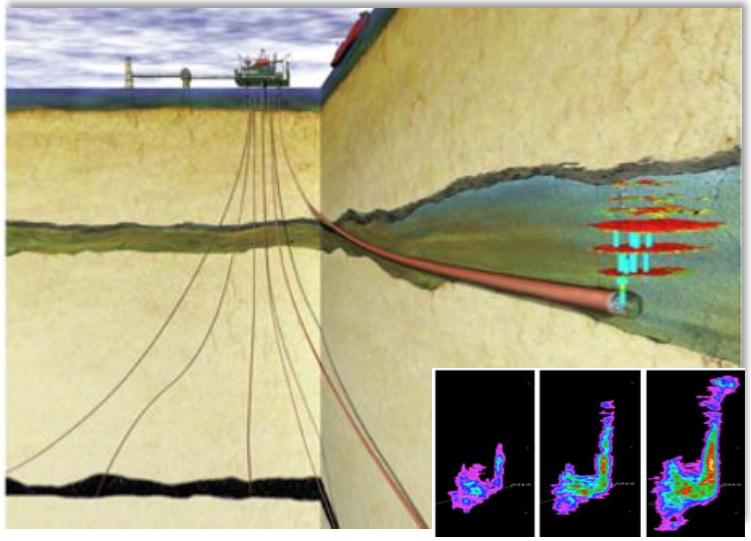
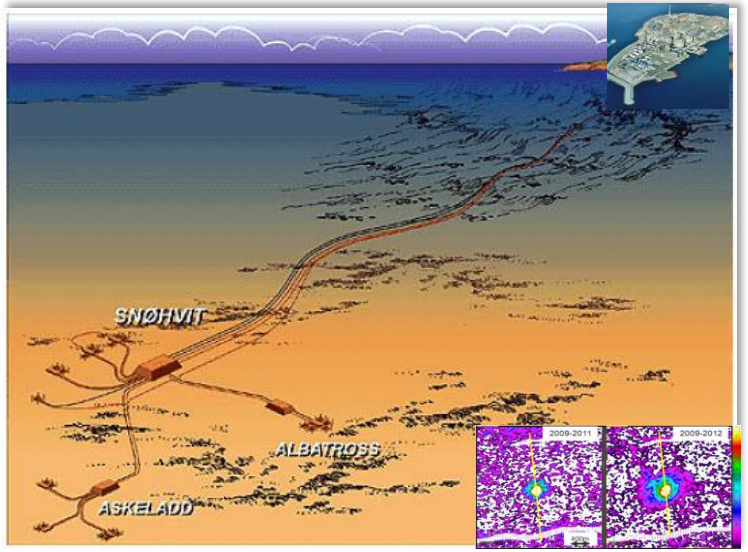
CO_2 capture and storage - success stories and challenges for upscaling deployment

Eva Halland, Norwegian Petroleum Directorate
UNFCCC Pavillion November 6. 2021

25 years experience with CO_2-storage offshore Norway
26 Million tonnes of CO_2 permanently stored deep under the seabed





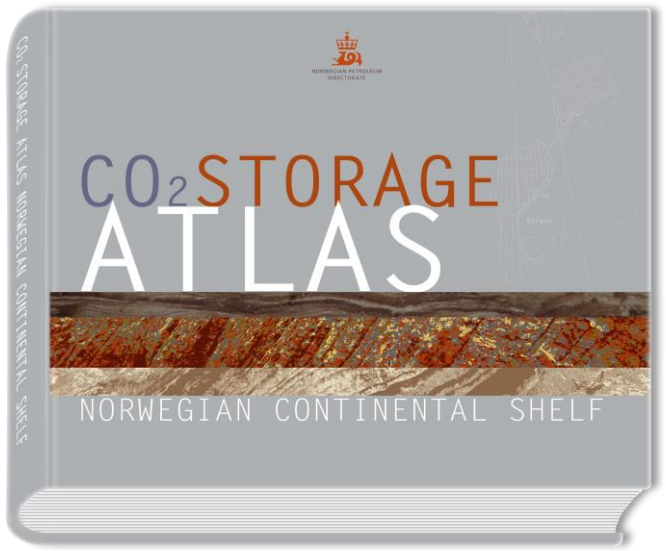
The Sleipner Vest gas field in the North Sea. This is the world first offshore CCS project. Today, three hydrocarbon fields capture CO_2 through the SleipnerT facility and inject through the same well in the Utsira formation.

The Snøhvit gas field in the Barents Sea. The well stream, with natural gas, CO_2, NGL and condensate, is transported in a 160-kilometre pipeline to the facility onshore. The gas is processed and cooled down to liquid natural gas (LNG). The CO_2 is separated and returned to the field by pipeline for reinjection into a geological formation.

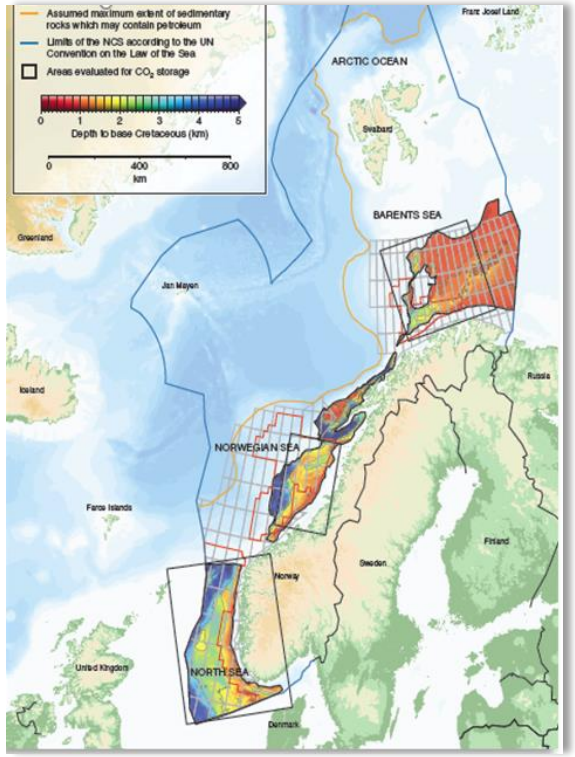
Technology Centre Mongstad (TCM) is the world's largest facility for testing and development of carbon capture technologies.

Source: Equinor

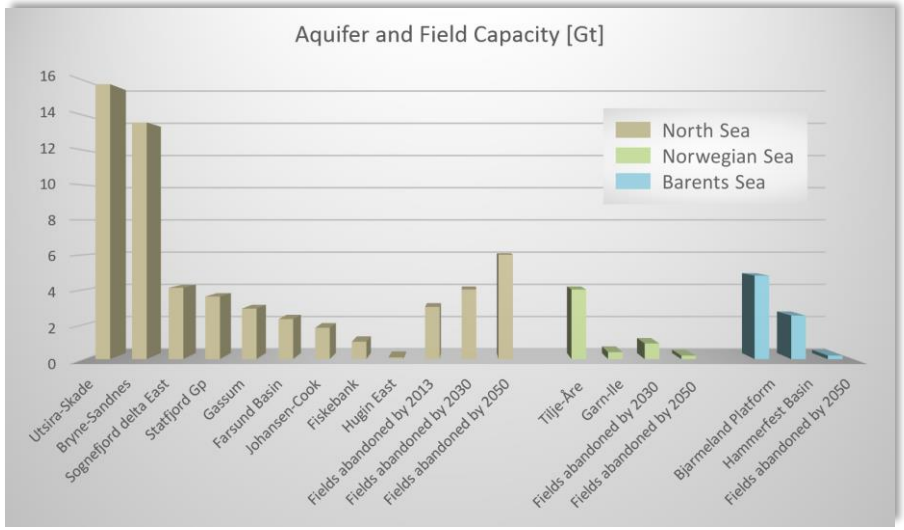
Storage of CO_2 on the Norwegian Continental Shelf is safe and available



The CO_2 Atlas for the entire Norwegian continental shelf was launched in 2014
Built on data and knowledge from 50 years of petroleum activity and 25 years of CO_2 storage



The digital CO_2 storage atlas was launched in 2015



- Development phase: 1,3 Gt
- Exploitation phase: 47 + 25 Gt
- Exploration phase: 11 Gt

Challenges for upscaling CCS deployment

CCUS projects in Europe (IOGP 2021)

Total number of CCS projects: 66 – can contribute with around 60 $MtCO_2$/yr stored by 2030

Today 4 CCS projects are in operation in Europe

The North Sea basin appears to be a key area for the development of carbondioxid capture and storage (CCS) in Europe

Why:

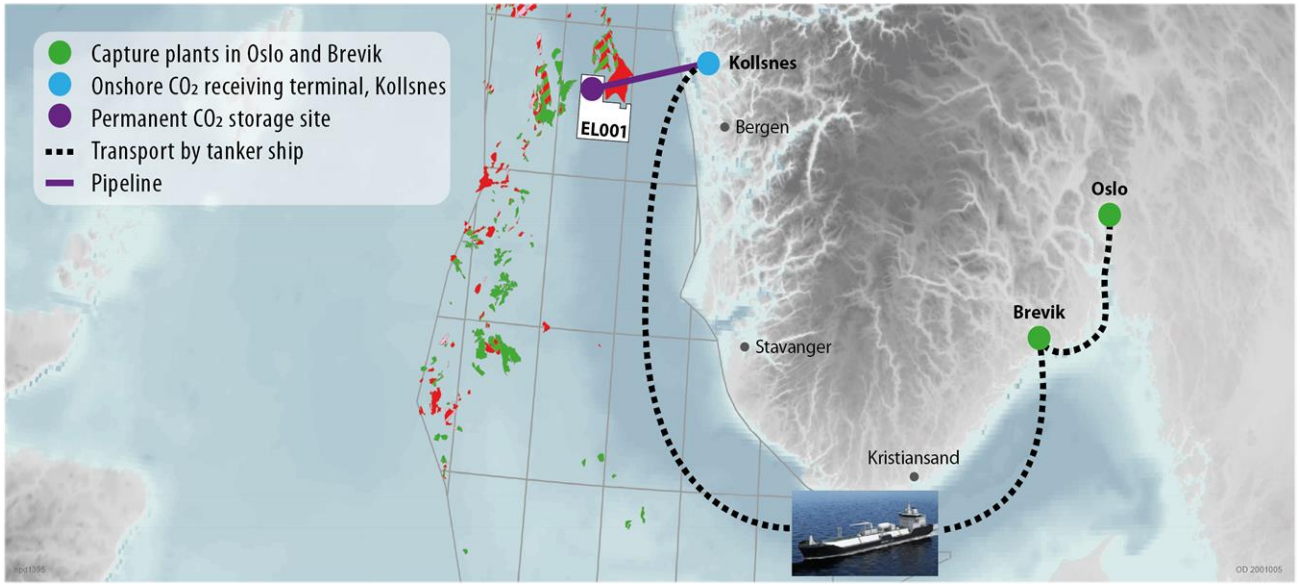
Through years of petroleum activity, the geology is well known and where the potential reservoir rocks suitable for storing CO_2 can be found.

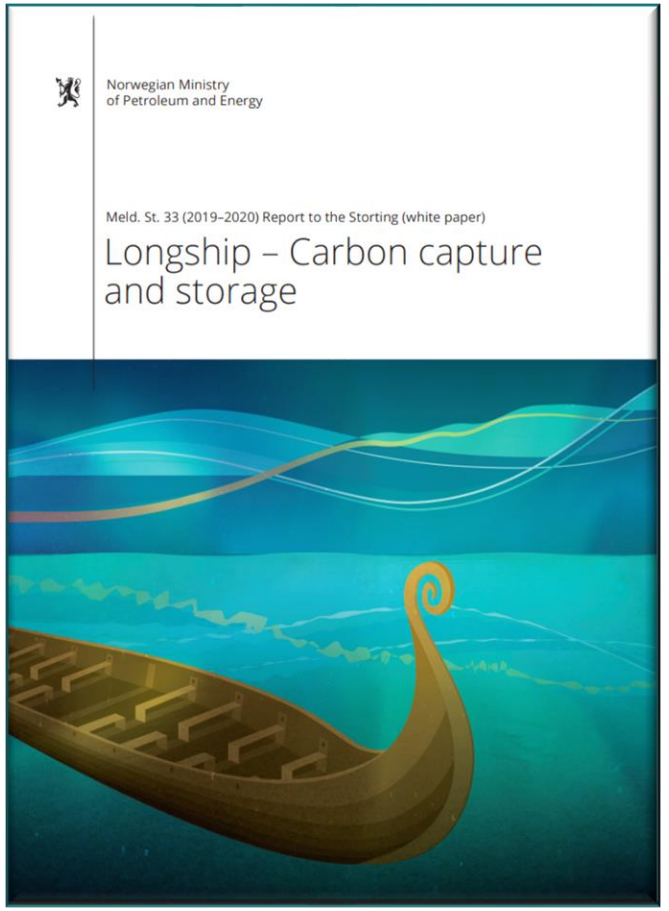
What's needed:

- Consistent policy support is key to unlocking investment in offshore carbon storage
- Cost - effective technology for injection and monitoring
- Demonstrate the whole value chain
- Develop a sustainable business case
- Rely on professional competence

Source:IOGP 2021

Longship- a full scale CCS demonstration project on the way to large-scale deployment





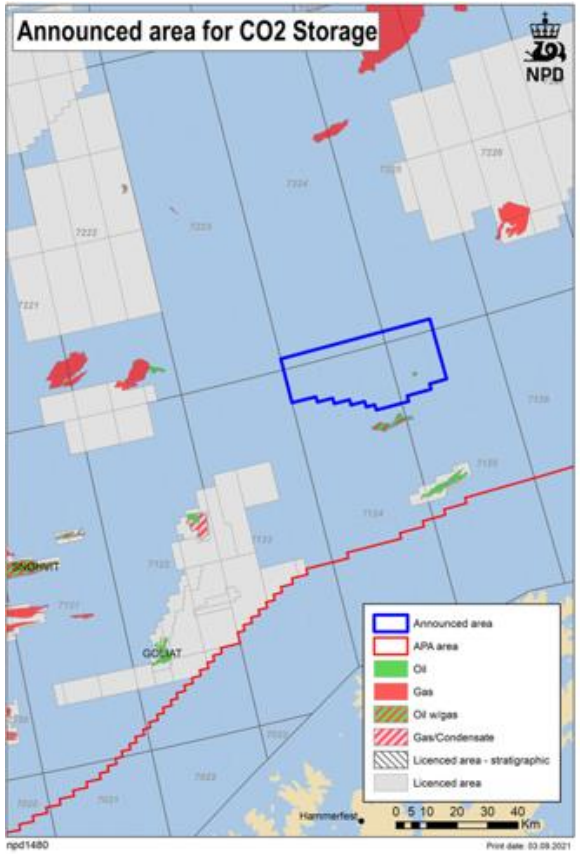
- Contribute to developing technology for capture, transport and permanent storage of CO_2
- Develop a full-scale CCS value chain in Norway by 2024
- Demonstrate that CO_2 management are safe and possible

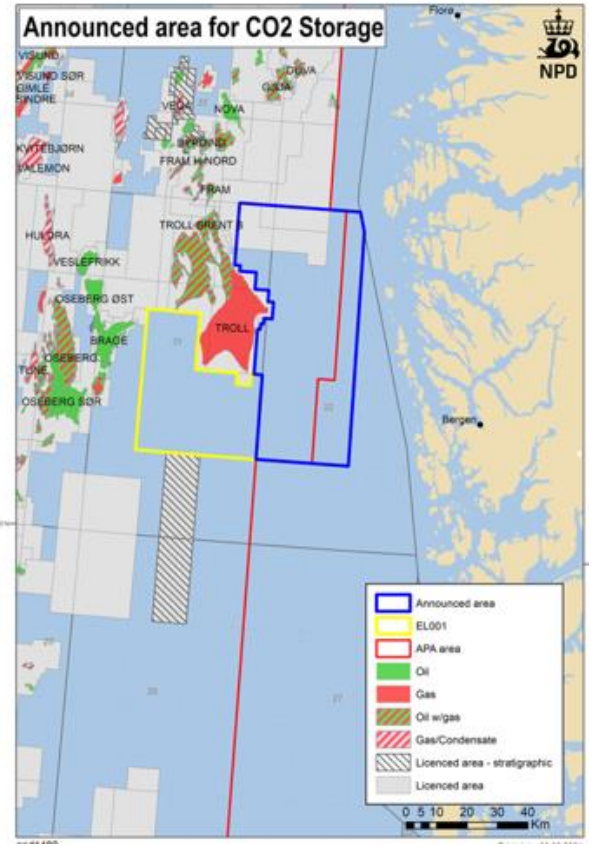
Learning- cost reductions – business development

- CCS can enable negative emissions as part of large-scale deployment

New areas for CO_2 Storage
Creating a future for CCS

Application deadline Desember 9th 2021





A comprehensive regulatory framework for CCS

Key elements in the Norwegian CCS regulation

- Site selection, exploration and exploitation
- Environmental assessment plan
- Storage permits
- CO_2 stream composition
- Monitoring, Verification and reporting
- Post-closure obligations and transfer of responsibility to State c/o Ministry of Petroleum and Energy (MPE)
- Financial guarantees

Safe storage of CO_2

- **We have the experience:** CO_2 has been injected and stored for several decades both onshore and offshore. On the Norwegian shelf we have stored CO_2 in deep saline geological formations for 25 years - which we monitor closely
- **We have the knowledge:** Through more then 50 years of oil and gas industry in the North Sea Basin and on the Norwegian continental shelf, we have mapped, collected and interpreted geo-data which gives us a good overview of reservoirs and the sealing rocks that can be used for CO_2 storage.
- **We have a huge storage potential:** Our mapping and evaluation show that there can be capacity to store as much as 80 billion tonnes of CO_2 offshore Norway.
- **We have the instruments:** We have solid regulations on site characterization and monitoring and we set requirements
- **It's ready now:** CCS is a key part for meeting our climate targets by decarbonising the industry, can enable negative emissions and the technology is ready now.

Thank you for your attention!

npd.no
factpages.npd.no/no
norskpetroleum.no