



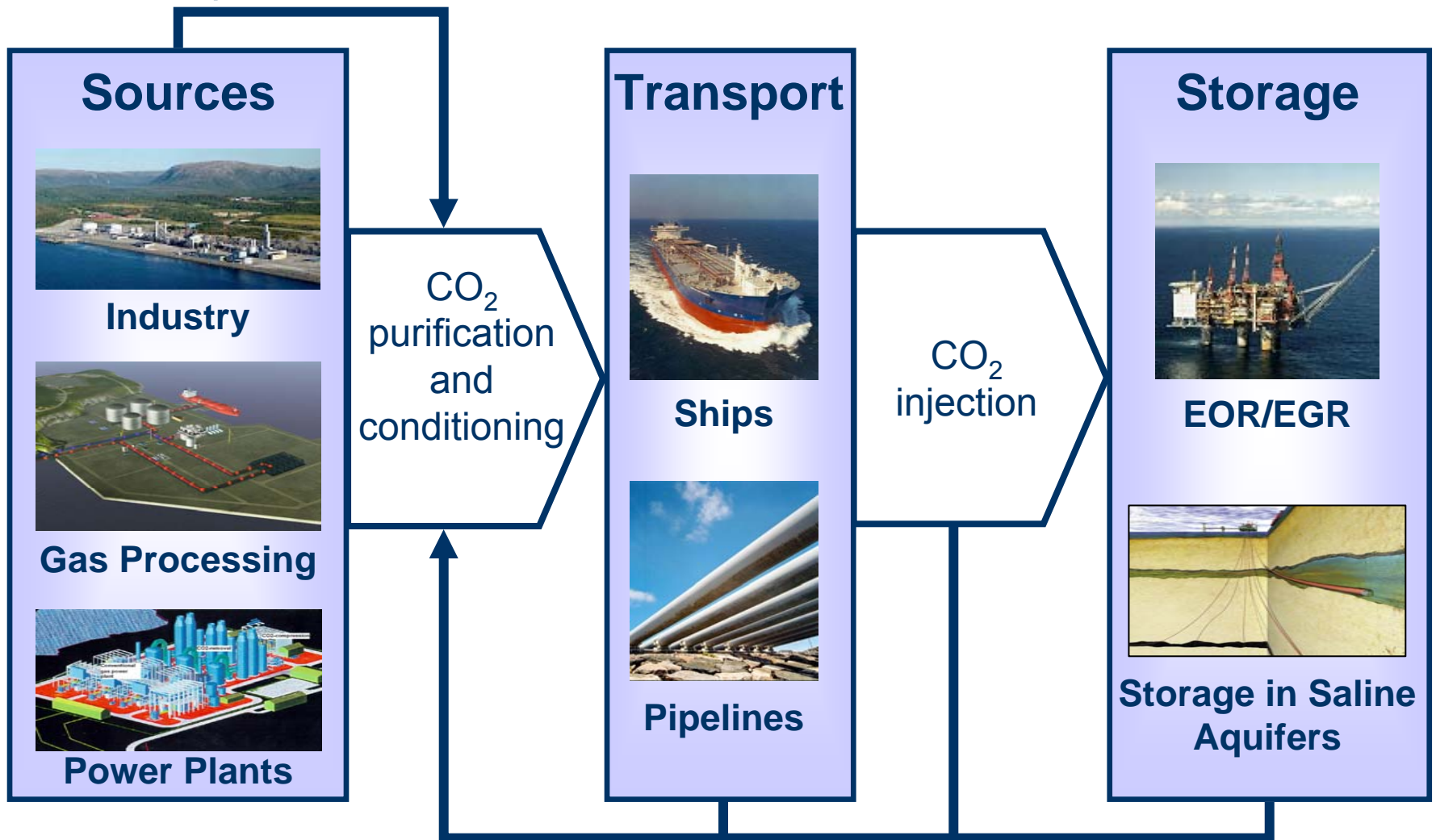
**Når kommer egentlig CO<sub>2</sub> -  
håndteringen?**  
**Mål og retning for dagens aktiviteter**

**SINTEF Seminar 2010-04-27**

**Mona J. MølInvik  
BIGCCS  
SINTEF Energy Research**

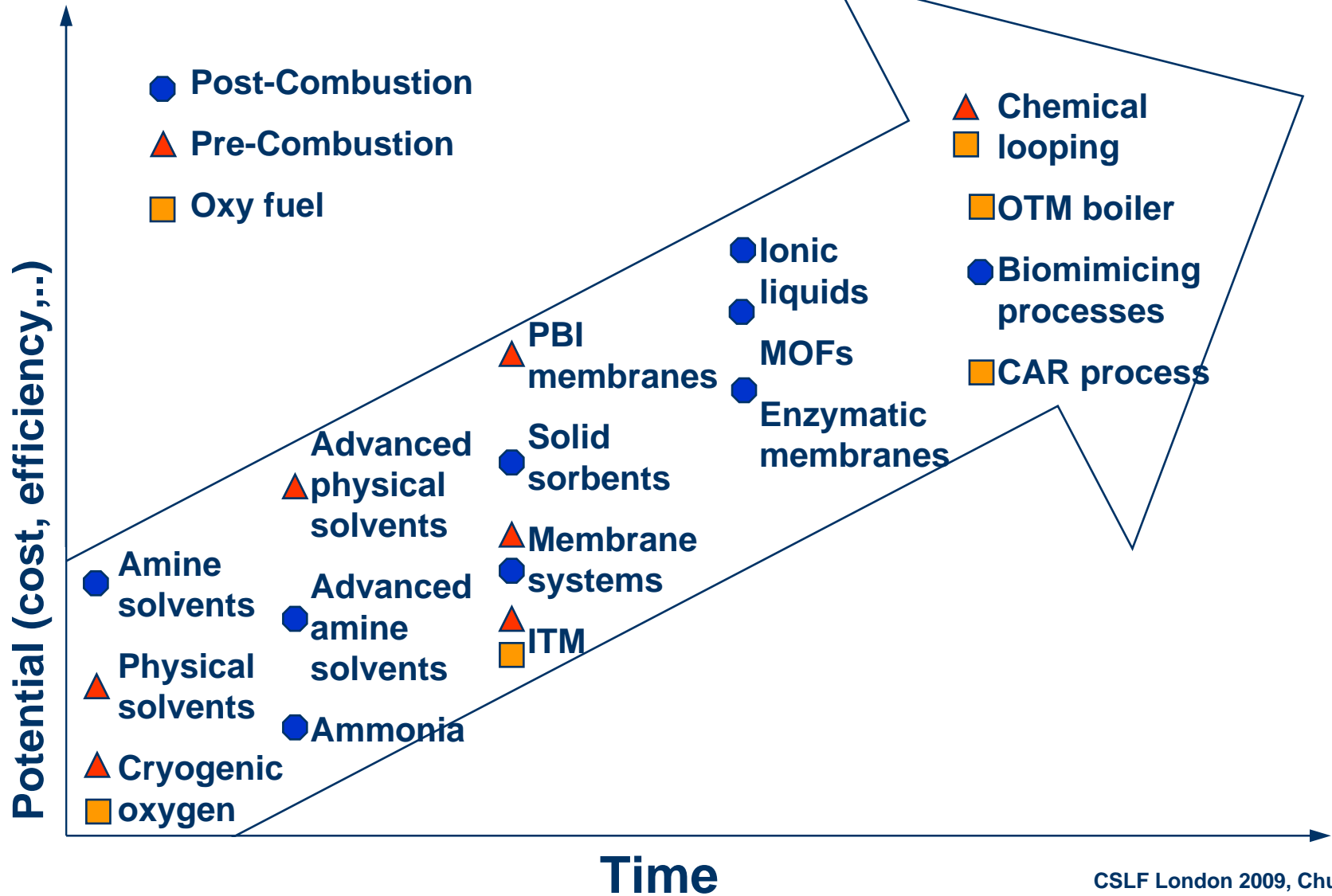
# CCS kjeden

composition, T, P



technical and legal CO<sub>2</sub> requirements

# Nye CO<sub>2</sub> fangst-teknologier



# BIGCLC - Chemical Looping Combustion

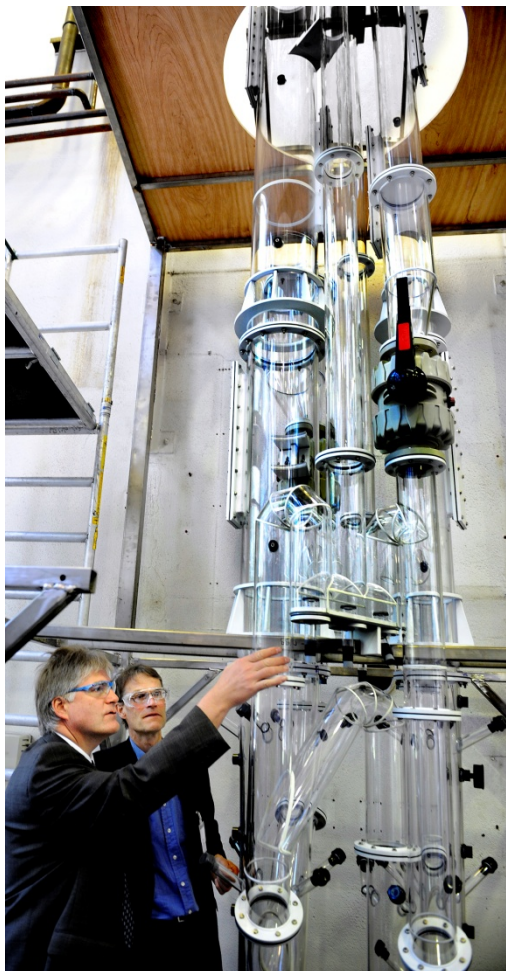
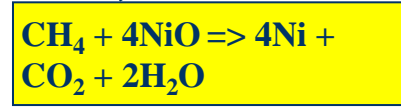
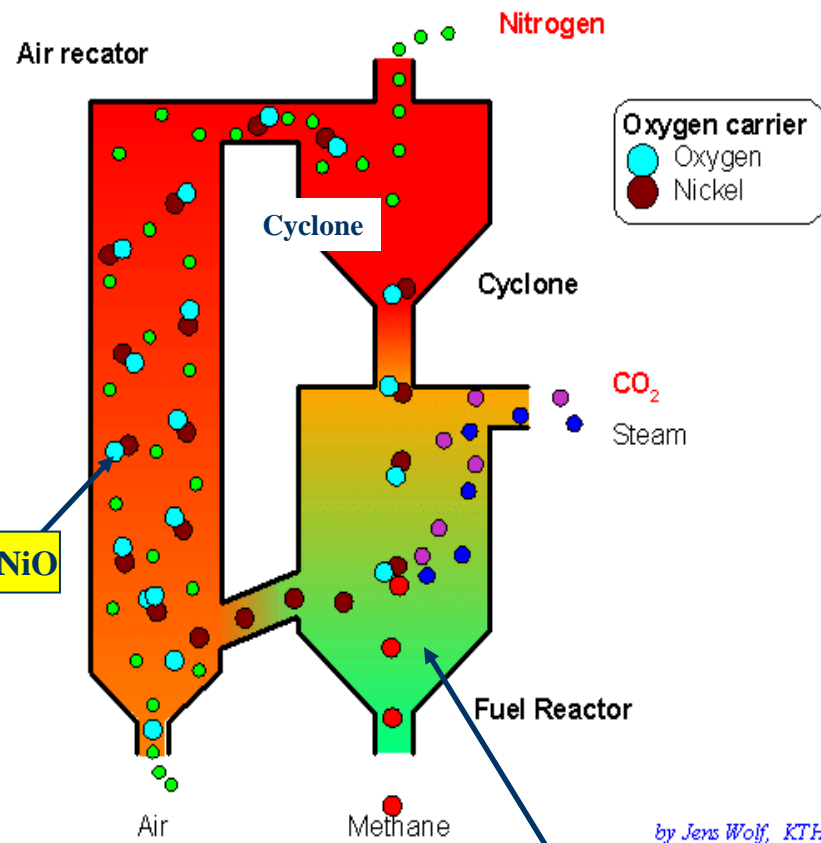
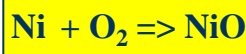
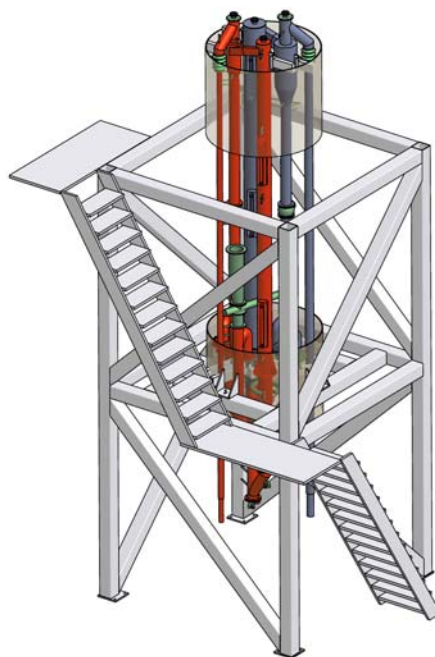


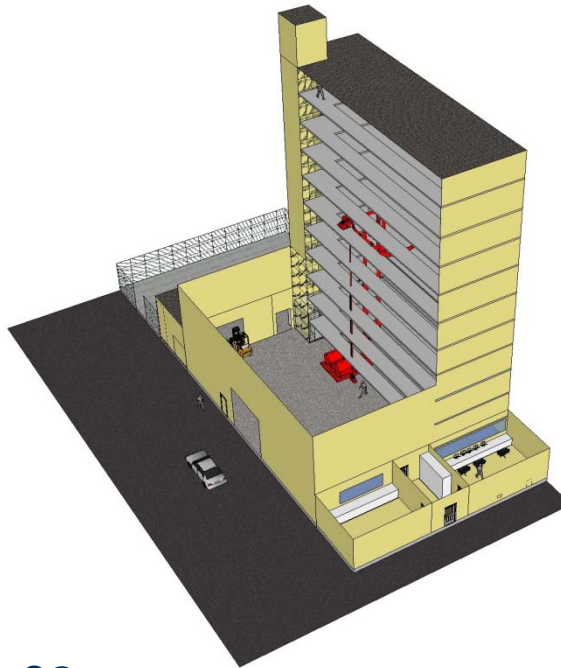
Foto:Steinar Fugelsøy, Adresseavisen



World's largest : 150kW - pressurised

# The SOLVit Programme

Solvent development for next generation  
Post combustion systems



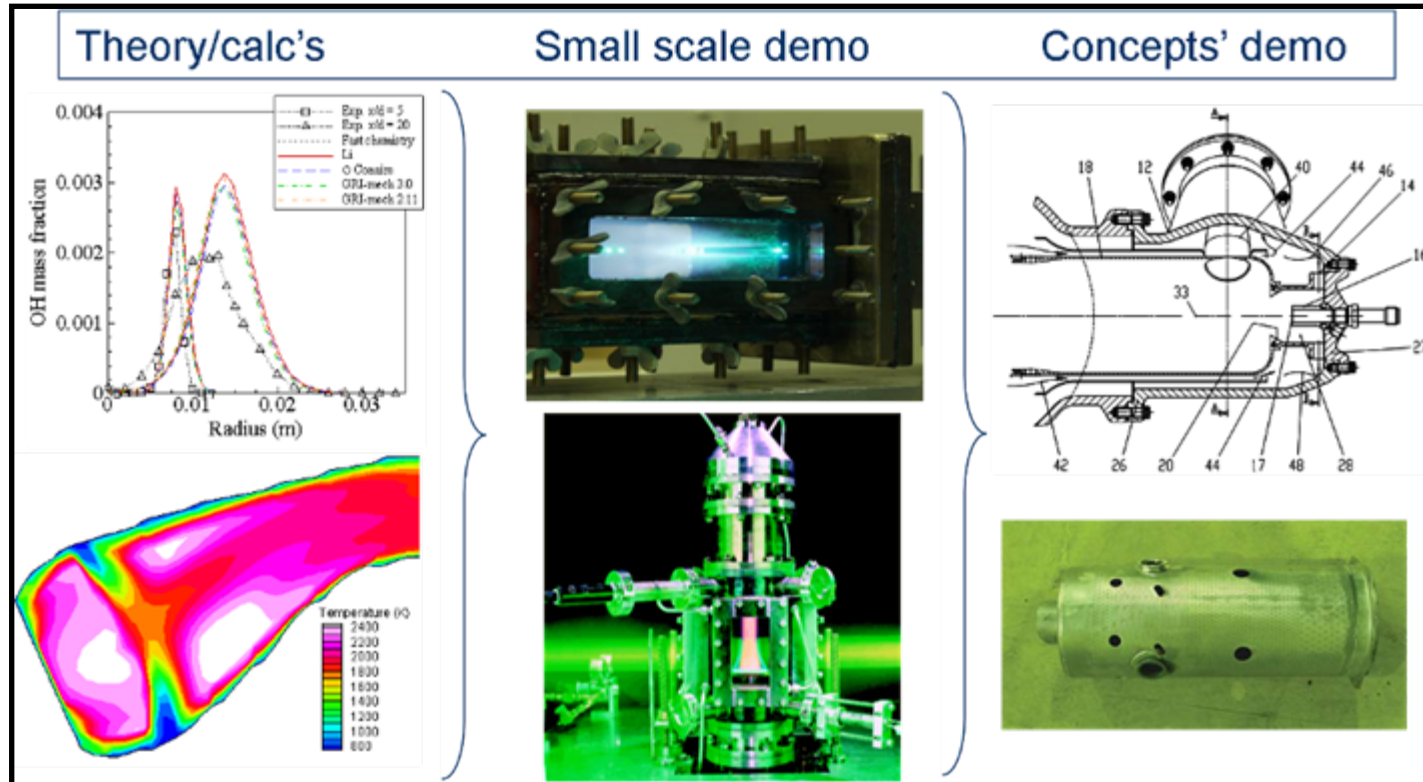
## EU-ZEP:

- 2020 < 2 GJ/ton CO<sub>2</sub>
- 2030 < 1,5 GJ/ton CO<sub>2</sub>

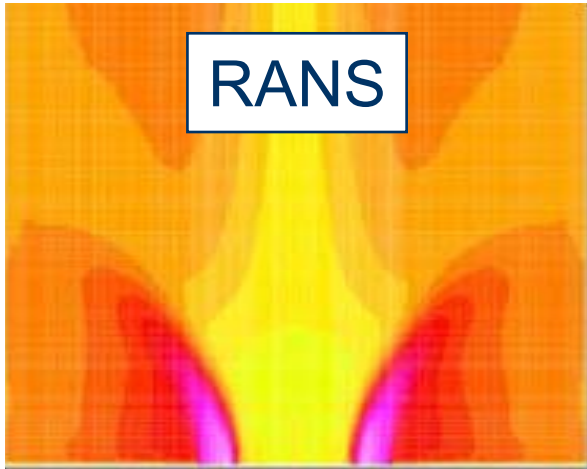
Targets new solvents with 50% energy reduction in second phase

# BIGH2 "Innovation" project

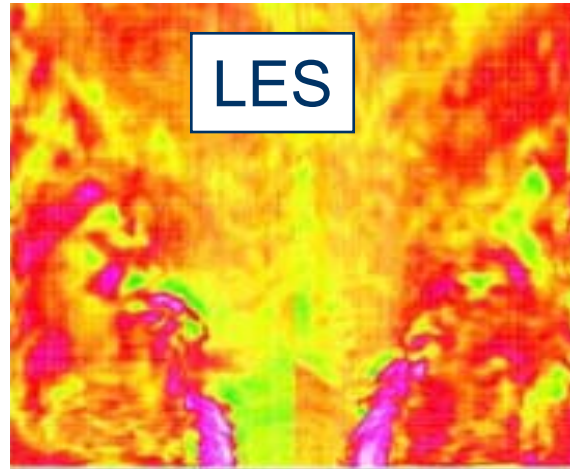
- Develop a H<sub>2</sub>-fuelled gas turbine combustor operating in LPM mode
- Enables pre-combustion CCS
- From combustion & fluid dynamics theory to concept's demo...



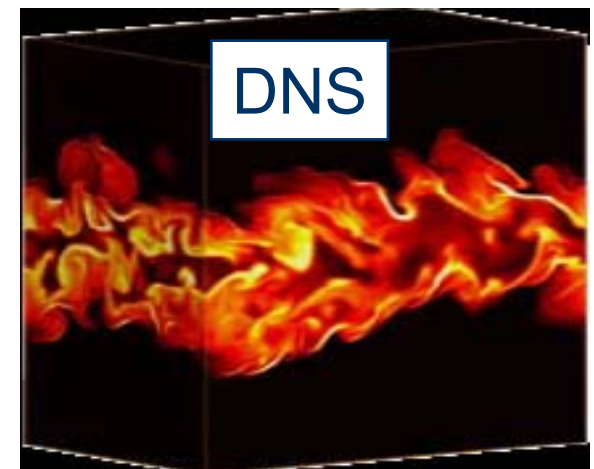
# Ulike CFD metoder for å beregne forbrenning i gassturbin



**Reynolds Averaged  
Navier-Stokes**



**Large Eddy  
Simulation**



**Direct Numerical  
Simulation**



UNIVERSITY OF OSLO



# BIGCCS

International CCS Research Centre

Budget 47 M€ over 8 years

2009-2016

BIGCCS Director: Mona J. Mølnvik

BIGCCS Chair: Nils A. Røkke

SINTEF Energy Research



ConocoPhillips



HYDRO



Statkraft

CICERO



AkerSolutions™



CENTRE FOR ENVIRONMENT-FRIENDLY ENERGY RESEARCH

BIGCCS

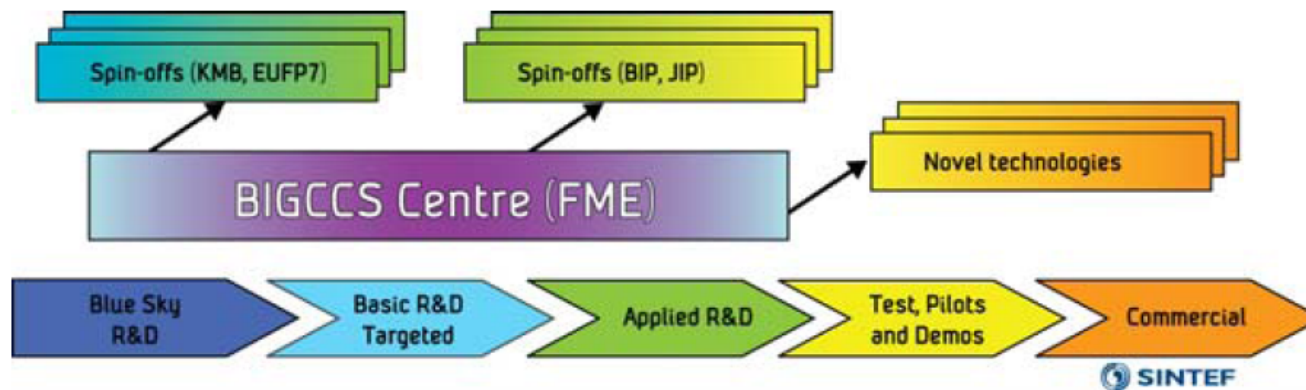
International CCS Research Centre





# Objective

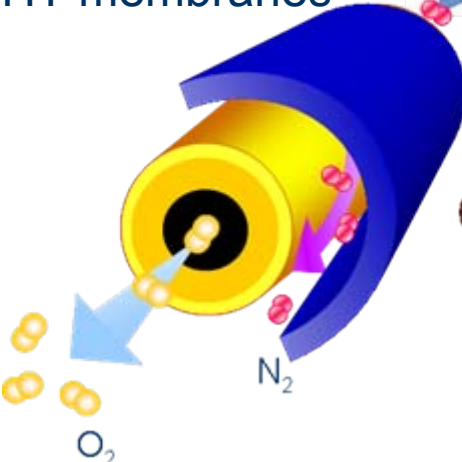
- ▶ The main objective of the BIGCCS Centre is to contribute to the ambitious targets in the Climate Agreement in the Norwegian Parliament in February 2008 – to increase the efforts in CCS.
- ▶ Enable sustainable power generation from fossil fuels based on cost-effective CO<sub>2</sub> capture, and safe transport and underground storage of CO<sub>2</sub>.



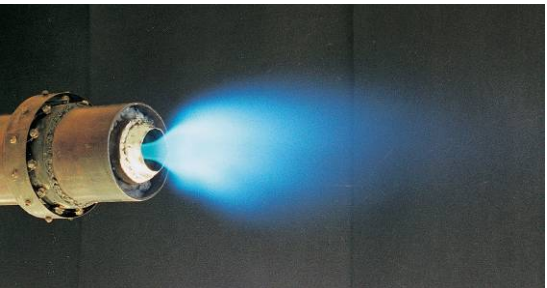
# SP1 CO<sub>2</sub> capture

O<sub>2</sub> combustion & FGR  
HP O<sub>2</sub> combustion

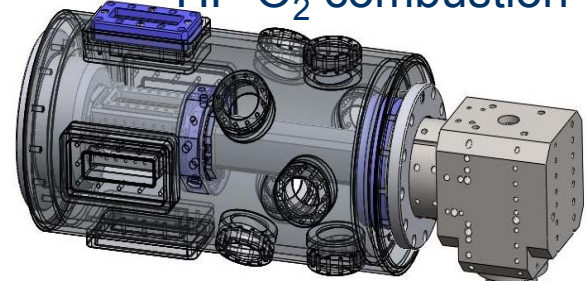
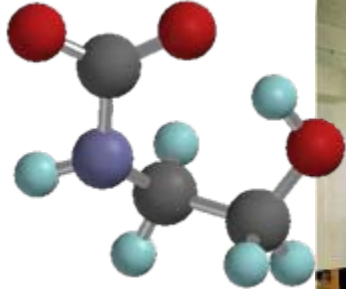
HT membranes



H<sub>2</sub> combustion



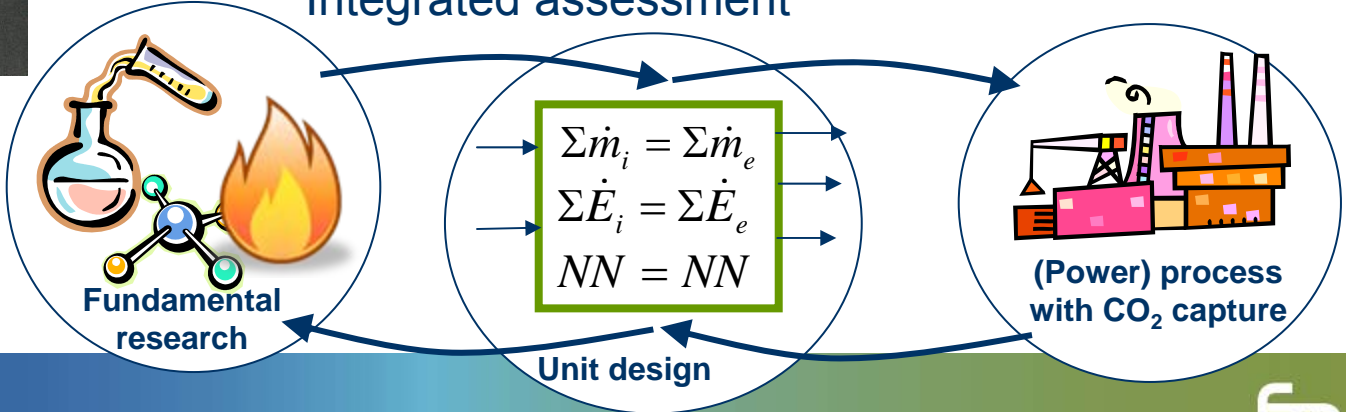
CO<sub>2</sub> separation



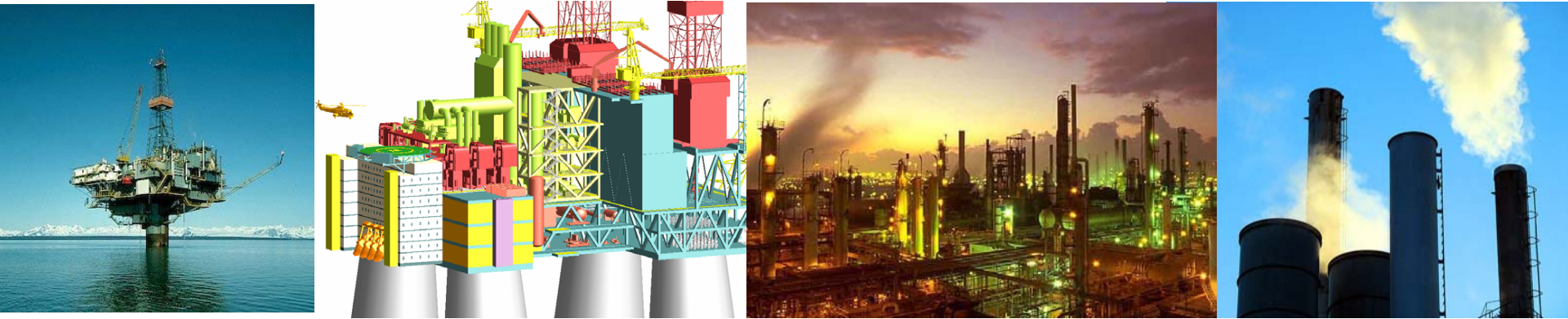
application to industry and offshore



Integrated assessment



# Application to industry and offshore

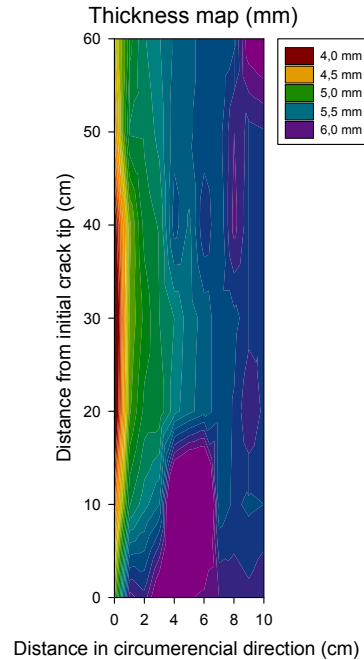
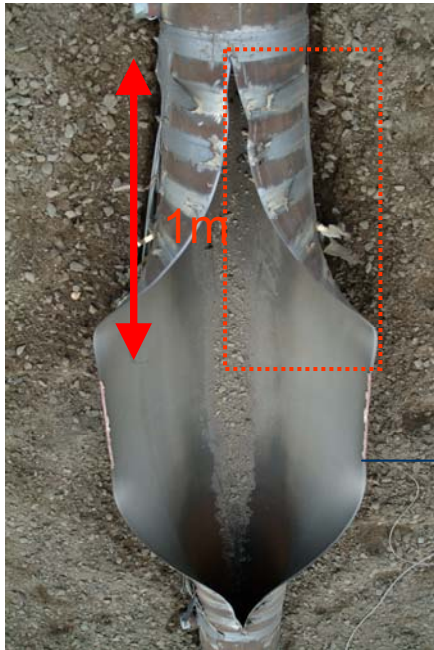


- ▶ **A group of active working members among the BIGCCS partners**
- ▶ **Case definition**
  - ▶ **Special focus on battery limits, and case specifications**
  - ▶ **A close dialogue with industry is a prerequisite**
- ▶ **Case analyses**
  - ▶ **Evaluate potential of the various cases**
  - ▶ **Identify challenges and possibilities**
  - ▶ **Identify research needs and innovation requirements**
  - ▶ **PhD “Nano-structured membranes” – Prof. May-Britt Hägg**

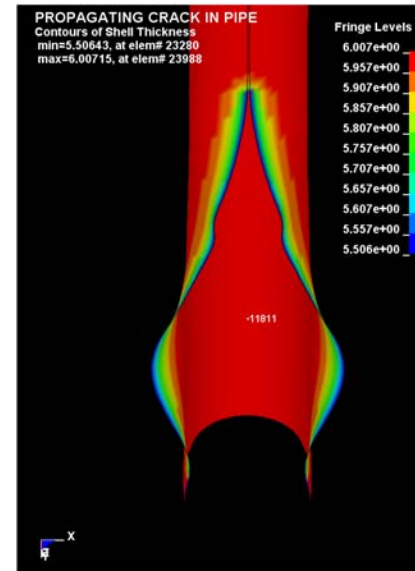
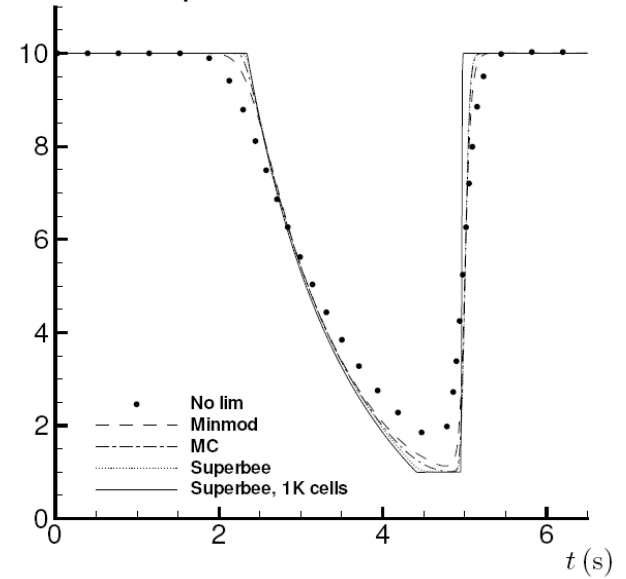
# SP2 CO<sub>2</sub> transport

## CO<sub>2</sub> pipeline integration

Picture from full-scale test of pipe;  
calculated and measured pipe  
thickness. From Olsø et al., 2009.



$p$  (MPa) Depressurization case



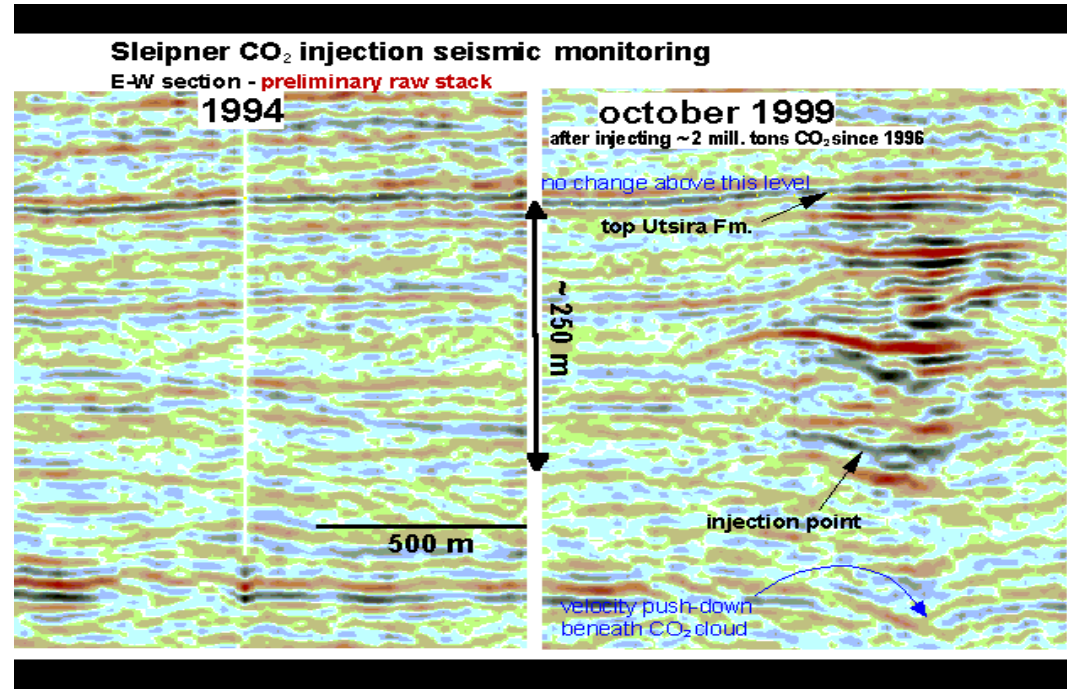
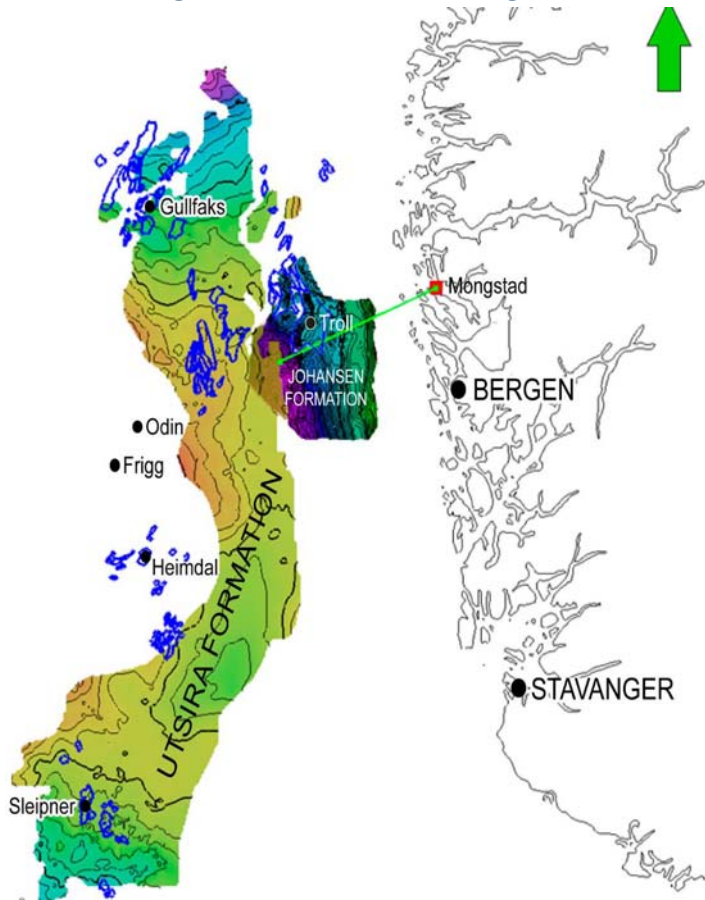
# SP3 CO<sub>2</sub> storage

qualification and management of storage

monitoring, leakage and remediation



storage behaviour



# Thanks!