

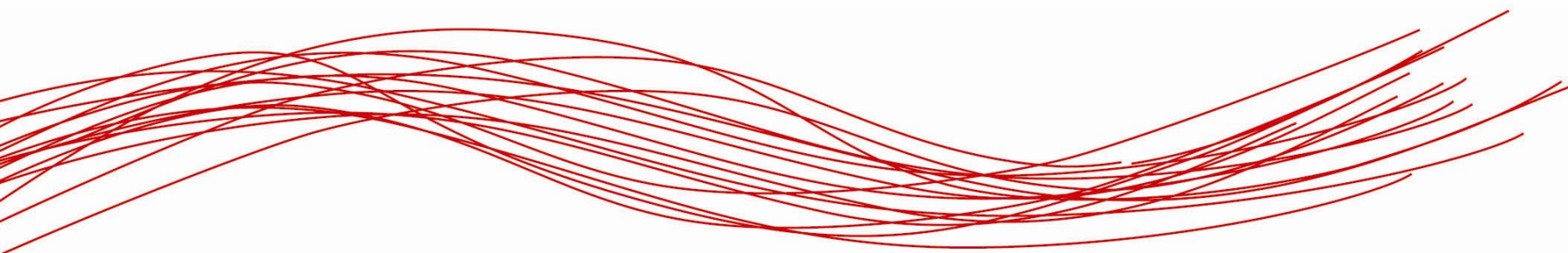


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# EC supported research in Carbon Capture and Storage/ EU-China Cooperation



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# EU Strategic Policy Objectives

## → Lisbon Agenda

- Strategy for growth, jobs, social cohesion, sustainability

## → Energy

- Sustainable development
- Competitiveness
- Security of supply

## → Research

- Increase emphasis on excellence and the research investment - to 3% of GDP
- Main instrument: The FP7 (2007-2013)
  - Budget: 50.52 b€
  - Energy Theme : 2.3 b€
  - Technology Platforms (ETP-ZEP), Joint Technology Initiatives



# Some Relevant Policy Initiatives

## → 2020 Energy Challenges for Europe

- 20% Efficiency increase
- 20% RES
- 20% Lower CO2 emissions

## → Towards an European Strategic Energy Technology Plan

- Technology is a key element in reaching energy and climate change policy objectives

## → 'Climate action: Energy for a changing world'

- ❖ Proposals to fight climate change and promote renewable energy in line with EU commitments
  - ❖ Directive for the Geological Storage of CO2
  - ❖ Communication on "Supporting Early Demonstration of Sustainable Power Generation from Fossil Fuels"

## → Second Strategic Energy Review

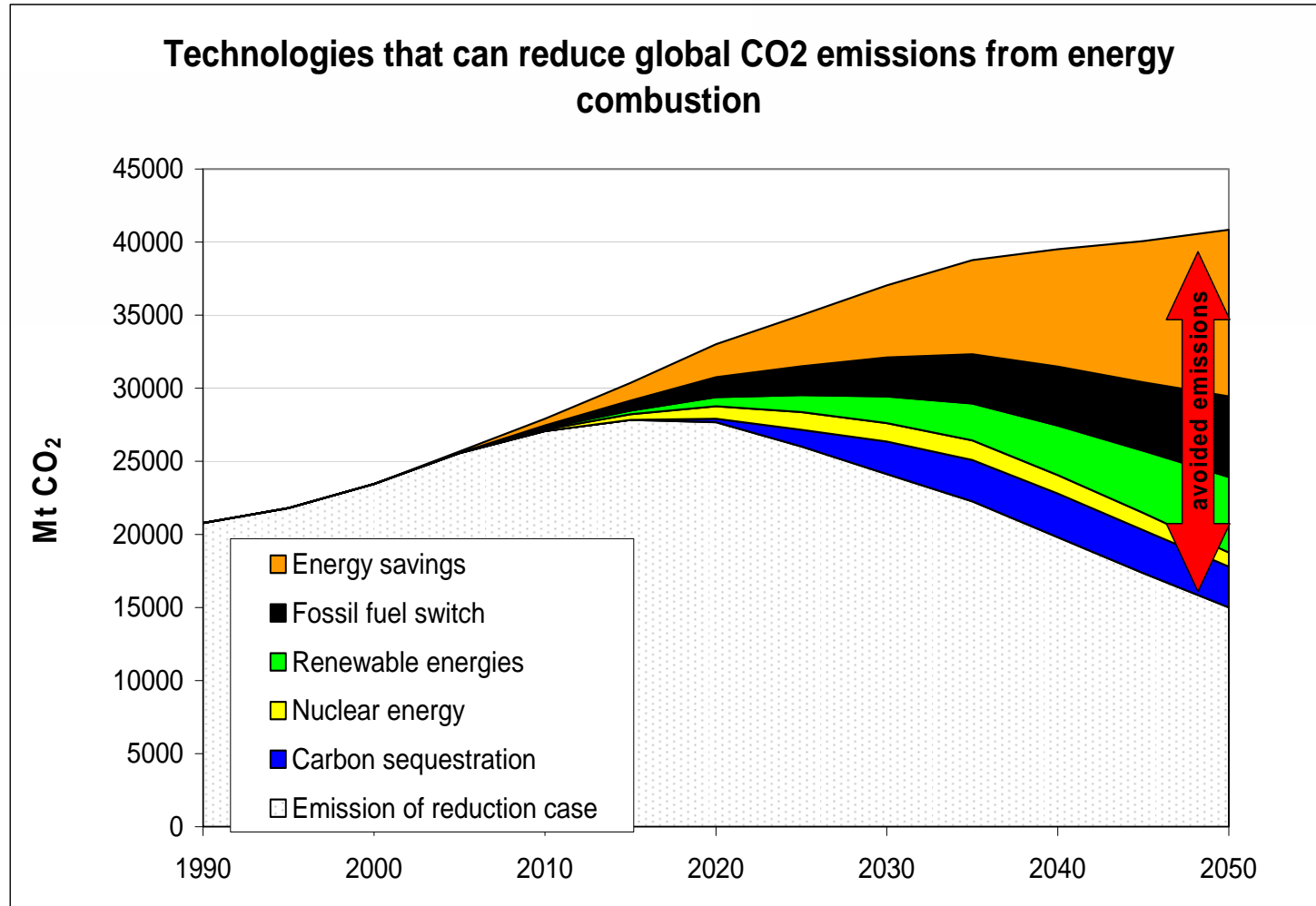
climate change, high energy prices and energy security



- **2020 targets:** Prioritise and accelerate the development and wide-scale application of low-carbon energy technologies
- **2050 vision:** develop new generation of technologies through breakthroughs towards transition to a low-carbon economy.
- A new governance at EU level to develop a European Research Area on Energy
  - Joint strategic planning /Steering Group and information system
- Effective implementation:
  - European Industrial Initiatives
  - European Energy Research Alliance
  - Trans-European Energy Networks and Systems of the Future
- Actions for industry, Member States, the EC and at global level
- Increase in resources, both financial and human
- Reinforce international cooperation



# Possible reduction pathways exist, but no consensus on the best way forward





# Role of CCS technology

**The research, development and demonstration are fundamental to make CCS a commercially viable option**

## Achievements to date

- ✓ **Activities under past Framework Programmes - technological viability of CCS**

## Ongoing activities

- ✓ **The 7th Framework Programme – preparation for demonstration scale, novel technologies**

## Looking forward

- ✓ **European Industrial Initiative on CCS – demonstration to accelerate commercial deployment, low cost CCS, permanent and safe storage, public acceptance**





# Highlights of CCS Activities under past Framework Programmes

## ***Activities under FP5 and FP6 (1998-2006)***

### ***❖ CCS Projects***

***❖ FP5 – CCS projects worth 32 M€ (EC funding 16 M€)***

***❖ FP6 - CCS projects worth 170 M€ (EC funding 70M€)***

***❖ European Technology Platform on Zero Emission Fossil Fuel Power Plants launched on 1 December 2005***

***❖ Coordination of member states research activities, ERA-NET (FENCO)***

***❖ International cooperation:  
EC member of CSLF, EU-China MoU on NZEC, US, India...***



# Energy Theme in FP7

Implemented jointly by DG Research and DG Energy and Transport

**Hydrogen and fuel cells**

**CO2 capture and storage  
technologies for zero  
emission power generation**

**Renewable  
electricity  
generation**

**Clean coal  
technologies**

**Renewable  
fuel production**

**Smart energy  
networks**

**Renewables  
for heating and cooling**

**Energy savings  
and energy efficiency**

**Knowledge for energy policy making**



## **1<sup>st</sup> Call (2007): focus on capture**

- ✓ Advanced capture techniques
- ✓ Support to regulatory activities for CCS
- ✓ EC funding 17.4 M€

## **2<sup>nd</sup> Call (2008): focus on storage**

- ✓ Storage capacity emerging economies
- ✓ Transport infrastructure
- ✓ Public acceptance
- ✓ Qualification of deep saline aquifers
- ✓ EC funding likely to be upwards of 10 M€

## **3<sup>rd</sup> Call (2009) (23 m€) 1<sup>st</sup> stage evaluation Jan 2009**

- ✓ Advanced capture technologies
- ✓ Storage safety
- ✓ Transport infrastructure



# The ZEP Technology Platform



- The EC facilitated the establishment of ZEP, launched in December 2005 by variety of stakeholders from RTD, Industry , NGO's
- **The ZEP Vision: to enable European fossil fuel power plants to have “zero CO2 emissions” by 2020 using CCS**
- Strategic Research Agenda (SRA) and Strategic Deployment Document (SDD) endorsed at 1<sup>st</sup> GA, September 2006.
  - Recommended to urgently implement large scale CCS demonstration in the EU.
- The CCS Demo programme (EU Flagship Programme) was launched at 2<sup>nd</sup> GA in October 2007
- The ZEP platform delivered on 3<sup>rd</sup> GA on 10 November 2008 what is the optimum portfolio of demonstration projects (McKinsey Study) needed in the EU Flagship Programme to give confidence in CCS technology



# Towards early demonstration

## A European Industrial Initiative within the SET Plan

### *Objectives*

- ✓ ***Making CCS commercially feasible***
  - *in an ETS driven system*
  - *A set of full-scale demonstration projects*
  - *a wide range of CCS technologies*
  - *EU-wide*
  - *proving technical and commercial viability*
- ✓ ***Prepare the way for fully commercial implementation by:***
  - *advancing the performance of current CCS technologies,*
  - *extend their use to other energy intensive industries,*
  - *develop next generation of low energy penalty and low cost CCS technologies*





# How do we plan to do that?

- **Development of the regulatory framework – CO2 Storage Directive**
- **Launch of the European Industrial Initiative on CCS as soon as possible**
  - ✓ **By an industry-led network of demonstration plants, which develops a joint program of activities, knowledge sharing and R&D**
  - ✓ **By a cohesive public research programme on CCS, bringing together MS research programmes, CCS activities of EERA, major EU infrastructures on CCS, and FP**
- **Important sources of public money have been secured under the ETS; Recovery Package proposes €1250 M for CCS demo plants.**
- **A facilitator and coordinator (DNV) of the network of CCS demo projects kicked-off in Feb. 2009**
- **Workshops of EERA on CCS research aspects**
- **A workshop with MS and financial institutions to develop concept & financial modalities of the initiative – Mar. 2009**



# International cooperation Mechanisms in FP7

- o “**Opening**” of all activities and topics to international cooperation
- o **Specific International Cooperation Actions (SICA)** with targeted ICPC
- o Other important Specific Mechanisms
  - **Twinning** of existing or new projects (information exchange)
  - **Coordinated** Call (topics jointly defined)



# International Cooperation

- ✓ ***The International Energy Agency (IEA)***
  - Participation in *Greenhouse Gas Implementing Agreement*.
  - Participation in the *Clean Coal Implementing Agreement*.
  - Participation in *IEA Working Party on Fossil Fuels*
  
- ✓ ***EC is a member of the Carbon Sequestration Leadership Forum (CSLF)***
  
- ✓ ***EC Bilateral cooperation with :***
  - ***US (DoE Technical Visit to the EU 13-17 October 2008)***
  - ***Japan (CCS Workshop, Japan, March 2009)***
  - ***Australia (EC participation to the preparation of the Global CCS Institute)***
  - ***South Africa (in progress to identify areas of cooperation)***
  - ***India (Clean Coal and CCS Workshop 26-27 November 2008)***
  - ***OPEC (CCS Workshop in Brussels 31 October 2008)***
  - ***China (MoU with on Near Zero Emission Coal Power Generation)***



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# EU and China Partnership on Climate Change

## EU-China MoU on NZEC

**20 Feb 2006** Signature of the EU-China MoU in Shanghai

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*EU-China Cooperation foresees three phases :*

**Phase 1:** *Exploring the feasibility and options for NZEC technology in China through CCS;*

**Phase 2:** *Defining and designing a demonstration project;*

**Phase 3:** *Construction and operation of a demonstration project."*

*The EU-China MoU focus on PHASE 1 .  
interface with the UK-China MoU on NZEC*



## ➤ *2006-2009 Objectives*

- Assessment of the potential for CCS in China and opportunities for demonstration and deployment of CCS.
- Development of knowledge, expertise and experience on CCS in China
- Review of costs, socio-economics , regulatory requirements of NZEC
- Identify the options for financing the research and demonstration of CCS
- Identify and prepare appropriate structures and instruments to establish co-operation for the following phases



# EU-China MoU on NZEC Phase I - Implementation

➤ **International Workshop on NZEC – Power Generation with CCS in China 4-5 July 2006, Beijing**

➤ **EU-China NZEC Steering Committee**

- **1<sup>st</sup> Meeting, Beijing, China 5 July 2006**
- **2<sup>nd</sup> Meeting, Guangzhou, China 6 March 2008**
- **3<sup>rd</sup> Meeting, Brussels, 23rd March 2009?**

➤ **COACH-NZEC-STRACO2 Joint Meetings**

- **1st Meeting, July 7 2008 , Brussels**
- **2<sup>nd</sup> Meeting, November 4 2008, Brussels**

**Conclusion of Phase I and Joint Workshop, November 2009**

**Phases II and III, Set out a financial vehicle to fund NZEC cooperation with China and related cooperation with other emerging and developing countries:**

**EC Communication on “Financing CCS and other clean carbon technologies in emerging and developing countries”**

EC Funded Projects related to NZEC	Project title	Chinese participants	Total EC funding to China(€)	Total project Cost (€)
<b>CACHET</b>	Carbon Dioxide Capture and Hydrogen Production from Gaseous Fuels	DALIAN INSTITUTE OF CHEMICAL PHYSICS	406.000	13448000
<b>EUGEOCAPACITY</b>	Assessing European Capacity of Geological Storage of Carbon dioxide	TCINGHUA UNIVERSITY	124.500	3.588.000
<b>CAPRICE</b>	CO2 CAPTURE USING AMINE PROCESSES	TCINGHUA UNIVERSITY	25.000	1.140.000
<b>MOVECBM</b>	CO2 storage on enhanced coal bed methane	1) China United Coalbed Methane CO., 2) Research Institute of Petroleum Exploration and Development, PetroChina ,Langfang branch, (RIPED) 3) Institute of Coal Chemistry, Chinese Academy of Sciences	100.000	2.670.000
<b>COACH</b>	Cooperation Action with CCS China-EU	1) ACCA21, 2) SHELL China exploration and production 3) TCINGHUA UNIVERSITY 4) ZHEJIANG UNIVERSITY 5) Inst. of engineering thermo-physics 6) Thermal power research inst, 7) Inst. of geology. & geophysics 8) RIPED 9) GREENGEN	700.000	2.620.000
<b>STRACO2</b>	Support to Regulatory Activities for Carbon Capture and Storage (Focused to China)	1) ACCA21, 2) INSTITUTE FOR POLICY AND MANAGEMENT (Chinese Academy of Sciences) 3) Inst. of Engineering Thermo-physics	100.000	860.000
<b>Total</b>			<b>1.46 M€</b>	



# Phase I - Implementation

## COACH overall objectives



- **Enhance Knowledge sharing and capacity building**
- **Prepare the ground for**
  - a demonstration of CCS in China using coal-based polygeneration schemes including CCS
- **Assessment of CO<sub>2</sub> geological storage potential**
  - hydrocarbon reservoirs (EOR/EGR), deep saline aquifers, coal seams
- **Address cross-cutting issues**
  - Public acceptance
  - legal, regulatory, funding and economic aspects



# EU- China Cooperation

## Further RTD Activities in parallel to Phase I

- (1) Achieve coordination of on-going EU-China RTD projects and other initiatives in order to report consistent results in November 2009.
  - (2) Achieve coherence with other on-going CCS activities in China with US, Australia and Japan. (VDC with US DoE)
  - (3) Examine further options for RTD cooperation with China based on CCS proposals by MoST and the outcome of EU-China CCS Workshop in March 2008.
- Continue to open FP7 Calls for cooperation with China
  - Prepare an EU-China Coordinated Call to be published on 2010 or other actions (SICA's, Twinning) on CCS coupled with Clean Coal.



# In summary

- **Activities under the Framework Programmes have considerably advanced the state of CCS**
- **Stakeholders have played an important role (ETP-ZEP)**
- **We must continue to work with industry, researchers in Member States and developing countries in a joint effort**
- **We must continue our efforts on International Cooperation on CCS.**
- **We need new EU initiatives to achieve EU targets – an instrument such as the EU SET-plan**
- **A European Industrial initiative on CCS under the SET plan will advance EU demonstration on CCS and link to global CCS demonstration**



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# Energy Research Staying informed

❖ Energy Research web site

<http://ec.europa.eu/research/energy>



Seventh Framework Programme-find a call

<http://cordis.europa.eu/fp7/dc/>





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# Thank you for your attention

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