

Koning, Maartje; Zikovic, Vedran; Van der Valk, Kaj; Pawar, Rajesh; Williams, John; Opedal, Nils; Dudu, Alexandra. 2023 Development of a Screening Framework for Re-Use of Existing Wells for CCUS Projects Considering Regulatory, Experimental and Technical Aspects. [Speech] In: *Middle East Oil, Gas and Geosciences Show, Manama, Bahrain, 19 Feb 2023*. OnePetro, Society of Petroleum Engineers.

Oil and gas fields that have reached their end of economic life provide a potential option for geologic CO₂ storage in support of the energy transition and efforts to reduce CO₂ emissions. Re-use of these existing wells can potentially result in significant cost savings compared to drilling new wells, but also presents a challenge for CCUS (Carbon Capture, Utilisation and Storage) development. Prior to conversion, evaluation of the feasibility of re-using existing oil and gas wells will be required, including consideration of operational and safety requirements. Currently, there are no standard approaches or public tools available to aid in the technical evaluation and to support decision making on well re-use potential for CO₂ storage.

The REX-CO₂ (Re-using EXisting wells for CO₂ storage operations) project, funded by the ACT (Accelerating CCUS Technologies) program has developed a first-of-its-kind assessment framework and evaluation tool based on state-of-the-art practices, standards, guidelines and international reference projects. The tool is designed to utilize available data on well construction, subsurface geology, well operational and integrity history to screen the re-usability of wells for CO₂ storage operations. The tool provides a thorough qualitative evaluation of the current re-usability potential of existing wells and highlights the most important issues requiring further detailed analysis. The results can be used to design and select mitigation options, ultimately identifying the most promising candidate wells.

The tool has been applied to multiple international case studies with tens of wells, both onshore and offshore, covering a wide range of well designs and subsurface settings. The overall goal was to test and demonstrate the evaluation process, identify remediation activities and providing a high-level cost benefit analysis. The tool has recently been applied successfully in the Middle East region for one of the national oil companies, showcasing the assessment framework and identifying potential remediation activities to safely convert a selection of wells into CO₂ injectors.

The tool development is supplemented by experimental research focused on well cement integrity due to its role as a well barrier element. The emphasis is on mechanical and chemical degradations and damage processes on well barrier elements, including investigation of novel self-healing and active remediation measures. In addition, state-of-the-art research on the conditions of well materials expected in CO₂ injection wells have been described, providing recommendations for material selection in a CO₂ CCUS storage setting. Lastly, the project evaluated the regulatory and environmental frameworks, permit requirements and social perspectives related to re-using existing oil and gas wells for CO₂ storage. All aspects (technical & non-technical) have been integrated in a final set of recommendations to provide insights into the factors that need to be addressed when considering existing wells for re-use in CO₂ storage operations.