



# CO<sub>2</sub> capture, transport and storage at Gaz de France

**CSLF Meeting, Paris, France, 27 March 2007**

Gaz de France

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# Gaz de France

## A long experience in underground storages

### **Operating knowledge and expertise of underground natural gas storages since 1956**

- Aquifer storages
- Salt storages

### **R&D on CO<sub>2</sub> capture, transport and storage**

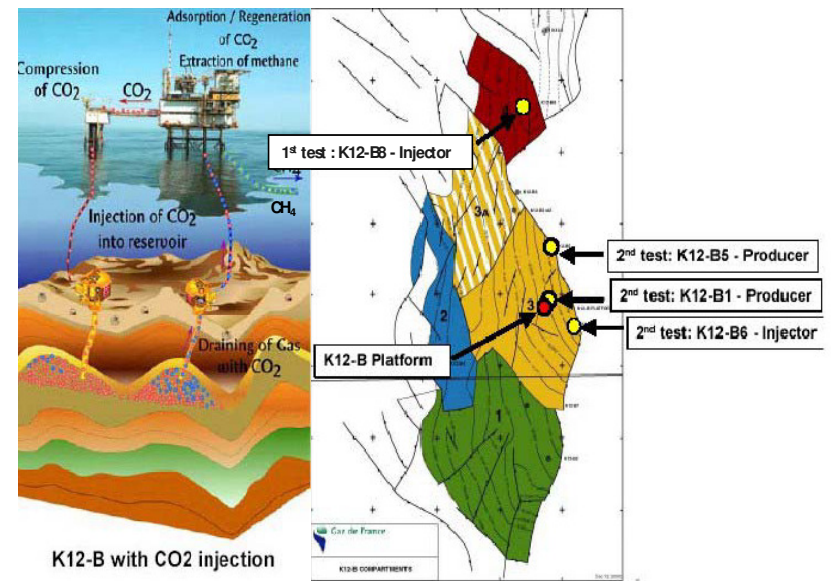
- Capture : Studies on the three main options : oxyfuel/chemical looping, precombustion and post-combustion
- Transport : feasibility studies
- Storage : reservoir simulations, CO<sub>2</sub> injection pilots
- French & European partnership with universities, R&D centers and industry

# R&D and operational projects on CCS at Gaz de France

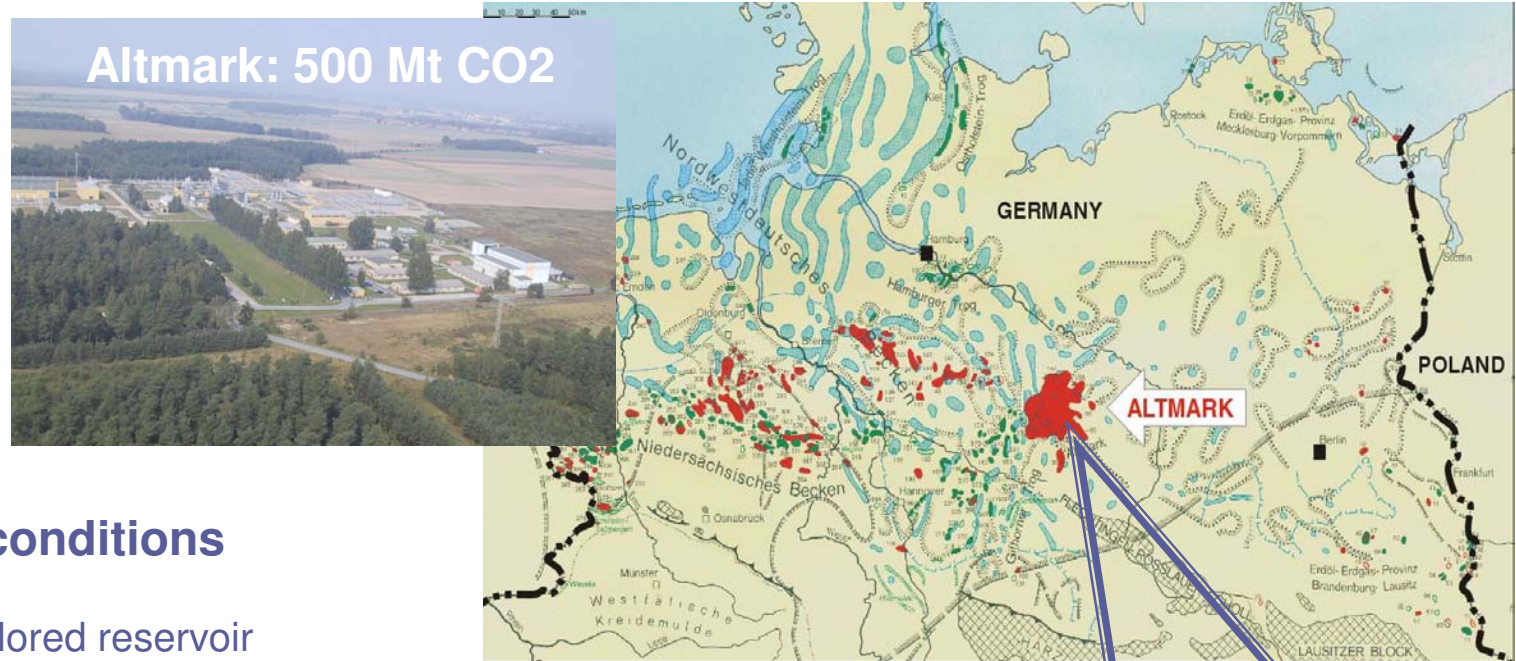
## Operational projects on CO<sub>2</sub> storage

- K12-B CO<sub>2</sub> re-injection
  - ✓ Feasibility study (2002-2003)
  - ✓ Pilot injection phase (2004-ongoing)
  - ✓ Scale-up

- Near Future : Snøwhit, Altmark



# CO<sub>2</sub> Storage in the Altmark



Altmark: 500 Mt CO<sub>2</sub>

## Favorable conditions

- Well explored reservoir
- Proven seal integrity (Zechstein salt)
- Low reservoir pressure
- Wells available
- Existing infrastructure (>1000 km flowline)
- Possible combination with EGR

One of the largest depleted gas field in Europe which can store the entire CO<sub>2</sub> emitted from a large-scale power plant throughout its entire life cycle.

# CO<sub>2</sub> Storage in the Altmark

## Gaz de France's involvement in CO<sub>2</sub> Projects in Germany

### **CSEGR - Carbon Sequestration with Enhanced Gas Recovery (2005 –2008)**

- Joint research under the German “Geotechnologies” research program
- Partners: TU-Clausthal, Vattenfall, EEG, Wintershall, E.ON-Ruhrgas, BGR
- Fields under investigation: Altmark and Barrien (Lower Saxony)

### **Internal study for Altmark (2006)**

- To Identify candidate site for pilot injection :
  - Small area, isolated from other compartments
  - Good reservoir quality
  - Wells for injection, observation & production

# CO<sub>2</sub> Storage in the Altmark Research Program for a pilot injection

## Surface

- Monitoring of well parameters and environmental impact

## Subsurface

- Run different injection regimes: injection of gaseous, supercritical and liquid CO<sub>2</sub> at different wellhead pressures and rates
- Downhole measurements
- Use of tracer to track CO<sub>2</sub> migration
- Well integrity surveys (corrosion, cement)
- Sampling of reservoir fluid in monitoring wells

## Applied Research

- Chemical interactions of CO<sub>2</sub> with reservoir rock and reservoir fluid content
- Rockmechanics of reservoir and caprock (repressurization, alteration of porosity and permeability)