CO_2 storage at the Norwegian Continental Shelf

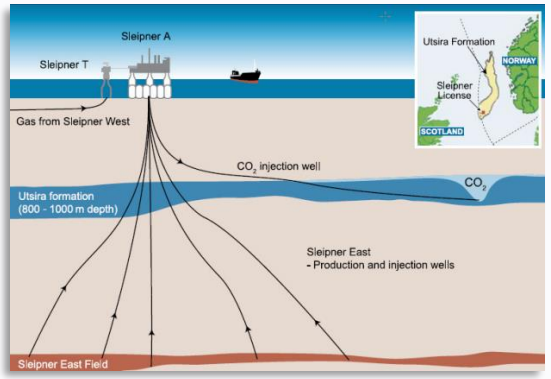
17th **CO2GeoNet** Open Forum May 22nd 2024

Aslaug E. Janssen, Norwegian Offshore Directorate (NOD)

High interest for storage on Norwegian Continental Shelf (NCS)

CCS projects on the NCS

1996: CO2 re-injection **Sleipner**

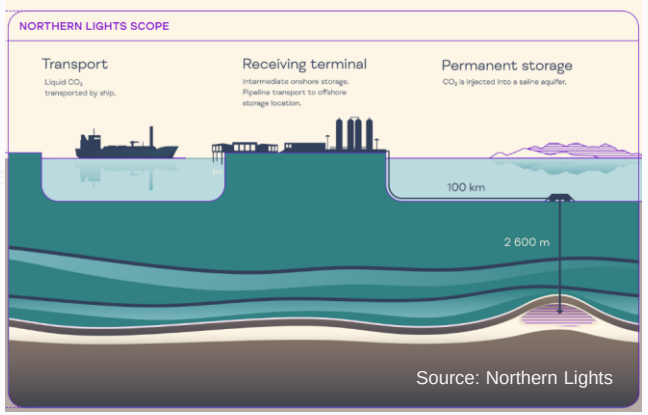


Source: Equinor

2008: CO2 re-injection **Snøhvit LNG**

2012: Technology Centre Mongstad (**TCM**)

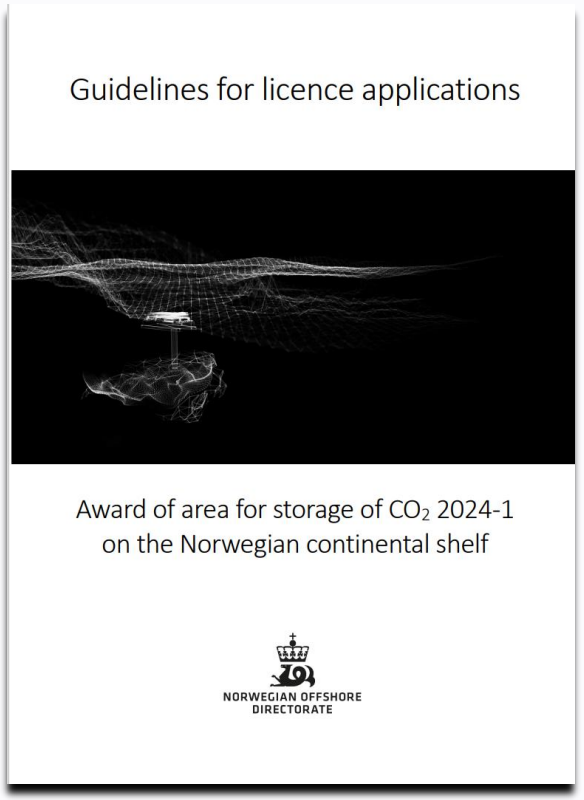
2019: **Northern Lights**



Open door policy

[Announcement round 1 2024 - The Norwegian Offshore Directorate (sodir.no)]

6th round; Eight companies have applied for exploration license



Documentation

- Understanding of the geology, injectivity and migration
- Containment and risks
- Plans for development and realisation of storage in the area.
- Competence and experience with drilling of wells
- Systems for quality assurance and HSE
- Financial capacity

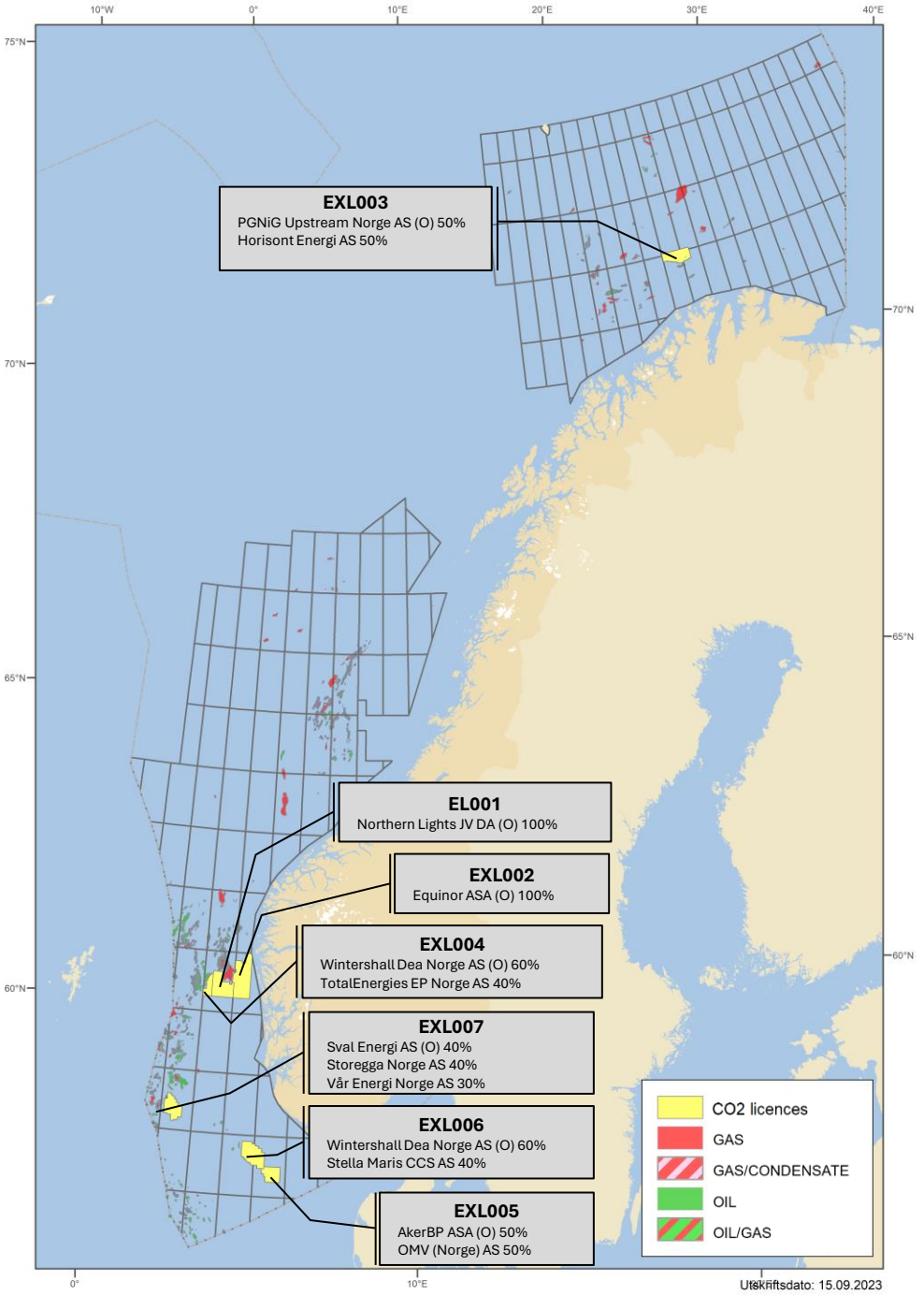
Active licenses May 2024

- A steadily increasing number of CO_2 storage licenses have been awarded since 2019

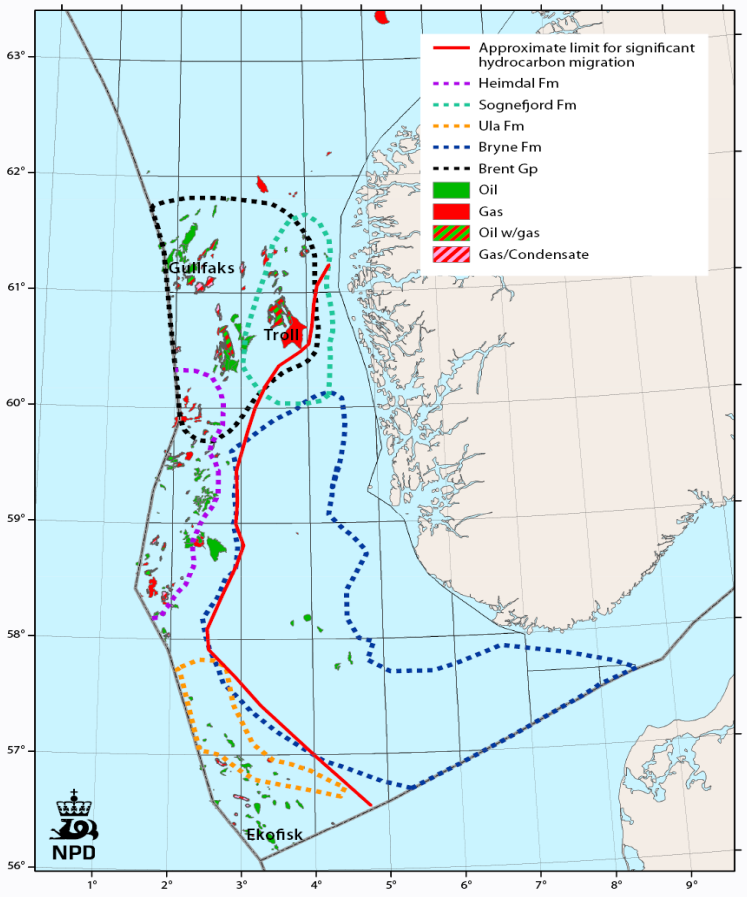
2019: EL001 (Northern Lights, Longship)

2022: EXL002
2022: EXL003
2022: EXL004
2023: EXL005
2023: EXL006
2023: EXL007

- Total ~ 8 550 km^2
- Exploration licenses
  - First FIDs expected in 2026
  - First CO_2 injection in 2028 from the EXL-licenses



Significant safe storage potential – mapping (2014)

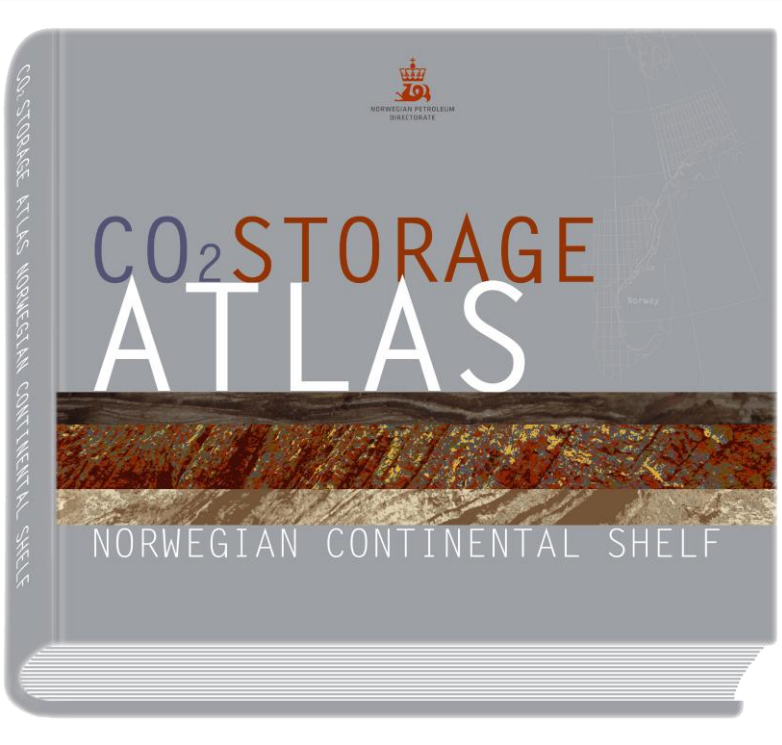


Saline aquifers in the North Sea

NOD has access to all data collected from the petroleum industry on the Norwegian continental shelf over 50 years. This is authorities' access to collected and analyzed data is stipulated in law.

~ 80 gigatons CO_2 storage capacity calculated.

[CO2 atlases - The Norwegian Offshore Directorate (sodir.no)]



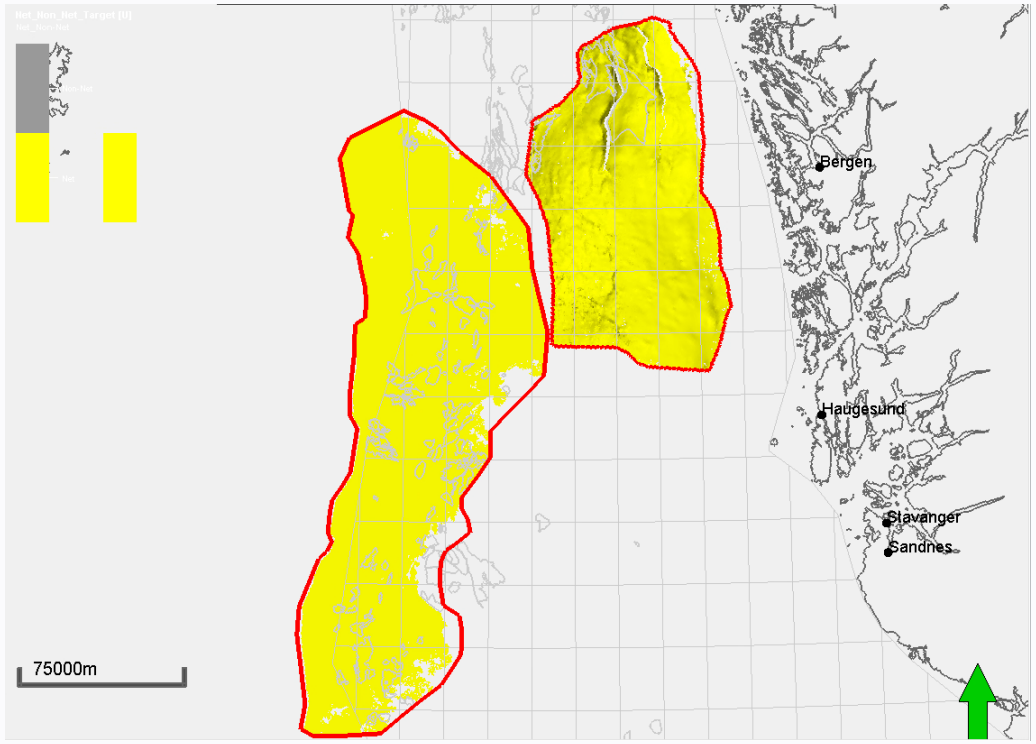
Aquifer capacity management

§ 5-3 in the Storage regulation:

*Any mutual **pressure influences** between storage locations in the same hydraulic unit are of such a nature that the requirements in these Regulations can be fulfilled **for both locations at the same time.***

How and who to manage?

- *Modelling*
- *Monitoring – access to data*
- *Sharing of data*



- NOD has developed large scale regional models, in the Frigg/ Heimdal and Troll area in the North sea.

- For CCS purposes these models can be used for better prediction of CO_2 migration and pressure development. The models are public.

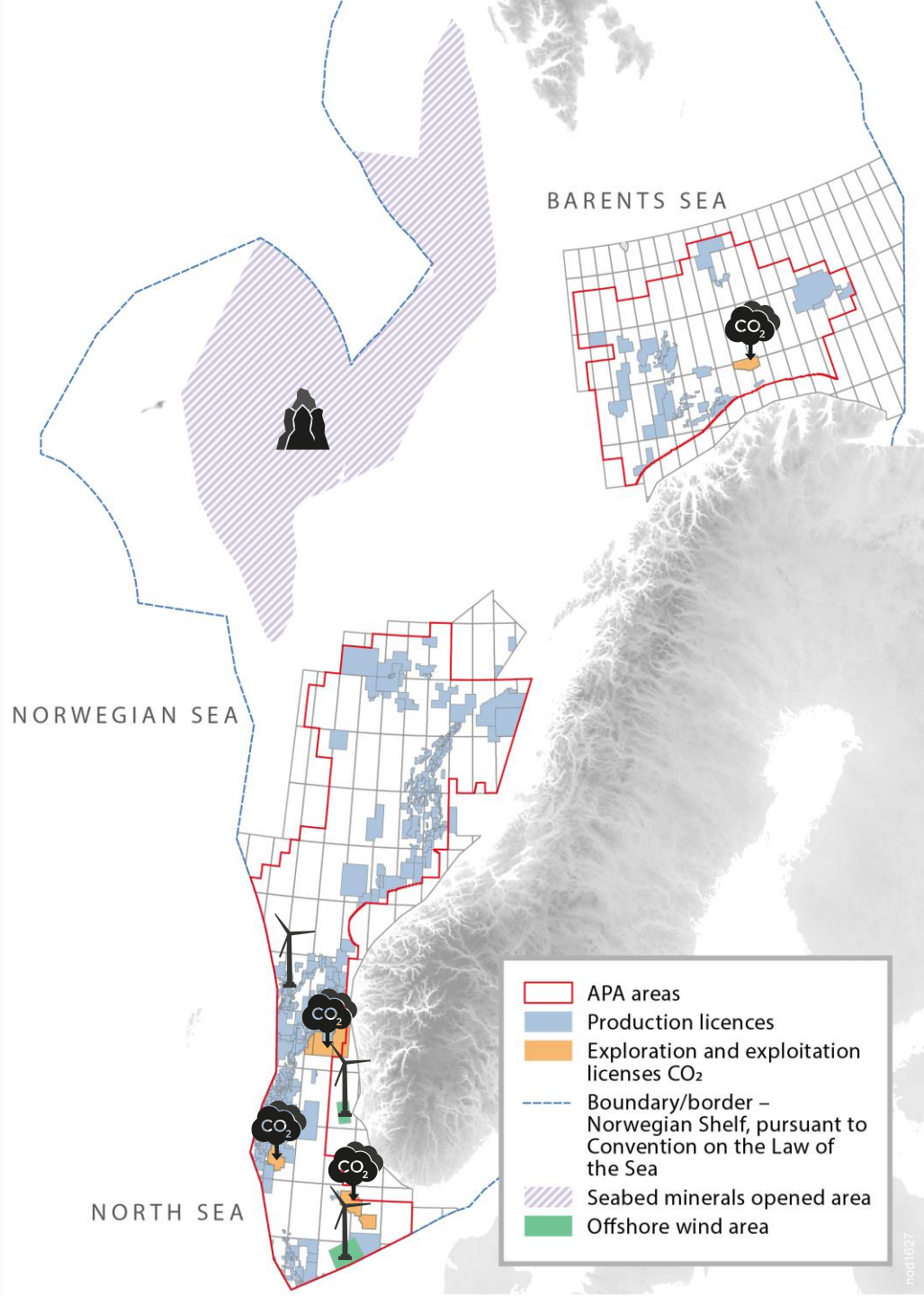
Coexistense!

Management areas are expanding

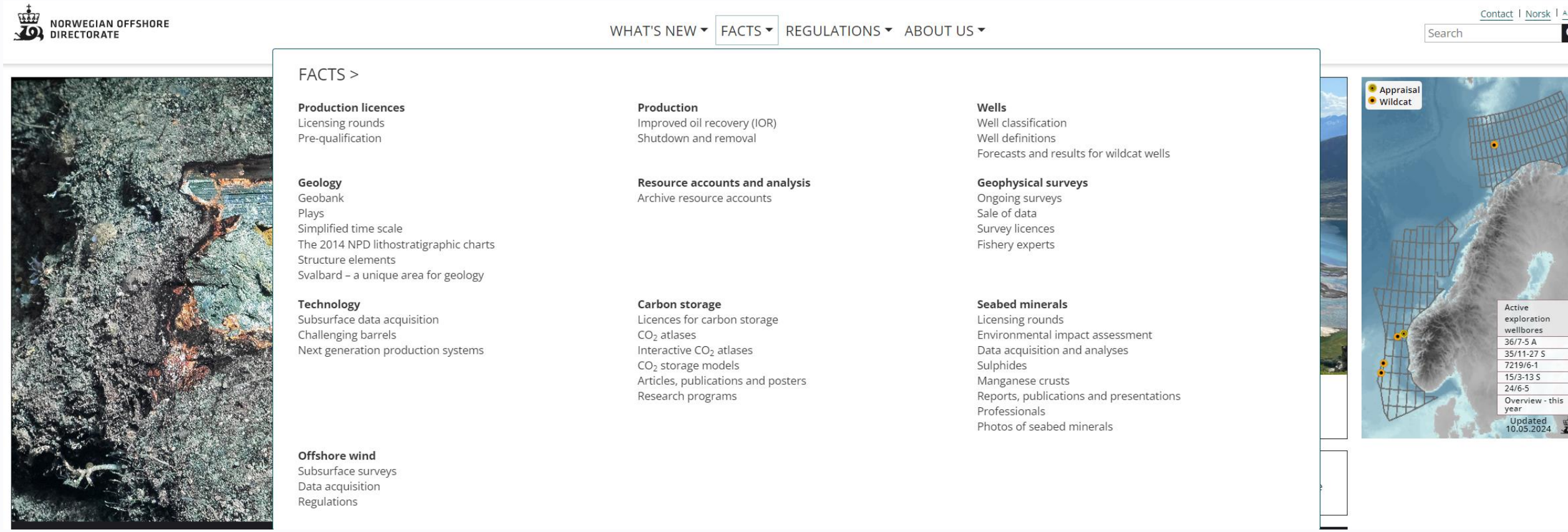
Offshore wind

Storing CO_2

Seabed minerals



And a lot more information on sodir.no



THANK YOU FOR YOUR ATTENTION

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SODIR.NO/EN

CO2-storage framework

- Based on the EU CO2-emission Directive
  Requirements to the member states; technical requirements to a storage licenses

- CO2 storage regulation. Regulations relating to **exploitation of subsea reservoirs** on the continental shelf for **storage of CO_2** and relating to transportation of CO_2 on the continental shelf
  Impact assessment
  Plan for development and operation (PDO/PIO) (Guideline expected within 2024)
  Monitoring plan

- Regulations relating to **materials and documentation** in connection with surveys for and utilisation of subsea reservoirs on the continental shelf to store CO_2
  NOD requirement
  Guideline guidelines-for-the-regulations-relating-to-documentation-for-co2-storage-on-the-shelf2.pdf

- CO2 safety regulation. Regulations relating to **safety and working environment** for transport and injection of co2 on the continental shelf (Norwegian Offshore Industry Authority (Havtil))

- The **London protocol** - IMO
  Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter
  Regulates transport of CO2 across borders

CO_2 Licenses Definitions

- **Survey License**
  The right to explore for subsea reservoirs for storage of CO_2.
  It is not an exclusive right to explore in the areas mentioned in the license and neither does it give preferential rights in the assignment of exploration licenses or licenses for exploitation of a subsea reservoir for storage of CO_2.
- **Exploration License (EXL)**
  An exclusive right to exploration with a view toward assessing the potential for exploitation of a subsea reservoir for storage of CO_2 in areas comprised by the license.
  This may include stratigraphically designated areas within one or more blocks or parts of blocks.
- **Exploitation License (EL)**
  An exclusive right to store CO_2 within the defined license area.