



Fuel Cell &
Hydrogen Energy
Association

Fuel Cell & Hydrogen Energy Association Codes and Standards Support

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(FCHEA)

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Project ID #SCS022

This presentation does not contain any proprietary, confidential, or otherwise restricted information

Overview

Timeline

- Project start date: 11/2011
- Project end date: 10/2016*

* Project continuation determined annually by DOE

Budget

- FY15 DOE Funding: \$200,00
- Planned FY16 DOE Funding: \$214,924
- Total DOE Project Value: \$1,059,792*

* Previous subcontract thru NREL

Barriers

- 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

Partners

- Interactions/ collaborations: FCHEA Members; CDOs & SDOs through NHFCCSCC and direct participation
- Project Lead -ORNL- Prime Contract

Relevance

- As the premiere trade association for the fuel cell and hydrogen energy industry, FCHEA utilized 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 project contributes directly to achievement of four of the seven objectives outlined in the Fuel Cell Technologies Office Multi-Year Research, Development and Demonstration Plan, Chapter 3.7, Hydrogen Safety, Codes, and Standards:
 - Support and facilitate development and promulgation of essential codes and standards to enable widespread deployment and market entry of hydrogen and fuel cell technologies and completion of all essential domestic and international RCS by 2020.
 - Ensure that best safety practices underlie research, technology development, and market deployment activities supported through DOE-funded projects.
 - Conduct R&D to provide critical data and information needed to define requirements in developing codes and standards.
 - Develop and enable widespread sharing of safety-related information resources and lessons learned with first responders, authorities having jurisdiction (AHJs), and other key stakeholders.

Relevance - Objectives

- Support and facilitate development and promulgation of essential codes and standards to enable widespread deployment and market entry of hydrogen and fuel cell technologies and completion of all essential domestic and international RCS by 2020.
- FCHEA participates directly in key domestic and international RCS technical committees; and encourages members to participate directly in appropriate technical committees, working groups or discussions. Member companies can therefore participate directly or indirectly as appropriate.
 - ISO/TC 197 – many new work groups to support gaseous hydrogen refueling; as well as revisions to published standards. ISO work items are reviewed and tracked by the appropriate FCHEA WGs.
 - IEC/TC 105 – fuel cell requirements with efforts to harmonize with national standards and international regulations. Our stationary power and portable power working groups review and track IEC/TC 105 documents and work to promote harmonization with national codes, standards and regulations.
 - CSA Fuel Cell Standards Committee – Staff participates on this committee and takes items to the appropriate FCHEA WGs for discussion and action. CSA develops national standards and serves as secretariat for the US TAG on IEC/TC 105.
 - NFPA 2: Hydrogen Technologies- staff serves on the NFPA Hydrogen Technologies Committee and acts as proponent for FCHEA member public input developed through our Transportation Working Group Hydrogen Codes Task Force.
 - ICT Fuel Cell Guidance for the Telecommunications Industry Association – staff served as liaison between the TIA and FCHEA, and ensured industry had the opportunity to review and shape draft documents.
 - Others as needs arise

Relevance to DOE Objectives

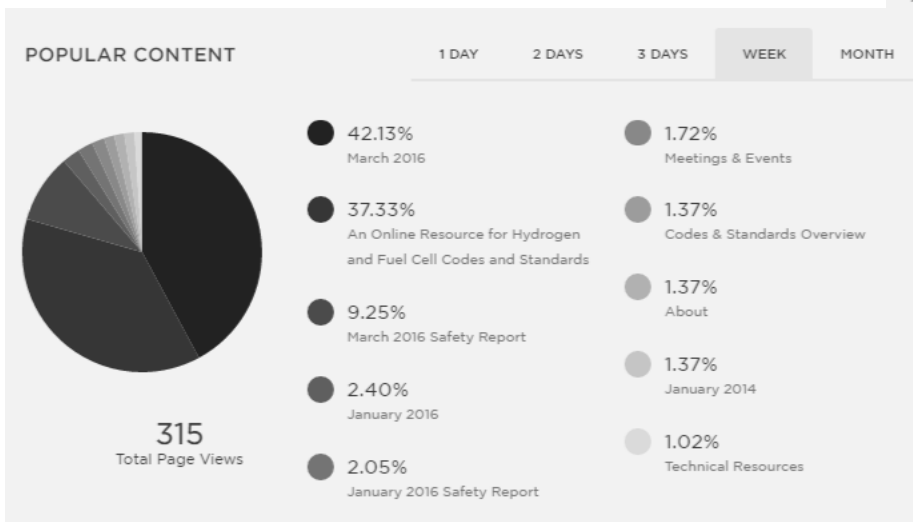
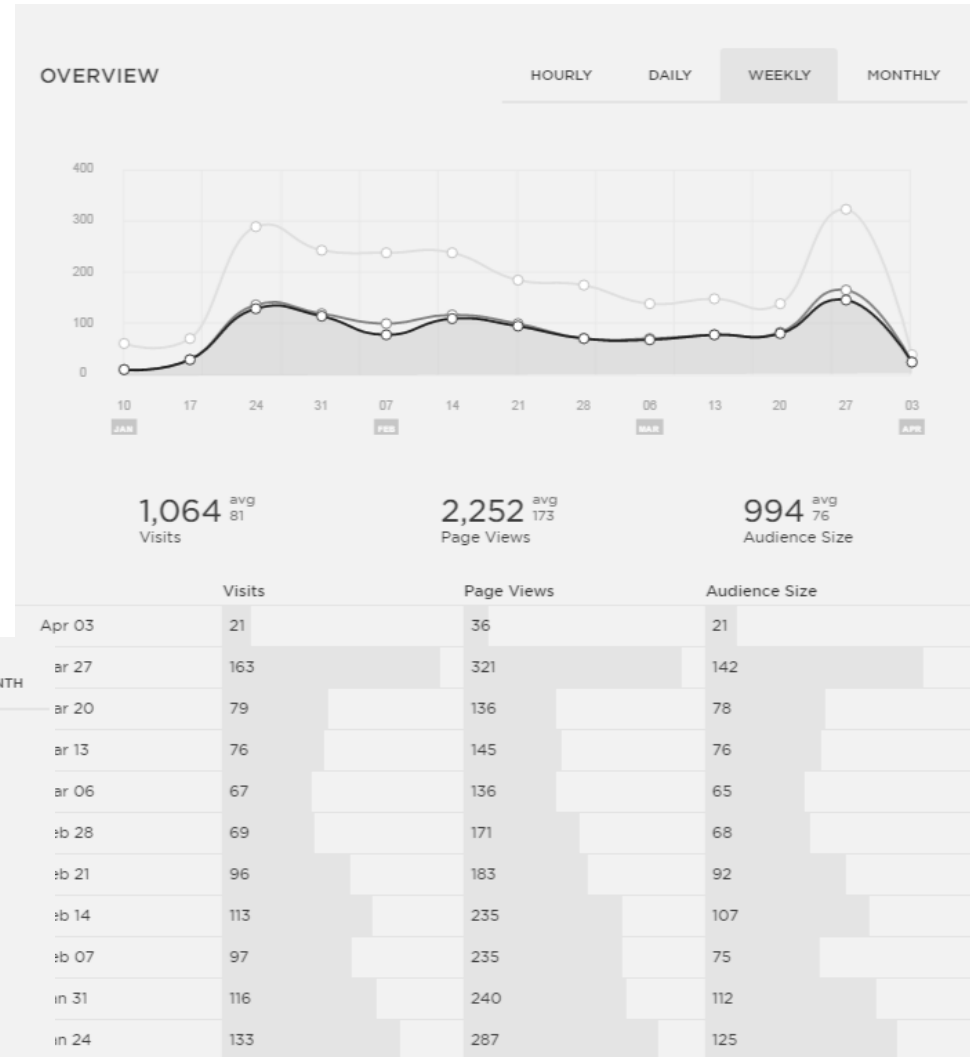
- Ensure that best safety practices underlie research, technology development, and market deployment activities supported through DOE-funded projects.
 - FCHEA supports information-sharing of pre-competitive safety information
 - Open discussions during FCHEA Working Group and Task Force meetings between codes and standards development organizations, researchers, government and industry. Aids harmonization of requirements and enhances collaboration. Provides mechanisms for industry to contribute to the development of requirements. Members are encouraged to participate directly – but when this is not practical, they may contribute to development of FCHEA comments and voting.
 - Identify and schedule Topical Discussions during monthly meetings of the National Hydrogen and Fuel Cell Codes & Standards Coordinating Committee (NHFCCSCC) which FCHEA administers. Enables industry priorities to be discussed and synergistic activities to be coordinated. Topics are then discussed within the appropriate FCHEA WGs to broaden awareness and participation in development of activities to address identified topics.
 - Posting and/or linking data, workshop proceedings, and other informational resources online at www.hydrogenandfuelcellsafety.info. This facilitates access to available resources as well as a providing a mechanism for reaching out to others working on similar activities.

Relevance to DOE Objectives – Cont'd

- Conduct R&D to provide critical data and information needed to define requirements in developing codes and standards.
 - FCHEA conducts forums to identify R&D needs, and engages in dialog with DOE; providing a mechanism for input and feedback into DOE R&D plans and activities.
 - FCHEA Working Groups set industry priorities and engage in related activities with outside organizations. (Examples: TIA, component manufacturers)
 - Direct participation in National CDO/SDO Technical Committees
 - Examples include SAE, CSA standards development, model code development, engagement with hydrogen component manufacturers
 - Direct participation in US TAG for ISO/TC 197 and IEC/TC 105 with opportunities for FCHEA members to review and comment on developing draft documents.
 - Facilitation and documentation of monthly NHFCCSCC meetings
 - Monthly summary reports
 - Strategic meetings of FCHEA Board of Directors and Executive Committee
 - DOE is invited to engage with industry in discussions of accomplishments and challenges.

Relevance to DOE Objectives – Cont'd

- Develop and enable widespread sharing of safety-related information resources and lessons learned with first responders, authorities having jurisdiction (AHJs), and other key stakeholders.
- *The Hydrogen and Fuel Cell Safety Report* is read by thousands of interested parties all over the world. 2,200 people, including AHJs and first responders, have signed up to receive E-mail notification when new issues are posted. Many others find it through Internet searches and bookmarks.
- Provided information and photos in support of NFPA 2 staff presentation to Regional Directors responsible for facilitating state and regional adoption of NFPA documents.



Relevance - Impact

- Enabling National and International Markets Requires Consistent RCS (Barrier F)
 - Lack of consistency limits international trade and markets.
 - This is a key issue identified by industry, and is the reason that we work to ensure developing standards are technically consistent with published standards.
- Insufficient Synchronization of National Codes and Standards (Barrier H)
 - The codes and standards development and revision cycles established by SDOs vary and are difficult to coordinate or synchronize even under a consensus national agenda.
 - FCHEA maintains a matrix to provide a single resource for stakeholders to see which activities are active, the status and next steps, and publication or revision dates.
 - FCHEA facilitates the monthly meetings of the NHFCCSCC, where CDOs/SDOs can share information about timing and issues; and where industry and researchers can engage in the discussion and provide essential linkages. Organizations that report out during the calls include: DOE, DOT, IEC, NFPA, ICC, CSA, SAE, ASTM, ASME, H2USA, H2FIRST, The State of California, and NIST.
 - FCHEA staff participates directly in the key national and international codes and standards technical committees to provide consistency.
- Limited Participation of Business in the Code Development Process (Barrier J)
 - Businesses, particularly small businesses, do not always have the resources to participate fully in the codes and standards development process.
 - Participation in FCHEA RCS Working Groups allows these businesses opportunities to be briefed on the RCS efforts of interest; to weigh in on issues that arise; and to review documents in order to develop a FCHEA comment or position.
 - The Hydrogen and Fuel Cell Safety Report and the FCHEA Regulatory Matrix provide quick overview information

Sample Page from Matrix

Significance to Commercialization
 ⇐ More Critical
 Highest Effort

← Significance

↑ Level of Effort

A. Essential To or Enables Commercialization	B. Important to Commercialization	C. Supports Commercialization	
	<p>ICAO <i>Technical Instructions for the Safe Transport of Dangerous Goods by Air</i>: published every two years. <i>2013 edition includes</i> references to IEC 62282 – 6 – 100 for both carry on and checked baggage, October 2012, inclusion of A1 approved for inclusion by addendum. Publication of addendum 3 occurred June 10, 2013. (micro fuel cell applications)</p> <p>Work commencing to clarify restrictions on charging of batteries by fuel cell devices. Future work anticipated as edition 2 of IEC 62282-6-101 nears completion to more explicitly include new technologies in the regulations.</p> <p>ICAO technical instructions took effect January, 2015.</p>		CARGO
<p>IEC 62282-4-102: Fuel cell systems for forklift applications – Performance requirements and test procedures: Approved for 2nd Committee Draft All 7 USTAG comments to the 1st Committee Draft were accepted.</p> <p>A Group HPIT 1 System Components in Hydrogen Powered Industrial Trucks: published reh 2015. To be removed next version of matrix.</p>			VEHICLES
<p>19880-1 Gaseous Hydrogen Filling Stations. continues to have frequent meetings to accomplish aggressive schedule to achieve an IS in 2015. Effort launched in Dec 2013 as ISO 19880-allowing cancellation of ISO 20100 effort. First work item will be a Technical Report. Clean Energy Partnership is providing WG 24 their</p>	<p>ISO 19880-2: Gaseous hydrogen filling station dispensers was started in Dec 2013. To be coordinated with ISO 19880-1 and component standards. This standard will focus on safety aspects of dispenser equipment whereas performance of the fill will be governed by the</p>	<p>ASME B31.12 H2 Hydrogen Piping and Pipelines Code: published 2012-2nd edition in progress-Revised B31.12-2014 to be published by the end of January-March 2015 - to supersede B31.12-2011. To be removed next version of matrix.</p>	INFRASTRUCTURE

Through the use of “Track Changes” software, users can quickly identify what has changed during the past quarter. The “track changes” version is reviewed by our WGs and the NHFCCSCC, and provided to ORNL each quarter. Clean copies are available upon request and archived, and form the basis of the next quarters mark-up.

Approach: FCHEA WGs

- FCHEA Working Groups provide regular opportunities to engage industry in developing RCS:
 - **Transportation WG**
 - Transportation Infrastructure standards, R&D, deployment.
 - Hydrogen Codes Task Force
 - In process of developing public code change proposals for 2018 editions of NFPA 2/NFPA 55
 - Coordinating with H2USA to address known restrictions for FCEVs and hydrogen infrastructure in state and regional regulations.
 - **Stationary Power WG**
 - Supports the Telecommunications Industry Association's (TIA) focus group on fuel cells and tracks RCS relating to Stationary Power.
 - Recent topics include the TIA focus group, new work item proposals and opportunity to comment on draft revisions to International Standards on stationary fuel cells from IEC/TC 105
 - **Portable Power WG**
 - Complete regulatory framework to ship and to allow consumer transport of FCs and FC cartridges to be regulated in parity with similar technologies.
 - RCS from UL, CSA, DOT, the UN, ICAO, IEC and others.
 - Encourage international harmonization of requirements; adoption of international standards into regulations, and equal opportunity for all micro fuel cell technologies.

FCHEA RCS Activities Flow

** All members are encouraged to participate in RCS activities appropriate to their business. Outside experts are invited as needed to address topics of interest to industry.*

TWG Membership

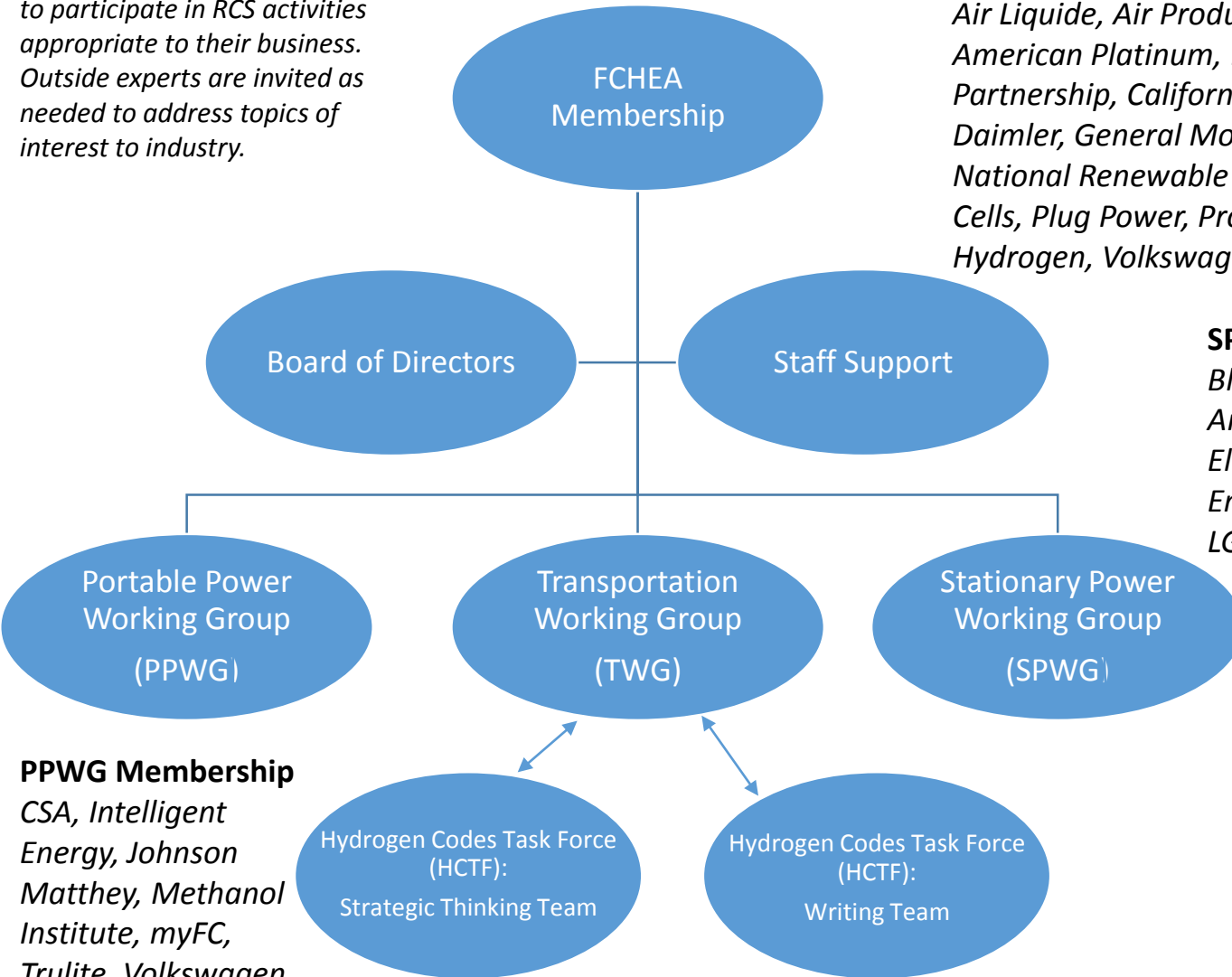
Air Liquide, Air Products and Chemicals, Anglo American Platinum, BMW, California Fuel Cell Partnership, California Air Resources Board, CSA, Daimler, General Motors, Honda, Hydrogenics, Nissan, National Renewable Energy Laboratory, Nuvera Fuel Cells, Plug Power, Proton OnSite, Shell, Toyota, United Hydrogen, Volkswagen

SPWG Membership

Bloom Energy, Doosan Fuel Cells America, FuelCell Energy, Fuji Electric, Hydrogenics, Intelligent Energy, LG FCS, Plug Power, Trulite

HCTF Membership

Air Liquide, Air Products & Chemicals, California Fuel Cell Partnership, First Element, National Renewable Energy Laboratory, Nissan, Nuvera Fuel Cells, Toyota, Other invited experts



PPWG Membership

CSA, Intelligent Energy, Johnson Matthey, Methanol Institute, myFC, Trulite, Volkswagen


Approach: Coordination and Outreach

NHFCCSCC (monthly)

- Forum for effective communication and collaboration
- Facilitates the development of the consensus-based C&S
- Identifies critical gaps and makes recommendations to address them.



HOME ARCHIVE COMMITTEE RESOURCES TECHNICAL RESOURCES MEETINGS & EVENTS ABOUT CONTACT



An Online Resource for Hydrogen and Fuel Cell Codes and Standards

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.

In addition, this site supports the activities of the National Hydrogen and Fuel Cells Codes & Standards Coordinating Committee, an entity consisting of a large number of organizations involved in the development of codes and standards for hydrogen energy systems and fuel cells

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Latest Safety Reports

March 2016 Safety Report

Mar 29, 2016

January 2016 Safety Report

Jan 29, 2016

November 2015 Safety Report

Dec 9, 2015

Sign up for the Safety Report

SIGN UP

Safety Report (bi-monthly)

- Central source of information on RCS activities and issues
- Improves coordination of RCS activities and information transfer
- Meetings of the NHFCCSCC
- Summarizes key domestic and international RCS issues
- List key upcoming events and issues



HOME ARCHIVE COMMITTEE RESOURCES TECHNICAL RESOURCES MEETINGS & EVENTS ABOUT CONTACT

March 2016

March 2016 Safety Report

NFPA 2 Update

Karon Quackenbush, FCHEA

Proposed NHTSA Rule May Facilitate FCEVs and Hybrids

Karon Quackenbush, FCHEA

ICC Hearings

Karon Quackenbush, FCHEA

Request for Information on Hoses for Hydrogen Fueling

Karon Quackenbush, FCHEA

DetecTape Webinar

Karon Quackenbush, FCHEA

National Hydrogen and Fuel Cells Codes & Standards Coordinating Committee Teleconference - December 2015 Minutes (PDF)

Connor Dolan, FCHEA

National Hydrogen and Fuel Cells Codes & Standards Coordinating Committee Teleconference - February 2016 Minutes (PDF)

Connor Dolan, FCHEA

Latest Safety Reports

March 2016 Safety Report

Mar 29, 2016

January 2016 Safety Report

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November 2015 Safety Report

Dec 9, 2015

Sign up for the Safety Report

SIGN UP

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Approach to Resolve Technical Challenges

- Challenge: Development and Harmonization of Regulations, Codes and Standards
 - Facilitate the development of clear and comprehensive codes and standards to ensure consistency and facilitate deployment of hydrogen and fuel cell technologies
 - Reduce competition between individual SDOs and to minimize duplication in domestic codes and standards development. Coordinated development of international standards is also a key challenge.
 - APPROACH: Technology and application-specific forums to identify issues and discuss progress and needs in developing RCS; open dialog between CDOs/SDOs, government and research organizations, industry and users; Direct Participation in RCS-development activities; and information dissemination and outreach to develop consensus requirements to ensure consistency.
- Challenge: Dissemination of Data, Safety Knowledge, and Information
 - General lack of understanding of hydrogen and fuel cell safety needs among local government officials, fire marshals, and the public. Failure to comprehensively consider the properties and behavior of hydrogen may lead to overly restrictive policies that preclude or delay deployment of hydrogen and fuel cell technologies.
 - APPROACH: FCHEA publishes, maintains, and disseminates key safety information through the *Hydrogen and Fuel Cell Safety Report* website at www.hydrogenandfuelcellsafety.info; and works with stakeholders to disseminate FCV and infrastructure-deployment activities, internally as well as externally. Recent activity – direct engagement with component manufacturers to contribute to harmonized requirements and identify concerns and challenges.
- Milestones: Monthly summaries, bi-monthly Safety Report
 - Aligned with the Go/No-Go Decisions in DOE's current plans. Provides regular mechanism to identify and address industry priorities.

Accomplishments and Progress: Portable Power

- Standards and Regulations for micro fuel cells
 - Working to ensure International Standards are inclusive of all fuel types. IEC 62282-6-101 Edition 2, and associated “fuel specific” Part 2 documents. Held open meeting to reach out to manufacturers.
 - Ensuring that appropriate international standards for shipping of fuel cells and fuel cell cartridges are included in the ICAO Technical for the Safe Transport of Dangerous Goods by Air.
 - Provided input during PHMSA Office of Hazardous Materials Safety R&D Forum on interest in classification for novel micro fuel cell systems and testing of modern cartridge designs.
- Significance: Supports Objective from MYRDD - 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.
- Take Home Message: Regular dialog in FCHEA WGs and consistent messaging and participation in relevant RCS forums can result in consistent RCS.

Accomplishments and Progress: Transportation and Stationary

- **Transportation WG:** Infrastructure RCS review. Administers Hydrogen Codes Task Force to review and develop public input for NFPA 2. Initiated development of comments for I-Codes as well as 2018 editions of NFPA 2 and NFPA 55 model codes.
 - Task Group is developing harmonized public inputs for the next development cycles of key model codes. The public inputs are solicited from business and experts with operational experience, and focus on harmonizing requirements with other industry-accepted standards and codes.
 - Significance: Supports Objective from MYRDD – Provides consistent RCS and synchronization of national codes and standards.
 - Take Home Message: FCHEA WGs and TFs work collaboratively with others to effectively make changes to developing RCS
- **Stationary Power WG:** Forum for engaging in the development of RCS for stationary applications. FY 13 a fuel cell focus group was created by the Telecommunications Industry Association (TIA). FCHEA's SPWG provides support and fuel cell experts, and assisted in populating a new draft guideline with relevant information from existing codes, standards, and guides. WG also reviews and provides feedback on draft documents, including New Work Item Proposals
 - Significance: Supports Objective from MYRDD – Develop and enable widespread sharing of safety-related information resources and lessons learned with first responders, authorities having jurisdiction (AHJs), and other key stakeholders. Provides consistency in requirements and reduces duplication of effort.
 - Take Home Message: FCHEA works with other stakeholders, even where FCHEA is not leading the activity, to ensure valuable resources are shared.

Accomplishments and Progress

- Coordination
 - NHFCCSCC – Monthly facilitated discussion of new key topics of broad interest, such as “Facilitating Deployment”, and “H2FIRST”. Progress in the development of RCS is reported and captured for the FCHEA Regulatory Matrix, providing an up-to-date overview of current industry priorities and recent progress in RCS.
 - Hydrogen & Fuel Cell Safety Report – Published every two months, keeping readers informed of the progress and issues encountered in the development of RCS. Has introduced industry to the many new WGs in ISO/TC 197 and the call for participation in US standards committees. Calendar of events aids in scheduling meetings.
- Significance: Contributes to DOE goal to develop and enable widespread sharing of safety-related information resources and lessons learned with first responders, authorities having jurisdiction (AHJs), and other key stakeholders. Increases participation of stakeholders in development of harmonized RCS.
- Take-Home Message: FCHEA is building relationships and working directly with stakeholders to identify and address issues in order to ensure consistency in RCS and facilitate deployment of hydrogen and fuel cell technologies.

Responses to Previous Year Reviewers' Comments – Part 1

- This work is critical and needs to continue. Relationship building is crucial, and the project is focusing on this. Ideally, the information developed by this effort will be integrated into existing systems/orgs.
 - Specific example is how review and development of 2016 NFPA 2 facilitated harmonized proposals for the I-Codes; which in turn is now coming back to development of code change proposals for NFPA 2 and NFPA 55.
- Coordination with multiple SDOs/CDOs is a strength of the project but interfacing with pre-normative activities may be improved. Lack of interface with research activity. No change is needed but FCHEA could play the role for interfacing normative activities with research or pre-normative activities (round robin test)
 - FCHEA is happy to contribute to such activities; and in particular strives to connect desired technical experts to pre-normative activities. We are always interested in engaging with such activities within the scope of our efforts, and work within the appropriate working groups to prioritize our RCS activities based on importance of the activity to commercialization of fuel cells and adoption of hydrogen technologies and infrastructure. (see our Matrix activity, slides 8 and 9)
 - FCHEA's PPWG is specifically working with research activities which can develop the data needed to promote harmonized shipping requirements for micro fuel cell systems. (slide 10)
- The meetings and connectivity is clearly happening. There appears to be a lack of direct impacts apart from coordination which is important but a soft goal. More emphasis should be put on other direct impacts.
 - TIA fuel cell guideline is now in publication (slide 10)
 - Coordination of micro fuel cell power systems safety requirements is leading toward R&D to develop science-based information for International Standards and regulations. (slide 10)
 - Consistent code development process is leading to clearer, harmonized code requirements for hydrogen and fuel cell systems. (slide 14 and above)

Responses to Previous Year Reviewers' Comments – Part 2

- Future work seems to be more of the same. Have alternative approaches been fully-explored? Is there a way to better anticipate looming hurdles for the industry?
 - Development of science-based, harmonized codes, standards and regulations takes time, as the code and standard development organizations have to comply with strict protocols.
 - Our collaborations with other organizations allows exchange of ideas and engagement of appropriate parties to do more than FCHEA could do alone. Key examples include state and regional restrictions of FCEVs. H2USA leads this effort, while FCHEA focuses on developing improved model codes which address the concerns which led to the restrictions; and FCHEA providing information and photos in support of briefings to key decision-makers who can help lift restrictions. Another example is participation in efforts to develop guidelines for user-groups such as the TIA effort.
 - Hurdles are specifically explored within FCHEA Working Groups, during review of model codes, in partnership with H2USA, and during the monthly NHFCCSCC meetings – to name a few.
- Progress sometimes bogs down with standards bureaucracy
 - Our extensive stakeholder engagement allows us to anticipate timeframes for standards-development, and work toward interim products such as position papers, technical articles, technical reports, etc., to move forward with key priorities.
- To the maximum extent possible, this effort should integrate with the H2tools.org and H2 Safety Panel efforts so that lessons learned are centralized and accessible to all.
 - We agree, and have been engaged with both efforts to promote exchange of information in both directions.

Collaborations

- FCHEA performs this work with ORNL.
- FCHEA members represent the full global supply chain, including universities, government laboratories and agencies, trade associations, fuel cell materials, components and systems manufacturers, hydrogen producers and fuel distributors, utilities and other end users. Members direct our activities, provide input to RCS through FCHEA involvement; review and prioritize our efforts.
- CDOs/SDOs through direct participation on RCS activities, participation in the NHFCCSCC, and participation in appropriate FCHEA WGs. This facilitates information-sharing and synchronization.
- FCHEA's PPWG is collaborating with appropriate research activities to address future research needs to inform harmonized safety standards and regulations.
- FCHEA works with the full range of stakeholders, including industry, state and local officials, and others to address RCS and outreach needs and facilitate deployment.
 - State and regional RCS issues identified by H2USA are coordinated with FCHEA's national and international efforts. FCHEA also provides information upon request to address specific regional needs.
- FCHEA works closely with DOE to facilitate productive dialog on industry priorities, R&D needs, and deployment barriers; as well as to promulgate R&D results and information and data resources available through DOE-funded projects.

Remaining Challenges and Barriers

- The four objectives supported by this project are ongoing and on target to be reached between now and 2020.
- Further advances on US Model Codes. This includes reference to available harmonized standards.
- Easy access to guidelines for AHJs to facilitate adoption of NFPA 2 and withdrawal of regional restrictions (such as FCEVs in tunnels, over bridges, in parking garages, etc.)
- US harmonization with IEC 62282-6-100 for inclusion of division 2.1 and 4.3 fuel cartridges for checked baggage.
- 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.
 - Residential and industrial Electrolysers documents, hydrogen stored in metal hydrides, gaseous hydrogen vehicle tanks.
 - Significant work remaining: Component standards – significant effort launched this year to engage more component manufacturers in development of requirements, and to understand their concerns and issues. US experts beginning to map out the similarities and differences between US best practice and developing international requirements.

Proposed Future Work

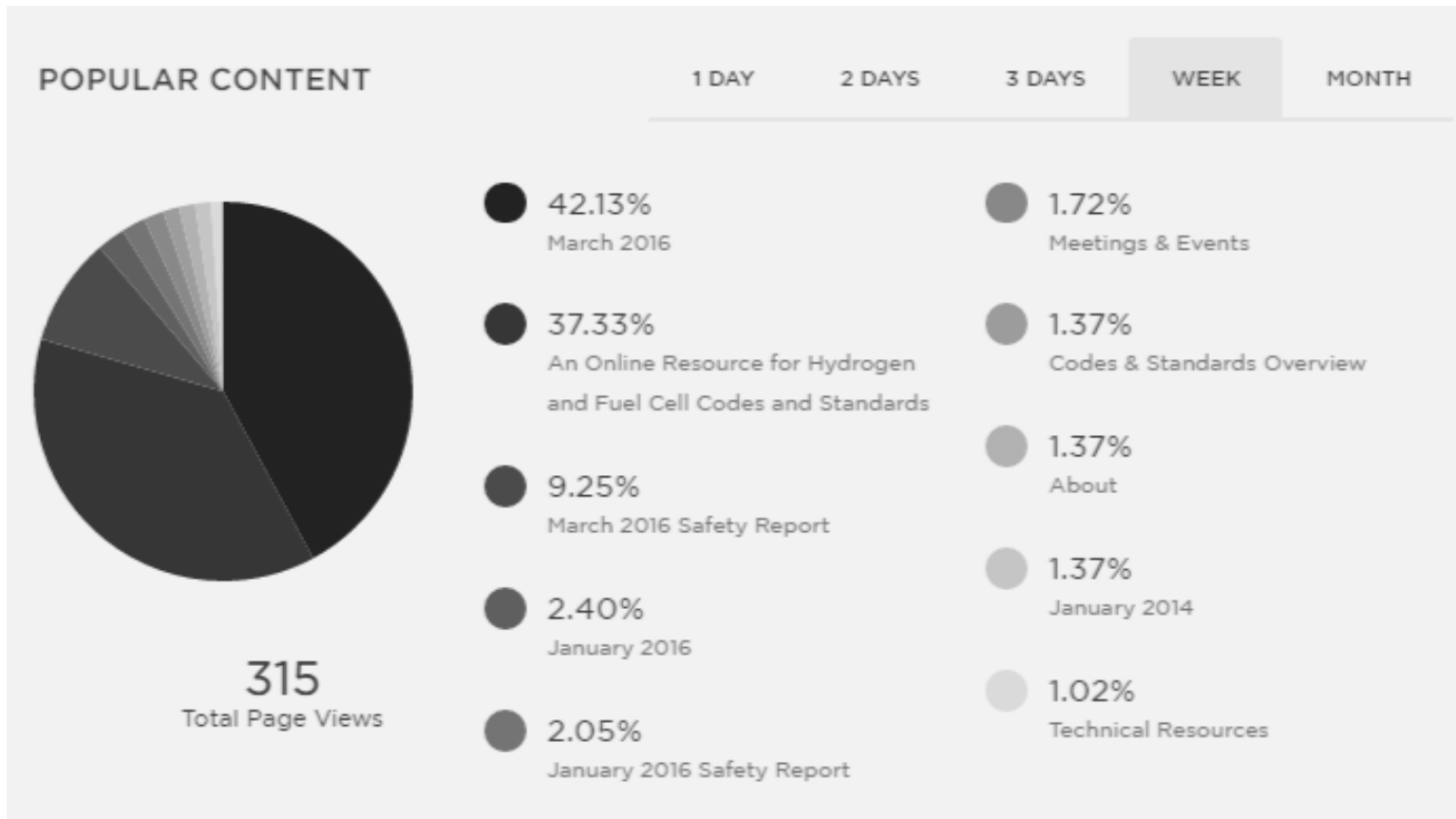
- **Portable Power WG:** To ensure harmonization with international standards for fuel cells as carry on and checked baggage. DOT continues to not be harmonized with inclusion of division 2.1 and 4.3 fuel cartridges for checked baggage (micro fuel cell applications). FCHEA is pursuing inquiry within the US DOT PHMSA to determine options to have these regulations harmonized.
- **Transportation WG:** Special Task Force for Strategic Planning and Code Writing Team – complete the next round of code revisions, predict potential future needs. Continue dialog with component manufacturers to resolve issues in advance of infrastructure roll-out.
- **Stationary Power WG:** Continue to review international standards and US as well as state regulations to ensure consistency with accepted US requirements and best practices.
- Coordination
 - **NHFCCSCC** – continue to administer, identify key issues, and document discussions and outcomes. Provide industry feedback and other input to the Department of Energy (DOE) Safety and Codes and Standards Subprogram on RCS development needs and priorities; outreach needs and priorities; R&D needs and priorities to support RSC development activities.
 - **Safety Report** – continue to report on the developing RCS to improve coordination of activities and improve information transfer.
- **Technology Transfer Activities:** We develop consensus and information rather than technologies. These are shared openly at www.hydrogenandfuelcellsafety.info. We also hold regular working group meetings, monthly coordination webinars, and web-based workshops/webinars to reach beyond our membership.

Project Summary

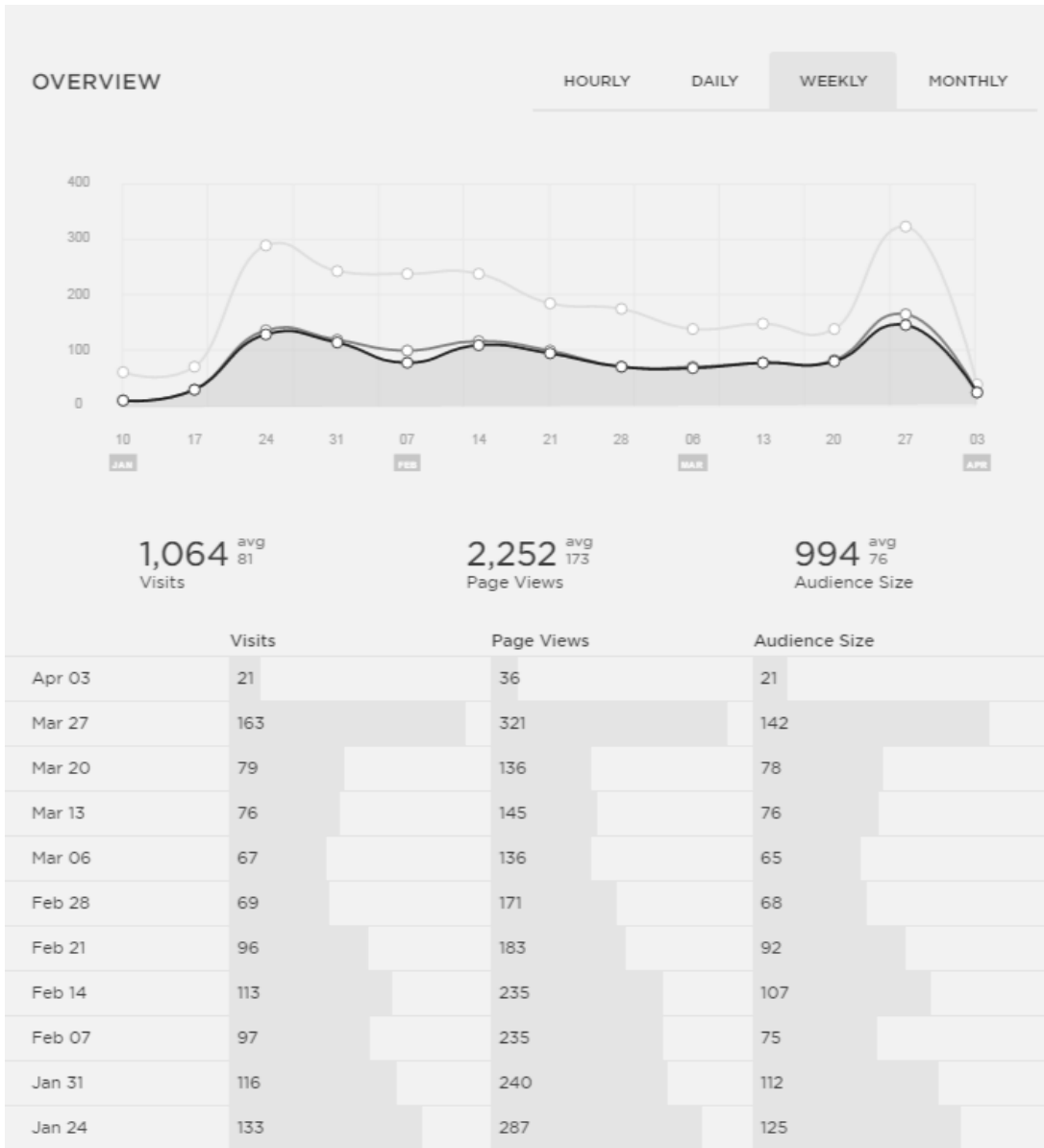
- **Relevance:**
 - FCHEA project contributes directly to achievement of four of the seven objectives outlined in the Fuel Cell Technologies Office Multi-Year Research, Development and Demonstration Plan. Project facilitates industry participation in essential codes and standards to meet DOE goals.
- **Approach:**
 - Multi-tiered approach: forums to identify issues and discuss progress and needs in developing RCS; facilitating open dialog; participating directly in national and international RCS-development activities; information dissemination & outreach tools.
- **Technical Accomplishments:**
 - Significant progress in harmonizing national and international requirements for transportation of portable fuel cells in passenger aircraft; proposals to improve harmonization in domestic RCS; maintained central point of information for RCS activities; identified and communicated needs in RCS, R&D, and outreach.
- **Proposed Future Work:**
 - Continued focus on harmonization of requirements to facilitate deployment; ensure international standards are consistent with US practices; continue building relationships with key stakeholders, including outside associations; continue dialog with component manufacturers to facilitate deployment of hydrogen infrastructure; complete code inputs for 2018 code revision cycle.

Backup Slides

Safety Report Viewing Statistics



Safety Report Page Visits



FCHEA Members

FCHEA represents members throughout the global supply chain of the fuel cell and hydrogen energy industry, including fuel cell manufacturers and component suppliers, industrial gas suppliers, automakers, energy companies, non-profits, national laboratories, associations, and others. Our members as of 4/5/2016 are:

- 3M
- Air Liquide
- Air Products and Chemicals
- American Honda Motor Company
- Anglo American Marketing Limited
- ARC: Hydrogen
- AREVA
- Ballard Power Systems
- Bloom Energy
- BMW of North America, Inc.
- California Air Resources Board
- California Fuel Cell Partnership
- Connecticut Hydrogen-Fuel Cell Coalition
- CSA Group
- Daimler
- Doosan Fuel Cell America
- Fuel Cell Seminar & Energy Exposition
- FuelCell Energy
- Fuji Electric
- General Motors
- Gore Fuel Cell Technologies
- Hydrogenics
- Hyundai Motor Company
- Idaho National Laboratory
- Intelligent Energy
- ITM Power
- Johnson Matthey Fuel Cells
- LG Fuel Cell Systems Inc.
- McPhy Energy
- Methanol Institute
- MyFC
- National Renewable Energy Laboratory
- Nebraska Public Power District
- Nissan Technical Center North America
- Nuvera Fuel Cells
- Ohio Fuel Cell Coalition
- Pajarito Powder
- PDC Machines
- Plug Power
- Proton OnSite
- Sandia National Laboratories
- Savannah River National Laboratories
- SCRA
- Shell Oil Company
- South Coast Air Quality Management District
- The Linde Group
- Toyota Motor North America
- Treadstone Technologies
- United Hydrogen
- Volkswagen Group of America