

Project Title: Codes and Standards for the Hydrogen Economy

Recipient: Regulatory Logic LLC

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Award Number: DE-FC36-07GO17004

Project Start Date: 09/01/06

Project End Date: 09/30/11

Notice: The following is a compilation of progress reports and presentations submitted by Regulatory Logic to the DOE's Fuel Cell Technologies Office for award number DE-FC36-07GO17004. This compilation has been uploaded to OSTI by DOE as a substitute for the required Final Technical Report, which was never submitted by Regulatory Logic or received by DOE.

VII.2 Supporting the Consensus-Based Process for Hydrogen Codes and Standards

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Contract Number: DE-FC36-07GO17004

Subcontractors:

- American National Standards Institute (ANSI), New York, NY
- American Society of Mechanical Engineers (ASME), New York, NY
- Compressed Gas Association, Inc., Chantilly, VA
- CSA America, Cleveland, OH
- GWS Solutions of Tolland, Tolland, CT
- U.S. Fuel Cell Council, Washington, D.C.
- International Code Council, Inc., Country Club Hills, IL
- Kelvin Hecht, Avon, CT
- National Hydrogen Association, Washington, D.C.
- National Fire Protection Association (NFPA), Quincy, MA
- Society of Automotive Engineers (SAE) International, Warrendale, PA

Project Start Date: December 5, 2007

Project End Date: September 30, 2011

Objectives

- Develop a robust supporting research and development program to provide critical hydrogen behavior data and a detailed understanding of hydrogen combustion and safety across a range of scenarios, needed to establish setback distances in building codes and minimize the overall data gaps in code development.
- Support and facilitate the completion of technical specifications by the International Organization for Standardization (ISO) for gaseous hydrogen refueling (TS 20012) and standards for on-board liquid (ISO 13985) and gaseous or gaseous blend (ISO 15869) hydrogen storage by 2007.
- Support and facilitate the effort, led by the NFPA, to complete the draft Hydrogen Technologies Code (NFPA 2) by 2008.
- With experimental data and input from Technology Validation Program element activities, support and facilitate the completion of standards for bulk hydrogen storage (e.g., NFPA 55) by 2008.
- Facilitate the adoption of the most recently available model codes (e.g., from the International Code Council [ICC]) in key regions.
- Complete preliminary research and development on hydrogen release scenarios to support the establishment of setback distances in building codes and provide a sound basis for model code development and adoption.
- Support and facilitate the development of Global Technical Regulations (GTRs) by 2010 for hydrogen vehicle systems under the United Nations Economic Commission for Europe, World Forum for Harmonization of Vehicle Regulations and Working Party on Pollution and Energy Program (ECE-WP29/GRPE).
- Support and facilitate the completion by 2012 of necessary codes and standards needed for the early commercialization and market entry of hydrogen energy technologies.

Technical Barriers

This project addresses the following technical barriers from the Hydrogen Codes and Standards section of the Hydrogen, Fuel Cells and Infrastructure Technologies Program Multi-Year Research, Development and Demonstration Plan:

- (A) Limited Government Influence on Model Codes
- (B) Competition among SDOs and CDOs
- (C) Limited State Funds for New Codes
- (D) Large Number of Local Government Jurisdictions (approximately 44,000)
- (E) Lack of Consistency in Training of Officials
- (F) Limited DOE Role in the Development of International Standards
- (G) Inadequate Representation at International Forums
- (H) International Competitiveness
- (I) Conflicts between Domestic and International Standards

- (J) Lack of National Consensus on Codes and Standards
- (K) Lack of Sustained Domestic Industry Support at International Technical Committees
- (L) Competition in Sales of Published Standards
- (M) Jurisdictional Legacy Issues
- (N) Insufficient Technical Data to Revise Standards
- (O) Affordable Insurance is Not Available
- (P) Large Footprint Requirements for Hydrogen Refueling Stations
- (Q) Parking and Other Access Restrictions

Safety Contributions

This project will contribute to achievement of the following DOE Hydrogen Codes and Standards milestones from the Hydrogen Codes and Standards section of the Hydrogen, Fuel Cells and Infrastructure Technologies Program Multi-Year Research, Development and Demonstration Plan:

- C1 Input from Codes and Standards: Completed hydrogen fuel quality standard as ISO Technical Specification.
- C2 Input from Codes and Standards: Technical assessment of standards requirements for metallic and composite bulk storage tanks.
- C3 Input from Codes and Standards: Final standards (balloting) for fuel dispensing systems (CSA America).
- C4 Input from Codes and Standards: Draft standards (balloting) for refueling stations (NFPA).
- C8 Input from Codes and Standards: Final Hydrogen fuel quality standard as ISO Standard.

Accomplishments In 2007

- Completed transition to the cost share model of funding the Code Development and Standard Development Organizations (SDOs and CDOs) as codes and standards sub-awardees, in close collaboration with DOE.
- Ensured requested funding provided for critical participation in international forums by U.S. industry and association representatives.
- Continued development of increased user-friendliness of ANSI web portal for hydrogen standards available at <http://hcsp.ansi.org/> and the additional hydrogen information provided at the hydrogen matrix web site available at <http://www.fuelcellstandards.com/Matrix.htm>.
- Initiated electronic payment system allowing quicker reimbursement of sub-awardee code and standard developers.

- Continued support of cooperation between ICC and NFPA continued through Hydrogen Industry Panel on Codes (HIPOC) activities.



Introduction

As suggested by the list of barriers, the codes and standards area is unusual for a DOE program in that the ultimate goals and objectives cannot be achieved directly by DOE or its contractors, but rather, must be met indirectly, as the necessary process of consensus-based codes and standards development is carried out. Virtually all relevant hydrogen-related codes and standards work rests on a voluntary, consensus-based process, in contrast to the direct development of government-based rules and regulations.

Thus, in addressing the barriers, this project relies on the strategic value of targeted resources and support aimed at identified “log jams” in the process, and the provision of supported manpower where the voluntary process would otherwise succumb to the delays inherent in such processes. This approach is thus able to ensure or enhance the free flow of important and credible information, including supporting necessary research to develop or adapt new codes and standards, and always supporting the optimum participation by U.S. industry and related industry associations.

Approach

This project utilizes close collaboration between DOE program leadership, national laboratory technical experts, and the individual and SDO and CDO sub-awardees to identify the highest value contributions that are available for improving the timeliness of the consensus-based standard process for the successful commercialization of hydrogen in stationary and mobile applications.

Results

Because of the relatively late beginning of the Regulatory Logic LLC contract, initial results for this year are primarily focused on the initiation of the new contractual relationships with the 11 designated sub-awardees, the identification of one to five year tasks in the relevant statements of work (SOW). The transition process, including the challenge of moving to a cost-shared model of funding, has largely been completed.

Conclusions and Future Directions

With the completion of the remaining sub-award contracts, Regulatory Logic LLC will be able to

increasingly participate in outreach efforts regarding the dissemination of the program's codes and standards work whenever deemed appropriate by DOE leadership. The close collaboration with DOE, and the technical experts of the national laboratories, continues the funding announcement prescription of the awardee's working in close collaboration with DOE in fulfilling the objectives of the project.

FY 2007 Publications/Presentations

1. Regulatory Logic LLC presented a poster at the 2007 Annual Merit Review, held May 15–18, 2007 in Arlington, VA.

VIII.7 Supporting the Consensus-Based Process for Hydrogen Codes and Standards

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Contract Number: DE-FC36-07GO17004

Subcontractors:

- American National Standards Institute (ANSI), New York, NY
- ASME International (ASME), New York, NY
- Compressed Gas Association, Inc. (CGA), Chantilly, VA
- CSA America, Cleveland, OH
- GWS Solutions of Tolland, Tolland, CT
- United States Fuel Cell Council, Washington, D.C.
- International Code Council, Inc. (ICC), Country Club Hills, IL
- Kelvin Hecht, Avon, CT
- National Hydrogen Association (NHA), Washington, D.C.
- National Fire Protection Agency (NFPA), Quincy, MA
- SAE International (SAE), Troy, MI

Project Start Date: December 5, 2006
Project End Date: September 30, 2011

Objectives

- Develop a robust supporting research and development program to provide critical hydrogen behavior data and a detailed understanding of hydrogen combustion and safety across a range of scenarios, needed to establish setback distances in building codes and minimize the overall data gaps in code development.
- Support and facilitate the completion of technical specifications by the International Organization

for Standardization (ISO) for gaseous hydrogen refueling (TS 20012) and standards for on-board liquid- (ISO 13985) and gaseous- or gaseous blend- (ISO 15869) hydrogen storage by 2007.

- Support and facilitate the effort, led by the NFPA, to complete the draft Hydrogen Technologies Code (NFPA 2) by 2008.
- With experimental data and input from the Technology Validation Hydrogen Program activities, support and facilitate the completion of standards for bulk hydrogen storage (e.g., NFPA 55) by 2008.
- Facilitate the adoption of the most recently available model codes (e.g., from the ICC) in key regions.
- Complete preliminary research and development on hydrogen release scenarios to support the establishment of setback distances in building codes and provide a sound basis for model code development and adoption.
- Support and facilitate the development of global technical regulations by 2010 for hydrogen vehicle systems under the United Nations Economic Commission for Europe, World Forum for Harmonization of Vehicle Regulations and Working Party on Pollution and Energy Program (ECE-WP29/GRPE).
- Support and facilitate the completion by 2012 of necessary codes and standards needed for the early commercialization and market entry of hydrogen energy technologies.

Technical Barriers

This project addresses the following technical barriers from the Codes & Standards section of the Hydrogen, Fuel Cells and Infrastructure Technologies Program Multi-Year Research, Development and Demonstration Plan:

- (A) Limited Government Influence on Model Codes
- (B) Competition among SDOs and CDOs
- (C) Limited State Funds for New Codes
- (D) Large Number of Local Government Jurisdictions (approximately 44,000).
- (E) Lack of Consistency in Training of Officials
- (F) Limited DOE Role in the Development of International Standards
- (G) Inadequate Representation at International Forums
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- (J) Lack of National Consensus on Codes and Standards
- (K) Lack of Sustained Domestic Industry Support at International Technical Committees
- (L) Competition in Sales of Published Standards
- (M) Jurisdictional Legacy Issues
- (N) Insufficient Technical Data to Revise Standards
- (O) Affordable Insurance is Not Available
- (P) Large Footprint Requirements for Hydrogen Refueling Stations
- (Q) Parking and Other Access Restrictions

Accomplishments In 2008

- Completed first year transition to the cost share model of funding the code development and standard development organizations (CDOs and SDOs) as Codes & Standards sub-awardees, in close collaboration with DOE, with extensions and modifications as appropriate for second year.
- Ensured requested funding provided for critical participation in International forums by U.S. industry and association representatives.
- Continued development of increased user-friendliness of ANSI Web portal for hydrogen standards available at <http://hcsp.ansi.org/>, and the additional hydrogen information provided at the hydrogen matrix web site available at <http://www.fuelcellstandards.com/Matrix.htm>.
- Continued support of cooperation between ICC and NFPA continued through Hydrogen Industry Panel On Codes activities.



Introduction

As suggested by the list of barriers above, the codes and standards area is unusual for a DOE program in that the ultimate goals and objectives cannot be achieved directly by DOE or its contractors, but rather, must be met indirectly, as the necessary process of consensus-based codes and standards development is carried out. Virtually all relevant hydrogen-related codes and standards work rests on a voluntary, consensus-based process, in contrast to the direct development of government based rules and regulations.

Thus, in addressing the barriers, this project relies on the strategic value of targeted resources and support aimed at identified “log-jams” in the process, and the provision of supported resources where the voluntary process would otherwise succumb to the delays

inherent in such processes. This approach is thus able to ensure or enhance the free flow of important and credible information, including supporting necessary research where necessary to develop or adapt new codes and standards, and always supporting the optimum participation by U.S. industry and related industry associations.

Approach

This project utilizes close collaboration between DOE program leadership, National Laboratory technical experts, and the individual and SDO and CDO sub-awardees to identify the highest value contributions that are available for improving the timeliness of the consensus-based standard process for the successful commercialization of hydrogen in stationary and mobile applications.

Results

Results for this second year of the five year contract period have primarily focused on the smooth extensions of the multi-year contractual relationships with the 11 designated sub-awardees, and the review and modification where appropriate of the two to five-year Tasks in the relevant Statements of Work. The retirement of the two National Renewable Energy Laboratory-based technical monitors, along with the replacement of the DOE contract monitor has also required special efforts in order to keep the momentum of the project results.

Conclusions and Future Directions

With the completion of the remaining sub-awardee contracts in the first year of contracting, the second round of annual updates, revisions, and extensions has gone more smoothly. Regulatory Logic LLC has been able to increasingly participate in industry and agency conferences and other efforts regarding the dissemination of the Program’s Codes & Standards work as deemed appropriate by DOE. Regulatory Logic’s close collaboration with DOE, and the technical experts of the National Laboratories, continues the funding announcement prescription of the awardees’ working in close collaboration with DOE in fulfilling the objectives of the project.

FY 2008 Publications/Presentations

1. Regulatory Logic LLC presented a poster at the 2008 Annual Merit Review, held June 9-13, 2008 in Arlington, VA.

IX.8 Codes & Standards for the Hydrogen Economy

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DOE Project Officer: Jim Alkire

Phone: (303) 275-4795; Fax: (303) 275-4753
E-mail: James.Alkire@go.doe.gov

Contract Number: DE-FC36-07GO17004

Subcontractors:

- American National Standards Institute (ANSI), New York, NY
- Compressed Gas Association (CGA), Inc., Chantilly, VA
- CSA America, Cleveland, OH
- GWS Solutions of Tolland, Tolland, CT
- United States Fuel Cell Council (USFCC), Washington, D.C.
- International Code Council, Inc., Country Club Hills, IL
- Kelvin Hecht, Avon, CT
- National Hydrogen Association, Washington, D.C.
- National Fire Protection Association (NFPA), Quincy, MA
- Society of Automotive Engineers (SAE) International, Troy, MI
- FP2 (Martin T Gresho, PE), Livermore, CA
- James M. Ohi, PhD, Denver, CO

Project Start Date: December 5, 2006

Project End Date: September 30, 2011

Objectives

- Develop a supporting research and development project to provide critical hydrogen behavior data and a detailed understanding of hydrogen combustion and safety across a range of scenarios which are needed to establish setback distances in building codes and minimize the overall data gaps in code development.
- Support and facilitate the effort, led by the NFPA, to complete the draft Hydrogen Technologies Code (NFPA 2).
- With experimental data and input from Technology Validation subprogram element activities, support and facilitate the completion of standards for bulk hydrogen storage (e.g., NFPA 55).
- Facilitate the adoption of the most recently available model codes (e.g., from the International Code Council [ICC]) in key regions.
- Complete preliminary research and development on hydrogen release scenarios to support the establishment of setback distances in building codes and provide a sound basis for model code development and adoption.
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- Support and facilitate the completion by 2012 of necessary codes and standards needed for the early commercialization and market entry of hydrogen energy technologies.

Technical Barriers

This project addresses the following technical barriers from the Codes & Standards section of the Hydrogen, Fuel Cells and Infrastructure Technologies Program Multi-Year Research, Development and Demonstration Plan:

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- (P) Large Footprint Requirements for Hydrogen Refueling Stations
- (Q) Parking and Other Access Restrictions

Accomplishments

NFPA: Entered NFPA 2 into the Fall 2010 Revision Cycle; released draft of NFPA 2, Hydrogen Technologies Code, now ready for public proposals.

Glenn Scheffler: Supported the U.S. delegation in the drafting of the GTR for fuel cell vehicles (FCVs); chaired the SAE Safety Working Group; wrote and presented a paper of FCV Safety at the 2009 SAE World Congress; chaired the U.S. Technical Advisory Groups (USTAGs) for both ISO TC197 for hydrogen and TC22/SC21 for electric vehicles including FCVs.

USFCC: Served as chair of the Technologies Committee which is responsible for development of NFPA 2 (see NFPA, above); completed first formal technical meeting focused on addressing all public proposals received during the solicitation period; changed technical committee membership representation from Sandia Labs to FP2 (Marty Gresho, another Regulatory Logic subcontractor funded by DOE) to address concerns related to separation of code makers from researchers; selected new alternate member. (Approval anticipated August 2009.)

NFPA 55 Compressed Gas Standard - Separation distance proposal developed, submitted and approved; NFPA 51A Report On Proposals meeting completed; Hydrogen Industry Panel on Codes (HIPOC) participation included development of several code change proposals to the International Fire Code (IFC) for HIPOC review, deliberation and approval; started NFPA 52 versus IFC Chapter 22 review to identify additional correlating code change proposals needed; supported NFPA 52 motion to NFPA general assembly and appeal to NFPA Standards Council with coordinated in- person appearances and testimony; initiated reformulation of HIPOC charter to balance membership and scope.

NHA: Expanded Hydrogen and Fuel Cell Safety Report to include regular contributions by the USFCC and others; developed a primer for parties who are new to hydrogen and fuel cell codes and standards; conducted a codes and standards workshop in conjunction with the NHA Annual Conference in March 2009; published reports on key national codes activities and international standards activities between NFPA's Hydrogen Technology Technical Committee (NFPA 2) and NFPA's Industrial and Medical standards activities to keep interested parties informed and provide opportunities for comment; played a leading role in developing administrative procedures for the HIPOC for 2009.

CGA: A joint task group effort was undertaken by the Gases Technical Committee to establish scientifically based fundamental separation distances between bulk compressed hydrogen systems and sensitive receptors ("exposures"). Distances are designated as "fundamental" to indicate that these distances may be altered with the application of mitigation methods, some of which have been identified while others remain in the developmental phase

SAE: Completed two research projects, thereby establishing sound technical requirements for hydrogen codes and standards; published three Technical Information Reports advancing hydrogen safety standards and code development

Kelvin Hecht: Completed redesign of the American National Standards Institute (ANSI) portal (supported by ANSI, another Regulatory Logic subcontractor) in response to National Renewable Energy Laboratory suggestions, with limited impact on users; continued to monitor the status of approximately 150 U.S. and 80 international standards, and to update the Web site in real time when changes in standards occur; provided a valuable resource to hydrogen and fuel cell development efforts and to authorities having jurisdiction for siting and operating permits as demonstrated by almost 6,000 visits per month, as well as disseminating knowledge to researchers and graduate students as reference material to address development of commercial hydrogen energy resources.



Introduction

As suggested by the barriers listed previously, the Codes & Standards area is an unusual DOE activity in that the ultimate goals and objectives cannot be achieved directly by DOE or its contractors, but must be met indirectly, as the necessary process of consensus-based codes and standards development is carried out. Virtually all relevant hydrogen-related codes and standards work rests on a voluntary, consensus-based process, in contrast to the direct development of government-based rules and regulations. In addressing the barriers, therefore, this project relies on positioning the strategic value of targeted resources aimed at removing identified "log jams" in the process, and the provision of resources when the voluntary process would otherwise succumb to delays inherent in such negotiated results. This approach enhances the free flow of important and credible information, including supporting research wherever necessary to develop or adapt new codes and standards, consistently supporting optimum participation by U.S. industry and related industry associations.

Approach

This project utilizes close collaboration between DOE program leadership, national laboratory technical experts, and the individual standards development organization (SDO) and code development organization (CDO) sub-awardees to identify the highest value contributions available for improving timeliness of the consensus-based standard development process for successful commercialization of hydrogen in stationary and mobile applications.

Results

See also the achievements listed previously: The major achievement for the year has been that NFPA 2 has been issued and entered into the standard cycle – this is a major milestone from many perspectives, including establishment of scientifically-based fundamental separation distances between bulk compressed hydrogen systems and sensitive receptors (“exposures”).

Conclusions and Future Directions

Regulatory Logic’s close collaboration with DOE and the technical experts of the national laboratories continues the funding announcement prescription that the awardee work in close collaboration with DOE to fulfill objectives of the project. The subcontractors contributing to the NFPA 2 portion of the project will continue to support and improve this document during the development cycle; subcontractors, including NHA, USFCC, ICC, SAE, ANSI, NFPA, and CSA America shall continue to publish articles and announcements of interest to the hydrogen and fuel cell communities from USFCC and third parties. In addition to expanding the reach of available information, this effort reduces the cost of producing the Hydrogen and Fuel Cell Safety Reports, as fewer original articles will need to be written due to harmonization efforts by subcontractors. The Hydrogen Primer will be included posted under the “Technical Resources” area of the Hydrogen and

Fuel Cell Safety Web site to make it easy for interested parties to locate. This tool is additionally useful for presentations to countries which are just beginning to establish national codes and standards for hydrogen and fuel cell systems. The primer will also be used to develop a site map for the Web site in late 2009; SAE documents will continue to be revised so that they will continue to be relevant as fuel cell vehicle development moves forward. Revisions reflect unique aspects of fuel cell vehicles and harmonize requirements with international standards. Future document revisions include *SAE J2578, J2799, J2579 and FTA or FMEA for H2 Refueling Process*. SAE will continue to compile necessary test data for an engineer to access the suitability of using a specific commodity plastic for containment of hydrogen; the intent is to collect this information and have it included in a central source thus facilitating reference by standards development organizations and other interested parties. A secondary objective is to generate a comprehensive testing list to facilitate the evaluation of newly developed materials. SAE International shall continue to provide technical expertise and administrative services/support to the USTAGs of ISO TC22 SC21, ISO TC197, International Electrotechnical Commission, and other groups and agencies as directed by DOE pertaining to the development of fuel cell vehicles, fueling stations, and other interface technologies.

Special Recognitions & Awards/Patents Issued

1. Kelvin Hecht was recipient for 2008 of the International Electrotechnical Commission’s annual award for outstanding service to TC105 fuel cell standards.

FY 2009 Publications/Presentations

1. All of Regulatory Logic LLC’s subcontractors presented a variety of presentations as described in their individual annual reports. Regulatory Logic LLC presented a poster at the Hydrogen Program and Vehicle Technologies Program Annual Merit Review and Peer Evaluation Meeting this past year, May 13–17, 2009.

HYDROGEN CODES & STANDARDS

SUPPORTING THE CONSENSUS PROCESS

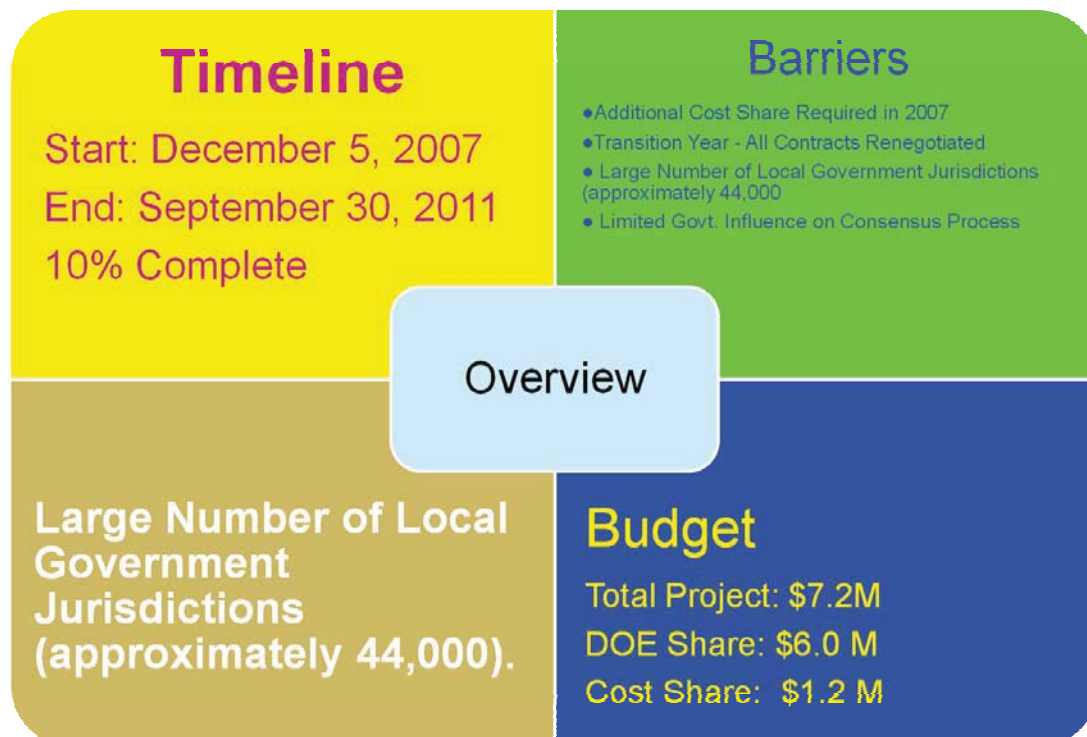
2007 DOE Hydrogen Program Review

Gary Nakarado & Chris Manchester



Project ID #SAP1

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



General Objectives of DOE Codes & Standards Project

- The overarching objective to facilitate the timely completion of the necessary codes and standards for hydrogen and fuel cell technologies and infrastructure.
- Support consensus based national agenda on domestic and international codes and standards for hydrogen systems in commercial, residential, and transportation applications
- Facilitate development of uniform codes and standards because manufacturers cannot cost-effectively manufacture multiple products that would be required to meet different and inconsistent standards

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Objectives (continued)

- Specific project objectives include:
 - Coordinate and facilitate the accelerated development of codes and standards in close collaboration with DOE, National Laboratories and other relevant agencies;
 - Establish strong partnerships with industry, SDOs and CDOs;
 - Facilitate information dissemination to technology developers, implementers and local code officials—ANSI Portal.

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Codes & Standards Partners with DOE Hydrogen Program

	Sub Awards (Complete or <i>in process</i>)
1	ANSI Contract #RL-2007-002
2	ASME Contract #RL-2007-011
3	CGA Contract #RL-2007-010
4	CSA America Contract #RL-2007-004
5	Glenn Scheffler Contract #RL-2007-003
6	ICC Contract Contract#RL-2007-006
7	Kelvin Hecht Contract #RL-2007-001
8	NFPA Contract #RL-2007-005
9	NHA Contract #RL-2007-008
10	SAE Contract #RL-2007-009
11	USFCC Contract #RL-2007-007



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Approach

- In close collaboration with DOE Hydrogen Program and Technical Advisors, develop streamlined contracting procedures, including multi-year contracts
- Consistent with DOE requirements, advocate Subawardee Improvement suggestions
- Utilizing modern electronic funds transfers, reduce invoice to payment time to less than 1 week
- Deliver low overhead services with experienced energy and business professionals

Task Schedule

Task Number	Project Milestones	Task Completion Date				Progress Notes
		Original Planned	Revised Planned	Actual	Percent Complete	
1	Task 1.0 Coordinate with DOE, National Laboratory Representatives and Other Relevant Agencies	10/30/06	11/31/06	11/31/06	100%	Complete.
2	Subtask 1.1 Define Criteria for the Selection of Industry, CDO and SDO Participants	10/30/06	12/31/06	12/31/06	100%	Complete
3	Subtask 1.2 Selection of CDOs, SDOs and Industry Organizations	11/31/06	12/31/06	12/31/06	100%	Complete
4	Subtask 1.3 Negotiate with Selected CDOs and SDOs for Contracts	11/31/06	12/31/06	01/30/07	85%	3 Remaining
5	Subtask 2.1 Manage Subcontract Performance	10/01/06	10/01/06	10/01/06	Ongoing	
6	Subtask 2.2 Coordinate Collaboration Between CDOs, SDOs and Industry Organizations	10/01/06	10/01/06	10/01/06		Ongoing
7	Task 5.0 Project Management and Reporting	10/01/06	10/01/06	10/01/06		Ongoing

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ANSI WEB PORTAL

<http://hcsp.ansi.org>

HYDROGEN CODES AND STANDARDS PORTAL POWERED BY ANSI

HOME SEARCH RESOURCES CONTACT HELP [FEEDBACK](#)

U.S. Department of Energy
National Renewable Energy Laboratory
Research National Standards Institute
ANSI standards store

About the Hydrogen Codes and Standards Portal

Hydrogen and Fuel Cells Permitting Guide

Browse by subject:

Vehicle Systems and Refueling Facilities

On-Site Hydrogen Generation and Fuel Cells

ANSI

HYDROGEN FOR VEHICLES

About | the hydrogen codes and standards portal

The Hydrogen Codes and Standards portal grew out of discussions between the Department of Energy's National Renewable Energy Laboratory (NREL) and the American National Standards Institute (ANSI). The initial idea was to provide a single point for people to find information about the various codes, standards, and regulations that apply to the use of hydrogen as a fuel source. It was proposed that ANSI coordinate the effort, with participation by NREL and other federal government agencies, private sector standards developing organizations, and state and local governments.

An initial meeting was held to get the project started. Attending the meeting were representatives from:

- ANSI
- NREL
- Department of Energy
- American Petroleum Institute
- American Society of Mechanical Engineers
- ASTM International
- International Code Council
- National Fire Protection Association
- SAE International
- Underwriters Laboratories
- Connecticut Department of Public Safety
- Massachusetts Department of Public Safety
- New York Department of State, Building Codes Division
- Rhode Island State Building Code Commission

Various presentations were given that covered ANSI's database expertise, an overview of the Department of Energy expectations of the portal, an overview of the technology, and an presentation of the two templates that form the classification system for the entire hydrogen fuel arena.

It was decided that the SDOs would provide ANSI with information about their standards and into which classification they belonged. This data forms the core of the database, and is accessible either by browsing

LATEST HEADLINES

Take the Hydrogen Codes and Standards Portal User Survey

HEC Demonstrates New, Hydrogen-Fueled 4 + 1 Power Generator System

HEC Demonstrates New, Hydrogen-Fueled 4 + 1 Power Generator System

Expanding Connectivity: Hydrogen and Fuel Cell Industries

Hydrogen Fuel Cells Make Good Business for Professionals

4th Annual Southeastern Fuel Cell & Hydrogen Conference Set for ...

Hydrogen & Fuel Cells 2007 - in Vancouver

The Group Exhibit Hydrogen Fuel Cells Set For April 16-20, 2007

Hydrogen Fuel Cell Bus begins tour of Arizona

CEGASA to Lead Team of 10 Companies in Hydrogen Fuel Cell Research

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CODES & STANDARD MATRIX

KELVIN HECHT

<http://www.fuelcellstandards.com/Matrix.htm>

By Application

- 1.0 [Stationary Fuel Cell Applications](#)
[PDF File of Stationary Matrix](#)
- 2.0 [Transportation Fuel Cell Applications](#)
[PDF File of Transportation Matrix](#)
- 3.0 [Portable / Micro Fuel Cell Applications](#)
[PDF File of Portable Matrix](#)
- 4.0 [Hydrogen Infrastructure](#)
[PDF File of Hydrogen Matrix](#)
- 5.0 [Miscellaneous \(Other Fuels, Definitions, Marine Fuel Cell Applications\)](#)
[PDF File of Misc. Matrix](#)

By Geographic Location & Organization

- A. [International](#)
- B. [North America](#)
- C. [Europe](#)
- D. [Pacific Rim](#)

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Future Work

- **Completion of All Remaining SubAwards for 2007**
- **Continue Streamlining Through Electronic Payment Systems**
- **Reduce SubAwardee Transaction Time & Expense Required for Annual Contract Extensions for 2008 and Beyond**



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Project Summary

- Approximately 1/3 through first and transitional year for Regulatory Logic LLC Award Placement
- Initial requirement of cost-share with Codes & Standards partners being addressed
- Positive response to streamlined electronic payments systems, which have led to invoice to payment times <1 week

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Questions?



- *Contact: Gary Nakarado at 303-550-3132 Gary@RegLogic.Org*
- *or Christine Manchester at 303-526-5505 Chris@RegLogic.Org*



regulatory logic LLC
supporting innovative regulation toward a sustainable world

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CODES & STANDARDS FOR THE HYDROGEN ECONOMY

2008 DOE Hydrogen Program Review

Gary Nakarado & Chris Manchester



Project ID: SCSP1

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



General Objectives of DOE Codes & Standards Project

- To accelerate the availability of appropriate codes and standards to ensure consistency and, if possible, uniformity of requirements and to facilitate deployment.
- To enable certification to applicable standards in order to facilitate approval by local code officials and safety inspectors.
- To Promote uniform standards because manufacturers cannot cost-effectively manufacture multiple products that would be required to meet different and inconsistent standards

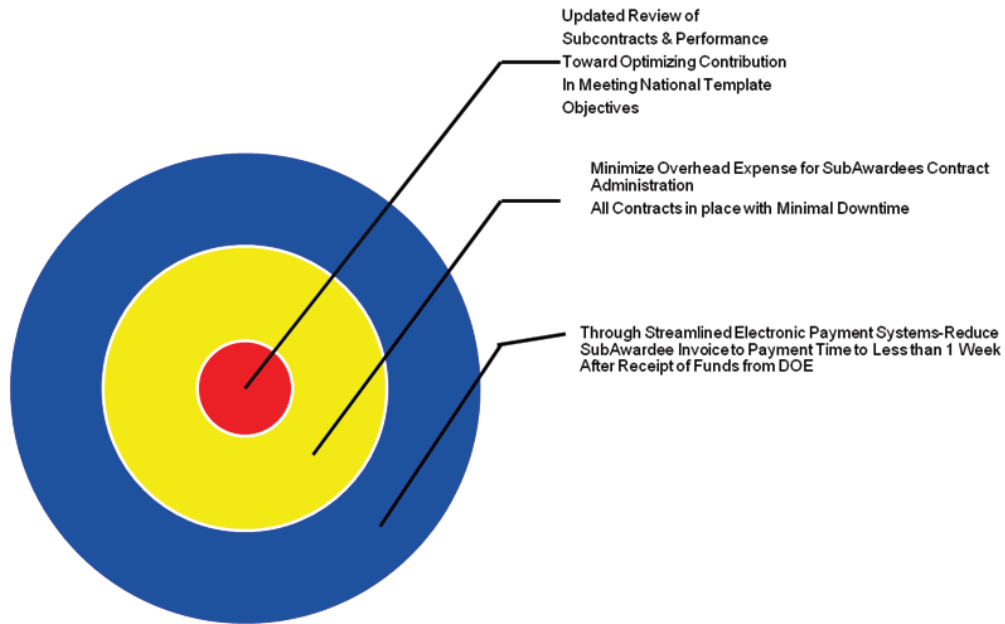
3

Objectives (continued)

- The overarching objective for Codes & Standards for The Hydrogen Economy (DE-FC36-07GO 17004) is to facilitate timely completion of the necessary codes and standards for hydrogen and fuel cell technologies and infrastructure. Specific project objectives include:
 - Coordinate and facilitate the accelerated development of codes and standards in close collaboration with DOE, National Laboratories and other relevant agencies;
 - Establish strong partnerships with industry, SDOs and CDOs;
 - Facilitate information dissemination to technology developers, implementers and local code officials.

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2008 Objectives



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The Barriers



- **Limited Government Influence on Model Codes.** The code development process is a consensus-based, voluntary process. Government support can affect its progression, but ultimately consensus from participants is required by standard development and code publishing groups.
- **Competition between SDOs and CDOs.** Competition between various organizations can hinder the creation of consistent hydrogen codes and standards.
- **Limited State Funds for New Codes.** Budgetary shortfalls in many states and local jurisdictions impact the adoption of codes and standards, since funds are not consistently available for purchasing new codes or for training building and fire safety officials.

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The Barriers (cont.)



- **Large Number of Local Government Jurisdictions** (there are approximately 44,000). The large number of jurisdictions hinders universal adoption of codes and standards.
- **Lack of Consistency in Training of Officials.** The training of code officials is not mandated. There are a large number of jurisdictions and significant variation in training facilities, requirements.
- **Limited DOE Role in the Development of International Standards.** Governments can participate and influence the development of codes and standards, but cannot direct the development of international standards.

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The Barriers (cont.)



- **Need for Representation at International Forums.** Participation in international forums and meetings is voluntary and has previously been ad hoc rather than planned and coordinated in advance. Our national interest requires representation.
- **International Competitiveness.** International economic competition complicates development of international standards.
- **Conflicts between Domestic and International Standards.** National positions can complicate the harmonization of domestic and international standards.
- **Lack of National Consensus on Codes and Standards.** “Intra” national Competitive issues can also hinder consensus.

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The Barriers (cont.)



- **Need for Technical Data to Revise Standards.** Research activities are underway to develop and verify the technical data needed to support codes and standards development, such as requirements for retrofitting existing infrastructure and universal parking certification.
- **Affordable Insurance is Not Available.** New technologies not yet recognized in codes and standards will have difficulty in obtaining reasonably priced insurance.

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The Barriers (cont.)



- **Large Footprint Requirements for Hydrogen Fueling Stations.** The existing set-back and other safety requirements can result in large footprints
- **Parking and Other Access Restrictions.** Complete access to parking, tunnels and other travel areas has not yet been secured

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Codes & Standards Partners with DOE Hydrogen Program

	Sub Awards 2007
1	ANSI Contract #RL-2007-002
2	ASME Contract #RL-2007-011 (<i>in process</i>)
3	CGA Contract #RL-2007-010
4	CSA America Contract #RL-2007-004
5	GWS Solutions Contract #RL-2007-003
6	ICC Contract Contract#RL-2007-006
7	Kelvin Hecht Contract #RL-2007-001
8	NFPA Contract #RL-2007-005
9	NHA Contract #RL-2007-008
10	SAE Contract #RL-2007-009
11	USFCC Contract #RL-2007-007



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Approach

- In close collaboration with DOE Hydrogen Program and Technical Advisors, develop streamlined contracting procedures.
- Consistent with DOE requirements, advocate Subawardee Improvement suggestions
- Utilizing modern electronic funds transfers, reduce invoice to payment time to less than 1 week after receipt of DOE funds.
- Deliver low overhead services to the Hydrogen Codes & Standards Program, with experienced energy and business professionals

Project Tasks Overview

Task Number	TASK DESCRIPTION	Progress Notes
1	Coordinate with DOE, National Laboratory Representatives and Other Relevant Agencies	INITIALLY COMPLETE ONGOING
2	Manage Subcontract Awards	ONGOING
3	Facilitate Development of Codes and Standards	ONGOING
4	Support Dissemination of Information to Technology Developers, Implementers and Local Code Officials	ONGOING
5	Project Management and Reporting	ONGOING

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Task Schedule

Task Number	Project Milestones	Task Completion Date				Progress Notes
		Original Planned	Revised Planned	Actual	Percent Complete	
1	Task 1.0 Coordinate with DOE, National Laboratory Representatives and Other Relevant Agencies	10/30/06	11/31/06	11/31/06	100%	Complete.
2	Subtask 1.1 Define Criteria for the Selection of Industry, CDO and SDO Participants	10/30/06	12/31/06	12/31/06	100%	Complete
3	Subtask 1.2 Selection of CDOs, SDOs and Industry Organizations	11/31/06	12/31/06	12/31/06	100%	Complete
4	Subtask 1.3 Negotiate with Selected CDOs and SDOs for Contracts	11/31/06	12/31/06	01/30/07	100%	Complete
5	Subtask 2.1 Manage Subcontract Performance	10/01/06	10/01/06	10/01/06	Ongoing	Ongoing
6	Subtask 2.2 Coordinate Collaboration Between CDOs, SDOs and Industry Organizations	10/01/06	10/01/06	10/01/06	Ongoing	Ongoing
7	Task 5.0 Project Management and Reporting	10/01/06	10/01/06	10/01/06	Ongoing	Ongoing

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ANSI WEB PORTAL

<http://hcsp.ansi.org>

HYDROGEN CODES & STANDARDS PORTAL

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TO DAY IS TUESDAY, MAY 19

Hydrogen Codes and Standards Portal provides one-stop access to standards critical to the jobs of building code officials, permitting officials, and fire safety officials. This information can be accessed by browsing the taxonomy below, or by using the search box to the left.

To use the browse feature,

- Select a category or subcategory by clicking the check box next to its name.
- If you click more than one subcategory in the same main category, records from all marked subcategories will be returned.
- If you check subcategories from more than one main category only records that have been classified as belonging to both subcategories will be returned.

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CODES & STANDARD MATRIX

KELVIN HECHT

<http://www.fuelcellstandards.com/Matrix.htm>

Hydrogen/Fuel Cell Codes & Standards

Select 'Application' or 'Region' Tab to Search Codes & Standards Matrix

Stationary F/C H2 & F/C Vehicle Portable & Micro F/C Hydrogen Infrastructure Misc International North America Europe Pacific Rim

Click on Area of Interest

Hydrogen & Fuel Cell Vehicle Applications

Vehicles

System Design/Testing

Safety

Performance - efficiency, emissions, durability

Terminology

Fuel Systems

Fuel Cells

System Design/Testing

Performance - efficiency, emissions, durability

Recyclability

Fuel Processors

Performance

Fuel Tanks

Fuel Refueling/Dispensing

Connections

Fuel Specifications

Hydrogen & Fuel Cell Vehicle Applications

Vehicles

System Design/Testing

Japanese Government Regulations

Hydrogen Fuel Cell Vehicles

Published

Japan

European Integrated Hydrogen Project (EIHFP) - Work Package 4

Vehicles

Under Development

European Union

United Nations Working Party 29 Global Technical Regulations (GTR) on Pollution and the Environment

Hydrogen Vehicles

Under Development

International

Safety

SAE J1766

Recommended Practice for Electric and Hybrid Electric Vehicle Battery Systems Crash Integrity Testing

Published

United States & Other Localities

SAE J2578

Recommended Practice for General Fuel Cell Vehicle Safety

Published

United States & Other Localities

ISO 23273-1

Fuel Cell Road Vehicle - Safety Specification, Part 1: Vehicle functional safety

Future Work

- **Completion of All Remaining SubAwards, with annual funding renewals, for 2008-2011**
- **Continue Streamlining Through Electronic Payment Systems**
- **Reduce SubAwardee Transaction Time & Expense Requirements for Annual Contract Extensions for 2008 and Beyond**



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Project Summary

- **Approximately 1/3 through second contract year for Regulatory Logic LLC Award Placement**
- **Start Up requirements of new cost-share with Codes & Standards partners hurdles have been overcome**
- **Ongoing positive response to streamlined electronic payments systems, which have led to invoice to payment times <1 week after receipt of DOE funds**

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Questions?



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