
X. EDUCATION

X.0 Education Sub-Program Overview

Introduction

The Education Sub-Program seeks to support and facilitate hydrogen and fuel cell demonstration, deployment, and market transformation by providing technically-accurate and objective information to key target audiences that can help transform the market (see Table 1).

TABLE 1. Key Target Audiences for the Education Sub-Program

Target Audience	Rationale
Code Officials	Code officials must be familiar with hydrogen to facilitate the permitting process and local project approval.
First Responders	Fire fighters, as well as law enforcement and emergency medical personnel, must know how to handle potential incidents; their understanding can also facilitate local project approval.
Local Communities/ General Public	Local communities will be more likely to welcome hydrogen and fuel cell projects if they are familiar with hydrogen.
Potential End-Users	Potential early adopters need information about commercially available hydrogen and fuel cell products and the opportunities for incorporating the technology into their operation.
State and Local Government Representatives	A broad understanding of hydrogen supports decision-making on current opportunities for near-term deployment and lays the foundation for long-term change.
Teachers and Students	Teachers are looking for technically accurate information and usable classroom activities.
University Faculty and Students	Graduates are needed for research in government, industry, and academia.

The Education Sub-Program includes the development and dissemination of information resources as well as training. It considers a balanced message to help target audiences become familiar with hydrogen and how it fits in the portfolio of energy choices, develop an accurate understanding of hydrogen safety, recognize opportunities for deployment in near-term markets, and understand their part in facilitating use of hydrogen and fuel cell technologies.

Goal

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

Objectives

Education objectives are based on national, statistically-valid knowledge surveys. An initial survey conducted in 2004 provides a baseline from which the sub-program can measure changes in knowledge over time. The baseline for each target population is defined as that population's average score on the survey's technical knowledge questions. Objectives are:

- By 2009, increase knowledge of hydrogen and fuel cell technologies among key target populations (compared to a 2004 baseline):
 - Increase understanding of hydrogen and fuel cell technologies among state and local governments and students (ages 12-17) by 10%.
 - Increase understanding of hydrogen and fuel cell technologies among the public and potential end-users by 15%.
- By 2012, increase knowledge of hydrogen and fuel cell technologies among key target populations (compared to a 2004 baseline):
 - Increase understanding of hydrogen and fuel cell technologies among state and local governments and students (ages 12-17) by 20%.

- Increase understanding of hydrogen and fuel cell technologies among the public and potential end-users by 30%.

Fiscal Year 2009 Status

The Education Sub-Program works in collaboration with the Safety, Codes, and Standards Sub-Program to provide objective and technically-accurate information to the safety community, including fire, law enforcement, and emergency medical personnel. In FY 2009, the subprogram completed and conducted several sessions of a new hands-on “prop course” for fire fighters. This advanced-level one-day course builds on an introductory course launched in 2007, but provides more detail and includes a hands-on training component and training scenarios to demonstrate the safe approach to a fuel cell vehicle, extinguishment of a compartment fire, extrication techniques, and hydrogen venting during a compartment fire. The Web-based “Introduction to Hydrogen Safety for First Responders” was updated to include audio narration, an extended video, a revised quiz, and a certificate of completion. The sub-programs also launched an introductory course designed specifically for code and permitting officials. Like the introductory course for first responders, “Introduction to Hydrogen Safety for Code Officials” is a 5-module, Web-based course that provides a general overview of hydrogen and its properties and applications, but also includes additional information on the technology and equipment tailored to the needs of code and permitting officials.

In FY 2009 a new early market outreach project provided potential end users with real-world experience through month-long deployments of two hydrogen fuel cell-powered lift trucks at high-profile geographically diverse locations. Complementary workshops targeted toward facilities management, operators, maintenance personnel, health and safety groups, first responders, authorities having jurisdiction, technical and community colleges, and the general public used these deployments to demonstrate the economic and environmental benefits of fuel cells.

The Education Sub-Program expanded its efforts to reach out to and partner with state and local governments through seven new state and government outreach projects. These outreach efforts focused on states with an active hydrogen and fuel cell presence to develop case studies, best practices, and technical assistance resources to help decision-makers identify and assess opportunities for future deployment. In collaboration with partners, the sub-program continued to host the Bi-monthly Informational Conference Call Series for State and Regional Hydrogen and Fuel Cell Initiatives, bringing together state groups to network and share lessons learned.

“H2 Educate!” a set of lesson plans and activities for middle school teachers and students, continued to be disseminated through one-day teacher training workshops across the country. The companion effort for high schools, “HyTEC,” completed a national field test of a six-unit science curriculum on hydrogen and fuel cells. In FY 2009, the Education Sub-Program launched five new projects with universities, targeting a broad student audience with the development of general courses as well as specialized science and engineering programs through minor and concentration programs, courses, curriculum modules, internships, labs, lab kits, and textbook chapters.

In FY 2009, the Education Sub-Program moved to the Vehicle Technologies Program to build on synergy with related efforts for other alternative fuels and advanced transportation technologies. As part of this effort, Education activities expanded to include support for the Automotive X Prize and the contest’s education component, “Fuel our Future Now”, a Web site targeted toward K-12 students.

FY 2009 Accomplishments

- Launched advanced-level prop-based course for first responders in coordination with the Safety, Codes and Standards Sub-Program with input from a steering committee comprising representatives from auto companies, energy companies, and the fire safety community. This in-depth 8-hour course uses a one-of-a-kind hydrogen burn prop that simulates a fuel cell vehicle. Building on the “Introduction to Hydrogen Safety for First Responders,” the course has been developed to help first responders gain hands-on experience with personal protective equipment, monitoring and detection equipment, and the basic control, containment, and confinement

operations associated with fuel cell vehicles and stationary applications. After two pilot courses in December and March for technical and industry representatives, DOE has trained 36 first responders from 10 states with two trainings in June and August.

- Upgraded “Introduction to Hydrogen Safety for First Responders” Web-based course, in coordination with the Safety, Codes and Standards Sub-Program. Updates include the addition of an audio narration, an extended video on *The Characteristics of Hydrogen*, a revised quiz, and the addition of a certificate of completion. Since its launch in January 2007, an average of 300-500 users have accessed the course each month; user groups include the fire prevention/protection community, law enforcement, industry, universities, military, non-profits, and national and international users.
- Outreach efforts continued for both first responder courses with the dissemination of hydrogen safety literature and course CDs, promotion of the prop course, and demonstration of the small hydrogen flame prop at emergency responder conferences including Fire Department Instructor’s Conference and Fire Rescue International.
- Launched “Introduction to Hydrogen Safety for Code Officials” in coordination with the Safety, Codes and Standards Sub-Program. This e-learning package builds on modules in the introductory first responders’ course and includes additional information on technology and equipment tailored to the needs of code and permitting officials. Modules focused on fueling stations and stationary facilities present technical information essential to permitting hydrogen and fuel cell facilities. Outreach activities identified and connected with authorities having jurisdiction through Web sites, e-mails, newsletters and other publications. Course material was also distributed at five permitting workshops around the country.
- Launched a new early market outreach project to educate facilities management, operators, maintenance personnel, health and safety groups, first responders, authorities having jurisdiction, technical and community colleges, and the general public on the benefits of fuel cell forklifts through nine educational seminars targeted to lift truck users (90 total attendees) and two high-profile conferences. In parallel, month-long deployments of two hydrogen fuel cell-powered lift trucks at high-profile geographically diverse locations provided real-world experience and showcased the economic and environmental benefits of fuel cells. So far, the project has completed one successful deployment at Stanley Tool with an additional five sites planned at Lowe’s, Michelin Tire, Bausch & Lomb, Electrolux, and UTi.
- Launched new state and government outreach projects in states with an active hydrogen and fuel cell presence including Connecticut, Texas, Ohio, South Carolina, Virginia and two national groups. These seven projects have conducted 11 workshops and Webinars across the country in addition to producing Web sites, video, and print articles to educate state and local government officials. During the first year, these groups have developed technology basics curricula, case studies, best practices, and technical assistance resources to help decision-makers identify and assess opportunities for future deployment.
- Continued state and local government outreach with the Bi-monthly Informational Conference Call Series for State and Regional Hydrogen and Fuel Cell Initiatives. Featured topics included hydrogen and fuel cell tax incentives and state and national strategic plans. In addition, to the bi-monthly calls, an in-person meeting at the National Hydrogen Conference allowed participants and experts to meet in small groups to network and discuss topics relevant to state and local hydrogen and fuel cell initiatives.
- Launched new university education projects at California State University, Los Angeles, Humboldt State/University of California, Berkeley, Michigan Tech, the University of Central Florida, and the University of North Dakota. These five projects have developed a total of 22 courses and curriculum modules for general science and engineering programs and specialized hydrogen and fuel cell concentrations. Universities are building labs and sponsoring teaching assistantships and internships to provide hand-on experience with the technology. Lab kits and textbook modules will be integrated into existing science and engineering teaching materials to introduce hydrogen and fuel cell technology to university students across the country. These education materials are targeting a broad student audience in general courses and specialized science and engineering programs

- Continued to disseminate the middle school teacher and student “H2 Educate!” curriculum through one-day teacher training workshops across the country. Since its inception, the program has reached over 7,000 middle school teachers through workshops and conference sessions. Teacher and student guides are available via the DOE Hydrogen Program Web site (www.hydrogen.energy.gov) and www.need.org.
- The Hydrogen Technology and Energy Curriculum Project (HyTEC) for high schools completed a nation-wide field test by 13 science teachers of a six-unit curriculum. More than 600 high school students and 100 high school teachers have been introduced to hydrogen and fuel cell course materials.
- Continued audience-targeted Hydrogen Program exhibit outreach to early end-user conferences (e.g. ProMat 2009, International Warehouse Logistics Association 118th Annual Convention) and safety community conferences (e.g. Fire Rescue International) in addition to hydrogen and fuel cell conferences. A new portable fuel cell-powered booth lights to showcase the technology.
- Completed the 2008/2009 Hydrogen Knowledge and Opinions survey and analysis with plans to publish a report in the fall of 2009. This effort follows the baseline survey conducted in 2004 and will also include a separate survey of code officials – an audience that had been previously incorporated into the state and local officials survey population but have been prioritized as a key target audience essential to the early adoption of fuel cells.
- Partnered with the Clean Cities Program, the Automotive X Prize, and Discovery Education to launch “Fuel our Future Now” an educational Web site on advanced transportation technologies. The Web site premiered at the Washington D.C. Auto Show in February 2009 and features curriculum modules for students K-12.

Budget

The FY 2009 Education Sub-Program budget was \$4.2 million; an increase from the previous year and the highest it has been since FY 2004.

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