

What happened to CCS in Norway

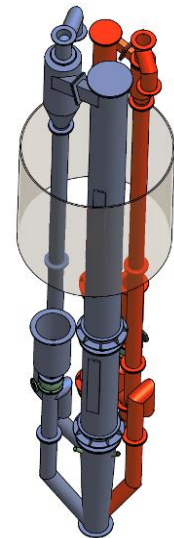
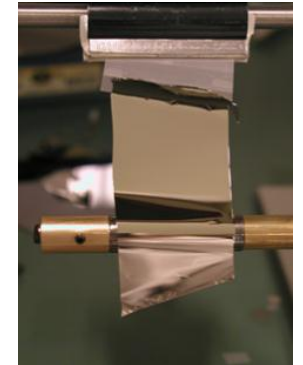
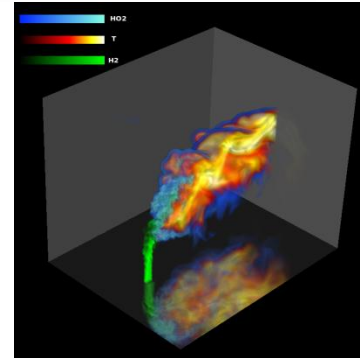
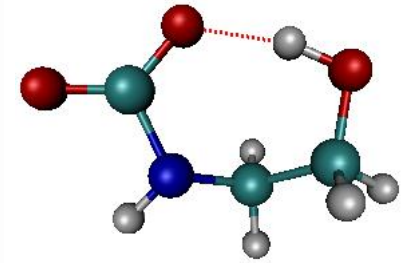
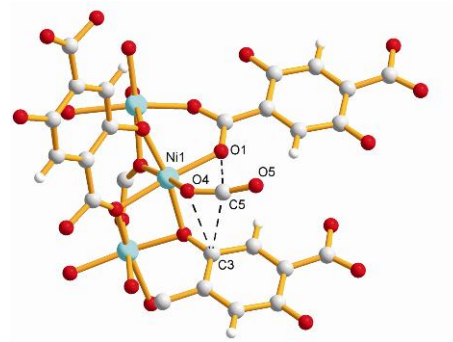


Dr. Nils A. Røkke, VP Climate Technologies SINTEF
Technoport 2012- CCS- Transition Technologies

Gassnova

Outline

- Short historical recap
- Perspectives of CCS
 - power
 - Industrial
 - "do good"
 - "licence to operate"
 - "what now"
- This is what we should do



Historical recap

A photograph of an offshore oil platform at night. The platform is illuminated with warm lights, and the sky is a deep blue. In the foreground, a complex network of white pipes runs along a walkway. In the background, another smaller platform is visible, connected to the main one by a long bridge. The ocean is dark and calm.

Photo: [Kjetil Alsvik](#) / Statoil

1987



Erik Lindeberg and Torleif Holt introduces the concept of geological storage of CO₂ to isolate CO₂ from the atmosphere

1996



Statoil pioneers CCS off-shore by separating CO₂ from natural gas and storing it in the Utsira formation, about 1 Mton CO₂/yr, approx. 850 metres depth

1991



The Norwegian offshore CO₂ tax is introduced – equivalent to approx. 45€/ton CO₂

17/3 -2000

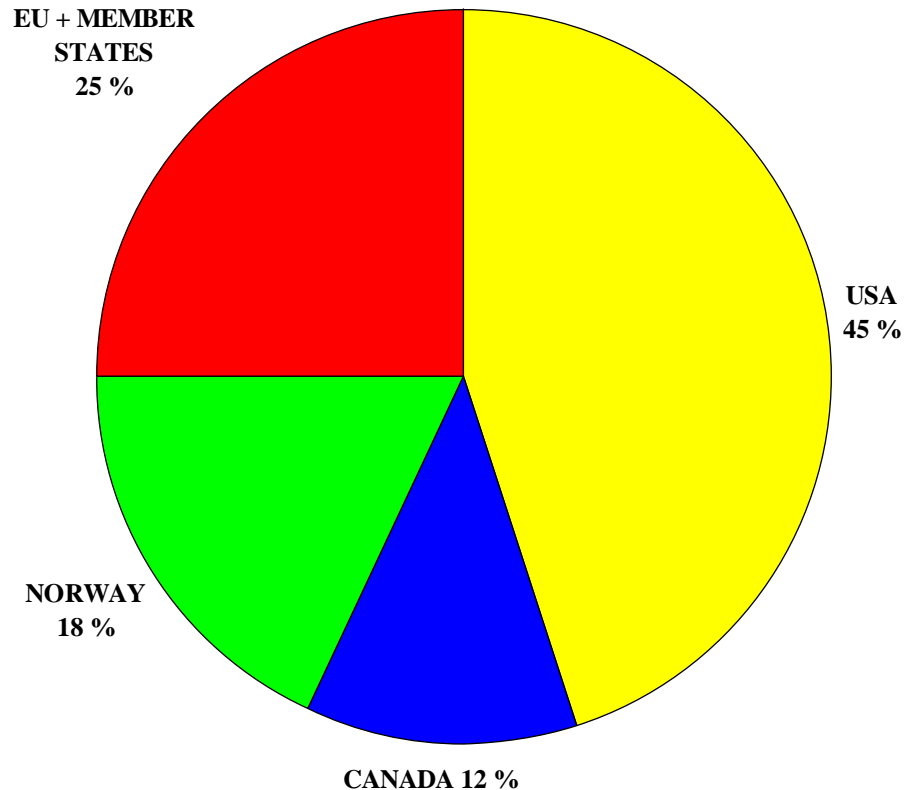


Prime minister Bondevik resigns after demanding a vote of confidence for his cabinet in the matter of not allowing gas power plant concessions without CCS – and lost

17/3 -2000



2001-2005



Norwegian CCS R&D boosted, total annual governmental spending in the world in 2005 estimated to 115 million €

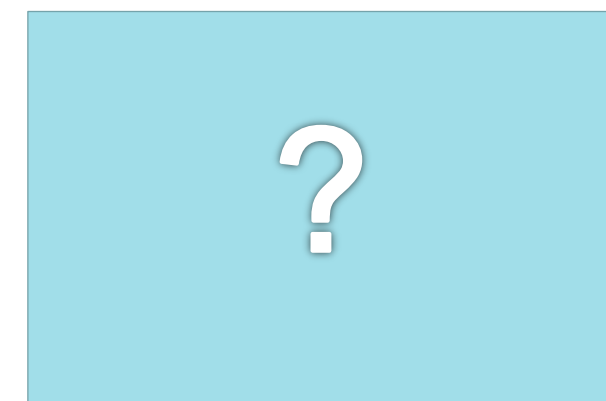
2005-2007



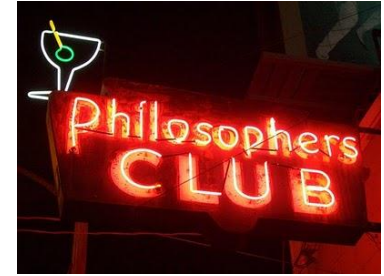
2008-2012



2012-2020



Reasoning behind CCS in Norway



- The Power Perspective, CCS for Norway
 - Power shortage, need gas fired power plants and thus CCS to keep within Kyoto and show leadership
- The Industrial perspective, CCS from Norway
 - Develop technology that can be exported and thus earn money on CCS
 - Applies to capture (7500 plants globally by 2050) and storage (storage stewardship in the North Sea, Utsira and other formations – great storage potential)
- The "Do good perspective", CCS pioneered by Norway
 - Moral obligation- about 600 Million ton CO₂ exported from Norway due to oil and gas exports
 - Burden sharing, our Moonlanding,
- The "Licence to operate perspective"
 - Securing the value of our petroleum resources on the Norwegian continental shelf
 - EU 2050 Energy Roadmap

EU Energy Roadmap 2050

If Carbon Capture and Storage (CCS) is available and applied at large scale, gas may become a low-carbon technology, but without CCS, the long term role of gas may be limited to a flexible back-up and balancing capacity where renewable energy supplies are variable. For all fossil fuels, **Carbon Capture and Storage will have to be applied from around 2030 onwards** in the power sector in order to reach the decarbonisation targets. CCS is also an important option for decarbonisation of several heavy industries and combined with biomass could deliver "carbon negative" values. The future of CCS crucially depends on public acceptance and adequate carbon prices; it needs to be sufficiently demonstrated on a large scale and investment in the technology ensured in this decade, and then deployed from 2020, in order to be feasible for widespread use by 2030.

Reasoning behind CCS in Norway



- The "What now" perspective, CCS?
 - Don't really need new power except offshore
 - Not really interested in producing new power for Europe from gas
 - Technology development and export?
 - Storage is there – what about liabilities when receiving from other countries

A perspective of "This is what we should do"



Do the following:

- Reboot the CCS process for full scale plants and include industrial sources
- Ensure that we can operate at Mongstad, rebuild the power station to true combined cycle
- Pioneer an integrated CCS plant at Svalbard using coal, unique opportunity and possible to combine with TCM
- Focus on offshore power demand- make CCS mandatory for new field developments – supplied from shore or offshore
- Restart the EOR discussion, EOR makes sense from a economic viewpoint
- Continue and expand R&DD in CCS
- Invest in downturns, we can make a difference, and remember: R&D are investments not expenses

Endurance, Pace and Leadership



CCS is needed to avoid unforeseen conflicts!



Vattenfall