Hydrogen Safety Panel Strategic Plan

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The Case for Safety

- Safety issues **must** be addressed for successful hydrogen technology development
- Safety issues can be a ‘deal breaker’
- Hydrogen technology proponents and stakeholders cannot begin to individually understand or know how to effectively address all relevant safety issues
- Proponents and stakeholders are on a challenging ‘technology highway’ that is improved when they all collaborate
- A trusted source of information on hydrogen safety can drastically change the ‘view from the road’ and ‘success of the trip’
Responding to Incidents

As the number of fueling stations and vehicles increases, more safety-related events and accidents may occur.

▶ In the event of an incident, communicating clear and accurate information with authorities, stakeholders, and the public is the foundation of effective decision making and response.

This is distinctly important for hydrogen as it is a new retail fuel for which there is not yet a broad awareness, understanding, and acceptance of its safety.
The Need for a Comprehensive, Consistent, and Coordinated Response to Hydrogen Safety-related Events

A subcommittee of the Hydrogen and Fuel Cell Technical Advisory Committee (HTAC) members worked together beginning in January 2016 to review and assess current resources\(^1\) such as:

- safety plans
- event response plans
- current federal, state, and local requirements
- case studies

The goal was to **identify gaps and recommend actions** to address current and projected needs.

\(^1\) This activity is within HTAC’s scope as outlined in its charter to “…review and make recommendations to the Secretary on...the safety, economical, and environmental consequences of technologies for the production, distribution, delivery, storage, or use of hydrogen energy and fuel cells.”
Recommendations of the HTAC Task Group for Addressing the Gaps

1. Maximize the Hydrogen Safety Panel (HSP)

2. Leverage the Capabilities of Public–Private Partnerships

3. Reopen Hydrogen Stations in a Timely Fashion after a Safety-Related Incident

4. Identify and Support Other Federal and State Agencies
Focusing on the Hydrogen Safety Panel

“Maximize the Role of the Hydrogen Safety Panel”

▶︎ positioning the HSP as a trusted resource on hydrogen safety
▶︎ ensuring the HSP is visible and accessible
▶︎ fostering relationships with the hydrogen technology safety community

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Utilizing the HSP

The HSP is an expert based resource that can play several potential roles:

- **During project development, through launch, and during ongoing operations:**
  - Provide advice and safety resources

- **After a safety related incident:**
  - Interpret event information and investigate

- **Once an investigation is complete:**
  - Propose facility and operations modifications
  - Conduct site visit to confirm modifications have been implemented and minimize the potential for reoccurrence
Overview of the Hydrogen Safety Panel (HSP)

HSP Goal: Support U.S. energy security by enabling the safe and timely transition to hydrogen and fuel cell technologies

Objectives

▶ Provide expertise and recommendations and assist with identifying safety-related technical data gaps, best practices and lessons learned

▶ Help integrate safety planning into R&D and other funded projects to ensure that all projects address and incorporate hydrogen and related safety practices

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More information is available at http://www.h2tools.org/hsp
The HSP provided safety resources for critical support of the 2016 California Energy Commission (CEC) general funding opportunity for construction of 16 new hydrogen fueling stations.

HSP held meetings at over 25% of the locations associated with existing hydrogen fueling stations involving builders, code officials, and other state officials and stakeholders to discuss safety issues and lessons learned from recent station deployments.
More Work is Needed to Avoid Repeating Past Mistakes

Fuel Cell Transit Bus Fueling Station Case Study

- Advance training on the unique conditions of hydrogen storage systems for first responders is of critical importance.
- There was confusion amongst first responders about the differences between a liquid hydrogen storage system and liquefied natural gas.
- The area evacuated was not consistent with the hazard.

March 2017 Discussions with Code Officials

- Discussion confirmed the assumption that first responders were not trained on hydrogen safety and response.

Those that fail to learn from history are doomed to repeat it.

-Winston Churchill
1874-1965
Four Objectives of the HTAC HSP Recommendation

- Raise awareness of the HSP and H₂Tools among state/local officials and project developers
- Establish working relations with key state and local organizations to enable seamless incident response
- Identify types of projects that would benefit from HSP involvement
- Identify methods to facilitate outside organizations paying for HSP services

Photo credit: Venessa Miemis via Foter.com / CC BY-NC-SA
HSP is Visible and Accessible

Stakeholders must know about HSP and its availability to:

- Assist with implementing safe projects
- Participate in fact finding and investigation of incidents
- Bring lesson learned from incidents back to inform new projects

Focus will be on:

- Who the HSP is, what the HSP does, and how to contact the HSP
- Where to find additional safety resources: http://h2tools.org/
HSP as ‘The Trusted Source on H2 Safety’

Activities

▶︎ Identify hydrogen technology proponents and stakeholders, their safety roles, and challenges

▶︎ Develop compelling messages that focus on the importance of each in ensuring hydrogen technology safety

▶︎ Show how their value in ensuring hydrogen technology safety can be enhanced through the HSP
Safety is paramount - it's the first question we get asked in California when we go into local communities. If anything, we need to figure out how to expand the Safety Panel's reach. The reviews from the Panel have already shown benefit to the state - it's a crucial, trusted 3rd party resource. – 2015 DOE AMR Reviewer Comment
Projects That Could Benefit From HSP Involvement

The Panel’s expertise and vast experience makes it uniquely positioned to ensure investments in hydrogen technologies are of high yield.

Can support:

▶ Federal agencies and agencies that receive federal support
▶ State and local agencies
▶ Private industry and commercial installers

Types of Activities:

▶ Review designs and supporting documentation
▶ Participation in or review of risk assessments
▶ Site reviews

“I cannot emphasize enough how vital & timely the HSP involvement was during this [H-Prize] competition – appropriately informing our product safety architecture, and enabling us to galvanize our appliance design.” Darryl Pollica, IVYS Energy Solutions

More information is available at http://www.h2tools.org/hsp
Optimal HSP Project Interaction

Project Team

Hydrogen Safety Panel

HSP Presentation on Safety Guidance

Possible Interactions
Document and Design Reviews, P&ID Reviews, Conference Calls, etc.

Safety Plan Review

Possible Interactions
Commissioning Site Visits, Conf. Calls

Safety Learnings

Learnings benefit future projects

May 15, 2017
Resourcing the HSP

The HSP is a unique resource that can provide significant benefit to hydrogen projects (having learnings from 460+ reviews covering a wide range of R&D and demonstration activities)

A project-funded model for DOE R&D will enable an appropriate support that is a “justifiable benefit” (bringing learnings to new activities)

Mechanisms are in place to facilitate non-DOE utilization of the HSP (e.g., CEC)

Continued need to identify project and funding opportunities in other federal agencies and private industry
2. Leverage Public–Private Partnerships
   • Expand tiger teams to include hydrogen – a subgroup of HSP could function as a tiger team if it were formalized within the Clean Cities process or other opportunities.

3. Reopen Hydrogen Stations in a Timely Fashion after a Safety-Related Incident
   • Develop a guidebook on incident recovery that the HSP can use during outreach and initial engagement with project developers and state and local officials – the HSP can help develop and deliver the guidebook.
   • Develop virtual training courses that demonstrate what first responders can expect during a hydrogen leak or fire at a fueling station – other parts of the PNNL H₂ safety program are well positioned to do this.

4. Identify and Support Other Federal and State Agencies
   • A formal outreach plan has been drafted by PNNL. Additionally, activities in California and work with the Federal Energy Management Program are examples of how this might work moving forward.
The Need for HSP to Continue Support of R&D Activities

The purpose of R&D is to develop new products, and the approaches used there don’t necessarily translate to safe or code compliant configurations for commercial deployment.

Some potential reasons why:

- Manufacturers generally use design engineers rather than safety engineers to design products. This can result in a product that performs well but may not comply with the safety, health or environmental standards or requirements.

- Designers and stakeholders may not have the experience to recognize and address specific safety issues.

Safety issues can be a barrier – but need not be if managed effectively starting early in R&D. If unsafe practices are overlooked during the R&D phase, they may be a barrier towards acceptance and result in negatively impacting its deployment.

Key Resource – Hydrogen Tools Portal

User Groups
- AHJ/code officials
- First responders
- Operations and maintenance
- Project proponents
- Research and development

Compatibility of Materials
- Properties, Calculators & Bibliographic Database
- Lessons Learned and Best Safety Practices
- Training for First Responders, Code Officials and Researchers
- Codes and Standards Tools
- User Group Networking
- HSP
- QRA Tools (coming soon)

H₂Tools Portal
Summary

- As the number of fueling stations and vehicles increases, more safety-related events and accidents may occur.
- Safety issues and incidents can impact the interests of hydrogen proponents/stakeholders and their realization of the benefits associated with its use.
  - Impacts can affect one proponent or stakeholder, or the entire industry.
- The availability and communication of safety-related information is critical to ensuring that the impacts from any incidents are minimized.
- Who lends support to assuring the safe deployment of hydrogen technologies?

The HSP is valued as a trusted resource – they understand the technology and safety issues, they have been and should continue to be invaluable resource for safety planning and recovering from incident.
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OR VISIT:

http://h2tools.org
for more Hydrogen Safety related news and the latest resources