EU R&D for Green Road Transport: Fuel Cells, Hydrogen and Vehicle Technology Programmes

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The European Union
27 countries – 493 million people

- Austria
- Belgium
- Bulgaria
- Cyprus
- Czech Republic
- Denmark
- Estonia
- Finland
- France
- Germany
- Greece
- Hungary
- Ireland
- Italy
- Latvia
- Lithuania
- Luxembourg
- Malta
- The Netherlands
- Poland
- Portugal
- Romania
- Slovenia
- Slovakia
- Spain
- Sweden
- United Kingdom
EU Institutions

EXECUTIVE
Proposes and implements legislation

European Commission

Council of Ministers

Member States

European Parliament

Governments of the 27 Member States

LEGISLATIVE
Jointly decide on legislation

Directly elected
EU Energy Challenges

Security of supply

Competitiveness

Sustainable development

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EU Energy Targets

• **By 2020 – the three 20s:**
  – 20% reduction in GHG emissions compared to 1990 levels (30% if global agreement)
  – 20% reduction in global primary energy use (through energy efficiency)
  – 20% share of **renewable energy** in the EU's **overall mix** and **10% share of renewable energy in transport**

• **By 2050: 60 to 80% reduction in GHG**
Public RTD Funding in Europe

• RTD on green road transport activities in Europe is funded at different levels: EU, national and regional.

• EU funding mainly through public-private partnerships:
  1. The European Green Cars Initiative

• EU RTD to focus efforts and provide for a clear overall common strategy.
The European Green Car Initiative
European Green Car Initiative – Part of a European Economic Recovery Plan

• Adopted by the EC on 26 Nov 2008 and endorsed by the EU Council on 11-12 Dec 2008 “To support innovation in manufacturing, construction and the automobile sector, which have recently seen demand plummet as a result of the crisis and which face significant challenges in the transition to the green economy…”

• The European Green Car Initiative is one of 3 Public-Private Partnerships (PPPs) proposed, together with:
  - European Energy Efficient Buildings Initiative
  - Factories of the Future Initiative
European Green Car Initiative – A Public-Private Partnership

• **Objective:** to promote the convergence of public interest with industrial commitment and leadership in determining strategic research activities

• **Quick response:** to use existing schemes & structures (FP7 and ETPs)

• **Smart investments:** to improve competitiveness of European industries & environmental protection

• **Implementation approach:** cross-thematic calls and exploitation of other possibilities
European Green Car Initiative
– 3 methods of financial support

• **R&D** mainly through FP7. Budget: **€1 billion**
  (€500 million from FP7 matched by €500 million from Industry and Member States)

• **EIB loans** in support of research & industrial innovation
  Budget: **€4 billion** (in addition to existing loans)

• **Demand side measures & public procurements:**
  reduction of circulation & registration taxes for low CO2 cars
European Green Car Initiative – Research Content

• **Heavy duty vehicles (Internal combustion engines, vehicle technologies for energy optimisation).**

• **Road and urban transport electrification.**

• **Logistics, co-modality and Intelligent Transport Systems technologies.**
European Green Car Initiative: Road and Urban Transport Electrification

System levels:

- *Power generation and grid*

- *Power distribution*

- *Power usage: the electric car*
European Green Car Initiative
- First calls for proposals

- 4 forthcoming calls in 2010

Overall budget: +/- €100 million
Opening Date: July 2009

1. Electric vehicle: physical integration
2. Electric vehicle: ICT/controls
3. « Electromobility » demonstration
4. Joint Call on Electric Batteries
   - Budget: circa €25 million
   - Emphasis on development of advanced materials and on chemistry
The Fuel Cells and Hydrogen Joint Undertaking (FCH JU)
Public RTD Funding for H₂/FC in Europe

- **RTD** on H₂/FC activities in Europe is funded at different levels: EU, national and regional.

- EU funding now through Fuel Cells and Hydrogen Joint Undertaking (FCH JU).

- The overall public budget of EU national programmes is estimated to be app. USD 333 M per year (2003-2005); industry budgets are even larger.

- EU RTD to focus efforts and provide for a clear overall common strategy.
FCH in the EU Framework Programmes ~ €550 M so far

FP2 (1986-1990) 8
FP3 (1990-1994) 32
FP6 (2002-2006) 314

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FP6 (2002-2006) Budget Breakdown for FC & H2 – Total EC Contribution ~€314 M

- H2 production & distribution: 18.5%
- H2 storage: 10.1%
- Safety, Regulations, Codes & Standards: 5.1%
- Pathways and socio-economic analysis: 9.8%
- Stationary and Portable Applications: 7.7%
- Transport applications (including FC hybrid vehicles): 18.8%
- Validation and Demonstration: 16.0%
- FC basic research - Low Temp: 7.7%
- FC basic research - High Temp: 6.3%
EU-US Projects in FP6

• CACHET: CO2 capture from natural gas-based H2 production
  *Conoco Phillips Company /Chevron Energy Technology Company*

• FCTESQA: Validation of test procedures for FC systems
  *US DoE*

• HYAPPROVAL: Handbook for approval of H2 refuelling stations
  *National Renewable Energy Laboratory*

• HYPER: Installation Permitting Guidance for stationary FC systems
  *Sandia Corporation*

• HYWAYS: Roadmap for H2 in the EU energy system
  *MidWest Research Institute*

• NESSHY: H2 solid storage development
  *Southwest Research Institute*

• NEXTGENCELL: PEM material development for small CHP systems
  *Plug Power Inc./Pemeas USA Inc.*
The Fuel Cells and Hydrogen Joint Undertaking

- Public private partnership established in May 2008
- Aimed at enabling market breakthrough of FCH technologies
- Will establish and execute long-term, commonly agreed strategy
- Shared governance
- Industry lead for faster commercialisation
FCH JU - Governance

- The European Commission, the Industry Grouping and the Research Grouping are members of the FCH JU
- Governing Board: 6 members from Industry, 5 from EC, 1 from Research
- An Executive Director, supported by a Programme Office, will be responsible for the day-to-day management of the JU
Budget and cost sharing of the Fuel Cells and Hydrogen JTI

- EC budget for 2008 – 2013: €470 M (cash contribution)
- Industry will match the EC contribution (in-kind contribution)
- Close follow-up to monitor and ensure the cost sharing between the Community and industry
Expected outcome

- Time to market shorter by between 2 and 5 years
- Earlier gains for the energy system
- Improved competitive position for the industry
### FCH JU - Scope

**Public Awareness, Education**

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

<table>
<thead>
<tr>
<th>Demonstrations</th>
<th>Vehicles &amp; Infrastructure</th>
<th>Low Carbon Supply Chain</th>
<th>System Readiness Manufacturability</th>
<th>Backup/UPS Off-road H2 Vehicles Micro/Portable FC</th>
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<tbody>
<tr>
<td>Technology, Sustainability &amp; Socio-Economic Assessment Framework</td>
<td>Stack &amp; Subsystems</td>
<td>Processes &amp; Modules</td>
<td>Periphery &amp; Components</td>
<td>Systems &amp; Integration &amp; Testing</td>
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<tr>
<td>Specific PNR &amp; Harmonised RCS</td>
<td>Components</td>
<td>New Technologies</td>
<td>Material &amp; Design &amp; Degradation &amp; Durability</td>
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<td>Research and Technological Development</td>
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**Long-term and Breakthrough Orientated Research**

<table>
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<tr>
<th>Transport &amp; Refuelling Infrastructure</th>
<th>Hydrogen Production &amp; Distribution</th>
<th>Stationary Power Generation &amp; CHP</th>
<th>Early Markets</th>
</tr>
</thead>
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FCH JU - Preliminary Budget Breakdown by Application Area

- **Stationary Power Generation & CHP**
  - (34-37%)

- **Hydrogen Production & Distribution**
  - (10-12%)

- **Early Markets**
  - (12-14%)

- **Cross-Cutting Activities**
  - (6-8%)

- **Transportation & Refuelling Infrastructure**
  - (32-36%)
FCH-JU: Preliminary Budget Breakdown by Action Category

- Support Actions (9-11 %)
- Long-term & Breakthrough Research (13-15 %)
- Demonstration (41-46 %)
- Research & Technological Development (31-35 %)
Participating in FCH-JU Projects

- Open (annual) calls for proposals
- Minimum 3 independent legal entities from different MS/AC
- At least one legal entity belonging to the Industry Grouping or Research Grouping in each project. As a norm, the coordinator will be member of IG or RG
- All legal entities and international organisations can participate

First Call for Proposals launched in October (€28.1 M, deadline 15 January 2009)
International Cooperation

- EC is a member of the International Partnership for the Hydrogen Economy (IPHE), IEA, and has bilateral S&T cooperation agreements with third countries.
- Third country partners are welcome to participate in the FCH JU calls for proposals. However, as a rule they are not eligible for funding.
- The FCH JU is developing its own policy for international cooperation. EU-US cooperation will be an important element of this policy.
EU-US Cooperation

- EU-US bilateral discussions initiated
- Possible areas of cooperation identified:
  - Safety, codes and standards; risk assessment
  - Socio-economic studies
  - Harmonising technology readiness scales
- Exchange call/solicitation info for forward planning
- Cross-participation at meetings and workshops
- Exchange of scientists/managers
THANK YOU
FOR YOUR ATTENTION

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