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CSLF meeting
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European Commission

Activities in CO2 Capture and Storage

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Rationale

CO2 and Climate Change

- There is evidence that there is a link between the increase of greenhouse gas concentration in the atmosphere and the measured temperature rises.
- Communication from the EC (February 2005):"Winning the Battle Against Global Climate Change" (See Annex). Technology can play an important role

Political context

- Kyoto protocol/ Post Kyoto
- Renewable Energy Sources and Energy Efficiency are recognised as key technological options for reducing emissions
  - ✓ Green Paper on Energy Efficiency or *Doing More With Less* (EC publication Jun 2005).
    "*Europe could save 20% of its energy by 2020"*
- European Climate Change Programme second phase will soon start and has CCS high on the agenda
- EU Greenhouse Gas Trading Directive – trading started Jan 05
- Security of Supply and Competition supporting EU's Lisbon and Barcelona objectives

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Activities under Framework Programmes

Activities under FP5 and FP6 (See Annex)

- 19 Projects on Capture and Storage worth more than 170 M€
- Growth Initiative – "Quickstart" Programme : Hypogen
- Co-ordination of member states activities, ERA-NET (FENCO)
- 1st European High Level Conference on CO2 Capture and Storage (April 2005)
- International Cooperation : Contribute to the Carbon Sequestration Leadership Forum, an objective in last 2 Call for Proposals
- European Technology Platform on Zero Emission Fossil Fuel Power Plants

Activities under FP7 (See Annex)

- CO2 capture and storage technologies for zero emission power generation
- Clean coal technologies

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Activities under FP5 / FP6

Capture R&D – Objectives

- ✓ 70-80 % of total cost - therefore primary objective is to decrease the cost of capture (to below 20 €/ton).
- ✓ Capture R&D - Scope:
  - pre-combustion capture
  - post-combustion capture
  - Oxyfuels

Sequestration R&D - Objectives

- ✓ Long term stability;
- ✓ Risks and safety aspects;
- ✓ Build public confidence;
- ✓ Map and assess geological storage potential.

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Proposed Activities in FP7

- **CO2 Capture and Storage technologies for zero emission power generation**

  To drastically reduce the environmental impact of fossil fuel use, aiming at highly efficient power generation plants with near zero emissions based on CO2 capture and storage technologies.

- **Clean Coal Technologies**

  To substantially improve plant efficiency, reliability and cost through development and demonstration of clean coal conversion, complementing and linked with developments on CO2 capture and storage.

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The European Technology Platform on Zero Emission Fossil Fuel Power Plants

Scope:

- To drastically reduce the environmental impact of fossil fuel use, aiming at highly efficient power generation plants with near zero emissions.

Concept:

- Stakeholders getting together to define a Common Vision and a Research Agenda on key strategically important issues.

Expected benefits:

- Structure and integrate EU research
- Establish EU in leadership position at global level
- Support and increase overall RTD investment in the field
- Remove obstacles to deployment
- Contribute to achieving a coherent policy and regulatory framework

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International Activities

- **The Commission is actively involved in the IEA**
  - ✓ **Working Party for Fossil Fuels in defining its ZETS (Zero Emission Technology) strategy**
  - ✓ **Greenhouse Gas Implementing Agreement specifically looking at CO2 C+S**
  - ✓ **Clean Coal Center Implementing Agreement which has many CO2 C+S activities**

- **Bilateral Collaboration programmes and agreements**

- **Ongoing EU wide Projects with International Presence**

The CSLF need to complement, add value and optimize cooperation to accelerate development and facilitate deployment

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Issues for the CSLF

- **Need for a shared understanding on objectives and strategy (or strategies)**
- **More flexible and effective operational structures aimed at facilitating results (including a more transparent and participative management), particularly in view of possible admission of new members**
- **Focus on identifying and recognising CSLF projects and activities as key vehicles to deliver CSLF relevant results**
- **Members to take active provision to facilitate funding of CSLF relevant projects/activities**

(See Annex for info EU PF6 Energy-4 Call for Proposals)

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CONCLUSIONS

In consolidating its leading position in Clean Power Generation, Europe aims to :

- ✓ **Boost investment on research and technology development**
- ✓ **Integrate fragmented, private and public (national, European) efforts**
- ✓ **Work together towards a vision shared by all relevant stakeholders, including European society and governments**
- ✓ **Face jointly the challenges and opportunities of international cooperation and competition**

The « Zero Emissions » TP and FP7 are key elements to address these needs in the months and years to come

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Staying Informed

Call information and documentation:

access from: http://fp6.cordis.lu/fp6/calls.cfm

Energy research helpdesk:

rtd-energy@cec.eu.int

Energy Research on Europa

http://europa.eu.int/comm/research/energy/index_en.html

CORDIS FP6 Service:

http://www.cordis.lu/fp6/

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Thank you for your attention

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ANNEX

Additional Information on on-going activities in European Commission in CO2 Capture and Storage

CONTENT:

- ✓ Climate Change Post 2012
- ✓ The Technology Platform on Zero Emission
- ✓ Activities in Research Framework Programmes – FP5, FP6, FP7
- ✓ Call for Proposals Energy-4

CLIMATE CHANGE - POST 2012

Communication from the EC (February 2005) : "Winning the Battle Against Global Climate Change"

***Challenges* : More drastic GHG reductions will be needed**
max. 2°C increase, max. 450 ppmv,- 50 / 60% by 2050

- **Participation Challenge:** Include all major emitters
  - ✓ **share of EU-25 in world GHG emissions will decline to <10%**
  - ✓ **share of developing countries will expand to >50%**
- **Innovation Challenge**
  - ✓ ***Pulling technological change*: Stimulate markets to promote adoption of new technology**
  - ✓ ***Pushing technological change*: *Invest in knowledge economy to give EU a competitive edge in a low carbon future***
- **Adaptation Challenge**

CLIMATE CHANGE - POST 2012

Communication from the EC (February 2005) : "Winning the Battle Against Global Climate Change"

Conclusions

- **The inclusion of more policy areas:**
  - ✓ **widen scope of international action to cover all greenhouse gases and all sectors.**
- Enhanced innovation to transform energy and transport systems
  - ✓ **optimal mix of technology 'push' (RTD) and 'pull' (Market Stimulation) instruments**
- **The continued use of market based and flexible instruments**
- **The inclusion of adaptation policies**
  - ✓ **More resources need to be allocated in the EU to adapt effectively to climate change**
- The broadening of participation
  - ✓ **Specific projects/ programmes with major emitting nations to improve energy efficiency or to promote development and adoption of low-carbon technologies**

CLIMATE CHANGE - POST 2012

Communication from the EC (February 2005) : "Winning the Battle Against Global Climate Change"

EC recommendations for a post-2012 EU Climate Change Strategy: NEXT STEPS

- Immediate and effective implementation of agreed policies
  Kyoto Protocol, ETAP, Energy Efficiency Initiative.
- Increased public awareness
- **More and better focused research**
  increased EU funding under the 7th Framework Programme
- Stronger co-operation with third countries
  technology transfer, scientific R&D cooperation
- European Climate Change Programme in 2005
  - ✓ energy efficiency,
  - ✓ RES,
  - ✓ the transport sector
  - ✓ **carbon capture and storage.**

Fifteen Technology Options

Each potential reducing emissions by 3.6 Gt CO2 per year by 2050

- Efficiency and conservation
  1. Improved fuel economy of vehicles
  2. Reduced reliance on cars
  3. More efficient buildings
  4. Improved power plant efficiency
- Decarbonization of Electricity and Fuels
  5. Substituting natural gas for coal
  6. Storage of carbon captured in power plants
  7. Storage of carbon captured in hydrogen plants
  8. Storage of carbon captured in synthetic fuel plants
  9. Nuclear fission
  10. Wind electricity
  11. Photovoltaic electricity
  12. Renewable hydrogen
  13. biofuels
- Natural sinks
  14. Forest management
  15. Agricultural soils management

Source: Pacala, S, Socolow, R.2004. Science Vol. 305: 968-972

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The Technology Platform on Zero Emission Fossil Fuel Power Plants

Scope

To drastically reduce the environmental impact of fossil fuel use, particularly coal , aiming at highly efficient power generation plants with near zero emissions. This will include CO2 capture and storage, as well as clean conversion technologies leading to substantial improvement in plant efficiency, reliability and costs.

Concept

Stakeholders getting together to define a Common Vision and a Research Agenda on key strategically important issues with high societal relevance where achieving Europe's future growth, competitiveness and sustainability objectives is dependent upon major research and technological advances in the medium to long term.

The Technology Platform

Expected benefits :

- Accelerate the generation of new knowledge, innovation and the uptake of research and technologies;
- Remove obstacles to deployment at EU, MS, regional and local levels;
- Contribute to achieving a coherent and consistent policy and regulatory framework;
- Increase attractiveness of EU for researchers and investors;
- Increase public awareness, understanding and acceptance.

The Technology Platform

The Advisory Council

A high level group of committed and influential personalities to steer, monitor, initiate and push actions

25 Members, balance between regional and sectorial origins:

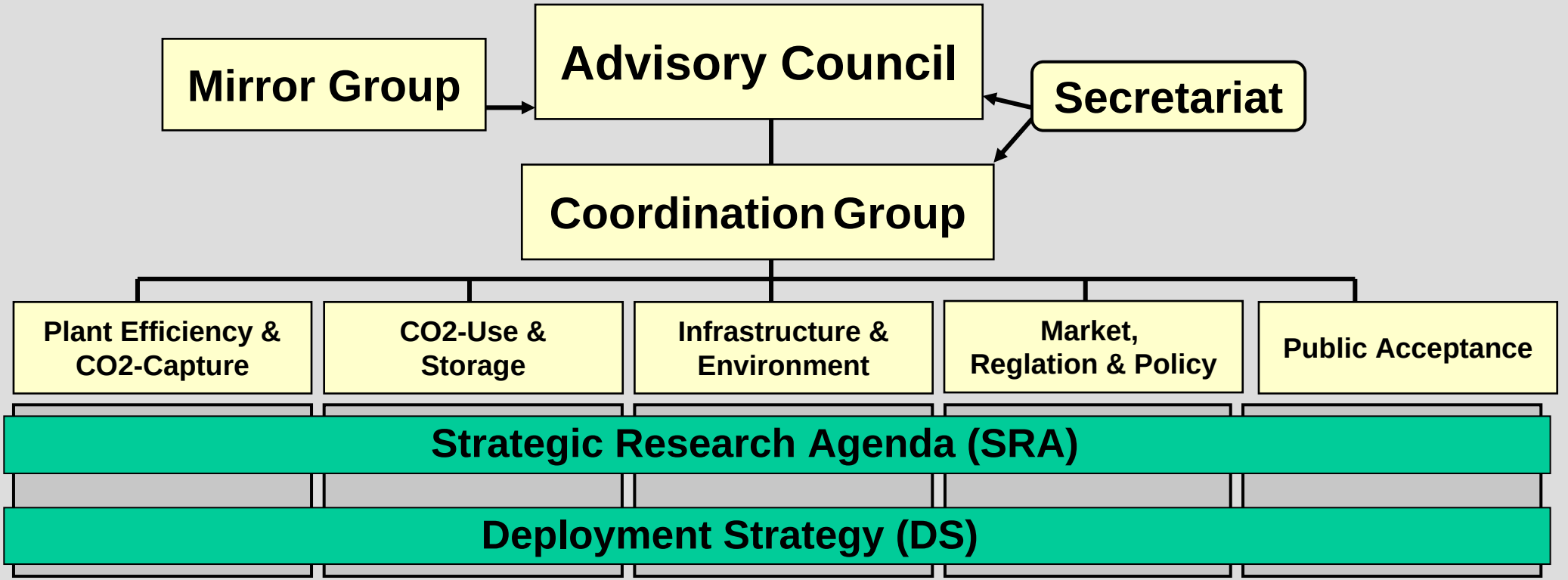
- **Utilities**
- **Energy Companies (Oil, Gas, Coal)**
- **Equipment Supply Industry**
- **Academic and Research organisations –public and private**
- **Public authorities and regulators – incl. the EC.**
- **Civil Society (e.g. Environmental NGO's organisations, Consumers/Users groups, etc.)**
- **Others necessary for the Platform.**

The Technology Platform

Tentative Time Table

Initial 18 months	2005				2006	
Consultation with main initiators and stakeholders	→→→ →→→					
Advisory Council and Terms of Reference. Possible Creation of MG and GA.	→ →	→→→ →→→				
Joint Vision		→ →	→→→ →→→	→→ →→		
Launch the Technology Platform				→→ →→		
Strategy Research Agenda			→→→ →→→	→→→ →→→	→ →	
Implementation:		→→→ →→→	→→→ →→→	→→→ →→→	→→→ →→→	→→→ →→→

Technology Platform Structure
Zero Emission Fossil Fuel Power Plant



Matrix management requirement

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Activities in FP5 / FP6

RTD Activities under FP5 and FP6 :

- **19 Projects on Capture and Storage worth more than 170 M€**
- **Growth Initiative – "Quickstart" Programme : Hypogen**
- **Co-ordination of member states activities, ERA-NET (FENCO)**
- **International Cooperation : The Carbon Sequestration Leadership Forum**
- **FP6 Last Call by Sept. 2005 on Complementary Activities and preparation for FP7**

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FP6 – on-going projects

Project Acronym	Type of Action	Title	EU funding (M€)	Coordinator	Duration (months)	Start	No of Partners	No of countries
CO2SINK	IP	In-situ laboratory for capture and sequestration of CO_2	8.7	Postdam Research C	60	1/4/04	14	8
ENCAP	IP	Enhanced capture of CO_2	9.8	Vattenfall	60	1/3/04	33	9
CASTOR	IP	CO_2 from capture to storage	8.5	IFP	48	1/2/04	30	12
CO2GEONET	NoE	Network of excellence on geological sequestration of CO_2	6	BGS	60	1/4/04	13	7
ISCC	STREP	Innovative in-situ CO_2 capture technology for solid fuel gasification	1.9	Univ. of Stuttgart	36	1/1/04	14	7

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FP6 Third call –Dec. 2004 –
New Proposals under negotiation

- **CO2 capture and hydrogen production from gaseous fuels (IP)**
  CACHET
- **The monitoring and verification of CO2 geological storage (IP)**
  CO2REMOVE
- **Preparing for large scale H2 production from decarbonised fossil fuels including CO2 geological storage (IP) (HYPOGEN PHASE1)**
  DYNAMIS
- **Advanced separation techniques (STREP)**
  CLC GAS POWER, C3-Capture, DeSANNS, HY2SEPS
- **Mapping geological CO2 storage potential matching sources and sinks (STREP)**
  EU GeoCapacity

Energy Research in FP7

Cooperation – Collaborative Research

Possible Thematic Priorities and indicative budget breakdown (M€)

1.	Health	8373
2.	Food, agriculture and biotechnology	2472
3.	Information and communication technologies	12756
4.	Nanoscience, nanotechnologies, materials and new production technologies	4865
5.	Energy	2951
6.	Environment and climate change	2552
7.	Transport	5981
8.	Socio-economic sciences and the humanities	798
9.	Space and Security research	3987

Energy - Proposed Priorities topics:

- **Hydrogen and fuel cells**
- **Renewable electricity generation**
- **Renewable fuel production**
- **Renewables for heating and cooling**
- **CO2 capture and storage technologies for zero emission power generation**
- **Clean coal technologies**
- **Smart energy networks**
- **Energy savings and energy efficiency**
- **Knowledge for energy policy making**

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Call Energy-4

Budget: 20M€ (expected 50% RES)

Three themes for the content of the call:

- ✓ **Preparing the transition to FP7 and support to the running of technology platforms**
- ✓ **Enhancing strategically important international cooperation initiatives (IPHE, CSLF)**
- ✓ **Strategically relevant topics not well covered by running projects**

With such a limited budget, we had to avoid heavy oversubscription to target precisely

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Call Energy-4 : details

- ✓ **Call launch:** 22 September 2005 – Tomorrow ! In a few hours
- ✓ **Call close:** 10 January 2006 at 17.00h (Brussels time)
- ✓ **Call documents:** http://fp6.cordis.lu/fp6/calls.cfm
- ✓ **Call topics:** Work Programme, Section 6.1.3.2.6
- ✓ **Electronic submission only**
- ✓ **Strongly recommended to use the Pre-proposal Check facility (see Call page & Guides for Proposers)**

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Call Energy-4: Theme 2 (1)

Enhancing strategically important international cooperation initiatives

- ✓ **To facilitate and enhance the International Cooperation dimension of running FP6 projects** in the fields of:
  - ✓ **hydrogen and fuel cells**; and
  - ✓ **CO2 capture and storage**

Instruments: STREP or SSA

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Call Energy-4: Theme 2 (2)

Enhancing strategically important international cooperation initiatives

- ✓ **Preference will be given to proposals designed to stimulate co-operation and exchange through the established international cooperation frameworks IPHE and CSLF and their recognised projects.**
- ✓ **Activities could include, for example, workshops, studies, joint dissemination activities, actions addressing cross validation and calibration of theoretical studies and experimental results, benchmarking, round-robin testing, gap analysis and development of complementary research action plans and strategies.**

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Call Energy-4: Theme 2 (3)

Enhancing strategically important international cooperation initiatives

International Partnership for the Hydrogen Economy (IPHE)

Members : Australia, Brazil, Canada, China, France, Germany, Iceland, India, Italy, Japan, Korea, Norway, Russia, United Kingdom, United States, European Commission.

http://www.iphe.net/

Carbon Sequestration Leadership Forum (CSLF)

Members : Australia, Brazil, Canada, China, Colombia, European Commission, Germany, India, Italy, Japan, Mexico, Norway, Russian Federation, South Africa, United Kingdom, United States.

http://www.cslforum.org/

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Call Energy-4: Theme 2 (4)

Enhancing strategically important international cooperation initiatives

IMPORTANT NOTES

- ✓ **The normal rules for participation of Third and INCO country partners will apply. Proposal consortia should include European partner(s) representing the running FP6 project (e.g. co-ordinator or work package leader) as well as the international partner(s).**
- ✓ **If appropriate and more cost-effective, the EC may consider merging the new activities with the corresponding running FP6 projects.**
- ✓ **More information on relevant on-going FP6 projects is available on the CORDIS Call page.**

Call Energy-4: Theme 3 (1)

Strategically important topics not well covered by running projects

d) **Research to support the development of permitting guides for the installation of (small-sized) stationary hydrogen and fuel cell-based systems** (STREP) (IPHE relevant)

e) **Experimental test sites for Monitoring and Verification of CO2 Storage with Enhanced Coal Bed Methane** (STREP) (CSLF relevant)

f) **Assessing the potential for a hydrogen-oriented economy in the New Member States and Accession Countries** (SSA) (IPHE relevant)

Call Energy-4: Theme 3 (2)

Strategically important topics not well covered by running projects

g) System integration, development, test and validation of new generation, small distributed domestic PEMFC CHP systems (STREP) (IPHE relevant)

Important Note

This project is intended to be a EU-US collaborative effort, with funding provided from both sides to the corresponding participant organisations, as a result of co-ordinated calls in the EU and US. This topic will only receive an EU contribution if the proposers succeed in securing financing from the EU and US sides and satisfactory implementation arrangements are signed.