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NATIONAL RENEWABLE ENERGY LABORATORY

2010 DOE Fuel Cell Technologies Program Codes and Standards Training and Outreach and Education for Emerging Fuel Cell Technologies

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Overview

Timeline

- Start date: Oct 1, 2007
- Percent complete: ongoing

Barriers

- Knowledge of codes and standards – (D,E)
- Jurisdictional Issues (M)

Budget

- Funding received in FY09: $0.5M (Vehicle Technologies)
- Funding for FY10: $0.45M, ($0.3M from SCS and $0.15M from Education)

Partners

- National H2/Fuel Cells Codes and Standards Coordinating Committee (NHA, USFCC), CaFCP, CARB
- FreedomCAR-Fuel Partnership C&S Technical Team, DoD

Objectives

- Advance renewable energy safety, code development, and market transformation issues by distribution of information
- Facilitate the safe deployment of renewable energy technologies
- Overcome barriers to emerging fuel cell technologies, specifically fuel cell powered forklift vehicles and stationary fuel cells used for back up power

Approach

- Research and Development
  - Use workshops to help define research needs
- Codes & Standards Coordination
  - Code and Standards workshops to help define codes and standards gaps
  - SNL, LANL, ORNL, ANL, PNNL, NASA, NIST, JRC, UL, NHA, USFCC, CaFCP, CARB, SDO's, CDO's, Industry
- Support Technology Readiness/Market Transformation
  - Permitting workshops, web based information compendium, hydrogen fact sheets, third party safety reviews and site visits

Technical Accomplishments

- Conducted the following workshops in FY10:
  - October 15, 2009 Tampa, Florida in collaboration with the Florida Fire Bureau
  - November 13, 2009 Metairie, LA in collaboration with the Jefferson Parish Fire Department
- The following workshops are planned for remainder of FY10:
  - May San Francisco, CA in collaboration with the California Fuel Cell Partnership and San Francisco Fire Department
  - July Los Angeles, CA in collaboration with the California Fuel Cell Partnership and Los Angeles Fire Department
  - September East Coast location TBD
- Web based Information Compendium maintained

Technical Accomplishments

- Code Official training course deployed in FY09
- Electric vehicle (EV) module added to web based Code Officials Training that covers the following topics:
    - Basics of electric vehicles
    - Charging stations
- More than 500 course visitors to date

Technical Accomplishments

- Identified two key emerging fuel cell technology projects for direct project support including site visits:
  - Stationary fuel cell for back up power
  - Indoor hydrogen fueling for forklifts
- Site visit for stationary fuel cell conducted April 26, 2010
  - Draft report for stationary fuel cell
- Site visit for indoor hydrogen fueling scheduled

Codes and Standards Workshops

- Workshops held in Tampa, FL (Oct 09) & Metairie, LA (Nov 09)
  - Held in key locations identified by Industry and Regional trade organizations with invited code officials and project developers
  - Provide essential background on renewable energy technologies and applications
    - hydrogen fueling stations
    - hydrogen fuel cells in telecom applications
    - electric vehicle safety and charging stations
  - Provide workshop participants with with basic safety information and an overview of applicable codes and standards
  - Participants develop a permitting tool to assist in future permit review
- Proceedings on NHA website: www.hydrogenandfuelcellsafety.info
- 5 Workshops planned for FY10 in key regions

Jefferson Parish, LA Workshop

- Key workshop objective was providing information on codes and standards to code officials who will be directly involved in project review
- Attendees included key individuals such the parish's Plans Review Officer and the Fire prevention Chief
- Workshop conducted in partnership with the Jefferson Parish Fire Department and in conjunction with training in NFPA 1 Uniform Fire Code® which ensured a good audience

Jefferson Parish, LA Workshop

Agenda
NREL Hydrogen and Renewable Energy Technologies
Codes and Standards Workshop
Metaire, Louisiana
November 13, 2009
AGENDA
11:30 AM – 12:30 PM Lunch
12:30 PM Welcome Remarks
Sam Vanover, Jefferson Parish Fire Department
12:30 PM – 12:45 PM Workshop Background & Objectives
Carl Rivkin, NREL
12:45 PM – 1:15 PM Overview of Renewable Energy and Fuels
Melanie Caton, NREL
1:15 PM – 2:15 PM Hydrogen Regulations, Codes, and Standards
Carl Rivkin, NREL
2:15 PM – 2:45 PM Break
2:45 PM – 3:15 PM Codes and Standards Website & Education Tools
Melanie Caton, NREL
3:15 PM – 4:00 PM Hydrogen Fueling Station Case Studies
Carl Rivkin, NREL
4:00 PM – 4:30 PM Workshop Wrap-Up
Carl Rivkin, NREL

Jefferson Parish, LA Workshop

- **Responses to What did you like about the workshop?**
  - Very professionally presented with plenty of information
  - It was a new topic considering what we have been exposed to
  - Introduced new technology
  - A lot of information. Lots of great sites given for further viewing
  - I learned new ideas about alternative fuels, mainly hydrogen
  - The reference to resources, including the flash drive of the presentation that can be stored for future use and reference and share with colleagues.
  - Good awareness of what's coming
  - Subject was new to me
  - The informal exchange of information. Q & A
  - Did not know anything on this subject. Helped me understand better
  - Had info no one else has

Jefferson Parish, LA Workshop

Responses to What improvements, if any, would you recommend to the workshop?

- More time to be more in depth with regard to questions and the Processes
- Make it more concise
- More ideas of how will effect me personally
- More on codes
- None
- None
- Good as is

Web Based Information Compendium
Accessible at
http://www1.eere.energy.gov/hydrogenandfuelcells/codes/

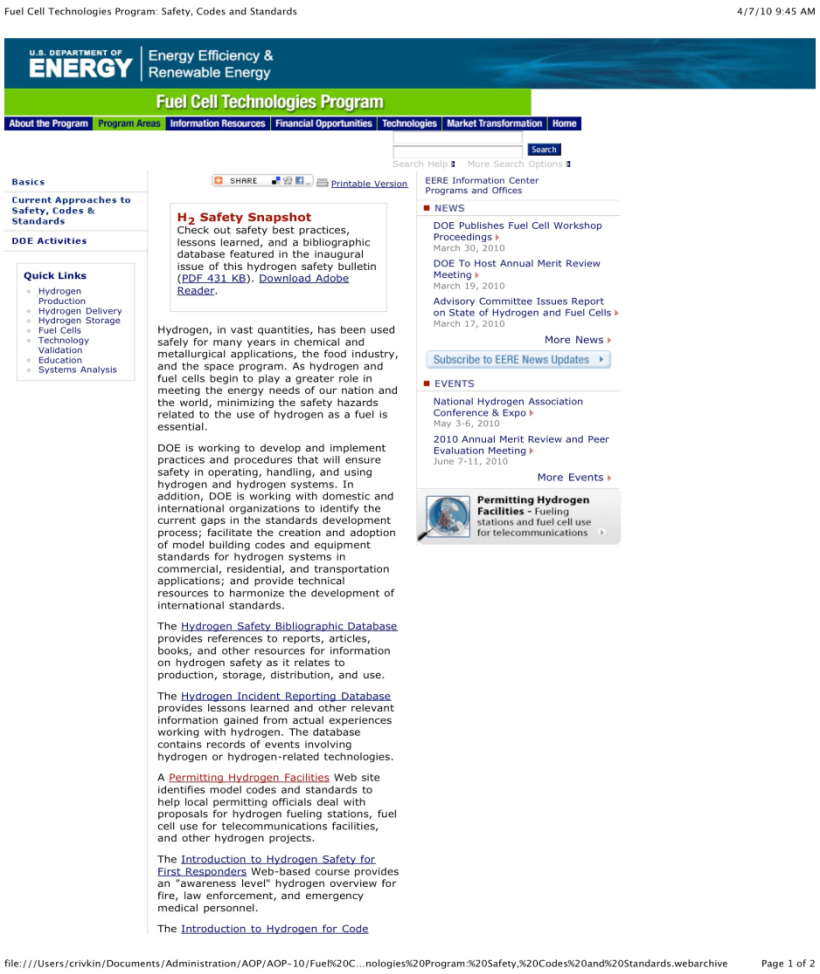
Information compendium:

NREL will update

code official training

to include a module

on electric vehicles



Code Official Training Course

- Electric vehicle module added to web based Code Officials Training covers:
  - Types of electric vehicles
  - Battery technologies
  - Electric vehicle charging
- Additional deployments efforts will include:
  - Posting course links on key web sites
  - Presenting information on the course at codes and standards workshops
  - Developing a fact sheet describing the course for potential attendees
  - Large conferences and other key events

Web Based Information Compendium

Accessible at http://www.hydrogen.energy.gov/fueling_stations/

Two Case Studies In Emerging Fuel Cell Technologies

Case 1: Indoor hydrogen dispensing operation to support forklift vehicles

- Select project that is in the planning phase where NREL's involvement could assist the project developers and Authority Having Jurisdictions (AHJ) in their codes and standards evaluation and safety review

Case 2: Stationary Fuel Cell used for back up power at the Marine Corps Logistics Base, Barstow, CA

- Plan to use a PEM fuel cell for backup power at the base fire station

Project Components and Procedures

- Identify the AHJ (s) (projects may have multiple AHJs which can increase coordination efforts)
- Perform site safety review identifying hazards that may be unique to the site
- Perform Codes and Standards evaluation for the project
  - List of applicable codes and standard citations
  - Evaluation of compliance status for each citation
  - Recommendations on any potential compliance issue
- Work directly with site project personnel and AHJs to ensure safety, and codes and standards questions are addressed
- Provide background information to site project personnel and AHJs

Case 1: Indoor Hydrogen Dispensing

- Evaluate all components of the operation including:
  - Hydrogen storage/generation
  - Hydrogen dispensing unit (s)
  - Operation of the forklift vehicles within the facility and in the cargo containers that they service and other potentially confined spaces
  - Building ventilation
  - Building alarm system
  - Building egress requirements relative to dispenser location
  - Operator training plans
  - Facility and vehicle maintenance plans

Case 2: Stationary Fuel Cell

- Evaluate all components of fuel cell installation and operation including:
  - –Storage and delivery of hydrogen to the site
  - –Fuel cell operation and maintenance
  - –Operator training

Technical Report

- The technical report will include the following elements:
- Project description and background including project funding information if available
- Comprehensive codes and standards evaluation including any applicable local ordinances
- Recommendations on any compliance issues
- Recommendations on any potential improvements in the administrative process the project required
- Recommendations on how the findings could be applied to other projects
- Photographs of the site and equipment (if allowed)

Future Work

- Continue outreach activities such as workshops and safety reviews
- Workshops will be planned and delivered in close collaboration with local and regional organizations
- Continue to extend web based compendium to include information on other alternative fuels and renewable energy technologies
- Add case studies on emerging fuel cell technology projects to the compendium

Summary

- NREL will continue to support technology readiness of renewable energy technologies through programs such as the workshops for code officials, project developers and other interested parties safety reviews, and the web based information compendium that includes on line training
- Workshops will be focused on geographic areas where there is project activity and desired attendees are code officials, project developers, and other interested parties who will be directly involved in project work
- Look to workshops to help define potential codes and standards issues as well as research and development efforts
- Technical reports documenting site visits will assist code official and project developers

Mr. Rivkin,

On behalf of the Jefferson Parish Fire Prevention Bureau and Inspector Vanover, please allow me to express our gratitude for the classroom instruction, distributed information, refreshments and the excellent meal that you provided for our seminar. You, Ms. Caton and NREL put on a first class event. We are fortunate to acquire this leading edge training.

Initially, I was worried about the topic being a bit too technical for our group. That all went away in the manner the information was delivered. Especially when the questions came repetitively, I knew that the audience was taking an interest.

Thank you,

Dennis Guidry

Fire Prevention Chief

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