CCUS Conference

21-24 February 2022
Virtual Events

ORGANISED BY

Wednesday 23rd February – Operations & Infrastructure

Conference Co-Chairs

Alex Crossland

Alex graduated from the University of Nottingham in 1998 with a BEng in Environmental Engineering before then going on to complete a Masters in Petroleum Engineering at Heriot-Watt University in 2000. He then joined Reeves Wireline, a small logging company which took him to Oklahoma, Texas, Alberta and then Aberdeen in 2002. He continued to work in the North Sea and internationally before moving to Total as an offshore Well Services Supervisor, Read Well Services developing hydraulic expanded completion products and EV cameras as Region manager for Europe and West Africa. Since 2016 Alex has consulted for a variety of small technology companies focussed on well logging and intervention but is actively following the energy transition which lead to him volunteering for the recently formed SPE Aberdeen Net Zero Committee and the Geothermal and CCUS Conference Committees.

Gavin Ward

Gavin has an economic, accounting and technical skill set from over 30 years in the oil and gas industry at major international operators and independents. He has peer-reviewed and valued assets and companies in Europe, Middle East, Far East, Africa and North America. Mr. Ward is an expert on risk and volume estimation, and is able to translate technical evaluations into meaningful economic and financial assessments as a Chartered Accountant/CPA and professional geoscientist. He has used these skills previously as a sedimentologist for Corex, geophysicist for Phillips Petroleum; corporate business advisor for Noble Energy (based in Houston); Europe & Mediterranean Portfolio Manager for Noble Energy; Reserves and Economics manager for UK utility Centrica, and Regional Subsurface Manager for Centrica Energy Upstream when he also managed a team working on a CCS feasibility study for North Morecambe gas field. He currently manages the EAME regional office, based in London, for RISC Advisory, a global technical energy consultancy. Mr Ward holds a B.Sc (Hons) degree in physics and geology from Aston University in the UK, an MBA from Cranfield School of Management in the UK, Dip M. Post Graduate Diploma in marketing, MCIM Chartered Institute of Marketing, UK; and is a fellow of the Association of Chartered Certified Accountants.

Wednesday 23rd February

THEME – OPERATIONS & INFRASTRUCTURE

Conference Co-Chairs - A. Crossland & G. Ward /// Session Chair - E. Godding /// Session Co-Chairs - Bruce Kennedy, Iain Martin, Reza Sanaee

10:00	Opening statement	A.Crossland/G.Ward
10:05	Keynote #1	Craig Frenette, VP, Brookfield Asset Management
10:25	Linking capture to storage - offshore pipeline considerations in CCUS	Phil Cooper, Petrofac
10:45	Structured methodology for repurposing of existing pipelines for CCUS service	Ian Matheson, Kent plc
11:05	Carbon dioxide monitoring and assessment with advanced surface logging technologies: challenges and successful outcomes	Alessandro Pozzi, ENI
11:25	Q&A	
11:40	Coffee Break	
11:50	When Time-lapsed Pulsed Neutron Logging is a Real CCUS Monitoring Solution	Saida Machicote, ENI
12:10	Cost effective monitoring of geological CO_2 storage utilising compressive sensing schemes	Hayley Vosper, British Geological Survey
12:30	Q&A	
12:45	Lunch	Sponsored by RISC Advisory
13:15	Advances in Distributed Acoustic Sensing (DAS) monitoring for CCS projects: The DigiMon project	Anna Stork, Silixa
13:35	Building sustainable and robust CCUS infrastructure: A cornerstone of the energy transition	Leila Faramarzi, Vallourec
13:55	TECHBYTE - An AI enabled early warning decision support system for induced seismicity monitoring of carbon capture and storage fields	Jacqueline S Floyd, Baker Hughes
14:00	TECHBYTE- Seismic technologies for cost effective monitoring of carbon storage sites	Will Bradbury, TGS
14:05	Q&A	
14:20	Coffee Break	
14:30	New techniques of measurement and verification for CCUS	Sebastian Kroczka, Halliburton
14:50	Operational and monitoring challenges over 6 years of injection at Aquistore	Zeinab Movahedzadeh, Petroleum Technology Research Centre
15:10	Q&A	
15:20	Closing statement	A.Crossland/G.Ward

Session Three Operations & Infrastructure

Session Chair – Emma Godding, Fugro

Emma has spent much of her career in the geoscience business, initially as a geoscientist offshore but latterly in commercial and business development roles for Fugro in Norway, UK, and Australia. Emma's primary focus is the use of geophysics to derisk offshore infrastructure projects and with a background in both environmental and geoscience she is passionate about the role geoscience (and geoscientists) will play in achieving net zero.

Session Co-Chairs

Bruce Kennedy, OGA

Bruce is an internationally experienced reservoir engineer with over 30 years with bp working in numerous countries. He has worked as a subsurface team leader, a senior level engineer and a trainer in upstream management. He has worked across operations, new projects and subsurface on field developments, mergers and acquisitions, gas contracts, joint ventures and from new field start-up to cessation of production across the range from deep water assets to land operations.
He graduated from Heriot-Watt University with a Master of Engineering degree in Petroleum Engineering and an Honours Bachelor's degree in Offshore Mechanical Engineering. Currently Bruce is an advisor with the UK Oil and Gas Authority on the UK reserves and resources and CO2 storage.

Iain Martin, Net Zero Technology Group

Iain is the CCUS Theme Lead at the Net Zero Technology Centre. As part of the Energy System Integration team Iain is responsible for delivering projects in the priority areas of Carbon Capture, utilisation, and transportation and storage.
He is a geoscientist, whose career started at the operational end of seismic acquisition, before moving on to developing specialist geophysical workflows and application of big data to deepen our understanding of the subsurface. Iain is passionate about transferring those skills and knowledge into the development and deployment of technology for an affordable net zero energy industry.

Keynote

Craig Frenette, Brookfield Asset Management

Craig is a Vice President with Brookfield based in Calgary. His responsibilities include engineering and financial due diligence supporting transactions and asset management for Brookfield's investments in the energy sector globally. He is also part of the Investment Team for the Brookfield Global Transition Fund, which at a size of US$14.5bn is the largest fund focused on energy transition and decarbonization investments. Prior to joining Brookfield, he worked as a reservoir engineer with Cenovus Energy, and prior to that at Fekete Associates (now part of IHS) in the reserve evaluations group. Craig holds a Bachelor of Science (Distinction) in Chemical Engineering from the University of Calgary, and is a registered professional engineer in the Province of Alberta. He is also a Chartered Financial Analyst charter holder.

Linking Capture To Storage: Offshore Pipeline Considerations In CCUS
Phil Cooper, Petrofac

In the UKCS and elsewhere, substantial pipeline infrastructure is needed to transport captured CO2 to offshore storage locations. This element represents a significant portion of the total system cost, and requires careful design and operation. To date, only two offshore CO2 transport pipelines are operating worldwide, but many more are planned. Reliable and economic pipeline systems are critical to successfully unlocking CCUS opportunities in mature offshore basins like the North Sea. This presentation will cover:

- High level design and operating considerations for CO2 pipelines: what is different and what is the same as more familiar gas transmission pipelines.
- Opportunities to repurpose redundant offshore pipelines for CO2 transport.
- What we need to do to prove an elderly gas pipeline is OK for 20+ more years of CO2 service.
- The role of the pipeline in protecting the injection system from upstream process plant output variations or process trips.
- What the pipeline sector is doing to reduce risk and improve economics of CCUS.

Phil leads the subsea and pipeline team in Petrofac, which incorporates KW which he helped establish in 1999. Current projects include design of onshore and offshore pipelines for hydrocarbon, hydrogen and CO_2 service; subsea decommissioning; and support to field development studies.
Phil has contributed to technical advances many aspects of subsea and pipeline engineering, drawing on worldwide project experience spanning 25 years. Before entering the subsea oil and gas sector, Phil provided structural engineering and advanced analysis consultancy services to a wide range of landmark projects, from the UK's tallest sculpture to the world's tallest building. He is now overseeing the early phase design of the pipelines element of a major UK CCS project. Phil graduated from Loughborough University, UK, and is a Fellow of the Institution of Mechanical Engineers.

Structured Methodology For Repurposing Of Existing Pipelines For CCUS Service

Ian Matheson, Technical Authority, Kent Plc

Evaluation of repurposing of existing hydrocarbon pipelines is a requirement of OGA Stewardship Expectations and is a key enabler for CCUS, providing multiple benefits and risk reduction including avoidance of construction in environmental sensitive areas, reduced carbon emissions, reduced consenting, earlier deployment and reduced CAPEX.
Candidate pipelines may have been installed in the last century with several decades of prior hydrocarbon service. Demonstration of repurposing encompasses several elements:

- Confirmation of pipeline condition including corrosion defects or anomalies from prior hydrocarbon service, and completeness of manufacturing and fabrication data.
- Confirmation of suitability of materials such as fracture toughness and compability of valve components.
- Requalification to contemporary design codes including conformance of materials, welding and design to the current requirements.
- Confirmation of design pressure or potential uprating to avoid capacity restrictions given dense phase operating and reservoir storage pressures.
- Demonstration of life extension by a risk based approach which focusses on time dependent threats and considers the uncertainty over the required life of CCUS schemes.

A structured methodology will be presented which provides assurance of asset repurposing. The methodology is developed upon a roadmap which logically sets out the required activities and data within each element, and identifies the interdependencies between tasks.

Ian has 30 years' experience in the design, assessment and integrity management of subsea facilities and pipelines. Ian is Kent's Technical Authority for Subsea and Pipelines, responsible for the technical quality of all subsea and pipeline work. Ian has provided technical direction and delivery management to multidisciplinary teams on the design and verification of numerous North Sea and international pipeline and subsea projects. Ian leads the integrity management of the BBL Gas Interconnector, and has provided technical assurance to a number of pipeline life extension and change of use studies.
Within energy transition, Ian is the pipelines technical lead for the Appraise and Pre-FEED phases of the CCUS project which includes the reuse of a offshore gas trunkline. Ian has also provided technical guidance to a number of studies for new build onshore CO_2 and H_2 pipelines.

Carbon Dioxide Monitoring And Assessment With Advanced Surface Logging Technologies: Challenges And Successful Outcomes

Alessandro Pozzi, G.N. Pinna S. Mazzoni S. Eni Natural Resource

Accurate and reliable Carbon Dioxide (CO2) estimations have significant impact on recent Carbon Capture Utilization and Storage (CCUS) projects, especially for CO2 plume distribution modelling, monitoring and mapping through depleted reservoirs subject to storage. Most of the technologies applied so far involved indirect measurement, making CO2 quantification challenging due to the chemical reactions involved within circulation fluids.

This paper will address the problems related to CO2 detection in drilling wells, describing the state of the art of the existing technologies for direct measurement and providing an overview for further development of the equipment that might be applied for CCUS projects.

Infrared Spectroscopy (IR-S), Micro Gas Chromatography (Micro-GC), Gas Chromatography-Mass Spectrometry (GC-MS) - provided by the Advanced Surface Logging - represent a good solution to obtain semi-quantitative measurements on surface, especially if combined with subsurface analysis, contributing to understand CO2 migration in depleted fields after injection campaigns.

Some case studies of CO2 monitoring will be here discussed, showing good results in terms of representativeness (compared to PVT analyses) to infer CO2 distribution within the reservoir.

Alessandro is an Operational Geologist with Eni. In his current role he is involved in the coordination of programs for the acquisition of geological data for oil wells; this also includes defining technical specifications. In addition, he is responsible for monitoring data collection, preliminary interpretation and production of studies to compute reservoir parameters.

Alessandro has bachelor degrees in Geology & Natural Resources and Industrial Engineering and Management; he also has an MSc in Applied Geological Sciences.

When Time-lapsed Pulsed Neutron Loggings Is A Real CCUS Monitoring System

Saida Machicote, Marco Pirrone, Giuseppe Galli, Massimiliano Borghi, Eni S.p.A.

In Carbon Capture, Utilisation and Storage (CCUS) projects a paramount role is played by monitoring activities. The accurate identification and possible characterization of carbon dioxide (CO2) plume at spy-wells is a critical aspect for the understanding of injection and reservoir behavior. This is even more important in depleted gas reservoirs since methane (CH4) and CO2 mixtures can migrate at different pressure/temperature/saturation regimes, and a detailed discrimination of the two components could be not straightforward. In this respect, time-lapse pulsed neutron logging (PNL) can represent a viable cased-hole monitoring option.

This work is aimed at shading light on the PNL diagnostic capability through an in-depth analysis performed on a selected case study. Several simulations of PNL responses are performed in order to forecast the deviation from acquired pre-injection baselines, according to the possible arrival of a plume composed by a CH4-CO2 mixture with different relative concentrations, displacing different amounts of water volume fraction, and at different pressure and temperature. The uncertainty of the outputs is also quantified by means of an ad-hoc Monte Carlo approach. The final outcome is a useful template to understand when PNL is a real and quantitative monitoring solution during the different phases of the CCUS project.

Saida graduated in Physics at the University of Perugia in 2015 and she has 2nd Master degree in Petroleum Engineering and Operations from Politecnico di Torino. Her experience in Eni started in 2017 during her Master's thesis where she worked on a new NMR-based method for the determination of trapped gas saturation on rock samples. She joined Eni in 2018 and she was involved in various research activities, R&D projects and Business Unit supports in the areas of geomechanical and petrophysical laboratory studies. She is now a Production Petrophysicist in the advanced well characterization department. Her activity is mainly focused on wellbore integrity and monitoring studies applied to Carbon Capture, Utilization and Storage (CCUS) and Underground Hydrogen Storage (UHS) projects.

Cost-effective Monitoring Of Geological CO_2 Storage Utilising Compressive Sensing Schemes

Hayley Vosper, GA Williams & JC White, British Geological Survey

Subsurface monitoring is an essential component of any CO_2 storage operation. Time-lapse, 3D seismic surveys are widely accepted as primary data for CO_2 imaging but can be expensive to acquire. Options to reduce costs include the deployment of semi-permanent recording stations on the seabed. Sparse data could be acquired with a system of this type with a focus on key azimuths (2D monitoring) or with a well–spaced 3D distribution, with the potential to expand the recording array as required. Compressive sensing utilises sparsity in data, in a given transformation domain, to reconstruct a high-resolution signal from a limited number of randomly-distributed observations. Various studies have demonstrated the applicability of compressive sensing concepts to seismic data, and this contribution seeks to evaluate the effectiveness of using a sparse array coupled with compressed sensing to image a CO_2 plume. Two case studies were used, based around past and potential CO_2 storage offshore Norway. Firstly, a CO_2 injection scenario was run on a model of the Smeaheia site and synthetic seismic data generated. An image of the plume was reconstructed using compressive sensing from a small proportion of the original data. Secondly, the study was repeated using 2D seismic data from the Sleipner operation. The minimum data required to image the CO_2 plume with compressive sensing is significantly less than the fold available at Sleipner.

With a background of mathematical modelling Hayley has been working in CO_2 storage for over 8 years. Hayley works on various aspects of modelling relating to CCS including reservoir flow simulation using both analytical and numerical methods to investigate: capacity estimation, flow-based upscaling, water production, and history matching as well as investigating the impact of parameters such as relative permeability and temperature. Recently she has been more involved with monitoring and conformance of CO_2 storage sites.

Advances In Distributed Acoustic Sensing (DAS) Monitoring For CCS projects: The DigiMon Project

Anna Stork[1], Antony Butcher[2], Tom Hudson[3], J-Michael Kendall[3], Sacha Lapins[2], Wen Zhou[2], Bob Paap[4] & Boris Boullenger[4], [1]Silixa Ltd, [2]University of Bristol, UK; [3]University of Oxford, UK; [4]TNO, The Netherlands

The ACT DigiMon project aims to develop a digital monitoring system for Carbon Capture and Storage (CCS) projects. Fibre-optic Distributed Acoustic Sensing (DAS) data processing methods have been developed for passive seismic monitoring of CCS to raise the technology readiness level (TRL) and provide valuable information for project containment and conformance monitoring. Passive seismic methods include microseismic monitoring for seismic hazard assessment and containment verification; and ambient noise imaging of the CO_2 plume extent. DAS provides dense spatial and temporal sampling, facilitating the use of array methods to improve signal-to-noise ratios and provide detailed information. Methods to denoise data using machine learning methods; image the near-surface with ambient noise; detect microseismic events; convert DAS data to geophone equivalent data to facilitate magnitude calculations; and full-waveform source mechanism inversions have all been developed and applied to field DAS data.

Anna is a Senior Geophysical Analyst at Silixa and has 10 years' experience in monitoring technologies for Carbon Capture & Storage projects. Since 2018 Anna has been involved in developing the applications of fibre-optic Distributed Acoustic Sensing (DAS) to geophysical monitoring, in particular passive seismic monitoring, and she has significant expertise in implementing a wide range geophysical techniques to environmental and industrial settings. Anna holds Masters degrees in Physics from University of Manchester and Geophysics from Durham University; and a DPhil in Geophysics from University of Oxford. She has over 10 years postdoctoral research experience in seismology and seismic monitoring with many publications in international journals.

Building Sustainable And Robust CCUS Infrastructure: A Cornerstone Of The Energy Transition

Leila Faramarzi, Vallourec

With Energy Transition we are moving from a carbon-intense industrial regime to a material-intense one. We are essentially replacing material-efficient, carbon-intense systems with material-intense, carbon-efficient ones to combat global warming. Thus, we need to re-think infrastructure of Energy Transition. We need to think about long life of new energy assets. Material-intensive industries must aim at longevity and efficient lifecycles beyond the typical 40 years of the previous era. Often, in discussions about e.g., steel pipelines for CO_2 transport or OCTG for CO_2 storage we hear projects aim at using the cheapest option and a steel which is just good enough in a short time span and one that may need replacement. However, that may not be a sustainable approach to the Energy Transition infrastructure development, or we just push the sustainability cost to future and a much heftier price tag.

In addition to being sustainable, the CCUS infrastructure must also be safe and accessible for maintenance. However, our judgement on hazards of new things can be best perceived when we compare them to existing experiences and currently, we lack sufficient CCUS experience and track record. For example, often the closet experience for dense phase CO_2 transportation and storage is natural gas handling. Hazards, risks, and design practices for natural gas pipes are our compass in CO_2 risk assessment and practices. That is not sufficient. CO_2 is a known asphyxiant and it can harm people and environment. It also forms acid solution in aqueous phase leading to corrosion issues and pipe cracks. In presence of small amounts of NOx, SOx and O_2 typical to industrial CO_2 streams and the risk of incidental formation of water in the pipeline, CO_2 pipelines can experience PH levels below 3 and stress corrosion cracking can start in matter of hours or days. Pipe cracks in turn may lead to severely low temperatures. The metallic material exposed to low temperature can experience embrittlement.

The risk of stress corrosion cracking cannot be left unmitigated. Mitigation in this case is only possible through appropriate material choice, deep dehydration of CO_2 streams where possible and close monitoring of the pipeline. Severely low PH conditions where there is risk of stress corrosion cracking in CO_2 pipelines requires deeper understanding and more representative experimental data. Currently there is a significant knowledge gap in this domain. In this presentation we present Vallourec's research and development program and laboratory experimental work to aid with better understanding of failure mechanisms in CO_2 pipelines due to stress corrosion cracking and how to mitigate them.

Leila joined the Energy Transition Office of Vallourec in 2020. As CCUS Director, she heads Vallourec's strategy in products, market and business development for CCUS. She holds a PhD in carbon capture from the Technical University of Denmark (DTU). Leila has 16 years of international experience in CCUS in different sectors including O&G and Heavy Industries.

Techbyte - An AI-Enabled Early Warning Decision Support System For Induced Seismicity Monitoring Of Carbon Capture And Storage Fields

Jacqueline S. Floyd, Sebastien Rajeul, Baker Hughes

Subsurface pressure created by fluid and gas injection in carbon capture, utilization and storage (CCUS) fields alters the subsurface stress state which can create microseismic or larger earthquakes that risk damaging the formation, causing operational shutdowns, or release of gases into shallow aquifers or the atmosphere. Continuous CCUS field surveillance of microseismic activity provides operators the ability to mitigate induced seismic risk and maintain asset integrity. The challenge in assessing the likelihood of seismic events due to fluid or gas injection is largely a result of imperfect reservoir and geomechanical models and supporting data that would allow us to directly tie injection well parameters to seismic activity. We present initial results from a reinforcement learning algorithm for estimating CCUS field seismic risk that uses continuous seismic monitoring and pressure pumping measurements and does not rely upon a detailed geophysical or reservoir model. Reinforcement learning has been shown to solve dynamical problems without prior knowledge or a detailed physical model and is able to learn and adapt as new data are collected. The dynamics are defined by a sequence of states, actions, and rewards as well as a transition probability function that continuously learns the dynamics based on historical and real-time data. We designed the reward function to optimize the number and magnitude of microseismic events against operational up-time. The potential time lag in seismic response following a change in injection well parameters is accounted for by a discount rate, which is an adjustable hyperparameter that considers seismic events k time steps into the future. The model retrains automatically on a daily basis, which enables the algorithm to adapt to changes in environmental parameters over time without manual intervention. This novel technology for CCUS field surveillance of subsurface microseismicity will provide operators the ability to (1) mitigate induced seismic risk and maintain asset integrity and (2) properly plan an adequate pressure testing program.

Jacqueline is a geophysicist with a BS in Geophysics from the University of Texas at Austin and Masters and PhD degrees in Earth and Environmental Sciences from Columbia University with a specialization is in seismology and tectonophysics. Her current role is as Senior Data Scientist at Baker Hughes.

Techbyte - Seismic Technologies For Cost Effective Monitoring Of Carbon Storage Sites
Will Bradbury, TGS

Northern Europe is leading the way with regard to marine carbon storage, where existing installations at megaton scale are in the planning phase. Even if the subsurface of the planned carbon storage hubs are de-risked properly a geophysical monitoring plan is required (4D) for the decades to come to demonstrate the sealing integrity of the overburden while injecting CO_2 into the reservoirs. Different to 4D seismic used for oil and gas fields where a successful use represents increased value, 4D data for carbon storage is a cost-only entity in a loss-bearing business for the foreseeable future. Therefore, the search for more cost-efficient measurements is ongoing and here we present two seismic alternatives: In-Well-DAS-VSP (Distributed Acoustic Sensing – Vertical Seismic Profiling) and a repurposed light weight, small-footprint 3D system that has been used by academia and O&G industry over shallow targets. These technologies can deliver lower cost fit for purpose imaging to support the demonstration of containment and conformance for carbon storage reservoirs with regard to future 4D programs.

Will is the Director of Business Development for New Energy Solutions in TGS, responsible for developing new investment opportunities for TGS in renewable energy and net zero initiatives in the Eastern Hemisphere. In this role Will engages with various stakeholders including energy companies, technical partners and vendors. Wills background is in structural geology focussing on fault and top seals for the oil and gas industry at Rock Deformation Research from 2002. In 2011 Will moved to TGS working various technical and business unit leadership roles including VP Africa Middle East and VP UK & Russia before joining the New Energy Solutions team in early in 2021.

New Techniques Of Measurement Monitoring And Verification For CCUS Storage Sites

Sebastian Kroczka, Halliburton

Currently there is a big focus on Measurement Monitoring and Verification techniques required for CCUS site to control conformance and containment during the lifetime of an injector well. Monitoring system is required to help with process optimization, reduction of operational expenditure but most importantly to reduce risks associated with pumping and storage of CO_2 downhole.

There are several objectives that a monitoring system is expected to meet. One of the most importantone is to understand direction and the distance of CO_2 injected down to the formation over time. It isalso important to understand if the cap rock seals the reservoir during continuous injection.

In this presentation we will demonstrate new approaches related to containment and conformance monitoring for CCUS. DAS Microseismic for far field and near field cap rock integrity will be discussed as a supplementary technique to standard DAS leak detection. In addition, submersible tiltmeters willbe discussed as a valuable source of information for horizontal displacement monitoring. Those two techniques together combined with FiberVSP enabling 3D seismic, may play important role in offshoreMMV systems for CCUS projects.

Sebastian Kroczka has 12 years of experience in Oil and Gas. He currently works as a Regional Business Development Manager at Halliburton Pinnacle covering Europe, Eurasia and Sub-Sahara. In his current role he supports Oil and Gas customers with fiber optic and microdeformation technologies including interpretation and data systems. In his former roles he worked as Industry Solutions Advisor around digitalization of completion phase. He also he served with various country and area Business Development roles. Sebastian started at Halliburton in 2010 as a well stimulation and conformance engineer. Sebastian holds Master degree in Drilling Technology from University of Science and Technology in Krakow, Poland.

Operational And Monitoring Challenges Over 6 Years Of Injection At Aquistore

Zeinab Movahedzadeh, Petroleum Technology Research Centre

Since 2015, the Aquistore project has seen injection of CO_2 captured from the Boundary Dam coal fired power plant in Saskatchewan, Canada. Initially intermittent in nature, injection is now much steadier at 4-600 tonnes/day, to the point where there is now a plume of 385,000 tonnes of CO_2 at a depth of approximately 3200m.

Running and operating an injection site attached to a post-combustion coal capture facility presents challenges that are sometimes difficult to foresee in the planning stages. Unexpected outcomes in relation to injection pressure or downhole temperature may require a quick understanding of the mechanisms at play and a confident recommendation of remediation methods.

With seismic imaging, new insights are gained with each passing survey and latest 4D image. Geology that was once thought to be stable and layer-cake may exhibit an effect on plume development that needs to be better understood.

There are many aspects of running CCUS injection into a deep saline aquifer that will not and could not occur on pre-drilling models. It is important to have a dedicated team to identify and mitigate these challenges as they arise in order to continue the important work of injection in a way that gives a good picture of the fate of CO_2 in the reservoir.

Zeinab received her bachelor's degree in Petroleum Systems Engineering from University of Regina in Saskatchewan, Canada, in 2011 and is currently registered as a Professional Engineer with Association of Professional Engineers and Geologists of Saskatchewan (APEGS). Since 2019, Zeinab has been responsible for managing the Aquistore CCS Project. Aquistore is the largest active filed lab in the world to study CO2 measurement and monitoring.

Platinum Sponsors

Harbour Energy

Baker Hughes

Event Sponsor

kent

Programme Sponsor

RISC

Coffee Break Sponsor

vallourec
SMART TUBULAR SOLUTIONS

Registration Sponsor

Petrofac

Media Sponsor

GEOExPro