

NATIONAL RENEWABLE ENERGY LABORATORY (NREL) HYDROGEN PROGRAM

DOE HYDROGEN CODES & STANDARDS COORDINATING COMMITTEE (HC&SCC)

- o Russ Hewett**
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DOE HYDROGEN PROGRAM: HYDROGEN CODES & STANDARDS GOAL

- o INCORPORATE HYDROGEN SAFETY ISSUES INTO EXISTING AND PROPOSED NATIONAL AND INTERNATIONAL CODES IN ORDER TO FACILITATE MARKET ACCEPTANCE AND PENETRATION**

PROGRAM OBJECTIVES in FY02:

Facilitate Development of Codes and Standards for the Following Applications:

- (1) STATIONARY/BUILDINGS (Fuel Cells)**
- (2) TRANSPORTATION (Fuel Cells and Internal Combustion Engines)**
- (3) PORTABLE APPLICATIONS (Fuel Cells)**

(Production, Transportation, Storage, Dispensing and Use of Hydrogen)



CODES & STANDARDS ISSUES

- **Codes and Standards Are Being Developed in Advance of or in Parallel with Hydrogen-Fueled Systems. Standards Development Must Be Coordinated with Technology Development.**
- **Efforts Should Be Devoted to R&D Efforts to Validate Proposed Standards (i.e., Need for Data to Support Proposed Standards)**
- **Since All Applications Involve Production, Transportation, Storage, Dispensing and Use of Hydrogen, There Are a Lot of Organizations Involved in Generating Standards. These Efforts Need to Be Coordinated.**



EXAMPLES OF ORGANIZATIONS INVOLVED IN CONDUCTING HYDROGEN- RELATED CODES and STANDARDS EFFORTS

- o DOE Hydrogen Program**
- o DOE Fuel Cells for Transportation Program**
- o DOE Fuels for Fuel Cells Program**
- o DOE HTAP**
- o NASA**
- o International Code Council**
- o National Fire Protection Association**
- o International Organization for Standards**
- o Society of Automotive Engineers**
- o Natural Gas Institute**
- o International Electrotechnical Commission**
- o etc.**



EXAMPLE OF NEED FOR DATA TO SUPPORT PROPOSED STANDARDS

Proposed Revision to IFC Relating to Hydrogen Gas Motor-Vehicle Dispensing and Generation Stations

2209.3.1.1 Gaseous Hydrogen Systems. The minimum distance in feet from a gaseous hydrogen system to outdoor exposures shall be as follows:

1. Five feet or more from a vertical plane below the nearest overhead electrical wire that upon failure may fall near the equipment
2. Twenty-five feet or more from buildings having non-combustible exterior wall surfaces that are not part of a one-hour fire-resistant-rated assembly.....



Hydrogen trailer accident near Cologne

DWV, 01-03-15: A serious traffic accident with a hydrogen trailer happened in the morning of 7. March on a highway near Cologne, Germany. At the end of a traffic jam a lorry crashed with considerable speed into a Messer Griesheim tube trailer for compressed hydrogen, obviously due to a lack of attention on the side of the driver. Hydrogen gas escaped from valves and pipings of three of the nine tanks and was ignited. The lorry driver could not escape and died. Other persons or vehicles were not involved.

The driver of the hydrogen lorry could uncouple the trailer from the truck and thus remove its diesel fuel from the danger zone. The fire brigade blocked the highway as well as the nearby railway line between Cologne and Aachen, which caused extended traffic jams. As common in such cases the fire was not extinguished; only the undamaged tanks were cooled to prevent them from bursting. Due to the small diameter of the leaks it took several hours for the gas from the damaged tanks to burn. The danger of explosion was over in the afternoon, but the highway remained blocked until the next morning.

A spokesman of the Cologne fire brigade said that accidents with road transports for dangerous goods like this are extremely rare. A rough estimate would give a number of about 30 accidents per year in and around Cologne with transports for dangerous goods involved directly or indirectly. Most of these cases were said to be not more dangerous than any other accident. He said that vessels for liquefied or compressed gases are particularly resistant.



Posting on the German Hydrogen Association's Web Site "HyWeb: News - HyWeb-Gazette"

ACCIDENT AT NATURAL GAS FILLING STATION

(00-07-18): A serious accident happened on 6 July at a natural gas filling station at Recklinghausen (Germany). The key factor was a car which had been converted to LPG operation (mixture of propane and butane, liquified under pressure). The owner filled the the vehicle with natural gas (tank pressure 200 bar). While the connections are so different that this principally cannot happen, the owner had, for reasons of his own, mounted a natural gas filling connection to the tank tube. During filling, the tank burst. The car owner was killed, an employee of the filling station was seriously hurt...

Considering the introduction of hydrogen as a fuel, it is compelling to come to an agreement on unified filling connections. Apart from simple handling and tightness, this must include the non-interchangeability with the connections for other fuels...



Neil Rossmeissl (Program Manager of the DOE Hydrogen Program) and Ron Fiskum (Manager of the DOE Fuel Cells for Buildings Program) Asked:

“Wouldn’t It Be Nice If the Hydrogen-Related Codes and Standards Efforts Being Conducted by the Various DOE Programs and by Non-Government Organizations Were Coordinated”



**In Late 2001, At The Behest of DOE, NREL
and NHA Began Working to Establish the:**

**DOE HYDROGEN CODES AND
STANDARDS COORDINATING
COMMITTEE (HC&SCC)**



HC&SCC MISSION STATEMENT

The mission of the DOE Hydrogen Codes and Standards Coordinating Committee (HCSCC) is to coordinate the development and implementation of a consistent set of hydrogen-related codes and standards that will ensure the safe production, delivery, and use of hydrogen, and facilitate the accelerated commercialization of hydrogen technologies for stationary, transportation and portable applications.

In addition to serving as the data base repository, clearinghouse, and gatekeeper for the codes and standards activities being conducted within DOE, the HCSCC will also reach out to and collaborate with other national and international organizations involved in codes and standards activities to promote the sharing and dissemination of this information.



Specifically, the HCSCC will:

- (1) Support and facilitate the timely and efficient incorporation of hydrogen safety issues into existing and proposed codes and/or standards promulgated by organizations such as the International Code Council (ICC), the National Fire Protection Association (NFPA), the Society of Automotive Engineers (SAE), and the International Organization for Standards (ISO)**
- (2) Support and encourage technical and operational consistency among and across the codes and standards developed by different organizations**
- (3) Disseminate and share codes and standards development information**
- (4) Identify critical gaps and deficiencies in codes and standards and formulate recommendations for addressing them**
- (5) Familiarize building code officials, fire safety officials, local/state/Federal policymakers, and other strategic stakeholders (e.g., homebuilders, architects, transportation regulators, etc.) with hydrogen technologies and the related codes and standards**
- (6) Actively seek opportunities to work collaboratively with other DOE programs and non-Federal organizations involved in hydrogen-related codes and standards efforts to streamline codes and standards development and minimize duplication of efforts**



MODUS OPERANDI

The DOE Hydrogen Codes & Standards Coordinating Committee Tries to Have A Monthly Meeting -- Two Teleconference Meetings and One In-Person Meeting Each Calendar Quarter to Address:

- o Who's doing what**
- o Progress reporting on various efforts**
- o Opportunities for coordination and collaboration**
- o C&S issues and concerns**
- o Things that need to be done**



EXAMPLE of “WORK IN PROGRESS”

- (1) NREL and NFPA Are Working to Design and Generate Two Collaborative Reports (Titles are “Tentative”):
 - (a) *“Representative Operating Hydrogen Refueling Facilities: Safety and Codes and Standards-Related Issues”*
 - (b) *“How To Permit a Hydrogen Refueling Facility Guide for Code Enforcement Officials”*

- (2) Specific Operating Hydrogen Refueling Facilities to Be Documented in the Report *“Representative Operating Hydrogen Refueling Facilities: Safety and Codes and Standards-Related Issues”*
 - (a) Chicago Hydrogen Bus Project
 - (b) Palm Desert Renewable Hydrogen Transportation Project
 - (c) Ford Motor Company
 - (d) Honda Refueling Facility in Torrance, CA
 - (e) California Fuel Cell Partnership



EXAMPLE of “WORK IN PROGRESS”

Conducting a special two-day workshop is to bring together representatives from strategic organizations (government and non-government) involved in developing codes and standards relating to the hydrogen technologies in order to:

- (1) identify who’s doing what**
- (2) coordinate codes and standards development efforts and prevent needless duplications of efforts**
- (3) identify critical deficiencies and gaps in hydrogen codes and standards developments efforts that could adversely impact market acceptance and penetration**
- (4) determine collaboratively how critical gaps and deficiencies might be addressed.**



EXAMPLE of “WORK IN PROGRESS”

DESIRED OUTCOMES OF THE SPECIAL TWO-DAY WORKSHOP:

- (1) Matrix that identifies and categorizes all major hydrogen-related codes and standards activities (completed and in-progress)**
- (2) Identification of gaps and deficiencies (i.e., gaps and deficiencies that should be addressed because, without them, market acceptance and penetration would be adversely impacted)**
- (3) Proposed strategy and action plan for addressing critical codes and standards deficiencies**
- (4) Identification of areas where there might be duplications of efforts and proposed methods for minimizing them**
- (5) Identification of specific possibilities for organizations to work collaboratively**



INTERNATIONAL ELECTROTECHNICAL COMMISSION (IEC)

MISSION:

Promote, through Its Members, International Cooperation on All Questions of Electrotechnical Standardization and Related Matters, Such as the Assessment of Conformity to Standards

TECHNOLOGIES:

- o Electricity**
- o Telecommunications**
- o Energy Production and Distribution**
- o Electronics**
- o etc.**

