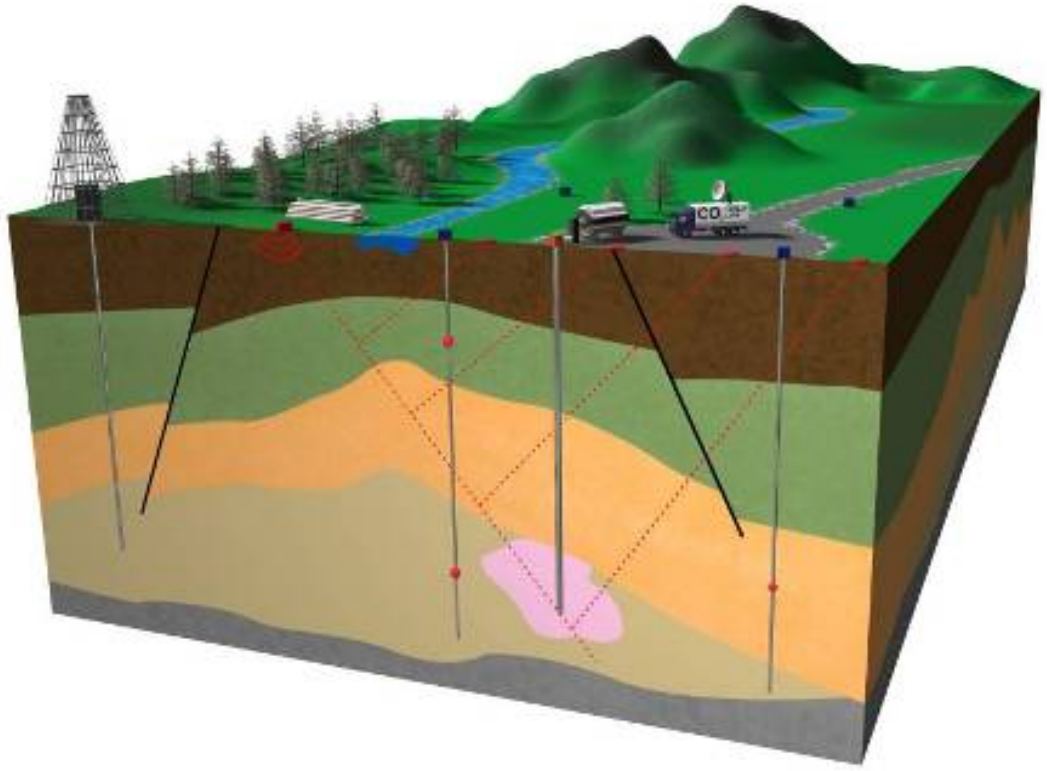


CO_2FieldLab

Presentation to CSLF, October 2010

Background

- **From demonstration projects to sequestration deployment:** Storage considered as an acceptable option for mitigation of climate change.
  By 2012, 3 projects for storage in saline aquifers > 5MT CO_2 /Y,
  4 projects > 0.5 MT CO_2 /Y

- **Regulatory framework**:
  EU legislation passed December 2008, to be derived state by state
  Monitoring, Reporting and Accounting protocols are under development.

- However, the **issue of leakage** must be well addressed :
  - Safety: Minimize the Health, Safety & Environmental risk
  - Mitigation and early remediation
  - Public acceptance: credibility of geological storage challenged
  - Accounting: if leakage occurs, emission credits must be surrendered and the site stabilized (EU)

Crucially needed: validated monitoring system for leakage
Currently: no means to assess such technologies.

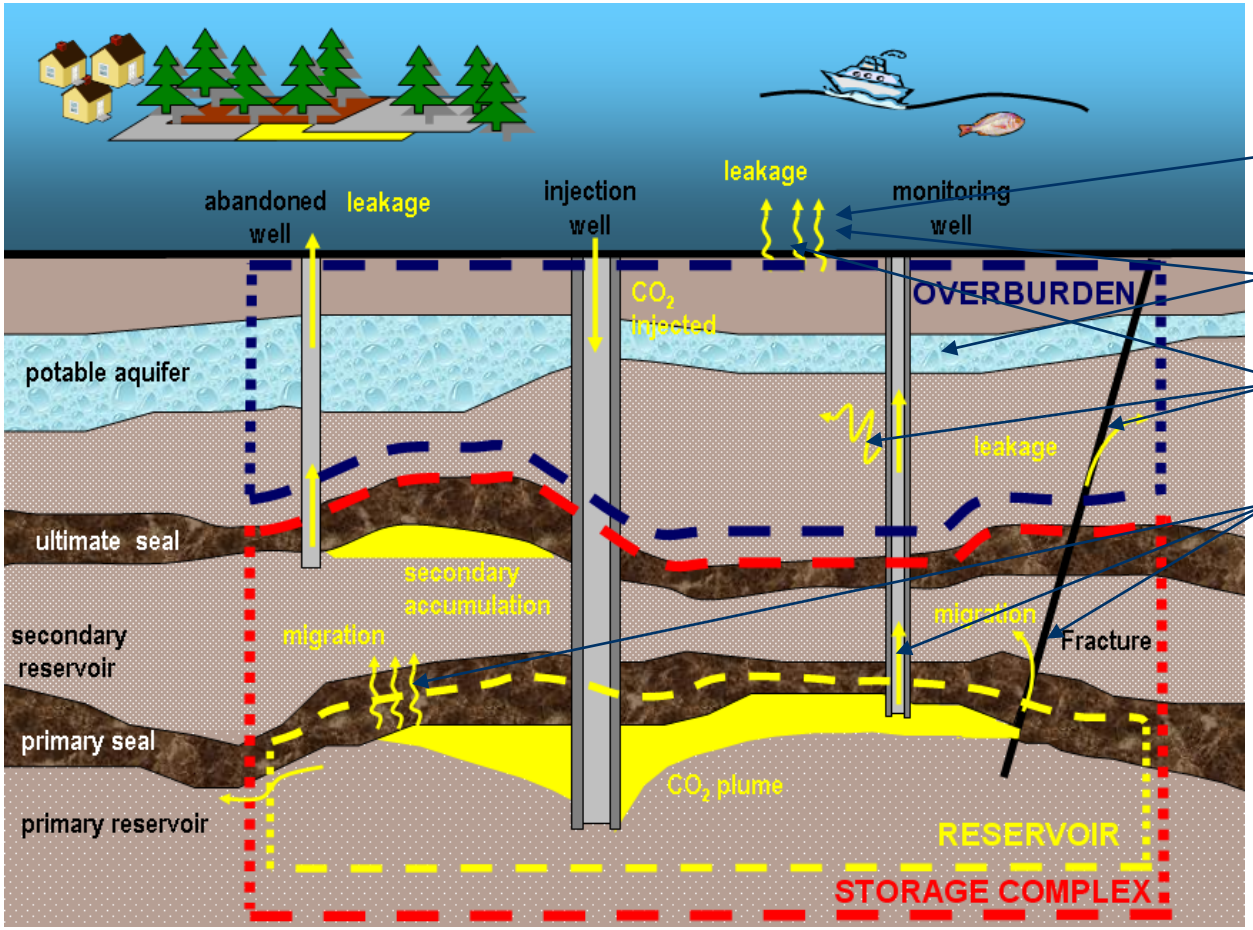
CO_2FieldLab in one slide

CO_2 injected in permeable rocks in a well-controlled and well-characterised geological environment.
Shallow and very shallow subsurface in a Norwegian field

The underground CO_2 distribution will resemble leakages and will be monitored with an exhaustive set of techniques deployed by the project partners.

Assurance Monitoring

Four monitoring activities targeted at controlling containment



4-Leakage quantification

3-Impact detection and evaluation

2-Leakage detection

1- Control of barriers' integrity

Objectives

- **CO_2 injection in permeable reservoir**
  - **Shallow** (10-30 m)
  - **Deep** (200 – 300 m, ca. 200 tons in 2-4 weeks)
- Determine **sensitivity** of monitoring systems to detect subsurface **migration** & surface **leakage**
- Upscale results to **assess monitoring systems and requirements** ensuring safe CO_2 storage
- Test and calibrate **migration models** in well controlled conditions
- **Inform the public** about the safety of CO_2 storage by showing the performance of monitoring systems
- Develop monitoring **protocol / certification** scheme

The project is unique

- Controlled leakage experiment
- Main focus on detection limits:
  - For each monitoring technology, what is the detection limit (threshold)
- Combination/integration of monitoring tools and technologies
- Test of existing and novel technologies
- Focus on repeatability and permanent networks
- A better option than natural analogues
  - We have a controlled source of CO2 and a well known geological environment

Project history

- Project approved by EUROGIA+ board (June 2009)
- Project approved by French Ministry (July 2009)
- Project approved by CLIMIT board (September 2009)
  - Phase 1 (appraisal, Sep. '09 – Sep. '10) approved
  - Phase 2 (CO_2 injection, Oct. '10 – Oct. '13) approved, in case 9% missing funding is found
- Project start 1 September 2009
- Go/no-go decision at the end of Phase 1

Partners

France

Schlumberger

BUREAU VERITAS GROUP

Géosciences Montpellier

brgm

imaGeau

Norway

SINTEF

NGI

WesternGeco

Great Britain

BGS 1835

Drilling – June 10

Appraisal phase: Baseline monitoring

Mean CO_2 concentrations (soil gas)

- Original site: 0.13 %
- Alternative 1: 0.06 %
- Alternative 2: 0.38 %
- Seismic line E-W: 0.16 %
- Seismic line N-S: 0.20 %

External Communications

- Exposure in media
  - Newspaper articles
  - Norwegian national TV:
  - Oil & energy minister's site visit

- Personal contact
  - Public hearings (SINTEF, UiO)

  - Direct mail about first survey
- Future exposure
  - Press book (BV)
  - Scientific publications
  - Press releases

Timeline – phase 2 + 3

- Milestones – phase 2
  - July 2011: shallow injection completed
  - Spring 2012: deep injection initiated
  - Spring 2013: coupled modeling reported, protocol
  - September 2013: final report

- Milestones - phase 3 (parallel to Phase 2)
  - December 2011: 1st abandonment plan
  - September 2013: Site abandoned; project closure

Acknowledgements

Financial support:

- CLIMIT via Gassnova SF (NO)
- DGCIS, Direction générale de la compétitivité, de l'industrie et des services (FR)