

TRIP REPORT

DOE/NASFM//NREL/NHA/USFCC WORKSHOP ON PERMITTING HYDROGEN FUELING STATIONS AND TELECOMMUNICATIONS PROJECTS HAVING FUEL CELLS FOR BACKUP POWER

DATES: May 15-16, 2008

LOCATION: Teaneck, NJ (Marriott Teaneck at Glenpointe)

REPORTER: Russell Hewett

During the period May 15-16, I participated in the *Workshop on Permitting Hydrogen Fueling Stations and Telecommunications Projects Having Fuel Cells for Backup Power*. It was planned and conducted collaboratively by DOE, NREL, the National Association of State Fire Marshals (NASFM), the National Hydrogen Association (NHA) and the US Fuel Cell Council (USFCC). The workshop was held in Teaneck, NJ at the Marriott Teaneck at Glenpointe.

One of the things I've attempted to do in this report is highlight the additions/changes to the subject workshop, based on recommendations made by the participants in the last workshop (in Buelton, CA).

1.0 BACKGROUND AND WORKSHOP OBJECTIVES

This workshop was the *fourth* of a series of planned workshops to address the critical issue of facilitating the timely and cost-efficient permitting of hydrogen fueling stations (HFS) – to facilitate the introduction of hydrogen-powered vehicles in the US as they are introduced by the automotive industry. However, one of the applications of hydrogen being introduced into the marketplace currently is hydrogen-powered fuel cells for providing backup power for telecommunications. Consequently, the workshop also addressed facilitating the permitting process for telecommunication applications.

The objective of these workshops is to obtain the input of key state and local fire safety and building code officials having roles in the permitting process regarding how the permitting process for HFS and for telecommunications applications should work and be made more timely and cost-effective for both code officials, HFS project developers and telecommunication project developers. In addition, the objective is to give the participants the opportunity to articulate their recommendations regarding: (i) changes to existing codes and standards to facilitate permitting; and (ii) new safety requirements.

The subject workshop was the **second** of several planned regional workshops and involved approximately 30 invited fire marshals, fire safety officials and building code officials – recognized as being “leaders” by their peers.(There was the attempt to have the workshop be “half-and-half” in terms of the mix of fire safety and building code officials).

In addition, there were several representatives from the telecommunications industry. *Also, the workshop included electrical permitting officials (this was a recommendation made by participants in the first regional workshop held in Buelton, CA and conducted collaboratively with the California Fire Prevention Institute).*

This workshop was targeted specifically at permitting officials in: (i) New York City; (ii) New York State; and (iii) New Jersey. New York City is in the process of revising their building, fire, mechanical and other construction codes based on the 2003 ICC codes. Some of the changes to the codes relate to hydrogen and fuel cells. The new codes go into effect July 2008.

There is proposed language in the mechanical code that has negative implications with respect to use of fuel cells for stationary applications (e.g., mandating that only natural gas can be used and banning onsite hydrogen storage). In addition, in the revised fire code (which is based on the 2003 edition of the **IFC**), references to hydrogen motor vehicle fueling stations have been deleted entirely. Chapter 22, Section 2209 has been "reserved" instead of being used for hydrogen vehicle fueling as is done in the **IFC**. In addition, CNG vehicles are provided for, but hydrogen vehicles are not.

Consequently, a major objective of the workshop was to familiarize New York City permitting officials with the hydrogen and fuel cell technologies and available codes and standards in order to facilitate their putting hydrogen and fuel cell safety requirements into their new codes.

Workshop invitees are listed in the attachment below.



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2.0 HOW THE WORKSHOP WAS CONDUCTED

The agenda for the one-and-a-half day workshop is attached below.



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The work of the workshop began with a presentation by Antonio Ruiz (Technology Development Manager, Safety and Codes & Standards Subprogram of the DOE Hydrogen, Fuel Cell and Infrastructure Technologies Program). His presentation provided background information for the participants regarding: (i) the Safety and Codes and Standards Subprogram; (ii) how DOE became involved in the workshops program; and (iii) what DOE hoped to get from the workshop. Antonio's presentation is attached below.



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One of the recommendations from the first regional workshop held in Buelton, CA was that the participants be given relatively detailed briefings on: (i) hydrogen as a fuel and its properties; and (ii) how fuel cells operate. Bob Davidson (Davidson Code Concepts) kicked off the technical program by giving briefings on the two topics. In addition, he graphically articulated the “permitting pathways” in the ICC family of codes. Also, the video “***Hydrogen – The Matter of Safety***” was shown, which provides additional information on safety issues.

Then, there were technology presentations: (i) a combined fuel cell manufacturer/telecommunications presentation describing a completed telecommunication project; and (ii) a presentation on fuel cell vehicles, hydrogen fueling stations and the HFS permitting process from the perspective of the automotive industry.

The objectives of the presentations were to:

- o Articulate the issues and challenges involved in getting a project permitted (i.e., the telecommunications project) and the codes and standards documents and sections of those documents used in the permitting process
- o Articulate “challenges” involved in working with permitting officials
- o Articulate what might be done to make permitting less time-consuming and more efficient
- o Articulate the need for permitting official/project developer collaboration

The first telecommunications presentation was given by Paul Buehler (Plug Power) and addressed experiences with getting projects permitted. The presentation is attached below.



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This was followed by a presentation given by Mark Cohen (ReliOn) that familiarized the participants with the issue of hydrogen storage and delivery to telecom projects (*this issue was raised at the Buelton, CA workshop*). Mark's presentation is attached below.



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With respect to telecommunications, for the purposed of the workshop, telecommunications projects are *projects involving telecommunications facilities for which emergency, back-up power is provided by gaseous hydrogen fuel cells with the hydrogen stored on-site in storage tanks*.

The presentation on fuel cell vehicles and HFS permitting from the perspective of the automotive industry was given by Michael Paritee (General Motors). GM brought one of its fuel cell-powered vehicles to the workshop that participants had the opportunity to “kick the tires”-- but not drive – during the lunch hour on Friday. Michael's presentation is attached below.



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Then, the permitting officials were organized into three **breakout teams** (about seven participants per team). An attempt was made to organize the teams so that each consisted of:

- o At least one building code official
- o At least one fire safety official
- o An electrical permitting official

Each team was assigned the task of reviewing four “case studies” -- two HFS projects and two telecommunications projects that have been permitted or are likely to be proposed in the near term. Each case study included layouts of a HFS or a telecommunications project that incorporated a specific hydrogen delivery and storage option. Each team attempted to review each case study, from the permitting perspective, and reach consensus on how existing codes can be applied to permit each such project. Each team had a copy of the following codes and standards documents for use in their reviews:

- o **International Building Code (2006 Edition)**
- o **International Fire Code (2006 Edition)**
- o **International Fuel Gas Code (2006 Edition)**
- o **International Mechanical Code (2006 Edition)**
- o **NFPA 54 (National Fuel Gas Code 2006 Edition)**

- o NFPA 55 (*Standard for the Storage, Use and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks 2005 Edition*)
- o NFPA 853 (*Standard for the Installation of Stationary Fuel Cell Power Systems 2007 Edition*)
- o NFPA 70 (*National Electric Code*) (*added based on recommendation from Buelton workshop*)

More specifically, in reviewing each project, they did so by addressing the following questions:

- (1) Which codes and standards did you apply during your review and why were they applied?
- (2) What codes or standards were needed but not supplied? (Explain why they were needed)
- (3) What items shown on the plan were determined to be acceptable? (List code sections referenced)
- (4) What items shown on the plans were not found to be acceptable? (List code sections referenced)
- (5) What items or information, if any, was not provided on or with the plan and is needed to complete your review? (List code sections referenced)

As the teams were conducting their reviews, the two workshop facilitators -- Bob Davidson (Davidson Code Concepts) and Lisa LaRue (NASFM) rotated among them, offering assistance and answering questions.

The representatives from the automotive and fuel cell manufacturers also circulated among the teams to answer questions. *I sat in with Team 1 and helped facilitate their deliberations and answer their questions.*

The teams spent the late afternoon of Thursday conducting their reviews. During breakfast on Friday morning, Russ Hewett and Carl Rivkin briefed the participants on the new DOE/NREL [*Hydrogen and Fuel Cells Codes and Standards*](#) website and invited them to review and critique it.

The teams continued their deliberations until the lunch break. After lunch, every one reconvened in a plenary session during which each team gave a report on the projects that they reviewed.

3.0 HEWETT'S SUMMARY OF THE COMMENTS MADE BY THE BREAKOUT TEAMS IN THE PLENARY SESSION REGARDING THE PROJECTS THEY REVIEWED

The detailed, specific comments and critiques of the HFS and telecommunications projects that each breakout team reviewed will be documented in the *Workshop Final Report*.

3.1 Commonly-Reported Problems and Issues with the HFS and Telecommunications Project Plans

Below are the comments that I recorded that were commonly reported by most of the teams with respect to problems with the plans, issues or missing information for both types of projects. Clearly, many are “saying the same thing in different ways”.

- (1) In many cases, no scales on the drawings
- (2) Electrical classification information and electrical diagrams were not provided
- (3) Narrative description of each project are needed in order to scope the project and tell what its all about (in working with Team 1, it took as much as 30 minutes for the members to understand and “agree” on the description of the project)
- (4) Too many plan packages were “incomplete” in terms of information provided
In order to do a “decent” review, the team needs the full package, including site drawings, fire safety plan, electrical plan, structures plans, etc.
- (5) Engineering descriptions not given for various items of hardware (e.g. storage tanks)
- (6) Lack of details on many of the drawings and/or the need to try to interpret what symbols on the drawings and acronyms meant
- (7) Hydrogen sensors and fire safety equipment not identified and also fire fighting equipment
- (8) Sprinkler systems not identified
- (9) Signage issues or lack of signage, especially signage relating to canopies
- (10) Signage issues outside and inside the fence of telecom projects
- (11) For telecom projects, system site security not adequately addressed
- (11) Specification and location of emergency shutoff and automatic shutoff valves
- (12) Issues relating to access to the sites by trucks (in both the cases of HFS and telecommunications projects) were not addressed
- (13) For fuel cell projects (i.e., telecommunications), the power ratings of the fuel cells were not provided
- (14) Landscaping issues in the case of telecommunications projects
- (15) Hydrogen detection and leak detection systems were not shown on the plans
- (16) No indication or statement was provided as to whether or not the project (in the case of a HFS) was attended or non-attended
- (17) Planning and zoning need to be addressed
- (18) Separation distance requirements need to be addressed for telecommunications projects
- (19) Setback distance specifications in the case of canopies for HFS projects lacking
- (20) Fire hydrants and fire protection plans were not provided
- (21) For both HFS and telecom projects, site plans reviewing should include vehicle movement – where vehicles enter a site and make their deliveries
- (22) Telecom equipment (including fuel cells?) need to satisfy *Telecordia* requirements

The workshop addressed another recommendation from the Buelton workshop—i.e., making measurements on the plans, especially pressure, available in English units. This was done by issuing a card developed by NREL that has the conversions.

As was also mentioned repeatedly in the Buelton, CA workshop, the participants stated, ***before projects come to the fire safety and building code officials for permitting, they first have to be approved by the zoning and planning departments.***

An issue for our Program is whether or not this is the case in much of the rest of the country.

Other questions asked and issues raised by the participating permitting officials included:

- (1) Are their standards or regulations that address the issue of whether or not hydrogen tankers and gasoline tankers can be at a station at the same time to replenish storage tanks? Is this a safety hazard?
- (2) Are there codes, standards or regulations that address safety issues relating to hydrogen and/or gasoline tankers' access into fueling stations? Of particular concerns were: (i) access to fueling stations located at road intersections; and (ii) access into stations with tight footprints.
- (3) When a hydrogen tanker is “parked” in a HFS to refuel its storage tanks, is it itself then considered to be a “hydrogen storage tank” and has to meet separation distance requirements?

There was a lot of discussion regarding the above issues. It appears that none are addressed in the codes and standards.

What was especially remarkable was the ability of the teams to come to a consensus regarding the strengths and weaknesses of the project plans, given that they were different persons: (i) representing different professional interests; (ii) coming from different jurisdictions; (iii) in some cases, coming from AHJs using different codes & standards documents and; (iv) in general, having never met each other.

In my opinion, the workshop went extremely well and was successful. However, there were a few "glitches" -- for example, many of the participants leaving early Friday afternoon before the final session was done. We need to figure out how to deal with this in future workshops.

Another “glitch” was that, it seems to be difficult for team members to review and discuss projects and **do scribing** at the same time. It might be helpful to them if there were a staff person assigned to each team to do the scribing on the flip charts.

3.2 Additional Codes and Standards Documents Desired for Project Reviews

In addition to the documents provided, the breakout groups would like to have had the following:

- o **ASME B31.3 (*Process Piping*)**

3.3 Recommendations to DOE and NREL Regarding Conducting Future Workshops

Facilitator Bob Davidson pointed out to the participants that the workshop was planned and conducted using feedback and recommendations from the participants in the first workshop and invited the participants to give their feedback and recommendations for use in planning future workshops.

Feedback and recommendations given included the following:

- (1) More detailed plan information regarding the projects that the breakout teams reviewed should be provided . In fact, why not provide the exact plans?
- (2) What about adding other officials as participants in the workshops – specifically, planners and zoning personnel?
- (3) Provide other documents for use in reviewing project plans – e.g., **ASME B31.3**

4.0 NEXT STEPS

The next steps are:

- (1) Generating the Final Report for the workshop that will include: (i) the detailed results of the reviews of the “case study” HFS and telecommunications projects by the breakout teams; (ii) recommendations offered by the participants for use in planning and conducting future workshops; and (iii) the participants’ evaluations of the usefulness of their having participated in the workshop
- (2) Review by DOE, NREL and NASFM of the recommendations offered by the participants
- (3) Planning the next workshop.....

Russ Hewett (21May08)

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