

SPE Review London



The official e-magazine of the Society of Petroleum Engineers' London branch

The next transition for CIOs and CDOs: Preparing for climate-risk reporting requirements

Also in this issue:

- ★ C-Level talks: Sustainable careers
- ★ A discrete fracture-based approach to approximating stress-dependent permeability in fractured media
- ★ New – Digital Transformation committee
- ★ Energy on Draft: fun in the sun!



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ABOUT US

The Society of Petroleum Engineers (SPE) is a not-for-profit professional association whose members are engaged in energy resources, development and production. SPE is a non-profit professional society with more than 156,000 members in 154 countries, who participate in 203 sections and 383 student chapters. SPE's membership includes 72,000 student members. SPE is a key resource for technical knowledge related to the oil and gas exploration and production industry and provides services through its global events, publications, events, training courses and online resources at www.spe.org. SPE London section publishes SPE Review London, an online newsletter, 10 times a year, which is digitally sent to its 3000+ members. If you have read this issue and would like to join the SPE and receive your own copy of SPE Review London, as well as many other benefits – or you know a friend or colleague who would like to join – please visit www.spe.org for an application form.

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Behind the Scenes: SPE Review Editorial Board



Elizaveta Poliakova, Editor in Chief

Elizaveta is a Reservoir Engineer at Trident Energy. She has an M.Sc in Petroleum Engineering from Imperial College London and a B.S. in Petroleum Engineering from the University of Leeds. Elizaveta has been with SPE for more than five years. She was the President of SPE Imperial College Chapter and the President of SPE Leeds Chapter. Previously, she was also on the committee of SPE YP.



Ffion Llwyd-Jones

Business editor and writer. Extensive experience in writing and editing (digital and print). International experience in technology, health, and the environment.



Mark Beleski

Experienced engineer, with deep understanding of industry practices, trends and challenges. Energy Loss Adjuster with AqualisBraemar, in London.



Shalom Amakhabi, Editorial volunteer

MSc Petroleum Engineering student (Imperial College London); BEng in Petroleum and Gas Engineering from Nile University of Nigeria. SPE member 5+ years, and membership chairperson for the SPE Nile University of Nigeria student Chapter.

A big Thank You! to all the organisations that support the SPE London section





Letter from the Editor / Chair

Dear SPE London Members and colleagues,

Welcome to the new SPE year! I hope you had a lovely August break and enjoyed your holiday.

It is an honour to represent SPE London Section as a Chair. I would like to thank our past Chair, Adam Zalewski, and the 2021/2022 Board for the great work that has been done to support SPE London Section, specifically, on transitioning the Section from online events to face-to-face networking. I believe that 2022/2023 will be another critical year for our Section as we further explore Energy Transition opportunities and return to face-to-face events. I hope that, in my role, I can support maximising the benefits we can offer.

For us, it is very important to keep increasing the value that our current members get from SPE London membership. The SPE London Net Zero Gaia Committee continues to deliver a strong set of events that are of high interest to our members and has undoubtedly become our high-flier. Please find the committee's outlook and updates from Barny Brennan, the current Chair of SPE London Net Zero Gaia, on **page 19**. SPE London Technical Programme, chaired by Tim Lines, continues to be our success story as well. Stay tuned for upcoming events!

Maintaining the flow of new talent is key to the viability of our Section. I am happy to welcome the newly-formed Digital Transformation Committee to the Board; you can get to know the Team on **page 12**. SPE Student chapters are another key element in maintaining the sustainability of our talent pool. With the start of the new academic year, the five SPE Student Chapters that we support are about to undergo their elections. I believe this year will be key for SPE London to assist the adaptation of the SPE Student Chapters, especially, in the Universities undergoing the transition to the new courses coming in place of the traditional petroleum-related degrees.

Moving to our publication, in this issue, you will find a C-Level Talk focusing on Sustainable careers. We have interviewed Harry Simons, Michele Vaquer, Christabel Ofori-Atta, and Russel Julier about their career transition from Oil & Gas. To read more, please go to **page 6**. On 11 April, the second Energy on Draft event took place in collaboration between PESGB, SPE and EAGE. Please follow **page 15** to read more. On **page 16**, Mahesh Venugopalan, Sachin Padhye, Nilotpal Chatterjee, and Naga Suresh Govindaraju have shared their work on 'The next transition for CIOs and CDOs: Preparing for climate risk reporting requirements'. On **page 13**, Aleksandr Novikov has given a summary of his research on 'A discrete fracture-based approach to approximating stress-dependent permeability in fractured media'.

I look forward to working with you this year as a Chair. Please get in touch if you would like to volunteer with us or see an opportunity for us to enhance value to our members.

Sincerely yours,

Elizaveta Poliakova

SPE London Section Chair and *SPE Review London* Editor



NEWS DIGEST... NEWS DIGEST... NEWS DIGEST



Emission reduction targets on track

An overall 21.5% reduction of greenhouse gas emissions means the North Sea oil & gas industry is on track to meet early emissions reduction targets.

According to a report from the North Sea Transition Authority (NSTA) the emissions were cut by an estimated 14.6% to 14.3 million tonnes of CO₂e last year. The interim emissions reduction targets were set at 10% by 2025 and 25% by 2027. The main source of emissions is combustion for power generation (averaging 71%), followed by flaring (22%), venting (4%), and other non-combustion processes (3%).

[Read more](#)

Energy transition

The UK's first carbon storage licensing round closed on 13 September, and attracted 26 bids from 19 companies. The 13 areas on offer are off the coasts of Aberdeen, Lincolnshire, Liverpool, and Teesside.

The next stage is the evaluation of the bids by the North Sea Transition Authority (NSTA), with the aim of awarding licences in early 2023. Nick Richardson, NSTA Head of Exploration and New Ventures, said: "Carbon storage can play a big part in reducing greenhouse gas emissions into the atmosphere and awarding additional licences in 2023 will be a significant step forward."

[Read more](#)

Improved subsurface imaging

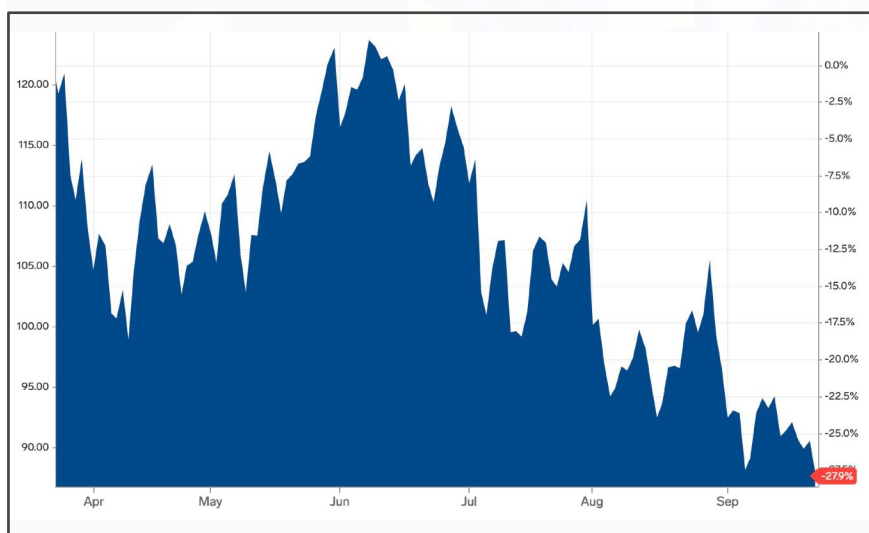
A multi-year global agreement between UK-headquartered geophysical services company WesternGeco and Norwegian Shearwater GeoServices has resulted in its first seismic survey, in the Bonaparte basin offshore Australia. Its objective is an improved subsurface image of the eastern flank of the Vulcan sub-basin and Londonderry High. "The new frame agreement with WesternGeco enables both companies to move quickly to respond to client needs and market opportunities," said Irene Waage Basili, Shearwater chief executive. "With this latest award in Australia, Shearwater has successfully secured 52 months of new contracts across both streamer and seabed markets so far in the third quarter alone."

[Read more](#)

Drilling start up

The Stena Don rig arrived at the Serenity well site in the central North Sea in mid-September. According to updates issued by partners i3 Energy and Europa Oil and Gas, the drilling operations on Serenity appraisal well SA-02 may last 30 days.

[Read more](#)



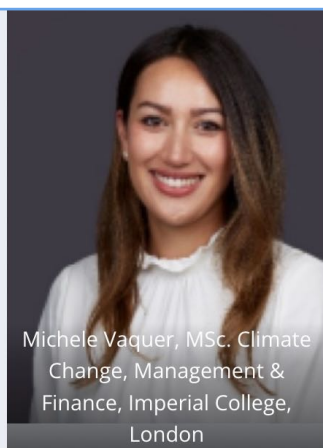
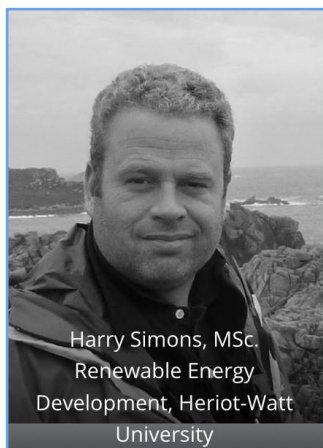
Oil (Brent) 87.59 -2.73 (-3.03%). 23/09/2022 (Credit: Market Insider)

Sustainable careers: insights, opportunities ++

One of the main goals of the London SPE Net Zero Gaia committee is to help the membership adapt to a changing energy industry. With this in mind, the committee has launched an initiative called 'Sustainable Careers'. Useful information, insights and advice are being gathered from knowledgeable individuals across the industry and beyond, on topics such as evolving education opportunities, recruitment trends, energy transition business models, and career pathways. Short interviews based on the gathered insights will be available as a growing resource on the [SPE London Sustainable Careers webpage](#).

Instalment one: Masters programmes

Should I commit to obtaining a new Master's qualification in an 'energy transition' subject? What are the options? How much work is it? How will it positively impact my career? We asked four O&G professionals who have already taken the plunge to share their experiences.



Harry Simons has 25 years of experience in technical, commercial and management roles in the E&P sector.



As Country Manager and Directeur Général, Harry led the Algerian business for Hess, managed the non-operated portfolio, and was the Business Advisor for the Europe Eurasia region.

With Burlington Resources he was the Planning Manager and Operations Engineer for the assets run from the UK. Prior to this, as a consultant and also working in the service sector, Harry worked on and offshore. He has extensive well operations experience in both engineering and geological roles, risk management, business continuity, Health, Safety and Environmental management, and government and NOC relations. While working in consultancy roles, Harry is nearing completion of an M.Sc. in Renewable Energy Development at Heriot-Watt.

Why did you decide to take time out of work to study and how did you decide which course? Tell us a little about the course.

My course is an Independent, Distance Learning (IDL)

M.Sc. in Renewable Energy Development with Heriot Watt. I picked a course that was flexible to allow for changing work commitments. To a large extent, this flexibility helped me focus on who was able to provide me with professional development at a pace that I could manage. While I would have been keen to attend lectures in person once in a while (say once a month), as it turned out due to the COVID pandemic, this wouldn't have been possible. Heriot Watt was already providing online lectures and recordings of prior courses for IDL students. Heriot Watt's involvement with Renewable Energy activities in Orkney and their close links with industry were important – a good balance of academic and practical, commercial experience.

Unlike my first degree, the course is modular, and comprises a set number of modules that must be completed within an allotted time period over a number of years. The university suggests 10-15 hours a week should be expected for study, although in all honesty this varies from subject to subject. Some subjects have been quite intensive, particularly where my existing knowledge has been challenged



Sustainable careers: insights, opportunities ++... continued

(such as with Electrical Engineering), but I've enjoyed grappling with new subjects and understanding the detail behind them. Some subjects have been less challenging (such as economics), but going back to basics has been useful and I've taken the time to challenge my own understanding and make sure some assumptions I've made over my understanding of things has actually been correct.

I am required to do eight modules in total, and a dissertation. My remaining modules are marked by assignment during the semester (rather than by exam) or by project submission – effectively a practice dissertation.

What was challenging about going back to study? Have you had the support of an employer or another organisation in pursuing this additional qualification

Finding a structure in which I can work and a systematic way of engaging with new subjects has required discipline. Given the breadth and fast-moving nature of the renewables sector, it's very difficult when researching a subject not to go off down 'rabbit holes' and find yourself many papers away from the original issue you were considering. Unlike my first degree, which involved research through libraries and hard copy papers, it is almost too easy to find information regarding a particular topic and become overwhelmed with the mass of information on the Internet. Independent learning is a challenge in itself. It's not unknown for me to sit in the office for hours and come out a bit saturated with information. And it's possible to do this without having any interaction with other people – certainly my first and second modules were done with very little, if any, interaction with other people. Only as I have become more aware of the resources available within the University have I spent more time talking to the lecturers and asking for assistance with specific learning objectives.

I've also had to try and put aside some of my work experience and be open minded and listen to different perspectives on subjects I have been heavily involved in during my career. 'Personal experience' it turns out, isn't something that you can rely on in an academic paper.

I've had no support from an employer or other organisation during this study and have been solely responsible for the qualification. Family has been hugely supportive. In fact, the transition to renewable energy from the hydrocarbon sector has and continues to be a challenging activity.

Has it been what you expected so far, has anything surprised you? What were the key things you have learnt so far that you think will change your career path going forward?

I certainly underestimated the effort and discipline needed to undertake an M.Sc. and the independent, learning-at-a-distance aspect makes it no easier. I have a newfound admiration for friends and colleagues who have studied over the years while also having a day job. I've been surprised at how I've found studying really refreshing, frustrated that I didn't do it years ago, but really enjoying learning about new and relevant subjects.

I've been surprised at how certain aspects of renewable energy can polarise discussions, are often poorly understood and how entrenched people can be about their opinions. Have a discussion and argument about things, but do it from a position of knowledge of the subject, not by regurgitating headlines or misinformation.

There is a balanced and reasoned answer as we transition to a Low Carbon economy, which I believe is exactly the right thing to do, but we have to be practical frustratingly so at times to make sure the changes we are making now are the right ones for the future.

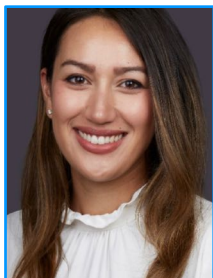
I believe we should be far, far more careful about how we manage and use our finite hydrocarbon resources.

I am certainly committed to making sure we use these resources most effectively, and less, but certainly want to be part of the unlocking of more renewable resources for the future wave and tidal are really exciting, particularly around the UK, but there are some great engineering and commercial challenges to overcome. Let me at them!



Sustainable careers: insights, opportunities ++... continued

Michele Vaquer has accepted a position as a Senior Associate at 8 Hours Ahead.



In this role, Michele is responsible for Clean Tech deal origination in addition to operational and market due diligence. She is a seasoned engineer with a decade of experience within the energy sector. She has worked in both operational and asset planning roles within infrastructure and

production engineering teams. These experiences include leading operations excellence and methane reduction programs as well as overseeing development of large-scale pipeline and facility projects.

Michele has an MSc in Climate Change, Management, and Finance from Imperial College London and a B.Eng in Chemical Engineering from Oklahoma State University.

Why did you decide to take time out of work to study and how did you decide which course? Tell us a little about the course.

In the words of the fictional Disney character Johnny Tsunami: “Go big or go home.”

While I haven’t seen Johnny Tsunami since I was twelve years old, the creed has stuck with me. Unlike Johnny, after nine years of working in onshore, unconventional oil and gas, my enthusiasm was beginning to fall flat and I felt like I was sitting squarely in the middle of that mantra. I genuinely enjoyed the complexity of my projects, the travel, and authenticity of the people I worked with, but I didn’t feel that higher calling that I once did.

Then cue Covid – I feel extremely lucky that the first months of the pandemic in 2020 afforded me time to focus on my bigger picture. I had a fondness for technological innovation and a desire to focus on high impact issues, but had obvious gaps in the subject matters of finance and strategy. When things were getting bleak, WWJTD (What Would Johnny Tsunami Do) surfed back into my brain waves.

I chose to ‘go big’ and by that I mean I uprooted my family and moved from Houston to London so that I could pursue an MSc. Climate Change, Management and Finance (CCMF) at Imperial College London. I looked at a dozen programs in the States and in the

UK and chose CCMF because I felt that it intersected the subjects that I was most interested in learning. I also felt that the programme’s broad base of topics would give me the best foundations to choose between a 180° with my career or grow into a strategic position within oil and gas. I was particularly excited for the ‘Innovation in Cleantech and Climate Change Solutions’ and ‘Energy Business and Strategy’ courses.

What was challenging about going back to study? Have you had the support of an employer or another organisation in pursuing this additional qualification

Going back to university was a multi-layered challenge for me. Not only had I been out of school for almost a decade but I was jumping into a school system that I was unfamiliar with (English vs. American), I was studying a highly topical subject within business when I had studied engineering before, and, last but not least, Covid was still in full swing. While different from my previous experiences, these challenges were not insurmountable and ultimately gave me an appreciation for people who easily adapt in new situations and more understanding and compassion for those who don’t.

Was the course what you expected and did anything surprise you? What are the key things you took away from it and how do you think finishing the course will impact your career options and aspirations going forward?

I thought the coursework overall was particularly well structured to bring out engaging discussions and force us beyond the walls of our own echo chambers. Some of the key things I took out of the program was a better understanding of climate science, fundamental knowledge of corporate finance and management consulting principles, and the desire to challenge the status quo through the lens of climate change. I was surprised at the access we had to scientists, policymakers, and academics who are at the forefront of their fields. The passion these individuals showed for their subject matter was contagious and their willingness to engage with students outside the classroom made up for some of the issues we experienced with Covid. On the flip side, I was possibly more surprised by my cohort. In a world where different backgrounds and beliefs generally shut down conversations before they



Sustainable careers: insights, opportunities ++... continued

begin, I found a comfortable environment where curious minds openly engaged with me on oil and gas topics. Ultimately, everyone was just as eager to find pragmatic yet ambitious solutions to the challenges posed by climate change and achieving an equitable energy transition. Having graduated, I firmly believe that Imperial's 'Climate Change Management and Finance Programme' was the right choice for me. The programme is grounded in science and established business principles and helped me understand the climate crisis from

financial, scientific, and policy angles. Coupling these new-found learnings with my facilities and production engineering background has expanded my career opportunities immensely.

I am now working with a specialist firm within the venture capital space that scales CleanTech (among other high-impact sectors) into China. The company saw value in my operations and engineering experience and my dual profile was an interesting fit. Without 'going big' I might not have uncovered this path where I reignited my career ambitions.

Christabel Ofori-Atta is one of Ghana's budding young engineers in the energy industry today.



Christabel holds a BSc. in Petrochemical Engineering from Kwame Nkrumah University of Science and Technology, Ghana and is on track for an MSc. in Sustainable Energy Futures from Imperial College London.

Currently, she works as a Field Engineer with Schlumberger and is involved in multiple oil and gas projects across Ghana, Nigeria and West Africa.

Throughout her pursuit of academic and career successes, she remains driven, open-minded, ambitious, creative and forward-thinking. Furthermore, she is resilient and focused uniquely on continuous learning, developing relevant skills, pushing boundaries and influencing prodigious growth of world economies, especially Africa's.

In the future, she will be looking to join rising energy leaders to tackle energy challenges and reduce energy poverty globally. Through her efforts and collaborations, she will be at the forefront of sustainability, next-generation technology and turning ideas to value for human life.

In tandem, as a firm believer in equal opportunities for all, she hopes to substantially empower young females through mentorship and training to increase women representation in STEM careers globally. Miss Ofori-Atta is determined to make a lasting impact in the world. As she likes to quote: "The goal is not to live forever. The goal is to create something that will." - Chuck Palahniuk.

Why did you decide to take time out of work to study and how did you decide which course? Tell us a little about the course.

As a young engineer in the oil and gas industry, I quickly became keenly aware of the major wave of transformation towards sustainability, greater efficiency and digitalization that is taking place especially within the energy sector. Energy companies are under increasing pressure each day to evolve and adopt innovative and sustainable practices and technologies in line with climate change action and decarbonization targets as a result. Schlumberger, for example, which is the company I work with, is poised to become a Sustainability leader and has already launched a corporate strategy and transition technology portfolio towards a net-zero future. Having realised this ongoing transition, I felt the pressing need to reposition myself to deeply understand the changing energy landscape and the strategies required by companies to remain competitive in global markets. This would be essential to my career growth as I would very much like to stay relevant in times ahead and actively support critical decision-making that turn ideas into value for people and businesses. Fueled by this reason, and coupled with my ambition to become a thought leader focused on tackling global energy challenges and reducing energy poverty, especially in Africa, I decided to take time out of work to pursue a postgraduate degree centered around providing a sustainable energy future. Deciding which course I wanted to study was easy. I already knew what I wanted to get out of the course so I scouted for courses that could deliver these objectives. I came across the MSc. Sustainable Energy Futures at Imperial College London in my search and it fit like a glove. It provided the perfect



Sustainable careers: insights, opportunities ++... continued

cross-disciplinary synergy between technology, environment, policy and economics that I was looking for. I was so sure that I was going to get opportunities to learn and develop new strategies to contribute to real-world solutions. And so far, I have not been disappointed.

What was challenging about going back to study? How have your SLB colleagues reacted and how supportive SLB has been in your pursuit for the masters degree?

I had been out of the academic world for about four years so, going back to study I was quite worried that I might struggle a bit to re-acclimatize myself to the scholastic nature of a learning institution. Besides, I was entirely new to the UK and the system of education here seemed quite different than I was used to. Already, the masters programme is very demanding of time and effort. But especially in Imperial College London, to me, it is relatively super intense than in other schools. Additionally, if I am to be very honest, in spite of my interest in Sustainable Energy, it was still fairly an uncharted territory to me because I was coming from a region where renewable energy technologies, electric transport and energy storage among others were underdeveloped and merely a theory. So it definitely took a while to readjust.

I am grateful for the massive support I have received from my SLB colleagues and management. My colleagues have motivated me every step of the way to press on. I think they are as equally expectant as I am of the new and improved impacts I could make to push the company's sustainability agenda for itself, its clients and the energy industry as a whole forward. Furthermore, rather than have to quit my job to pursue the masters degree, I was offered a study leave instead by SLB. It was a long arduous process to get my leave approved from top management because there are a lot of structures and stages in place that could sometimes be frustrating. However, I was humbled by the fact that my direct management did not give up eventually but kept pushing for the needed approvals. It boosted my confidence in SLB's commitment to supporting the personal and career growth of its people.

Has it been what you expected so far, has anything

surprised you? What were the key things you have learnt so far, soft skills and more specific on sustainability, that you think will change your career path going forward?

Well, the exposure, for one, has been incredible and more than I expected. Meeting and collaborating with new people from different backgrounds and discussing ideas with a profound intellectual community that is aligned towards advancing a more sustainable future has been one of the biggest highlights.

Going through the MSc. Sustainable Energy Futures course especially, I feel I have become more open-minded, forward-thinking and proactive with an undeniable foothold in international energy dynamics. I have expanded my knowledge appreciably on next-generation energy systems and technologies and learned new things as seemingly simple as how to write a good policy brief. Besides, the course is expandable in a way that it merges the technical part with the economics and policy and data science, digitalization and project management aspects making me well-rounded. This is very important if one wants to have a holistic view of the energy sector to fully take on energy projects subsequently.

Certainly, understanding the interplay that exists between renewable integration, storage, demand-side management, interconnected networks and energy markets provides greater insight into the level of flexibility and optimization that can be attained to ensure cost-effectiveness and sustainability for businesses and countries. Additionally, I think that not one-size-fits-all. As such, in order to fully deliver net-zero targets, different organizations, countries and regions might have to employ different approaches that is more suited to their economic and environmental climate.

However, it is very imperative that we make a conscious effort everyday to not lose sight of the main goal. Going forward, I am very confident that I have the relevant toolbox to guide SLB and clients in future decision making to reach their sustainability targets. Similarly, I will be uniquely positioned to contribute to improving the energy sector substantially in my home country Ghana, Africa and the world at large.



Sustainable careers: insights, opportunities ++... continued

Russell Julier is a Petroleum Engineer.



Russell has a background in Portfolio Management, Uncertainty Management, Production Forecasting, Opportunity Identification and Decision Risk Analysis. He has worked in the industry since the mid 1980's, working for BG Group and later Shell.

Why did you decide to take time out of work to study and how did you decide which course? Tell us a little about the course.

I had been interested in the Energy Transition for about 10 years when I was asked to study the possible impact of carbon pricing on the BG portfolio. When I left Shell in 2020, I was looking to study the subject further and the MSc Energy Policy by University of Sussex offered a good opportunity.

Energy Policy making is a very complex subject, it interweaves a myriad of subjects including energy justice, sustainable development, economic growth, governance, and politics as well as technology and innovation. To achieve a successful energy transition requires policy makers to understand both these subjects as well as role of governments, industry, and NGOs.

The course is offered online and is modular so you can, within reason stop and start, as required. I have been impressed by the quality of the interactive material and tutors and have very much enjoyed the group team working assignments. Despite the course being online you do get to engage with a wide range of people outside the oil and gas industry.

Assignments include both individual essays and report writing as well as group presentational work.

So far, I have looked at the impact of energy subsidies on achieving net zero, the opening of the Woodhouse Colliery in Cumbria and an analysis of the UK Government policy mix supporting Carbon Capture and Storage.

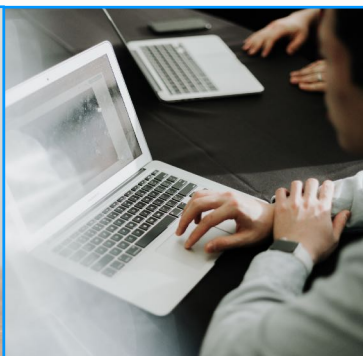
What was challenging about going back to study? Have you had the support of an employer or another organisation in pursuing this additional qualification?

Going back to study demands you keep an open mind and be prepared to see things differently from your initial perceptions. While working in the O&G industry was a good grounding for the course, you quickly realise that there is a lot more to energy than producing barrels of oil and gas. The main personal challenge from my perspective was learning to adapt to an academic reading and writing style. I am self-funded and am doing the course for my own interest.

Has it been what you expected so far, has anything surprised you? What were the key things you have learnt so far that you think will change your career path going forward?

The course has changed my perspective on the Energy Transition, and I now see that achieving net zero will be much more about changing the way we live and our social practices than solving the substantial technical challenges that will also need to overcome.

One key takeaway from the course is that energy transition will require many of us to change our priorities and work more collaboratively together, the oil and gas industry does not have all the answers and should be prepared to listen to others a bit more. I have made no decision on my future career path at this stage.



Digital Transformation Committee

It is a new academic year and the SPE London section is starting the year with a new committee.

The SPE London Digital Transformation Committee is stepping up to carry out its mission by focusing its goals on the energy industry digital transformation.

The committee is finally formed and ready to start the year focusing our efforts to bridge the gap between the energy industry and data science, whether with events, workshops, courses and more.

Meet our members



Cedric John
ICL
SPE London DTC Technical
Advisor/University Liaison



Raghd Gadrbouh
CGG
SPE London DTC Chair



Nihal Darraj
ICL
SPE London DTC Vice Chair



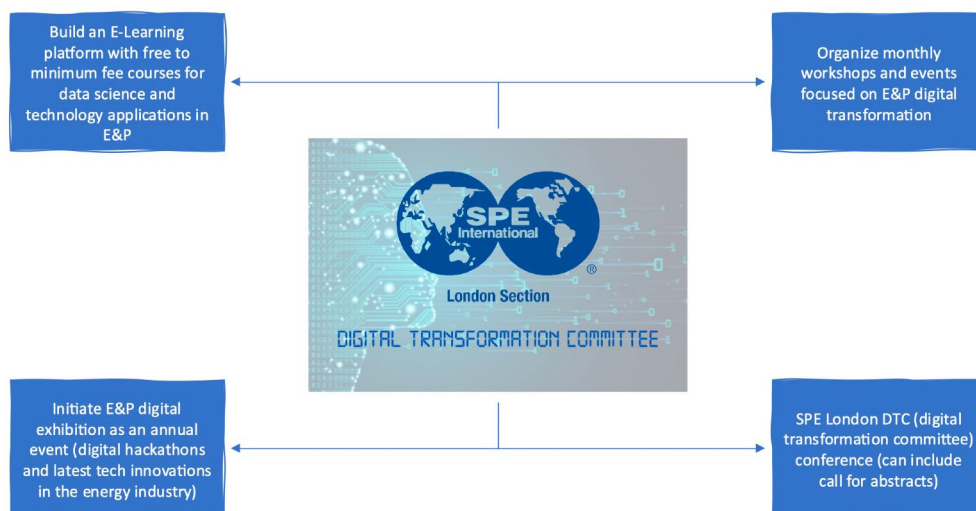
Adam Turner
RPS
SPE London DTC Events Coordinator



Meghan Davies
CGG
SPE London DTC Technical
Advisor/Corporate Liaison



Teddy Solares
GEOLOG
SPE London DTC Social Media Officer



A discrete fracture-based approach to approximating stress-dependent permeability in fractured media



Aleksandr Novikov has a BSc in Petroleum Engineering from the University of Leeds and an MSc in Petroleum Engineering from Imperial College. He is a Production Engineer with LUKOIL Engineering, and was previously Vice President of the SPE Student Chapter at the University of Leeds.

This paper was written as an MSc thesis for Imperial College London; Imperial College supervisors were Dr Adriana Paluszny and Dr Robin N. Thomas.

Below is a summary of the work.

For an original copy, please get in touch with the author.

Introduction

The paper outlines the simulation of discrete fracture network models using the pre-existing approach to geomechanical deformation and growth while modelling fluid flow in the matrix and fractures. These models help to understand the behaviour of the domain, for instance, fracture propagation (Thomas et al. 2020) and nucleation under the specified geomechanical conditions (Saceanu et al. 2022). Below is a summary of the conducted work. The aim of the work was to show that permeability, in terms of reservoir characterisation, is not a static property.

Reservoir heterogeneity comes from the rock's static properties and a dynamic permeability induced by fracture networks created by effective net stress applied on the rock. The stresses acting on the rock change with a formed differential pressure and temperature. The rock exhibits tensional/compressional forces that deform the rock during these stress changes, allowing the formation of the fracture network. A fracture network is a highly complex system dependent upon fracture parameters such as fracture growth, aperture, orientation, spacing and connectivity that will describe the characteristics of the modelled rock system (Azizmohammadi and Sedaghat, 2020). Understanding the growth of the fracture network assists in the approximation of stress-dependent aperture and permeability distributions, and the evaluation of fluid flow through porous media.

Growth simulations of fracture networks containing six initial large fractures and the nucleation of hundreds of secondary smaller fractures have been performed using the Imperial College Geomechanical Toolkit, ICGT (Paluszny and Zimmerman, 2013). Seven different models have been generated, using slightly different initial geometries. Fracture network growth has been controlled by selected tensile stress boundary conditions, material properties, and parameters of initial and nucleated fractures. Fracture parameters governed the fracture network growth based on the orientation and position of the initial fracture with following fracture nucleation. *Figure 1* shows an example of the mechanically induced fractures growing in the model. The analysis has shown that fracture nucleation happens at the parts of the domain with a higher stress intensity – areas of higher damaged rock.

An analysis was conducted to evaluate the effect of assuming uniform/fixed apertures in contrast to computing mechanically-induced apertures that ensue from applying different stress boundary conditions. The permeability of the domain is governed by the position of the initial larger fractures, their orientation and the stress boundary conditions selected. Permeability calculated for the models with uniform apertures has shown an anisotropy of permeability larger than the permeability of mechanically induced apertures.

The increase of the tensile stress boundary condition resulted in larger mechanical aperture openings and an





Fracture-based approach... continued

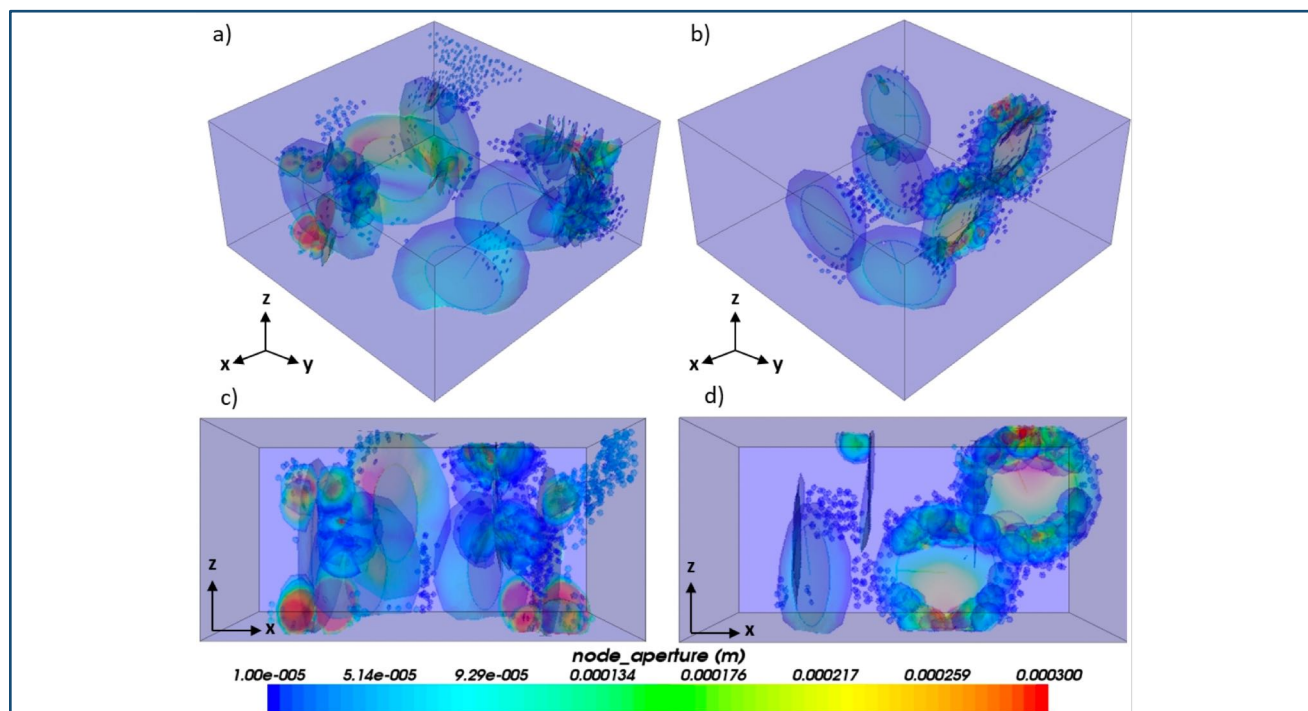


Figure 1. Visualization of mechanically induced apertures and their ranges of Models B and C at their last growth steps. a) Isometric view of Model B. b) Isometric view of Model C. c) y- view of Model C. d) y+ view of Model B.

increased directional permeabilities. Aperture opening distribution was observed to be higher at the matrix boundaries and in the direction of the matrix boundaries from the centre of grown initial fractures. Flow velocity yielded more anisotropy during the increase of the tensile stress boundary conditions of mechanically induced apertures as compared to velocity simulations of uniform apertures. The flow becomes more channelized around the fractures, as observed in Paluszny et al. (2020), and through the nucleated fractures connecting the initial fractures in simulated fractured network.

Fracture nucleation provides an additional method to describe the potential behaviour of the fractured rock. Generated fracture networks, including fracture nucleation, can be used in various industrial applications. Further research of higher intensity models and the growth of fractured networks under compressional and mixed-mode stresses are recommended in future studies.

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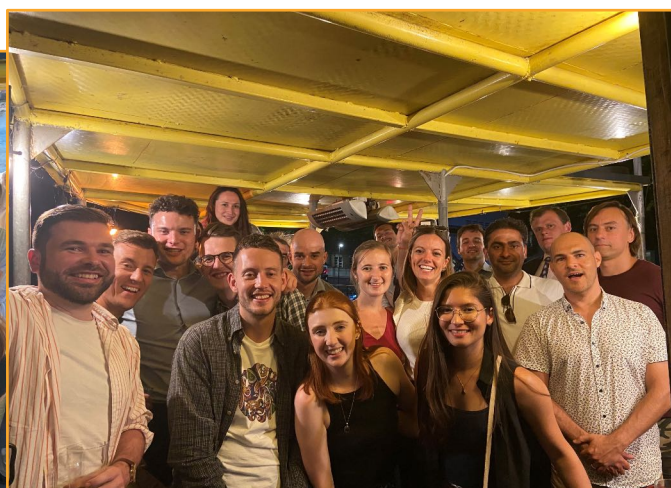
— ENERGY ON DRAFT —

AUGUST 11TH SAW OUR SECOND 'ENERGY ON DRAFT' EVENT. WE HEADED OUT AFTER WORK TO THE TAMESIS DOCK FLOATING PUB, VAUXHALL, FOR SOME DRINKS AND A CATCH UP IN THE SUN.

THANK YOU TO ALL WHO ATTENDED. IT WAS A FANTASTIC TURN OUT WITH ~60 MEMBERS JOINING FROM A VARIETY OF SOCIETIES, AND SPANNING FROM EARLY-MID CAREER AND BEYOND. IT WAS GREAT TO SEE SO MANY FACES RETURNING FROM OUR PILOT EVENT HELD IN APRIL AND TO MEET THOSE WHO HAVE ONLY RECENTLY CAUGHT ON!

FOR THOSE WHO AREN'T FAMILIAR, ENERGY ON DRAFT IS A JOINT SOCIETY NETWORKING EVENT HELD EACH QUARTER HOSTED BY PESGB YOUNG PROFESSIONALS, SPE LONDON & EAGE.

WE LOOK FORWARD TO SEEING YOU ALL AT OUR NEXT 'ENERGY ON DRAFT' EVENT IN NOVEMBER!



The next transition for CIOs and CDOs: Preparing for climate risk reporting requirements

Increasingly, companies are focused on meeting the requirements of the Paris Climate accord, adopting energy transition, and meeting consumer demands for actions reducing climate change. This focus results in activities that may have a material impact on a company's business, operational results or financial condition. This article is by **Mahesh Venugopalan, Sachin Padhye, Nilotpall Chatterjee, and Naga Suresh Govindaraju**.

Be prepared

Regulators are taking note of this impact and are framing requirements for mandatory climate-related disclosures. The Securities and Exchange Commission has proposed amendments to its rules that would require registrants to disclose climate related risks including greenhouse gas (GHG) emissions and financial metrics in audited financial statements.

The new requirement is likely to take effect in FY2023 and apply to SEC filings in FY2024. CIO's and CDO's will be well served to start planning and acting now to ready the IT infrastructure and data foundation that will enable data collection, calculation and reporting for climate-related requirements.

SEC Climate Disclosure Requirements

The SEC is proposing to add a new subpart Regulation S-K, 17 CFR 229.1500-1507 ("Subpart 1500 of Regulation S-K") to disclose climate-related information and GHG emissions metrics that could help investors assess those risks. The SEC is also proposing to add a new article to Regulation S-X, 17 CFR 210.14-01 and 02 ("Article 14 of Regulation S-X") that would require certain climate-related financial statement metrics and related disclosure to be included in a note to a registrant's audited financial statements.

The proposed rules would require an accelerated filer or a large, accelerated filer an attestation regarding disclosures of emissions and service provider. The **Content**, **Presentation** and **Attestation** of disclosures are summarised below.

Content

- Oversight and governance of climate related risks.
- How short, medium, long-term risks likely to impact business and financial statements.
- How climate related risks may affect registrant's strategy, business model and outlook.
- Processes for identifying, assessing, and managing climate related risks.
- Impact of climate-related events, transition activities on financial statements, related expenditures.
- Scope 1 and 2 GHG emission metrics expressed in aggregate, disaggregated constituents in absolute and intensity terms.
- Scope 3 GHG emissions and intensity if material or part of GHG emissions reduction target.
- Climate-related targets or goals and transition plans, if any.

Presentation

- Provide climate-related disclosure in registration statements and Exchange Act annual reports.



The next transition... continued

- Provide Regulation S-K mandated climate-related disclosures in a new or existing section of reports.
- Provide Regulation S-X mandated climate-related financial statements metrics and related disclosure in a note to audited financial statements.
- Electronically tag both narrative and quantitative climate-related disclosures in inlines XBRL.
- File rather than furnish climate-related disclosure.

Attestation

The proposed rules would require an accelerated filer or a large, accelerated filer to include an attestation report covering the disclosure of its Scope 1 and Scope 2 emissions and the service provider.

The proposed rules would be phased in for all registrant's dependent upon the status of the registrant as a large, accelerated filer, accelerated or nonaccelerated filer, or SRC. Registrants subject to the proposed Scope 3 disclosure requirements would have one additional year to comply.

Implications for CIOs and CDO's

The SEC has estimated the burden associated with its proposed climate-related reporting requirements. The SEC's estimates for non-SEC registrants across different sectors range from 3,600 to 4,400 hours annually. This range is 2,800 to 3,300 for SRC registrants. These hours comprise activities such as gathering data, preparing, and providing disclosures for governance, strategy, risk management and metrics and targets.

This burden will be determined by the maturity of the registrant's people, processes, and systems to collect, calculate, and report climate-related risks that materially impact the company's business, operations, and financial statements:

- Skills and experience of people.
- Sophistication and completeness of processes for climate-related corporate data collection, calculation, and reporting.
- Readiness and flexibility of IT and data systems.

CIOs and CDO's will play a key role in this transition for reporting climate-related risk reporting requirements by equipping people and shaping processes through an IT and data-led solution. This solution will enable the following:

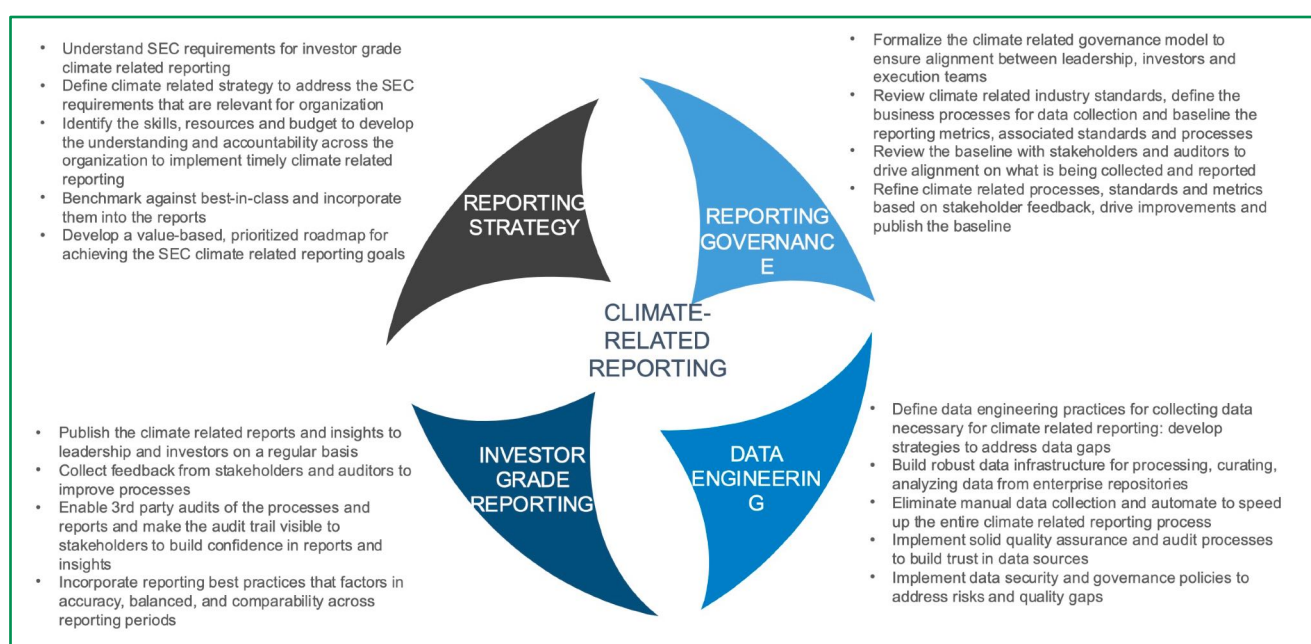
- Consistent process across companies to collect, store, calculate and report climate-related data
- Reducing number of sources to gather data/documents from
- Eliminating redundancy and reinvention of tasks and systems
- Track and trace changes to data / documents
- Data-munging capabilities, automation, and self-service reporting toolkits
- Developing capability to catalogue and govern such data generated at a high volume/velocity
- Operations staff to focus on their core activities while reducing their burden of climate related risk reporting

The next transition... continued

Climate-risk data and reporting platform

A cloud-based platform solution will help meet requirements of climate-related risk disclosures by providing powerful tools to equip companies, streamline processes, and enable comprehensive and rapid reporting. The appropriate solution can be derived using a comprehensive approach that spans Strategy, Governance, Data Engineering and Reporting.

Strategy begins with making choices and developing a road map for modifying people processes and systems after understanding the gaps between SEC requirements and current reporting. This is followed by defining a Governance structure to implement and maintain climate related processes and systems. Data Engineering provides the foundation to leverage reporting requirements and build the reporting structure. Reporting enables the company to publish investor grade reports that are auditable.



Sources:

1. SEC Regulation S-K, S-K: <https://www.sec.gov/divisions/corpfin/ecfrlinks.shtm> 2. SEC Proposed Rule, Fact Sheet, Comments Received: <https://www.sec.gov/news/press-release/2022-46>
2. SEC Proposed Rule, Fact Sheet, Comments Received: <https://www.sec.gov/news/press-release/2022-46>

Conclusion

Climate-related reporting is gaining importance. Regulatory bodies such as the SEC are also showing increased interest in including climate-related disclosures in financial statements. Climate-related reporting requirements are very extensive and detailed. These can be addressed effectively only through a strong IT infrastructure and a data foundation. CIO's and CDO's can proactively take a lead in building this foundation while collaborating with other functions such as finance, operations, and HR to build and maintain this reporting platform.

The transition from the current state of reporting to the new state that includes climate-related reporting will take time and effort and needs to start now.

Some thoughts from the Net Zero Gaia Committee Chair



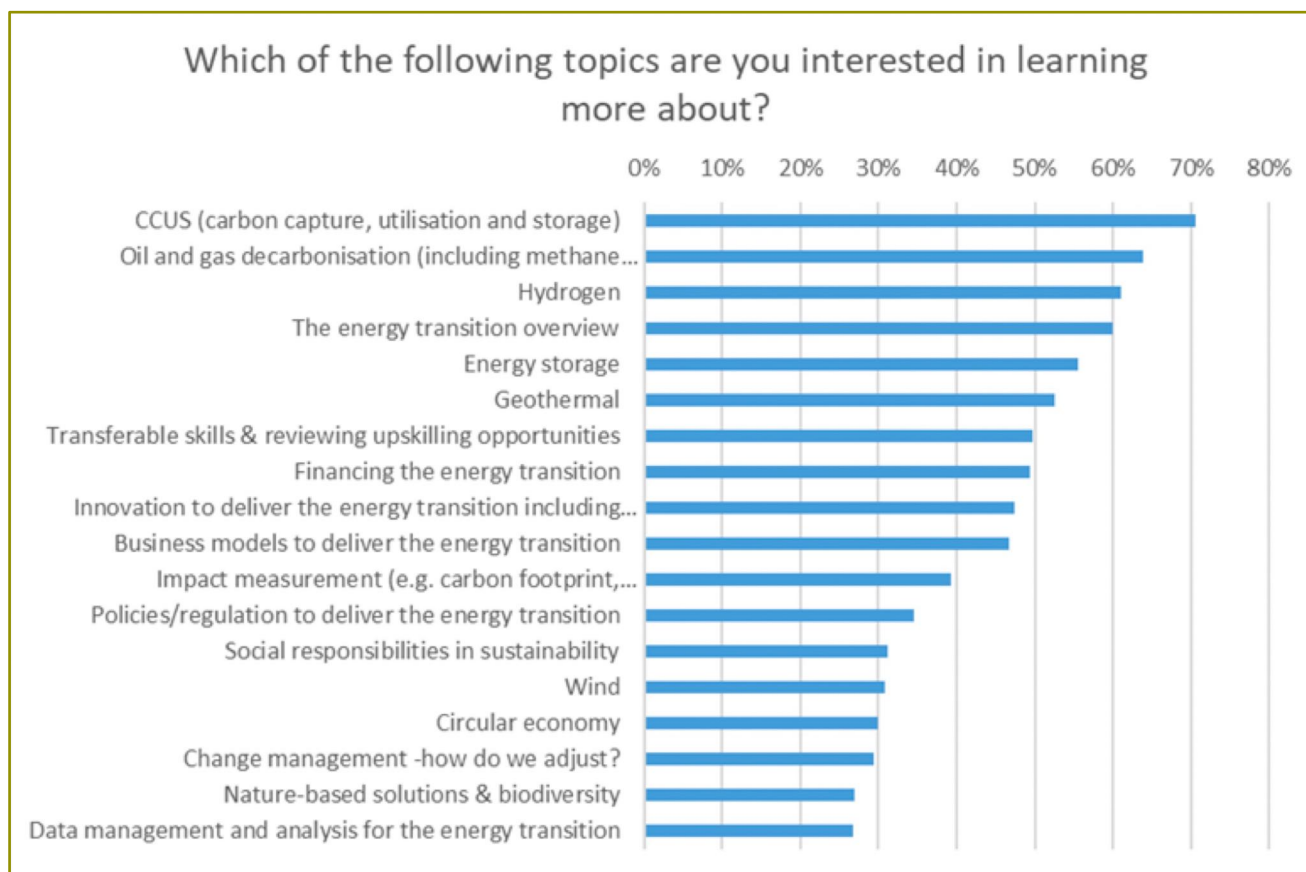
Barney Brennan
SPE London Net Zero
Committee Chair 2022/23

Your SPE London Net Zero Committee has had an active year so I thought I would take this opportunity to say a few words about what we have done and to outline some of our future plans.

Firstly, I would like to say a huge thanks to Alison Isherwood who handed over the chair of the committee to me in July. She has done an amazing job in setting up the committee, providing direction and inspiration, and in bringing together a talented group of committee members. For Alison fans, don't worry, she is still going to be involved in the activities of the committee, but she can now channel her efforts towards her Net Zero Sustainable Careers initiative.

The committee has been strengthened by two new committee members, Dr Stuart MacKinven and Michele Vaquer. Stuart, who is a Senior Manager at Worley, brings specific expertise in Hydrogen, which could become a key part of the future energy mix. Michele is a Senior Associate at 8 Hours Ahead where she brings her engineering expertise to look at Clean Technology and she brings knowledge from her MSc in Climate Change, Management and Finance to the committee. We are sad to say goodbye from the committee to Harry Simons, Maren Strandevold and Kate Hayo. We thank them for all their excellent contributions.

Back in March 2021, we ran a survey to ask what topics the membership would most like to hear about (see chart, below) and we have tried to structure our Net Zero webinar programme around the results of that survey.



Some thoughts... continued

As a result, some webinars focus on technical aspects while others are on the social, financial, or business elements of the Energy Transition (see table below) .

Month/ Date	Topic	Organiser/host
20-Jan	CCS measure and monitor	Barny
Feb	Gap	
08-Mar	CCUS Business Models	Barny
12-Apr	Oil & Gas Social Acceptance	Alison
10-May	Offshore Electrification	Barny
14-Jun	CCS Wells, Reservoir, Flow Assurance	Max
12-Jun	Gap - holidays	
Aug	Financing Energy Transition	Davis
Sep	Geothermal for heat and power	Alison & Adrian S
Oct	Oil & Gas - methane reduction	Barny
Nov	Hydrogen	Max/Stuart
Dec	Gap/Spare	

The series has benefited from individual committee members organising and hosting subjects that they are particularly passionate about: Alison on Social Acceptance of Oil and Gas; Max Richards on CCUS; Davis Bigestans on Financing the Energy Transition; and Adrian Southworth and Alison on Geothermal.

On average, the series has attracted 120 registrations and 50 attendees for each webinar. We are moving from an evening format to lunch-and-learn to help maintain numbers as the membership returns to office working and evening social engagements.

In addition to the webinar series, Alison Isherwood has started the Sustainable Careers initiative. Part 1 of this was a series of interviews with oil and gas professionals who have taken the plunge in obtaining a Master's qualification in an Energy Transition subject. These interviews make fascinating reading and can be found here <https://www.spe-london.org/sustainable-careers/>.

We are starting to plan for 2023. We aim to keep the Net Zero webinar series going throughout the year and Alison will continue with her work on Sustainable Careers. Keep a look out for more information on both.

However, most importantly, we would like to hear from you, the members, as to what you would like the committee to focus on, whether this be specific topics for a webinar or some new initiative.

Please share your thoughts with me at barny.brennan@gmail.com



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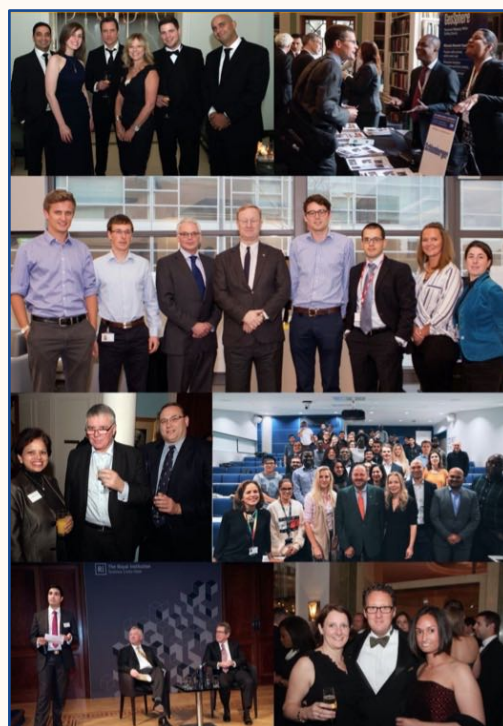
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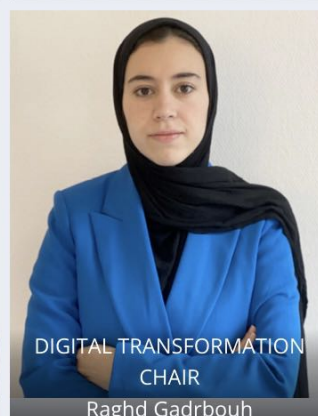
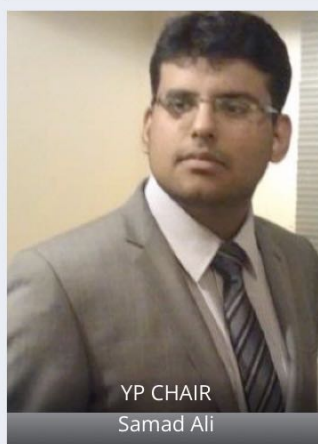
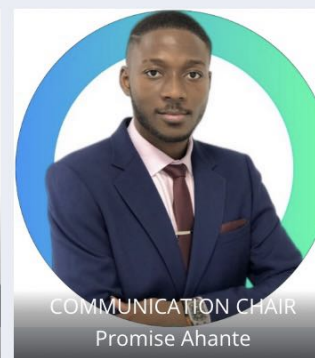
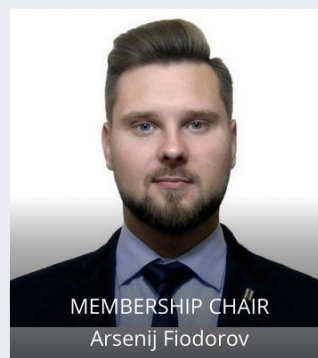
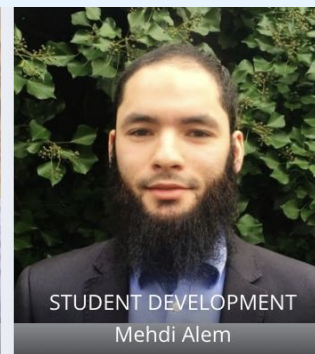
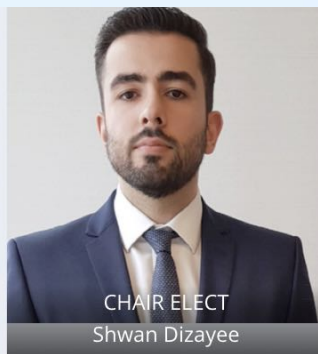
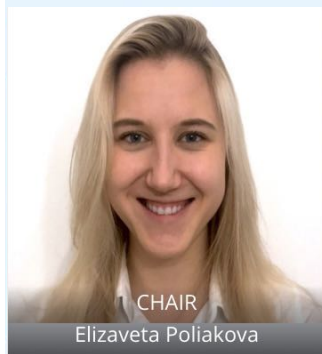
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