



UN-ECE / WP.29-AC3 HFCV - SGS

Informal document No. GRSP-41-30
(41st GRSP, 7-11 May 2007,
agenda items 6. & 6.1.)

Federal Ministry of Transport, Building and Urban Affairs

- **Christoph Albus**
Head of Division S 34
Vehicle Engineering / Environment
- **GRPE / WP.29**
- **Project Management of HFCV project**



UN-ECE / WP.29-AC3 HFCV - SGS

The HFCV GTR project

- **Development of a GTR for Hydrogen-/Fuel Cell Vehicles**
- **3 co-sponsors (Japan, USA, Germany)**
- **Action plan: AC.3 Dokument -
ECE/TRANS/WP.29/2007/41**
 - **Informal document March 2007**
 - **On agenda for adoption in June 2007**



Hydrogen- / Fuel Cell Vehicles

- **Technological aspects**
 - **Safety aspects (SGS)**
(Hydrogen H₂, high pressure, high voltage)
 - **Environmental aspects (SGE)**
- **Three main questions**
 - **Differences to conventional vehicles ?**
 - **What should be regulated ?**
 - **What can be harmonized (ww) ?**



UN-ECE / WP.29-AC3 HFCV - SGS

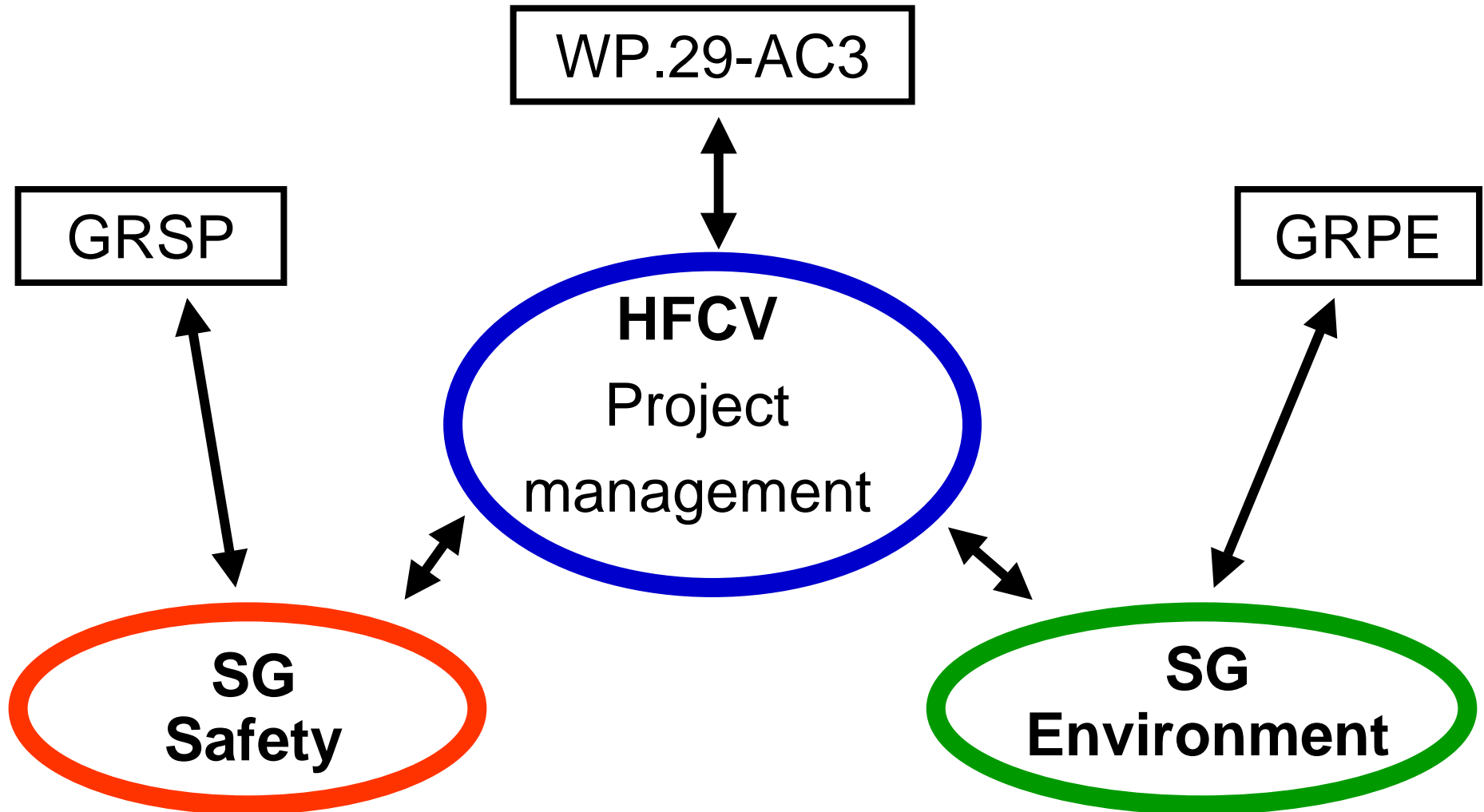
History and status quo of national / regional requirements for H2- / FC vehicles

- **GRPE activities**
- **Japan legislation 3/05**
- **Europe – Regulation in preparation**
- **AC.3 decision about HFCV structure (June 2005)**

Outstanding: action plan as a basis for HFCV and the technical work of the two sub groups



UN-ECE / WP.29-AC3 HFCV - SGS





UN-ECE / WP.29-AC3 HFCV - SGS

The HFCV Action Plan

(ECE/TRANS/WP.29/2007/41)

- I. Objective of the proposal
- II. Safety Requirements
- III. The GTR development process



UN-ECE / WP.29-AC3 HFCV - SGS

I. Objective of the proposal

- **Development of a HFCV GTR**
 - **Attains equivalent levels of safety as those for gasoline vehicles**
 - **Is performance based and does not restrict future technologies**

- **H2 powered vehicle technology is still emerging**
 - **Researchers input is a vital component**



UN-ECE / WP.29-AC3 HFCV - SGS

I. Objective of the proposal

- **Based on a comparison of existing regulations and standards for HFCV with conventional vehicles:**
 - **Differences in safety and environmental aspects**
 - **What items need to be regulated**



UN-ECE / WP.29-AC3 HFCV - SGS

II. Safety Requirements

- **Vehicle occupant protection (crash test)**
- **Fuel Integrity (crash test)**
- **Fuel Integrity (system safety and system requirements)**
- **Component requirements**
- **Electric isolation and electric safety**



UN-ECE / WP.29-AC3 HFCV - SGS

Vehicle Fuel Integrity (Table 1)

		Conventional Gasoline and Electrical / Hybrid			CNG/LPG			Hydrogen- / Fuel Cell- Vehicle		
		Japan	EU	US	Japan	EU	US	Japan	EU***	US
Fuel Integrity Crash test	Full frontal	50	N	48	N	N	48	50	N	N
	Offset frontal	N	N	N	N	N		N	N	N
	Side	50	N	53	N	N	48	50	N	N
	Rear	50	N	80	N	N	48	50	N	N
	Rollover	N	N	Static rollover	N	N	N	N	N	N
Integrate system safety and system requirements	Fuel tank and underride protection		Y	N		Y	Y (Tank)		Y	N
	Fuel lines		Y	N		Y		Y	Y	N
	Detection of leakage	N	N	N	N*****	N	N	Y	N	N
	Purge gas							Y	N	N
	Blow off	N/A	N/A	N/A	N	N	N	N	Y	N
	Container Assembly	N/A	N/A	N/A	N	Y	Y	Y	Y	N
	Fault Strategy / Safety management system	N	N	N	N	N	N	N	Y	N
	Prevention of misfueling	N/A	N/A	N/A		Y			Y	
	Installation and mounting requirements		Y		Y	Y		Y	Y	



UN-ECE / WP.29-AC3

HFCV - SGS

Vehicle Fuel Integrity (Table 1)

		Conventional Gasoline and Electrical / Hybrid			CNG/LPG			Hydrogen- / Fuel Cell- Vehicle		
Component requirements:	Container	N/A	N/A	N/A	Y	Y	Y	Y	Y	N
	Container Attachments	N/A	N/A	N/A	Y	Y	N	Y	Y	N
	Other components of the fuel system	N/A	N/A	N/A	Y	Y	N	Y	Y	N
	Fuel Cell	N/A	N/A	N/A	N/A	N/A	N/A	N	N	N
Electrical Isolation and electric safety *	In-use	N	Y****	N	N/A	N/A	N/A	Y	N****	N
	During and post crash	N	N	Y	N/A	N/A	N/A	N	N****	Y
	Total electric safety		N****					Y	N****	

Y Mandatory Requirement

N No requirement

N/A Not applicable

* For Electric, Hybrid or Fuel Cell Vehicles

** N1 vehicles with side fuel container

*** Draft European H2 Regulation (already applicable in Germany)

**** Draft proposal to amend ECE-R 100 is under discussion

***** Odorant in CNG fuel

No's in table : Impact speed [km/h]



UN-ECE / WP.29-AC3 HFCV - SGS

	Vehicle Occupant Protection (Table 2)		
	Japan	EU	US
Full frontal	50 km/h	Y	48 km/h
Offset frontal	N	56 km/h	N
Side deformable barrier	50 km/h	50 km/h	53 km/h
Side pole	N	N	53 km/h
Rear	N	N	N
Rollover	N	N	Y
Roof crush	N	N	Y



III. The GTR development process

- **The GTR will cover:**
 - **FC, ICE**
 - **CGH2, LH2**

- **Vehicle categories (applicability, scope): tbd**

- **Two step approach (Phase 1, 2)**



UN-ECE / WP.29-AC3 HFCV - SGS

Phase 1

- **Component and subsystem requirements (non-crash test based)**
- **Crash testing based on national requirements, but harmonization of hydrogen leakage requirements**
- **Preparation of Phase 2 (research, test data, risk analysis, etc.)**



UN-ECE / WP.29-AC3 HFCV - SGS

Phase 2

- **Update and improvement of the HFCV GTR taking research and technology development into account**
- **Discuss how to harmonize crash test requirements for HFCV**



UN-ECE / WP.29-AC3 HFCV - SGS

Timeline for phase 1

- **GRSP June : setting up & formation of SGS**
- **GRPE June: Next SGE meeting**
- **WP.29/AC.3 June: adoption of the action plan (TRANS/ECE/WP.29/2007/41)**
- **September 2007: First SGS meeting**
- **2010 GTR proposal (phase 1) to AC.3**



UN-ECE / WP.29-AC3 HFCV - SGS

The September SGS meeting

- **Location : Bonn, Germany (proposal)**
- **2 days (date ?,)**
- **chair tbd (co-chairmanship Japan/USA)**
- **agenda:**
 - **Formation of SGS**
 - **Action plan of the HFCV project**
 - **Information about Japanese H2 legislation**
 - **Detailed time schedule**



UN-ECE / WP.29-AC3 HFCV - SGS

Formation of the HFCV SGS (Invitation)

Members of GRSP +

Members of original HFCV group (GRPE)



New HFCV - SGS



UN-ECE / WP.29-AC3 HFCV - SGS

Electric safety

- Item under HFCV-SGS (fuel cell)
- 2 proposals Japan and Germany to amend ECE-R 100 concerning high voltage / electric shock protection (GRPE Jan. 2007)
- WP.29 decided in March 2007, that GRSP should take the responsibility for ECE-R 100

Open question: Informal group under GRSP
or under SGS



UN-ECE / WP.29-AC3 HFCV - SGS

Thank you for your attention

narusawa@ntsel.go.jp

nha.nguyen@dot.gov

christoph.albus@bmvbs.bund.de