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## VIII.8 Fuel Cell & Hydrogen Energy Association Codes and Standards Support

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Project End Date: June 30, 2017; Project continuation  
and direction determined annually by DOE

development organizations, and other interested parties by providing a common, current, and factual information base.

### Technical Barriers

This project addresses the following barriers identified in the DOE Fuel Cell Technologies Office Multi-Year Research, Development, and Demonstration (MYRDD) Plan, Section 3.7: Hydrogen Safety, Codes and Standards.

- (F) Enabling National and International Markets Requires Consistent RCS
- (H) Insufficient Synchronization of National Codes and Standards
- (J) Limited Participation of Business in the Code Development Process

### Overall Objectives

Enhance and sustain industry participation to enable:

- Timely development of regulations, codes, and standards (RCS) deemed critical by industry for the commercial deployment of hydrogen and fuel cell technologies and the infrastructure needed to support them.
- Timely and coordinated industry participation in key forums for safety and RCS development for hydrogen energy and fuel cell technologies.
- Efficient, productive, and timely information exchange between the hydrogen and fuel cell industry, regulatory officials, codes and standards development organizations, and other interested parties by providing a common, current, and factual information base.

### Fiscal Year (FY) 2017 Objectives

- Enhance and sustain industry participation to enable:
  - Timely development of RCS deemed critical by company with input from seller and industry for the commercial deployment of hydrogen and fuel cell technologies and the infrastructure needed to support them.
  - Timely and coordinated industry participation in key forums for safety and RCS development for hydrogen energy and fuel cell technologies.
  - Efficient, productive, and timely information exchange between the hydrogen and fuel cell industry, regulatory officials, codes and standards

### Contribution to Achievement of DOE Safety, Codes & Standards Milestones

This project will contribute to achievement of the following DOE milestones from the Safety, Codes & Standards section of the Fuel Cell Technologies Office MYRDD Plan.

- Milestone 2.17: Publication of updated international fuel quality standard to reflect fuel cell technology advancement. (3Q, 2018)
- Milestone 2.19: Validate inherently safe design for hydrogen fueling infrastructure. (4Q, 2019)
- Milestone 4.6: Completion of standards for critical infrastructure components and systems. (4Q, 2014)
- Milestone 4.8: Revision of NFPA 2 to incorporate advanced fueling and storage systems and specific requirements for infrastructure elements such as garages and vehicle maintenance facilities. (3Q, 2016)

### FY 2017 Accomplishments

- Supported over 300 draft public inputs to National Fire Protection Agency's NFPA 2, NFPA 55, and the International Fire Code developed by FCHEA in 2016 to address key industry needs for fuel cell electric vehicle repair booths and harmonized requirements for defueling, and addressing inconsistencies or lack of clarity between model codes.
- Made progress on technical gaps for micro fuel cell power systems to facilitate national and international harmonization of shipping regulations. Working to

ensure international standards are inclusive of all fuel types. IEC 62282-6-101 Edition 2, and associated fuel specific Part 2 documents. Took on convenorship of international working group (WG), International Electrochemical Commission Technical Committee (IEC/TC) 105 WG#8 to advance this effort.

- Managed the development of industry comments to draft international standards for hydrogen fueling components to support harmonization of national and international requirements, and supported these comments in the U.S. technical advisory group and International Organization for Standardization (ISO) Working Groups.
- Supported the Telecommunications Industry Association (TIA) publication of its *Reference Guide to Regulations, Codes, and Standards for the Deployment of Stationary Fuel Cells*. FCHEA contributed to the development of this guide in previous years. A PDF of the document is available online (<http://www.tiaonline.org/resources/tia-fuel-cell-reference-guide>).



## INTRODUCTION

As the premiere trade association for the fuel cell and hydrogen energy industry, FCHEA utilizes a working group structure to facilitate focused effort in each of the three following applications: portable power, stationary power, and transportation, which includes vehicles and the infrastructure to support them.

FCHEA's project contributes directly to achievement of four of the seven objectives outlined in the Fuel Cell Technologies Office MYRDD Plan, Chapter 3.7, Hydrogen Safety, Codes, and Standards by engaging industry to develop consistent technical requirements and harmonized national and international safety codes and standards.

## APPROACH

FCHEA working groups and monthly facilitation of the National Hydrogen & Fuel Cells Codes & Standards Coordinating Committee (NHFCCSCC) provide regular opportunities to engage industry in developing RCS through discussion of priorities, opportunities to participate in technical committees and WGs directly, and opportunities to comment on draft standards. Industry priorities in codes and standards development are captured and tracked in FCHEA's regulatory matrix, which is updated regularly and published quarterly (see Figure 1).

Our bi-monthly Hydrogen and Fuel Cell Safety Report, available online at [www.hydrogenandfuelcellsafety.info](http://www.hydrogenandfuelcellsafety.info) (Figure 2), provides timely information on the progress of developing codes, standards, and regulations to stakeholders

including authorities having jurisdiction (AHJs), emergency responders, industry, researchers, and other interested parties.

## RESULTS

Our Portable Power WG authorized staff to take on convenorship of international working group IEC/TC 105 WG #8 to ensure international standards are inclusive of all fuel types. WG #8 is leading the development of IEC 62282-6-101 Edition 2, and associated fuel specific Part 2 documents. This effort supports the following objective from MYRDD Plan: “enabling national and international markets requires consistent RCS,” by ensuring national and international standards for micro fuel cell applications are harmonized, then adopted by international regulations.

Our Transportation Working Group Hydrogen Codes Task Group continues to support harmonized public inputs for the next development cycles of key model codes. In 2016, over 300 public inputs on NFPA 2, NFPA 55, and the International Fire Code were solicited from business and experts with operational experience, and focus on harmonizing requirements with other industry-accepted standards and codes. This effort supports the following objective from MYRDD Plan: “Provides consistent RCS and synchronization of national codes and standards.”

Our Stationary Power WG worked with TIA to publish its *Reference Guide to Regulations, Codes, and Standards for the Deployment of Stationary Fuel Cells*. FCHEA contributed to the development of this guide in previous years. A PDF of the document is available online: <http://www.tiaonline.org/resources/tia-fuel-cell-reference-guide>. This effort supports the following objective from MYRDD Plan: “Develop and enable widespread sharing of safety-related information resources and lessons learned with first responders, authorities having jurisdiction (AHJs), and other key stakeholders.” Working closely with related industries provides consistency in requirements and reduces duplication of effort.

Publication of our Regulatory Matrix and the Hydrogen & Fuel Cell Safety Report keep stakeholders informed of the progress and issues encountered in the development of RCS. It has introduced industry to the many new working groups in ISO Technical Committee (TC) 197 and the call for participation in U.S. standards committees. The integrated calendar of events aids in scheduling meetings. Facilitation of the monthly web-based meetings of the NHFCCSCC provides a regular forum to coordinate and align efforts in standards activities and harmonize requirements. This effort contributes to the DOE goal to develop and enable widespread sharing of safety-related information resources and lessons learned with first responders, AHJs, and other key stakeholders. These activities also increase participation of stakeholders in development of harmonized RCS.

Significance to Commercialization  
 ⇐ More Critical  
*Highest Effort*

A. Essential To or Enables Commercialization	B. Important to Commercialization	C. Supports Commercialization	
<del>IEC 62282-4 102: Fuel cell systems for forklift applications – Performance requirements and test procedures. Approved for FDIS circulation.</del>			VEHICLES
<p>ISO 19880-1 Gaseous Hydrogen Filling Stations. TS published in June. Development of IS continues. Glenn Scheffler has been appointed as co-convenor.</p> <p>CSA Group HPIT 2: Compressed Hydrogen Station and Components for Fueling Industrial Trucks: <del>In publication. Published – to be removed in next update of matrix.</del></p> <p>Hydrogen Dispenser Metrology: <del>The July 2016 National Conference on Weights and Measures (NCWM) Meeting agreed to (1) recognize that a Category 3 device may make the required information from the event logger available electronically and (2) expanding the current hydrogen code acceptance tolerance of 1.5 % to 5.0 % and the current maintenance tolerance of 2.0 % to 7.0 %. The code will have only one accuracy class designated as Accuracy Class 7.0 in NIST Handbook 44 Section 3.39 Hydrogen Gas-Measuring Devices-Tentative Code. The National Conference on Weights and Measures (NCWM) approved hydrogen gas measuring devices and 5% increase in specification clause, with no sunset clause. Enables dispenser designers to apply for certificates.</del></p>	<p>ISO 19880-2: Gaseous hydrogen filling station dispensers DIS is scheduled for early 2017.</p> <p>HGV 4.3 Fueling Parameters Work on the next edition will commence in the first quarter of 2017 to align with SAE J2601.</p> <p>ISO 17268 Gaseous Hydrogen Land Vehicle Refuelling Connection Devices is developing a revised standard. The DIS is anticipated <del>in a few weeks shortly</del>, pending resolution of pressure definitions and relevant requirements.</p>	<p>ISO/CD 19880-3 Gaseous hydrogen -- Fueling stations -- Valves Covers the safety performance of valves over 1MPa for gaseous hydrogen fueling stations. Revised CD passed; however DIS 2 will be circulated in March 2017.</p> <p>CSA HPRD1 Work on the next revision of Pressure Relief Devices is pending.</p> <p>NFPA 55: Compressed Gases and Cryogenic Fluids Code: Reopened First Draft. Agreed to act on Public Inputs submitted to NFPA 2 on extract text from NFPA 55. Revision cycle has officially been changed from Annual 2018 to Annual 2019, and will remain in-cycle with NFPA 2.</p>	INFRASTRUCTURE
			RESEARCH

**FIGURE 1.** Sample page from FCHEA's Regulatory Matrix, showing progress in developing codes, standards, and regulations during the first half of 2017.

## CONCLUSIONS AND UPCOMING ACTIVITIES

The DOE objectives supported by this project are ongoing and on target to be reached between now and 2020.

- This project has produced further advances on U.S. model codes. This includes reference to available harmonized standards.
- Working along with H2USA, FCHEA has facilitated easy access to technical papers to aid adoption of NFPA 2 and withdrawal of regional restrictions (such as fuel cell electric vehicles in tunnels, over bridges, in parking garages, etc.).

International standards need to develop in a coordinated fashion to ensure they reflect the needs of industry and consistency with accepted practices.

- Significant progress: ISO/TC 197 WGs on hydrogen fueling stations and components.
- Progress: published standards being updated to reflect advances and learnings.
- CSA Group seed document on hydrogen fueling components to be brought back to CSA following ISO publication.

Significant work remaining: Work with stakeholders to update the national and international RCS templates to determine gaps and areas where harmonization efforts are needed. CSA has begun this effort for the national template. FCHEA to ensure industry priorities are reflected in updated templates, and provide technical experts to any resulting new efforts. Work closely with H2USA to provide expertise or data required to remove any regional restrictions for deployment of fuel cell electric vehicles and hydrogen infrastructure.



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## Welcome to the Hydrogen and Fuel Cell Safety Report

The Fuel Cell & Hydrogen Energy Association publishes the Hydrogen and Fuel Cell Safety Report, an electronic publication which provides information about developing hydrogen and fuel cell codes and standards and related safety information.

Search

Latest Safety Reports

March 2017 Safety Report

**FIGURE 2.** Hydrogen and Fuel Cell Safety Report

Portable Power WG: through IEC/TC 105, revise micro fuel cell and cartridges documents to ensure harmonization with international standards for fuel cells as carry on and checked baggage. Department of Transportation continues to not be harmonized with inclusion of Divisions 2.1 and 4.3 fuel cartridges for checked baggage (micro fuel cell applications).

Transportation WG: contribute to updating national and international RCS templates to ensure U.S. industry interests and priorities are reflected. Continue dialog with component manufacturers to resolve issues in advance of infrastructure roll-out.

Stationary Power WG: continue to review international standards and United States as well as state regulations to ensure consistency with accepted U.S. requirements and best practices.

Continue to administer the NHFCCSCC and publish the Safety Report.

Technology Transfer Activities: we develop consensus and information rather than technologies. These are shared openly at [www.hydrogenandfuelcellsafety.info](http://www.hydrogenandfuelcellsafety.info). We also hold regular working group meetings, monthly coordination webinars, and web-based workshops/webinars to reach beyond our membership.

FCHEA will continue to administer the NHFCCSCC, including identify key issues, and document discussions and outcomes. Provide industry feedback to the DOE Safety, Codes and Standards subprogram on RCS development needs and priorities; outreach needs and priorities; and R&D needs and priorities to support RSC development activities.

FCHEA will continue to produce the Hydrogen and Fuel Cell Safety Report to report on the developing RCS to increase awareness of published and developing requirements, improve coordination of activities, and improve information transfer.

## FY 2017 PUBLICATIONS/PRESENTATIONS

1. Markowitz, Quackenbush, and Dolan; “Fuel Cell & Hydrogen Energy Association Codes and Standards Support;” (project presented at the DOE Annual Merit Review; June 5–9, 2017, Washington, DC).