

**EIHP2 Set of Presentations  
at the ELEDRIIVE Workshop on  
Regulations, Codes & Standards  
in Brussels  
20OCT2003**



Time Schedule at ELEDRIVE Workshop as of 09OCT2003:

11.55	Infrastructure	5 min	LBST (R. Wurster)
		6 min	Vandenborre (C. Machens)
		8 min	Norsk Hydro (H. Andersen)
		6 min	Air Liquide (J.Y. Faudou)
		10 min	Raufoss (P.S. Heggem)
12.30	<i>Lunch</i>		
14.00	Hydrogen Vehicles		CRF (G. Brusaglino) & CITELEC (P. Van den Bossche)
		10 min	BMW (P. Michel)



### *Vehicles:*

Everybody (EU, Japan, USA, etc.) wants a Global Technical Regulation (GTR) by 2010, or sooner

To get there, everybody has to give up something and still all will win (Europe: extend/ abandon UNECE, USA: extend/ abandon FMVSS)

### *Components/ Stationary Equipment:*

International standards are required, such as ISO and IEC



Onboard storage-related issues

⇒

ECE

⇒

GTR

(to replace ECE)

Rest of H2-Vehicle  
(FC, Safety in normal & crash conditions; Fuel consumption; etc.)

Using existing  
ECE, EEC,  
FMVSS;  
ISO, IEC and other  
national RC&S

⇒

GTR



A budget for real coordinative and screening work on Regulations/ Codes and Standards has to be allocated by the European Commission which would only try to match international efforts in Japan and the USA.

Funding situation for RC&S in Hydrogen Vehicles and related Refueling Infrastructure:

### **USA:**

Regulations, Codes, Standards and Safety (FY2004): 16.0 M US\$

### **Japan:**

PEMFC & H2 system codes and standards studies (FY2003): 32.2 M US\$

### **Europe:**

RC&S & Safety in EIHP2 (FY 2001, 2002, 2003): 2.36 M € ~ 0.9 M US\$  
⇒ ~ 1/50 of USA + J





**Refueling systems:**  
Private (HomeFueler)  
Public (Community Fueling)  
Industrial (Buses, Fleets, ...)



**(Nothing stays the same!)**

H2 filling-stations will not only be used for refueling:

- ELY generates H2
- H2 is compressed
- H2 is stored
- H2 is dispensed

But there are more possibilities:

H2 can be used for „Peakshaving“:

- GenSets or one day Fuel cells could be integrated on a filling-station
- Filling stations at power stations ?
- Filling stations at Wind-energy systems (remote) ?
- Filling stations at supermarkets & on parking-lots ?
- „Dual use“ filling stations (for cars & boats) -> specific locations





Small refueling systems

Mobile fueling stations (for "mobile" fleets) 

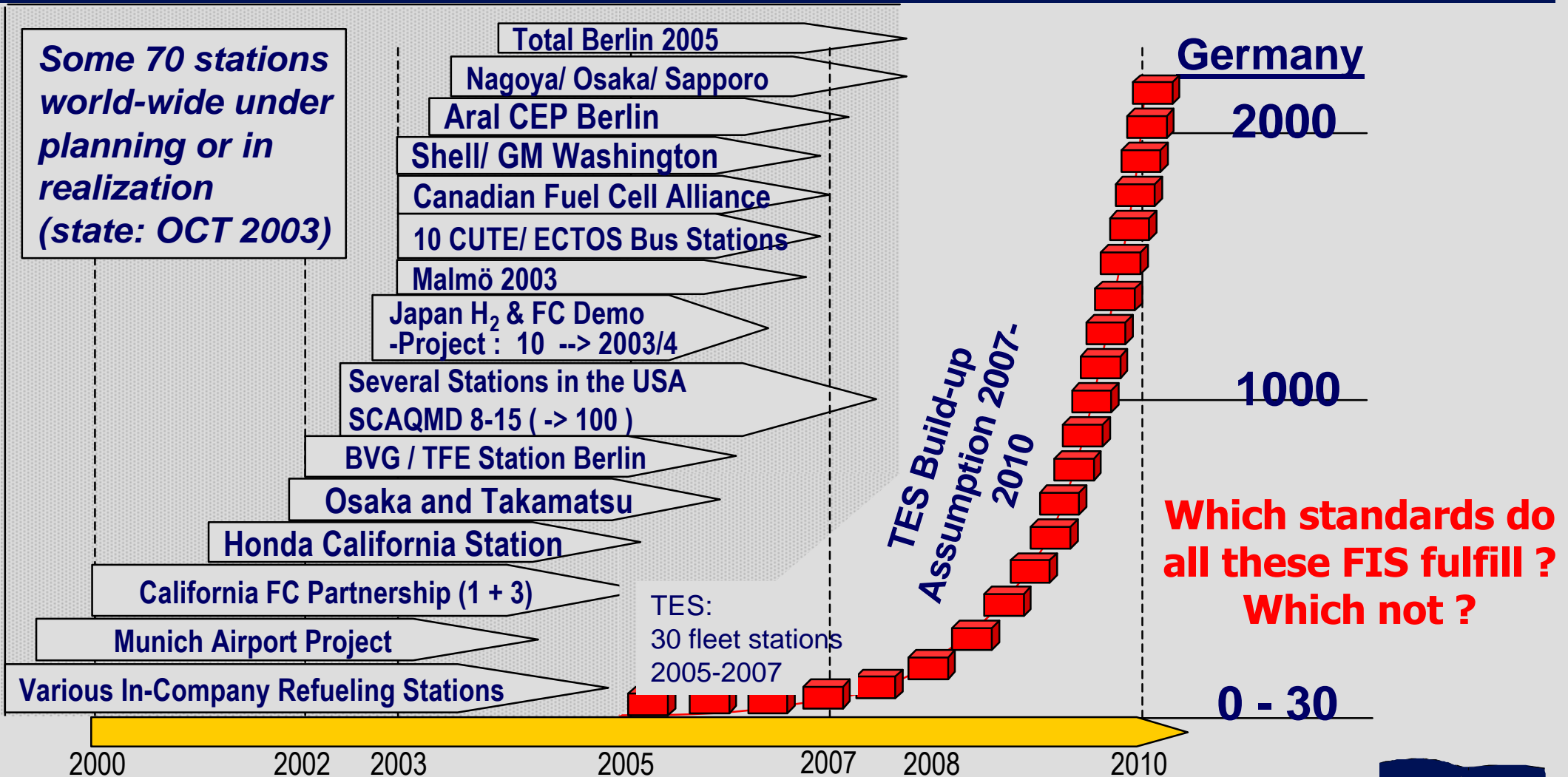


FiS on a trailer





# EIHP2 - "Meta-Study" of all realised Filling-stations ? Does this exist ? 9

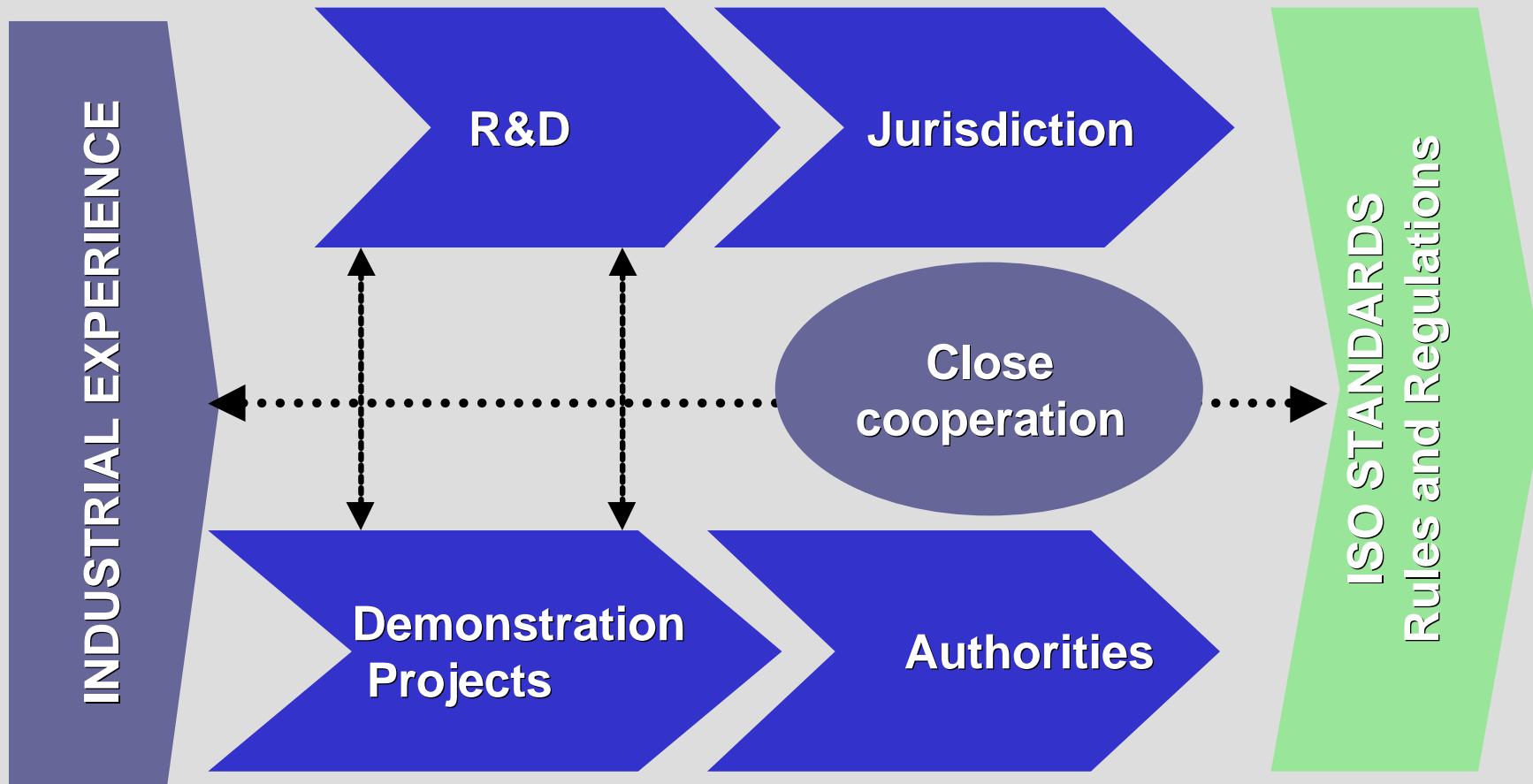


- **Not legal requirements**
- **Made by interested parties**
- **Supposed to give recommendations about safe solutions and practice on the particular topic/ installation/ equipment**
- **Supposed to support the free exchange of goods and services**
- **Examples:**
  - ISO, IEC
  - NFPA
  - IGC
  - ASME
  - ANSI



- Legal Requirements and Regulations is ranked above standards
- EU directives express the frame requirements for national regulations in the different European member countries
- Important directives regarding hydrogen technologies and infrastructure are:
  - ATEX directives
  - PED (Pressurised Equipment Directive)
  - EMC (electromagnetic compatibility) directive
  - The Machinery Safety Directive
  - SEVESO II (large amounts of haz. mat.)
  - Transport of dangerous goods by road
  - UN IMO





- **Other parts of the world have other rules and regulations. This could make a problem harmonizing all kinds of standards for all relevant areas.**
- **ISO and IEC with their technical committees should try to cover all common interests.**
- **Development of standards and regulation require knowledge about how to do it. Experts know!**
- **To have influence means participation in the development of drafts, membership in relevant committees, membership in working groups, convenership and so on.**



**ISO/TC 197, which covers 'Hydrogen Technologies', and some other of its 14 liaison committees are central to the development of infrastructure.**

- **P-members in ISO/TC 197: 17 countries**
- **O-members: 12 countries.**
- **Only half of the P-members are actively participating in the development of standards**



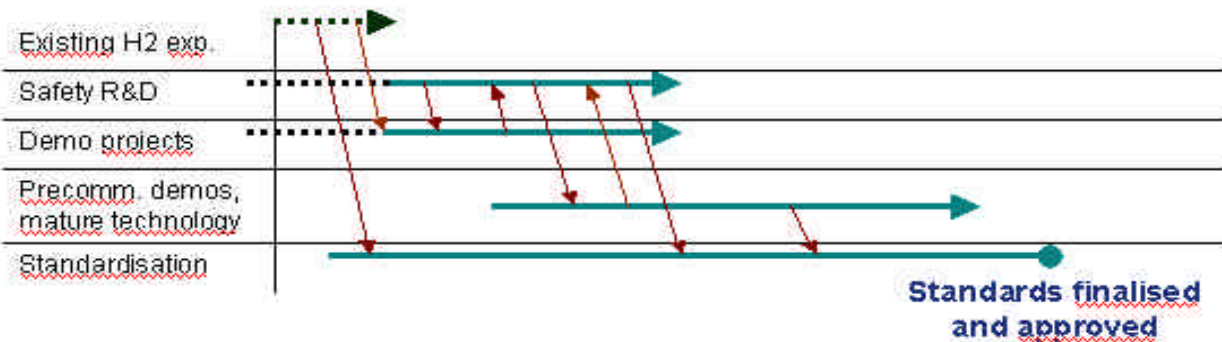
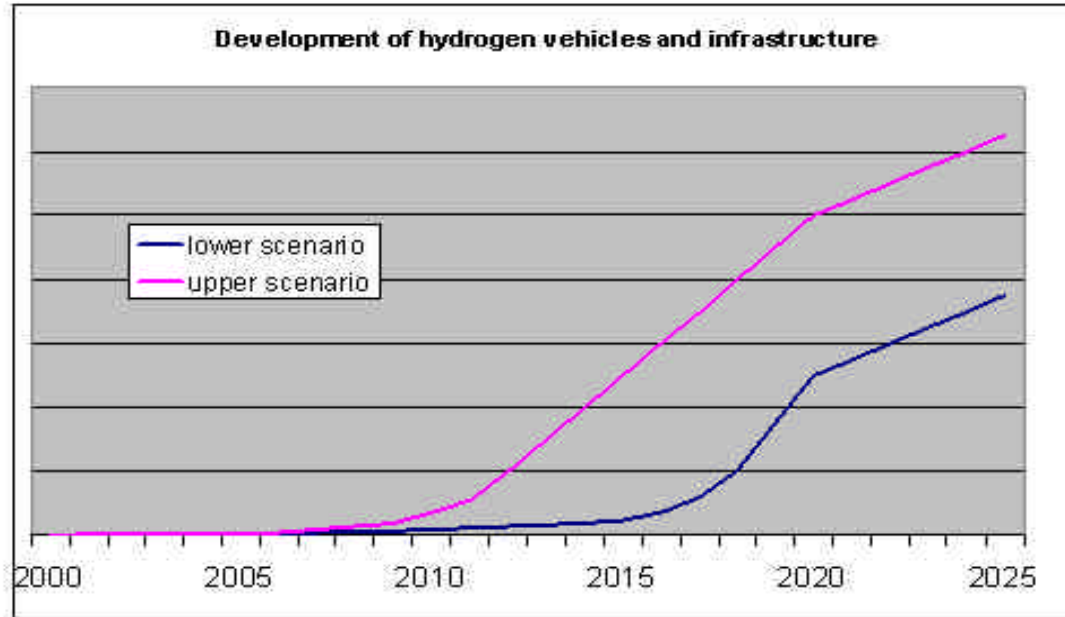


- **New working item : Gaseous Hydrogen Service Station**
- **6 (5 active members a minimum) have volunteered to contribute to the development of the standard:**
  - Canada (leader)
  - Norway
  - Holland
  - France
  - Japan
  - Argentina (???)
- **US voted against**
  - Hazardous zones are critical
    - US have started large activity to address this issue
  - US wants fixed zones
    - This will require fixed technology solutions
    - European approach is evaluation by risk assessment



- We need **commitment** !!!!!
- Education of public authorities and organisations responsible for approval, e.g. CE-marking
- Risk Analysis is a key area
  - Common understanding
  - Safety work is needed to support this area
    - Experimental and modelling - HYSAFE
  - Statistical data etc.
- We need harmonisation of standards and legal requirements





- **There must be a win-win situation in all types of collaborations**
  - **North America has the cash, EU has the skill and competence. Are we willing to trade the know-how ?**
  - **Why should company share knowledge if this does not give a return – do we need a reward system ?**
- **IPR and secrecy is a key barrier**
- **Who should form the core of that work**
  - **Do we need one place (committee) in EU for this area ?**



The distribution and delivery of Hydrogen through pipelines, liquid bulk, and cylinders is well known in the industries as well as industrial filling installations.

Major difference in Hydrogen Energy is environment (urban sites, public) and New Technologies required for improved performances (autonomy, fast filling).

Today environmental policies are not very well harmonized between European Countries (e.g. Safety distances around LH<sub>2</sub> storages) whereas a lot has been achieved in transport policies through EEC Directives, TPED, as well as UNECE Global approach for vehicles.

Developing infrastructures for Hydrogen supply will require:

- Better harmonisation and standardisation in risk assessment analysis methodology - worst case accident scenarios.
- Standardisation for implementation of new technologies and new components.
- To improve feed back coming from Hydrogen projects.
- Sharing and harmonisation of C&S programs between Europe USA and Japan



- Experiences from Drafting a CNG- and a CGH<sub>2</sub>-regulation for UNECE approval. Different design philosophies covered by ISO and ECE/GTR-regulations (high initial safety factor, versus end of life safety).
- Alternative hydrogen storage technologies (other than CGH<sub>2</sub> or LH<sub>2</sub>), at least an instrument to work on regulatory issues if needed in relation to 'New/Alternative' storage technologies
- Establishment of an active, inter-company (from vehicle and component manufacturers), drafting work group for amendments, corrigenda and new regulations (e.g. GTR – US-goal for draft finalization: 2007, for draft approval: 2010) related to road vehicles, in line with new technology.





- Establishment of an active , inter-company working group for adoption of a GTR into existing Type approval processes.
- Envelope vehicle/refuelling dispenser not covered yet. (same process for CNG took YEARS.
- Legal aspects regarding the refuelling of vehicles (robots, self-service++)
- Hydrogen blends (i.e. hydrogen blended into CNG, or v.v.)



## APPROVAL OF ROAD VEHICLES - Today

- Vehicle manufacturer's both in Europe and the USA must meet legal requirements if a vehicle shall be approved and registered for use.

	Approval procedures	Legal Requirements
Europe	Type approval	ECE regulations or EC directives or national laws
USA	Self-Certification	FMVSS



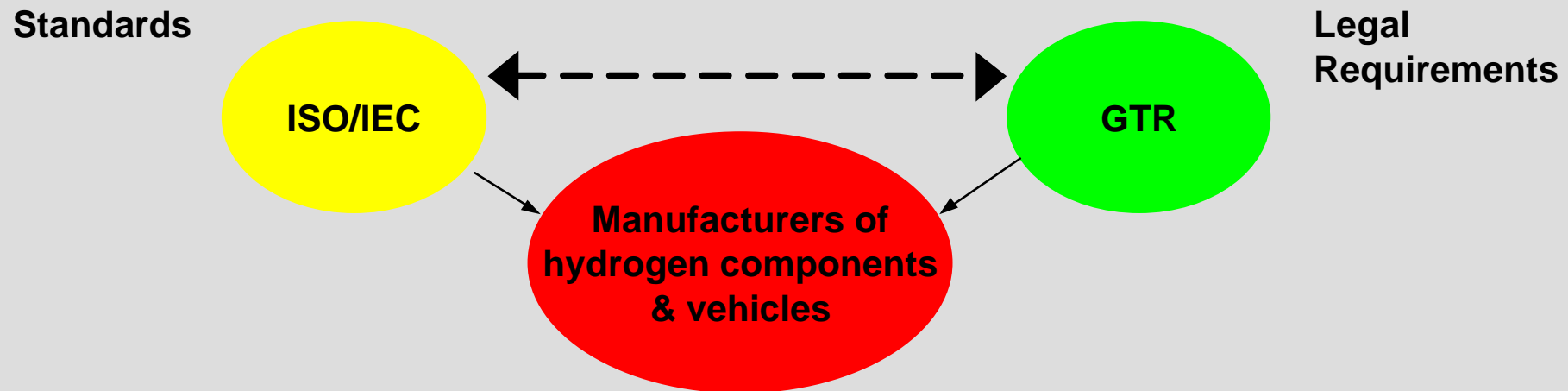
## APPROVAL OF ROAD VEHICLES - Tomorrow

- Vehicle manufacturer's everywhere must meet legal requirements if a vehicle shall be approved and registered for use.
- Vehicle manufacturer's need uniform legal requirements throughout the world to speed development and reduce costs.

	Approval procedures	Legal Requirements
Europe, USA, Japan, ...	Type Approval or Self-Certification	GTR



## Desirable Future Scenario For Regulations & Standards



- Legal requirements should be created only where necessary
- GTRs should refer to available ISO/IEC standards
- No standards should be created for subjects where legal requirements are necessary
- Standards are necessary for communication between industries



### BMW Plans:

- 2003** Register H2 prototype cars based on a national approval
- 2004/5** Register H2 pre-series cars based on a national approval
- 2006** Register small volume H2 series production cars based on ECE regulation
- 2010** Register H2 series production cars based on a GTR !



- **ECE regulation:** draft is based on ISO/IEC Standards - where available. The balance is made up by ENs. These ENs need transformation into ISO/IEC Standards.
- **C&S generally:** gap analysis of codes and standards development. (use traffic lights framework methodology developed by IHIG in the US)
- **Safety:** Support leading institutions carrying out modelling and safety studies globally.
- **Politics:** List issues that may act to hinder the hydrogen economy.
- **Industry:** Target global industrial stakeholders to act as 'international links' – involve auto companies as well as infrastructure providers and other experts



**A road map is needed !**

