

# Hydrogen Education for Code Officials

Melanie Caton

National Renewable Energy Laboratory

June 12, 2008

Project ID – ED3

This presentation does not contain any proprietary, confidential, or otherwise restricted information

# Objective

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.

# Overview

## Timeline

- Start – Oct. 2007
- Finish – FY09
- 65% Complete

## Budget

- Funding in FY08: \$255K  
(100% DOE Funded)

## Partners

- See partner page

## Education 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



NREL is working with 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.

# 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 accuracy of the content.
- Attend workshops for code officials to determine what information they need.
  - March 2008, Santa Ynez, CA
  - May 2008, Mahwah, NJ

# Approach (cont.)

- 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.

Hydrogen Basics - Windows Internet Explorer

## Introduction to Hydrogen for Code Officials

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

### Hydrogen Properties: Quiz

COURSE MAP EXIT

Resources Glossary Help

Now practice what you've learned.

Hydrogen is the most common element in the universe. What are its characteristics?

From the options below, choose all of the correct answers, and then click the Done button.

- Poisonous
- Odorless
- Flammable
- Colorless
- Heavy

Done

No. Hydrogen is odorless, colorless, and flammable. It is also nontoxic and the lightest identified gas.

Back Page 10 of 37 Next

Hydrogen Basics - Windows Internet Explorer

## Introduction to Hydrogen for Code Officials

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

### Hydrogen Properties: Quiz

COURSE MAP EXIT

Resources Glossary Help

Now practice what you've learned.

Hydrogen is the most common element in the universe. What are its characteristics?

From the options below, choose all of the correct answers, and then click the Done button.

- Poisonous
- Odorless
- Flammable
- Colorless
- Heavy

Done

That's right. Hydrogen is odorless, colorless, and flammable. It is also nontoxic and the lightest identified gas.

Back Page 10 of 37 Next

# Milestones

Oct. 07 Complete	Evaluate e-learning software, methods and tools. Determine the best application and method for presenting the information to code officials.
Nov. 07 Complete	Organize content information and graphics for the first module (Introduction to Hydrogen).
Dec. 07 Complete	Develop module 1 content and put into e-learning format. Submit for review.

# Milestone (cont.)

July 08	Complete first four e-learning modules: <ol style="list-style-type: none"><li>1. Introduction to Hydrogen</li><li>2. Fuel Cell Applications</li><li>3. Hydrogen Codes and Standards</li><li>4. Permitting a Hydrogen Fueling Station</li></ol>
Sept. 08	Complete the fifth module, Permitting Stationary Hydrogen Facilities, in series.



# Accomplishments

## Module 1 - Introduction to Hydrogen

Includes hydrogen properties, production, storage, and applications.

Hydrogen Basics - Windows Internet Explorer

### Introduction to Hydrogen for Code Officials

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

Introduction COURSE MAP EXIT

Resources Glossary Help

Click on a lesson title below to begin the course.

- [Lesson 1: Hydrogen Properties](#)
- [Lesson 2: Hydrogen Production and Distribution](#)
- [Lesson 3: Hydrogen Storage](#)
- [Lesson 4: Hydrogen Applications](#)

Back Page 3 of 37 Next

Hydrogen Basics - Windows Internet Explorer

### Introduction to Hydrogen for Code Officials

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

COURSE MAP EXIT

Resources Glossary Help

Welcome to the Department of Energy Hydrogen Program's Introduction to Hydrogen for Code Officials training.

In this module, you'll learn about hydrogen properties; hydrogen production, distribution, and storage; and hydrogen applications.

Click the Next button to advance to the next screen.

Page 1 of 37 Next

# Accomplishments (cont.)

- Module 2 - Fuel Cell Applications
  - Provides the learner with a detailed look at fuel cell applications and how they work.
- Module 3 – Hydrogen Codes and Standards
  - Educates the learner about codes and standards used for hydrogen systems and is linked to a codes and standards database.
- Module 4 - Permitting Hydrogen Fueling Stations
  - Walks the learner through the permitting process and provides examples of station designs.

# Accomplishments (cont.)

- Module 5 – Permitting Stationary Hydrogen Facilities
  - Educates the learner on aspects of permitting a hydrogen stationary facility and provides examples of facility designs.

# Future Work

## Remainder of FY08

- 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 and publications.
- Consolidate DOE's online hydrogen education resources to provide a single location where information can be accessed.

# Future Work

## FY09

- 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 codes and standards are established.

# Summary

- Five e-learning modules are being developed targeting code officials. This work will be completed in FY09.
  - Module 1 – Introduction to Hydrogen
  - Module 2 – Fuel Cell Applications
  - Module 3 – Hydrogen Codes & Standards
  - Module 4 – Permitting Hydrogen Refueling Stations
  - Module 5 – Permitting Stationary Hydrogen Facilities
- Each module is a stand-alone course that can be used for educating other target audiences.