

Tracking Hydrogen Codes & Standards “Well-to Wheels”: An IHIG Initiative

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IHIG Codes & Standards Working Group

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IHIG – International Hydrogen Infrastructure Group

An industry-lead group, whose mission is to determine and address the key challenges facing the introduction of a hydrogen supply infrastructure for hydrogen fueled, light duty vehicles.

Member organizations include:

DaimlerChrysler, Ford, GM, BMW

BP, Chevron Texaco, Conoco Phillips, ExxonMobil, Shell

Air Products, BOC, Praxair

US DOE

Hydrogen Codes & Standards – A Key Issue

IHIG: “In order to ensure successful commercialization of hydrogen-fueled FCVs, common Codes & Standards will have to be established”.

IHIG Codes & Standards Working Group established.

Members include: BP, ExxonMobil, Shell, BMW, DOE, GM, SAE, Air Products, BOC, Praxair.

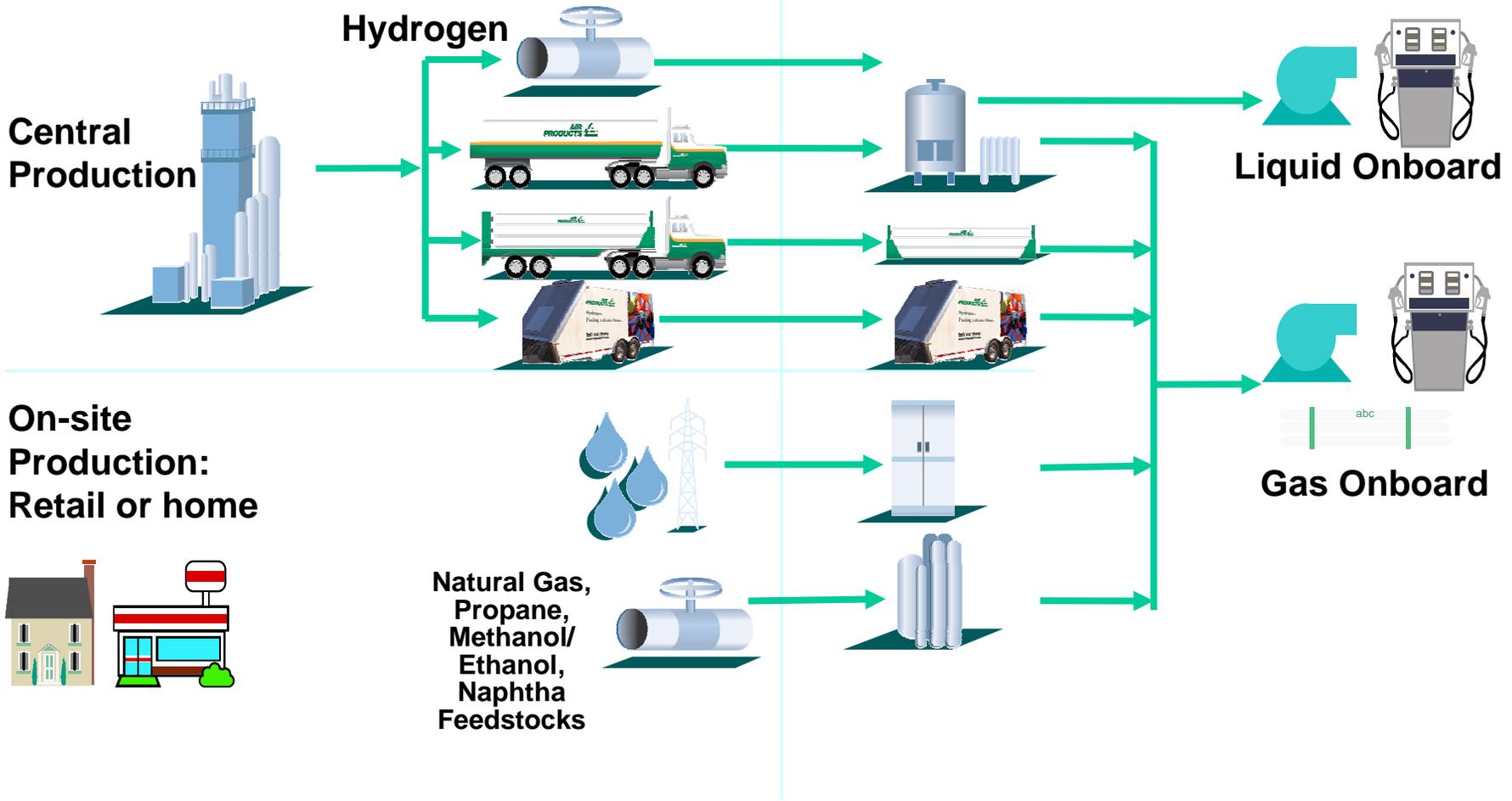
How can the status of Hydrogen Codes & Standards, from Well to Wheels, best be assessed and tracked on an ongoing basis?

US Hydrogen Supply Chain

Production

Distribution

Fuel Station



Codes & Standards Status of Hydrogen Supply Chain

Current Status

	Standard in place, and adequate for projected needs
	Standard in place, not adequate for projected needs
	No applicable standard in place

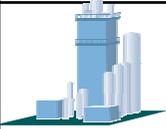
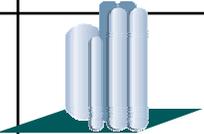
Productive Activity

	Significant productive activity
	Some level of activity
	No activity

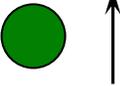
Future Outlook

	Direction appears adequate for commercialization
	Direction may fall short of commercialization
	Direction appears to be inadequate for commercialization

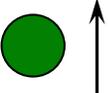
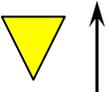
Production

		Current Status	Productive Activity	Future Outlook	Comments
Central Production		●	●	●	Established industry
Onsite Prod. Reforming		■	▼	▼	Local zoning ISO/ UL standard
Onsite Prod. Electrolysis		■	▼	▼	Local zoning ISO/ UL standard
Home Production		■	▼	■	Local zoning In 03 ICC code and template

Delivery

		Current Status	Productive Activity	Future Outlook	Comments
Delivery – HP composite					ASME including portable containers for DOT (a 1st)
Delivery – HP conventional					ASME research activities
Delivery – cryo					Harmonization in progress
Pipelines	H2 				ASME recommendations
Tunnel Delivery					Review and change DOT hazard class

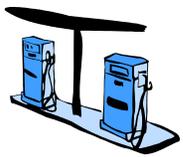
On-Site Bulk Storage

		Current Status	Productive Activity	Future Outlook	Comments
HP Composite					Standards activities initiated
HP Conventional					Research activities for higher strength material
Set-back					SNL tests underway, U of Miami, ICC, NFPA
Location above grade					SNL tests underway, ICC, NFPA codes
Below grade					CGA kicking off activity & NFPA 52
Cryogenic					Well-established technology
Set-back					SNL tests underway, ICC, NFPA codes
Location					SNL tests underway, ICC, NFPA codes
Below grade					CGA position paper, ICC (04 amend), NFPA 55

Fuel Dispensing

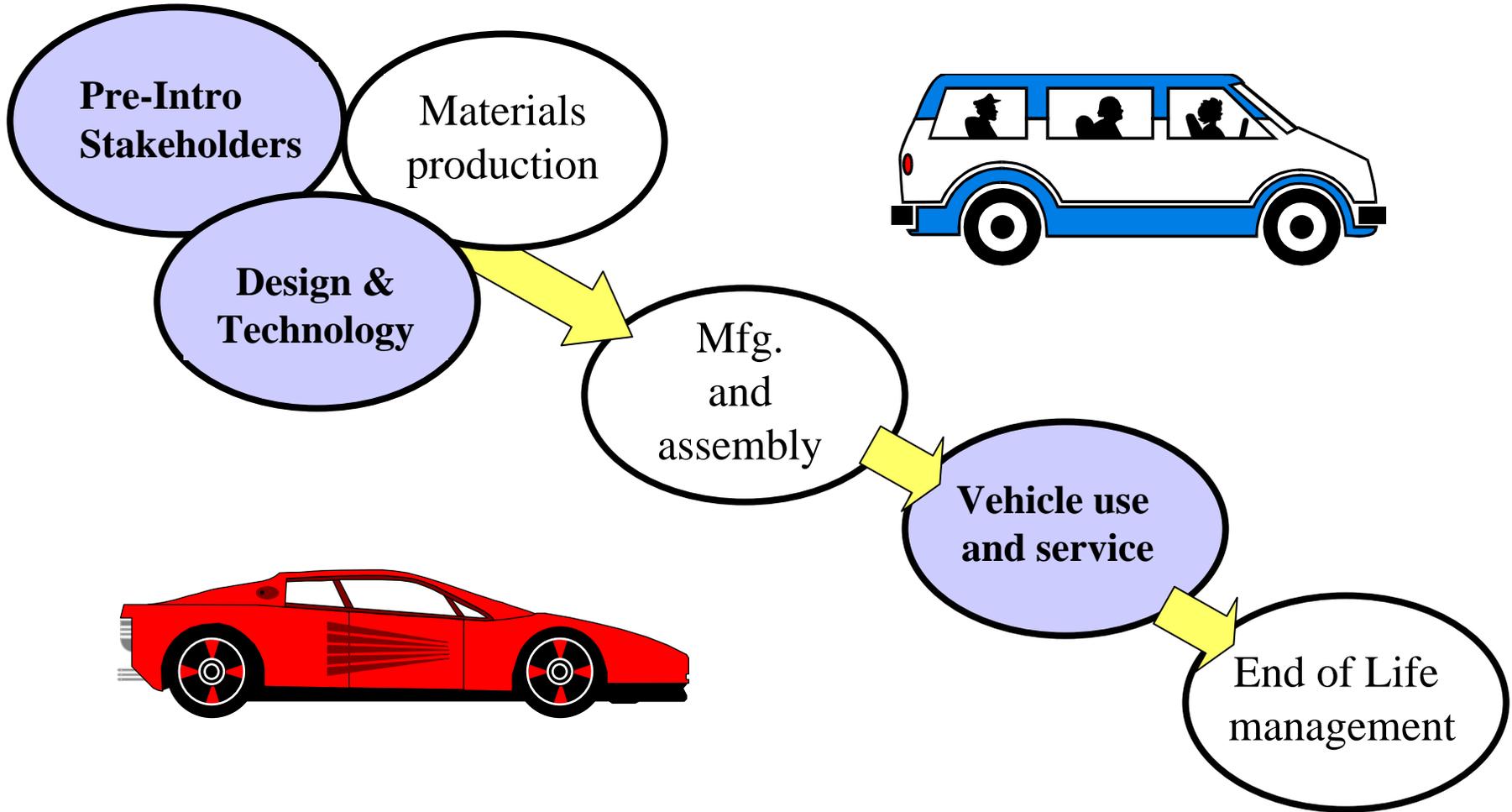
		Current Status	Productive Activity	Future Outlook	Comments
Equipment Nozzle (250/350)		●	●	●	In testing CaFCP
Communication		■	●	●	SAE
Weights & Measures (gas) (liquid)		■ ■	▼ ■	● ■	In testing, CaFCP
Fuel Specification		▼	● ↑	▼	In template: SAE, ASTM, API; ISO
Equipment (700) nozzle		■	▼	■	SAE work in progress
Liquid Dispenser		■	■	■	No activity in US

Fuel Island

		Current Status	Productive Activity	Future Outlook	Comments
Piping, electrical		▼	▼	●	In ICC 03 code and template
Proximity to other fuels		▼	▼	■	Not addressed yet, will be in 06 ICC
Safety Integration		■	▼	▼	Prevention of ignition sources, i.e. grounding, PPE
Building codes		▼	●	▼	ICC 03 codes, NFPA code
Canopy		■	▼	●	ICC 04 amendment
Onsite Equip		●		●	Electrical and piping code changes applicable

Automotive Perspective

Automotive Life Cycle - Status and Comparisons



Codes & Standards Status: Automotive Perspective

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Pre-Introduction Stakeholders (US)

	<i>CS</i>	<i>CA</i>	<i>FO</i>	<i>Remarks</i>
Code Officials				H2 Infrastructure issues not getting adequate technical support within ICC. DOE getting organized for education efforts aimed at Code officials.
Public Education				Ownership? Coalition of DOE-industry?
First Responders				NFPA clearly go-to authority. DOE (thru H2C&SCC) becoming more proactive

Pre-Introduction Stakeholders (EU/J)

	<i>CS</i>	<i>CA</i>	<i>FO</i>	<i>Remarks</i>
Code Officials				EU: Work progressing on Type-approval documents Japan: METI involvement
Public Education				EU: unknown Japan: unknown
First Responders				EU: EIHP2 WP5 conducting risk analyses Japan: heavy gov't involvement



Design/Technology (US)

	CS	CA	FO	Comments
Vehicle Safety	▼	▼	●	SAE/NHTSA working to identify crossover FMVSS documents
Interface	▼	▼	●	25/35Mpa published, 50/70Mpa in work; Communication in process; LH2 interface comprehended within SAE, BMW lead
On-Board Storage	■	■	▼	9 ISO/ECE documents in play; impact of GTR process not fully comprehended
CH2	■	▼	▼	CSA lead SDO; Solutions being pursued at several pressure levels
LH2	■	■	▼	Predominantly EU usage



Design/Technology (EU/J)

	CS	CA	FO	Comments
Vehicle Safety	▼	▼	●	EU: EIHP2 interplay between WP3/4/5 Japan:
On-Board Storage	■	■	▼	9 ISO/ECE documents in play, Japan: Focus on 35Mpa systems for introduction
CH2	■	▼	●	EU: Working towards optimum storage pressure; seen as vital to safe and commercially viable vehicle introduction Japan: 35Mpa predominates, narrows focus
LH2	■	■	▼	EU: Primarily BMW in ICE Japan: Experimentation underway, no commitment

Vehicle Use (US)

	CS	CA	FO	Comments
Parking (garage)				Garage not in ICC 03 model code, ICC process needs attention
Parking (indoor)				Indoor addressed in ICC 03 model code, is in template
Driving				
Tunnels and vehicle movements				SAE working with NHTSA to coordinate requirements; local jurisdictions predominate
Service				ICC Proposal 156-03/04 disapproved - not enough technical backup

Future Outlook - Vehicle Usage Comparisons

	US	EU	J.	Comments
Parking (residential garage/other indoor)				Garage [not] in ICC 03 model code; EIHP2 actively studying issue; no existing Japanese prohibitions.
Driving				
Tunnels and vehicle movements				Japanese regulations do not differentiate between on-vehicle fuels. Product shipment another issue.
Service				Proposal rejected in Sept. ICC hearings. Japanese study underway for determining fuel proximity regulations

Microsoft Internet Explorer window titled "IHIG Codes and Standards - Microsoft Internet Explorer". The address bar shows "http://www.ihig.org/cs/csindex.jsp". The page content includes a navigation menu on the left with "Home", "Codes & Standards", and "Member Login". The main content area features the "IHIG" logo and "www.ihig.org" URL. The primary heading is "Codes & Standards Tracking System", followed by a disclaimer: "The information obtained through this site is draft IHIG material, and does not necessarily represent the views of individual IHIG members." Below this are four links: "Automotive Perspective", "US C&S H2 Supply Chain", "Japan H2 Supply Chain", and "European C&S H2 Supply Chain". A final link at the bottom reads "Submit comments to IHIG on Codes and Standards Tracking System". The Windows taskbar at the bottom shows the Start button, several application icons, and the system tray with the time "6:30 PM".



- Home
- Codes & Standards
- Member Login

Codes & Standards Tracking System

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[Automotive Perspective](#)

[US C&S H2 Supply Chain](#)

[Japan H2 Supply Chain](#)

[European C&S H2 Supply Chain](#)

[Submit comments to IHIG on Codes and Standards Tracking System.](#)

Status of SAE's Standards Activities

Standards Published

- 1. FCEV Terminology (J2574)**
- 2. General Hydrogen Vehicle Safety (J2578)**
- 3. PEM FC System Recyclability Design Guideline (J2594)**
- 4. Compressed Hydrogen Vehicle Fueling Coupling (J2600)**

Standards Awaiting Publication

- 5. Fuel Cell System Performance Testing (J2615)**
- 6. Fuel Processor Subsystem Performance Testing (J2616)**

Draft Standards in Progress

- 7. Fuel Cell Stack Subsystem Performance Testing (J2617)**
- 8. FCEV Hydrogen Consumption and Range Testing (J2572)**
- 9. Fuel Systems in Hydrogen Vehicles (J2579)**
- 10. Hydrogen Vehicle Fueling Communication Devices (J2601)**

SAE FCEV Standards – Recent Work Group Additions

1. Terminology Update

- Terminology WG Reconvened – New Members
- Late 2004 Re-issue of J2574

2. Hydrogen Fuel Specification

- New Task Force (HQTF) Formed – Leader from GM
- Broad-based Industry Membership of HQTF
- Data Sources: USFCC, CaFCP, CSA, EIHP, and JARI. HQTF to compile a compositional guideline initially, standard ultimately.

3. New Work Items

- IHIG C&S Assessment Chart – set drafting priorities.