Fuel Cell & Hydrogen Energy Association

National Hydrogen and Fuel Cell Codes and Standards Coordinating Committee (NHFCCSCC)

Wednesday, April 6, 2016
TIME: 3:00 – 4:30 pm (Eastern Standard Time)

Agenda

Attendees

Connor Dolan	**Jay Keller**	**Norm Newhouse**
Greg Chirdon	**Jennifer Hamilton**	**Karen Quackenbush**
Eric Nelson	**Juana Williams**	**Kelvin Hecht**
Eric Parker	**Julie Cairns**	**Scott Lindsay**
Jesse Schneider	**Mike Steele**	**John Grimes**
Ernst Baumgartner	**Nick Barilo**	

I. Welcome and Housekeeping Items

- Review FCHEA's anti-trust guidelines - Available on FCHEA's members only website and a copy can be provided to you on request.
- Review the meeting agenda.
- Approve the March draft meeting minutes.

II. DOE/HQ Update — Will James

The DOE Hydrogen Technical Advisory Committee is currently meeting in California today and tomorrow.

III. C&S Events and Fuel Cell Safety Information

http://www.fuelcellstandards.com/calendar_new.html — **Kelvin Hecht**

http://www.hydrogenandfuelcellsafety.info/events/ — **Karen Quackenbush**

Request: technical resource updates for the Hydrogen and Fuel Cell Safety website. Any committee members who have materials they would like hosted on the website can send them to Karen Quackenbush (khall@fchea.org) or Connor Dolan (cdolan@fchea.org).

Request: Please notify Karen or Connor of any meetings / events to add to the calendar.

Items to add – SAE World Congress to the calendar

IV. Global Technical Regulations — Nha Nguyen

Jay Keller – The GTR phase two is being kicked off. Potentially in June.

V. Codes and Standards Organization Updates

IEC TC 105 **Kelvin Hecht**

Working Group 1 - Terminology (Zhigang Qi, China) Burpee, Hecht, Lindsay, Maurer, Milas, Ullman

- IEC/TS 62282-1:2013 Ed.3 *Terminology*
  - New convener working to incorporate IEC/TS 62282-1 into IEC International Electrotechnical Vocabulary

Working Group 2 – Fuel Cell Modules (E. Schwendemann, Germany) Burpee, Chirdon, Florence, Lindsay, Maurer, Milas, Ullman

- IEC 62282-2:2012 Ed. 2 *Fuel Cell Modules (Safety)*
  - Comments for edition 3 posted in 105/570/INF

- IEC 62282-2-201 *Fuel Cell Modules (Performance)*
  - New work (A. Dyck, Germany)

Working Group 3 – Stationary Fuel Cell Power Systems (K. Hecht, USA) Burpee, Chirdon, Florence, Hecht, Lindsay, Maurer, Milas, Ullman

- IEC 62282-3-100:2012 Ed. 1 *Stationary Fuel Cell Power Systems – Safety*
  - National committee comments posted in 105/558/DC
  - Japan proposing new annex for small power systems
  - Meeting scheduled for June 14-16 in Washington

Working Group 4 – Performance of Fuel Cell Power Systems (N. Hashimoto, Japan) Burpee, Chirdon, Maurer, Milas, Ullman, Viswanathan

- IEC 62282-3-200:2015 Ed.2 *Stationary Fuel Cell Power Systems – Performance*

- IEC 62282-3-201:2013 Ed.1 *Stationary Fuel Cell Power Systems – Performance of Small Fuel Cells*
  - CDV posted for Ed. 2 in 105/564/CDV
  - Comments to US TAG by June 3

Working Group 5 – Stationary Fuel Cell Power Systems – Installation (E. Schwendemann, Germany) Burpee, Chirdon, Hecht, Lindsay, Maurer, Milas, Ullman

- IEC 62292-3-300:2012 Ed.1 *Stationary Fuel Cell Power Systems – Installation*
  - Reaffirmed February 2016

Working Group 6 – Propulsion (other than road vehicles) and APU (G. Tsotridis, Netherlands) Chirdon, Florence, Medwin, Milas

- IEC 62282-4-101:2014 Ed.1 *Electrically Powered Industrial Trucks – Safety*

- IEC 62282-4-102 *Electrically Powered Industrial Trucks – Performance*
  - CDV posted in 105/562/CDV
  - Comments to USTAG by May 13

Working Group 7 – Portable Fuel Cells (convener, open) Chirdon, Florence, Lindsay, Milas

- IEC 62282-5-1:2012 Ed.2 *Portable Fuel Cell Power Systems – Safety*

Working Group 8 – Micro Fuel Cells – Safety (convener, open) Chirdon, Florence, Lindsay, Quackenbush

- IEC 62282-6-100:2010 *Micro Fuel Cells Power Systems – Safety*
  - Corrigendum 2011
  - Amendment 2012
  - Next update designated PWI (developing technology; preliminary work)
  - Waiting new convener

Working Group 9 – Micro Fuel Cells – Performance (Yokoyama, Japan) Chirdon

- IEC 62282-6-200:2012 Ed.2 *Micro Fuel Cells Power Systems – Performance*
  - Edition 3 approved for publication

Working Group 10 – Micro Fuel Cells – Interchangeability (H. Lee, Korea/ T. Moriga, Japan) Chirdon

- IEC 62282-6-300:2012 Ed.2 *Micro Fuel Cell Power Systems – Fuel Cartridge Interchangeab*ility

Working Group 11 – Cell Testing (K. Koseki, Japan) Chirdon, Ullman

- IEC/TS 62282-7-1:2010 Ed.1 *Single Cell Test methods for PEFC*
  - CD posted for edition 2 in 105/568/DTS
  - Comments to US TAG by April 29

- IEC/TS 62282-7-2:2014 Ed.1 *Single Cell/Stack – Performance Test Methods for SOFC*

Working Group 12 – Small Stationary Fuel Cells with Combined Heat and Power (N. Chmielewski, Switzerland) Chirdon, Hecht, Lindsay, Ullman

- IEC 62282-3-400 *Small Stationary Fuel Cells with Combined Heat and Power*
  - Results of CD voting posted in 105/563A/RVC

Working Group 13 – Energy Storage Systems Using Fuel Cell Modules in Reverse Mode (T. Kameda, Japan, S. McPhail, Italy, H. Yu, China) Burpee

- SOFC single cell/stack performance - PEM single cell/stack performance – power-to-power performance
  - New work

Joint Working Group with TC21 Viswanathan
Flow Battery Systems for Stationary Applications

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Karen Quackenbush – FCHEA's Portable Power Working Group is interested in the activities of WG 08. Part 2 documents have never been published. How do we get this process moving again? Do we submit an RR form or a new work item proposal?

Kelvin Hecht – This activity is waiting for a new convener. The Chairman of IEC 105 has said he would take on this position, though he has not made an effort to date.

NFPA 2 **Martin Gresho / Susan Bershad**

NFPA 2 is open to public comments until June 29th. FCHEA is considering a number of topics through FCHEA's Transportation Working Group, once the topics are approved, the FCHEA Hydrogen Codes Task Force will begin generating code change proposals.

The first NFPA 2 meeting is expected to be held in August in Virginia. By then the public comments should be in.

ICC **Bob Davidson**

Tabled until next meeting.

CSA **Sara Marxen**

Report is available online at www.hydrogenandfuelcellsafety.info/s/CSA-Group-Update-2016-04-06.pdf.

SAE **Mike Steele / Tim McGuire**

Three documents out for vote, or recently closed. J2601 is out for vote. J2990-1 has closed without comment – first responders. J2719-1 – fuel quality guideline is up for vote.

SAE meetings in June in Detroit – cancelled due to lack of SAE staff support.

Jesse Schneider – SAE meetings and panels upcoming of interest.

April 14th (3:30-5:00) PFL 720 Panel in 420A**:** Commercialization of the Fuel Cell Vehicle & Infrastructure Panel

Organization	Presenter, Title
Honda:	Takashi Moriya, Senior Chief Engineer
US DOE:	Dr. Will James, Manager, Safety, Codes, and Standards
Intelligent Energy:	Dr. Ralph Clague, Head of Motive Systems and Architecture
H2 USA:	Stephen Ellis (Honda), Chair H2 USA Roadmap Workgroup
FirstElement Fuel:	Dr. Shane Stephens, Chief Development Officer and Principal

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April 13-14th in 420A: **SAE PFL 799: Advances in Fuel Cell Vehicle and Hydrogen Applications (3 sessions total over 2 days)**

2016-01-1187
Development Of The Electrode Catalyst For The Fuel Cell Vehicle
Nobuaki Mizutani, Kazunobu Ishibashi, Toyota Motor Corporation
2016-01-1191

Employing Hot Wire Anemometry to Directly Measure the Water Balance of a Commercial Proton Exchange Membrane Fuel Cell Stack
Saher Al Shakhshir, Torsten Berning, Aalborg University
2016-01-1192

In-Situ Liquid TEM Study on the Degradation Mechanism of Fuel Cell Catalysts
Hisao Kato, Toyota Motor Corporation
16PFL-1163

Oil-Free 10kW High Speed Centrifugal Air Compressor for Fuel Cell Vehicles
Yu Wan
2016-01-1184

A Study on the Characteristics of an Oil-Free Centrifugal Compressor for Fuel Cell Vehicles
Kyoung-Ku Ha, Chang Ha Lee, Chi Myung Kim, Sae Hoon Kim, Byung Ki Ahn, Hyundai Motor Company
2016-01-1186

Effect of road-induced vibration on gas-tightness of vehicular fuel cell stack
Dong Hao, Yongping Hou, Tongji University; Jianping Shen, Shanghai Motor Vehicle Inspection Center; Liying Ma, Tongji University
2016-01-1183

Simulation, Sizing and Analysis of High Pressure Hydrogen All Electrochemical Decentralized Refueling Station
Hisham Al Ashkar, University Of Applied Sciences Esslingen; Ferdinand Panik, Waldemar Schneider, Thomas Rohrbach, Walter Czarnetzki, University of Applied Sciences Esslingen; Sami Karaki, American University of Beirut
16PFL-1117

Hydrogen Fueling Station and FCEV Fueling Process Safety Guideline: ISO TR19880-1
Jesse Schneider, BMW
2016-01-1190

Development of the Hydrogen Station Equipment Performance (HyStEP) Device
Terry A. Johnson, Sandia National Laboratories; Christopher Ainscough, Danny Terlip, National Renewable Energy Laboratory; Graham Meadows, Liam Quinlan, Brad Wong, Powertech Labs
16PFL-1165

Cryo-Adsorbent Hydrogen Storage System Designs and Prototype Experiments for HSECoE
David A. Tamburello, Martin Sulic, Claudio Corgnale, Savannah River National Laboratory; Richard Chahine, Universite de Quebec; Kevin Drost, Oregon State Univ.; Donald Anton, Bruce Hardy, Savannah River National Laboratory
16PFL-1171

Hydrogen Storage Engineering Center of Excellence Culmination
Mike Veenstra, Ford Motor Company
16PFL-1009

Fuel Cell Vehicle Technology Targets and Market Potential
Marc W. Melaina, Aaron Brooker, Yuche Chen, National Renewable Energy Laboratory
2016-01-1189

A Comparative Analysis for Optimal Control of Power Split in a Fuel Cell Hybrid Electric Vehicle
Arya Yazdani, Mehran Bidarvatan, Michigan Technological University
16PFL-0558

Comparative Study of Degree of Hybridization for Fuel Cell/Battery Hybrid Electric Vehicle
Ke Song, Wenxu NIU, sheng sun, Tong Zhang, Tongji University
2016-01-1188

Comparative Analysis of Internal Combustion Engine and Fuel Cell Range Extender
Stuart Chubbock, Ralph Clague, Intelligent Energy
2016-01-1185

Development of the Fuel Cell System in the Mirai FCV
Takahiko Hasegawa, Hiroyuki Imanishi, Mitsuhiro Nada, Yoshihiro Ikogi, Toyota Motor Corporation

ASTM **Tommy Rockward**

Tabled until next meeting.

ASME **John Grimes**

B31.12 hydrogen piping to pipeline committee met on March 23. Next committee meeting will be on September 21st in Orlando. The committee is actively balloting the non-mandatory appendix for guidance on system cleanliness, as well as Part CR for commercial and residential pipelines. Plan for new B31.12 publication standard in 2018.

VI. Discussion Topics

Facilitating Deployment **Carl Rivkin**

Tabled until next meeting.

H_2USA Activities **Karen Quackenbush**

Codes and standards, really focused on identifying and developing a rationale for removal of found restrictions on FCEVs and hydrogen in state and regional regulations. Working on general hydrogen safety type issues such as bridges, tunnels, and placarding.

Developing two presentations for upcoming State Fire Marshals conference in July. Two presenters from H2USA, talking about both market side deployments and safety, codes, and standards side including NFPA 2 and others.

NFPA 2 staff are developing a presentation for the regional NFPA directors introducing them to NFPA 2 so that they can help facilitate regional adoption of NFPA 2.

The Fueling Station WG is working with those from H2FIRST to develop priorities from future research. Preliminary findings to be determined soon.

Currently looking for anyone with operational experience with hydrogen stations for input.

Identifying gaps in the codes for co-locating hydrogen stations.

Jay Keller – Cross activity with H2USA and FCHEA, developing a response to address specific comments from Maryland and New York AHJs for tunnels and bridges. Developed so that the industry has common and defensible talking points going forward.

H2FIRST **NREL/SNL**

See above report.

Regulatory Matrix Review and Comment **Karen Quackenbush**

www.fchea.org/s/FCHEA-Regulatory-Matrix-mark-up-March-31-2016.pdf

A new version came out in on March 31st which featured a number of changes.

Let Karen know if anything on the matrix is missing or outdated, or where it is regarding to priority-level of the activity. Everything is open to discussion.

Comments can be submitted to Karen Quackenbush at khall@fchea.org.

VII. Permitting and Installation of Hydrogen Fueling Stations

Ca Station Implementation **Jennifer Hamilton**

Bulleting has been circulated providing guidance on the adoption of 2015 international fire code and adoption of NFPA 2.

IB_16-004_-_2016_NFPA_2.pdf.pdf

14 open retail stations currently. Upwards of 40 in development. The status changes frequently.

The CAFCP has a new hydrogen station map, also allows option to download a static excel sheet on hydrogen station status based on report from the Governor's office.

Ca DMS Fuel Quality / Metrology **Kevin Schnepp**

Tabled until the next meeting.

Fueling Compliance **Sara Marxen / Jesse Schneider**

Jesse provided a report on ISO and CA DMS. More information can be found here www.hydrogenandfuelcellsafety.info/s/ISO-TC197-WG24_N0320_ISO_TC197_WG_24__Meeting_Agenda_Logisti.pdf.

Legal Metrology Standards Hydrogen Fuel Quality and Measurement **Juana Williams**

The U.S. National Work Group on the Development of Commercial Hydrogen Measurement Standards (H2 USNWG) last met October 2011 and will need to meet again spring 2016. The purpose of the meeting (in late April-early May 2016) will be to develop input on the two proposals before the July 23-28, 2016 Annual Meeting of the National Conference on Weights and Measures in Denver, CO. The proposals would modify hydrogen dispensing equipment requirements in NIST Handbook 44, 3.39 hydrogen code.

Other groups in the weights and measures community that might benefit from the H2 USNWG's input are the Northeastern Weights and Measures Association holding its annual meeting May 16-19, 2016 in Portland, ME and Central Weights and Measures Association holding its annual meeting May 23-26, 2016. The H2 USNWG will be polled on tentative meeting dates, updates on the participant list, and other pressing issues that should be on its agenda, as well as receive notification about the dates, locations, and points of contact for these events.

VIII. Open Discussion & Other Issues

IX. Next Meeting

Next meeting on Wednesday, May 4th at 3:00 PM Eastern.