National Renewable Energy Laboratory
Innovation for Our Energy Future

Hydrogen Education for Code Officials

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Overview

TIMELINE

- *Start date:* October 2007
- *End date:* October 2010
- *Percent complete:* 80%

BUDGET

Funding (100% DOE Funded)

- FY08: **$255K**
- FY09: **$130K**

BARRIERS

- Lack of Readily Available, Objective, and Technically Accurate Information *(A)*
- Disconnect Between Hydrogen Information and Dissemination Networks *(C)*
- Lack of Educated Trainers and Training Opportunities *(D)*

PARTNERS

- The Fire Protection Research Foundation
- Battelle
- ECommerce Systems
- e-learning Experts
- Code Officials
- Codes and Standards Technical Experts

Relevance— *Objectives*

Develop an introductory information (e-learning) package for code officials that specifically addresses safety, codes, and standards for hydrogen technologies, and facilitates demonstration and deployment projects.

Collaborations

Partners

- NREL is working with The Fire Protection Research Foundation, Battelle, ECommerce Systems, e-learning experts, code officials, and codes and standards technical experts to produce a high quality, technically accurate educational tool and disseminate the information in a productive manner.

Battelle
The Business of Innovation

ECS
ECommerce Systems

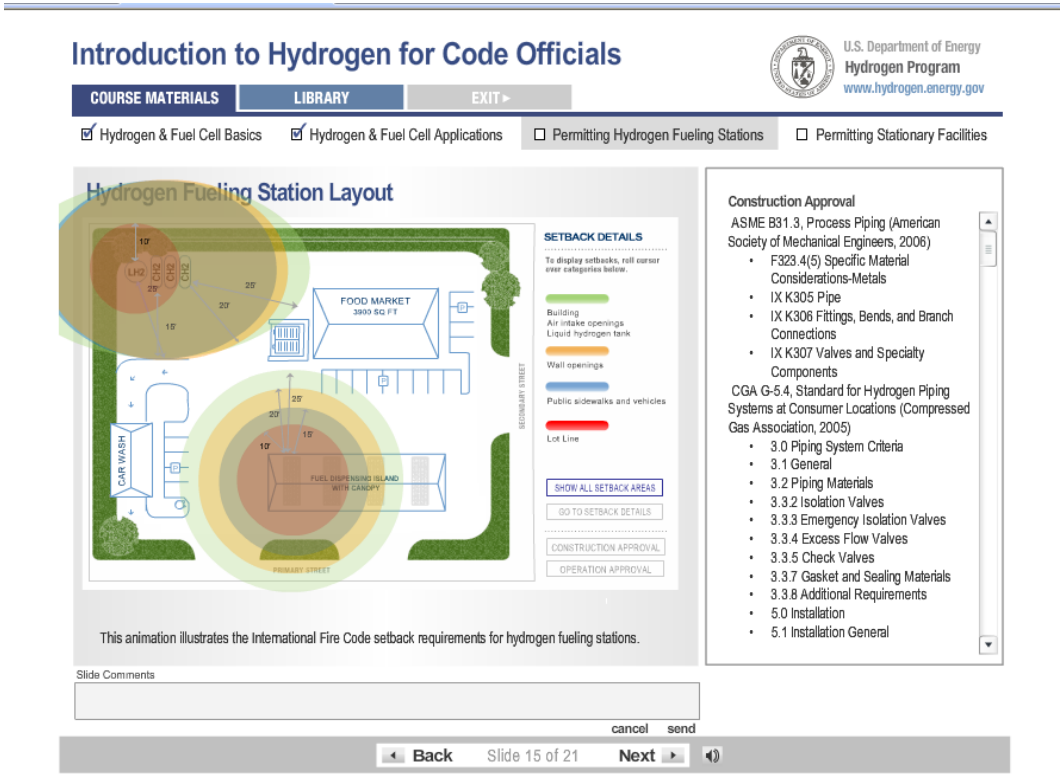
THE
FIRE PROTECTION
RESEARCH FOUNDATION

Approach

- Evaluate e-learning methods, tools, and software packages to determine the best way to present the information to code officials.
- Develop a detailed outline and content of each module.
- Work with codes and standards experts to ensure accurate and appropriate content.
- Attend workshops for code officials to determine what information they need.
- Disseminate the information through publications and electronically.

Approach

- Design e-learning resources to maximize usability.
- E-learning tools are most effective when the learner is engaged and interacting with the information on the screen.



Technical Accomplishments and Progress

Milestones

October 2007 ✓*Complete*	Evaluate e-learning software, methods and tools. Determine the best application and method for presenting the information to code officials.
November 2007 ✓*Complete*	Organize content information and graphics for the first module (Introduction to Hydrogen).
December 2007 ✓*Complete*	Develop module 1 content and put into e-learning format. Submit for review.

Technical Accomplishments and Progress

Milestones

July 2008 ✓ ***Complete***	Complete first four e-learning modules: – Introduction to Hydrogen – Fuel Cell Applications – Hydrogen Codes and Standards – Permitting a Hydrogen Fueling Station
Sept. 2008 ✓ ***Complete***	Complete the fifth module: – Permitting Stationary Hydrogen Facilities, in series
Oct. 2008 ✓ ***Complete***	Begin internal review.
March 2009 ✓ ***Complete***	Begin external review among the hydrogen and code official community.
May 2009	Launch course on web site for public use.

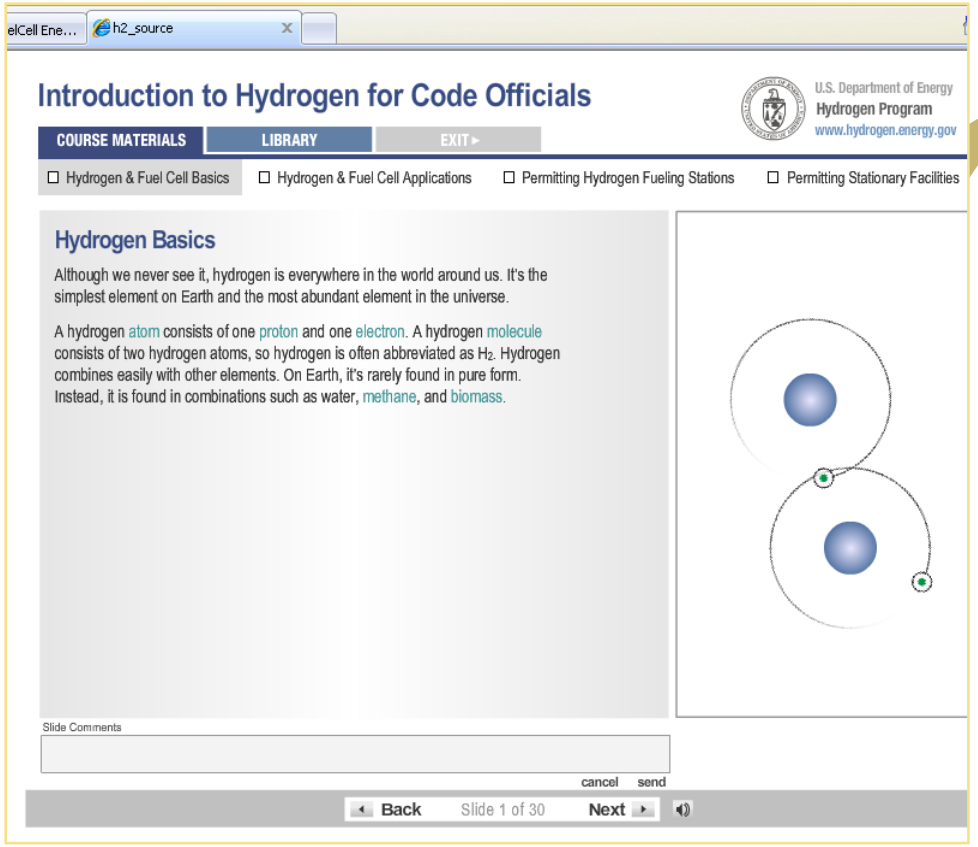
Technical Accomplishments and Progress

LEARNING MODULES

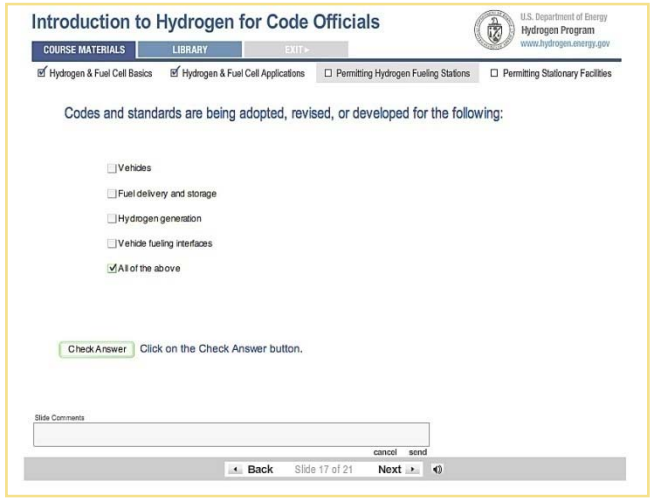
MODULE 1

Hydrogen & Fuel Cell Basics

- Includes hydrogen properties, production, storage, and fuel cell basics.



Comprehension of content is tested with a module quiz.



Technical Accomplishments and Progress

LEARNING MODULES

MODULE 2

Fuel Cell Applications

- Provides the learner with a detailed look at fuel cell applications.

MODULE 3

Permitting Hydrogen Fueling Stations

- Walks the learner through the permitting process and provides examples of station designs. Includes an animation of a typical station design with codes and standards that would apply along with the setback requirements.

MODULE 4

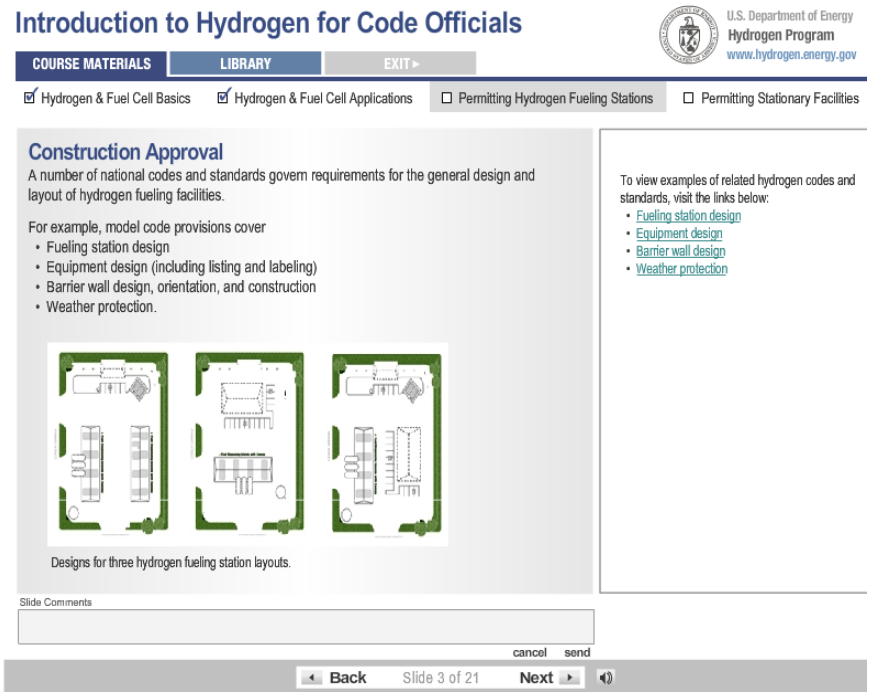
Permitting Stationary Facilities

- Describes fuel cell systems and walks the learner through the permitting process for these applications. An example of a telecom backup power application is provided.

Technical Accomplishments and Progress

LEARNING MODULES

The course was designed to automatically update the codes and standards when they are available.



Technical Accomplishments and Progress

Implementation

- Reaching the Target Audience
  - Identifying and understanding the Authority Having Jurisdiction (AHJ)
  - Presentations at organization membership meetings
  - Articles and Public Service Announcements for organization membership publications and websites
  - Training the trainer

Technical Accomplishments and Progress

Implementation – Working with AHJs on National Level

- National Association of State Fire Marshals (NASFM)
- International Fire Marshals Association (IFMA)
- PARADE (Info exchange network administrated by USFA)
- IAFC Fire & Life Safety Section Meeting (at IAFC Fire Rescue International)

Other organizations:

- International Code Council (ICC)
- National Fire Protection Association (NFPA)

Technical Accomplishments and Progress

Implementation – Working with AHJs on Local Level

- Every jurisdiction in U.S. is unique
- Working with AHJs on hydrogen applications
- Fire Code Officials (Fire Marshals and Fire Prevention Staff)
- Building Officials, and other code officials
- Planning and Zoning, Mechanical, Electrical
- AHJs for Federal or Tribal applications

Other AHJs:

  - Public utility boards, insurance, etc…

Technical Accomplishments and Progress

The course is located at:

http://www.hydrogen.energy.gov/

Proposed Future Work

Remainder of FY09

- Review the content and usability among the hydrogen and code official community.
- Complete the modules by adding audio and conducting beta testing.
- Disseminate web-based tools and other information to code officials through outreach activities, publications, and public service announcements.
- Consolidate DOE's online hydrogen education resources to provide a single location where information can be accessed.

Proposed Future Work

For FY10

- Continue to refine the e-learning module content and interactivity based on feedback received from the code official audience and reviewers.
- Update the information in each module as new information becomes available.
- Continue outreach activities.

Summary

- An Introduction to hydrogen e-learning course has been developed targeting code officials. This work will be completed in FY10.