

IX.0 Education Sub-Program Overview

The Education sub-program supports and facilitates hydrogen and fuel cell demonstration, deployment, and early market introduction 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	Firefighters, 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 technologies into their operations.
State and Local Government Representatives	A broad understanding of hydrogen encourages favorable decision-making regarding opportunities for near-term deployment and lays the foundation for long-term change.
Middle School and High School Teachers and Students	Teachers need technically accurate information and usable classroom activities to educate the next generation of potential researchers, engineers, policy-makers, and end-users about the technologies.
University Faculty and Students	Graduates are needed for research and development in government, industry, and academia.

The Education sub-program develops and disseminates information resources and conducts training. It strives to communicate a balanced message to help target audiences become familiar with hydrogen and fuel cell technologies and how they fit in the portfolio of renewable energy and energy-efficiency options. To aid with market introduction, the sub-program helps target audiences develop an accurate understanding of hydrogen safety, recognize opportunities for deployment in near-term markets, and understand the role of early markets in facilitating the use of hydrogen and fuel cells.

Goals

Educate key audiences about hydrogen and fuel cell technologies to facilitate near-term demonstrations and commercialization in early markets and longer-term widespread commercialization and market acceptance.

Objectives

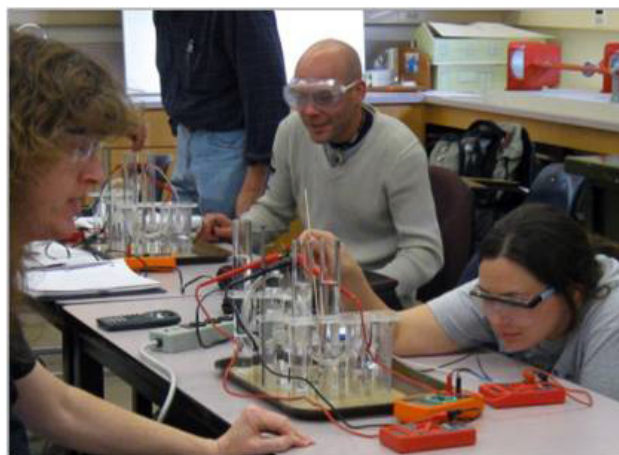
The Education sub-program is closely coordinated with the Program's activities in technology demonstration and validation; safety, codes and standards; and early market deployment and associated market transformation activities. It is also coordinated with state- and regional-based hydrogen and fuel cell outreach programs. These integrated efforts form a comprehensive strategy to transform success in demonstrating and deploying technologies into success in the broader marketplace. Specific objectives for the Education sub-program include the following:

- Increase the acceptance and inclusion of hydrogen and fuel cell technologies as a part of a clean energy portfolio in federal, state, and local government investments, as well as private sector investments.

- Reduce the “soft costs” associated with the deployment and early adoption of hydrogen and fuel cell technologies in multiple applications (e.g., insurance, permitting, uniform codes and standards) through education, outreach, and training of “second generation” clean energy professionals.
- Increase general knowledge and awareness of the benefits of the use of hydrogen and fuel cell technologies in multiple applications among key target audiences.
- Increase awareness of the broad range of applications for fuel cells and hydrogen—beyond light-duty vehicles and buses.

Fiscal Year (FY) 2011 Status

The Education sub-program continued to support state and regional outreach efforts by providing consistent messages, readily available information resources, and other activities, as appropriate. The sub-program’s seven outreach projects are focused on states with an active hydrogen and fuel cell presence, and they are working to develop case studies, best practices, and technical assistance resources to help decision-makers identify and assess opportunities for future deployment. In the area of academics, the sub-program also continued to support university, high-school, and middle-school education, including dissemination of lesson plans, curricula, and laboratory materials. Continuing its work with first responders, the sub-program conducted several sessions of a hands-on “prop course” for firefighters and continues to maintain the Web-based “Introduction to Hydrogen Safety for First Responders,” which is registered on the Training-finder Real-time Affiliate Network website, a central repository for health training courses, with 30,000 members. The sub-program also continued to work closely with the Safety, Codes and Standards sub-program, expanding the code and permitting official e-learning package with indoor fueling information and developed permitting case studies, in support of increasing early market deployments.



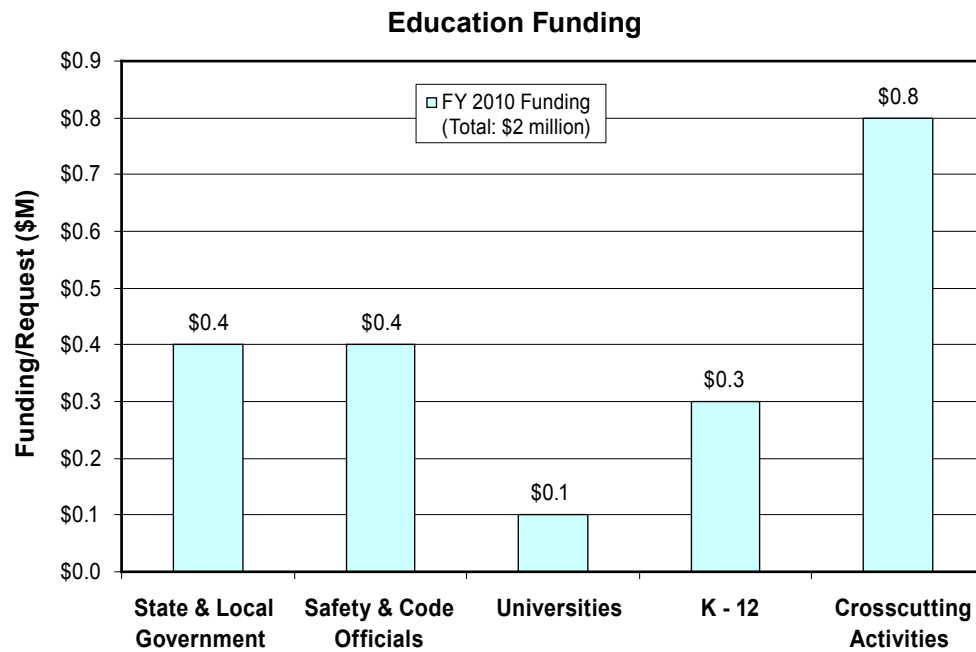
FY 2011 Accomplishments

- In coordination with the Systems Analysis sub-program, developed a model to analyze the economic impacts of early market deployment of fuel cells in primary power, backup-power, and material-handling applications. The user-friendly spreadsheet tool is used to calculate the impacts of the production, installation, and utilization of hydrogen and fuel cells on a regional or national level. Early versions of the model were demonstrated to stakeholders and industry representatives to obtain feedback on desired functionality, granularity, and outputs.
- Completed deployment and outreach activities with two Caterpillar electric trucks, each powered by a Hydrogenics Fuel Cell Power Pack. Continued to educate stakeholders on the benefits of fuel cell and hydrogen technologies in material handling applications including facility management, operators, maintenance personnel, safety groups, first responders, authorities having jurisdiction, and technical/community colleges. Continued demonstration of fuel cell and hydrogen technology for lift trucks in real-world applications at large prominent companies.
- Continued to promote and deploy the “H2 Educate” middle-school learning module—reaching a total of more than 8,800 teachers in 35 states since the project was launched. Preliminary survey results indicate that over 90 percent of survey participants felt that the resources have made it possible to teach hydrogen more often and in more detail and that the materials increased student knowledge and understanding of hydrogen.

- Developed network of key stakeholders in the Northeast region—in order to leverage regional efforts through increased collaboration—including Northeast Energy & Commerce Association, Clean Energy States Alliance, Massachusetts Hydrogen Coalition, Hydrogen Energy Center, and New Energy New York.
- Identified target locations for fuel cell deployment in the Northeast service area based on deployment criteria including energy intensive commercial building types identified by the Environmental Protection Agency’s Commercial Building Energy Consumption Survey and mapped out locations using ArcGIS software.
- Developed a Web-based virtual Regional Resource Center that provides online information, models, and other tools to assist local, state, and regional planners in the Northeast to quantify the costs and benefits of hydrogen and fuel cell technology at potential sites. Models address environmental value, energy management, renewable hydrogen generation, distributed technology comparisons, and cost/economics of stationary fuel cells.
- Continued to facilitate the Hydrogen Student Design Contest. In 2011, the contest challenged teams to plan and design a residential hydrogen fueling system. Fifty-four university teams registered from 19 countries, including seven of the top 20 engineering schools in the world.
- Developed videos to be aired on TV and posted online to YouTube and other sites, including the development of two segments for Motorweek entitled “Hydrogen and Fuel Cells Emerging Markets” and “Vehicles and Infrastructure Update.”
- Produced report and briefing paper on hydrogen production and storage for distribution to state policymakers and others. Developed case studies on early markets for hydrogen and fuel cell technologies including: fuel cell lift trucks, combined heat and power, and telecommunications backup power.
- Organized, publicized, hosted, and facilitated five webinars on hydrogen and fuel cell topics of interest to state policymakers, local leaders, and end users. For the last two webinars, more than 300 people registered, including many state policymakers. The sub-program also held three webinars to provide information to stakeholders throughout South Carolina and developed a first-responders webinar workshop.
- Continued to reach influential audiences including state policymakers, financial institutions, business leaders, end users, and others by giving presentations and distributing fuel cell literature and briefing papers at multiple conferences and meetings. Conferences attended in FY 2011 included the Clean Energy States Alliance Fall 2010 Members Meeting, the National Conference of State Legislatures Fall Forum, the Building Energy Conference, the Fuel Cells Finance and Investment Summit, the Ohio Fuel Cell Symposium, and the Northeast Commerce and Energy Association.
- Increased offering of university certificates and minors at universities including a “Graduate Certificate in Hybrid and Electric Vehicles” from Michigan Tech and a hydrogen and fuel cell technology concentration as an option in the engineering program at the University of North Carolina at Charlotte.
- Developed modules to introduce hydrogen and fuel cell technologies to students taking core chemical, mechanical, and electrical engineering courses.
- Facilitated creation of two fuel cell development intern positions at Protonex Technology Corporation for summer 2011; filled these positions with two Humboldt State University engineering students who had previously participated in H2E3 curriculum. Placed summer interns at the National Renewable Energy Laboratory, Oak Ridge National Laboratory, and the National Center for Hydrogen Technology.
- Published the two-week high school curriculum titled “Investigating Alternative Energy: Hydrogen & Fuel Cells.” Held a two-day workshop for teacher professional development in February 2011. Materials were disseminated via 13 presentations to secondary science educators and hydrogen and fuel cell professionals.

Budget

The Education sub-program’s FY 2011 budget and FY 2012 request are zero. New projects that were competitively awarded in FY 2004 and FY 2008 were fully funded in FY 2010. Most projects are scheduled to be completed in FY 2011. Given budget constraints and the need for including hydrogen and fuel cells within the broader Energy Efficiency and Renewable Energy portfolio, education and outreach activities will be coordinated with other DOE-wide efforts. Target audiences have been prioritized according to their near-term relevance and the effect on the use of hydrogen and fuel cell technologies today.



FY 2012 Plans

In FY 2012, the Education sub-program will complete expenditures of prior-year appropriations in relevant areas and focus on facilitating the introduction of hydrogen and fuel cell technologies into early markets. Future efforts will coordinate with other DOE-wide efforts to leverage recent project successes through the development of educational materials and webinars to highlight the benefits of hydrogen and fuel cell technologies.

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