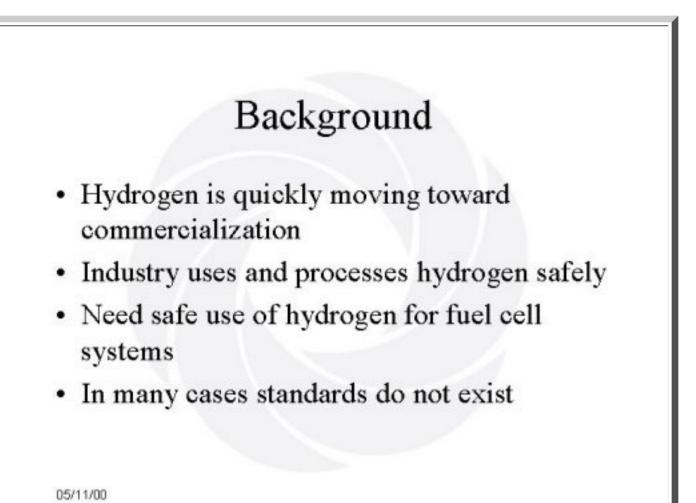
Developing International Codes and Standards for the Safe Production, Storage, and Use of Hydrogen Lara Neer National Hydrogen Association DOE Fuel Cells Summit IV





NHA C&S Process

- Identify areas where codes and standards for the safe use of hydrogen energy systems are needed
- · Determine if adequate codes and standards exist
- · Identify other stakeholder and expertise
- Develop new draft standards through the NHA, only when the work is needed but not being accomplished elsewhere in a timely way.

NHA C&S Process

- Poll membership for Hydrogen C&S Issues perceived as a need in the 2-5 year time-frame
- · Identify other entities which may be stakeholders
- Rank C&S issues based on highest need, interest from members, and requiring NHA lead or coordination
- Based on funding, work on those items with the highest ranking
- Utilize support from members, other C&S organizations, and other identified experts to develop a draft document
- Advance the draft through a larger standard organization, such as NFPA, ISO, etc.

ISO/TC-197 Standards

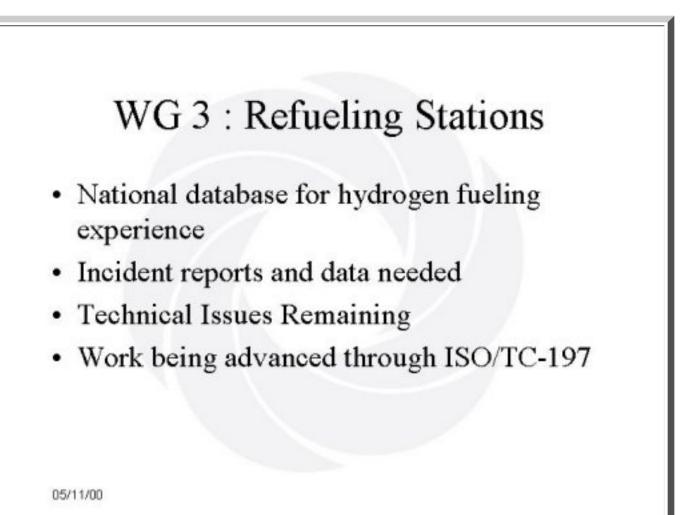
- International standards already published are:
 - ISO 13984: Liquid Hydrogen Land vehicle fuelling system interface
 - ISO 14687: Hydrogen Fuel Product specification
- Standards under development are:
 - ISO/CD 13985: Liquid hydrogen Land vehicle fuel tanks
 - ISO/WD 13986: Tank containers for multimodal transportation of liquid hydrogen
 - ISO/WD 15594: Airport hydrogen fuelling facility
 - ISO/WD 15866: Gaseous hydrogen blends and hydrogen fuel Service stations
 - ISO/WD 15869: Gaseous hydrogen and hydrogen blends Land vehicle fuel tanks
 - ISO/WD 15916: Basic requirements for the safety of hydrogen systems
 - ISO/AWI 17268: Gaseous hydrogen Land vehicle fuelling connectors 05/11/00

WG 1: Connectors

- Due to the international interest in blends and portable power, it was suggested the group look at development of standards for these.
- Refilling of hydrides
- Now that the connectors work is an ISO work item, being advanced by the same working group as the refueling station item, this may be done through ISO.

WG 2: Containers

- NHA Item based on CNGV Standard
- Item Accepted and Advanced through ISO/TC-197
- · NHA interested in looking at Hydrides
- NHA C&S Group formed to continue this work



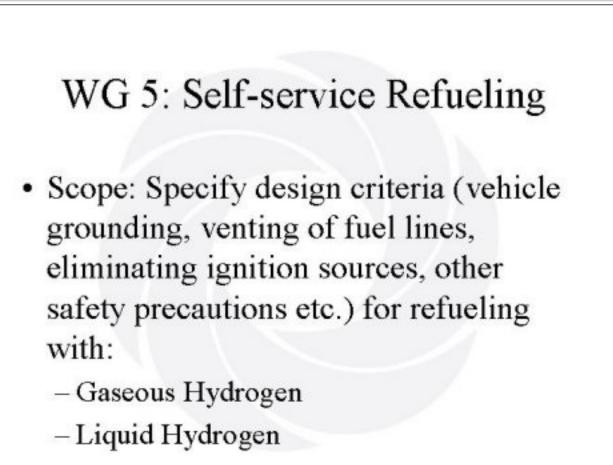
New Work Items

- C&S for the use of electrolysers and fuel cells at customer sites, including homes.
- C&S for safe self-service refueling of vehicles with H2.
- Certification program for hydrogen vehicle fuel systems.
- C&S for maritime unique applications of hydrogen (identify unique applications).

WG 4: Electrolyzers

- Scope: To develop a standard for installation, safety and use of electrolyser hydrogen generators in end use applications, including residential, commercial, and industrial.
- · Activities for this group include:
 - Identify other group participants
 - Assess relevant codes
 - Parameter review; determine technical envelope
 - Develop draft standard
 - Code/Building & Zoning review
 - Template document

 – Specific Document Scope 05/11/00



WG 5 - Self-service refueling -Cont..

- WG5 Actions:
 - Review existing draft standards for refueling stations and connectors - identify any deficiencies for public use.
 - Specify design criteria fold output into ongoing NFPA and ISO activities
 - Coordinate with DOT and SAE (and others)

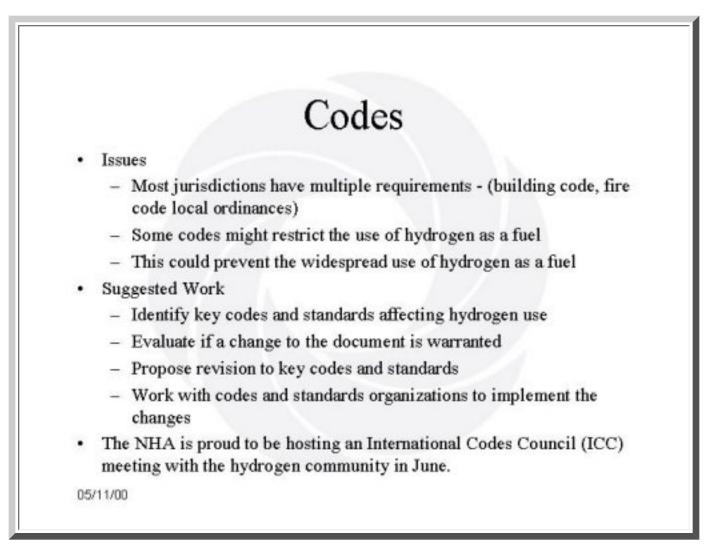
WG 6 - SAE Coordination

- Scope : Verify that the On-Board Hydrogen system (storage, generation, distribution, power source, controls, etc.) is safe and performs to specified vehicle standards
- Actions:

-NHA is actively working with SAE C&S safety task force

WG 7 - Maritime Applications

- Scope: To identify maritime unique applications of hydrogen.
- Coordinate efforts being accomplished under the Maritime Hydrogen Technology Development Group (MHTDG), led by DCH Technology, into the NHA C&S process. The NHA WG 7 will identify standards and needs for new C&S for unique applications of maritime hydrogen use.



Sourcebook for Hydrogen Applications

- Funded by Natural Resources Canada and U.S. Department of Energy
- Current state of knowledge and experience with using hydrogen safely in emerging applications, especially the transportation sector
- Compiles key materials to provide an overview of the prevailing practices and applicable standards and codes for using hydrogen as a fuel