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TITLE Safe Carbon Storage to support Denmark's energy transition

SUBTITLE Size and scale matter

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A new multidisciplinary CO2 storage research program has been initiated at the Danish Offshore Technology Centre in order to develop cost effective and low risk CO2 storage solutions in depleted hydrocarbon chalk reservoirs and thus unlock a major storage potential in Denmark. Carbonate reservoirs, including limestones, dolomites and chalks, comprise one of the most prevalent types of hydrocarbon reservoir worldwide, and just in Denmark it may be possible to store up to 1000 million tons of CO2 in depleted chalk fields. However, the geochemical response of chalk and other fractured and layered carbonate rocks to CO2 and the geomechanical consequences need to be investigated carefully in order to de-risk storage.

The research program aims to determine whether chalk is suitable as a safe and long term storage reservoir for CO2. It includes modelling studies, covering a wide range of coupled simulations including chemical reactions and transport phenomena at different length scales, and laboratory experiments on core flooding at representative reservoir temperature and pressure conditions, geochemical analyses and geomechanical tests under similar in-situ conditions.

When CO2 is injected as a supercritical fluid part of it will dissolve in the formation water, which will cause the water in contact with the rock to become somewhat acid. Chemical processes taking place at the surface of the rock in contact with formation water and dissolved CO2 can lead to reservoir changes at different scales, both during injection and over time, which might affect injectivity, storage capacity or containment.

The poster shows a range of experiments and models being used to address the challenges of rock integrity, injectivity, storage capacity, containment and costs with regards to CO2 storage in depleted chalk reservoirs, for both short and long-term responses and at various scales.

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