Assessing the reusability of legacy well in Carbon Capture & Storage (CCS):a screening framework, its application and the impact

Rosener, A.[1], van der Valk, K.[2], Zikovic, V.[2], Pawar, R.[3], Williams, J.[4], Opedal, N.[5], Dudu, A.-C.[6], Cangemi, L.[7], Arts, R.[8]
[1]Wintershall Dea AG, Hamburg, Germany, [2]TNO Applied Geosciences, Utrecht, Netherlands, [3]Los Alamos National Laboratory, Los Alamos, United States, [4]British Geological Survey, Environmental Science Centre, Keyworth, Nottingham, United Kingdom, [5]Sintef Industry, Trondheim, Norway, [6]fNational Institute for Research and Development on Marine Geology and Geo-ecology, Bucharest, Romania, [7]IFP-EN, Rueil-Malmaison, France, [8]Neptune Energy, Gravenhage, Netherlands

Existing oil and gas fields provide an option for geologic CO_2 storage as part of the reduction of CO_2 emissions. Re-use of existing infrastructure such as oil and gas wells for CO_2 storage can potentially result in significant cost savings. Prior to converting the existing oil and gas wells, feasibility of their use as part of a CO2 storage operation will have to be evaluated while taking into consideration operational and safety requirements. Currently there are no standard approaches or public tools available to aid in this evaluation.

Based on state-of-the-art practices, standards, guidelines and international reference projects, the REX-CO2 (Reusing Existing wells for CO_2 storage operations) project, funded by the ACT (Accelerating CCS Technologies) program, has developed an assessment framework to evaluate the re-use potential of existing oil and gas wells.

Integral part of the project is a stand-alone well screening tool designed to utilize available data on well construction, subsurface geology and well operational and integrity history to qualitatively screen the reusability of wells in a consistent manner aiding concept selection and decision making processes.

The tool has been applied to multiple international case studies of which some have already been completed, covering a wide range of well designs and subsurface settings, with the overall goal to test and demonstrate the evaluation process.

A further focus area of the REX-CO2 project is experimental work on well cement integrity due to its role as a well barrier element, with emphasis on mechanical and chemical degradations and damage processes.
Also, the project evaluates existing regulatory and environmental frameworks, permit requirements, and social perspectives related to reusing existing oil and gas wells for CO_2 storage.
Lastly, technical recommendations for well re-use are being developed by combining the knowledge and lessons learnt during the project. The provision of these recommendations will provide a reference document for both operators and relevant regulatory authorities, promoting the safe re-use of wells in accordance with current technical best practice.

This presentation will provide an overview of the assessment framework, evaluation tool and its application to case study fields and potential CO_2 storage sites. It will illustrate well screening results, common issues and mitigation strategies, and give an outlook on the REX-CO2 projects recommendations on the reuse of wells including the impact such methods could have on the implementation of CO_2 storage development in general.