



ENCAP—CASTOR Joint Training Seminar / Workshop

A Training Seminar - Workshop, organized in common by ENCAP and CASTOR Project partners, is scheduled to take place on 16th March 2006 at Hotel LEGOLAND, Billund, Denmark.

Issues related to CO₂ pre- and post-combustion capture and CO₂ storage will be covered.

The status on CO₂ pre- and post-capture technologies outside the EU (e.g. in USA and Japan), will be also presented.

Experts from Research Centres, Industry, Manufacturers, Universities will be invited. Furthermore,

Governmental and EC officers related to Environment and Climate Change will be also invited.

Participation in the event is free of charge.

More information about the event (such as the Agenda,

the Official Invitation, the Registration Form and the Hotel Booking Form) is available on request in the following e-mail: is-fta@techp.demokritos.gr, fax: +30 210 6527539, or in Project's website: <http://www.encapco2.org/>.



**Check the date !!!
ENCAP—CASTOR
Training Seminar -Workshop**

ENCAP Highlights

“TOTAL France” Entering ENCAP Project as a “Funder”.....

TOTAL is a multinational energy company committed to leveraging innovation and initiative to provide a sustainable response to humankind's energy requirements.

The world's fourth-largest oil and gas company and a world-class chemicals

manufacturer, TOTAL operates in more than 130 countries and has over 111,000 employees.

The company is strategically dedicated to meeting the challenges faced by all its businesses when developing natural resources, protecting the environment, integrating its operations into host country cultures, and dialoguing with civil society.

TOTAL France expressed its wish to support the ENCAP Project during its duration, and in consideration of such support, to take part in the further execution of the Project and obtain certain rights to use the Deliverables arising from the Project.

Project Partners as well as the European Commission have agreed on this act, and the agreement has been officially signed and put into force.



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Special points of interest:

- ENCAP Training Seminar - Workshop to be organized on March 16th, 2006
- Highlights within the ENCAP Project

SP1: Process and Power Systems

Within SP1, a common basis for concept and technology evaluation has been established. This includes the definition and the provision of five reference power plants - without CO₂ capture - fired with natural gas, bituminous coal and lignite, and opportunity fuels (residue oil). The five selected reference cases are:

- Natural gas-fired 393 MWe gross Combined Cycle Gas Turbine
- Bituminous/pet coke-fired 445 MWe gross Circulating Fluidised Bed
- Bituminous-fired 600 MWe gross pf
- Lignite-fired 1000 MWe gross pf

- Lignite-fired 380 MWe gross pf

These cases will be used as reference with common boundaries and a common basis for economic evaluations - including quality requirements pertaining to the captured CO₂ in terms of transportation and storage. More specifically three CO₂ quality requirement scenarios have been selected:

a) Design case. Pipeline transport and geologic storage.

This requirement scenario is based on CO₂ transport in pipelines at 100 – 150 bar and temperatures down to 0°C followed by storing the CO₂ in geologic formations.

b) EOR case. Pipeline transport and EOR. Conservative water content requirement.

This requirement scenario is based on CO₂ transport in pipelines at 100 – 150 bar and temperatures down to 0°C followed by storing CO₂ combined with EOR.

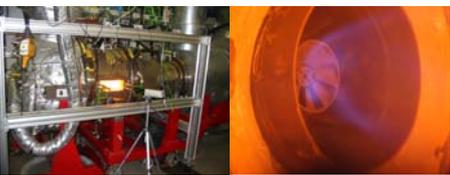
c) Severe limit case. Ship transport and EOR combined with strict limit values for toxics.

This requirement scenario is based on CO₂ transport using future larger ships at 6 - 7 bar and temperatures down to -50°C followed by storing the CO₂ combined with EOR.

SP2: Pre-Combustion Decarbonisation Technologies

SP2's scope is to investigate candidate pre-combustion decarbonisation processes with reference to:

1. the Integrated Gasification Combined Cycle (IGCC) for hard coal and lignite, and



H-rich fuels combustion test rig

2. the Integrated Reforming Combined Cycle (IRCC) for natural gas - with corresponding adaptations

Basic results for the time being in ENCAP SP2 deal with the definition and

analysis of various plant concepts integrated with efficient CO₂ capture technologies. Different intermediate gas processing steps have been selected and the way of their integration into power plant concepts has been determined. Preliminary results on the analysis of these concepts are shown below.

Key element of the successful implementation of abovementioned concepts is the development of gas turbine burners capable of combusting H₂ – rich fuels. This topic is thoroughly investigated within SP2 and experiments on existing burner

Preliminary Key Figures for ZEIGCC Concepts

	Shell IGCC (hard coal)		HTW IGCC (lignite)		IRCC (natural gas)	
	no CO ₂ capture	With CO ₂ capture	no CO ₂ capture	With CO ₂ capture	no CO ₂ capture	With CO ₂ capture
Net efficiency (LHV %)	46.4	35.9	51.7	40.4	-	41
CO ₂ emissions (kg/MWh _{th})	756	88	796	152	-	37
Carbon capture rate (%)	-	>91	-	85	-	>91

design have successfully completed showing that basic burner concepts are suitable platforms for further burner development work for H₂-rich fuels.

ENCAP's Annual Review — European Commission's Comments:
"The contract should be continued with no or minor changes." ...

SP3: OxyFuel Boiler Technologies

The objectives of the work in SP3 is to develop and validate oxyfuel combustion based power plants concepts for bituminous coal and lignite for a greenfield plant based on PF and CFB combustion technology. During the past 12-month period, conceptual designs for four oxyfuel power plants have been made. The integration of the different process components have been studied with the objective of optimising the plants' efficiency while still keeping in mind the expected availability of the plant. Investment costs have been estimated and the

technical and economical performance of the plants are compared with a relevant reference plant.

Another important part of SP3 is the experimental investigations in laboratory scale related to the combustion process. Combustion experiments have been performed in a 100kW rig at Chalmers and in a 10kW rig at University of Stuttgart. CFB combustion experiments have been also performed at University of Mulhouse. The results give an indication of the changes to be expected regarding temperature distribution, heat transfer and emissions from the boiler. The "Oxyfuel boiler technology" subproject has

nominated two candidates for pilot testing in phase 2:

- A 30 MW_{th} power plant, based on the ENCAP oxyfuel PF concepts, in which crucial technical oxyfuel related issues will be tested. The pilot plant will be erected next to the Schwarze Pumpe power station in Germany.
 - A 1 MW_{th} oxyfuel CFB plant, to be constructed through modifications to the existing CFB test plant in France.
- The decision on which of the candidates will be included in phase 2 of the ENCAP project will be taken during spring 2006.

Contacts

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Annual Review of ENCAP's first year

The first EC Review of ENCAP took place in May 2005. The EC review report was mainly very positive and the Commission concluded that the ENCAP project should be continued with no or minor changes.

1st Technical Seminar, Brussels, October 5th, 2005

In October 2005 the Project Management Team organised the first Technical Seminar. Over 50 participants were present in Brussels. The objective of the Seminar was to enable more detailed technical discussions within the ENCAP project. Results from all SPs were presented and interesting and fruitful discussions related to both achievements and preliminary results followed. During the same week the ENCAP Technical Advisory Committee (ETAC) was constituted. ETAC is intended to support the Executive Board and has already contributed both in the selection of technology in SP5 and in the selection of technology for the Large Scale Testing.

Information on Upcoming Events related to power generation with CO₂ capture

- ◆ **CSLF Meeting of Policy and Technical Groups, 3-5 April 2006, New Delhi, India**
- ◆ **5th Annual Conference on Carbon Capture & Sequestration (with Technology Exhibit), US Dept of Energy, the National Energy Technology Laboratory, May 8 - 11, 2006, Hilton Alexandria Mark Center, Alexandria, VA, US**
- ◆ **19th FBC Conference (with the IEA-FBC Conference to be held closely before it), Vienna University of Technology, 21 - 24 May, 2006, Vienna, Austria**
- ◆ **8th International Conference on Greenhouse Gas Control Technologies GHGT-8, NTNU – SINTEF, 19 - 22 June 2006, Trondheim, Norway**
- ◆ **6th European Conference on Coal Research and its Applications, Coal Research Forum, September 5 - 7, 2006, University of Kent, Canterbury, Kent, UK**

More info about the events can be found in www.encapco2.org/news/events.html

Project Partners

