

# ENABLING HYDROGEN TECHNOLOGY

Codes and Standards in the USA

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# The Path for Hydrogen

- Current World Annual Consumption 400 Billion m<sup>3</sup>
- Established Diversified Markets Growing at a rate of 6% to 10%
- Demand Expected to Escalate this Century due to Economic, Environmental, Political, National Energy Security, and Sociological issues
- This Growth will be prompted by New Energy Technologies in the Transportation, Commercial and Residential sectors
- Attention to Safety is Paramount

# Hydrogen Safety Fundamentals

- Minimize the leak potential,
- Provide adequate ventilation,
- Minimize ignition sources,
- Provide attention to materials compatibility,
- Employ best industrial practices, and
- Respect for the commodity properties.

# Existing Hydrogen Codes and Standards (C&S)

- Compressed Gas Association (CGA)
- National Fire Protection Association (NFPA)
- Code of Federal Regulations (CFR)
  - Department of Transportation (DOT)
  - Occupational Safety and Health Administration (OSHA)
- International Standards Organization (ISO)
  - Hydrogen Technologies (ISO/TC-197)

# Hydrogen C&S Progress and Status

- ISO/TC-197 Working Groups
- ISO/TC Liaison Committees
- National Hydrogen Association (NHA)
- NFPA
- Society of Automotive Engineers (SAE)
- International Code Council (ICC) ad hoc
- Underwriters Laboratory (UL)
- Natural Gas Vehicle Coalition (NGVC)

# Hydrogen C&S Problems/Issues/Concerns

- Schedule and progress
- Duplication and overlap
- Gaps and deficiencies
- Expert participation
- Overkill
- Existing code backlash
- Proprietary aspects/intellectual property
- Technical issues to resolve

# Prudent Engineering and Design

- Use of related C&S
- Use of indirect references
- Sourcebook for Hydrogen Applications
- NASA Hydrogen Safety Handbook
- Industrial hydrogen documents

# The Project Management Team

- Employ key organizational elements
- Interfacing with other organizations
- Project design reviews
- Risk assessments/hazard analysis
- Customized training
- Local officials (Authority Having Jurisdiction)

# Collaboration and Coordination

- Cross participation
- Pace the process, employ experience
- Use new C&S as they mature
- DOE HTAP Safety Committee
- DOE Hydrogen C&S Coordinating Committee

## *A PARTING THOUGHT*

Let us not dwell on the codification of rules for hydrogen so much as the invocation of nurturing a hydrogen culture. If significant hydrogen technology progress is desired then all parties involved should subscribe to the philosophy I have suggested