

Readout Report: Working Group #2 Hydrogen

Working Group Leaders

Kandi Barakat & Vincent Holohan: PHMSA

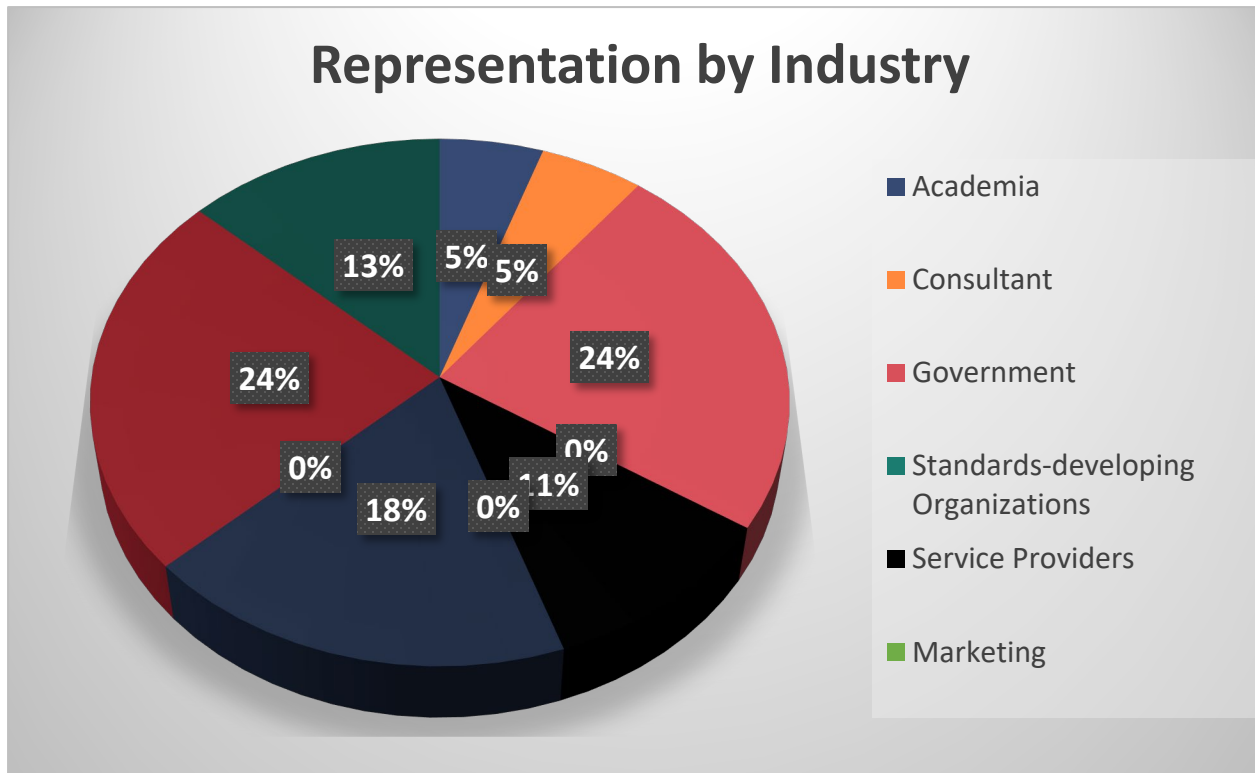
Mark Richards: DOE

Ashley Duckman: AGA

Pipeline Safety R&D Forum 2023
October 31 – November 1



Working Group Participation by Industry



Pipeline Safety R&D Forum 2023
October 31 – November 1



Gap #1 Associated Details

Title: Coating and Liners Development

Main Objective: Development of Pipeline surface treatment/coatings/liners for pure and blended hydrogen to prevent hydrogen embrittlement and hydrogen induced cracking in existing pipelines.

New or Improved Technology

- a. What pipeline or facility type(s), or LNG/UGS operations, does the technology target? **Hydrogen, h2 blends**
- b. What operating environment(s) must the technology operate in (inside/outside-pipe, above/under-ground, hazardous liquid or natural gas service, etc.)? **Inside, Under-ground, hydrogen**
- c. Does the gap address any regulatory, congressional, or NTSB drivers? **no**
- d. Does the gap address related consensus standards? **no**
- e. What technical or regulatory roadblocks or barriers prevent the technology deployment? **Fitting, prior testing, material compatibility, access, feasibility, pigging and ILI inspections**
- f. What are anticipated targets or timeframes to complete this research? **2-3 years**
- g. What funding level is estimated to support such topic? **\$1-2million+**

Pipeline Safety R&D Forum 2023
October 31 – November 1



Gap #2 Associated Details

Title: Welding Standards

Main Objective: Update and validate welding standards for transmission and distribution pipelines. API 1104 requirements may not be suitable for hydrogen pipelines (including in-service welds)

Creation and Dissemination of General Knowledge

- a. What pipeline type(s) or LNG/UGS operations does the general knowledge target?
Hydrogen pipelines
- b. Does the gap address any regulatory, congressional, or NTSB drivers? **yes**
- c. Does the gap address related consensus standards? **yes**
- d. What technical details or scope items are necessary and recommended? **Working with SMEs, various working groups with regulatory industry and standards committees (API 1104).**
- e. What are anticipated targets or timeframes to complete this research? **3-5 years**
- f. What funding level is estimated to support such topic? **\$1million+**

Pipeline Safety R&D Forum 2023
October 31 – November 1



Gap #3 Associated Details

Title: Evaluation of Pipeline Repair and Maintenance

Main Objective: Exploring the compatibility of existing pipeline repair and maintenance technologies for hydrogen and h2 blending in transmission and distribution lines such as welding, joining, hot tapping, stopping, squeeze-off, and purging, etc. for pure and blended hydrogen for metallic and nonmetallic pipelines.

Creation and Dissemination of General Knowledge

- a. What pipeline type(s) or LNG/UGS operations does the general knowledge target?
Transmission/distribution of blending and pure hydrogen pipelines
- b. Does the gap address any regulatory, congressional, or NTSB drivers? **no**
- c. Does the gap address related consensus standards? **no**
- d. What technical details or scope items are necessary and recommended? **Developing working groups with regulators, hydrogen pipeline operators, industry leaders, manufacturers, and other stakeholders**
- e. What are anticipated targets or timeframes to complete this research? **2-3 years**
- f. What funding level is estimated to support such topic? **\$1-2 million**

Pipeline Safety R&D Forum 2023
October 31 – November 1



Gap #4 Associated Details

Title: Recommended Guidance for Hydrogen Pipelines

Main Objective: Provide a guidance document for engineering assessment of system integrity and performance for pure hydrogen and blending pipelines

Creation and Dissemination of General Knowledge

- a. What pipeline type(s) or LNG/UGS operations does the general knowledge target?
Hydrogen pipeline facilities
- b. Does the gap address any regulatory, congressional, or NTSB drivers? **Operators**
- c. Does the gap address related consensus standards? **yes**
- d. What technical details or scope items are necessary and recommended? **SMEs and regulators working groups**
- e. What are anticipated targets or timeframes to complete this research? **2-3 years**
- f. What funding level is estimated to support such topic? **\$1-2million**

Pipeline Safety R&D Forum 2023
October 31 – November 1



Additional Identified Gaps

- **Materials:** Assess and develop material test methodologies for non-metallics such as plastic pipes and elastomers for hydrogen and blending
- **Leak Detection:** Develop technologies that would detect and/or quantify leaks on pure hydrogen pipelines
- **Storage:** Qualification of premium OCTG (Oil Country Tubular Goods) connections for underground hydrogen storage.
- **Artificial Intelligence & Machine Learning:** Evaluate the use of AI and ML efforts to predict integrity failures of assets that are transporting Hydrogen
- **Odorization:** Evaluate odorization of pure and blended hydrogen
- **Risk Assessment:** Conduct modeling analysis of potential impact radius of hydrogen or h2 blending releases and provide full-scale field trials for hydrogen blend releases including radiant energy, over-pressure potential and probability of ignition
- **Materials:** testing and evaluation in high pressure and pipeline operational conditions under hydrogen gas blends

Pipeline Safety R&D Forum 2023
October 31 – November 1



Thank You!/Questions?

Pipeline Safety R&D Forum 2023
October 31 – November 1



U.S. Department of Transportation
Pipeline and Hazardous Materials
Safety Administration

PHMSA: Your Safety is Our Mission

