IX.0 Education Sub-Program Overview

Introduction

Although hydrogen and fuel cells are considered longer-term technologies, the U.S. Fuel Cell Council reports more than fifty fuel cell products are commercially available for applications including backup power and specialty vehicles.[1] In addition, hydrogen fueling stations and fuel cell vehicles are entering the public space through demonstration projects in certain regions of the country. 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 are directly and indirectly involved in the use of hydrogen today (see Table 1).

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

Target 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 the permitting process and local project approval.
Local Communities/ General Public	Will be more likely to welcome hydrogen and fuel cell projects in the community if they are familiar with hydrogen.
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.
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.
University Faculty and Students	Current interest is high; graduates needed for research in government, industry, and academia.
Other Teachers and Students	Current interest is high; teachers looking for technically accurate information and usable classroom activities.

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.

In 2004, the Education sub-program conducted a national hydrogen knowledge survey to serve as a baseline for measuring changes in knowledge and opinion over time. A follow-on survey is planned for 2008/2009. The baseline results also provide important information about current knowledge gaps, information needs, and opinions of hydrogen technologies that helps to inform the ongoing development of the Education sub-program.

Goal

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

[1] Commercially available products list – EZ read, U.S. Fuel Cell Council, www.usfcc.com, accessed September 2007.

Objectives

Education objectives are based on the 2004 baseline hydrogen knowledge survey. The baseline for each target population is defined as that population's average score on the survey's technical knowledge questions.

- 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%.

FY 2007 Status

An update of the Education chapter of the Multi-Year Research, Development and Demonstration Plan reflects the ongoing evolution of the Education sub-program. The most significant revision prioritizes the target audiences and emphasizes those who are directly and indirectly involved in the use of hydrogen and fuel cells today. These groups include safety and code officials, state and local governments, local communities and the public, and potential end-users. Undergraduate and graduate students, professors, and middle and high school teachers and scientists comprise another important audience as future researchers, scientists, engineers, and technology users.

As part of a major effort to ensure the safe use of hydrogen as an energy carrier, the sub-program has been working in collaboration with the Safety, Codes, and Standards sub-program to provide objective and technically-accurate information to the safety community. In January 2007, the sub-program released the "Introduction to Hydrogen Safety for First Responders." This seven-module, web-based course provides an "awareness-level" overview of hydrogen for fire, law enforcement, and emergency medical personnel. The course is also available in print and on CD from the DOE/EERE Information Center; a summary poster with critical course information is also available for fire stations. In the first seven months after its launch, nearly 4,500 users had accessed the course. A more detailed, "prop course," that incorporates the use of a hands-on training device being developed by the Safety, Codes and Standards sub-program, is planned for release in the fall of 2008. Also under development is a similar introductory course for code officials. The "Introduction to Hydrogen Safety for Code Officials" will include additional detail about hydrogen and fuel cell technologies and equipment; it is scheduled for release in May 2008.

In FY 2007, the Education sub-program continued to augment its "Increase Your H2IQ" informational toolbox with additional resources. This public information project, launched in FY 2006, uses various forms of media to raise public awareness of hydrogen and fuel cells, spark interest, and direct people to more information available on the DOE Hydrogen Program web site. New resources include a hydrogen overview book, two 30-second radio spots rolled out in September 2007, "The Hydrogen Report" podcast series, and additional fact sheets focused on early market fuel cell applications in support of the overall DOE Hydrogen Program's new market transformation efforts.

With its most robust budget since FY 2004, the Education sub-program was able to restart funding for its middle school project, "H2 Educate!," and the "HyTEC" project, focused on high schools. Funds also supported an update of the university program and textbook databases, as well as sponsorship of The Hydrogen Education Foundation's design contest for university students.

The Education Panel, managed by the National Renewable Energy Laboratory, held its inaugural meeting at the Hydrogen Program Annual Merit Review in May 2007. Members include representatives of industry as well as the sub-program's key target audiences. With its expertise and perspective, the Panel will provide valuable feedback on existing activities and suggestions on the future direction of hydrogen education efforts.

FY 2007 Accomplishments

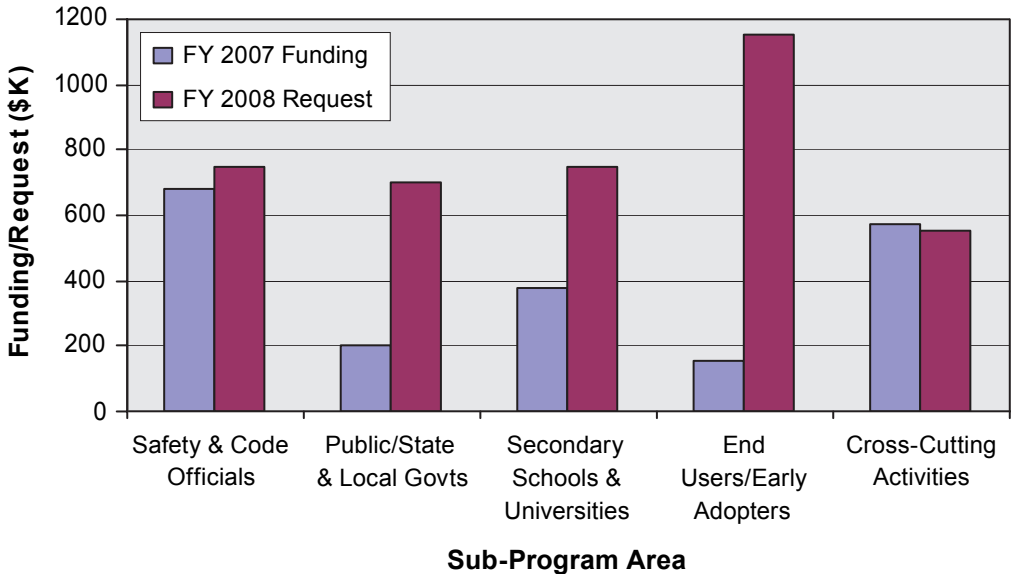
- Updated Education chapter of the Multi-Year Research, Development and Demonstration Plan to reflect evolution of the sub-program since its inception in 2002. Major strategic change includes an emphasis and prioritization of target audiences directly and indirectly involved in the use of hydrogen and fuel cells today.
- The Education Panel held its inaugural meeting at the Hydrogen Program Annual Merit Review in May 2007. Topics of discussion included the current state of the Education sub-program, feedback on ongoing activities, and structure and purpose of the Panel.
- Launched "Introduction to Hydrogen Safety for First Responders" on January 24, 2007 in coordination with the Safety, Codes and Standards sub-program. This multimedia tutorial acquaints fire, law enforcement, and emergency medical personnel with hydrogen, its basic properties, and how it compares to other familiar fuels; hydrogen use in fuel cells for transportation and stationary power; potential hazards; initial protective actions should a responder witness an incident; and supplemental resources including videos, supporting documents, and links relevant to hydrogen safety. Outreach efforts included dissemination of a poster summarizing essential hydrogen safety information and course CDs at emergency responder conferences.
- Initiated planning and development of a hands-on "prop course" in coordination with the Safety, Codes and Standards sub-program to be used in combination with "Introduction to Hydrogen Safety for First Responders." This two-component course will be designed to realistically and safely simulate an actual fuel cell vehicle emergency response event.
- Initiated development of "Introduction to Hydrogen Safety for Code Officials." This tutorial will build on the modules in the first responders course and include additional information on technology and equipment tailored to the needs of code and permitting officials. In addition, a codes and standards module will bring together tools and resources developed by the Safety, Codes and Standards sub-program.
- Continued state and local government outreach with Bi-monthly Informational Conference Call Series for State and Regional Hydrogen and Fuel Cell Initiatives. Featured topics included fuel cell forklifts, Federal support for hydrogen and fuel cells, and early market applications. As market transformation activities continue and state outreach activities ramp up, this group will provide a valuable mechanism for future collaboration between DOE and regional, state, and local entities.
- "Increase Your H2IQ" projects completed in FY 2007 include:
  - Hydrogen Overview Book: *Hydrogen & Our Energy Future* expands on DOE's fact sheet series to provide an in-depth look at hydrogen and fuel cell technologies. The 40-page document provides additional information on the science behind the technology – how it works, benefits over conventional technology, its status, and challenges – and explains how hydrogen and fuel cells fit into our energy portfolio.
  - Radio Spots: The Education sub-program produced two 30-second radio spots intended to spark interest and direct the general public to the H2IQ informational toolbox on the DOE Hydrogen Program web site. With an initial launch in the Orlando, Florida area in conjunction with a hydrogen fueling station opening, these spots facilitate public acceptance by raising community awareness on the use of hydrogen as an energy carrier.
  - Podcast Series: "The Hydrogen Report" podcast series adapts introductory information from the fact sheets and overview book and translates them into short audio introductions to hydrogen and fuel cells. In parallel with the fact sheet series, podcasts include "About the DOE Hydrogen Program," "Production," "Delivery," "Storage," "Fuel Cells," "Safety," and "Fuel Cells Today: Early Market Applications and Learning Demonstrations." These 5-minute audio files are available on the DOE Hydrogen Program web site and through iTunes.

  - Early Market Fact Sheets: As part of the Program's new market transformation activities, the Education sub-program introduced two new fact sheets on early market fuel cells for material handling equipment and emergency back-up power, summarizing technology basics and the value proposition.

- Sponsored the launch of "H2 and You," an outreach campaign managed by the Hydrogen Education Foundation focused on elevating knowledge among targeted stakeholders. Designed to employ a combination of innovative "word of mouth" and "social network" marketing techniques, along with other media relations and communications tools, the program seeks to dispel negative impressions and facilitate a broad understanding of the benefits of hydrogen.
- Expanded Hydrogen Program exhibit schedule to include early end-user conferences (e.g. GovEnergy, Industrial Utility Vehicles Technology Conference) and safety community conferences (e.g. Firehouse Expo, Fire & Rescue International) in addition to previously attended hydrogen and fuel cell conferences.
- Sponsored the Hydrogen Education Foundation's student design contest. The 2007-2008 contest challenges teams of university students from around the world to develop and design hydrogen applications for real-world use at airports.
- Updated teacher and student "H2 Educate!" guides are available via the DOE Hydrogen Program web site and www.need.org. Deployed materials through one-day teacher training workshops across the country.
- The Hydrogen Technology and Energy Curriculum Project (HyTEC) for high schools produced two video segments, a teaser and a virtual field trip, to be used as a part of hydrogen and fuel cell science class modules. Tested prototype curriculum and laboratory kits at local high schools.

Budget

The FY 2007 Education sub-program budget was $1.9 million; the budget request level is as robust as it has been since FY 2004. Restoration of the budget provided for the restart of several education projects that had not been funded since FY 2004 and allowed for full funding of projects that had been only partially funded in FY 2006.



FY 2008 Plans

In FY 2008, the Education sub-program plans to complete the hands-on "prop course" for first responders and the "Introduction to Hydrogen for Code Officials." Outreach for these two educational courses, as well as the "Introduction to Hydrogen for First Responders," will include exhibits at relevant conferences, promotion in related publications, and web meetings and in-person workshops.

Education activities in support of the Program's ongoing market transformation effort include the completion of a transit bus fact sheet and a new series of fuel cell deployment case studies. Case study subjects will include fuel cells for forklifts and backup power for schools, hospitals, and airports. These case studies will provide a practical, step-by-step look at a fuel cell deployment and communicate lessons learned for future installations.

The "Increase your H2IQ" project will expand with additional efforts to use new media to reach a broad general audience. In addition, the radio spots will continue to be deployed in communities with hydrogen and fuel cell demonstration and deployment activities.

The Education sub-program also applied for and received Office of Management and Budget approval to conduct the next hydrogen knowledge survey in late 2008. In the new survey, safety and code officials will comprise a separate target audience. A new survey instrument will be developed and the survey sample will be defined in FY 2008. Survey implementation will begin in late 2008 with expected completion in 2009. The results will be used to measure changes in knowledge and awareness of hydrogen technologies over time and provide guidance to the Sub-Program on future activities.

A new hydrogen education solicitation is planned for release in the fall of 2007. Topics will include state and local government outreach, early market deployment and coordinated outreach, and university programs.

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