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Joint CASTOR / ENCAP Technical Workshop

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OUTLINE

- × **Rationale**
 - why we do it
- × **How CASTOR and ENCAP fit in the portfolio**
 - the wider context
- × **Energy Research in FP7**
 - what is planned
- × **The Technology Platform
for Zero Emission Fossil Fuel
Power Plants (ZEP)**
 - a strategic item





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1. Rationale

- Why we do it





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- Both CASTOR and ENCAP had technical workshops planned in their respective technical annexes
- The complementarities of the projects requires that a dialogue takes place
- It does make sense to have joint workshops
- These workshops are therefore designed to make the researchers in both projects communicate





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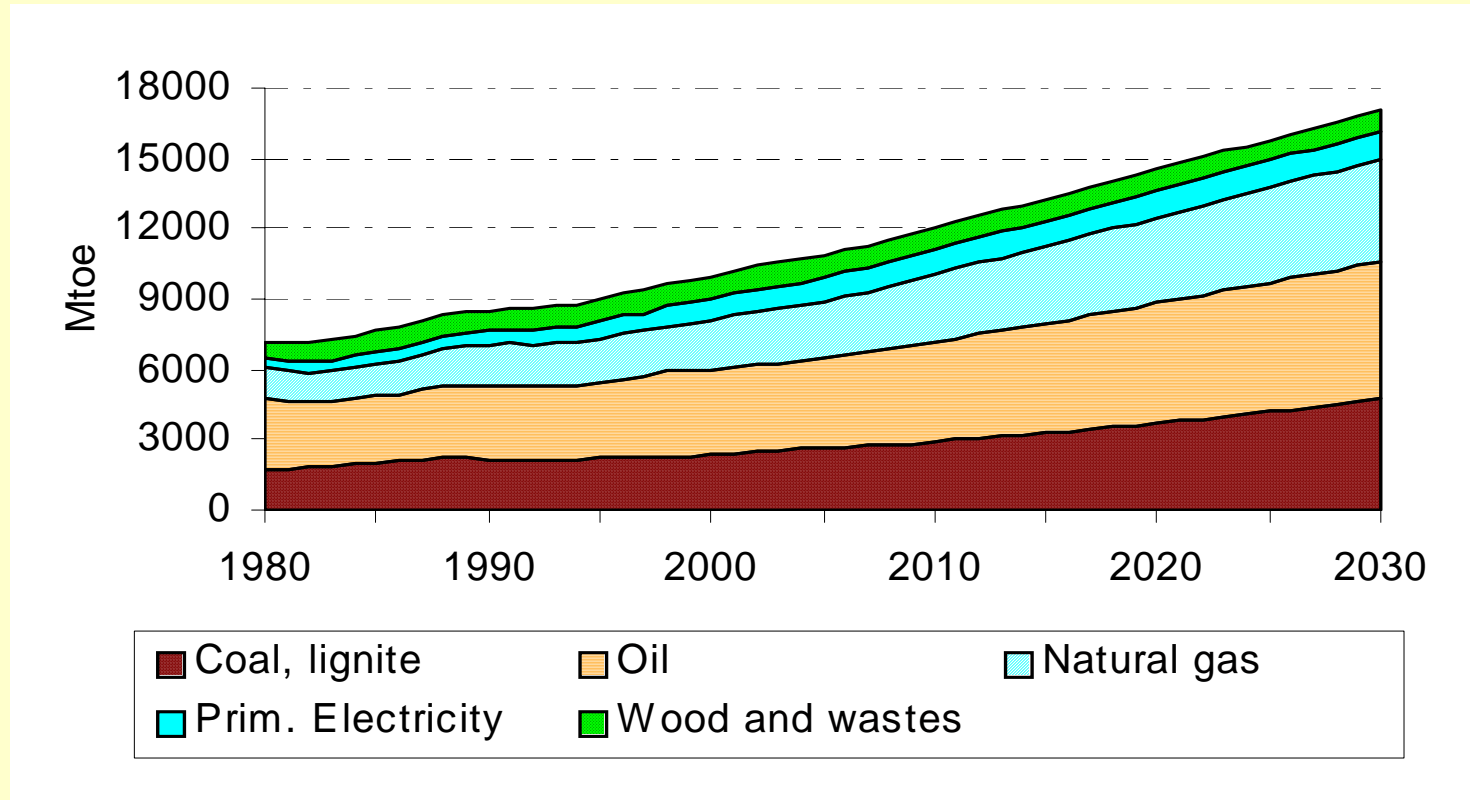
2. How CASTOR and ENCAP fit in the Portfolio

- The wider context





Scenarios and Projections (source : WETO)



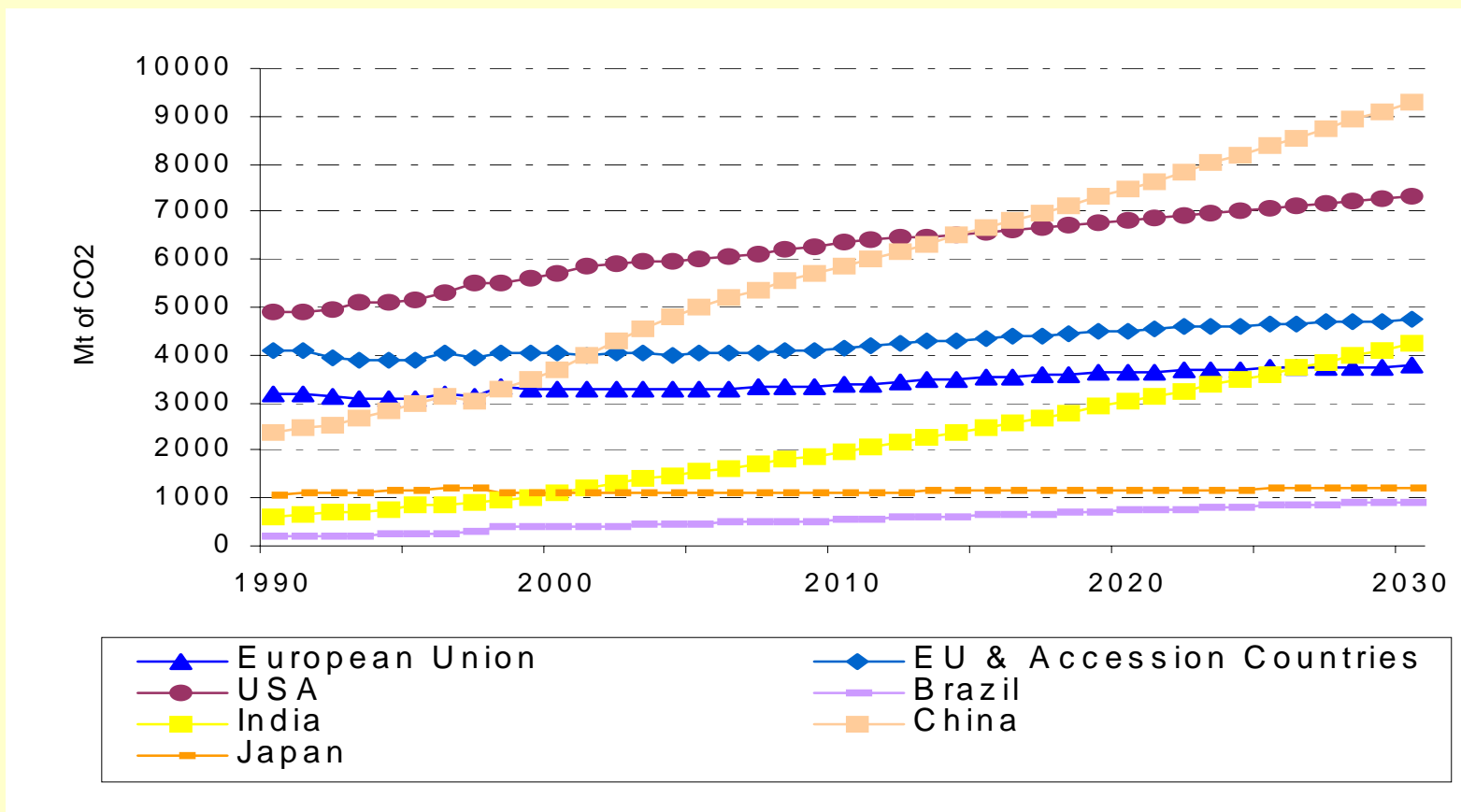
Still 90% fossil fuels by 2030

Coal to play a significant role (large resources, everywhere, unlike oil and gas)

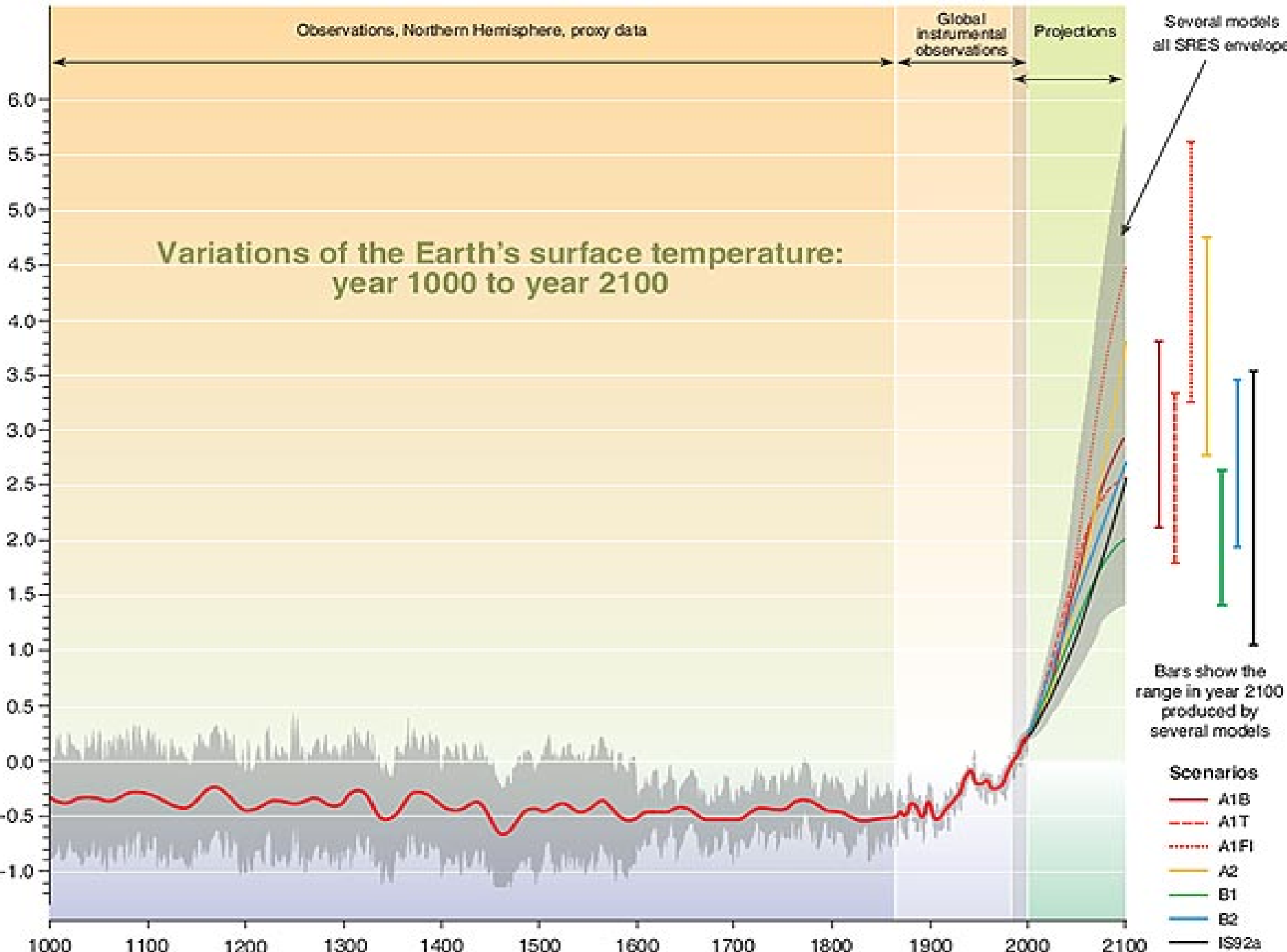




Energy Related CO₂ Emissions (WETO - EC DG RTD)



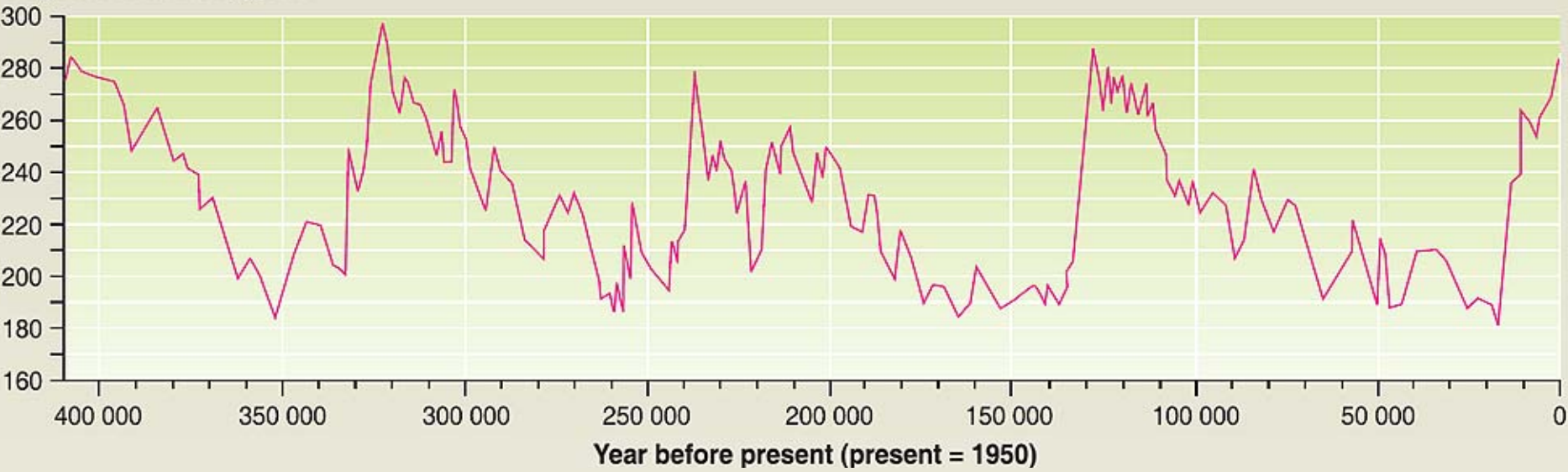
Departures in temperature in °C (from the 1990 value)



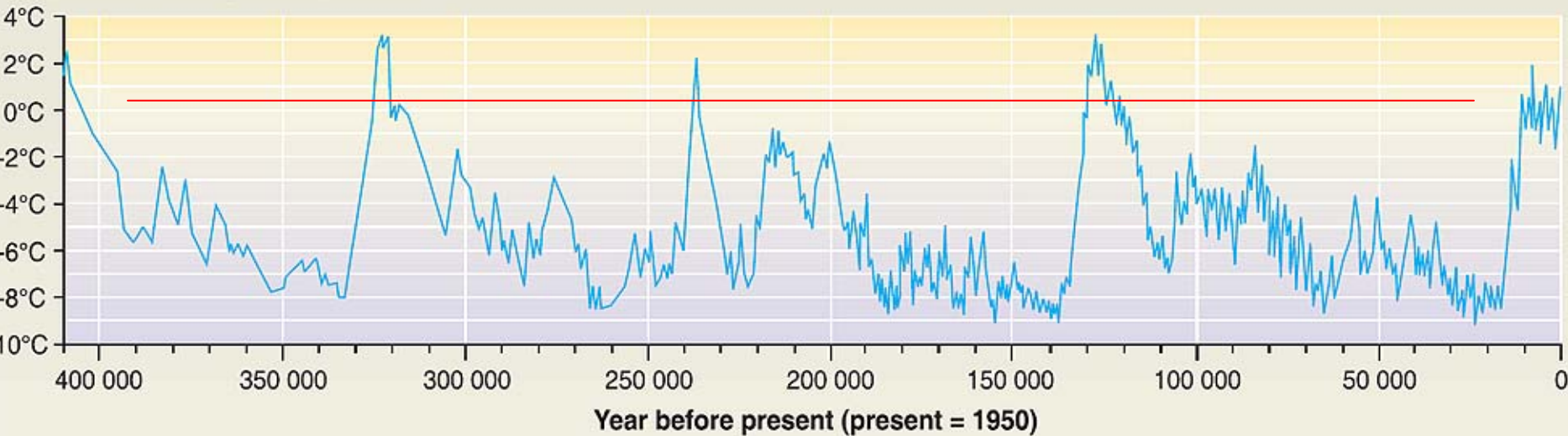
Temperature and CO₂ concentration in the atmosphere over the past 400 000 years (from the Vostok ice core)



CO₂ concentration, ppmv



Temperature change from present, °C





Political Context

- ✗ Kyoto protocol effective further to Russian ratification.
- ✗ EU set to decrease its GHG emission by 8% in 2008-2012 compared to 1990 under the Kyoto Protocol.
- ✗ Burden sharing agreement between Member States.
 - ✓ Providing differentiated objectives taking the situation of individual member states into account
- ✗ On track so far, but target could be missed in business as usual scenario.
 - ✓ Projections indicate that additional measures are required if the EU15 wants to achieve its goal, like buying emission permits from the new member states and developing countries (Flexible Mechanisms)
- ✗ Outcome of COP-11 / MOP1 (Montreal Dec. 2005) The EU has asserted international leadership in the fight against climate change:
 - Two tracks of official dialogue to prepare for Post 2010 negotiations
 - 1) The Convention Track including all Parties (includes also United States and Australia)
 - 2) The Kyoto track (CDM, JI to be strengthened)





Political Context

- ✗ **Renewable Energy Sources and Energy Efficiency** are recognised as Technological options for reducing emissions
 - ✓ **Green Paper on Energy Efficiency or *Doing More With Less*** (EC publication Jun 2005).
Main Message : "Europe could save 20% of its energy by 2020"
- ✗ **The new Green Paper "Secure, Competitive and Sustainable Energy for Europe"** adopted in March
- ✗ **European Climate Change Programme (ECCP)** has identified most promising and cheapest routes.
 - ✓ **Second phase has started and includes exploring the potential of carbon capture and storage**
- ✗ **EU Greenhouse Gas Trading Directive** – trading started Jan 05
 - ✓ **The first ever large regional market**
 - ✓ **Prices in 2005 in the region of 30 €/ton**
- ✗ **"Linking" directive transferring CDM and JI credits into the EU GHG trading directive**
- ✗ **Commission Communication on a "Post-Kyoto" strategy**
 - ✓ **Clearly recognizes the role of technology**



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 generation and adoption of new technology
 - ✓ *Pushing technological change:* Invest in knowledge economy (Research) to give EU a competitive edge in a low carbon future
- ✘ **Adaptation Challenge**





A Priority in Long Term Energy R&D in FP6 (2002-2006)

- × ***Capture and sequestration of CO₂, associated with cleaner fossil fuel plants.***
 - ✓ ***Targets: reduce the cost of CO₂ capture from 50-60 € to 20-30 € per tonne of CO₂ captured, whilst aiming at achieving capture rates above 90%, and assess the reliability and long term stability of sequestration.***



on-going projects – first half of FP6

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	10.7	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 gasification	1.9	Univ. of Stuttgart	36	1/1/04	14	7



FP6 Third call –Dec. 2004 – New Projects (starting now)

- **CO₂ capture and hydrogen production from gaseous fuels (IP)**
CACHET (7.5 m€ - coordinator BP)
- **The monitoring and verification of CO₂ geological storage (IP)**
CO₂REMOVE (8 m€ - coordinator TNO)
- **Preparing for large scale H₂ production from decarbonised fossil fuels including CO₂ geological storage (IP) (HYPOGEN PHASE1)**
DYNAMIS (4 m€ - coordinator SINTEF)
- **Advanced separation techniques (4 STREPs)**
CLC GAS POWER, C3-Capture, DeSANNs, HY2SEPS (7.6 m€ for the 4)
- **Mapping geological CO₂ storage potential matching sources and sinks (STREP)**
EU GeoCapacity (1.9 m€ - coordinator GEUS)

**ABOUT 70m€ COMMITTED UNDER FP6
– FOR A TOTAL RTD EFFORT OF ABOUT 140m€**



× The DYNAMIS project

- ✓ DYNAMIS responds to the target of "***Preparing for large scale H₂ production from decarbonised fossil fuels including CO₂ geological storage***". The main objective is to prepare the ground for large scale European facilities producing hydrogen and electricity from fossil fuels with CO₂ capture and geological storage. 30 legal entities have established DYNAMIS, encompassing 5 European fossil fuel end users, 3 fossil fuel producers, 6 technology providers, 1 engineering- and 1 financing group together with 14 RTD providers.

Coordinator : SINTEF (NO), budget 7.5 m€, EU-funding 4 m€, duration 3 years, started 1st March 2006.





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3. Energy Research in FP7

-What we are planning to do





WHAT'S NEW in FP7

(as proposed by the Commission)

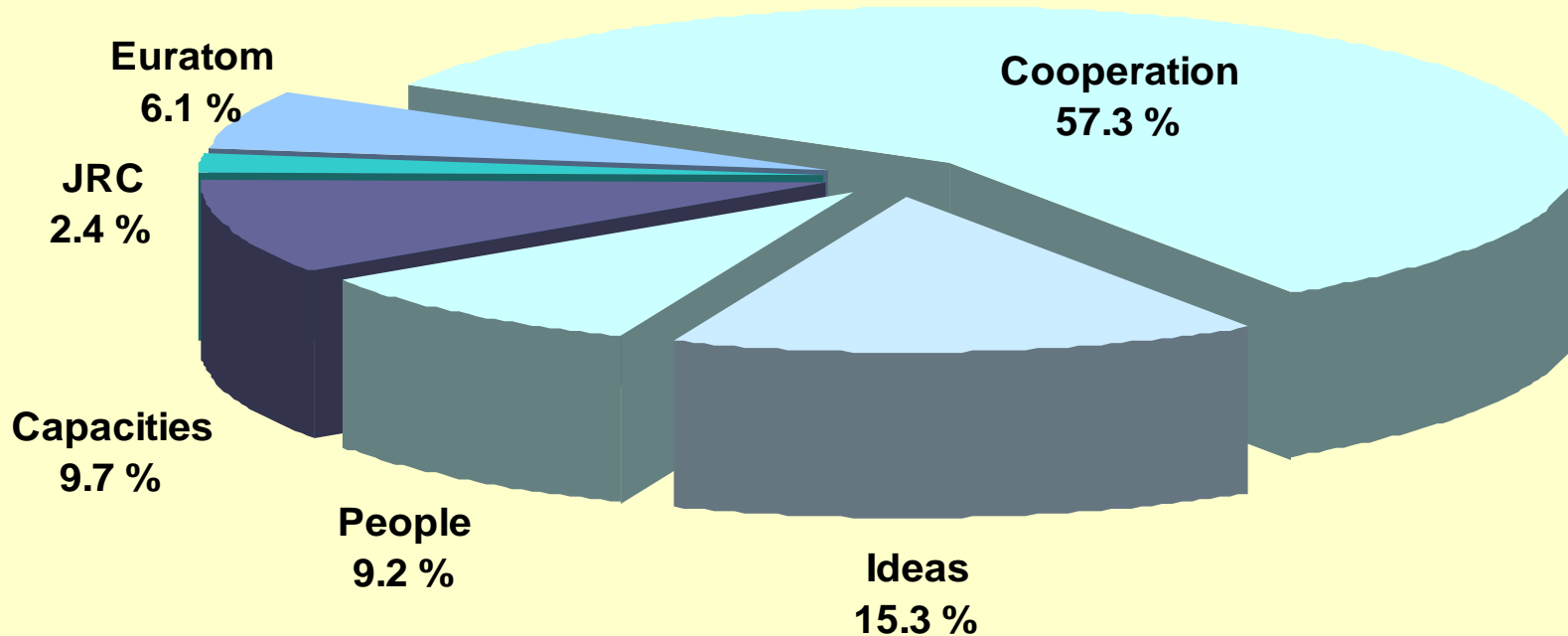
- Overall Budget increased by 2013: 75+ more than in 2006
- Emphasis on **RTD themes** rather than on “instruments” – **Continuity**.
- Significant **simplification** of its operation
- Focus on developing research that meets the needs of European industry, through the work of **Technology Platforms** and the new **Joint Technology Initiatives**
- Basic research - Establishment of a **European Research Council**
- Other new topics: Research Infrastructures, Regions of Knowledge, Risk-Sharing Facility (EIB).
- Programme length: **7 years**

(New proposal of the Commission
to follow the agreement on financial perspectives)





Seventh Framework Programme Commission proposal (7 years)



Simplified timetable

- × FP7 proposal of the Commission – April 2005
- × FP7 adopted by Council and Parliament – summer 2006
- × First calls for proposals – late 2006





FP7 (2007-2013)

'Cooperation' proposed budget breakdown per theme

Theme	Budget Breakdown (% of total)
1. Health	18.7
2. Biotechnology, food and agriculture	5.5
3. Information society	28.5
4. Nanotechnologies, materials and production	10.9
5. Energy	6.6
6. Environment	5.7
7. Transport	13.4
8. Socio-economic research	1.8
9. Security and space	8.9





OBJECTIVE

Transforming the current fossil-fuel based (carbon intensive) energy system into a more **sustainable** (low carbon) one based on a diverse portfolio of energy sources and carriers combined with enhanced energy efficiency, to address the pressing challenges of **security of supply** and **climate change**, whilst increasing the **competitiveness** of European industries.





FP7 – Proposed Priority Topics in Energy

Hydrogen and fuel cells

Energy savings and energy efficiency

Renewable electricity generation

CO2 capture and storage technologies for zero emission power generation

Renewable fuel production

Clean coal technologies

Renewables for heating and cooling

Smart energy networks

Knowledge for energy policy making





Clean Power Generation 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 technologies

- ✓ **Zero Emission Power Plants** mentioned as a possible topic for a future JTI





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4. The Technology Platform for Zero Emission Fossil Fuels Power Plants (ZEP)

- A Strategic Item





Technology Platform ZEP: Set Up and Vision

✗ EU Clean Fossil Power Initiative

- ✓ Aiming for critical mass programme
- ✓ Established European Technology Platform with EC
- ✓ Primary task to set technology agenda and deployment plan
- ✓ Major input to EC FP7 (2006-2013)

✗ ETP “Zero Emission Fossil Fuel Power Plants”

- ✓ Advisory Council formed 21 Jun 05 comprising senior individuals from :-
 - **6 Generators** : EoN, Endesa, ENEL, RWE, Vattenfall, Energie E2
 - **6 Equipment suppliers** : Ansaldo, ALSTOM, Air Liquide, Foster Wheeler, Mitsui Babcock, Siemens
 - **5 Oil/Gas** : BP, Shell, Statoil, Total, Schlumberger
 - **4 Researchers** : BGS, CIRCE, IFP, Polish CMI
 - **3 NGOs** : Bellona, CAN Europe, WWF

Chair : Haege/Vattenfall

Vice Chairs : Appert/IFP
Hill/BP
Soothill/ALSTOM
Valero/CIRCE



Technology Platform ZEP: Organisational Structure

Vision Statement
To enable European fossil fuel power plants to have zero emission of CO₂ by 2020

Mirror Group of Member States

Advisory Council

Coordination Group

Secretariat

Plants & CO₂-Capture

CO₂-Use & Storage

Infrastructure & Environment

Market, Regulation & Policy

Communication & Public Acceptance

Strategic Research Agenda (SRA)

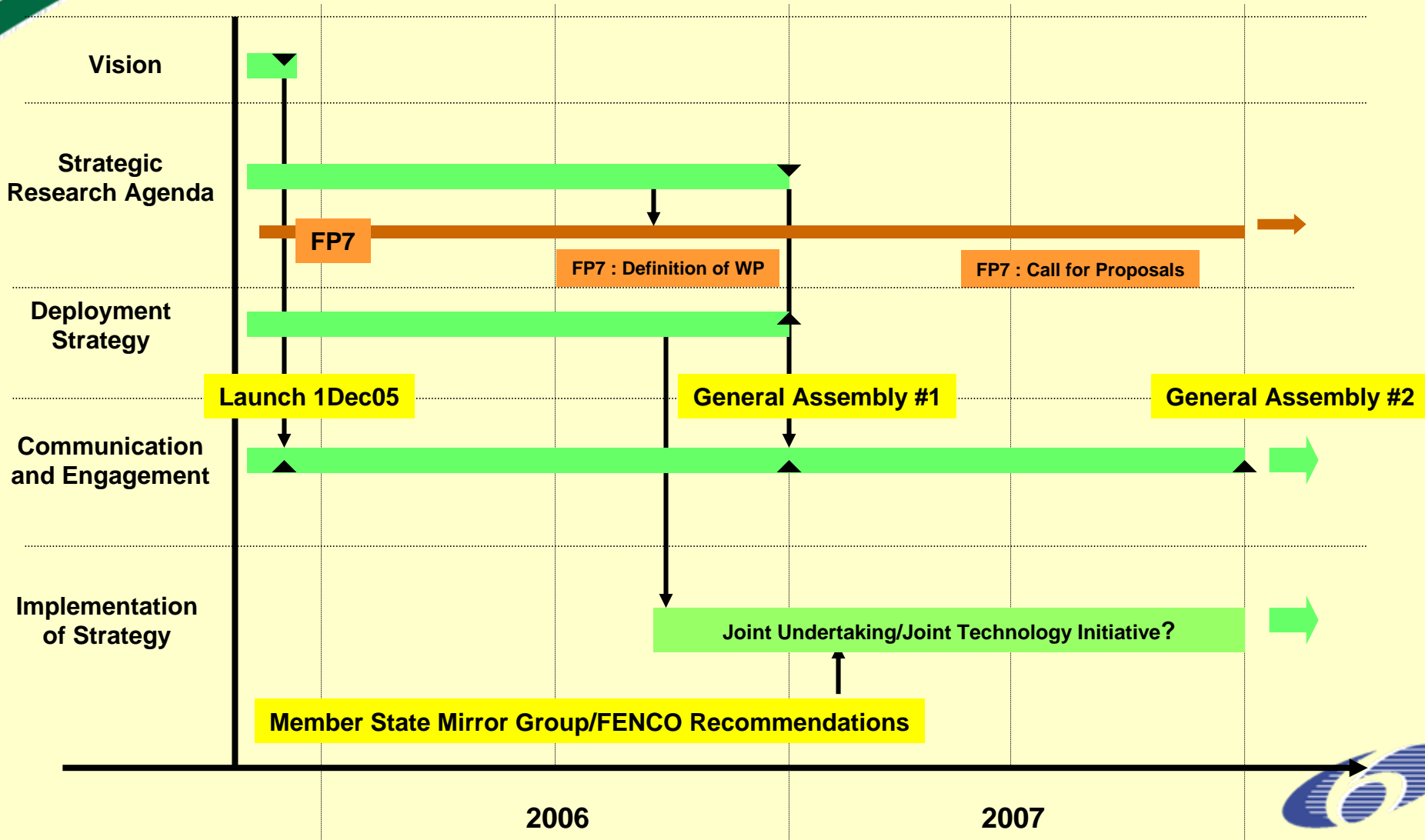
Deployment Strategy (DS)





ZEP ETP Action Plan : High Level 2-Year Milestones and Timing

Key Tasks





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Thank you for your attention !
I wish you all a fruitful workshop.
Questions ?

