European Commission

New Initiatives

on Demonstration of

Hydrogen for Transport

International Partnership for the Hydrogen Economy
Steering Committee
Vancouver, 28 & 29 March 2006

Iñigo SABATER EIZAGUIRRE,
Directorate General for Energy and Transport
European Commission

Index

1. Hydrogen and Fuel Cells Strategy
2. Lessons from CUTE
3. Expectations about "Hydrogen for Transport"

European Hydrogen and and Fuel Cells Technology Platform

HLG **Vision**

Strategic Research Agenda / Deployment **Strategy**

European Hydrogen & Fuel Cell Technology Platform (HFP)

- Member States' Mirror Group
- Advisory Council + Executive Group
- European Commission
- JTI Working Group
- Secretariat
- **Implementation** Panel Coordination Group
  - Transport
  - Stationary
  - Portables & Early Markets
  - Hydrogen Supply
  - Cross-cutting Issues
- General Assembly
- **Platform Operations**
  Projects and initiatives (EC, MS national, regional, local)
- Roads2HyCOM & HyLights

Components of the Strategy

1.- **Confirms** the European Sustainable Hydrogen Economy **vision**, underlining the importance of hydrogen for **transport**

2.- Requests a 10 year RTD+D programme
- 2.1 Hydrogen production and distribution (competitive)
- 2.2 Storage (on board)
- 2.3 Fuel cells (durability, performace, economics, industrialisation)

3.- "European Joint Technology Initiative"

4.- Large scale demonstration: "Lighthouse projects"

5.- Policy and financial framework

https://www.hfpeurope.org/

s1 sabatin, 10/25/2005

Index

1. Hydrogen and Fuel Cell Strategy
2. **Lessons from CUTE**
3. Expectations about "Hydrogen for Transport"

CUTE
Vision, Technology and Teamwork

Final conference:
Hamburg
10 & 11 May 2006
www.cute-hamburg.de

Is it possible to build hydrogen fuel cell buses in series production, and get them on the road to deliver regular public transport services?

- Hydrogen fuel cell buses were produced in a normal production plant
- These buses were certified to operate in urban public transport services
- 1.000.000 Km and more than 5.000.000 passengers over a two-year period

Is it possible to build a hydrogen supply infrastructure to fuel buses, mostly based on renewable energy sources?

- Nine fuelling stations were erected in the nine CUTE cities
- Each fuelling station refuelled the local fleet of three buses with hydrogen at 350 bars, delivering between 100 and 200 Kg of hydrogen everyday
- Hydrogen was produced both centrally and on-site (through natural gas reforming, or water electrolysis).
- More than 60% of the hydrogen produced on-site came from renewable energy sources

Would the hydrogen fuel cell buses and the hydrogen supply infrastructure achieve availability rates comparable with alternative technologies?

- Over the two-year trials the total system availability (bus + infrastructure) reached a rate of around 80%
- This availability, while being lower than that of a comparable diesel or CNG bus fleet, shows that the technology is workable
- And even more important, through the trials we have learnt how to improve availability

Would drivers, technicians and the general public accept these new technologies?

- Many drivers have tested the buses and they were highly satisfied
- Many technicians have developed the necessary skills to maintain the buses and the fuelling stations without any major problem
- Millions of European citizens have experienced this new form of clean mobility and they like it. Some passengers were even prepared to wait for the next bus if they knew it was one of the silent and non-polluting hydrogen buses

Is it safe to use hydrogen as a fuel?

- No single hydrogen related accident has occurred over the two-year demonstration period
- Hazards related to hydrogen are simply different from those related to other fuels and they can be managed

Index

1. Hydrogen and Fuel Cell Strategy
2. Lessons from CUTE
3. **Expectations about**

"Hydrogen for Transport"

Expectations after CUTE

- After CUTE the questions are no longer **how and if**, but
- **WHEN** will this technology be ready; and
- **WHAT** needs to be done to render performance and costs more competitive?

Expectations after CUTE

- The European Union has now embarked on a series of further demonstration projects grouped under the initiative "**Hydrogen for Transport**"
- Around 200 hydrogen-powered vehicles will be demonstrated over the next three years
- The aim is:
  - to improve vehicle efficiency and infrastructure reliability,
  - to facilitate the understanding of our citizens and our decision makers regarding hydrogen, and
  - to prepare even larger demonstration projects necessary to bridge the gap between the future state of technology and the market

Hydrogen for Transport

Buses

HyFLEET:CUTE




Cars

ZERO REGIO

Zero Regio
H2-MotorFuel


Mini-Transport

HyCHAIN





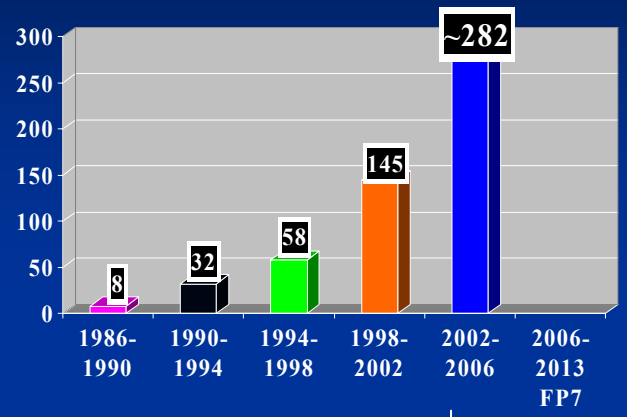
premia

HyLights

Monitoring and Preparation of « **Lighthouse Projects**»

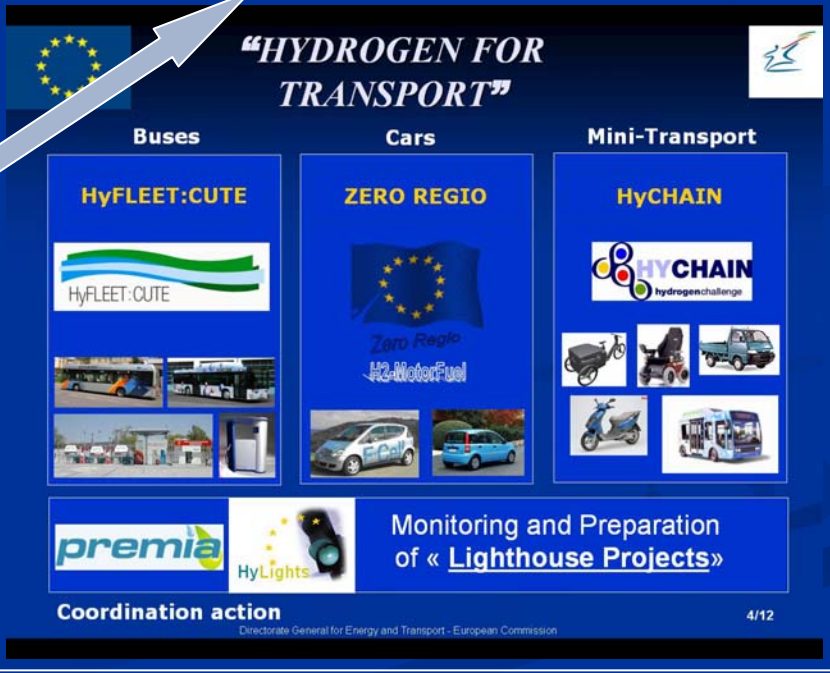
Coordination action

EC investment



Total € 105 M
EC € 48 M

Total € 60 M
EC € 21 M



2001 2006 2008-10

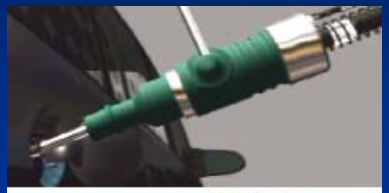
HyFLEET:CUTE

Berlin

London

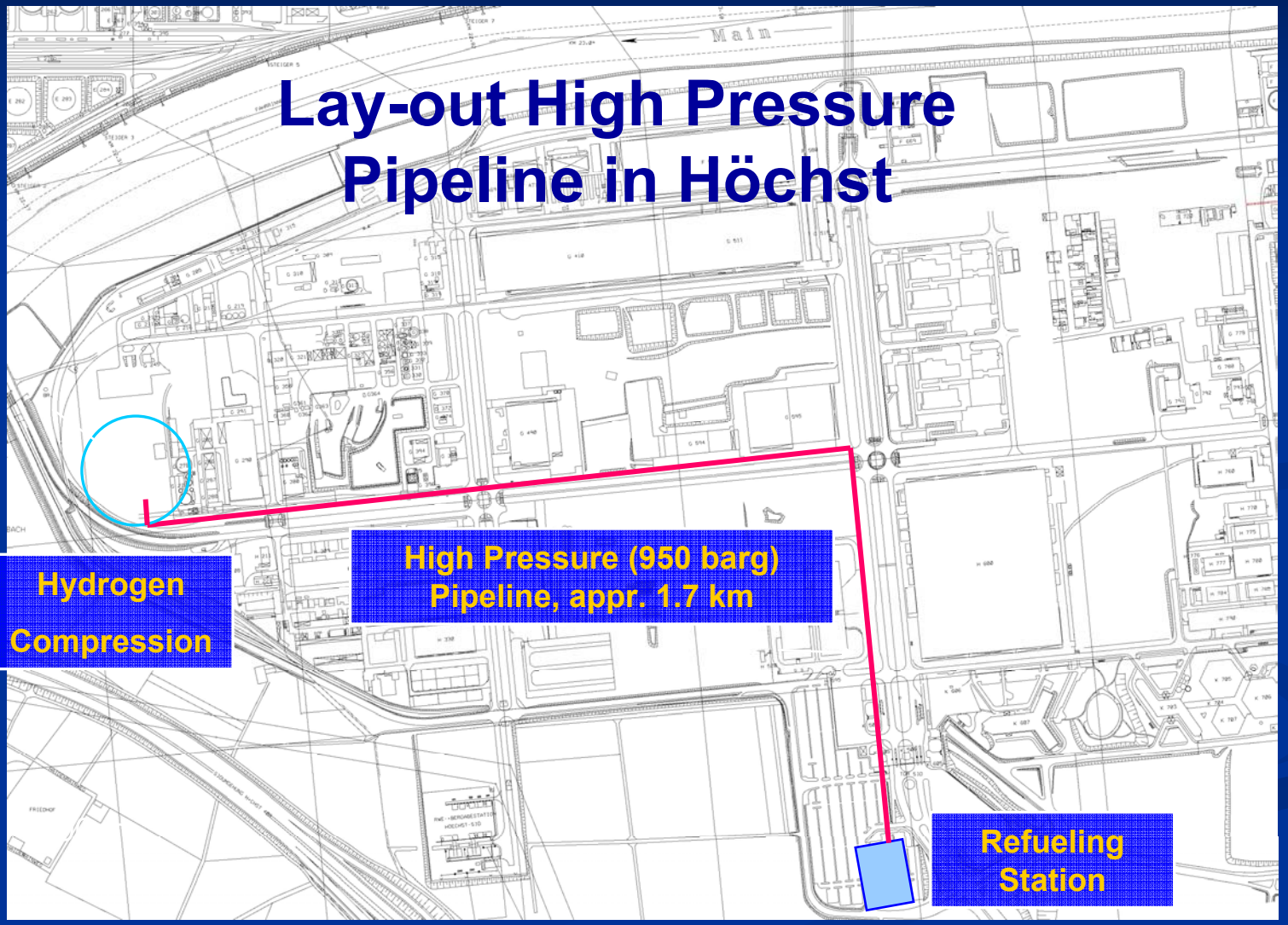
Hamburg

Zero Regio



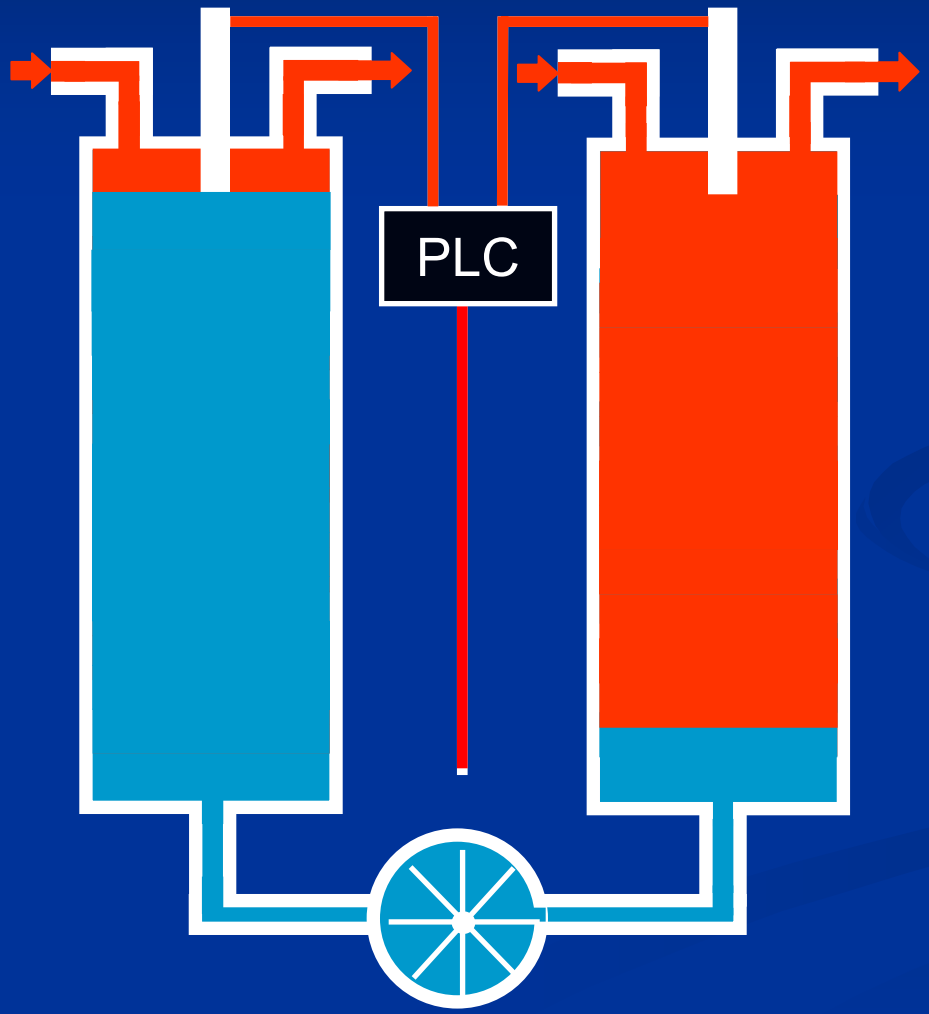
Zero Regio

Lay-out High Pressure Pipeline in Höchst



Zero Regio

Compressor with ionic liquid for 900 bar



HyCHAIN: MINITRANS

40 Tricycles
(0.25 kW fuel-cell)

34 Wheelchairs
(0.50 kW fuel-cell)

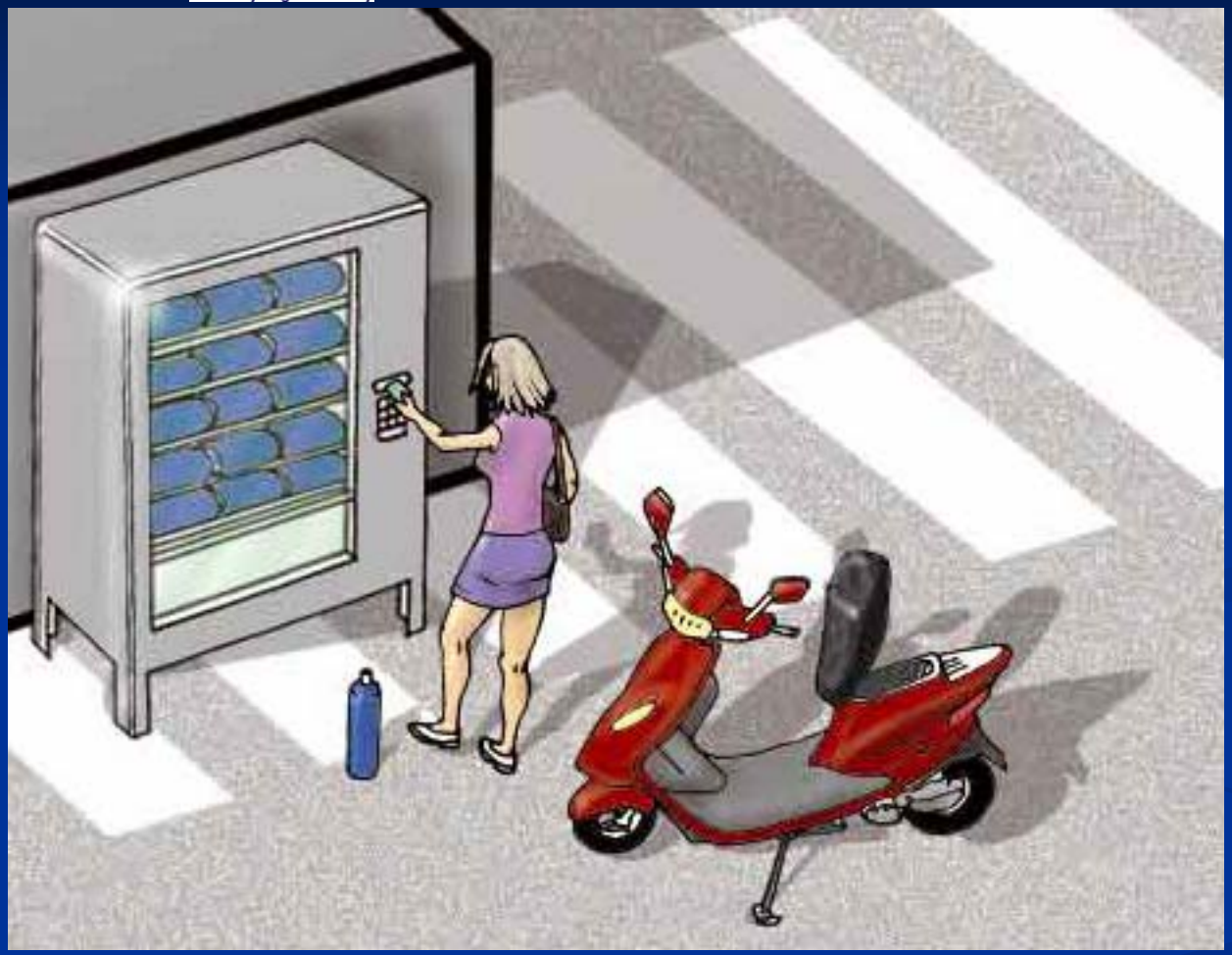
40 Scooters
(1.0 kW fuel-cell)

The fleet: 158 vehicles

44 Utility Vehicles
(2.5 kW fuel-cell)

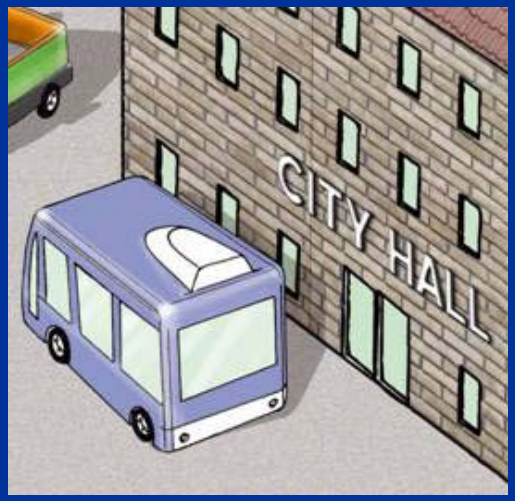
10 minibuses
(10 kW fuel-cell)

HyCHAIN: MINITRANS



Set up an hydrogen infrastructure

HyCHAIN: MINITRANS



Obtain public acceptance

Kick start a first business model

Hydrogen for Transport
Demo sites

HyLights

No.	Participant name	MS
01	L-B-Systemtechnik	D
02	Air Liquide Advanced Technology Division	F
03	Air Products	UK
04	Bayerische Motoren Werke	D
05	BP	UK
06	Centro Ricerche Fiat	I
07	DaimlerChrysler	D
08	Deutsche Energie-Agentur	D
09	Energy Research Centre of the Netherlands	NL
10	EniTecnologie	I
11	Ford Forschungszentrum Aachen	D
12	GM/Opel	D
13	Kellen Europe	B
14	Linde	D
15	Norsk Hydro	N
16	PSA Peugeot Citroën Automobiles	F
17	Repsol YPF	E
18	Shell Hydrogen	NL
19	Total	F
20	Vattenfall Europe	D
21	Volkswagen	D

European Commission

L-B-Systemtechnik

Associate Partners

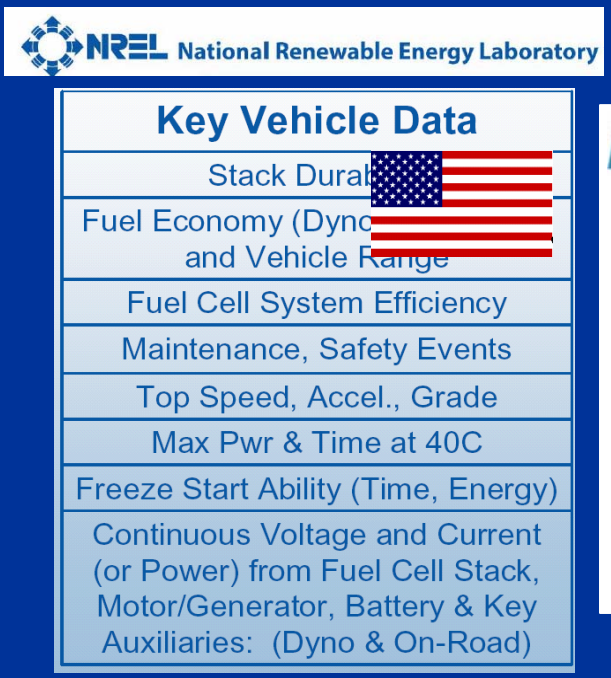
Directorate General for Energy and Transport - European Commission

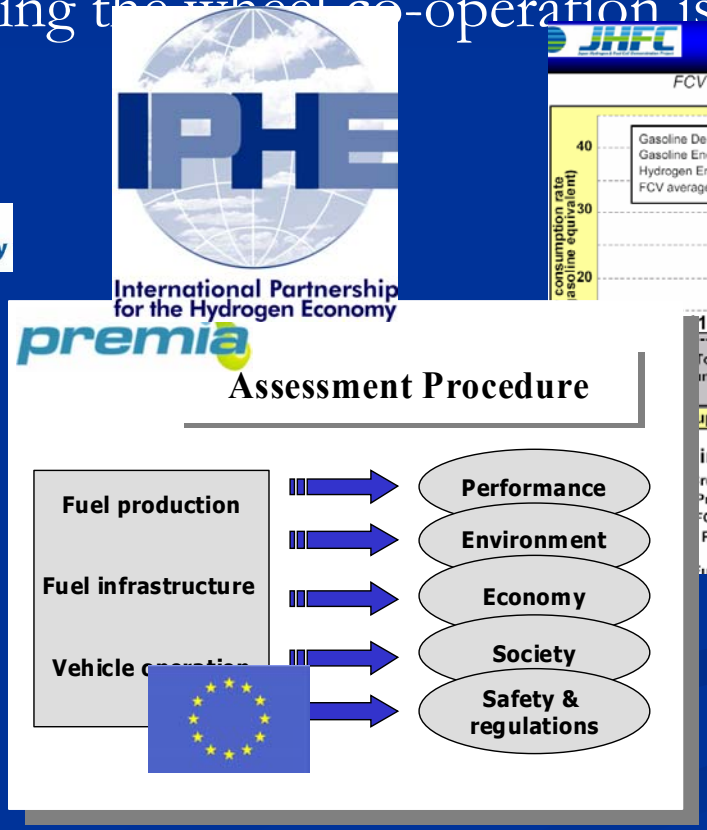
Enhancing Cooperation

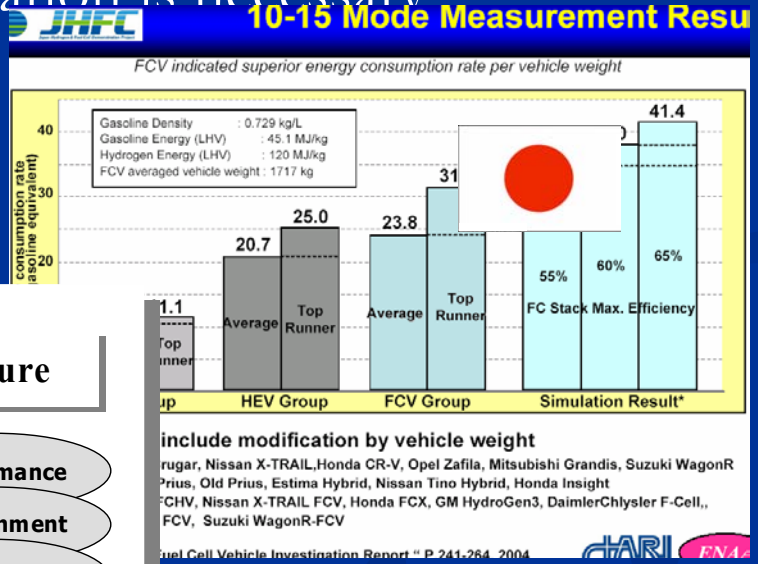
Alignment of assessment initiatives

Assessment frameworks for road transport related demonstration projects have already been developed in Europe (PREMIA), Japan (JARI, ENAA) and the U.S. (NREL)

To avoid re-inventing the wheel co-operation is necessary







THANK YOU FOR YOUR ATTENTION