CCS in Norway
– Political and legal framework

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About CLIMIT

- CLIMIT is the Norwegian RD&D programme on CCS
- Administrated in cooperation between Gassnova and the Research Council of Norway
How to combat global warming

CCS delivers one-fifth of the GHG reduction solution in 2050

Without CCS, overall costs to halve CO₂ emissions levels by 2050 increase by 70%.
How to combat global warming

Challenges for wide and fast CCS deployment

- Technical
- Regulations
- Policy
- Public acceptance
CCS legal issues

Legal issues to be addressed

- Storing CO\textsubscript{2} underground – is it legal?
- Storage permits
- Composition of CO\textsubscript{2} stream
- How to monitor storage sites
- Liability - What if CO\textsubscript{2} should leak?
- Standards for building pipelines and transport infrastructure
- Access to transport infrastructure
- Emission permits
- Health, safety and environment
- Trading of emission quotas
International legal framework relevant for Norway

- **The London Protocol**
  Control and regulate the deliberate disposal of wastes and other material in the seas

- **OSPAR**
  Protection of the Marine Environment of the North-East Atlantic

- **EU CO₂ Storage Directive**
  Enable environmentally-safe capture and geological storage of CO₂ in the EU
Norwegian regulations relevant for CCS

Legal Framework
- The CO₂ tax for the petroleum sector (~ 40 €/ton CO₂)
- Implementation of the EU CO₂ storage directive
- Regulations and laws for petroleum activity
- Regulations and laws related to pollution control
- ETS – European Trading Scheme

Status
- Actions started to implement the EU directive
- Proper regulations will be in place to ensure wide CCS deployment
- Challenge: accelerate permitting period
Policies for supporting low-carbon technologies

<table>
<thead>
<tr>
<th>$$\text{Technology development and demonstration}$$</th>
<th>$$\text{Niche markets}$$</th>
<th>$$\text{Achieving competitiveness}$$</th>
<th>$$\text{Mass market}$$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prototypes and demo stage (e.g. FC, 2nd gen. biofuel, el. vehicles, CCS)</td>
<td>1. Development and infrastructure planning</td>
<td>RD&amp;D financing, capital cost support for large scale demonstration</td>
<td>Low cost gap (onshore wind, biomass power in some markets)</td>
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<tr>
<td>2. Stable, technology-specific incentives</td>
<td>Feed-in tariffs, tax credits, loan guaranties</td>
<td>High cost gap (solar CSP and PV, hybrid vehicles)</td>
<td>Mature technology (energy efficiency, industrial CHP)</td>
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<td>3. Technology neutral, but declining support</td>
<td>Green certificates, GHG trading</td>
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<td>4. Accelerate adoption by addressing market barriers</td>
<td>Building codes, efficiency standards, information campaigns</td>
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Illustration based on IEA ETP 2010
The government: Gas power plants should not be built without capture and storage of CO₂

Lack of support in the parliament

The government resign

The first time a government has resigned based on environmental issues
## History of Norwegian CCS Policy - 2005

- The new government lead by the Labour party states that the new gas power plant will have CCS by 2009
History of Norwegian CCS Policy - 2006

Gas power plant with CCS at Mongstad

- New gas power plant will be in operation in 2010
- CCS planned installed by 2014
- The CCS project is a partnership between the Norwegian State and Statoil
- Big discussion as some NGOs demanded CCS from day one
- First step is TCM (Test Centre Mongstad), a pilot for CO₂ capture
History of Norwegian CCS Policy – 2007-2010

Mongstad

- Prime Minister Stoltenberg: CCS at Mongstad will be our moon landing (January 2007)
- Full scale CCS at Mongstad delayed
- Investment decision will be made 2014

Kårstø

- The gas power plant at Kårstø is commissioned - without CCS (November 2007)
- CCS at Kårstø is put on hold (May 2009)
Norwegian CCS policy today

- All new gas power plants shall be based on technology for CO₂ capture
- Ambitious goals for wide spread use of CCS
- Wide international cooperation
CCS plans at Mongstad - I

TCM – Test Centre Mongstad
- Pilot plant for CO₂ capture
- Facility start up 2011
- Capacity: 100 k tonnes CO₂ / year
- Partners: Statoil, Shell, Sasol, Gassnova
- 2 technologies tested: amine and chilled ammonia
- 2 sources of flue gas: cracker and gas CHP
CCS plans at Mongstad - II

Full scale CCS at Mongstad

- Investment decision 2014.
- In operation 2018?
- 1.2 M tonnes CO$_2$ / year
- Investment and operation cost covered by the government
- Statoil will cover cost equal to their alternative CO$_2$ cost
- The government will finance transport and storage of CO$_2$
CO$_2$ transport and storage options

- The state has committed to finance transport and storage of CO$_2$ from Mongstad and Kårstø
RD&D - CLIMIT

- The Norwegian RD&D programme on CCS
- Objective: Accelerate the commercialisation of CCS by financial stimulation of RD&D
- Support schemes from basic research to pilots and demonstration projects.
- Budget 2010: ~ 23 mill € (184 mill NOK)
- Budget increase 2009-2010: 3.7 mill €
RD&D - CEER

CEER - Centres for Environment-friendly Energy Research

**BIGCCS**
- Enable sustainable power generation from fossil fuels based on cost-effective CO₂ capture, and safe transport and underground storage of CO₂
- Total budget: ~ 6 M € annually for next 8 years
- Public funding: ~ 2.5 M € annually
- [www.sintef.no/projectweb/bigccs](http://www.sintef.no/projectweb/bigccs)

**SUCCESS**
- Subsurface CO₂ storage – Critical Elements and Superior Strategy,
- Total budget: ~ 2.5 M € annually for next 8 years
- Public funding: ~ 1.25 M € annually
- [www.fme-success.no](http://www.fme-success.no)
International cooperation

Why
- Make CCS commercially viable
- Make CCS technology available worldwide
- Gain public understanding and acceptance of CCS

What
- Share information, knowledge and experience
- Cooperate on research and demonstration plants
- Creating commercial incentives and regulatory frameworks

Where
- GCCSI – The global CCS institute
- CSLF – Carbon Sequestration Leadership Forum
- ZEP – The EU Zero Emission Platform
- The North Sea Basin Task Force
- 4-Kingdom Initiative
Political challenges

- Pressure from industry
  - Financial support schemes
- Pressure from the researches
  - Access to TCM
- Pressures from the public
  - Public acceptance of the cost
- Pressure from the NGOs
  - Avoid competition CCS vs renewables
  - Avoid delays
  - Show political leadership – be a visionary frontrunner
    - Establish Utsira as a European CO₂ storage pool
    - Establish several national CCS clusters
    - Accelerate implementation of the EU CO₂ storage directive
Concluding remarks

- Political ambitions to make CCS commercial viable

- CCS can be a major tool to combat global warming. To achieve this it is vital to:
  - Show the way – be a frontrunner
  - To realize projects and show that it works
  - Coordinated international effort to ensure global deployment

- Norwegian activities:
  - CCS at Mongstad
  - Comprehensive RD&D activities
  - EU CO₂ storage directive will be implemented in Norwegian law

- Norwegian governmental funding for CCS in 2009:
  - 2.9 billion NOK (~ 355 M € )
Thank you for your attention 😊

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