



EUROPEAN
COMMISSION

Community Research

“Fuel Cells and Hydrogen Research in the European Union”

**2004 DOE Hydrogen and Fuel Cell Program Review
Philadelphia, 24 May 2004**

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Presentation outline

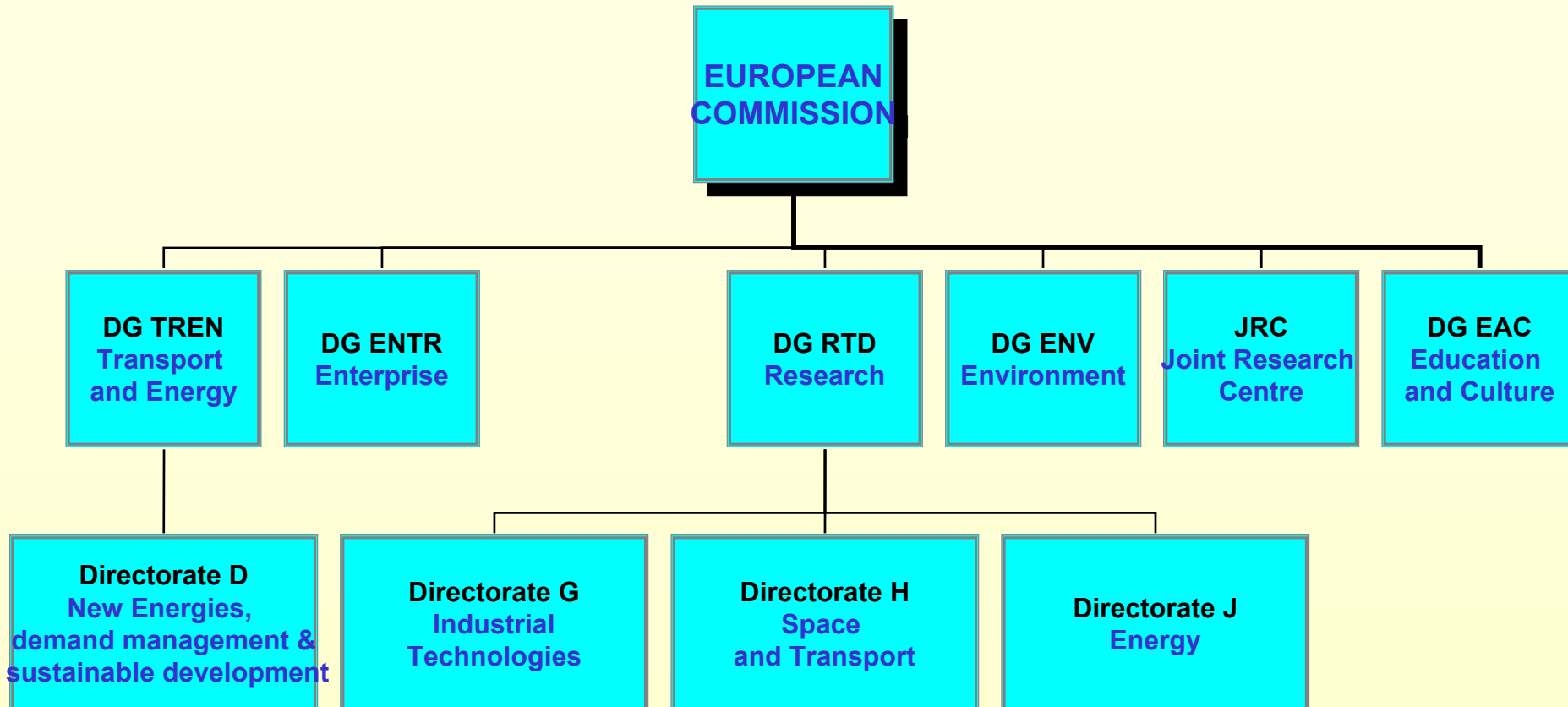
- ✓ **The EU energy context and policy objectives**
- ✓ **The EU Framework Programmes for Research and Technology Development**
- ✓ **Driving forward the vision: European Hydrogen and Fuel Cell Technology Platform**
- ✓ **International co-operation and Quick Start projects**

EU ENERGY CONTEXT AND POLICY OBJECTIVES

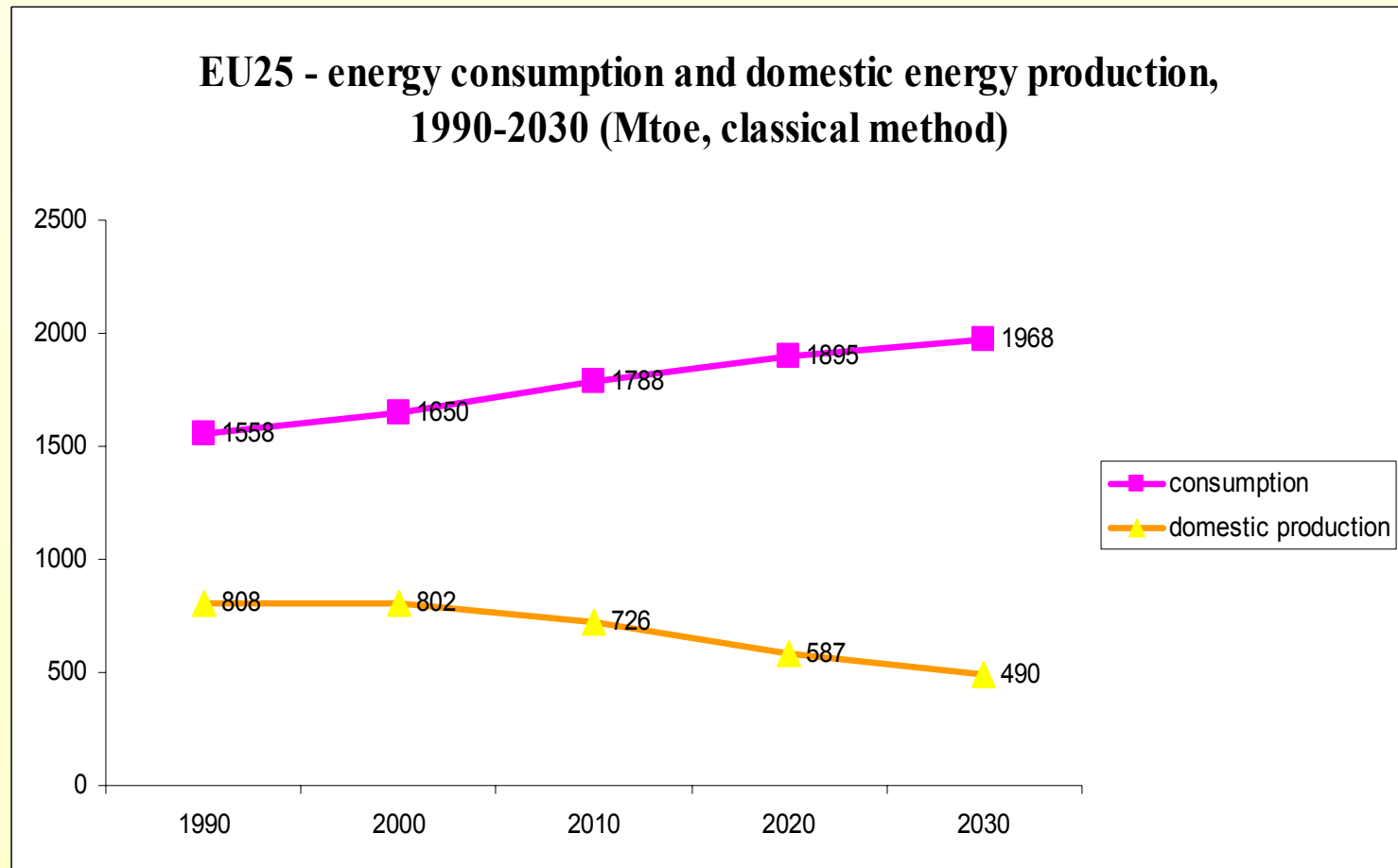
The European Commission

- ✘ The **European Union (EU)** is a treaty-based 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 and humanitarian aid.
- ✘ The EC has ~18.000 employees and the departments responsible for the various policy areas are called **Directorates-General (DG)**.

EC DGs related to Hydrogen and Fuel Cells



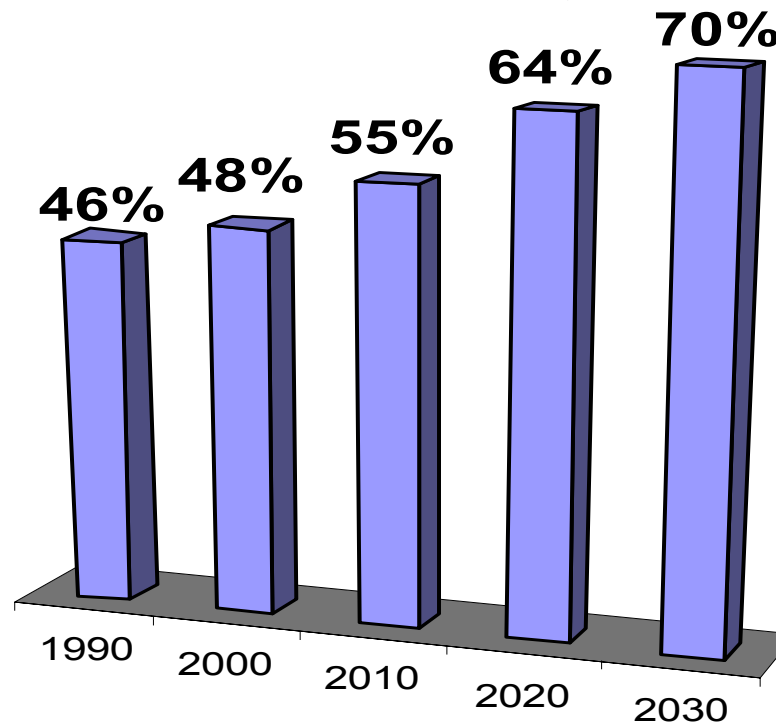
EU Energy context: import dependence is caused by growing demand and (after 2010) falling domestic production



EU energy context: Security of supply

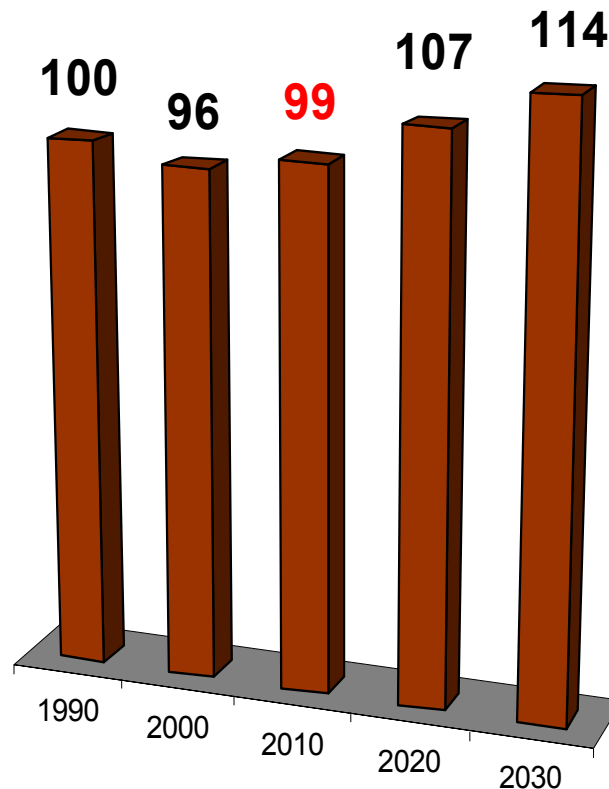
- growing import dependence

Share of imports in EU25 energy consumption (classical method of calculation)



EU energy context: despite measures to meet the Kyoto commitment, increasing demand for energy could push **CO₂ emissions** up if nothing more is done

EU25 CO₂ emissions (1990 = 100)



EU Policy Objectives

- ✓ **Meeting EU Kyoto Commitments**
8% CO₂ reduction by 2008-12 compared to 1990
Much deeper reductions required by 2015-2025...
- ✓ **Maintaining Security of Supply**
Green Paper of Nov. 2000 launched debate on a future EU energy strategy addressing both demand and supply sides
- ✓ **Promoting Industrial Competitiveness**
Hydrogen and fuel cell technologies forecast as paradigm shift in way we produce and use energy

Relevant EU Policy Actions

November 1997: White Paper on Renewable Energies

→ Doubling the Share of Renewable Energies from 6 to 12% of final energy by 2010

April 2000: Action Plan on energy efficiency

→ Improving Energy Efficiency: + 18% from 1995 to 2010

→ Increasing the Share of Cogeneration: 12% of EU-15 electricity by 2010

October 2001: White Paper on EU transport policy

→ 20 % substitution of diesel and gasoline by alternative fuels by 2020

November 2001: Communication on Alternative Fuels

→ Hydrogen : 5% of road transport fuel by 2020

September 2003: Communication on a European Partnership for the Sustainable Hydrogen Economy

→ Set up of European Technology Platform

December 2003: Alternative motor fuels contact group report

(See http://europa.eu.int/comm/energy_transport/en/fa_en.html)

EU Framework Programme for Research and Technological Development

What is the EU's Research Framework Programme (FP) ?

Main instrument for research funding in the EU since 1984. It covers a period of **5 years** with the last year of one FP overlapping the first year of the following FP.

Key principles:

- × only projects involving **several partners** from **different countries** are funded;
- × funds are allocated following competitive “**calls for proposals**”
- × quality and technological relevance of proposals are assessed by external, **independent experts**;
- × any legal entity established in a **third country** which has concluded a S&T cooperation agreement **may take part in FP activities**.

FP6: Objectives, priorities and budget

- ✓ The main objective of FP6 is to contribute to the creation of a true “**European Research Area**” (ERA), i.e. 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 is **€17.5 billion**, which is an increase of 17% respect to FP5. It represents close to **4% of the EU’s overall budget** (2001), and **5.4% of all public** (non-military) research spending in Europe.
- ✓ The biggest part of FP budget (12, 585 M€) will be spent on “**focussing and integrating**” future research activities on eight thematic priority areas (see next overhead). The rest will be spent in activities to strengthen and structuring the ERA.

Practical implementation of FP6

- ◆ “Traditional” and “new” instruments, each of which has their own set of objectives and conditions for participation.
- ◆ Main part of their programme (~75%) implemented via the ‘**new instruments**’: **multi-disciplinary** and **multi-partner *Integrated Projects*** (IP) and ***Networks of Excellence*** (the’).
- ◆ The rest of the programme implemented traditional instruments, similar to those in FP5: Specific Targeted Research Projects (**STREPs**), **co-ordination** actions, **specific support** actions and specific projects for **SMEs**.
- ◆ Projects are selected via ***call for proposals***. EC contribution depends on the type of instruments. For IPs / STREPs it is up to 50% (35% if demonstration) of the total project costs.
- ◆ There is always an organisation (i.e. the “**Project Co-ordinator**”) responsible for the management and technical direction of the project.

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€)

FP6 - Research on Hydrogen and Fuel Cells

Research on hydrogen and fuel cells is implemented in Thematic Priority 6, in particular under:

“Sustainable Energy Systems”

- ◆ *Energy savings and energy efficiency* (S-M Term)
- ◆ *Alternative motor fuels* (S-M term)
- ◆ *Fuel cells, including their applications* (M-L Term)
- ◆ *New technologies for energy carriers/transport and storage* (M-L Term)
- ◆ *New and advanced concepts in renewable energy technologies* (M-L Term)

“Sustainable surface transport”

- ◆ *New technologies and concepts for all surface transport modes* (M-L Term)

Call FP6-2003-ENERGY 1 ML

Retained projects - Hydrogen

Area	Project Acronym	Type of Action	Topic	EU indicative funding (M€)	Co-ordinator
H2 production	CHRISGAS	IP	Hydrogen rich gas from biomass	9,5	Växjö University, Sweden
	SOLREF	STREP	Solar MSR for synthesis gas Production	2.1	DLR, Germany
	HYTHEC	STREP	High Temperature Thermochemical cycles	1,9	CEA, France
	Hi2H2	STREP	Solid oxide water Electrolyser	0,9	EDF, France
H2 storage	STORHY	IP	Next generation storage technologies for on-board applications	10.7	Magna Steyr Fahrzeugtechnik, Austria
H2 safety, regulations, codes & standards	HYSAFE	NOE	Networking research in safety issues	7	Forschungszentrum Karlsruhe, Germany
	HARMONHY	SSE	Harmonisation of Standards and regulations	0.5	Vrije Universiteit Brussel, Belgium

Call FP6-2003-ENERGY 1 ML

Retained projects – Hydrogen (Cont.)

Area	Project Acronym	Type of Action	Topic	EU indicative funding (M€)	Co-ordinator
H2 pathways	HYWAYS	IP	Elaborating a European Hydrogen Roadmap	4	L-B Systemtechnik, Germany
	HYCELL-TPS	SSA	European H2/FC Technology Platform Secretariat	1.7	Ernst & Young, Belgium
	NATURALHY	IP	Investigating infrastructure requirements for H2 and natural gas mixes	11	Gasunie, The Netherlands
	INNOHYP-CA	CA	Innovative high temperature production routes for H2 production	0.5	CEA, France
H2 end use	ZERO REGIO	IP	H2 FC fleet demonstration	7,5	INFRASERV, Germany
	HYICE	IP	Internal combustion engines	9	BMW, Germany
	PREMIA	SSA	Effectiveness of demonstration initiatives	1	VITO, Belgium

Call FP6-2003-ENERGY 1 ML

Retained projects - Fuel Cells

Area	Project Acronym	Type of Action	Topic	EU indicative funding (M€)	Co-ordinator
High Temperature Fuel Cells	Real-SOFC	IP	Next generations SOFC planar technology	9	Research Centre Jülich (FZJ) (Germany)
	BIOCELLUS	STREP	Biomass Fuel Cell Utility System	2,5	TU Munich (Germany)
	GREEN-FUEL-CELL	STREP	SOFC fuelled by biomass gasification gas	3	CCIRAD (France)
Solid Polymer Fuel Cells	HYTRAN	IP	Innovative systems and components for road transport applications	9	Volvo (Sweden)
	FURIM	IP	High temperature polymer electrolyte membrane (PEM)	4	DTU, Technical University of Denmark
Portable applications	MOREPOWER	STREP	Compact direct (m)ethanol fuel cell	2,2	Geesthacht Research Centre, GKSS (Germany)

FP6: Next Calls for Proposals

- × **Eol exercised closed on March 2004: more than 100 Eols on H2 and Fuel Cells received**

Assessment in April 2004

Conclusions published in May 2004

- × **WP revision under discussion: Basis:**

- ✓ Existing portfolio: outcome of 1st call
- ✓ Stakeholder views: conclusions of General Assembly
- ✓ Joint calls envisaged with other Programmes: with nano-technologies, materials and production technologies, aeronautics and sustainable surface transport

- × **WP to be approved before Summer**

- × **Next Call closing in December 2004**

Driving forward the vision:
*European Hydrogen and Fuel Cell
Technology Platform*

European Hydrogen and Fuel Cell Technology Platform: A brief history....

- High Level Group – October 2002
- Conference (HLG vision report) – June 2003
- President's Communication – September 2003
- Advisory Council – December 2003
- Platform Launch – January 2004
- Member States Mirror Group – February 2004
- Steering Panels and Initiative Groups – March, April 2004



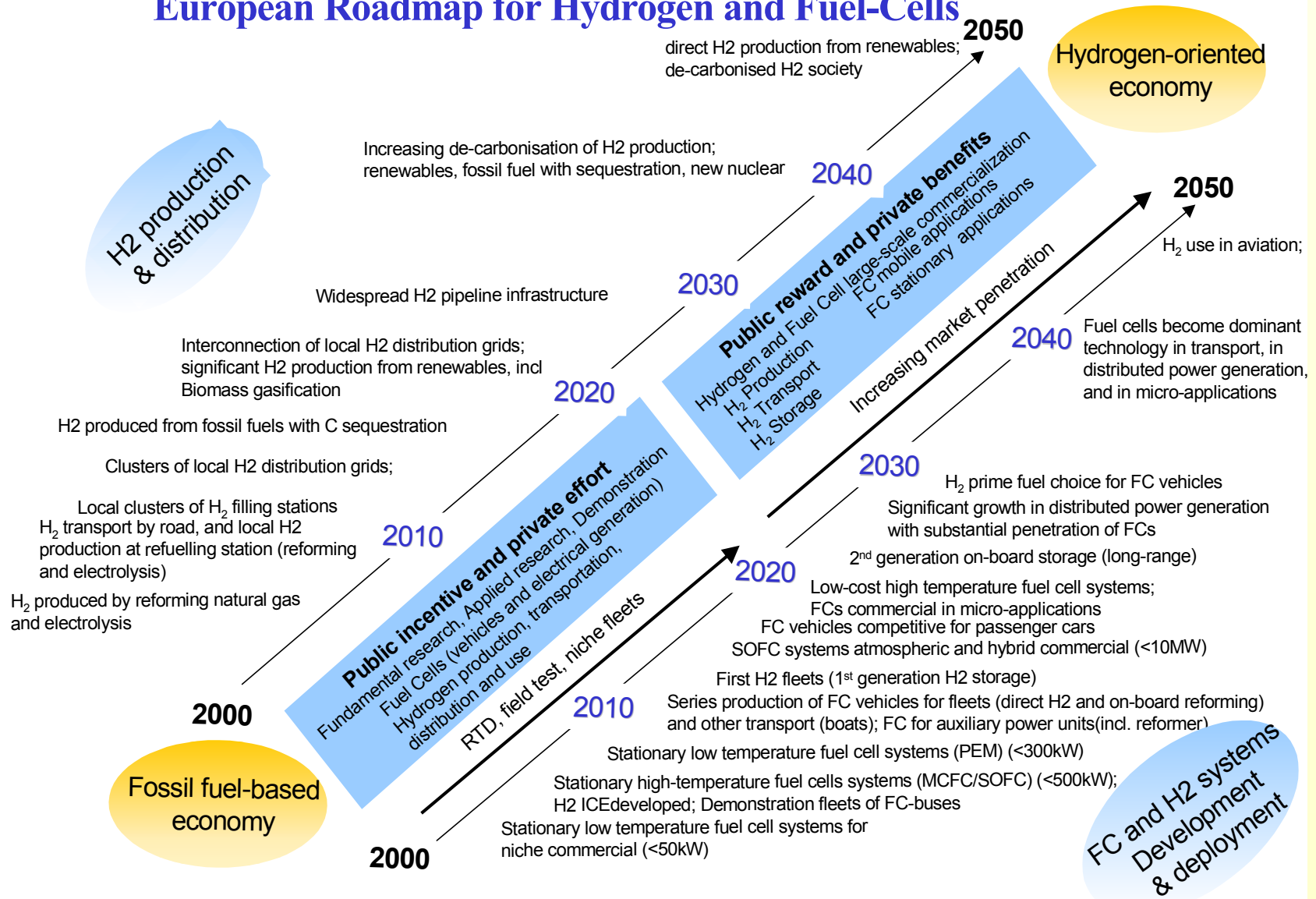
**Initiative for
Growth – Dec '03**

High Level Group Report: Main Recommendations

Five “Actions”

- ✓ European Political Frame for fostering new hydrogen and fuel cell technologies;
- ✓ Strategic Research Agenda;
- ✓ Deployment Strategy;
- ✓ **A European Hydrogen and Fuel Cell Technology Partnership, steered by Advisory Council;**
- ✓ European Roadmap for Hydrogen and Fuel Cells.

European Roadmap for Hydrogen and Fuel-Cells



HLG Vision

Commission H/FC Project Team
(Inter-service Group)

H2/ FC TECHNOLOGY PLATFORM

Member States'
Mirror Group

Advisory Council
(incl. Executive Group)

TP Secretariat
Information Office
IT Support Service

Steering
Panels :

Strategic Research
Agenda

Deployment Strategy
(incl. policy framework)

(possible)
Initiative
Groups :

H2/ FC
Roadmap

Public
awareness

Safety, codes
& standards

Business
development

Education &
training

PLATFORM OPERATIONS

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

GENERAL ASSEMBLY

(Bi-)annual Technology Platform Forum

International co-operation and Quick Start projects

International Cooperation

- **Implementing Agreements and Hydrogen Co-ordination Group created by IEA**
- **Bilateral co-operation agreements in place (or under development) with U.S., Japan, Canada, Russia, China, Australia, Brazil.....**
- **The U.S. International Partnership for The Hydrogen Economy (IPHE).**

H2 Quick-Start Projects (Part of “Growth Initiative”)

- ✘ The Initiative for **Growth** was launched by the Commission to boost EU economic development. It includes a “**Quick Start Programme**” with a list of projects with public / private investment in infrastructure, networks and knowledge.
- ✘ It was endorsed by the EU Summit of December 2003 and its aim is to encourage the creation of **public/private partnerships** in co-operation with the European Investment Bank (**EIB**) in order to leverage finance.
- ✘ This programme foresees two major **10-year projects** (2005-2015) for hydrogen-related research, production and use:
 - ✓ **HYPOGEN**: First large facility generating H2 and Electricity from Fossil Fuels with Sequestration of the CO2
Estimated Budget: 1.3 B€
 - ✓ **HYCOM**: Realisation of Hydrogen communities, demonstrating the generation (from Renewable Sources) and utilisation of H2 in stationary (CHP) and vehicle applications
Estimated budget: 1.5 B€

European Hydrogen Technology Platform

General Assembly Meeting,

Brussels, 20th January 2004



- × **President Romano Prodi:** “....our objective is to realise a step-by-step shift, towards a fully integrated hydrogen economy, based on renewable energy sources, by the middle of the century. We must focus on technologies that can sustain economic growth, neutralise the debate on climate change and eliminate harmful pollution forever..... In achieving this goal we shall contribute to quality of life, peace and stability the world over”.

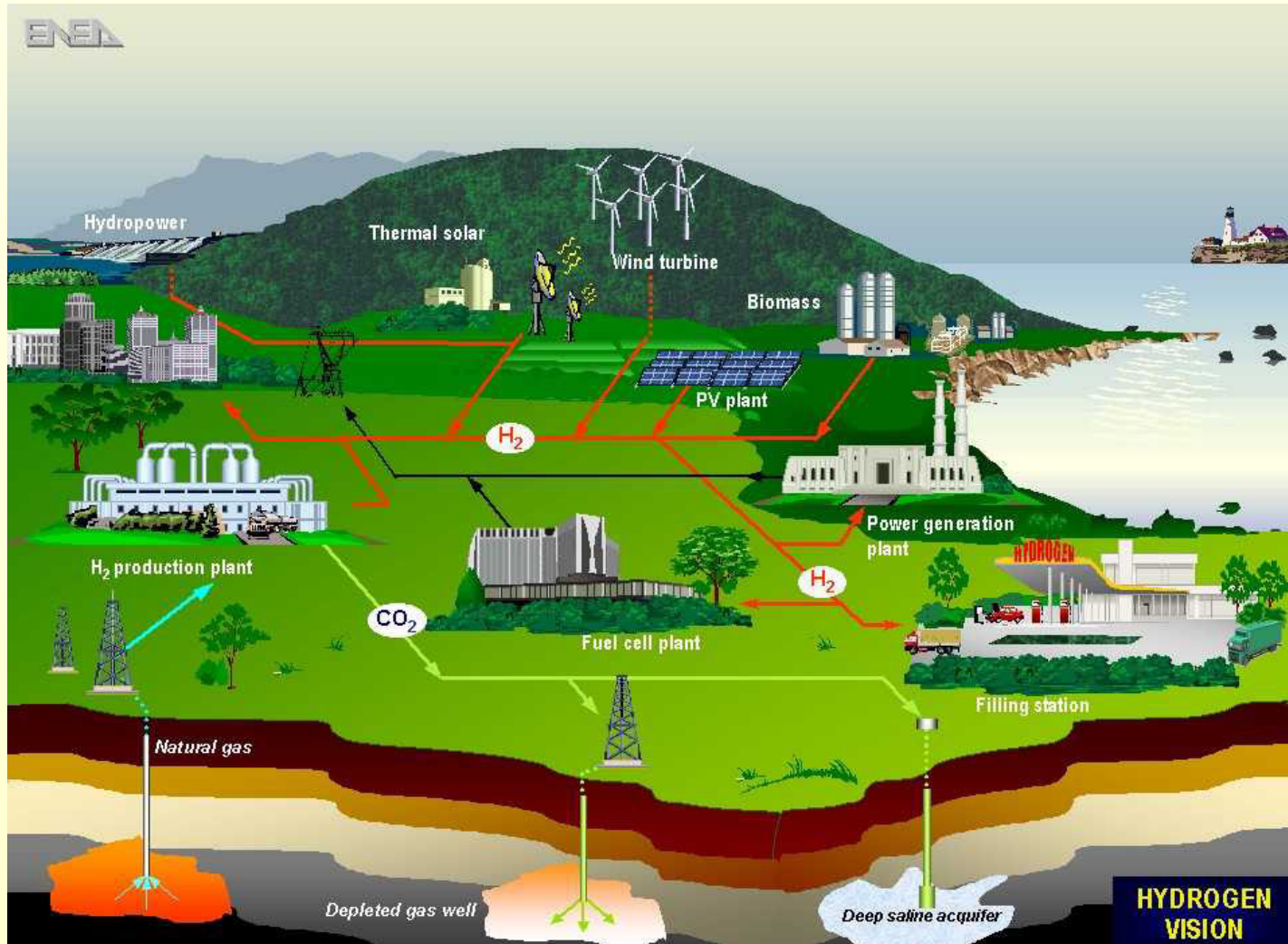


- × **Vice President L. De Palacio:** “Hydrogen as a potential new universal energy carrier has attracted our special attention. An integrated development for energy and transport sectors is particularly important to take full profit of common technologies. Hydrogen also can break the monopoly of oil in the transport sector and give it access to all energy resources”.



- × **P Busquin, Commissioner for Research:** “The implications of climate change go way beyond our lifetimes and what we choose to do now will have dramatic consequences for many generations to come. It is therefore imperative that we start now to develop experience of implementing these sustainable energy systems”

High Level Group : A visionary energy outlook



Thank you!

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