

## VIII.7 Codes and Standards Outreach for Emerging Fuel Cell Technologies

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determined annually by DOE

### Fiscal Year (FY) 2012 Objectives

- Facilitate the safe deployment of hydrogen and fuel cell technologies.
- Provide information on hydrogen and fuel cell technologies codes and standards to code officials, project developers, and other interested parties.
- Present workshops and other outreach activities such as webinars on hydrogen and fuel cell technologies codes and standards to code officials, project developers, and other interested parties in geographic areas where these technologies are being deployed.
- Develop tools to streamline the permitting process for fuel cell and hydrogen technology projects.
- Perform site visits to fuel cell and hydrogen technology project sites to obtain safety, codes and standards information for publication in technical reports and incorporation into codes and standards.
- Present safety, codes and standards information on DOE websites and through webinars.

### Technical Barriers

This project addresses the following technical barriers from section 3.7 of the Fuel Cell Technologies Program's Multi-Year Research, Development and Demonstration Plan:

- (D) **Large Number of Local Government Jurisdictions (approximately 44,000).**

The large number of jurisdictions hinders the universal adoption of codes and standards.

- (E) **Lack of Consistency in Training of Officials**

The training of code officials is not mandated and varies significantly. The large number of jurisdictions leads to variation in training facilities and requirements.

- (F) **Limited DOE Role in the Development of International Standards**

Governments can participate and influence the development of codes and standards, but they cannot direct the development of international standards.

- (G) **Inadequate Representation at International Forums**

Participation in international forums and meetings is voluntary and, to date has been limited by budgetary constraints.

- (H) **International Competitiveness**

Economic competition complicates the development of international standards.

- (I) **Conflicts between Domestic and International Standards**

National positions can complicate the harmonization of domestic and international standards.

- (J) **Lack of National Consensus on Codes and Standards**

Competitive issues hinder consensus.

### Technical Targets

Table 1 shows the NREL support for achieving DOE technical targets, specifically supporting the development of the codes and standards required to deploy hydrogen and fuel cell technologies. This technical target is described on page 3.7-1 and 2 of the Codes and Standards – Technical Plan.

### FY 2012 Accomplishments

NREL accomplished the following in support of section 3.7 of the DOE Fuel Cell Technologies Program's Multi-Year Research, Development and Demonstration Plan:

- **Sensor Workshop:** Issuance of NREL Technical Report summarizing 2011 Sensor Workshop. NREL conducted a Sensor Workshop in June 2011. The purpose of the workshop was to review the performance benchmarks set at the 2007 DOE Sensor Workshop and refine them based on defining performance criteria for specific applications. These applications include indoor hydrogen fueling, hydrogen storage, and residential fuel cells and fuel dispensing.
- **Support of Hydrogen Fuel Cell Vehicle Deployment in California:** NREL has actively participated on the

**TABLE 1.** Progress towards Meeting Technical Targets for Safety Codes and Standards

DOE/NREL Project Work Areas Supporting the Development of Regulations, Codes and Standards (RCS) for the Deployment of Hydrogen and Fuel Cell Technologies Outreach Activities		
Activity	Primary Impacted Groups	Progress Towards Meeting DOE Targets
Safety Codes and Standards Workshops	Code officials, project developers, and other interested parties	Workshops make information available to expedite process for developing and permitting fuel cell and hydrogen technology projects. NREL has moved from larger workshop to a more targeted approach in FY 2012.
Sensor Workshop and Webinars	Sensor developers, project managers,	Improve performance of sensors to increase project safety
Updating codes and standards citations on DOE websites	Code officials, project developers, and other interested parties	Web information make information available to expedite process for developing and permitting fuel cell and hydrogen technology projects
Permitting template for hydrogen dispensing stations	Code officials and project developers	Standardized permitting will streamline permitting for fuel cell and hydrogen technology projects
Hydrogen dispensing station site visit and technical report	Project developers	Improve fuel cell and hydrogen codes and standards by identifying safety issues that can be addressed by codes and standards modifications

California Fuel Cell Partnership Station Implementation team Working Group.

- Codes and Standards Workshops: NREL conducted a Codes and Standards workshop on October 26, 2011 in collaboration with the Society of Automotive Engineers. NREL has also met directly with code officials in areas where key projects are to be located such as Santa Monica, CA.
- Permit Template for Hydrogen Dispensing Stations. NREL developed a California specific permitting template for hydrogen dispensing stations that contains the basic codes and standards requirements as well as California specific requirements such as the California Risk Management plan requirements.
- Hydrogen Dispensing Station Site Visit. NREL performed a site visit to a hydrogen dispensing station (AC Transit facility located in Emeryville, CA) to evaluate code compliance and safety issues. The results of the visit will be used in evaluating the hydrogen dispensing system component safety issues.

- Support of Stationary Fuel Cell Deployment. NREL developed a fact sheet summarizing the requirements for siting stationary fuel cells and the associated hydrogen storage systems required to power the fuel cell.
- NREL webinars and other information outreach. NREL has conducted webinars and other information outreach to share information on sensors for deployment of hydrogen and fuel cell technologies.



### Introduction

It is essential to develop and promulgate codes and standards in order to provide for the safe use of hydrogen and fuel cell technologies. With the help of key stakeholders, the DOE Fuel Cell Technologies Program and NREL are coordinating a collaborative national effort to prepare, review, and promulgate codes and standards for all hydrogen and fuel cell technologies. To complement this codes and standards development effort, NREL is conducting outreach activities to inform code officials, project developers, and other interested parties of these codes and standards requirements.

### Approach

Domestic and international codes and standards must be established to enable the timely commercialization and safe use of hydrogen and fuel cell technologies. The lack of codes and standards applicable to hydrogen and fuel cell technologies is an institutional barrier to deploying these technologies. It is in the national interest to eliminate this potential barrier. As such, the sub-program works with domestic and international standards development organizations to facilitate the development of performance-based and prescriptive codes and standards. These standards are then referenced by building and other codes to expedite regulatory approval of hydrogen and fuel cell technologies. This approach ensures that U.S. consumers can purchase products that are safe and reliable, regardless of their country of origin, and that U.S. companies can compete internationally by having coordinated consistent requirements.

### Results

The Safety Codes and Standards work is divided into three major areas:

- Codes and Standards Coordination
- Codes and Standards Research
- Codes and Standards Training and Outreach

This report addresses the Outreach activities.

## Codes and Standards Outreach

In FY 2012 NREL continued outreach work in both in-person workshops, site visits, in-person meetings with code officials and project developers, and permitting tool development. These activities consisted of the following:

- Codes and Standards Workshop presented October 26, 2011 in collaboration with the Society of Automotive Engineers.
- Sensor Workshop report issued as NREL technical report July, 2012.
- California Environmental Quality Act summary document.
- Codes and Standards citations were updated for the DOE website.
- Codes and Standards permit template for hydrogen fueling stations completed (shown in Figure 1).



### Regulations, Codes, and Standards (RCS) Template for Hydrogen Dispensing Stations To be Located in California

April 2012

#### Background and Purpose

Building hydrogen dispensing stations for hydrogen fuel cell vehicles is a critical piece of the infrastructure required to support the deployment of hydrogen fuel cell vehicles on a commercial scale. There are fewer than one hundred hydrogen dispensing stations in the US as of April 2012 and all of these stations are prototype or developmental stations. They are dissimilar to the common commercial gasoline retail dispensing stations that often contain convenience stores and other products sales such as propane as well as multiple dispensers and multiple dispenser islands. They also differ from existing retail station in the relatively low number of vehicles they fuel.

The US Department of Energy (DOE) Office of Energy Efficiency and Renewable Energy (EERE) Fuel Cell Technology Safety, Codes and Standards (SCS) Project has as one of its objectives the accelerated deployment of hydrogen and fuel cell technologies. To achieve this objective The National Renewable Energy Laboratory (NREL) through direction and funding from EERE has developed a template for a commercial hydrogen dispensing station to streamline the project development and permitting process for widespread deployment of hydrogen dispensing stations.

This template will define a hydrogen dispensing station regulatory requirements that more closely approximates a commercial hydrogen station than the prototype or developmental stations that account for most of the station projects.

## Conclusions and Future Direction

NREL will continue to support outreach activities associated with the development and deployment of codes and standards by:

- Working with DOE to implement the DOE 2020 Deployment Plan for Hydrogen Fuel Cell Vehicles (the 2020 Deployment Plan).
- Performing outreach work to distribute information on hydrogen and fuel cell technologies to code officials, project developers, and other interested parties using in-person meetings, site visits, webinars, and other effective venues for distributing information.
- Collecting information from outreach activities to help identify gaps in codes and standards and research and testing projects that could fill these gaps.
- Performing site visits at fuel cell and hydrogen technology project sites to collect information to assist in the code development process and project permitting process.
- Developing information tools such as technical summary documents for code officials and project developers.

## FY 2012 Publications/Presentations

1. Codes and Standards Workshop October 27, 2011 Troy, MI.
2. NREL Technical Report on Sensor Workshop held June 8, 2011 Rosemont, IL (report issued July 2012).

FIGURE 1. NREL Template for California Hydrogen Dispensing Stations, CA