



Storage site selection process in the North Sea for the ACT ACORN CCS Project

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The ACT ACORN is a CCS project funded by ERA-NET under the Horizon 2020 programme that aims to develop a protocol for a low cost, scalable full chain CCS hub that will capture CO₂ emissions from the St Fergus Gas Terminal in North East Scotland and store the CO₂ at an offshore storage site under the North Sea. The project will build the case around one of two potential storage sites; a pre-identified storage site Captain X with CO₂ storage planned in the Captain Sandstone, and a second site ('Site 2'). This work describes the methodology and process used in the selection of Site 2 the methodology of which can be applied in future CO₂ storage site selection processes globally.

For ACORN the initial Basis of Design ensured that the screening and appraisal methodology was suitable for the objectives of the project, that it should be low-cost and operational by 2022. To ensure this, infrastructure in the form of three pipelines (Goldeneye, WAGES and MGS pipelines) that connect the St Fergus Gas Terminal to North Sea fields are planned to be reused, to limit the total cost of implementation. A previously constructed database (CO₂Stored) of potential UK North Sea CO₂ storage sites was used as the baseline. The 579 storage sites in the database were mapped and those sites lying out with 50km from the three target pipelines were excluded. 113 sites complied with the Basis of Design requirements. Six further criteria were then applied to screen the sites, further reducing the number of suitable sites to 16: storage capacity >50MT, reservoir porosity >10%, permeability >100mD, availability for operation by 2022 (in hydrocarbon fields), good seismic data coverage and well data available. The remaining 16 sites were ranked according to six new criteria: theoretical capacity, injectivity, development cost, containment risk, storage efficiency and upside potential. These six criteria enabled ranking of the sites in order of suitability as the second storage site. The top six sites ranked were selected for a more detailed due diligence, that included an analysis of 3D seismic over the due diligence area, the reservoir properties (permeability, net-to-gross ratio, porosity, etc.), well-log interpretations, geological and engineering risks to containment and an indicative cost estimate.

The results of the due diligence process enabled the selection of 'East Mey' as a suitable option for storage site 2, based on robust data sources. The East Mey area has a significant potential storage resource and injectivity, a proven caprock system, which serves a primary role for several large oil and gas fields in the Central North Sea, and with access to useful, confidence-building static and dynamic data from hydrocarbon fields, which have produced from the target storage formation. The Captain X and East Mey sites will now be characterised and developed to allow full reservoir simulations of CO₂ injection to demonstrate their effectiveness as ACORNS from which a scalable, full-chain CCS hub can be developed in the UK North Sea.