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Overview of European R&D on Hydrogen and Fuel Cells: current activities and future prospects

Latin American Forum on Hydrogen and fuel Cells

Rio de Janeiro, 21st March 2005

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Presentation outline

- **EU Policy context**
- **Introduction to the European Union**
- **The 6th EU Framework Programme (FP6):
European Research Area**
- **Elements of a European Strategy for Hydrogen
and Fuel Cells**
- **EU Cooperation with Latin America**





EU Policy Context

- **Security of EU energy supply**
- **Reduction of EU greenhouse gases and pollutant emissions (Kyoto and beyond)**
- **Improve energy efficiency, reduce energy intensity**
- **Increase share of renewable energy**
- **Improve EU industrial competitiveness**





The European Commission

- ✗ The **European Union (EU)** is a treaty-based political association of European countries that defines and manages economic and political cooperation among its European member countries. From May 1st 2004, the EU includes 25 member countries.
- ✗ The **European Commission (EC)** is the executive arm of the EU institutions and embodies the general interests of the EU. It proposes policies and legislation and implements the measures approved by the governments of the member states, which together constitute the European Council, and by the European Parliament.
- ✗ Its responsibilities include policy areas such as trade, competition, agricultural policy and economic development, but also research, public health, environment, humanitarian aid, etc...

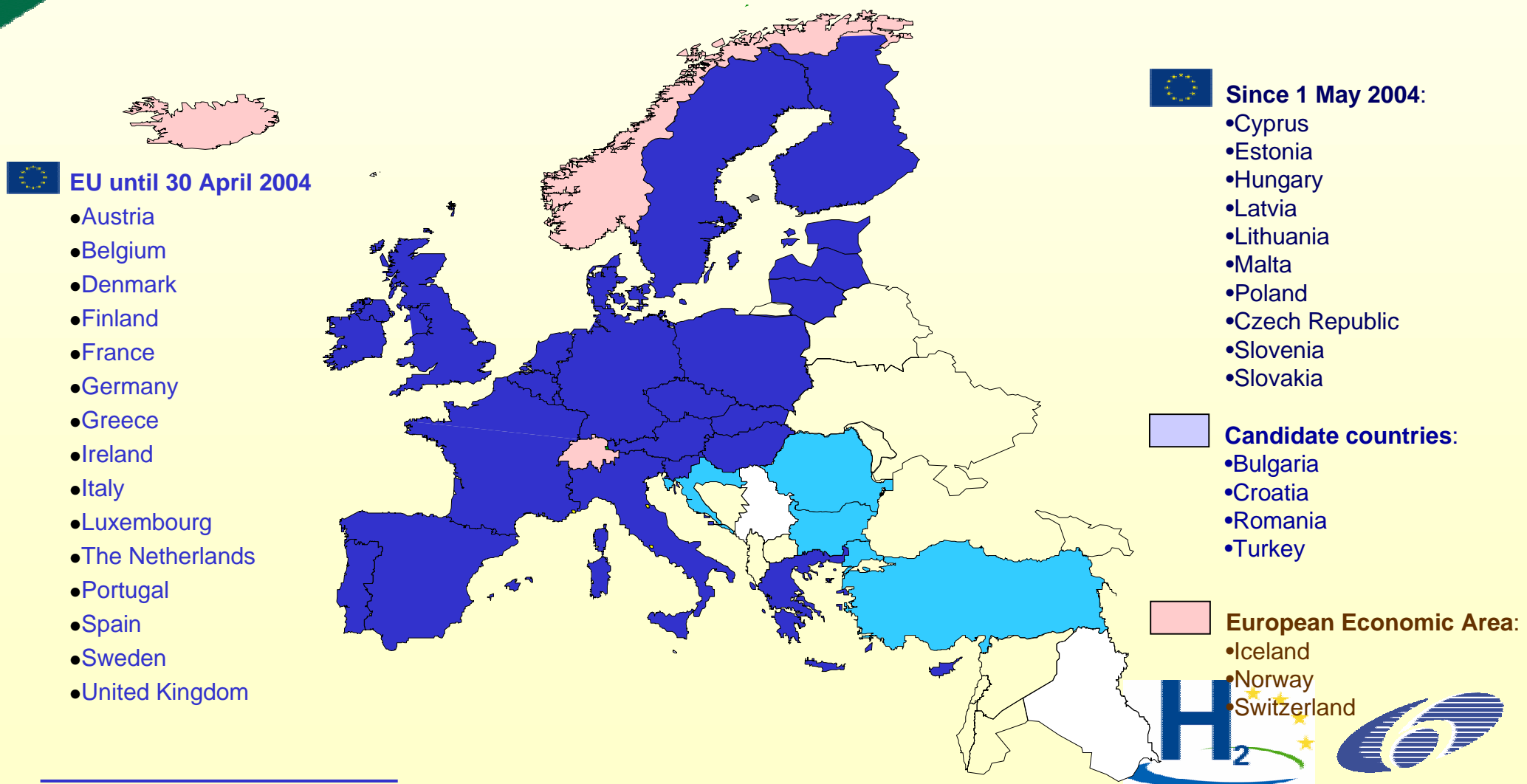




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Enlarged European Union

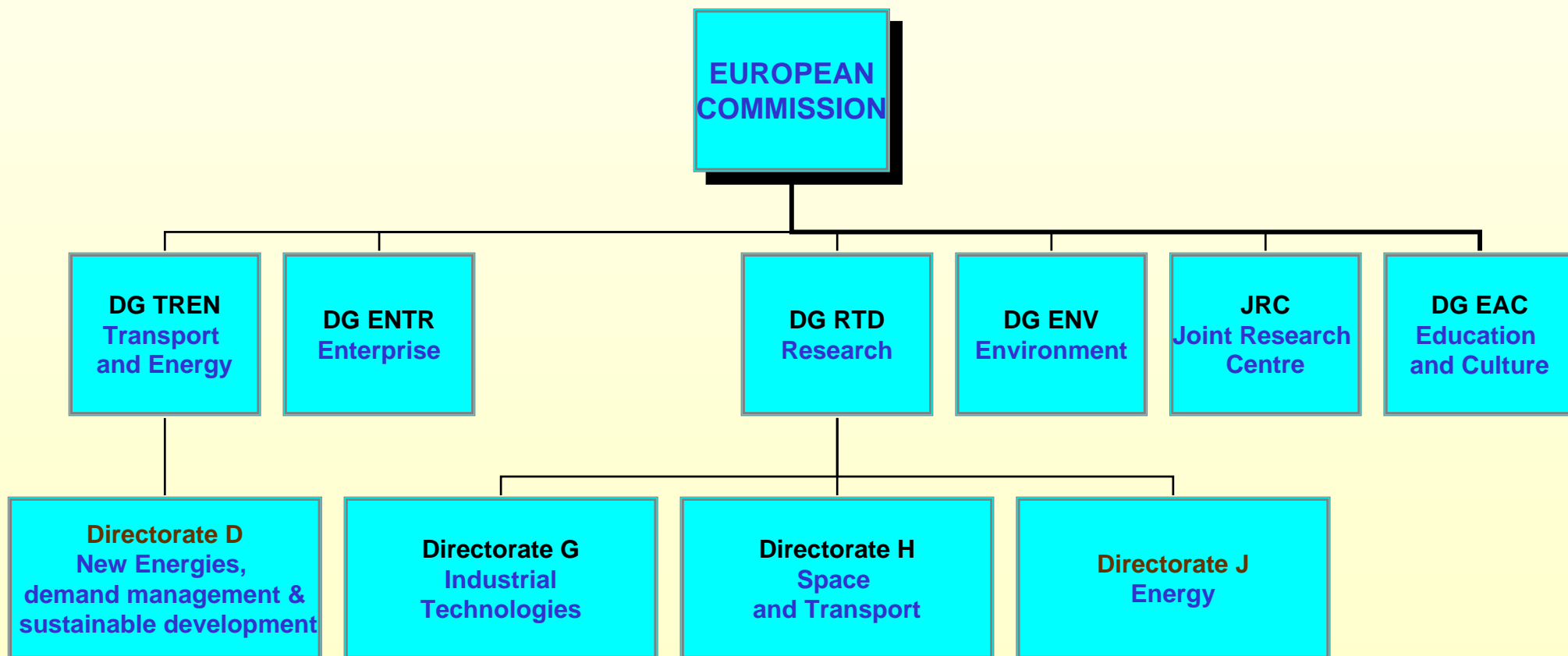




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Main EC DGs with responsibilities on Hydrogen and Fuel Cells Projects



Public funding of RD&D in Europe

- ✗ **RD&D on H₂/FC activities in Europe is funded at different levels: EU, national and regional.**
- ✗ **The main instrument for EU funding is the RD&D Framework Programme (FP).**
- ✗ **The overall public budget of EU national and regional programmes is estimated to be more than 160 Mio € per year; industry budgets are even larger.**
- ✗ **Up to recently the EU R&D efforts were dispersed, fragmented and lacking a clear overall common strategy.**





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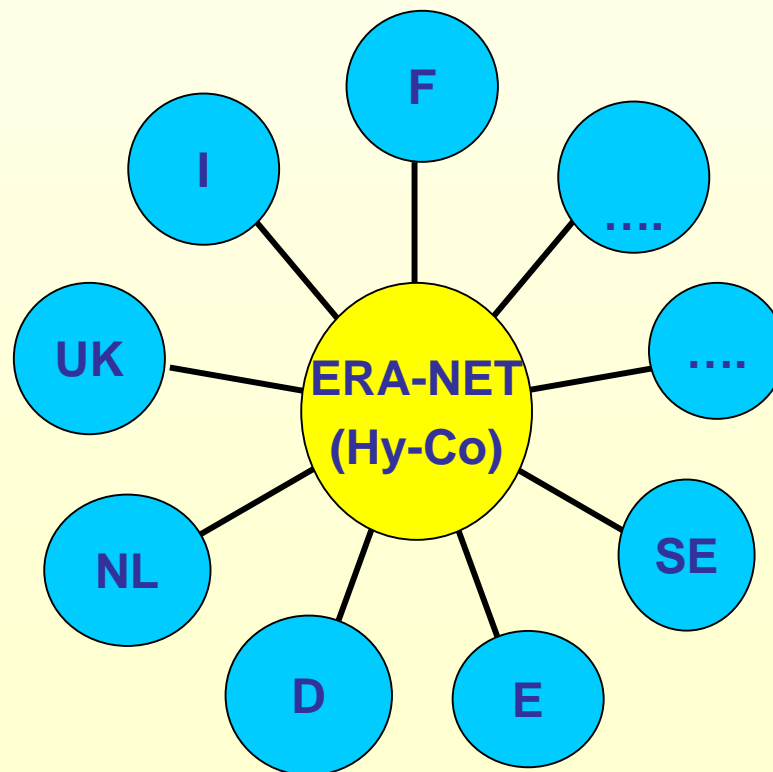
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Current RD&D structure in Europe

EU Framework Programme



National Programmes





Co-ordination Action to establish a Hydrogen and Fuel Cell ERA-NET (*Hy-Co*)

- ✗ **Co-ordinator: PT Jülich (D) on behalf of German Ministry for Economy and Labour**
- ✗ **Participants: 21 partners from 17 countries, mainly coordinators and managers of national research programmes**
- ✗ **EC contribution: 2.7 M€**
- ✗ **Duration: 4 years**
- ✗ **Main objectives**
 - ✓ **Strengthen the European Research Area (ERA)**
 - ✓ **A network of coordinated/harmonised European, ,national/regional RTD programmes on H₂ and Fuel Cells**
 - ✓ **Implement jointly trans-national RTD activities**
 - ✓ **Establish a common knowledge base for development of coherent policies towards a **hydrogen economy****
 - ✓ **Provides an interface with the **Member States Mirror Group** of the European Hydrogen and Fuel Cell Technology Platform**



Coordination of RD&D in Europe

Policy level

- ✓ open method of coordination
- ✓ mapping, benchmarking, score boards

Programme level

- ✓ Framework Programme and National Programmes
- ✓ European Research Area
- ✓ ERA-NET projects



Project level

- ✓ EU funded projects
- ✓ National and regional projects



The EU R&D Framework Programme (FP)

- **Main instrument** for research funding in the EU since 1984.
- **Proposed by the European Commission** and adopted by Council and the European Parliament
- Covers a period of **5 years** with the last year of one FP overlapping the first year of the following FP
- The main objective of FP6 is to contribute to the creation of a true “**European Research Area**” (ERA).
- **ERA** is a vision for the future of research in Europe, an internal market for science and technology. It fosters scientific excellence, competitiveness and innovation through the promotion of better co-operation and coordination between relevant actors at all levels.
- The total **budget** for FP6 (2002 – 2006) is **€17.5 billion**



Framework Programme 2002-2006 (FP6)

“Focussing and Integrating European Research”

Thematic Priorities

1. **Genomics and biotechnology for health (2,255 M€)**
2. **Information Society technologies (3,625 M€)**
3. **Nanotechnologies, intelligent materials and new production processes (1,300 M€)**
4. **Aeronautics and space (1,075 M€)**
5. **Food safety and health risks (685 M€)**
6. **Sustainable development and global change (2,120 M€)**
7. **Citizens and governance in a knowledge-based society (225M€)**
8. **Specific activities covering a wider field of research (1,300M€)**





FP6 - 2002-2006

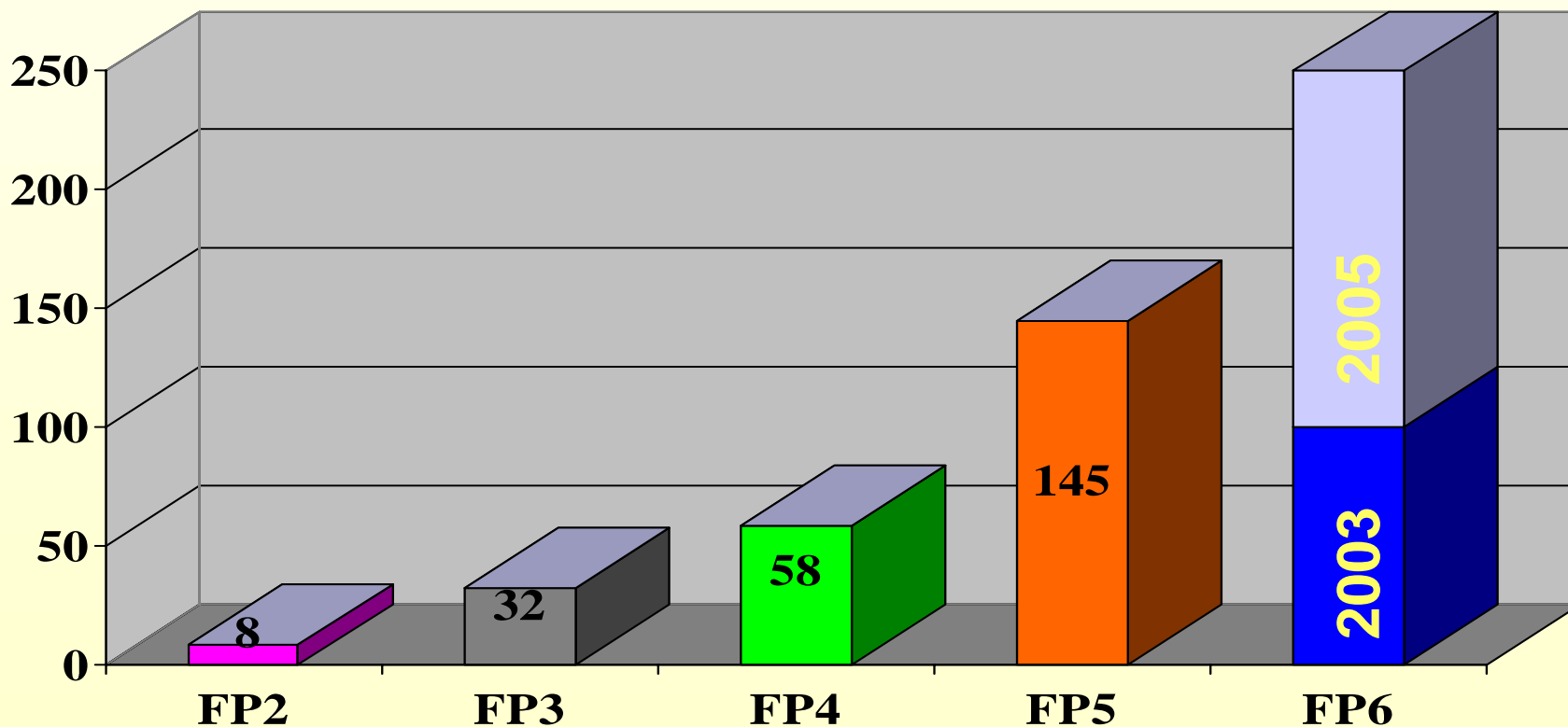
Focussing and integrating European Research

Priority 6: “Sustainable Development, Global Change and Eco-systems”

- Sustainable Energy Systems (810 M€)
- Sustainable Surface Transport (610 M€)
- Global Change and Eco-systems (700 M€)



EC Support to Fuel Cell/Hydrogen projects





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Elements of a European Strategy for Hydrogen and Fuel Cells



Elements of a European Strategy for Hydrogen and Fuel Cells

- **High Level Group H₂ and FCs (2002-2003) - Vision report :**
“Hydrogen energy and Fuel Cells – A vision of our future”
- **European Hydrogen and Fuel Cell Technology Platform:**
“To facilitate and accelerate the development and deployment of cost-effective, world class European hydrogen and fuel cell based energy systems and component technologies for applications in transport, stationary and portable power”
- **Building an European Research Area in hydrogen**
- **Capitalising RTD and Demonstration projects in FP5 and FP6 and national programmes**
- **FP7 (2006-2013?) – Hydrogen Joint Technology Initiative, may be proposed**



The H₂/FC Technology Platform: Structure and Participants

<http://www.HFPeurope.org>

× **Participants:**

- Research Community, Industry, Public Authorities, Financial Community, Users and Consumers, Civil Society

× **Platform Operations: General Assembly**

- On-going and future projects, networks and initiatives, supported by EC, national and regional programmes

× **Steering and support structures:**

- Advisory Council (and Executive Group),
- Steering Panels and Initiative Groups,
- Member States' Mirror Group,
- Commission Inter-service Hydrogen Project Team
- Secretariat



HFP: Its Operational Structure

EC Project Team

HLG Vision

European Hydrogen and Fuel Cell Technology Platform (HFP)

Member States'
Mirror Group

ADVISORY COUNCIL
(& its Executive Group)

HFP Secretariat

Steering Panels

Strategic Research
Agenda

Deployment
Strategy

Initiative Groups

Financing &
Business
Development

Regulations,
Codes &
Standards

Education
& Training

Public
Awareness

Platform Operations

New and on-going projects and initiatives (EC + MS:national, regional and local)



The European Hydrogen and Fuel Cell Technology Platform

Main immediate deliverables:

- Strategic Research Agenda (SRA)
- Deployment Strategy (DS)



Strategic Research Agenda: Headlines

- A highly focused, 10 year research, development and demonstration programme to bridge the technical gaps to commercialisation.
- Proposes budget shares for the main research areas (e.g. hydrogen production, storage & distribution, fuel cell materials, etc).
- In order to be competitive with conventional systems main goals of this programme are:
 - ✓ to reduce fuel cell system costs by a factor 10 to 100,
 - ✓ enhance the performance and durability of today's fuel cell systems by a factor of 2 or more
 - ✓ to reduce the costs of hydrogen delivered (compared to today's fossil based carriers) by a factor of 3 or more,
 - ✓ to achieve competitive hydrogen storage densities consistent with vehicle operating range and packaging requirements.

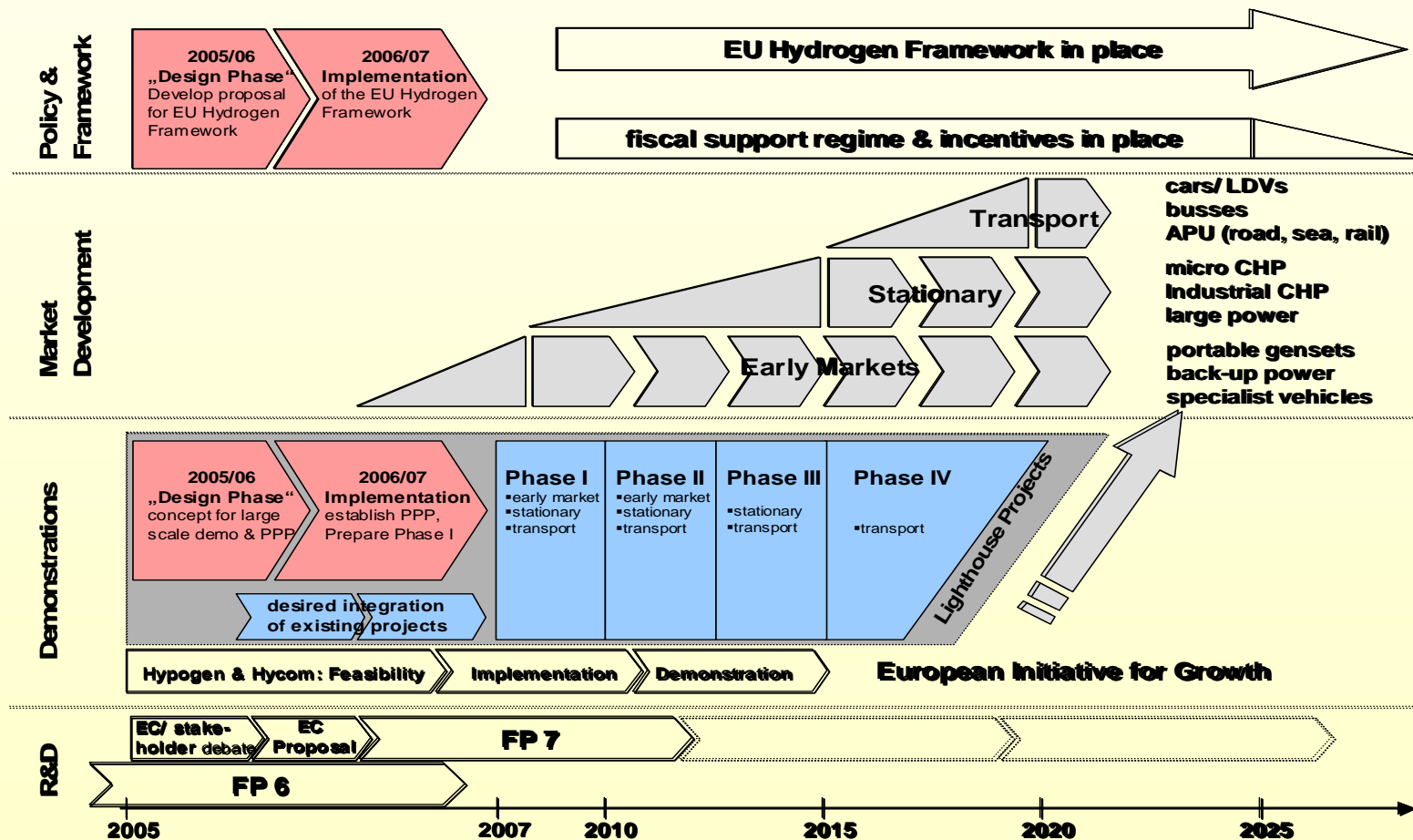


Deployment Strategy: Headlines

- ✗ **“Snapshot 2020”**. It outlines the phases needed to coordinate the first steps and key milestones for the market penetration of portable, stationary and transport applications **by 2020**.
- ✗ **Early markets** - including specialist vehicles (e.g. forklifts) and **portable applications** – could be established **by 2010**. **Stationary applications** will achieve commercialisation by 2015 and mass roll-out market **transport applications** by around 2020.
- ✗ In combination with private sector activity, it is vital that public investment - including from a **European Joint Technology Initiative**, the member states and regions - at least matches current R&D funding levels of major global competitors.
- ✗ **Policy frameworks and financial planning** for substantial, longer-term public contributions and incentives are essential.



Technology Platform : Schedule for a Deployment Strategy for Hydrogen & Fuel Cells



CHP: Combined Heat and Power Production

FP6: 6th Research Framework Programme

PPP: Public Private Partnership

Hypogen & Hycom: proposals for projects on hydrogen production and hydrogen communities under the Quick Start Programme of the European Initiative for Growth



7th Framework Programme

- **For the period 2006-2010 (possibly -2013)**
- **At least doubling the research budget**
- **Orientations presented in Commission Communication (COM/2004/353 of 16 June 2004)**
- **Proposes a new concept of European Joint Technology Initiatives (JTI), in particular for Hydrogen and Fuel Cells**
- **Tentative timetable:**
 - ✓ **FP7 proposal of the Commission – Spring 2005**
 - ✓ **First calls – late 2006**



JTI concept and values

- ✖ Implements in an effective and efficient manner the Integrated Strategy for research and deployment developed in the Technology Platform
- ✖ A Public-Private-Partnership with an appropriate governance and management structure (avoiding conflicts of interest)
- ✖ Envisages strong industrial lead and participation
- ✖ Supporting a European Research Area
- ✖ Developing outreach at international level
- ✖ Capitalising on FP5 and FP6



FP7

INDUSTRIAL
INVESTMENT

National & Regional
Programmes

EIB

Private
Investment

ERA-NET

UK

I

F

....

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SE

E

D

NL

*JTI will leverage
public & private
funds*

Structural
funds



Possible scope for JTI

- ✗ Fuel cell systems – transport, stationary and portable
- ✗ Hydrogen production, focus on transition from fossil fuels and sustainable renewable routes
- ✗ Hydrogen delivery and storage
- ✗ Hydrogen safety and testing
- ✗ Lighthouse projects, Demonstration to trigger deployment
 - ✓ HyCOM – transportation and stationary
 - ✓ HyPOGEN - hydrogen production from fossil fuels with CO₂ capture and storage
- ✗ Support to development of policy and regulatory framework, including pre-normative research, socio-economic research, education and training, dissemination
- ✗ Collaborative fundamental research – materials, processes





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EU – Latin America International Co-operation



EU Cooperation with Latin America in the field of energy

- Major priorities for co-operation are defined at the **biannual EU-Latin America summits**. The final declaration of last one held in Guadalajara (Mexico) includes 2 articles on energy, in which H₂/FCs are explicitly mentioned.
- **Bilateral S&T co-operation agreements** with Argentina, Brazil, Chile, and Mexico, defining specific areas of interest and conditions
- **Multilateral agreements** in which the European Commission and certain Latin American countries participate (e.g. IPHE: Brazil; CSLF: Brazil, Colombia, Mexico)



EU Cooperation with Latin America in the field of energy (cont.)

- **International co-operation (INCO) is a part of FP6 open to the world and implemented through three major routes:**
 - **Participation of third country organisations in Community Research projects**
 - **Specific measures in support of international co-operation (e.g. studies, input to policy, showcasing research results, seminars, groups, etc)**
 - **Human Resources (e.g. training networks, host fellowships, conferences and training courses, etc).**
- **Organisation from Latin American countries are eligible for funding from the EC in the same conditions as European organisations**

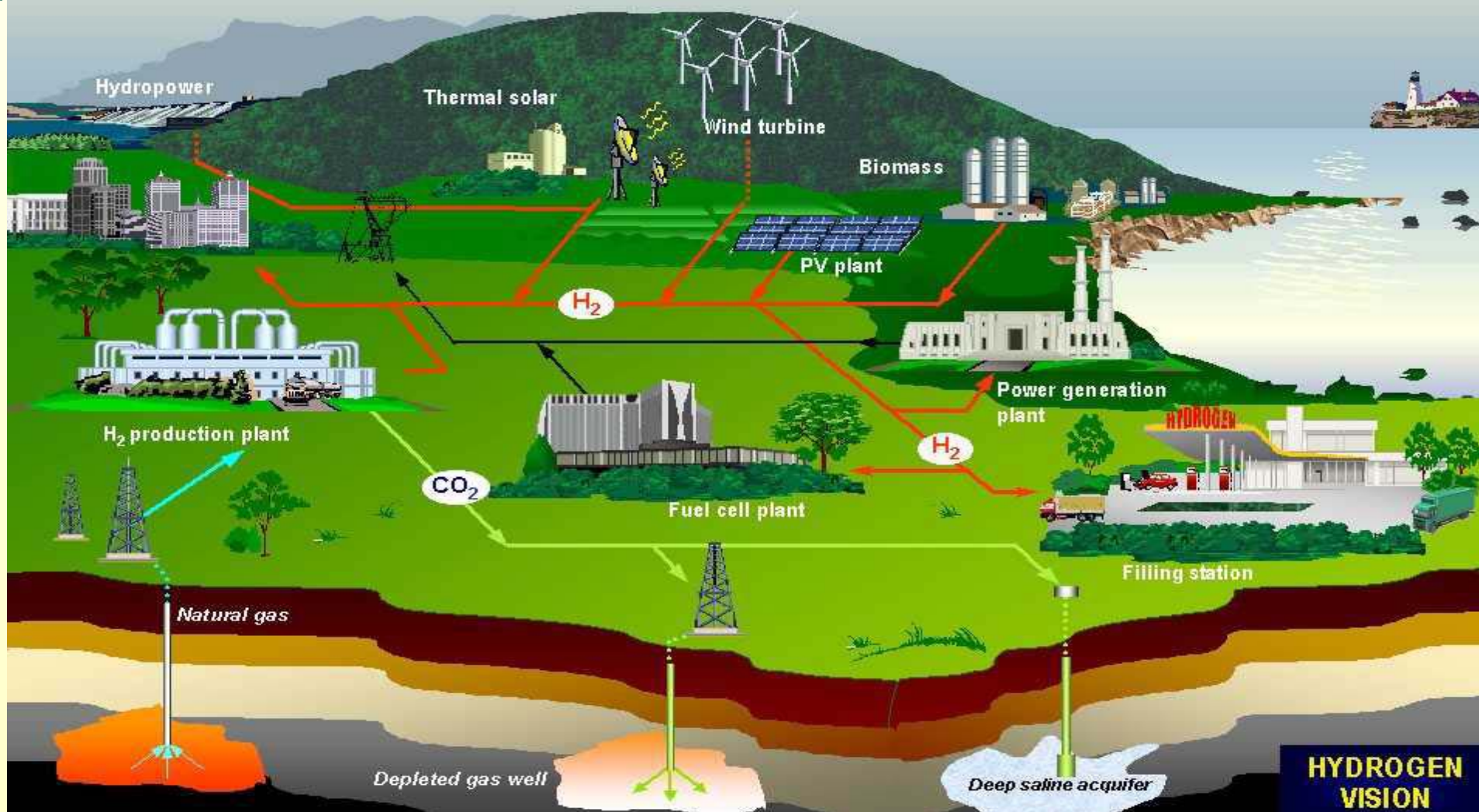




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THANK YOU for your attention



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