

# PETROLEUM GEOLOGISCHE KRING



## KONINKLIJK NEDERLANDS GEOLOGISCH MIJNBOUWKUNDIG GENOOTSCHAP **PGK**

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<b>Venue:</b>	PGK's monthly meetings are held at the KIVI building, Prinsessegracht 23, Den Haag. Drinks are served from 17:00 hrs; the lecture starts at 18:00hrs.		<a href="http://www.pgknet.nl">www.pgknet.nl</a>
<b>Membership:</b>	Apply for membership by contacting the secretariat. The annual fee is €15.-		
<b>Accounts:</b>	Fortis Bank: 88.65.82.733 (PGK, Den Haag)		

## JUNE 2010 NEWSLETTER

### **MONDAY, 21<sup>st</sup> JUNE: Joint PGK-SPE-DPS event, with the annual BBQ**

- 17:00-18:00 hrs: Social hour  
18:00-19:00 hrs: Lectures by:  
Christiaan Luca (Shell CO<sub>2</sub> Solutions.) and J. Brouwer (CATO-2)  
on  
"CO<sub>2</sub> Storage in the Netherlands, plan and practice"  
*Abstracts on separate pages*
- 19:00-end: Annual BBQ, see below for details.

The June meeting takes place at the **Carlton Beach Hotel, in Gevers Deynootweg 201, 2586 HZ Scheveningen, The Hague** ([www.carlton.nl/beach](http://www.carlton.nl/beach)). See also PGK webpage for route description.

**Registration:** Please register for the event **before Friday 18<sup>th</sup> of June (12:00hrs)** by sending an e-mail to Wouter Botermans ([Wouter.Botermans@taqaglobal.com](mailto:Wouter.Botermans@taqaglobal.com)). In case you do not have access to e-mail call the PGK secretary (number in newsletter header).

The costs for the social hour and the BBQ are **30EUR**. Registration will be taken as a firm commitment, so you will be billed. You can pay cash on site before the social hour. Fish and vegetarian options are available for the BBQ.

**NEXT MEETING:** Wednesday, 15<sup>th</sup> of September. Lecture by Bram van der Kooij (Shell) on "Carbonate Shelf Margin: outcrop study in Northern Spain"

### **NEW MEMBERS**

Applications for membership have been received from Xiangmin Zhang (PanTerra). If no objections are received prior to or during the next meeting, he will be admitted as member of our society.



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## **PGK EXCURSION: 14-17 OCTOBER 2010 DENMARK**

### **Upper Oligocene to Lower Miocene Eridanos delta sediments in Denmark**

The Upper Oligocene to Lower Miocene succession that crops out in the Lillebælt and Vejle Fjord area, east Jylland, shows exceptionally detailed sedimentary structures and demonstrates clear facies changes within a shallow marine and back barrier depositional environment. In addition, high quality seismic data from the same area illustrates the development of a wave-dominated delta and how to predict thick reservoir sands. The major surfaces and boundaries can be correlated into the North Sea Basin and thereby form a perfect analogue for the study of reservoirs encountered in the North Sea Basin.

The Upper Oligocene – Lower Miocene succession in Denmark is of interest to exploration geologists, to those working with seismic data, log-correlation and detailed sedimentology, and to reservoir geologists.

Why attend the excursion to east Jylland?

- Opportunity to study reservoir-analogues for the shallow gasfields in the northern Netherlands offshore area
- Reservoir prediction in wave-dominated deltas
- Principles of classic sequence stratigraphy
- Prediction of porous reservoir rocks
- Timing and tilting of the North Sea Basin - burial history and migration of hydrocarbons

Our excursion-leader will be Dr. Erik Rasmussen from the Danish Geological Survey (GEUS). He has >20 years experience in the area; especially regarding the Cenozoic delta system and published many papers on the subject. He will emphasize the link between the outcrops and subsurface data. Frans Bianchi will drive a comfortable bus.

**More details soon via e-mail from Henk Kombrink (our PGK excursion coordinator).**

**AAPG Distinguished Lecture 2009-2010:** Guy Plint: “The Evolution of a Cenomanian Delta Complex in the Western Canada Foreland Basin: Paleogeographic and Stratigraphic Responses to Tectonic and Eustatic Forcing”  
(for CV and abstract see separate attachment)

**Date: 7<sup>th</sup> of June 2010, 14:00-15:00hrs**

**Venue:** Shell Office (Shell International E&P B.V. Kessler Park 1, 2288 GS Rijswijk)

**Registration:** please register before the 6<sup>th</sup> of June with Uwe Baaske (uwe.baaske@shell.com; Phone: 070 447 2720) or Herman Darman (herman.darman@shell.com; Phone: 070 447 5340). Registration is necessary in order to arrange for visitor passes upfront.

# PETROLEUM GEOLOGISCHE KRING



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Monthly meeting: **MONDAY 21<sup>st</sup> June 2010**  
Address: **CARLTON BEACH HOTEL**, in Gevers Deynootweg 201, 2586 HZ  
Scheveningen, The Hague ([www.carlton.nl/beach](http://www.carlton.nl/beach)).  
Social hour: Between 17:00 and 18:00 hrs  
Lecture: 18:00-19:00  
Annual BBQ: 19:00-end

## Lectures on the theme

**“CO<sub>2</sub> STORAGE IN THE NETHERLANDS, PLAN AND PRACTICE”**

By

**Christiaan Luca**

(Shell Sustainable Development and CO<sub>2</sub> Solutions)

**The Barendrecht CO<sub>2</sub> storage project –  
Objectives, technical challenges, safety, project scope and public acceptance**

And

**J. Brouwer**

(CATO-2)

**“CO<sub>2</sub> Storage in the Netherlands (CATO-2)”**

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### **The Barendrecht CO<sub>2</sub> storage project – Objectives, technical challenges, safety, project scope and public acceptance**

By Ir. R.F. Bisschop & Christaan Luca

(Shell CO<sub>2</sub> Storage B.V., Shell Sustainable Development and CO<sub>2</sub> Solutions)

The Barendrecht CO<sub>2</sub> storage project aims to permanently store pure CO<sub>2</sub> from the Shell Nederland Raffinaderij at Pernis in two depleted gasfields Barendrecht (phase 1, three years injection, 1700 meter depth) and Barendrecht-Ziedewij (phase 2, 25 yrs injection, 2700 meter depth). The project will result in a reduction of CO<sub>2</sub> emissions by the refinery with some 0.4 million tonnes per year. The current CO<sub>2</sub> emission by the refinery is about 4.5 million tonnes per year. In total 10 million tonnes of CO<sub>2</sub> will be stored. The surface facilities required for the project comprise of 2 compressor stations, a 20 kilometer long pipeline and several injection- and monitoringwells (currently gas wells, re-used for the project).

In 2008, the ministry of VROM launched a tender for CCS projects in the Netherlands. End 2008, the Ministry of VROM granted a financial Government contribution to Shell for the Barendrecht CO<sub>2</sub> storage project. End April 2009 the independent EIA (MER) committee concluded that the EIA (MER) of the Barendrecht CO<sub>2</sub> storage project provided sufficient information to enable concession of permits and to conclude that the project meets the strict safety standards applicable. In June 2009 the Municipality of Barendrecht voted against CO<sub>2</sub> storage in Barendrecht. On the 18th of November 2009 the Ministers of Environment and Economic affairs decided that the project could go ahead, based on all information available.

To secure and realize safe storage of CO<sub>2</sub> and to operate the facilities for CO<sub>2</sub> compression, transport and injection safely, a thorough and solid risk analysis has been executed. This analysis has resulted in the execution of various technical studies (using external expertise) on the basis of defined risk scenarios, mitigation measures and definition of the project scope.

The key points of attention for geological CO<sub>2</sub> storage in a depleted gas field are the well integrity, cap rock integrity, injection flow and final storage pressure, geochemical interactions, natural faults and overburden formations and layers. For these points, distinction was made between short and long term scenarios. For surface facilities phase changes of CO<sub>2</sub>, release scenarios and materials are key points of attention.

An extensive monitoring & surveillance plan and protocol have been defined, in order to confirm on a regular basis the safe injection and storage of CO<sub>2</sub>.

Currently the most important challenges for the project exist in the area of public acceptance, legal procedures including permit concession and procedures and long term liabilities.

The Barendrecht CO<sub>2</sub> storage is a demonstration project, that will set the example for future CCS projects, both onshore and offshore.

For more recent background information the project website can be visited:

[www.shell.nl/co2opslag](http://www.shell.nl/co2opslag)



**“CO<sub>2</sub> Storage in the Netherlands (CATO-2)”**

By J. Brouwer (CATO-2)

The International Energy Agency (IEA) projects that energy-related CO<sub>2</sub> emissions may grow by 130% until 2050 in the absence of new policies. This increase will largely be a result of increased fossil fuel usage. The Intergovernmental Panel on Climate Change (IPCC) indicates that such a rise in emissions could lead to a temperature increase in the range of 4-7°C, with major impacts on the environment and human activity.

Various estimates of the economic impact of such a temperature increase have been reported, expected annual economic damage (in the absence of new policies) ranging between US\$20 trillion and US\$25 trillion by 2100.

There is a large consensus that a major decrease in CO<sub>2</sub> emissions is needed by 2050 to limit the expected temperature rise. Only then damages can significantly be eliminated. Meeting this formidable challenge will take an energy technology revolution. The massive changes will involve enhanced energy efficiency, increased renewable energies but also decarbonization of power generation from fossil fuels.

In the power and industrial sectors alone, CCS could contribute nearly one-fifth of the reductions needed to halve back greenhouse gas emissions by 2050, and this at reasonable cost. Most of the major world economies recognize this and have CCS technology development programs designed to achieve commercial deployment.

The Netherlands has committed to a number of small CCS pilots and two large scale demo's. To support these pilots and demo's the CATO-2 R&D consortium has been established. This consortium will execute a 60 MEuro research program over the next 5 years covering the full CCS chain.

The CATO-2 program incorporates over 30 parties from industry and academia and addresses capture, transport, and storage of CO<sub>2</sub> as well as issues related to legislation, safety and public perception.

The paper will give an overview of global CCS activities and subsequently zoom in on those activities executed in and planned for the Netherlands. Focus will be on the R&D perspective in general and the CATO-2 perspective in particular.