Fuel cells and hydrogen Joint undertaking

Priorities of Hydrogen and Fuel Cell Research in Europe



Jean-Luc Delplancke, Head of Program Unit Fuel Cells and Hydrogen Joint Undertaking 23 September 2013



- FCH 1 JU: the past and the present
 The FCH JU in the SET-Plan
 - The FCH JU in the 7th Framework Program
- FCH 2 JU: the future
 - Background information
 - The FCH JU in the Horizon 2020



FCH 1 JU: the past and the present

The FCH JU in the SET-Plan

European Energy Policy Challenges

Sustainable development



Security of supply

Competitiveness

Sustainable Development Challenge

In 2009 both the European Union and G8 leaders agreed that CO_2 emissions must be cut by 80% by 2050 if atmospheric CO_2 is to stabilise at 450 ppm and global warming stays below the safe level of 2°C

Gt CO2e per year



Huge efforts needed for:

- -Power production
- -Road transport
- -Buildings
- -Waste

Are they possible?

1 Large efficiency improvements are already included in the baseline based on the International Energy Agency, World Energy Outlook 2009, especially for industry

2 Abatement estimates within sector based on Global GHG Cost Curve

3 CCS applied to 50% of large industry (cement, chemistry, iron and steel, petroleum and gas, not applied to other industries)

Source: www.roadmap2050.eu

The European Union answer

The 20-20-20 by 2020 goals:

- 20% increase in renewables
- > 20% increase in efficiency
- 20% decrease in GHG emissions



AN ENERGY POLICY FOR EUROPE



energy for a changing world

The FCH JU in the

SET-Plan



The FCH JU in the SET plan: A strong public-private partnership with a focused objective

Fuel Cells & Hydrogen Joint Undertaking



The Joint Undertaking is managed by a <u>Governing Board</u> composed of representatives of all three partners and lead by the Industry.

To accelerate the development of technology base towards market deployment of FCH technologies from 2015 onwards

FCH 1 JU: the past and the present

The FCH JU in the 7th Framework Program

The FCH JU in the 7th Framework

Program



* 470 mill Euro to be implemented by FCH JU + about 10 mill Euro already spent from 2007 budget, before FCH JU in place

FCH JU - Operational budget



Budget : 2008 ~ 2013 : (min.) 940 M € **Operations** : to launch annual, open and competitive calls for project proposals Principle : 50/50 costsharing between the EU and all legal entities participating in the activities

Multi-Annual Implementation Plan 2008 - 2013

Public Awareness, Education

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

	Demonstrations					
Vehicles & Infrastructure	Low Carbon Supply Chain	System Readiness Manufacturability	Off-road H2 Vehicles Micro/Portable FC			
Technology, Sustainability & Socio-Economic Assessment Framework Specific PNR & Harmonised RCS						
Research and Technological Development						
Stack & Subsystems	Processes & Modules	Periphery & Components	Systems & Integration & Testing			
Components	New Technologies	Material & Design & Degradation & Research				
Long-term & Breakthrough-Orientated Research						
Transport & Refuelling Infrastructure	Hydrogen Production & Distribution	Stationary Power Generation & CHP	Early Markets			

Funding distribution by application area: Multi-annual Implementation plan

Figure 1 : Budget breakdown by application area



Figure 2: Budget breakdown by activity type







Multi-annual Implementation Plan

2010

2010

Early markets

2011





Cross-cutting

coverage

Stationary

FCH JU contributions per call and activity area



More than 150 FCH JU funded projects

TRANSPORTATION & REFUELLING INFRASTRUCTURE	21 projects 6 demo 13 research 2 studies +7 (2012) 2 research and 1 demo finished	<image/>
HYDROGEN PRODUCTION & DISTRIBUTION	21 projects 1 demo 20 research +4 (2012) 4 research finished	
STATIONARY POWER GENERATION & CHP	36 projects 6 demo 30 research +9 (2012) 4 research finished	
EARLY MARKETS	16 projects 8 demo 7 research 1 study +3 (2012)	
CROSS - CUTTING	9 projects- 5 finished	RCS, Safety, Education, PNR,

Programme participation per country



FCH 2 JU: the future

Background information

Survey respondents expect major FC&H applications to become commercial by 2020, although slower than anticipated in 2007



New Energy World

fuel cells & hydrogen for sustainability

Connecting the European grids



Electricity grid





Natural gas grid

Fuel cells and hydrogen technology: Enabler for a sustainable and secure energy &

transport system





Public Private Partnership: A joint effort





To overcome these challenges, continued public support in the coming years is seen to be essential

Public investments help sustain the competitive position Europe currently has in mobility





H2 mobility in Germany



- Initiative gathering the German government and industrial companies
- 200 to 500 hydrogen refuelling stations in 2020, distributed all over the country
- 150 000 to 500 000 FCEVs on the roads in 2020



FCH 2 JU: the future

The FCH JU in Horizon 2020

Proposal for a Council regulation (2013) 506 final of 10.07.2013

ECH 2JU

Duration: 2014-2020

Specific objectives include:

- Reduce cost of fuel cell systems for transport applications by a factor of 10;
- Increase electrical efficiency of fuel cells for power production by 10%;
- Demonstrate the viability of large scale hydrogen production from electricity generated from renewable energy sources.

The proposed budget is $\in 1.4$ billion. The EU expected contribution will be up to $\in 700$ million from the Horizon 2020 programme budget. The private contribution of $\in 700$ million will consist of both in-kind contributions in calls for proposals activities and of complementary actions implemented in addition to the calls, contributing to the objectives of the initiative.

Composition of the Board:

- Three representatives of the Commission
- Six representatives of the Industry Grouping (at least one represents SMEs)
- One representative of the Research Grouping

Industry roadmap



Proposal from IG/RG

The specific objectives of the FCH 2 JU are the following:

- Reducing by a factor of 10 the production cost of fuel cell systems to be used in transport applications (currently 500€/kW for cars) thanks to scientific and technology progress as well as scale effects when series production are launched – while increasing lifetime by a factor of 2 (currently 2,500 hours for cars).
- Increasing the electrical efficiency of fuel cells for power production by on average 10 percentage points (currently 40-50%), while reducing cost by a factor of 3 (currently 4,500-8,000€/kW) and increasing the durability by a factor of 4 (currently 8,000-15,000 hours).
- Increasing the energy efficiency of hydrogen production via electrolysis from 67% to 77% while reducing the investment cost to below 2M€/t per day capacity (currently 3-4M€/t).
- Demonstrating at large scale (10's to 100 MW) the feasibility of hydrogen as a competitive energy storage medium for integration of electricity produced from renewable primary energy.

Activity distribution	R&D	Demonstration
Transports Systems	15-20%	20-30%
Energy Systems	15-20%	20-30%
Cross-cutting activities	6-10%	

Proposal from IG/RG (2)

Innovation pillar 1: FCH Technologies for Transportation Systems

The main areas where research, development and demonstration activities will be undertaken are the following

- Road vehicles
- Non-road mobile vehicles and machinery
- Refuelling infrastructure
- Maritime, rail and aviation applications

Innovation pillar 2: FCH technologies for Energy Systems

The main areas where research, development and demonstration activities will be undertaken are the following:

- Hydrogen production from RES, storage and distribution
- Large scale hydrogen energy systems for the storage of renewable electricity and grid balancing
- Hydrogen blending in NG grid and the related energy chain
- Fuel cells in power, CHP and CCHP systems for domestic, commercial, municipal and industrial applications uses and other small applications
- The biggest implementation potential lays in gaseous and liquid storage technologies. CCHP = combined cooling, heat and power

Cross-cutting activities Possibility of Integrated Energy & Transport Systems



Thank you for your attention !

Further info :

- FCH JU : <u>http://fch-ju.eu</u>
- NEW-IG : <u>http://www.new-ig.eu</u>
- N.ERGHY : <u>http://www.nerghy.eu</u>