CCUS Conference

21-24 February 2022
Virtual Events

ORGANISED BY

Society of Petroleum Engineers Aberdeen Section

PESGB

Monday 21st February – Policy & Business Models

Conference Co-Chairs

Alex Crossland, SPE Aberdeen

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, RISC Advisory

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.

Monday 21 February

THEME – POLICY & BUSINESS MODELS

Conference Co-Chairs - A. Crossland & G. Ward /// Session Chair - B. Stewart /// Session Co-Chair - A. Aleandri

10:00	Opening statement	A.Crossland/G.Ward
10:05	Keynote #1	Michael Matheson, Cabinet Secretary for Net Zero
10:25	Keynote #2	Ronnie Quinn, CEO, NECCUS
10:45	Q&A	
11:00	Coffee Break	
11:10	CCUS business models in the UK	Ian Hunter, bp
11:30	Regulations and business models in Norway for CCS	Eva Halland, Norwegian Petroleum Directorate
11:50	Reservoirs are all well and good but am I allowed to go there?	Tina Hunter, Macquarie Law School, Sydney
12:10	Q&A	
12:30	Lunch and sponsor videos	
13:00	A U.S perspective on carbon capture projects based on recent gulf coast experience	Chris Chia, Carnrite Group
13:20	Emission costs, project feasibility and the foundation of value creation	Babak Jafarizadeh, Heriot Watt University
13:40	CCS technology, regulation and business models – A service company perspective	Christine Yallup, Halliburton
14:00	Coffee Break	
14:10	Carbon capture and storage	Frank C Schuller, Centre for Science & Society
14:30	Q&A/Panel	
15:20	Closing statement	A.Crossland/G.Ward

Session One - Policy & Business Models

Session Chair – Ben Stewart

Ben Stewart is retired. He left the oil and gas industry after more than 48 years. During his career he worked in operations, technical support, business development, and commercialisation roles at a large service company, a group of privately owned "oil & gas" companies, and his own company. He has been involved in several organisations focused on making science relevant and understandable to children and adults

Session Co-Chair – Alessandro Aleandri, Eni S.p.A

Alessandro has over 10 years of professional experience in the O&G industry working with an Italian oil company, Eni S.p.A. He has a significant background in reservoir and petroleum engineering working both in Milan Headquarters and in various Eni's affiliates (Italy, Iraq, United Arabian Emirates and United Kingdom). He is currently acting as CCUS Subsurface Manager for Eni UK Limited; he oversees and manages subsurface and MMV related workflows associated with the Liverpool Bay CCS project.

Keynotes

Michael Matheson, Cabinet Secretary for Net Zero, Energy & Transport

Michael Matheson was appointed Cabinet Secretary for Net Zero, Energy and Transport in May 2021. Duties include cross-government co-ordination of Net Zero policy; climate crisis and environmental protection; COP26 delivery; sustainable development; biodiversity; renewable energy industries, to name but a few. Born in Glasgow in 1970, Michael was elected as the MSP for Falkirk West following the May 2007 elections. Prior to this, he was a Regional MSP for Central Scotland from 1999 to 2007. Before being appointed Minister for Public Health and Sport, Mr Matheson was Vice Convenor of the European and External Relations Committee. He also sat on the Scottish Parliament's Health and Sport Committee, and previously served on the Justice and Enterprise and Culture Committees. Michael Matheson was appointed Cabinet Secretary for Justice in November 2014 and reappointed in May 2016. He was appointed Cabinet Secretary for Transport, Infrastructure and Connectivity in June 2018 and is currently Cabinet Secretary for Net Zero, Energy and Transport.

Ronnie Quinn, CEO NECCUS

Ronnie is Chief Executive of NECCUS, the membership organisation supporting and representing members through the challenge of industrial decarbonisation primarily through Carbon Capture and Hydrogen. He has over 30 years' experience in general management, with specific experience in the renewables and electricity industries. Ronnie's professional career began as a solicitor where he worked both in private practice and in local government. He then moved into the electricity markets' sector where he was Managing Director of the company administering the market in Scotland. Ronnie has worked for The Crown Estate where he led the transfer of its functions in Scotland to Scottish Ministers, being Crown Estate Scotland's first Chief Executive. More recently he has been the Interim Chief Executive for the Scottish Council for Development and Industry. Ronnie also sits on the Board of Management of City of Glasgow College.

CCUS Business Models In The UK
Ian Hunter, bp

Ian will explore the business models being developed for CCUS in the UK, using the East Coast Cluster to demonstrate the commercial frameworks for transportation and storage networks and CO_2 emitters. The presentation will address the impact of business models on our approach to developing projects and managing risks, and how industry is adapting to meet the unique technical and commercial challenges of CCUS.

Ian has worked on the Net Zero Teesside and Northern Endurance Partnership projects since 2018, leading commercial development on behalf of the BP-led partnerships. He has played a key role in working with industry and government to develop the business models for CCUS in the UK, including chairing the CCUS Advisory Group's working group for power and carbon capture. He brings experience from a range of commercial and business development roles with BP, with a focus in major gas value chains globally.

Regulations And Business Models In Norway For CCS

Eva K. Halland & Torhild S. Nilsen, Norwegian Petroleum Directorate

Offshore Norway, CO2 has been injected for 25 years deep under the seabed and more than 26 Mt CO2 has been permanently stored, proving that it is possible and safe to capture and permanently store CO2 in deep geological formations. The knowledge and technology are ready. The first two projects, Sleipner and Snøhvit, were triggered as a result of a tax on CO2 emissions from petroleum activities on the Norwegian continental shelf.

Based on these experiences and knowledge from 50 years of petroleum activities, a Norwegian CO2 storage atlas was launched in 2014 and the same year the Norwegian regulations for CO2 transport and storage were published, as an implementation of the EU CCS directive. The Norwegian regulatory responsibility for CO2 storage is shared between the Ministry of Petroleum and Energy and the Norwegian Environment Agency.

To contribute to the development of technology for capture, transport, and storage of CO2, with the ambition of achieving a cost-effective solution, the Norwegian government decided in 2020 to develop a full-scale carbon capture and storage project (CCS), called Longship. The state will cover about 2/3 of the costs in the first phase of the project. As a result of this decision, we see that the next phase for CCS is already underway with a growing interest in new areas for CO2 storage and more industrial demonstration projects for emission reductions.

Eva is educated geologist and was the project leader for the Norwegian CO2 Storage Atlas. She has held various positions within the Norwegian Petroleum Directorate (NPD), responsibilities being petroleum exploration, field development and production, regulations, HSE and CCS. Her present position is as Project manager for CCS and CO2 offshore storage in Norway. She is chair of the Norwegian “CO2 Storage Forum”

She was the Norwegian project leader for the UK-Norway ministerial CCS project “One North Sea” and appointed member of the selection panel and project advisor for the appraisal of UK offshore CO2 storage sites. Eva is an advisor to the World Bank Trust Fund and a member of the South African Pilot CO2 Storage Project International Advisory Committee. She has participated in the Advisory Board for several of the EU's collaborative R&D projects on CO2 offshore storage and monitoring. She is the deputy chair of the R & D program CLIMIT.

Reservoirs Are All Well And Good, But Am I Allowed To Go There?

Tina Soliman Hunter, Macquarie Law School, Sydney

One of the 'heroes' of the energy transition is likely to be Carbon Capture and Storage (CCS), which will be necessary for both the development of blue hydrogen, and the sequestering of industrial forms of COS, especially from the cement industry. Whilst much attention has been directed at CCS offshore, such as the Norwegian Northern Lights/Longship project, for many jurisdictions there is a focus on CCS onshore. For most regulators, there is little experience in regulating injection into a reservoir onshore, outside of enhanced oil recovery (EOR). Furthermore, there are many legal issues arising regarding the legal right to inject into a reservoir on land. For reservoir engineers, geologists, and geophysicists, the selection of a reservoir for CCS is a matter of physical characteristics. For regulators, there are many factors to consider, and indeed many regulators have little experience and therefore little idea of what factors to consider. Drawing upon the experiences of onshore commercial scale CCS activity in Australia (Chevron's Barrow Island), this paper will examine the legal and policy issues associated with reservoir selection and CCS injection onshore. In examining the issues arising, including crown capacity to grant access to reservoirs, liability, and licensing for CCS, this paper will discuss all the relevant regulatory issues for companies wishing to undertake CCS activities in the future.

Tina is a geologist and law academic, and a Professor in Energy and Resources Law teaching and researching in the area of petroleum law, Arctic resources law and shale gas law. She has received academic qualifications in marine sediments and geology, political science, applied science, and law, completing her PhD at the University of Bergen, Norway. She has undertaken teaching and research in numerous countries including the UK, Australia, Norway, Canada, Iceland, Greece, Finland, Russia, the USA and the Philippines. Her expertise in regulating petroleum activities has been sought worldwide. Tina is currently the Leader of the multidisciplinary Consortium of Researchers and Experts in North and Arctic Marine Ecosystems Oil Contamination (CRENAME), and a visiting Professor at Tomsk State University in the Russian Federation She has published six books and over one hundred articles, book chapters and conference papers. She is currently completing a book on Russian Petroleum Law, the first of its kind in English.

A U.S. Perspective On Carbon Capture Projects Based On Recent Gulf Coast Experience
Chris Chia, Carnrite Group

- The private ownership of the subsurface pore spaces and mineral rights in a nascent but potentially very large CCS market presents some unique challenges and opportunities that make the Gulf Coast attractive for 'first-movers'.
- Participation in carbon capture in the US market provides an energy transition entry point for independent E&P companies.
- Business models are based on the private sector leveraging the 45Q tax credit system where an unregulated market allows for commercial attractiveness and flexible terms.
- Revenue profiles drive different needs and behaviours than E&Ps are used to, shifting towards a 'service' model.
- OFS companies have a vital role to play in both changing their risk model to participate in CCS partnerships and in technology development that can also take them forward in the energy transition.
- The CCS business model will drive the need for new and unique partnerships and alliances across the value chain.
- Offshore CCS infrastructure supports large scale sequestration and provides optionality as carbon terminals in the future.

As a Managing Director for The Carnrite Group, Chris leads the firm's strategy and performance improvement consulting engagements across the energy sector. In recent years this has included supporting clients in defining their energy transition strategies, including the development of carbon capture and storage business plans. Chris has over thirty years of energy industry experience in a variety of operations management, product development and global technical roles with Schlumberger, GE Oil & Gas, and Scientific Drilling International. Chris is a lifetime member of the SPE and has a bachelor's degree in Mathematics and Computer Science, and an MBA in Energy Management from the University of Oklahoma.

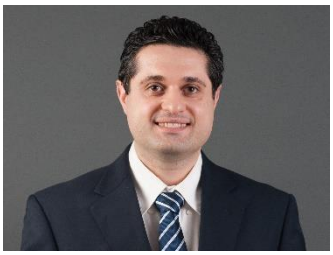
Emission Costs, Project Feasibility, And The Foundation Of Value Creation

Babak Jafarizadeh, Heriot-Watt University

We hear that “We need to revise the economics” ever since the discussions of emission control appeared in the energy industry. To many, this would mean dismantling the current body of knowledge and building from scratch—reflecting the role of emission control measures in project feasibility analyses and economic decisions.

We disagree with this interpretation. Environment has been the silent (and often neglected) stakeholder in energy projects. Understanding the big picture leads to better appreciation of the role of environment as a major stakeholder. For example, instead of direct project emissions we need to consider its incremental effect—the net contribution of the project. Therefore, to reflect the significance of emission control measures, we need to revise and redefine the frame of decisions. We do not need to re-invent finance and economics.

In this paper, we discuss that finance theory and the single goal of a firm—shareholder value creation—should be the guideline in defining decision frames. This needs sound environmental measures. In project decisions, value creation should be the goal. Yet to achieve the goal, the firm needs to first satisfy the stakeholders—including the environment.



Babak is an engineering economist. He thinks engineering is about economic solutions to the technical challenges of an uncertain world. He has worked as a senior analyst in energy industry, supporting investment decisions for multi-million-dollar projects across the globe. He is also an industry expert, and an assistant professor of petroleum engineering at Heriot-Watt University in Scotland. He teaches and conducts research on the art and science of economic decision analysis. Babak’s interests are at the intersection of decision analysis and corporate finance, with applications in engineering and industry. He is the author of the upcoming book “Economic Decision Analysis.” He holds a PhD in Investment and Decisions Analysis (University of Stavanger, Norway) as well as MSc and BSc degrees in industrial engineering.

CCS Technology, Regulation And Business Models – A Service Company Perspective
Christine Yallup, Halliburton

CCS is a key climate mitigating technology that is mature, commercially available, and necessary to achieve the Net Zero Emission target. Like traditional Oil and Gas Operators, energy service companies are also adapting to meet the challenges and future of the energy transition and play a large part in the supporting the design, execution and monitoring of CO2 Transport and Storage (T&S) Projects.

We will present a service company perspective on the challenges of supporting T&S Projects from:

- Supporting operators with optimum CO2 storage site characterisation, making best use of industry data and collaboration with regulators.
- Re-use and optimisation of existing oil and gas infrastructure and technology for CO2 storage to bring down CAPEX of T&S projects.
- Designing and testing fit for purpose technology for CO2 injection to de-risk leakage scenarios
- Commercial incentives/business model considerations to help service companies accelerate technology development to provide best in class service.

These are some of the considerations that will be discussed from a service company perspective, to help accelerate CCS Project development and meet the demand for storage capacity in the race to net zero.

Christine Yallup is the focal point for Halliburton's sustainable energy practice in Europe. In this role she covers Halliburton's solutions for carbon capture and storage, hydrogen, geothermal and emission reductions. With over nine years' experience, she leads industry engagement to build market awareness of Halliburton's capabilities. She works with global teams on strategic direction to drive the development of Halliburton's offering. Before this role, she was a geochemist and basin modeller, providing technical guidance and mentoring on these topics. Christine has a MSci in Geology from the University of Cambridge.

Carbon Capture And Storage

Frank C. Schuller, Centre for Science and Society, Cambridge

Suspension of operations of the Petra Nova carbon capture and storage (CCS) facility near Houston, Texas, whether temporary or permanent, has doused financial institutions, private and governmental, with further uncertainties about the technical, economic, and environmental justifications of billion dollar projects. A survey of government agencies in the United States, Europe, and Asia, as well as energy companies, and financial institutions, reveals a renewed scepticism about continued investments in carbon capture and storage facilities. The cessation of the Petra Nova plant with putative operational shortcomings strengthens the arguments of CCS critics. Financial backers of CCS projects, including multinational energy firms, are evaluating assumptions about economic forecasts and the net reduction of carbon emissions. Yet, with fossil fuel's continued use for the foreseeable future, CCS can potentially reduce in substantial amounts the release of carbon dioxide into the atmosphere.

Some of the difficulties in implementing and operating CCS projects derive from differences in analytical methodologies for economic and risk evaluations. A review of several CCS projects including interviews with managers and policy makers indicates evaluation by applying "engineering economics," which basically applies expected revenues and costs to designed technologies. In contrast, "statistical economics" utilises stochastic distributions to each critical economic and technical sequence throughout the process. The statical methodology, based on historical data and Bayesian estimates, identifies potential risks and their compounding effect and provides a mechanism to sensitise management to recognise impending technical failures or adverse economic changes.

To regain confidence among risk-averse private financial institutions and government agencies, proponents of future CCS projects must examine the total net gains and benefits of a proposed CCS facility. The product life cycle (PLC) model incorporates stochastic in-puts and out-puts with metrics to compare various economic and environmental differentials from the onset of a project, through its operational phase, to its retirement. The PLC model under specific technologies for CCS accounts for economic and environmental variables under multiple assumptions and scenarios with sensitivity analysis. Financiers and policy makers can compare the economic benefits and costs with relevant environment advantages and disadvantages. For instance, financiers can gauge the effects of higher or lower oil prices on break-even levels depending on the extent of CO2 sales for secondary oil recovery. Policy makers can compute the level of financial backing through tax credits and other investment incentives. Crucially, the PLC can delineate the cost of reducing emissions through CCS in relation to alternative technologies, particularly renewables. By arraying the cost-benefits and the potential trade-offs, initiators of CCS projects, financiers, and policy makers can design strategies and incentives to correlate to changes in in-puts and out-puts such as siting CCS projects near clusters of companies that utilise CO2 as a base material or to fashion tax credits that inversely mirror the price of oil.

Frank is Director of the Centre for Science and Society at Trinity College, Oxford. Dr. Schuller received an MBA and Doctorate from Harvard University where he also taught in the Business School and in the Kennedy School of Government. For the past ten years, Dr. Schuller has served as advisor and consultant to Swiss, German and Italian banks such as Hottinger & Cie, Credit Suisse, WestLB, Commerzbank and IMI. Working with Sir David Frost, Frank also conducts a television interview series entitled, "Taking Stock" for financial channels such as CNBC, Bloomberg and several other cable outlets.

Panel Session

Panelists

Craig Frenette

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.

Eugene Holubnyak

Eugene is a CCUS Program Lead at Kansas Geological Survey (KGS) and has over 14 years of experience in applied geoscience and energy-related research. Eugene has worked for five years at Plains CO2 Reduction (PCOR) Partnership before transitioning to KGS in 2012. He managed several research and field scale projects funded by Department of Energy including Wellington Field CO2 EOR and storage pilot, CarbonSAFE Phase I & II, and participated in numerous DOE funded projects as a Co-PI. Eugene has served on numerous professional committees including KS Induced Seismicity Task Force, State Carbon Capture Work Group, Regional Carbon Capture Deployment Initiative, and others. Currently, Eugene is heavily involved in Carbon Utilization and Storage Project for the Western USA (CUSP) under the DOE's Regional Initiative to Accelerate CCUS Deployment. He is also leading KS CCUS Task Force that is educating state legislators, regulators, and other stakeholders on pressing carbon management issues and is representing the state of Kansas at CO2 Transport Infrastructure MOU. Eugene is specializing in reservoir modeling, simulations, and fluid geochemistry applied to subsurface reservoirs and waste fluid disposal. Mr. Holubnyak is very familiar with US Underground Injection (UIC) program, including UIC Class VI well permitting.

Eugene has graduated with MS in Aerospace Engineering from the University of North Dakota, and BS and MS in Information Science and Technology from Lviv Polytechnic National University. Currently Eugene is a Ph.D. Candidate of Applied Geoscience at Heriot Watt University. Eugene is also interested in space exploration and developments in Advanced Life Support Systems for space settlements. He is continuing research and publication activities in this area.

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