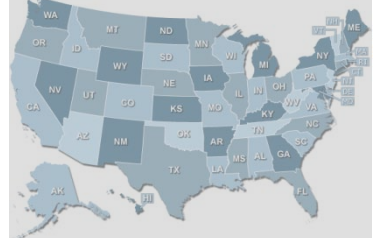
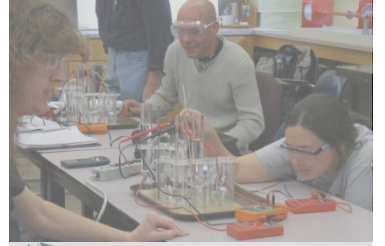
End Users

- Conducted day-long educational seminars targeted to lift truck users, includes hands-on forklift demonstration and real-world deployment data (1 site planning potential purchase)

Safety and Code Officials

First Responder Education

- Continuing to deploy web-based *Introduction to Hydrogen Safety for First Responders* – averaging 300-500 unique visits/month
- Trained 66 students, from 14 states, in 3 advanced-level hands-on training courses enhanced with updated 2010 material
- Raise awareness about hydrogen safety at Fire Department Instructors Conference and Fire Rescue International
- Lead: PNNL



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Introduction to Hydrogen for Code Officials

U.S. Department of Energy Hydrogen Program
www.hydrogen.energy.gov

COURSE MATERIALS LIBRARY EXCERPTS

Hydrogen & Fuel Cell Basics Hydrogen & Fuel Cell Applications Permitting Hydrogen Fueling Stations Permitting Stationary Facilities

Hydrogen Fueling Station Layout

Construction Approval
ASME B31.3, Process Piping (American Society of Mechanical Engineers, 2008)
NFPA 400, Storage and Handling of Compressed Gases in Cylinders

- IX 3000 Flow
- IX 3000 Fittings, Bends, and Branch Connections
- IX 3007 Valves and Specialty Components

CGA 6.4, Standard for Hydrogen Fueling Systems at Consumer Locations (Compressed Gas Association, 2010)

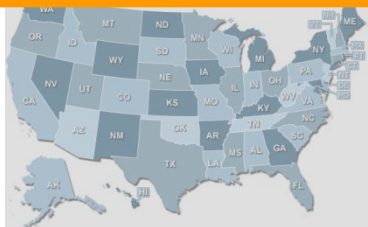
- 3.0 Piping System Criteria
 - 3.1 General
 - 3.2 Flange Materials
 - 3.3 Isolation Valves
 - 3.3.3 Emergency Isolation Valves
 - 3.3.4 Excess Flow Valves
 - 3.3.5 Check Valves
 - 3.3.7 Control and Sealing Materials
 - 3.5 Additional Requirements
 - 5.0 Isolation
 - 6.1 Isolation General

This illustration illustrates the International Fire Code setback requirements for hydrogen fueling stations.

Back Next

Code Official Education

- Updated web-based code official training with electric vehicle module
- Continuing to deploy code course – over 500 visitors since 2009 launch
- Held two in-person codes and standards workshop on fuel cell technology basics, safety information, and applicable codes and standards
- Developing 2 case studies documenting permitting process for early fuel cell deployments
- Lead: NREL



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Middle School & High School Education

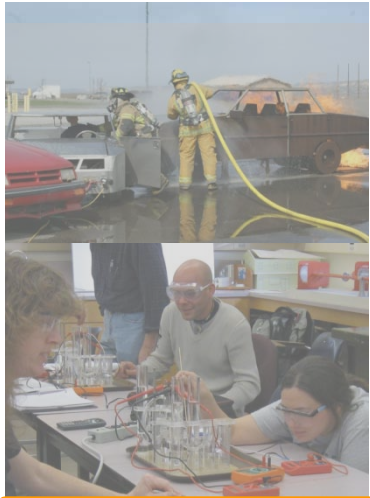
- Trained 8,000 middle school teachers through full day workshops and conference sessions (cumulative since 2004)
- Taught high school curriculum to more than 600 students; introduced 220 teachers to course materials, trained 19 teachers in professional development summer workshop
- Leads: The NEED Project (middle school), Lawrence Hall of Science at UC-Berkeley (high school)

University Education Projects (5 projects)

- Developing and teaching over 25 courses, labs, and curriculum modules at 5 universities for general science and engineering programs and specialized hydrogen and fuel cell concentrations
- Targeting broad student audience in general courses and specialized science and engineering programs
- Includes lab kits and textbook modules for general use, senior design projects, teaching assistantships and internships
- Educational materials repackaged to extend outreach to middle school, high school, and community college students
- Extensive partnerships with industry, government, and other schools
- Leads: Cal State-LA, Humboldt State, Michigan Tech, University of Central Florida, University of North Dakota

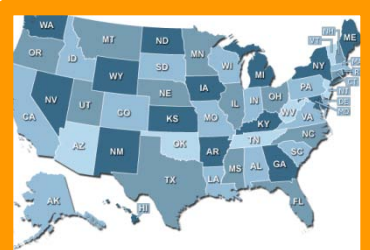
Student Competitions/Events

- Hydrogen Student Design Contest/IPHE Global Student Competition



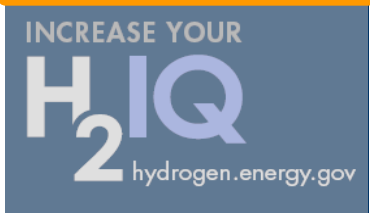
State and Local Government Outreach

- Conducted more than 40 workshops, seminars, and briefings across the country for state and local government officials
- Finalizing development of technology basics, case studies, best practices, and technical assistance resources to help decision-makers understand, identify, and assess opportunities for fuel cell deployment
- Disseminating information through conferences, webinars, websites, mailing lists, video, publications, and social media
- Leads: CT Center for Advanced Technology; Houston Advanced Research Center; Ohio Fuel Cell Corridor; SC Hydrogen and Fuel Cell Alliance; VA Department of Mines, Minerals, and Energy; Clean Energy States Alliance; Technology Transition Corporation



End Users/Early Market Outreach & Demonstration Project

- Conducted day-long educational seminars targeted to lift truck users, includes hands-on forklift demonstration and real-world deployment data (1 site planning potential purchase)
- Lead: Carolina Tractor & Equipment Company

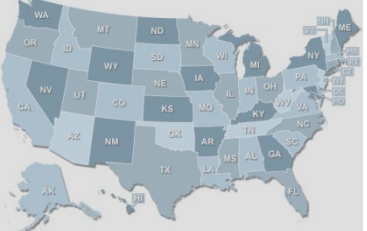
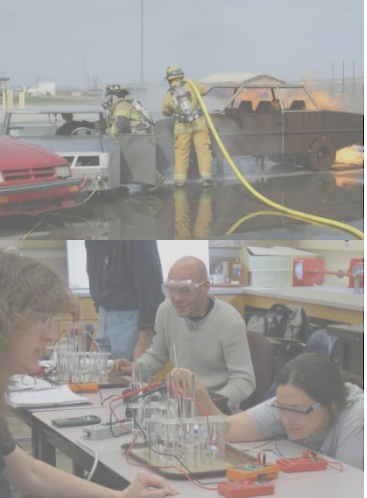


General Educational Resources

Fact sheets

Case studies

Radio spots and podcasts



European Hydrogen Association > Join the IPHE Global School Student Competition!

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Fuel Cell Technologies Program

About the Program | Program Areas | Information Resources | Financial Opportunities | Technologies | Market Transformation

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EERE Information Center Programs and Offices

NEWS

- DOE Issues a Request for Information: Manufacturing Stationary Fuel Cell Power Systems > April 15, 2010
- DOE Releases Fuel Cell Pre-Solicitation Workshop Proceedings > April 7, 2010
- DOE Publishes Fuel Cell Workshop Proceedings > March 30, 2010

More News >

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EVENTS

- National Hydrogen Association Conference & Expo > May 3-6, 2010
- 2010 Annual Merit Review and Peer Evaluation Meeting > June 7-11, 2010

More Events >

FEATURES

News & Financial Opportunities Receive updates >

2010 Annual Merit Review Meeting >
JUNE 7-11, 2010
Washington, D.C.

1 2 3

The U.S. Department of Energy (DOE) Fuel Cell Technologies Program conducts comprehensive efforts to overcome the technological, economic, and institutional obstacles to the widespread commercialization of fuel cells and related technologies. The program works with partners in industry, academia, non-profit institutions, and the national labs, and coordinates closely with other programs in four DOE offices—Energy Efficiency and Renewable Energy, Science, Fossil Energy, and Nuclear Energy.

The mission of the program is to enable the widespread commercialization of fuel cells in diverse sectors of the economy—with emphasis on applications that will most effectively strengthen our nation's energy security and improve our stewardship of the environment.

- Hydrogen Production >
- Hydrogen Delivery >
- Hydrogen Storage >
- Fuel Cells >
- Technology Validation >
- Safety, Codes & Standards >
- Education >
- Systems Analysis >

- Please mute all cell phones, BlackBerries, etc.
- This is a review, not a conference.
- Presentations will begin precisely at the scheduled times.
- Talks will be 20 minutes and Q&A 10 minutes.
- Reviewers have priority for questions over the general audience.
- Reviewers should be seated in front of the room for convenient access by the microphone attendants during the Q&A.

- Deadline for final review form submittal is **June 18th**.
- ORISE personnel are available on-site for assistance. A reviewer lab is set-up in room 8216 and will be open Tuesday –Thursday from 7:30 AM to 6:00 PM and Friday 7:30 AM to 3:00 PM.
- Reviewer feedback session – **Friday, at 1:00pm (after last Hydrogen Education session), in this room.**

Education

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