CO2 Storage Capacity Below Structural Spill Point in the Utsira Formation

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The CO2 storage capacity in saline aquifers is highly dependent on the different trapping mechanisms that are available. The largest rock volumes are generally positioned either outside structural closures or below structural closures but deeper than the structural spill point.

We have studied time-lapse seismic and undertaken modelling to understand the trapping mechanisms below the structural spill point of the Utsira Formation in the Sleipner region, and have found that as much as 70 % of the CO2 is stored below the structural spill point. The study further shows that the CO2 is divided into layers, most of which are less than 7-8 m thick.

The fraction of CO2 in the uppermost layers is increasing with time. After the termination of the CO2 injection (ca. 2020), there will be a flow of CO2 from the deeper to the shallower layers, but a part of the CO2 will remain in the lower layers due to capillary and residual trapping. The remaining amount depends on the extent of these trapping mechanisms, on the irreducible water saturation, and on the reservoir inhomogeneities.

Modelling demonstrates that storage capacity estimates are highly dependent on the calculation methods and parameters (as grid size). This study nevertheless shows that large amounts of CO2 can be trapped below structural spill points even in relatively homogenous sandstones. We expect even more CO2 trapping below spill points in less homogenous reservoir sequences.