

International Standards and Regulations

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Areas to be Covered

- Global Technical Regulations
- IPHE Scoping Paper for Regulations, Codes and Standards
- Related Activities (for information only)
 - ISO
 - IEC

Overview

- Timeline
 - Start: 9/03
 - End: 2010-2012
 - % complete: N/A
- Budget
 - Total Funding: \$775K
 - DOE share: 100%
 - Contractor share: N/A
 - FY04 funding: \$375K
 - FY05 funding: \$400K
- Barriers
 - Limited DOE Role in the Development of International Standards
 - Inadequate Representation at International Forums.
 - International Competitiveness
 - Conflicts between Domestic and International Standards.
 - Lack of Sustained Domestic Industry Support at International Technical Committees
- Partners, Collaborators
 - Bob Mauro
 - Martin Koubek, DOT

Objective

- By 2010, support and facilitate development of Global Technical Regulations (GTR) 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)
 - Work with DOT/NHTSA and EPA to coordinate US position on the development of international hydrogen/fuel cell codes, standards, and regulations that are performance-based

Approach – Brief History of GTR

- UN/ECE World Forum for Harmonization of Vehicle Regulations
 - 1958 agreement
 - Euro-centric
 - Purpose was to streamline European automotive regulation to ease cross-border movement of vehicles
 - **US is not a signatory** (conflicts with existing processes)
 - Japan signed in 1998
 - Majority vote
 - 1998 agreement
 - Set up Global Technical Regulation framework that is flexible enough to allow it to be applied in all countries, regardless of certification/approval process
 - Consensus process
 - Existing international standards can be/are incorporated by reference
 - US, Canada, Japan and a number of other non-European countries are signatories

Approach – What is different with GTR ?

Issue	1958 Agreement (ECE Regs)	1998 Agreement (GTRs)
Contracting Parties	European countries (33) European Community Japan (signed in 1998) Australia (2000), South Africa (2001) New Zealand (2002)	US Japan European Community Canada, European countries Russia, China, Korea...
Principal Elements	Conditions for granting type approvals and their reciprocal recognition by Contracting Parties Does not preclude membership by countries who use the self-certification process (“alternate to type approval”)	Does not contain provision for mutual recognition of approvals Allows authorities to adopt and maintain technical regulations that are more stringent Two pathways: harmonization of existing (recognized) standards or regulations; or establishment of new GTR where there are no existing standards or regulations
Voting	2/3 majority of Contracting Parties who are present and voting	Quorum = at least half of all Contracting Parties Have to be present to vote Existing regulation is added to the Compendium of Candidate Global Regulations if supported by 1/3 of the present and voting Parties, including the vote of Japan, EC, or US New GTR: consensus vote (unanimous) of Contracting Parties present and voting – if voting against, must provide an explanation within 60 days. If the Contracting Party fails to provide the explanation, vote is changed to affirmative
New/revision enters into force	If (within 6 months) fewer than 1/3 of all Contracting Parties object	A Contracting Party can decide not to adopt the established GTR into its own laws or regulations. Has to notify The Secretary-General in writing and has to give a reason (within 60 days of making decision) A Contracting Party that has not adopted the GTR or made a decision not to adopt within one year has to report to the S-G (yearly)

Approach – Brief History of GTR

- In 2002-2003, Informal Group developed one formal draft standard (on-board liquid hydrogen storage) and one informal draft standard (on-board compressed hydrogen storage)
- Drafts were submitted in 2003 for consideration under the **1958 agreement**, although the tacit agreement in the Informal Group was that they would be submitted under the 1998 agreement
- Protestations from the US at the GRPE level resulted in the request for development of a roadmap to GTR for hydrogen/fuel cell vehicles

Progress – GTR: Development of a Roadmap

- The US, in collaboration with representatives from Europe (primarily Germany) and Japan, led an effort to develop a roadmap to Global Technical Regulation(s) (GTRs)
- This effort is strongly supported by the leadership of WP.29 as a path forward to a Hydrogen Future
- The four routes are:
 - Direct to a single GTR (no intermediary GTRs or regulations)
 - Layered single GTR
 - Modules, where multiple parts of a GTR are developed in parallel and combined into one GTR
 - Modules, where multiple part of a GTR are developed in parallel and are approved as GTRs (unknown number)
- DOT strongly favors the first approach and considers the others as just variations on a (component) theme

Progress – GTR: Not all Routes are Equal

- The Europeans are very concerned about the first approach (Direct to a Single GTR)
 - No pathway to approve fuel cell vehicles until GTR is approved ?
 - Completion is not likely before 2010 – too late ?
 - Vehicles must currently conform to more than 100 ECE regulations
 - Many of the existing regulations will apply to hydrogen fuel cell vehicles, and that those should/could be used
 - Only need a few additional ones for hydrogen and fuel cells (component approach)
- Analysis of the impact on approval processes
 - US DOT (for self-certification)
 - Germany (for type approval)
 - Would provide balanced information to the WP.29 delegates who are expected to make the ultimate decision on the route to GTRs

Progress – GTR: Development Status

- Martin Koubek (DOT/NHSTA) officially announced US co-sponsorship of the GTR proposal
- Sub Working Group on Environment and Emissions formed (EC/JRC is lead) and first meeting held (April 28-29, 2005)

Progress – GTR: Japanese Regulation as Starting Point?

- The Japanese issued a comprehensive regulation for hydrogen vehicles and refueling infrastructure
 - Japan uses a type-approval process
 - The development of the regulation has been largely closed to outside comment
- USDOT supports the “systems” approach used by Japan
 - This comprehensive regulation could be (and likely will be) proposed as the basis for a one-step GTR
 - Careful study of the regulation, and supporting data, will be essential
- The Japanese representative stated that they could accept the module concepts only if consistent with the Japanese regulation

Approach – IPHE Scoping Paper

- International Partnership for the Hydrogen Economy (IPHE) has 16 members
 - Australia
 - European Commission
 - India
 - Norway
 - Brazil
 - France
 - Italy
 - Russian Federation
 - Canada
 - Germany
 - Japan
 - United Kingdom
 - China
 - Iceland
 - Republic of Korea
 - United States
- Members represent
 - Over \$35 Trillion in GDP, an amount equal to 85% of global GDP
 - Nearly 3.5 billion people
 - Over three-quarters of global electricity consumption
 - Two-thirds of global energy consumption
 - Two-thirds of global CO₂ emissions

Approach – IPHE Scoping Paper

- Scoping Papers were commissioned in five areas
 - Hydrogen Production
 - Hydrogen Storage
 - Collaborative Fuel Cell R&D
 - Hydrogen and Fuel Cell Regulations, Codes and Standards
 - Socioeconomics of Hydrogen
- Identify appropriate activities for the Implementation - Liaison Committee to spearhead
- Lead for the development of the Regulations, Codes and Standards (RCS) Scoping Paper is the European Commission

Progress – IPHE Scoping Paper Context

- The RCS Scoping Paper recognizes that
 - IPHE is neither a regulatory nor a standardization body
 - A lot of work has already been and is being done on RCS by IPHE members
- IPHE activities related to RCS should only be initiated when they provide, or are expected to provide, a clear added value
 - Should not duplicate ongoing activities
 - Should identify gaps
 - Should provide guidance through agreed-upon projects
 - Should provide a forum for facilitating progress towards common regulations, codes and standards, and safety protocols.

Progress – IPHE Scoping Paper Content

- The IPHE will undertake the following RCS activities:
 - Report cataloguing vehicle approval processes in use today in IPHE member countries (February 2006)
 - Report cataloguing the stationary, domestic and light duty appliance approval processes in use today in IPHE members (February 2006)
 - International Hydrogen Safe-Use Workshop that will address approaches to risk and safety modeling (September 2005 in Pisa, Italy)
 - Report containing a comprehensive “meta-gap analysis” on the complete range of Regulations, Codes & Standards across the hydrogen economy that exist, are under development, and need to be developed (December 2006)
 - As a first step on the meta-gap analysis, the IPHE will prepare a glossary of common definitions, terminology and nomenclature for standardization and regulatory terms, including terms which are specific to certain IPHE members such as directives, self-certification, etc. (December 2005)

Approach – Related Activities

- Two other separate but related international efforts are underway to develop standards
 - International Organization for Standardization (ISO)
 - Worldwide federation of national standards bodies from more than 140 countries, established in 1947
 - Mission is to promote standardization to facilitate the exchange of goods and services, and to facilitate cooperation in intellectual, scientific, technological and economic activities
 - ISO standards are developed through a consensus process
 - International Electrotechnical Commission (IEC)
 - Global organization for preparing and publishing international standards for electrical, electronic and related technologies.

Approach – Related Activities

- DOE supports and coordinates the U.S. Technical Advisory Groups (TAGs) to provide a national forum for industry and government experts to develop consensus positions on proposed documents and actions.
 - ISO TC197 (Hydrogen Technologies)
 - IEC TC105 (Fuel Cell Technology)
- ISO activities
 - **TC 197 - Hydrogen Technologies:** systems and devices for the production, storage, transport, measurement, and use of hydrogen. Working groups address standards for gaseous and liquid fuel tanks for vehicles, multimodal transport of liquid hydrogen, airport refueling facility, hydrogen safety, hydrogen and hydrogen blends, hydrogen fuel quality, water electrolysis, fuel processing, and transportable gas storage devices.
 - **TC 22 - Road Vehicles:** compatibility, interchangeability, and safety, with particular attention to terminology and test procedures for mopeds, motorcycles, motor vehicles, trailers, semi-trailers, light trailers, combination vehicles, and articulated vehicles. The Electric Road Vehicle Subcommittee (SC21) is addressing operation of vehicles, safety, and energy storage.
 - **TC 58 - Gas Cylinders:** fittings and characteristics related to the use and manufacture of high-pressure gas storage. The working group on gas compatibility and materials coordinates with TC 197.
- IEC activities
 - **TC 105 - Fuel Cell Technology:** primarily stationary power plants, but includes portable and propulsion fuel cells. The working groups in TC 105 include: Terminology, Fuel Cell Modules, Stationary Safety, Performance, Installation, Propulsion, and Safety and Performance of Portable Fuel Cells.

Progress – Related Activities: ISO TC197 update

- How ISO works:
 - New Work Items are proposed by a country member body to ISO, and if a majority of the members vote in favor of the item and five countries name a representative to work on this item in a Work Group (WG), it is approved.
 - A Work Group draft is produced and offered up as a committee draft (CD) which, if approved after being voted upon and having all comments addressed becomes a draft international standard (DIS) and it goes through the same process except that at this level and beyond each country has one vote.
- There is a three-year schedule for new work items to move to international standards.
 - Few work items move this quickly in ISO TC 197

Progress – Related Activities: ISO TC197 update

- Of the eight active work items, the U.S. either initiated or jointly proposed four items
- This may not be obvious if you look at the conveners
 - Only WG-10 is convened by a US representative
 - The original Hydrogen Fuel – Specification was a US-led standard which the Japanese are planning to amend

Progress – Related Activities: ISO TC197 update

- US TAG and Plenary - Future Meetings
 - October & November 2005
 - May & June 2006
- Final Draft International Standards (DIS) in the next year on:
 - WG-1 ISO/DIS 13985: Liquid hydrogen – Land vehicle fuel tanks
 - WG-5 ISO/DIS 17268: Gaseous hydrogen – Land vehicle filling connectors
 - WG-10 ISO/CD 1611: Transportable gas storage devices – Hydrogen absorbed in reversible metal hydrides
- Less certain is possibility of a Final International Standard on:
 - WG-6 ISO/DIS 15869: Gaseous hydrogen and hydrogen blends – Land vehicle fuel tanks

Progress – Related Activities: ISO TC197 update

- Progress is expected in the following areas next year
 - WG-8 ISO WD 22734: Hydrogen generators using water electrolysis
 - WG-9 ISO WD 16110: Hydrogen generators using fuel processing technology
 - WG-11 ISO/NP 10012: Gaseous service stations
 - WG-12 ISO 14697 Amendment 2: Hydrogen fuel – specification

Future Work

- LANL
 - Continue participation in UN/ECE process
 - Support IPHE RCS efforts
- Related Activities (not funded by or through LANL)
 - Continue support of US TAGs
 - Continue participation in ISO process

Supplemental Slide

- Publications
 - *Hydrogen Energy*, Chapter in 2005 Kirk-Othmer Encyclopedia of Chemical Technology
- Presentations on GTR
 - USFCC
 - C&S Tech Team (Feb 2005)
- Other technical presentations
 - Secretary's Hydrogen Learning Workshops in Maryland and Texas
 - Alternative Energy Workshop
 - China Hydrogen Vision and China Hydrogen Roadmap workshops
 - Systems Perspective seminar
 - Hydrogen 101 seminar