An ECCSEL ERIC project

Thursday, July 12th, 2022, 14-15 CET

WEBINAR

Monitoring technologies for CO_2 geological storage sites

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Speakers

Jon Gibbins– Director of the UK Carbon Capture and Storage Research Centre, Univ. of Sheffield

Kevin James Huhhes – Senior lecturer**,** Department of Mechanical Engineering**,** Univ. of Sheffield

Helen Taylor-Curran – Senior Geochemist and Soil Gas Scientist, British Geological Survey

Ceri Vincent - President of CO_2GeoNet, British Geological Survey

Q&A session chaired by:

Jonathan Pearce, CO_2 Storage team leader, British Geological Survey

WHAT WILL YOU LEARN

Monitoring technologies for CO_2 geological storage sites.

It is a requirement of the European directive on the geological storage of CO_2 (the CCS Directive) that storage projects demonstrate the storage complex is behaving as expected and the injected CO2 is safely stored. This requires an effective, appropriate Monitoring, Measurement and Verification (MMV) programme.

Having already responded to requirements for monitoring CO_2 capture (e.g. the use of solvents, part one of this webinar), we follow the route of CO_2 into long term storage in the deep subsurface. We consider the tools and techniques used to verify the location and behaviour of CO_2, and to monitor for migration/leakage at injection wells, reservoirs and seals. Deep monitoring techniques are used to monitor the CO_2 storage reservoir and primary caprock to verify that the injected CO2 is trapped in the storage reservoir and is not migrating outside of the storage complex. The monitoring programme will include contingency monitoring plans which would be rolled-out if data indicated that the storage complex were not responding as expected. This will include both deep and shallow MMV techniques.

Should injected CO_2 migrate upwards from the storage complex into shallower saturated or unsaturated zones, or to the surface, there are established and emerging options for monitoring at the near-surface. We will examine how CO_2 might be located, attributed and quantified, as well as the benefits of visibly monitoring for CO_2 in soils and the lower atmosphere, the zone in which we live.

ECCSEL ERIC (European Research Infrastructure Consortium) was established in June 2017 as a permanent pan-European distributed research infrastructure, with the main objective of enhancing European science, technology development, innovation and education in the field of CCUS, in orderto combat

ECCSELERATE project is aimed at increasing the accessibility to the excellent network of facilities already established in ECCSEL ERIC for a wider user group, part of the research and industrial community.

For further information visit our website

eccsel.org

eccsel.org/about/eccselerate/

KEYNOTE SPEAKERS

Jon Gibbins

Jon Gibbins is Professor of CCS at the University of Sheffield and director of the UK CCS Research Centre. He has worked on energy engineering, fuel conversion and CCS for 45 years, initially in industry and then as a university academic. Since 2002 Jon has been heavily involved in CCS activities, working on post-combustion capture and its effective integration and, through the UKCCSRC, helping to start now-mainstream UK initiatives on industrial decarbonisation (2012) and CCS clusters (2016). His personal research activities now centre around practical aspects of CCS deployment, with an emphasis on policy and economic requirements plus detailed analysis of matching capture plant designs to market conditions, supported in particular by the facilities at the Translational Energy Research Centre in Sheffield.

Kevin James Hughes

Kevin obtained his degree and PhD in 1987 in Chemistry at the University of Leicester. Since then, he has held positions at the University of Oxford, Shell Research Limited, and the University of Leeds before taking up a position as Senior Lecturer since February 2015 in the Department of Mechanical Engineering at the University of Sheffield.

His research work is in the areas of Alternative Aviation Fuels consisting of experimental investigation on laboratory scale burners, detailed chemical mechanisms of combustion processes and fuel deposit formation. The area of Carbon Capture & Storage consisting of process simulation studies, work on amine chemistry degradation chemical kinetics and quantum chemistry modelling. The area of small PEM Fuel Cell systems both experimental and modelling studies. And finally, whole energy systems simulation.

Helen Taylor-Curran

Helen is a Senior Geochemist and Soil Gas Scientist at BGS. She is a board member, BGS lead and the UK node representative for ECCSEL. Helen is heavily involved in monitoring of CO_2 in soil gas for CO_2 storage monitoring, and for other low-carbon geoenergy technologies. She has led soil gas activities for a range of European projects including SECURe, GEMex, ENOS, the development of the UK Geoenergy Observatories and the Environmental Baseline Monitoring project (UK unconventional gas). Helen provides access to the BGS Near Surface Gas Monitoring facility through ECCSEL. She is also responsible for developing SECURe's legacy initiative, the International Platform for Environmental Monitoring, that exchanges knowledge and good practice in environmental monitoring and community engagement and is actively developing participatory monitoring tools to supplement traditional monitoring approaches.

Ceri J. Vincent

She graduated with an MSci in geophysics from the University of Leeds in 2000. She has worked at the British Geological Survey (BGS) on CO_2 storage projects for over 21 years. This includes interpretation of geological and geophysical data for assessment and characterisation of potential storage sites at a range of scales (basin to reservoir). Ceri is President of CO_2GeoNet, the European Network of Excellence on geological storage of CO_2 (2019 – 2023).

Ceri is science lead for the UK Energy Research Accelerator GeoEnergy Test Bed, a field laboratory designed to advance understanding of processes and impacts in the shallow subsurface in order to refine monitoring techniques and technologies for CO_2 storage sites. Ceri led the workpackage on 'managing leakage risks for protection of the environment and groundwater' for the CO_2GeoNet H2020 ENOS (ENabling Onshore Storage) project. Ceri is currently leading the workpackage on collation of geological data to enable assessment of the potential for geological storage of Hydrogen in Europe for the H2020 Hystories project.

WHAT IS CCUS?

Carbon capture, utilisation and storage, or CCUS, is an important emissions reduction approach that can be applied across the energy system, in both power generation and industrial sectors.

CCUS encompasses methods and technologies to remove CO_2 from the flue gas and from the atmosphere, followed by recycling the CO_2 for utilization and determining safe and permanent storage options:

- **Capture** technologies allow the separation of CO_2 from gases produced in electricity generation and industrial processes.
- After capture, carbon dioxide must be **transport**ed to the storage or utilization site. CO_2 is an inert gas and can be easily handled and transported in high-pressure pipelines. Alternatively, it can be transported in industrial tanks by ship, rail and truck.
- There are several possibilities for long-term CO_2 **storage** in safe conditions. Generally, CO_2 is stored in carefully selected geological rock formations that are typically located several kilometres below the earth's surface.
- **Utilization** technologies allow to use CO_2 to make valuable products, such as clean fuels, building materials or consumer goods. A clear example of circular economy, where the CO_2 becomes a raw material rather than a waste by-product.