




Status on CCS in Denmark

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WHO ARE WE?



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Gjermund Blauenfeldt Næss is an Advisor in the Danish Energy Agency. He works in the CO2-storage team handling the framework, evaluation and supervision of the licenses for exploration and storage of CO2 in Denmark.



Mads Kjær Poulsen
Mads Kjær Poulsen is an Advisor at the Danish Energy Agency. His portfolio consists of aiding in the design and implementation of the Danish CCS subsidy funds.

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Danish climate targets, CCS strategy and potential
2. Overview & status on CCS funding schemes
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KEY TAKE AWAYS

- ❖ Denmark came late to the CCS-party but has moved fast since 2020!
- ❖ First tender for CCS-subsidy concluded, second tender has been published
- ❖ Ørsted has secured a state-sponsored contract to establish the country's first full-scale CCS project
- ❖ 2023 saw awarding of the 1st full-scale offshore CO₂ storage licenses in Denmark
- ❖ 1st Onshore CO₂ storage licensing round planned in near future



1. Political Context

Danish climate targets, CCS-strategy & -potential, latest development



DANISH CLIMATE TARGETS

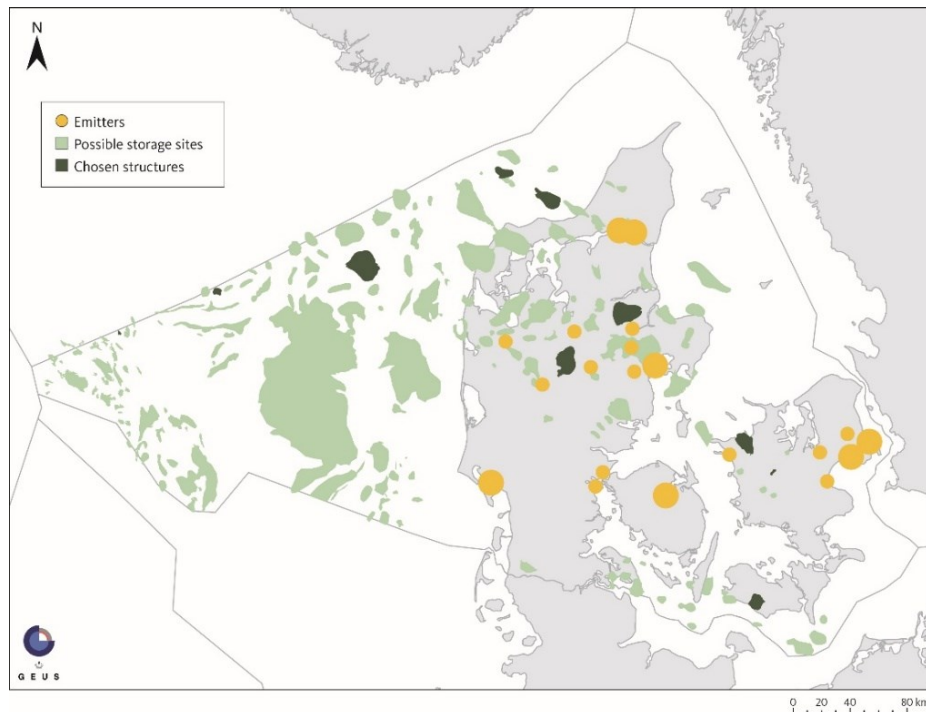
The Climate Act (2020)

Target of 70% reduction of greenhouse gas emissions in 2030 compared to 1990.
Sub-target in 2025 of 50-54% reduction of greenhouse gas emissions.

Long-term goal of climate neutrality by 2050 at the latest.

WHY DENMARK?

GREAT POTENTIAL FOR NATIONAL CCS REDUCTIONS AND GEOLOGICAL STORAGE OF CO₂



- National CCS reduction potential of 5,2-10,4 mio. ton CO₂ /y much of which stems from biogenic sources.
- Huge potential capacity for storage (**12-22 billion ton CO₂**). Equivalent of 400-700 times the Danish yearly CO₂ emissions.
- Strategic CO₂-storage location for the Baltic area and NW Europe



THE DANISH CCS STRATEGY (2021)

SUPPORTED BY A BROAD MAJORITY IN THE DANISH PARLIAMENT



- ❖ CCS will be used to reduce emissions from hard-to-abate sectors and contribute with negative emissions
- ❖ Support for CCS will not lead to a reduction in ambition to support energy saving policies, renewable energies and other sustainable low carbon technologies
- ❖ Prioritize the development of full scale CCS-value chain in Denmark
- ❖ Storage of CO₂ in Denmark should be environmentally sound and safe – and not be used for Enhanced Oil Recovery (EOR)
- ❖ Enable full scale CO₂-storage in Denmark and import/export of CO₂ with the aim of developing Denmark into a European hub for CO₂ storage

COLLABORATION



Bilateral agreements

- **29th of September 2022:** MoU signed with Belgium and Flanders (First of its kind)
- More agreements are in the pipeline

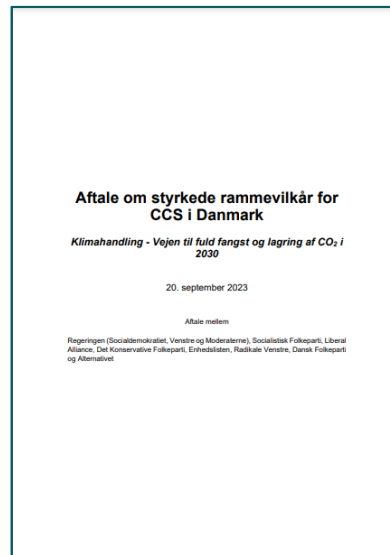
Cooperation agreements with NL, BE, GE, NO, UK



NEW POLITICAL AGREEMENT SEPTEMBER 20TH 2023



- ❖ Merging two subsidy funds into one subsidy fund
 - Making it easier for industry to understand and for the DEA to implement
 - **No support for CCU**
 - Combined fund of DKK 27 billion (EUR 3,6 billion)
 - **Two tender rounds in June 2024 and June 2025**
 - Capturing and storing 2,3 mio. ton CO₂ from 2029
- ❖ 20% state ownership of storage licenses both on- and offshore
 - Removing doubts and uncertainties in the market
 - State ownership will be administered through Nordsøfonden
 - **Onshore storage licensing round end of 2023**
- ❖ Denmark's first main law on CO₂ pipeline infrastructure
 - "All-purposes"-regulation
 - Removing doubts on expropriation rights
 - Ensuring third-party access to all CO₂ pipelines



2. Overview & status on CCS Subsidy Funds



OVERVIEW: DANISH SUBSIDY FUNDS

CCUS Fund (2020)

- ❖ One contract
- ❖ 0.4 Mtpa
- ❖ Contract period 20 years
- ❖ Fossil & biogenic CO₂
- ❖ 1.1 bn EUR

NECCS Fund (2021)

- ❖ Several contracts
- ❖ 0.5 Mtpa
- ❖ Contract period 8 years
- ❖ Exclusively biogenic CO₂
- ❖ 350 million EUR

CCS Fund (2023)

- ❖ Several contracts
- ❖ 2.3 Mtpa
- ❖ Contract period 15 years
- ❖ Fossil & biogenic CO₂
- ❖ 3.6 bn EUR



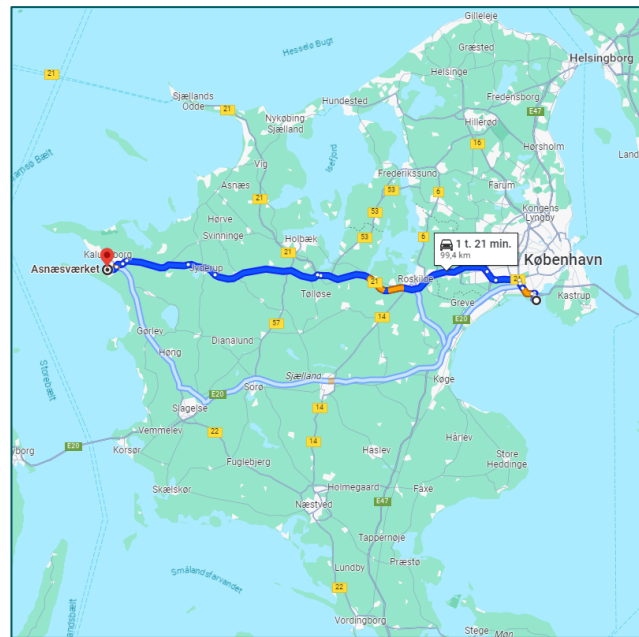
Target: 3.2 Mtpa CO₂ captured and stored in 2029



RESULT OF TENDER OF CCUS FUND



- ❖ Ørsted Bioenergy & Thermal Power A/S emerged as winner
- ❖ Capture and storage of 430,000 tonnes of (biogenic) CO₂ annually from 2026 and 20 years onward
- ❖ The CO₂ will be stored in Northern Lights storage complex in Norway
- ❖ Sale of carbon credits part of Ørsted's business case



3. Status: CO₂ storage in Denmark

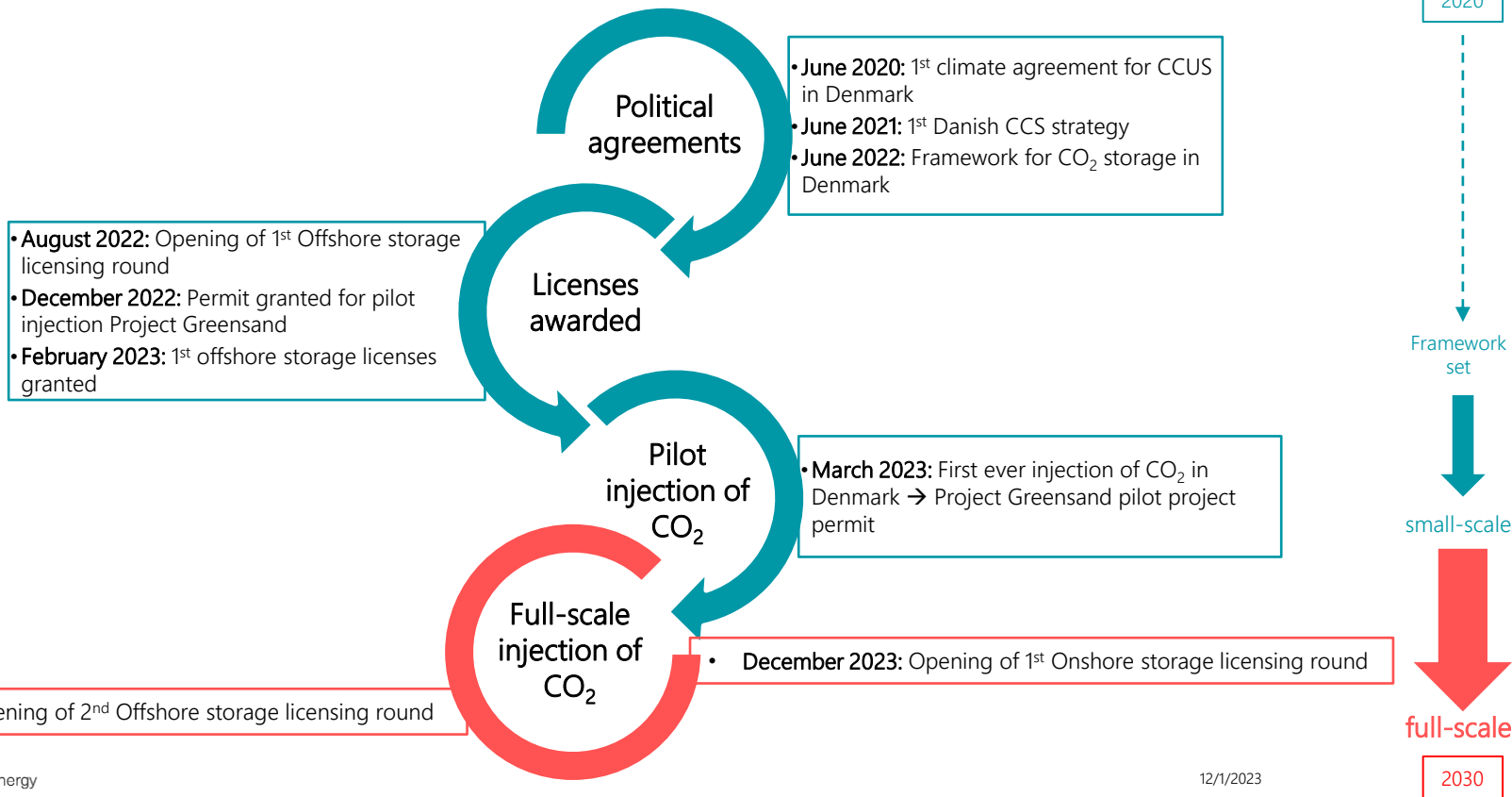
Offshore & onshore



UPSCALING OF CO₂-STORAGE IN DENMARK



TIMELINE FROM DEVELOPMENT OF FRAMEWORK TO ACTUAL INJECTION





CO₂ STORAGE PROJECTS IN THE MAKING



Project Greensand – INEOS

- License status: Exploration license C2023/01 granted February 2023
- License partners: Wintershall DEA (40%) and Nordsøfonden (20%)
- Pilot injection done
- Planned full-scale injection: 2025/26, 1.5 Mtpa – 2030, 8 Mtpa



Project Bifrost – TotalEnergies

- License status: Exploration licenses C2023/02 and C2023/03 granted February 2023
- License partner: Nordsøfonden (20%)
- Planned full-scale injection: 2030, 5 Mtpa
- Applied for PCI project



Figure: Picture from Project Greensand pilot injection, in the Nini West field.

1ST OFFSHORE STORAGE LICENSES GRANTED

AVAILABLE AREA AND AWARDED LICENSES FEBRUARY 2023

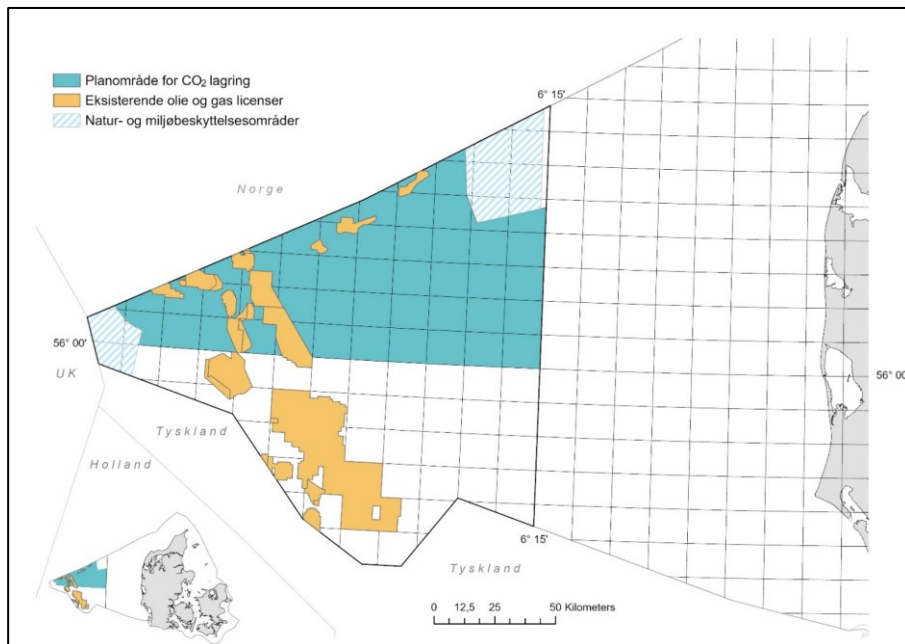


Figure: The boundary of the available area in the Danish North Sea on the Danish continental shelf west of 6 degrees 15' E and north of 56 degrees 00' N

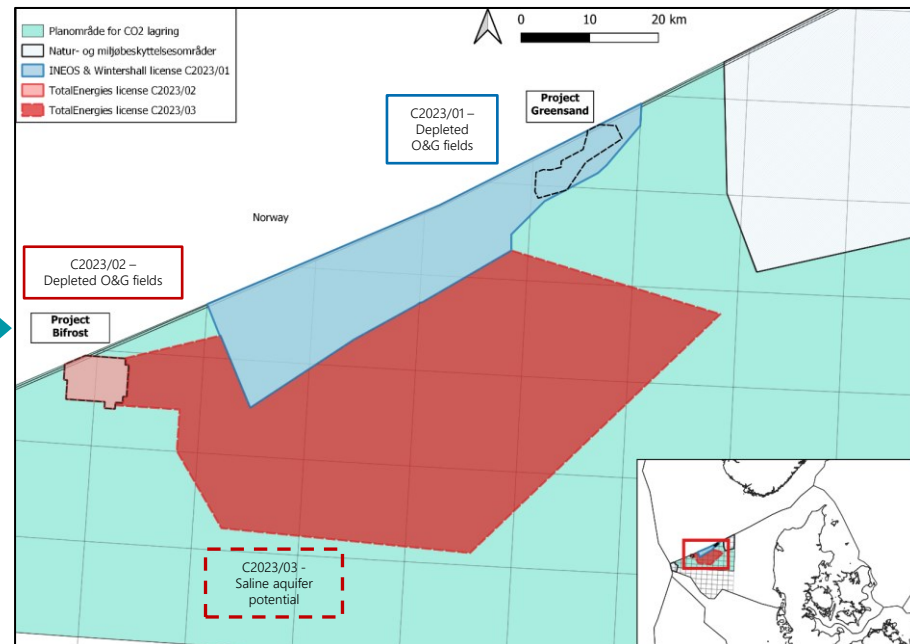


Figure: The awarded licenses (C2023/01, C2023/02 and C2023/03) to INEOS & Wintershall and TotalEnergies.



PLANNED CO₂ STORAGE PROJECTS

PUBLICLY ANNOUNCED BY COMPANIES - EARLY STAGE PROJECTS

- ❖ CO2RYLUS project Stenlille - Gas Storage Denmark
 - Gas storage operations experience
- ❖ Project Ruby – CarbonCuts
- ❖ Project Norne – Fidelis



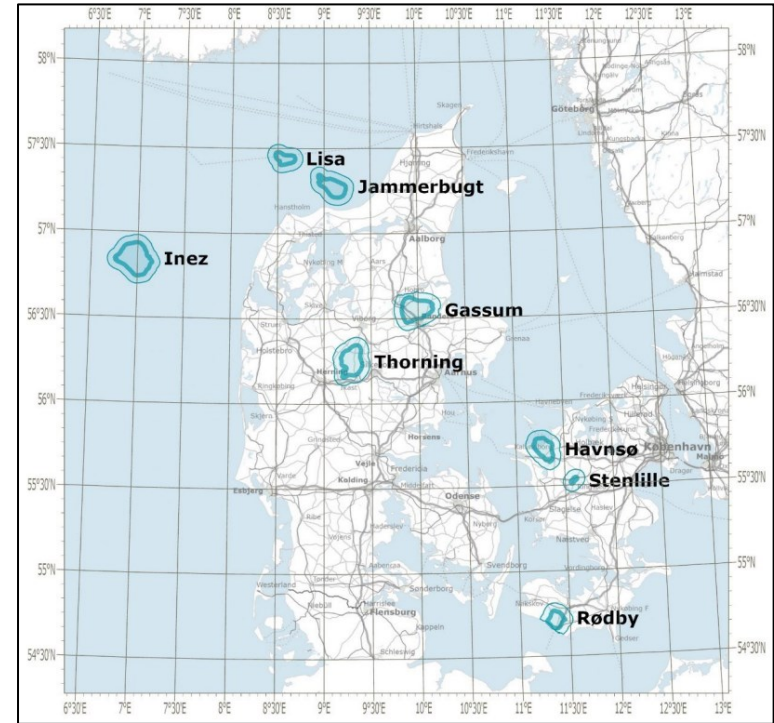
Figure: Picture from Gas Storage Denmark's gas storage operation in Stenlille.

STATUS: 1ST ONSHORE STORAGE LICENSING ROUND

DEVELOPMENT OF ON- & NEARSHORE STORAGE OF CO₂

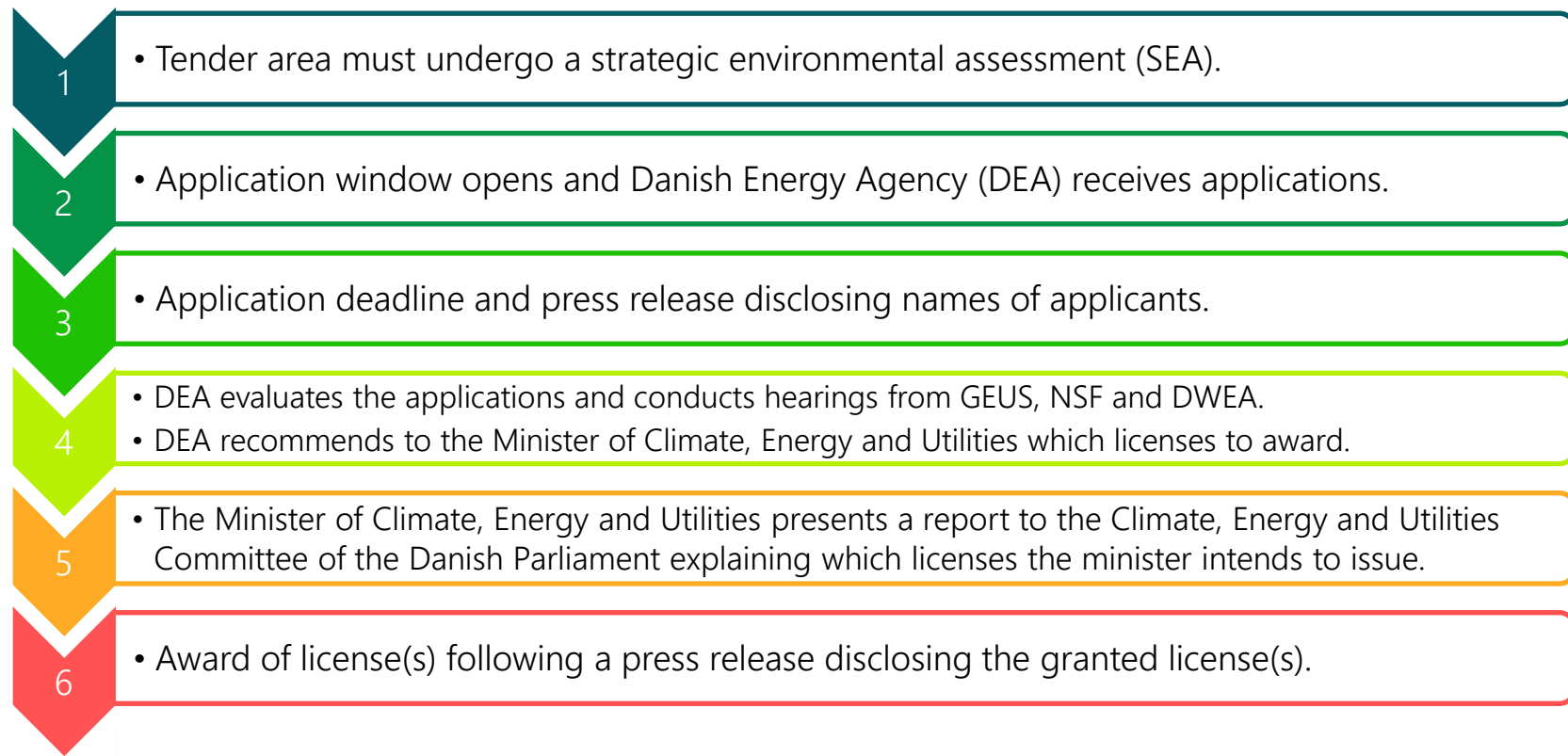


- The Geological Survey of Denmark and Greenland (GEUS) are conducting seismic studies of possible storage structures on land and nearshore.
- DEA is finalizing a strategic environmental impact assessment for potential on- and nearshore storage sites in sync with GEUS' seismic studies.
- The Strategic environmental impact assessment is expected to be completed by end of 2023.
- Onshore CO₂ storage licenses can open after the conclusion of the strategic environmental assessment.
- Stakeholders have disclosed their intentions to develop CO₂ storage sites on- and nearshore.





THE PROCESS FOR FULL-SCALE LICENSES





WHAT MAKES A GOOD APPLICATION?

The following items shall be covered and included in an application



FINANCIAL CAPACITY

- The latest 3 annual financial reports from the applicant as well as the cooperating companies.

- Organisation chart (group)

Budget

- Transparent detailed budget information in regards to the phases of the project

Financial plan

- A description on how the different phases of the project will be financed

TECHNICAL CAPACITY

- Description on former experiences as well as technical expertise in regards to the activities in question.
- A description of the geological knowledge at the time of application
- Which data are in possession and which data needs collection.
- Knowledge and previous experience in regards to the entire process of CO₂ storage.

WORK PROGRAM

1. Type of data collection.
 - Clear and concise work plan
2. Timeframe with the indication of the different phases.
 - Milestones and decision points
3. Detectability of specific storage sites in the area applied for.

The work program can be *crucial* especially if there is competition for the same area.

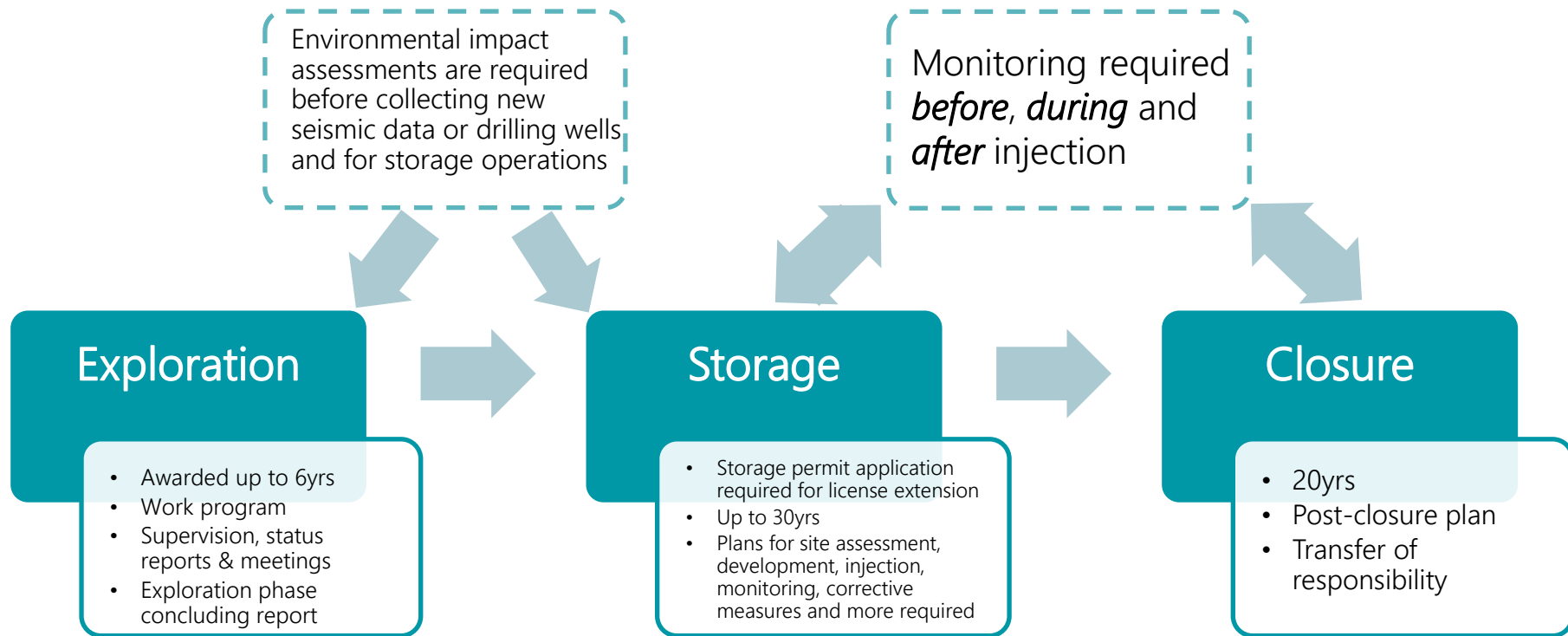
THE APPLIED AREA

- CO₂-storage site characterisation and assessment
- A map with coordinates.
- Geological and geophysical maps, including seismic lines, available at the time of application.



WHAT DOES A FULL-SCALE LICENSE ENTAIL?

EXCLUSIVE RIGHT TO EXPLORE AND, IF SUITABLE, STORE CO₂





LINKS TO FURTHER INFORMATION & CONTACT DETAILS

Read more:

- [Danish Energy Agency CCS homepage](#) (English)
- [The Danish Energy Agency awards the contract to Ørsted's full scale CCS project](#) (English)
- [Tender material for CCUS Fund & NECCS Fund](#) (English)
- [The Ministry of Climate, Energy and Utilities grants Denmark's first full-scale CO2 storage permits in the Danish North Sea](#) (English)
- [From oil and gas to a green storage facility: The first CO2 has been stored in the North Sea](#) (Danish)
- [Denmark enters into a number of agreements on closer energy connections to Europe](#) (Danish)



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Thank you