



Next steps for verifying European CO2 storage capacity Perspectives from the Baltic Region





CO2 storage research – 2004



In GESTCO project the Baltic Sea was obviously not covered (except from Danish islands). In CASTOR WP1.2 (led by GEUS) Poland was covered - onshore Mesozoic aquifers were investigated; HC fields including one depleted offshore oil field and coal beds.

EU GeoCapacity project (2006-2008)



GESTCO country GESTCO country update Full country evaluation Full country evaluation work initiated in CASTOR Neighbour country review





The storage capacity and source to sink scenarios in the Baltic Sea region were studied but the coverage was incomplete.

EU GeoCapacity project (2006-2008)



Offshore aquifers were identified but not assessed (except from Denmark); source to sink (aquifer) scenarios in Baltic states and Poland done onshore only. No assessment for Sweden was included, no storage capacity in sedimentary rocks in Estonia and Finland reported.

EU GeoCapacity project (2006-2008)



10.001 - 32.000

Coal Fields

One offshore (Middle Cambrian reservoir - east) and one coastal (Zechstein reservoir west) oil field in Poland were studied in EU GeoCapacity project.

Total storage capacity: **7+4=11 Mt** (static – volumetric replacement of hydrocarbons with CO2 assumed).

Further studies (2009-)



Polish national programme (2008-2012/13)



Regional studies on offshore Cambrian aquifer in Polish sector (area suitable for storage – in emerald) were carried out and the storage was estimated to be **861 Mt**. Storage capacity of the 4 hydrocarbon fields is up to 20 Mt, for the depleted one - **7 Mt**.

Studies of Swedish Geological Survey (input to the NORDICCS/NORDIC CO₂ Storage Atlas)



Regional studies identified the area of the offshore Cambrian aquifer (Faludden sandstone and L. Cambrian sandstones) suitable for CO₂ storage and also a coastal area where prospective Mesozoic aquifers appear.

Static storage capacity of the whole offshore Cambrian aquifer is estimated by SGU to be **1724 Mt** (Mortensen, 2014). Dynamic simulations in NORDICCS suggest 250 Mt of CO2 can be injected safely into Faludden sandstone (as in pilot injection designed under SWEDESTORE project – Gotland). 11 CO, GeoNet Open Forum, May 9 – 11, 2016 – Venice, San Servolo Island

BASTOR & BASTOR2 projects

- BASTOR and BASTOR2 projects (SLR, funded by Swedish and Finnish governments and GCCSI; 2011-2014) integrated available data on sources and sinks in the Baltic Sea region from above mentioned projects and other sources (also data from Russia).
- → The most important aquifer/reservoir (Cambrian) was evaluated. The Cambrian aquifer/reservoir (where numerous hydrocarbon fields occur, and for some of them CO₂-EOR scenarios were investigated, e.g. In Polish and Lithuanian sector) is the most extensive in the area in question and is covered up by a thick complex of Lower Paleozoic shales. The cut-off depth was below 900 m.



Static storage capacity (theoretical – no storage efficiency factor) was estimated to be 16 222 Mt (offshore aquifer makes 44% of that amount, i.e. about **7100 Mt**) and 'safe' dynamic storage capacity of the central part of aquifer area (where sector boundaries meet) was estimated to be about **250 Mt**.

BASTOR & BASTOR2 projects





global environmental solutions

BASTOR & BASTOR2 projects



BASRECCS and CGS Baltic

- Since 2012/2013 the forum of ministries of energy of Baltic/Nordic countries (BASREC) is providing a networking platform for CCS (BASREC CCS) where relevant tasks forces propose joint projects.
- One of such projects (CGS Baltic, GTK) is focused on elaboration of a proposal of a research project verifying CO₂ storage capacity and proposing transboundary scenarios in the Baltic region (a seed project).
- Gaps in data coverage in BASTOR project are to be identified and addressed and case studies proposed research and/or industrial pilots – examples for policymakers and interested stakeholders. The scope of research project generated by the seed project is not defined yet, but there is no room for a doubt that industrial application of CCS/CCUS in the Baltic region must employ transboundary scenarios of the full CCS chain.

Conclusions

- Sedimentary rocks suitable for geological storage occur in southern part of Baltic Sea and adjacent onshore areas and have a nonnegligible storage potential.
- → The most important and extensive is the Middle Cambrian aquifer/reservoir (where numerous hydrocarbon fields occur, and for some of them CO₂-EOR scenarios were investigated). Obviously the presence of hydrocarbon fields proves good reservoir properties of Cambrian sandstone (central part where sector boundaries meet and Latvian sector). Locally Permian-Mesozoic and Devonian aquifers are suitable for CCS.







In the remaining part of the Baltic region (Finland, Estonia, northern Sweden) mineral sequestration might be an alternative of CCS.







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