

U.S. Department of Energy Hydrogen Program

Overview of Recent IPHE Activities and U.S. – EU Bilateral Cooperation

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Presentation Outline

- 1. Recap of EU, Germany and Japan Activities**
- 2. Results from the 10th IPHE Steering Committee meeting**
- 3. Overview of the EC Joint Technology Initiative**
- 4. Review of U.S. – EU S&T Bilateral Cooperative Activities for H₂ & FC**



International Overview

	U.S.	E.U.	Germany	Japan
H and FC RD&D	~500 M USG (~\$268 M DOE) ('09)	€450 M ('08 – '13)	€700 M ('07 – '16)	\$1.5 B ('08 – '12)
Demo	<ul style="list-style-type: none"> ✓ 122 vehicles ✓ 16 stations ✓ 8 buses 	<ul style="list-style-type: none"> ✓ 8 Vehicles ✓ 27 buses (ICE and FC) ✓ 158 niche hydrogen vehicles 	<ul style="list-style-type: none"> ✓ 17 vehicles¹ ✓ 2 stations¹ ✓ 15 buses ✓ 60 biogas systems w/ HTFC (200-700 kW) ✓ 800 residential cogen units (1 – 5 kW, MG) by 2013 	<ul style="list-style-type: none"> ✓ 53 vehicles ✓ 12 stations ✓ 5 buses ✓ 2232 stationary (700-1000W)
Incentives	<ul style="list-style-type: none"> ✓ Fuel cell tax credit (up to \$3000/kW, extended to 2016) 	<ul style="list-style-type: none"> ✓ None currently 	<ul style="list-style-type: none"> ✓ Feed-in law for renewables, including biogas FCs and co-gen 	<ul style="list-style-type: none"> ✓ Subsidies for home-use stationary FCs
Other	<ul style="list-style-type: none"> ✓ Federal Procurement Requirements ✓ State Initiatives; i.e. CAFCP, RPS 	<ul style="list-style-type: none"> ✓ JTI ✓ Regional Programs (HyRaMP) 	<ul style="list-style-type: none"> ✓ Active state programs 	<ul style="list-style-type: none"> ✓ Focus on deployment via demonstration

¹ information refers to Clean Energy Partnership project only



10th IPHE SC Meeting Overview

October 13 and 15, 2008

10th IPHE Steering Committee Meeting

October 14, 2008

Participated in the launch of the Joint Technology Initiative

October 16 & 17, 2008

U.S. – EU Collaborative Activity Discussions

Participants: JoAnn Milliken, Michael Mills (International), John Garbak (Technology Validation), and Antonio Ruiz (Safety, Codes and Standards)



10th IPHE SC Meeting Overview

Key IPHE Actions/Decisions:

- 1. Launch of new IPHE website**
- 2. Continued development of collaborative “State of the Nation” document**
- 3. World Hydrogen Student Competition to be held in association with WHEC 2010**
- 4. Development of IPHE International Hydrogen Highway Network**
- 5. Launch of a Steering Committee task force on Strategic Outreach**
- 6. Possible collaboration with Fuel Cells Today**
- 7. Joint SC/ILC meeting to be hosted by the U.S. in November 2009**



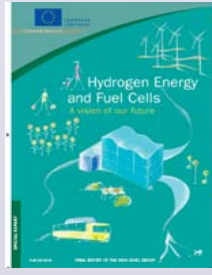
Overview of the JTI



EU Joint Technology Initiative



VISION
Hydrogen Energy
And Fuel Cells
(2003)



STRATEGY
Strategic Research Agenda
Deployment Strategy
Strategic Overview
(2005)



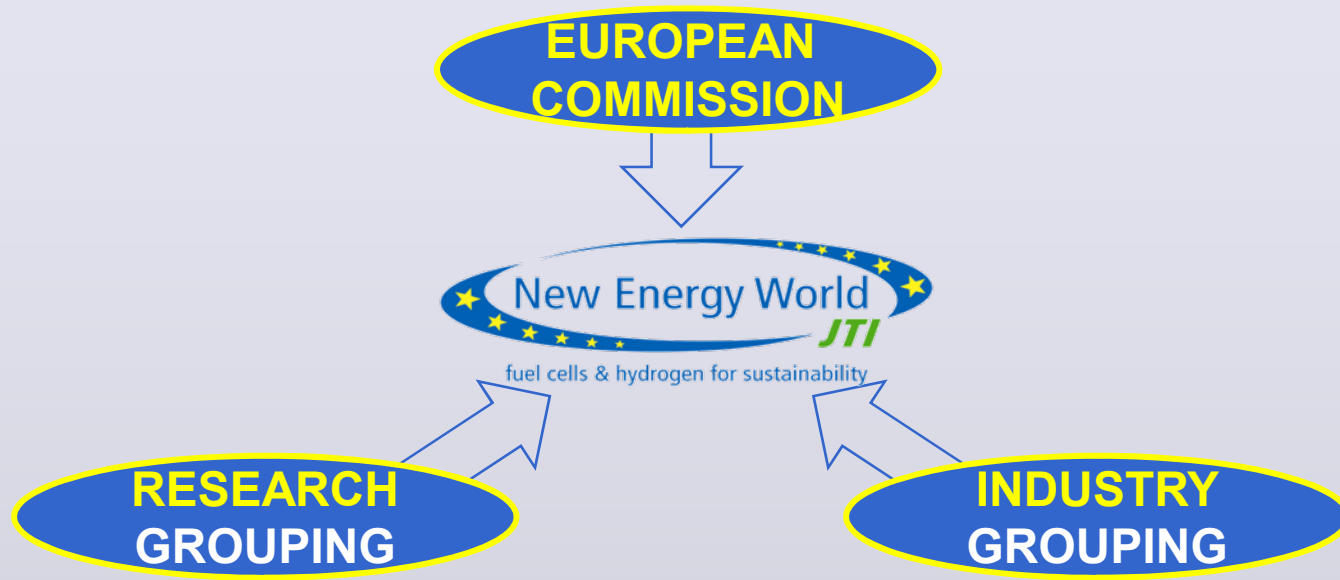
100 Stakeholders
invested more than €
10 m for the JTI
preparation

IMPLEMENTATION
Implementation Plan
(March 2007)





The Joint Technology Initiative



Main Objective:

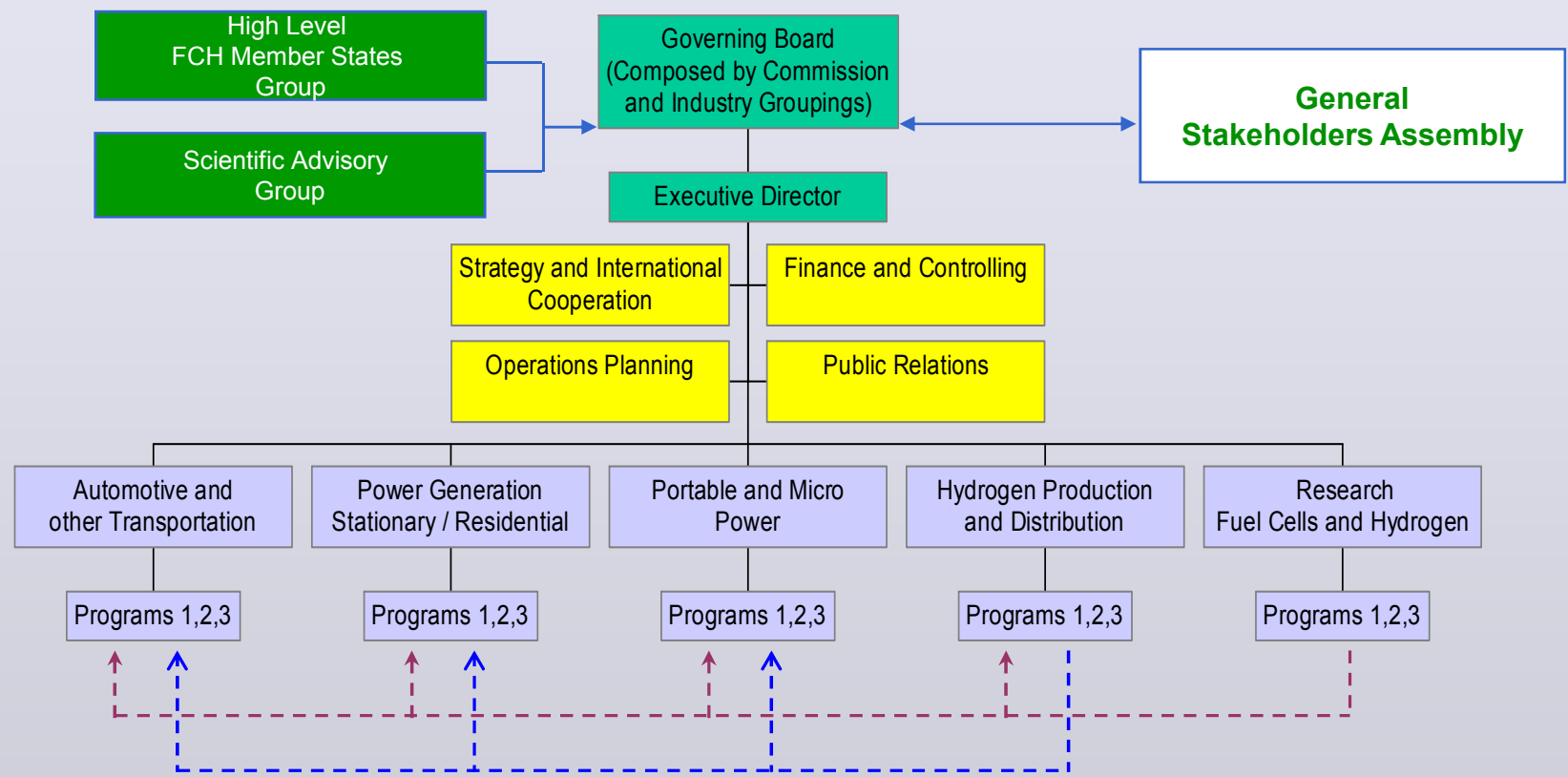
Long-term planning and coordination of European investments on fuel cells and hydrogen by all stakeholders

Structural Framework for Implementation:

EC-Body following EC rules and policy including financial reporting to the European Parliament (Budget line item)



New Energy World JTI Program Office Structure



- - - - - dotted lines: co-ordination of project themes within the program office
- Back-up Administrative Office functions
- Program Office



The Industry Grouping

- 64 companies from 17 countries and increasing
- A major share of European fuel cell and hydrogen industry, representing >90% of total investment of industry
- Well balanced between large corporations and SMEs
- Shares with the EC 50% of the JTI Program Office cost



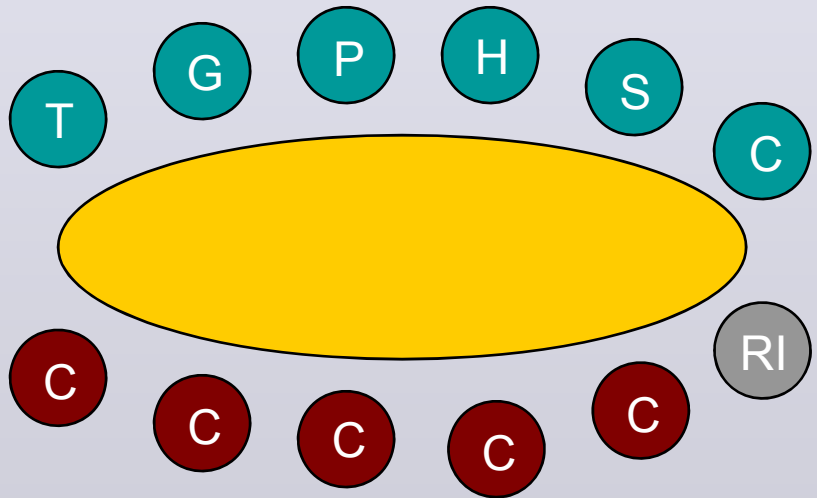


JTI Governing Board

- T** Transportation
- G** Power Generation
- P** Portable and Micro Power
- H** Hydrogen Production & Distribution
- S** Small & Medium Enterprises
- C** Components Industry

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- C** European Commission
 - RI** Research Grouping

Industry 50% voting rights

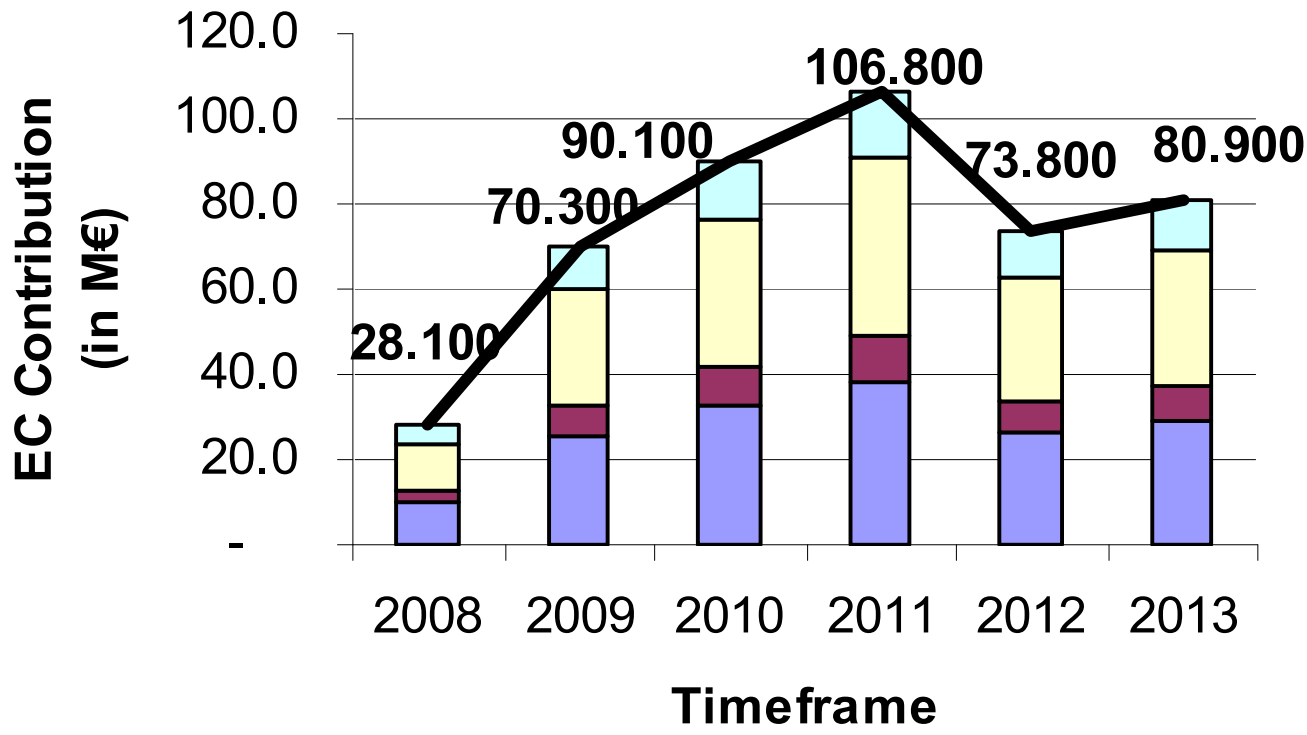


EC 50% voting rights



Budget Allocation 1st Tentative Run

JTI - Operational Budget Breakdown 2008-2013



Total Project Funding: 450 Mio Euro



A Balanced Portfolio for a Stable "FCH House"

Public Awareness, Education

Market Support (SME Promotion, Demand Side Measures, etc.)

Large Scale Demonstration Transport	Demo H2 Production & Distribution	Manufacturability & Demo Stationary Energy Systems	Demo: Backup/UPS Electric vehicles Micro/Portables
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Technology, Sustainability & Socio Economic Assessment Framework

Harmonised RCS

Applied Research Transport & Refueling Infrastructure	Applied Research H2 Production & Distribution	Applied Research Stationary Energy Production	Applied Research Early & Portable Markets
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Long Term and Breakthrough Oriented Basic Research



Targets and Milestones

Program Targets & Milestones

Transportation & Infrastructure	2010	<ul style="list-style-type: none">• Up to 10 road vehicles on 1 demo site and for demonstration on additional sites in Europe with re-fuelling capacity for up to 50 road vehicles• Up to 20 buses on 3 sites with appropriate refuelling capacity
	2015	<ul style="list-style-type: none">• Up to 500 road vehicles and 3 additional demo sites with 3 new refuelling stations• Up to 500 buses on 10 EU sites with at least 7 new refuelling stations• System cost of 100 €/kW, durability 5000h for car propulsion systems• Ramp up scenario for European refuelling stations



Targets and Milestones, continued

Hydrogen Production & Distribution	2010	<ul style="list-style-type: none">• Appropriate hydrogen supply chain to match demonstration requirements
	2015	<ul style="list-style-type: none">• 10 - 20 % of hydrogen demand, carbon free/lean• Cost of delivered H₂ at fuelling station < 5 €/kg - centralized and decentralised, excl. taxes
Stationary Power & CHP	2010	<ul style="list-style-type: none">• 3 - 7MW electrical capacity installed for pre-commercial demonstration phase
	2015	<ul style="list-style-type: none">• 100 MW electrical capacity installed• Cost of 5 000 - 6 000 €/kW (Micro CHP FC) and 1,500 - 2,500€/kW for commercial/industrial units
Early Markets	2010	<ul style="list-style-type: none">• 10 000 units in the market, thereof 6000 new sales
	2015	<ul style="list-style-type: none">• 50 000 new units in the market



U.S. – EU HFC Collaborations



U.S. – EU Collaboration Update

Cooperative Activities

- **Continue cooperation between the DoE safety codes group and EU funded projects (e.g. HySafe, HyPER, FCTEST-QA) in which US organisations are involved.**
 - **Data sharing, harmonization of databases, risk assessment**
- **Continue cooperation on materials research for PEMFC and hydrogen storage,**
 - **NESSHY project**
- **Expand collaboration on socio-economic research building on the HyWays-IPHE project, in particular benchmarking of different system analysis models**
- **Meet with the DoE Office (“Fossil Energy”) responsible for SOFCs**
- **Exchange information on calls for proposals (EU) and solicitations (US)**



U.S. – EU Collaboration Update

Cooperative Activities, Cont'd

- Coordinate evaluation scales such as the Technology Readiness Levels (TRL)
- Participate in selected meetings/workshops in 2009
- DoE Annual Merit Review (which will have an international session)
- International Conference for the Hydrogen Safety.

Proposed mechanisms

- *Coordinated or Matching Calls*
- *Exchange of Scientists/Managers*
 - It would allow a better understanding of the situation and problems of the counterparty and would facilitate the evaluation of each other's programmes, proposals and projects.



Questions / Comments?