Analysis of environmental and cumulative impacts and risks of CCS in the Baltic Sea

April 2026

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Offshore CCS in the Baltic Sea: relevance for cetaceans

- HELCOM analysis of environmental and cumulative impacts of offshore CCS
- CCSFocus here: implications for harbour porpoise
- CCS may support climate mitigation, but adds new marine pressures
- Baltic Sea context makes risk assessment especially important

What offshore CCS means

- Capture CO_2 from industrial sources
- Transport by pipeline or ship
- Inject into deep geological formations beneath the seabed
- In the Baltic, likely storage in deep saline aquifers
- Activities include surveys, construction, injection, monitoring, and long-term oversight

Why the Baltic Sea is especially sensitive

- Shallow, semi-enclosed, brackish sea
- Slow water exchange and strong stratification
- Lower buffering capacity, so local acidification risks may be stronger
- Ecosystems already under high cumulative pressure
- Lower resilience than more open marine systems such as the North Sea

Why this matters for cetaceans

- Baltic harbour porpoise populations already highly threatened
- Baltic Proper harbour porpoise: **critically endangered**
- Belt Sea harbour porpoise: **endangered**
- Marine mammals already affected by noise, cumulative pressures, and prey changes
- Limited scope for additional disturbance

Main CCS risk pathway for cetaceans: underwater noise

- Seismic surveys needed for site characterisation and monitoring
- Construction, drilling, vessels, and infrastructure add further noise
- Noise can disrupt:
    - echolocation
    - communication
    - feeding
    - habitat use

In the Baltic, sound propagation can be complex and extensive due to salinity and stratification

Other relevant impact pathways

- Seabed disturbance from pipelines and drilling
- Habitat loss or fragmentation
- Sediment resuspension and possible contaminant release
- Indirect food web effects through impacts on benthic and pelagic ecosystems
- Potential leakage risk causing local CO_2 exposure and acidification

Cumulative impacts are central

- CCS would be added to an already crowded sea
- Overlap with:
    - shipping
    - fishing
    - offshore energy
    - military areas
    - cables and pipelines
    - legacy pollution and munitions

Report recommends integrating CCS into cumulative pressure and spatial planning frameworks

Spatial safeguards

- Avoid Natura 2000 and HELCOM MPA areas
- Avoid key habitats of endangered, threatened, and protected species
- For harbour porpoise habitats, apply **12 km buffer, preferably 20 km**
- Avoid highest cumulative pressure zones
- Use a precautionary, risk-based approach to siting and monitoring

Key messages

- Noise is the most direct CCS issue for cetaceans
- Repeated surveys and monitoring may be as important as construction impacts
- Baltic conditions justify a more precautionary standard than in the North Sea
- Cetacean protection needs to be built into CCS planning from the start

Conclusion

- Offshore CCS may have a role in climate mitigation
- But in the Baltic Sea it must not undermine biodiversity goals
- For ASCOBANS, the priority is clear:
- **avoid sensitive areas, minimise noise, and assess cumulative impacts rigorously**

Thank you!

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