Issue 46
Autumn 2019

wireline

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Issue 46 | Autumn 2019

Welcome to Issue 46

Welcome to the 46th issue of *Wireline*, the magazine for the UK offshore oil and gas industry. Inside we hear from OGUK staff, members, and the wider industry on the latest projects, successes and challenges facing the sector as we turn attention to 2020 and beyond.

The preparation of this latest edition follows an exceptionally busy summer and a flurry of activity up and down the country, not least in Aberdeen, which played host to both the EICC Exports Conference in June and Offshore Europe 2019 at the city's newly opened P&J Live arena. Both events highlighted the breadth of work and expertise amongst operators and the wider supply chain, and offered a forum to discuss some of the pressing issues in the industry today, including the push for greater diversity and inclusion, how the industry can help drive energy transition and the influx of new technologies.

Alongside this, OGUK also helped unveil *Roadmap 2035: A Blueprint for Net-Zero*, a plan of action for reaching the goals set out in the Vision 2035 campaign. One of the first major industrial responses to government plans to reduce or offset carbon emissions to net zero by 2050 in the UK and 2045 in Scotland, it has been published following extensive engagement with over 2,500 industry stakeholders and sets out five key themes to co-ordinate industry, government and regulator action.

The summer has also proved to be eventful for operator Total which, after a run of exploration successes, also reached first gas at its Culzean megaproject. We spoke with project director Claus Vissing-Jorgensen to learn more about the challenges and successes inherent in bringing a $5 billion development to fruition on time and under budget [p. 20].

As operators look to bring offshore emissions in line with plans for the UK's commitment to net-zero, we look at what can be done, and how collaboration will be key to progress [p. 34]. Following the release of OPITO's *Workforce Dynamics Report* in May, we also consider what the workforce of the future might look like, and how it is reflected in the group's roadmap for skills, which plots a strategy for development up to 2025 [p. 28].

The opening of new, world-leading facilities in East Kilbride and Montrose mark a vote of confidence in the UK supply chain. Baker Hughes and TÜV SÜD explain what makes these new sites unique, and how their plans support exports, skills and industry excellence [p. 38]. Other OGUK members have been similarly busy — we catch up with several of them, including augmented reality expert R2S to discuss how new technology is empowering offshore workers [p. 44].

If you'd like to see your business in the next issue, we welcome any positive news and stories from your organisation at editorial@oilandgasuk.co.uk. Feel free to share *Wireline* with any interested colleagues, or request additional copies for your office or reception using the same email address.

In the meantime, we wish you a wonderful autumn — and thanks for reading.

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OGUK

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Contact the editorial team on editorial@oilandgasuk.co.uk

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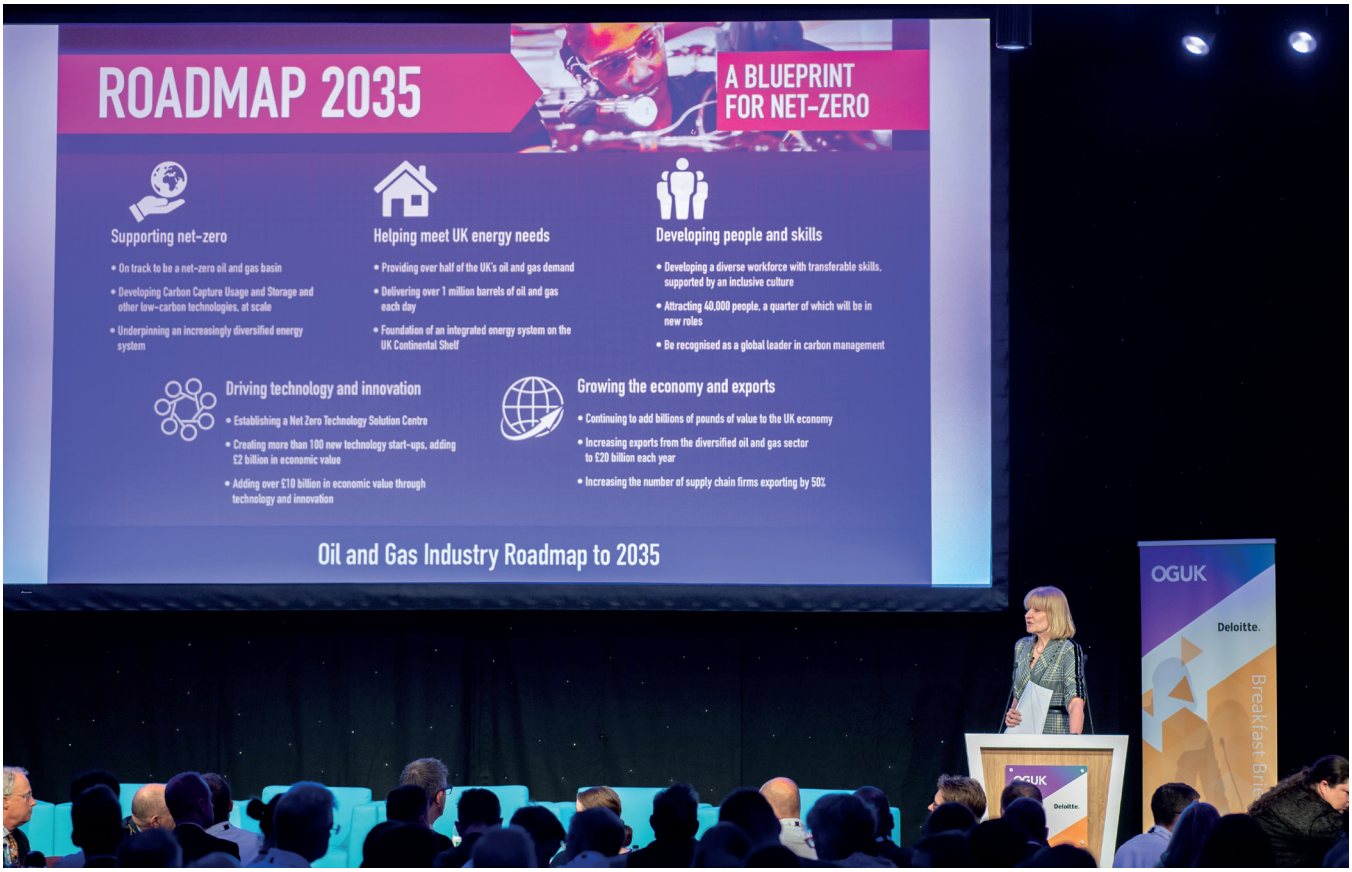

Industry vision set out in Roadmap 2035

The UK offshore oil and gas industry has outlined its contribution to the UK and Scottish Government net-zero ambitions as part of an ambitious blueprint showing what the sector could look like in future.

Roadmap to 2035: A Blueprint for Net-Zero sets out five key themes requiring industry, government and regulator action to ensure the sector can continue to provide secure energy supply, support net-zero and remain a vital contributor to the UK economy.

It includes coordinating activities to reduce emissions from the production of oil and gas, which currently accounts for 3% of UK total greenhouse gas emissions, and understanding how the UK oil and gas industry can play a key role in developing and commercialising low carbon technologies including carbon capture, usage and storage (CCUS) and hydrogen.

The roadmap is one of the first major industrial responses to government plans to reduce or offset carbon emissions to net zero by 2050 in the UK and 2045 in Scotland. It is published following extensive engagement with over 2,500 industry stakeholders. The roadmap is the centrepiece of a flagship report published today by the leading representative body for the industry.

You can learn more about Roadmap 2035 at www.energyvision2035.com.

Economic Report reinforces role of oil and gas in energy transition

OGUK's *Economic Report 2019* reinforces the importance of the sector to the UK's economy and to meeting the energy needs of consumers. It shows how the UK oil and gas industry can contribute to the transition towards net zero emissions in the UK.

Released at Aberdeen's Offshore Europe conference and a corresponding event in London on 4 September, the report shows that 75% of the UK's current energy needs are met from oil and gas, with just over half (59%) of oil and gas demand met by domestic production. It also highlights Climate Change Committee forecasts that the UK will still consume around 65 million tonnes of oil equivalent per year (roughly 45% of current demand) in 2050, making the development of infrastructure for carbon capture and hydrogen essential.

The report notes that continued collaboration between industry, government and regulators will be required to maintain the competitiveness and sustainability of the basin so that as much as possible of UK demand is met from our own resources rather than imports in parallel with efforts across all industries to reduce emissions. Access the Economic Report 2019 via the OGUK website.

Image below: Attendees at the Diversity and Inclusion Task Group launch during Offshore Europe 2019.

D&I Taskforce launched at Offshore Europe

Wood president of operations services, Europe & Africa, Craig Shanaghey, is to chair a new task group set up to champion diversity and inclusion in the oil and gas industry.

The Diversity and Inclusion Task Group set up by OGUK will bring industry together to drive action towards recruiting and retaining diverse people, representative of wider society, and ensure no-one feels excluded in their place of work.

The D&I Task Group will convene regularly with the aims of: reinforcing the business case for greater Diversity & Inclusion in the industry; seeking to establish a benchmark for Diversity & Inclusion, establishing what 'good' looks like, and providing support for businesses looking to do more; and shape and drive efforts to improve the image of the sector as an excellent career destination — one that embraces a culture of diversity.

The Task Group will include representatives from OGUK membership and will be launched at a Diversity and Inclusion lunch at Offshore Europe today jointly supported by OGUK, OGTC and the Axis Network.

New OGUK board appointments to address energy transition

OGUK has appointed two new members to its board to further bolster the sector's ongoing efforts to maintain the competitiveness of oil and gas production from the UKCS — whilst also playing a significant role in enabling the UK's net-zero carbon emissions ambition.

Bob Drummond, CEO of Hydrasun Group, has been appointed to the organisation's board, as well as Alistair Stobie, chief financial officer at Hurricane Energy.

Mr Drummond has been CEO and managing director in a number of major energy services companies including Maersk UK, Salamis Group, Wood Group Engineering and Rigblast Energy Services Group, prior to joining Hydrasun in 2002.

Mr Stobie has significant capital markets and international oil and gas industry experience. Alistair was previously director of finance at AIM-quoted Zoltav Resources and CFO at Oando Exploration & Production. Hurricane Energy has developed pioneering approaches to exploration, particularly in the frontier region West of Shetland and the company has recently achieved first oil from the Lancaster field.

Environment Report highlights stable performance amid increased production

The UK offshore oil and gas industry has delivered stable environmental performance whilst the sector has increased production levels, according to OGUK's flagship environmental report.

The 2019 *Environment Report*, which analyses and interprets data gathered and monitored by the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED), considers performance across a range of areas including emissions to atmosphere, chemical discharge, waste disposal and produced water, to the end of 2018.

Image bottom: Matt Abraham, OGUK Supply Chain and HSE Director, speaking at OGUK's Aviation Seminar.

The report finds that there was a 3% reduction in CO_2 emissions in 2018 compared with 2017, while production increased by 4% year on year. It also notes that upstream oil and gas operations contributed 3% (14.65 million tonnes CO_2e) of the UK's total greenhouse gas emissions.

The report is available on the OGUK website.

Safety tops agenda at OGUK Aviation Seminar

Leaders and experts in the oil and gas and aviation industries came together to discuss helicopter safety at an event hosted by OGUK in Aberdeen on 25 June.

The Aviation Seminar explored ways in which the sector can build on progress, whilst remaining alert to issues affecting the industry through ongoing engagement with the Civil Aviation Authority (CAA), helicopter operators, HeliOffshore and other stakeholders, with the goal of further improving helicopter travel. Sponsored by CHC Helicopter, the event included presentations from industry leaders and keynote speakers including Mark Abbey, regional director at CHC, Matt Abraham, supply chain and HSE director at OGUK, and Trevor Stapleton, health and safety manager at OGUK.

The opening address was given by Mark Swan, group director of safety and airspace regulation at the CAA, whilst delegates also heard from a licensed helicopter engineer and a captain — both of CHC — who shared insights into their roles and what they see as the future for aviation.

Commenting on the event, OGUK's health and safety manager Trevor Stapleton said: "The UK's offshore oil and gas industry is supported by one of the most modern helicopter fleets in the world – and safe helicopter operations is at the heart of what we do. As we look towards achieving Vision 2035 — the industry's shared ambition to meet as much of the UK's oil and gas needs from home-produced resources – this key event examined how can we learn from the past in order to plan for a successful, incident-free future for offshore travel."

Workforce Report 2019 finds stabilised oil and gas employment

Total employment supported by the UK offshore oil and gas sector is now back in line with industry's long-term trend, according to OGUK 2019 *Workforce Report*. The report, which provides insight into the employment landscape across the UK oil and gas industry, anticipates that the sector will support around 269,000 jobs in the UK this year — a rise of 10,000 from 2018.

Among the insights, the report notes that due to increased production in the basin coupled with more agile and efficient working practices, the overall figure of barrels-per-worker has risen by 5% since last year and is now 57% higher than in 2014.

The research highlights the industry's rapidly changing skills requirements. Digitalisation, internationalisation and the transition to a net-zero emissions future will require significant re-skilling for existing workers and the recruitment of up to 10,000 new roles in these areas, some of which don't exist yet. The report notes that these new roles could be a positive influence on gender balance in the industry as these are relatively new disciplines with a higher proportion of women than is found in traditional STEM areas.

You can read the *Workforce Report 2019* on the OGUK website.

2019 Offshore Safety Award Winners

The **Maritime Safety Award**, sponsored by Marine Safety Forum was won by Oleg Krushynin, Solstad and Eric Wiseman, of Seacroft Marine Consultants in recognition of their efforts to reduce the risk of injury when loading and discharging tubulars from a vessel.

Safety Representative of the Year, sponsored by Dräger, was awarded to Lee Chegwidden, production technician at Apache in recognition of his dedication to his role as an Elected Safety Representative (ESR).

CNOOC International and DNV GL clinched the **Award for Innovation in Safety,** sponsored by Bureau Veritas, in recognition of their ground-breaking use of virtual reality technology, designed to help eliminate hydrocarbon releases, prevent major incidents and ultimately save lives.

BP Clair Ridge Safety Representatives and Operations Technicians were crowned winners of the **Workforce Engagement Award**, sponsored by Peterson, for their innovative Process Information Prevents Explosions (PIPE) tours which help engage and build process plant awareness among those working on the Claire Ridge project.

The **Award for Operational Integrity**, sponsored by Aker Solutions was won by CNOOC International in recognition of its Hydrocarbon Release Prevention (HRP) Programme.

Shell UK's Brent Decommissioning Project was voted the winner of the **Sharing and Learning Award**, sponsored by Spirit Energy, for its efforts to reduce the number of eye-related incidents suffered by its workforce during Brent Delta decommissioning activities.

Champions crowned at 2019 Offshore Safety Awards

Safety champions of the North Sea were recognised at the 2019 Offshore Safety Awards, held in Aberdeen in August. The annual awards ceremony, jointly organised by OGUK and Step Change in Safety and sponsored by Total, celebrates the outstanding individuals and companies going above and beyond to improve safety across offshore operations on the UKCS.

Finalists were considered for six awards covering Safety Leadership, Workforce Engagement, Innovation in Safety, Safety Representative of the Year, Operational Integrity and a new category, Maritime Safety.

After hearing pitches from each of the finalists, the winners for each award were voted for by attendees at the awards ceremony using an interactive format.

New Reserves Progression tool launched to boost recovery

A new tool aimed at providing operators and licensees with a framework to re-evaluate

Image left: Attendees at the 2019 Offshore Safety Awards.

Offshore Safety Award medals.

Image bottom right: Steve Phimister, VP & Director Shell UK & Ireland addresses the OGUK Wells Conference.

methods to improve recovery from existing North Sea oil and gas assets was launched in August. Developed through industry collaboration, it provides a detailed process for identifying opportunities to learn from industry-leading practice.

An industry task group supporting the Oil and Gas Authority's Asset Stewardship Task Force, created the Reserves Progression self-verification check-list tool to promote good practice, and information-sharing. Available via the OGUK website, it is intended to help operators improve overall recovery rates and extend the productive life of the UKCS. Task group co-chair, Katy Heidenreich, noted that it "gives industry a consistent, integrated and systematic approach to progressing resources and reserves," which estimates suggest amount to over 2 billion barrels of near-field opportunities.

Fellow co-chair, Tony McGarva, said: "Companies can use the Reserves Progression checklist to identify, review and re-evaluate the potential opportunities for increasing oil and gas recovery in all aspects of their activities including reservoir management, well and production systems, and reassess where processes could be refined to unlock otherwise undeveloped reserves. With industry experts collaborating to develop this tool, it's designed to be easily incorporated into current processes so helping to drive continuous improvement in performance."

The tool can be found on the OGUK website.

LOGIC marks 20 years of promoting industry efficiency tools

Leading Oil and Gas Industry Competitiveness (LOGIC), a not-for-profit wholly owned subsidiary of OGUK, marked its 20th anniversary this August. Established to provide operators and supply chain service companies access to tools to increase efficiency, LOGIC is a key force for improving business working practices across the sector.

LOGIC is currently the custodian for six industry tools aimed at improving industry competitiveness. Vantage POB is a personnel and certification tracking system for the onshore and offshore workforce. In addition, LOGIC manages a suite of 11 Standard Contracts, template contracts which cover a broad range of UKCS operations from supply chain and services to decommissioning, Similarly, the Master Deed is a key part of the industry's legal framework, and helps streamline the timely and efficient completion of asset transfers in the UKCS.

Other benefits include the Industry Mutual Hold Harmless (IMHH) — a standard process to address the contractual gaps around liability for contractors — as well as Flightshare and Helimet.

You can find out more about the benefits provided by LOGIC at www.logic-oil.com.

Legal Conference takes over Ardoe House

A record attendance of 167 delegates joined the sixth annual OGUK Legal Conference on 12 September in Aberdeen. Supported by Principal Sponsor CMS and Supporting Sponsor Clyde & Co LLP delegates heard from a range of speakers addressing regulatory issues, Brexit, private equity and JOA disputes.

This flagship event facilitates learning and knowledge sharing and importantly builds a stronger network within the legal community.

OGUK Wells Conference tackles net-zero

OGUK's Wells Conference took place 26 September. Now in its third year, the event offers an opportunity to hear operators presenting case studies which describe the challenges of unlocking and delivering competitive drilling activity in the UKCS.

Image below left: OGUK continuous improvement manager, Emily Taylor.
Image right: INSITE programme director Richard Heard.

The conference aims to promote collaborative working and cross-industry learning. This year's programme was focussed around two thematic areas: 'novel' ways of working between operators and contractors, and the impact of technology adoption and innovation. Keynote speaker, Shell UK VP Steve Phimister, also shared his view on the role the wells community has in achieving a net-zero energy economy.

Commenting, lead business adviser Sophie Guy-Pearson says: "Sitting on the organising committee for the third year, it has been great to see this event evolve and grow. The presentations from members showcase their recent experience navigating some of the highly technical challenges that come with drilling on the UKCS.

"The conference offered a platform for our members to have very open and honest conversations about the lessons they have learned and was a great opportunity to come together to promote collaboration and cross industry learning. !"

Through information sharing, learning, networking and discussion, OGUK's Wells Conference provided 150 delegates a platform for learning about how the wells community is contributing to maximising economic recovery from the UKCS.

OGUK appoints new ETF manager

The Efficiency Task Force (ETF) was established in response to the sharp increases in cost, decreases in efficiency, and a fall in production volumes of the UK Continental Shelf (UKCS) after the downturn. Emily Taylor joined OGUK in July of this year as the continuous improvement manager where part of her responsibilities will be to lead and oversee ETF activity.

Taylor joins the company from Step Change

in Safety (SCiS), an organisation OGUK have close ties with. Taylor joined SCiS fresh from university and remained there for seven years. "Working for an industry body like SCiS was a fantastic introduction to the oil and gas industry," Taylor tells Wireline. "Working in a health and safety environment was also a sobering reminder every day of how important it is to look after each other on and offshore, and how essential it is that we get things right. Every day brought new challenges and I was constantly asking myself: 'What more can I do to make this better?'"

Taylor sought to expand her exposure to the industry. When the opportunity to apply to be continuous improvement manager at OGUK presented itself, she didn't hesitate to apply. "I'm hoping to utilise the skills I learnt in cross-industry project management and the importance of communication — I am a people person, so the role of seemed perfect to me," Taylor reflects.

OGUK's Efficiency Hub was created to promote the Efficiency Task Force as it works to seek out, promote and provide access to efficient practice across the UKCS. "I would like to increase the visibility of the ETF Hub, enable easier sharing and learning and make collaboration easier for members," Taylor adds. "I would like the ETF to be a platform to springboard ideas into the wider industry and shine a spotlight on things which are working well, as well as areas which need to be improved."

Access the Efficiency Hub at ogukefficiencyhub.co.uk.

INSITE Science Programme continues into second phase

The INSITE research programme (INfluence of man-made Structures In The Ecosystem) has become a focal point for marine research around structures in the North Sea, attracting recognition and support from government through the Department for Business, Energy and Industrial Strategy (BEIS) and DEFRA, and the scientific community through the Natural Environment Research Council (NERC).

Aimed at understanding the influence of such structures — including oil and gas and renewable energy infrastructure and wrecks — INSITE takes an ecosystem-based approach to determine the cumulative effects, and to compare them with that of other stressors of the North Sea region, e.g. river and atmospheric pollution, and climate change. The outcomes are being made available to support decision-making around the installation and removal of man-made structures from the marine environment.

More than five years on from its inception, and with funding confirmed from both industry and science communities, the project continues to gather momentum and is now moving into its second phase.

Commenting on progress, programme director Richard Heard noted: "At the conclusion of a successful INSITE Phase 1, the basis for a further development of the Programme was clear and the need for high-quality data to describe the ecosystem in the North Sea and enhance the scientific outcomes from the research. We have

therefore put a Data Initiative aimed at the sharing of industry data with scientists, as a key element of our second phase."

This Data Initiative has already delivered a new tool — INSITE Interactive — a data portal available to researchers submitting proposals for funding to NERC following their recent INSITE call for proposals announced in mid-June.

"This ground-breaking tool has been developed to provide a robust process for scientists to identify data collected by industry during the course of their operations, which could be used to further research into the role of anthropogenic structures in the ecosystem. The portal provides a GIS-based reference for sourcing industry held ecological data relating to offshore structures and pipelines."

We are delighted to see that this industry-led initiative has been enthusiastically embraced by the research community developing proposals under the NERC call," Heard added.

In addition to this Initiative, INSITE Phase 2 also includes a £5.6 million NERC and CEFAS-funded science programme building on the Phase 1 research, as well as a technology programme aimed at applying new and emerging technologies to marine data acquisition to support future scientific initiatives.

OGUK report calls for proactive approach to safety

The latest report on the health and safety landscape of the UK's offshore oil and gas industry has called for the sector to remain proactive on safety, while continuing to protect people working in the sector.

Findings from OGUK's *Health and Safety Report 2019* reveal that offshore helicopter operations were conducted without an accident last year, and the fatal accident rate per 100,000 flying hours dropped to zero for the first time since 2001, despite flying hours increasing by 12% to 77,286 in 2018.

In terms of general safety, the report shows that whilst the over-seven-day injury rate has increased, there has been a general downward trend in the years since 2014–15. However, it notes that major hydrocarbon releases, whilst reduced since 2012, have since increased to four in 2018.

Continued industry efforts to drive concerted action in this area are being steered by OGUK in partnership with Step Change in Safety.

The report also highlights OGUK's focus for next year and identifies four key areas to be addressed into 2020, including hydrocarbon release prevention, major hazard management, improvements in aviation safety and the health of the workforce.

The report is available via the OGUK website.

My two weeks at OGUK

– Archie Simons

"When I sat down to think about my prospects this summer, they looked bleak: my only option seemed to be a month handing out flyers at a rainy Edinburgh Fringe Festival. The opportunity then arose to do two weeks of work experience with OGUK's Stakeholder and Communications Team in London. Immediately, this struck me as the more appealing proposal.

From the first day onwards, I realised that this experience and work in External Affairs was going to be something I enjoyed. Tasked with preparing a briefing for a meeting with a Brexit Party MEP, I was pleasantly surprised by how interesting I found a simple research task. Throughout the two weeks it was meetings like this, with political actors, that I enjoyed the most. I found it fascinating to meet a BEIS representative one day and someone from the Conservative Environment Network the next.

Not all my time was spent at interesting meetings with stakeholders, but other research tasks I was given, whether creating stakeholder maps or preparing policy briefings, all interested me and made me feel like I was helping the team and the vital role they play. Overall, my two weeks at OGUK has given me some invaluable inexperience and a greater insight into where I may want my career to go after I graduate from university."

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Offshore Decommissioning Conference

The Fairmont, St Andrews

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Aberdeen Breakfast Briefing

P&J Live, Aberdeen

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11 December

OGUK & Deloitte Supply Chain Collaboration Report 2019

The Chester Hotel, Aberdeen

29 January

OGUK Exploration Conference

30 Euston Square, London

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7 May

OGUK Examining Doctors' Conference

London

Sponsorship and exhibition opportunities are available.
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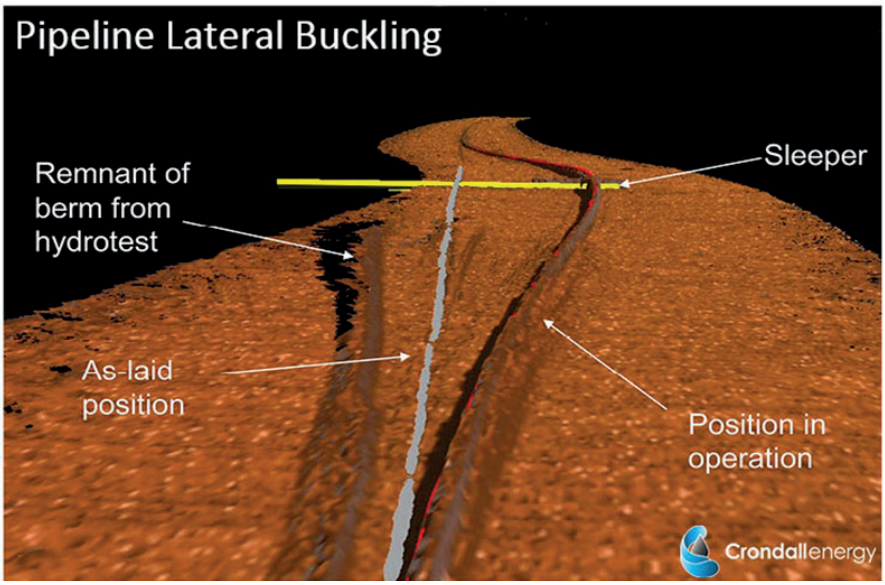
Member News



Crondall Energy creates network for pipelines that move

Floating production and subsea specialist Crondall Energy has created a Joint Industry Network (JIN) to address experiences and challenges relating to the interaction between subsea pipelines and the seabed.

The Buckling, Lateral or Upheaval and Walking of Pipelines (known as BLUW-JIN) is a forum for oil and gas operators to share and discuss their experiences and learn from other members about challenges in the field of pipeline buckling and walking. This includes factors such as design issues, operational challenges and how these challenges have been overcome.

Crondall Energy organises and facilitates two BLUW-JIN meetings each year. The network steering committee, formed by one individual from each member company and co-ordinated by Crondall Energy, will decide the content for each BLUW JIN meeting.

BLUW-JIN founder and Crondall Energy director David Bruton notes that: "Many important lessons have been learned, including how best to mitigate against unacceptable behaviour. It is time that these lessons were shared with a wider audience, to provide guidance on future projects and improve the integrity of existing pipeline systems."

The first BLUW-JIN meeting was held in May 2019 in London, and the next is planned to take place in Houston before Christmas and will be held at the offices of a member operator.

OGIC and University of Aberdeen to deliver drilling innovations

The Oil & Gas Innovation Centre (OGIC) is supporting more than £1.3 million worth of projects, in which the University of Aberdeen's Centre for Applied Dynamics Research (CADR) team will develop new technologies for use in offshore drilling operations.

OGIC has provided a total of £640,000 of co-funding for the seven projects which will see the CADR team partner with five companies to develop innovations including an automated programme for testing well integrity and a new drill-bit. Partners in these projects include companies such as Welltec, READ Cased Hole, Volcanic Basin Petroleum Research (VBPR), RotoJar and Varel.

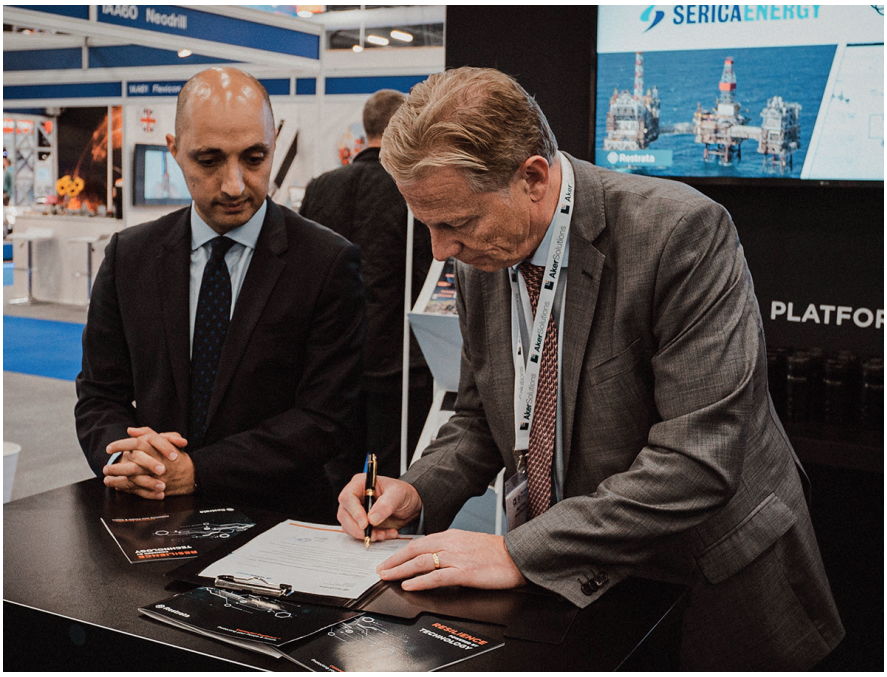
The two most recent projects will see CADR working with READ Cased Hole and Welltec. READ and CADR work with AI experts to develop an automated programme to process and analyse data gathered by a multifinger caliper during the integrity testing of downhole completion items. The ultimate aim of the project is to develop technology which can deliver fully or partially automated well integrity reports.

Meanwhile, Welltec will work with the CADR team on phase two of a project to develop a new tool. This will involve the re-design of a Welltec tool, incorporating the new technology which has been developed by the CADR team. The technology significantly increases rate of penetration (ROP), reduces vibrations of the drill-string for conventional drill-bits and a much lower axial force (weight-on-bit) is required without compromising ROP or borehole stability.

The CADR team also worked with RotoJar to test its new tool designed to do the job of a drilling jar, while VBPR has to test the effectiveness of Resonance Enhanced Drilling (RED) for coring drill bits. Varel UK will also work with CADR to develop a new polycrystalline diamond compact (PDC) drill-bit, which will combine shearing and gouging actions, allowing more efficient drilling in hard rock and heterogeneous formations.

Commenting on the projects, OGIC project manager Mhairi Begg added: "We have worked on a number of projects with the CADR team and their commitment to developing pioneering technology to better the industry has always been evident. The feedback we have had from companies that have worked with this team has been exemplar and the collaborations have resulted in the development of technology which has the potential to maximise economic recovery from the UKCS."

(L-R) Restrata CEO Botan Osman signs the contract with Serica CEO Mitch Flegg.



Wellit opens Aberdeen office

Wellit, the company behind oil and gas logistics software WELS, has opened a UK subsidiary to support a rapidly growing customer base. Wellit UK — a subsidiary of the Norway-headquartered Wellit AS — will be based in the heart of Aberdeen city centre, with offices at 1 Marischal Square. The new UK office will give comprehensive support to the growing number of UK companies that use its Wellit Logistics Software, better known as WELS.

Donald Pearson has taken on the position of sales manager & director for Wellit UK.
"We're proud to launch Wellit UK, in what we consider to be one of the most exciting regions in the world of oil and gas...The energy industry has become increasingly focused on costs, and logistics are a powerful cost driver. WELS offers customers increased planning power and more efficient use of resources. In effect our clients' costs and carbon footprint are typically reduced significantly," commented Wellit CEO, Jan Inge Pedersen.

RDS wins Pharis Energy conceptual study contract

RDS, a unit of KCA Deutag which provides engineering and design solutions to the oil and gas, renewable and alternative energy sectors, has announced a new contract to carry out a conceptual study for Pharis Energy.

Pharis aims to initiate the world's first major offshore steam flood project and is exploring innovative ways to maximise oil recovery in the Pilot Field in the UK North Sea. RDS's scope of work on this project will include jack-up screening and selection and well head platform design. This work will be executed out of RDS's London and Aberdeen offices.

Commenting on the award, RDS senior vice president Albert Allan said: "This is an exciting study for RDS and we are looking forward to working with Pharis Energy on this project which pushes the boundaries of oil recovery in the UK North Sea. Through our agile, fit for purpose and scalable engineering teams we are able to deliver maximum value for our client."

Serica Energy digitises safety with Restrata

Serica Energy has become the first operator to digitise safety in the North Sea after signing a deal to adopt the Restrata Platform — technology which provides real-time monitoring of people and assets around the world.

Technology and services company Restrata developed the platform to enhance personnel safety and wider operations. It enables operators to safeguard the operational safety of their employees and to quickly locate them in an emergency situation, supporting a more efficient response and helping companies across the energy and industrial sectors improve the safety of personnel. Support is provided from Restrata's Global Command Centre, based in Aberdeen.

The contract will see Serica deploy the Restrata Platform on its Bruce asset in the UK Northern North Sea. It cements the relationship between the two groups, with Restrata having provided emergency response support to Serica over the past year.

Restrata CEO Botan Osman said: "The Restrata Platform will protect not only the people involved in an incident, but also ensures the risk to emergency response teams is minimised. The technology allows the support and efficient management of an incident with information being shared real-time, meaning onshore teams can act fast for early intervention — with the safety of personnel at the heart of any response."

Member News

Turbines at the European Offshore Wind Deployment Centre (EOWDC).

Rigmar looks to wind market with Vattenfall EOWDC contract

The North Sea is an unforgiving environment and it is therefore reassuring that companies with skills and expertise built up supporting the UKCS oil and gas sector are now ensuring the safe operation of offshore wind and other renewable energy sources.

Rigmar Group, a UK-headquartered international service provider is one such player taking up the mantle. Established in 2007, the Group provides a range of services including asset integrity, fabric maintenance, marine projects management and survey services, as well as specialist consultancy services to offshore oil and gas operators and contractors, as well as delivering projects in the civil sector. Recently the group secured a major contract in the highly competitive UK offshore wind sector.

Awarded by Swedish energy group Vattenfall, the contract will see Rigmar provide inspection and maintenance services for both the above and underwater structures, together with subsea cable inspection associated with the European Offshore Wind Deployment Centre (EOWDC), located around 3km offshore Aberdeen.

Rigmar's chief operating officer Bill Donaldson commented: "This is significant both in terms of the renewables sector and the contract scope. Historically, Rigmar has primarily focused on oil and gas, and this main contract for a wind farm operator is a significant step for us. In addition, we are proud to be the first Scottish firm to be awarded such a contract."

Comprising 11 turbines, the EOWDC provides 93.2MW of power which, according to Vattenfall, supplies the equivalent of 70% of Aberdeen's household electricity demand.

BP to deploy methane monitoring technology

BP announced in September that it will deploy continuous measurement of methane emissions in its future operated oil and gas processing projects, as part of a programme to detect, measure and reduce methane emissions.

Continuous measurement, including instruments such as gas cloud imaging (GCI), will be rolled out to all new major projects worldwide, having been tested and installed in existing facilities such as the Khazzan field in Oman. The deployment of this technology represents a major step-change in the approach to detecting, quantifying and reducing methane emissions. Historically, engineering calculations and emission factors have played an important part in quantifying emissions.

BP added that data generated will help it identify the largest opportunities to tackle methane emissions, drive efficiency and develop best practice — and is ultimately aimed at delivering and improving on BP's methane intensity target of 0.2% from its upstream operations.

The company's chief operating officer for production, transformation and carbon, Gordon Birrell, said: "For gas to play its fullest role in the energy transition, we have to keep it in the pipe. This new technology will help us do that by detecting methane emissions in real time. The faster and more accurately we can identify and measure leaks, the better we can respond and, informed by the data collected, work to prevent them."

In addition to continuous methane measurement, BP is also aiming to make use of a network of complementary technology, including a new generation of drones, hand-held devices and multi-spectral flare combustion cameras — drawing upon breakthroughs made in fields spanning healthcare, space exploration and defence.

In time, the data collected will feed information into an extensive digital cloud network as part of a global integrated approach to reduce both methane and carbon emissions.

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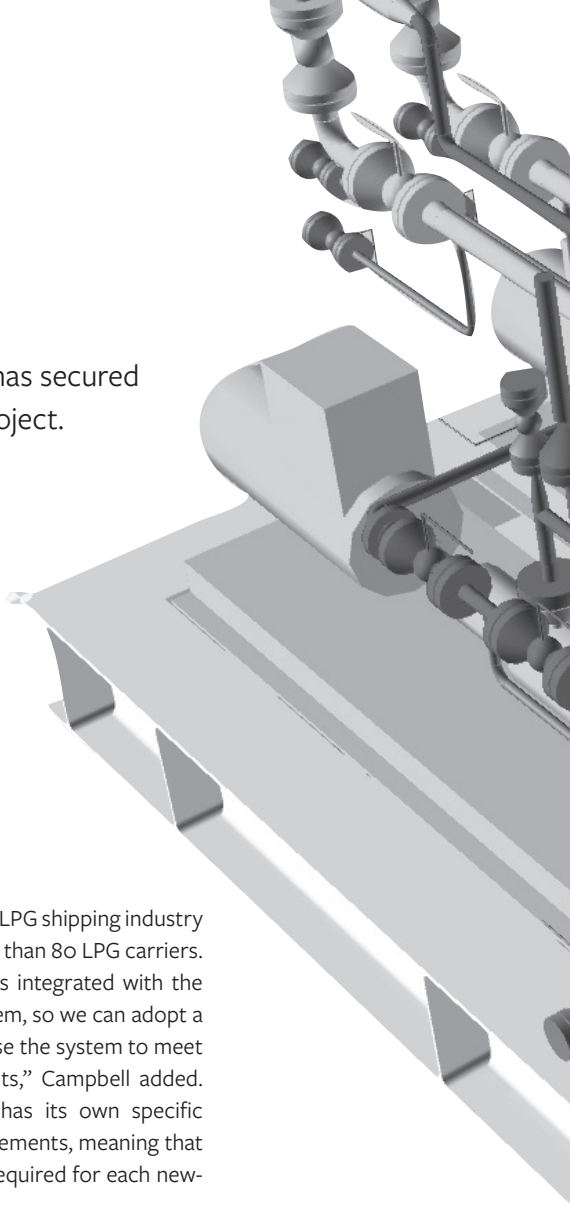
Carrier signal

As interest in LPG as a carrier fuel grows, UK-based Babcock LGE has secured a contract to supply technology to a world-first newbuild project.



Next year will see the introduction of new International Maritime Organisation (IMO) rules that seek to limit sulphur emissions from global marine traffic. As of 1 January 2020, the sector will have to slash its sulphur emissions by 80%, reportedly the largest ever such reduction in transportation fuel undertaken at one time. For many vessel operators, it would be impractical and expensive to retrofit the equipment necessary to remove sulphur from exhaust gases, or to secure supplies of low-sulphur diesels and other fuels. As a result, interest in alternatives to marine bunker fuel has grown, particularly with regards to gas.

Alongside liquefied natural gas (LNG), liquefied petroleum gas (LPG) is a promising candidate, owing in part to availability of supplies and price. In recent years, a raft of newbuild contracts have been issued for LPG-powered carriers, particularly for markets in China and India.

This uptick in LPG market growth has created opportunities for UK expertise. London-headquartered engineering group and OGUK member Babcock recently secured a contract to provide the LPG cargo handling and fuel gas supply system (FGSS) for the first newbuild vessel in the world to use LPG as a primary fuel source. Ordered by an Asian shipowner, the 86,000 cubic metre capacity very large gas carrier (VLGC) is being built in China for delivery in January 2021.

Supplying both the cargo and fuel gas systems, Babcock's Liquefied Gas Equipment (LGE) business draws on 50 years of expertise, and describes itself as the market-leading LPG cargo handling specialist, offering a "one stop shop" solution for this emerging LPG market. "This experience, plus close working relations with the largest tier 1 shipyards in the world, makes Babcock LGE the market leader," LGE managing director Neale Campbell told *Wireline*.

In this specification, the FGSS will use LPG stored in a deck tank, integrated with the larger cargo handling system to enable transfer between the two systems during voyages. To ensure the correct LPG fuel delivery condition from the FGSS to the main engine, Babcock has worked directly with the main engine supplier, MAN Energy Solutions (MAN-ES), for over 18 months.

The vessel's cargo handling system will also be equipped with the company's patented Vent Gas Cooler (VGC) technology, which can increase cargo handling capacity and improve efficiency at lower capital and operating costs. Babcock notes that this technology has had a significant impact in the LPG shipping industry and is already operational in more than 80 LPG carriers.

"The design of our LPG FGSS is integrated with the design of the cargo handling system, so we can adopt a 'whole ship' approach and optimise the system to meet particular shipowner requirements," Campbell added. "We find that each shipowner has its own specific chartering and operational requirements, meaning that different FGSS solutions can be required for each new-build project."

Delivery of the solution will be led by the LGE team based at Rosyth, near Edinburgh. The expertise anchored here, as well as the growing demand for LPG technology and other solutions, mean Babcock's work is in high demand. "Babcock LGE is a UK-based company that is almost entirely export focused, especially the Far East," added Campbell, "and we consistently achieve 50% of the world market share for the design and supply of LPG cargo handling systems."

This effort is borne out, with the business having been awarded two Queen's Awards for Enterprise in 2016 for Innovation and International Trade, "which highlights our success and export excellence," he continued.

"Babcock LGE is a UK-based company that is almost entirely export focused."

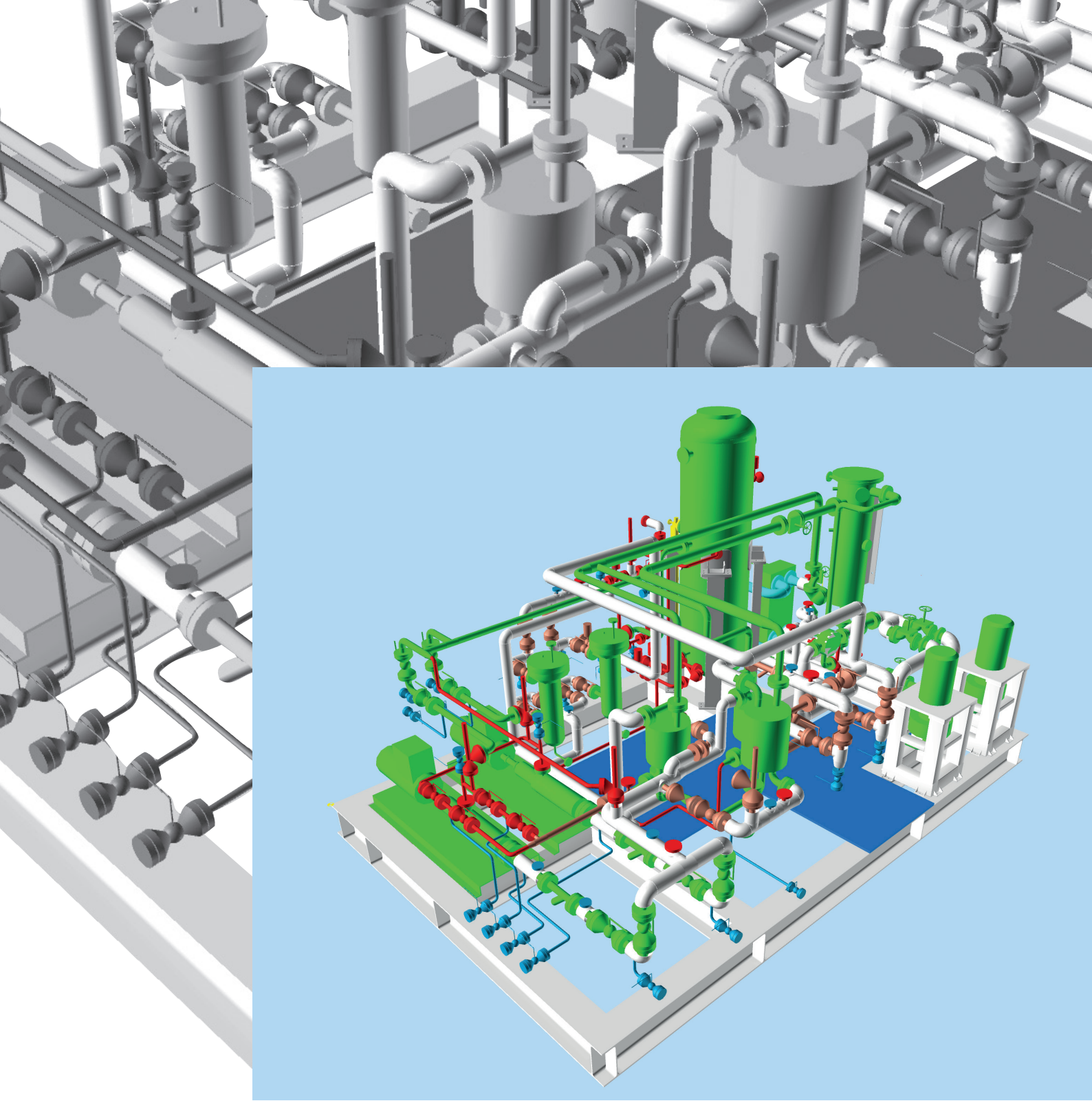


Image above: Rendering of LGE's LPG Fuel Gas Supply System.

With that in mind, it would seem to be an increasingly busy time. "Approximately 50% of the new-build enquiries for LPG carriers request an LPG FGSS, or to be LPG fuel 'ready' — i.e. the design is 'for [LPG], but not with' — facilitating the ability to readily retrofit an LPG FGSS to meet market demands," Campbell explained. "In the future, we expect that the significant majority of LPG carriers will be LPG fuelled. We also recognise that, with LPG being a widely available commodity, LPG as a fuel for other ship types is attracting interest, particularly as a more viable environmental and commercial alternative to scrubber solutions."

All of which infers sizable opportunities for the company at home and abroad in the coming years.

gas GIANT

Four years since its approval, Total's Culzean HPHT development is now on stream. *Wireline* learns what it takes to deliver a $5 billion megaproject on-time and under-budget.

To describe the past 12 months of operations at Total as 'busy' would be something of an understatement. With the significant discovery at Glendronach in September 2018, followed by the estimated 250 million boe Glengorm discovery alongside operator CNOOC Limited in January 2019, the French-headquartered supermajor had posted the two largest finds for a decade in the space of a few months and further cemented its position as one of the linchpin gas producers on the UKCS.

All the while, progress at the Culzean field — the previous record holder for a UKCS find — has continued apace, culminating in the production of first gas in early June 2019. Located on Block 22/25a, 230km off the cost of Aberdeen, the high-pressure, high-temperature field (HPHT) is a flagship development for Total and its partners (BP, 32%; JX Nippon, 18.01%) having assumed control of the project as part of its takeover of Maersk Oil. Recoverable reserves at the field exceed 250 million boe and planned output will reach 100,000 barrels of oil equivalent per day (boepd), providing around 5% of the UK's gas consumption. In doing so, Total will also increase its share of overall UK demand to 18%, assuring its place as the largest single UK gas producer.

Wireline last spoke with members of the Culzean team in 2015, following the field development approval issued by the OGA. With all facilities now in place and production ramping up, we caught up with project director Claus Vissing-Jorgensen in late summer to hear his thoughts on the successes and challenges of delivering a megaproject like this, and what it represents for those who worked on it.

High-pressure environment

Vissing-Jorgensen has been involved in the project since 2013 as a facilities manager, before becoming project director in 2018. Having been responsible for contracting strategy and execution, and later project delivery, he has been at the heart of Culzean from the beginning. Over that period, he has overseen a team which has managed not only to deliver on time, but to do so $500 million under budget.

Culzean's $5 billion capital budget is mirrored in its myriad components. "Culzean has all the features that make up a megaproject," Claus says, "It has all the variety of traits involved — you've got the drilling of new wells, new facilities installed, you've got around 7,000 people involved at peak." Coupled with its "strategic size" in relation to the UK's future gas supply, he says the importance of delivering on time, safely and within budget is clear.

At the time of writing, it has been around four years since Culzean received project approval in September 2015. The wellhead platform jacket was installed in 2016, while drilling began later that year from the newbuild Maersk Highlander jack-up. Further jackets were added in 2017 alongside the installation of subsea infrastructure, including the 52km subsea pipeline which connects the facilities to the Central Area Transmission System (CATS) T5 tie-in point to the south.

Over the same period, a pipe-in-pipe connection pipeline was installed to relay between the Culzean central processing unit and the floating storage and offload (FSO) vessel Ailsa, which handles condensate export. Designed by MODEC, the 243m newbuild ship can receive up to 25,000 barrels of condensate

Image right: Over 4,000 people worked on the project. Now operational, it provides jobs for 400 people onshore and offshore.

Image left: The MODEC-designed Ailsa FSO can store can store 430,000 boe.

per day and has a total storage capacity of 430,000 barrels. It is anchored in place 4km from the Culzean topsides via a SOFEC turret mooring system.

Culzean's topsides (five modules spread across the three platforms) arrived from Singapore in July 2018, along with the FSO, kicking off the hook up and commissioning operation. Claus estimates that the hook-up involved "around 700 people" in the field, including more than 100 personnel on the drilling rig itself, again confirming its status as a true megaproject.

The hook up and 'dynamic commissioning' continued for just under a year, culminating in first gas on 7 June 2019. "First gas export was reached in July," Claus continues, "and we are currently sitting in a pretty good place with four wells online and nearing our production plateau."

In addition to the project scale, the reservoir itself presents challenges. "Compared to a normal reservoir, it's about five times the pressure and two times the temperature," he explains, "Which of course makes it a little bit more complex — you need high-integrity process systems to mitigate any risks."

With output of 100,000 boepd at peak, Culzean will supply 5% of the UK's gas demand.

With that in mind, it is all the more impressive that the drilling team exceeded expectations, bringing four wells online in the time initially allotted for three. "That allows us to reach our production plateau slightly earlier than was planned," he adds.

Drilling and upskilling

In the middle of all this, there was the minor matter of Maersk's acquisition by Total. Despite the complexity and scale of the corporate transaction, Claus describes it as a good match and has found a company structure that has been "very accommodating." Given that progress at the Culzean field was already far underway, Maersk Oil's plans remained relatively ring-fenced from wider changes within the organisation. Nevertheless, he says, "Total holds a lot of expertise in HPHT development, so they were quite diligent in looking at what we were doing and how we were doing it."

Even prior to its relationship with Total, however, Maersk was building expertise within its team to deal with the challenges of developing an HPHT reservoir. The wider industry was happy to pass on knowledge, as Claus recalls: "We started out as Maersk Oil being new to HPHT developments, so we paid a lot of attention to detail and we took all the learnings from industry that we could find. We had quite a few helping hands from industry around best practices and we tried to put that into force and implement them."

While the newbuild rig brought with it a host of mod-cons and cutting-edge technology, it also meant assembling a new team, who took time to bed in. Claus notes that Maersk conducted a lot of work around competency, planning and preparedness with the drilling crews, which played a major part in delivering results. Ultimately, he says: "What we've seen is excellent drilling performance from Maersk Drilling, and it's quite complimentary given the fact that it's both a new rig crew and a new rig."

He attributes this performance to good processes, and the application of experience as the project progressed. "It was due to planning, preparation and essentially performance management of the wells," he continues. "We've taken on the learnings and we have managed to learn and be more efficient as we complete every well."

Key to that planning was the optimisation of drilling processes, one influential decision being the batch drilling of wells — i.e. drilling all the required top holes before moving onto the individual wells. "Obviously, that's a feature you can apply on a new project where you start on a greenfield, so there's a benefit in starting from scratch," he adds.

Local support

Contracting for Culzean and working in partnership with UK supply chain companies has also been an important element of the project. As well as major contractors such as Sembcorp, MODEC, Subsea 7

Total staff during the hookup phase.

"We started out as Maersk Oil being new to HPHT developments, so we paid a lot of attention to detail and took all the learnings we could find."

Culzean Project Director
Claus Vissing-Jorgensen

Culzean Project Timeline: 2008–19

Total's UKCS Assets

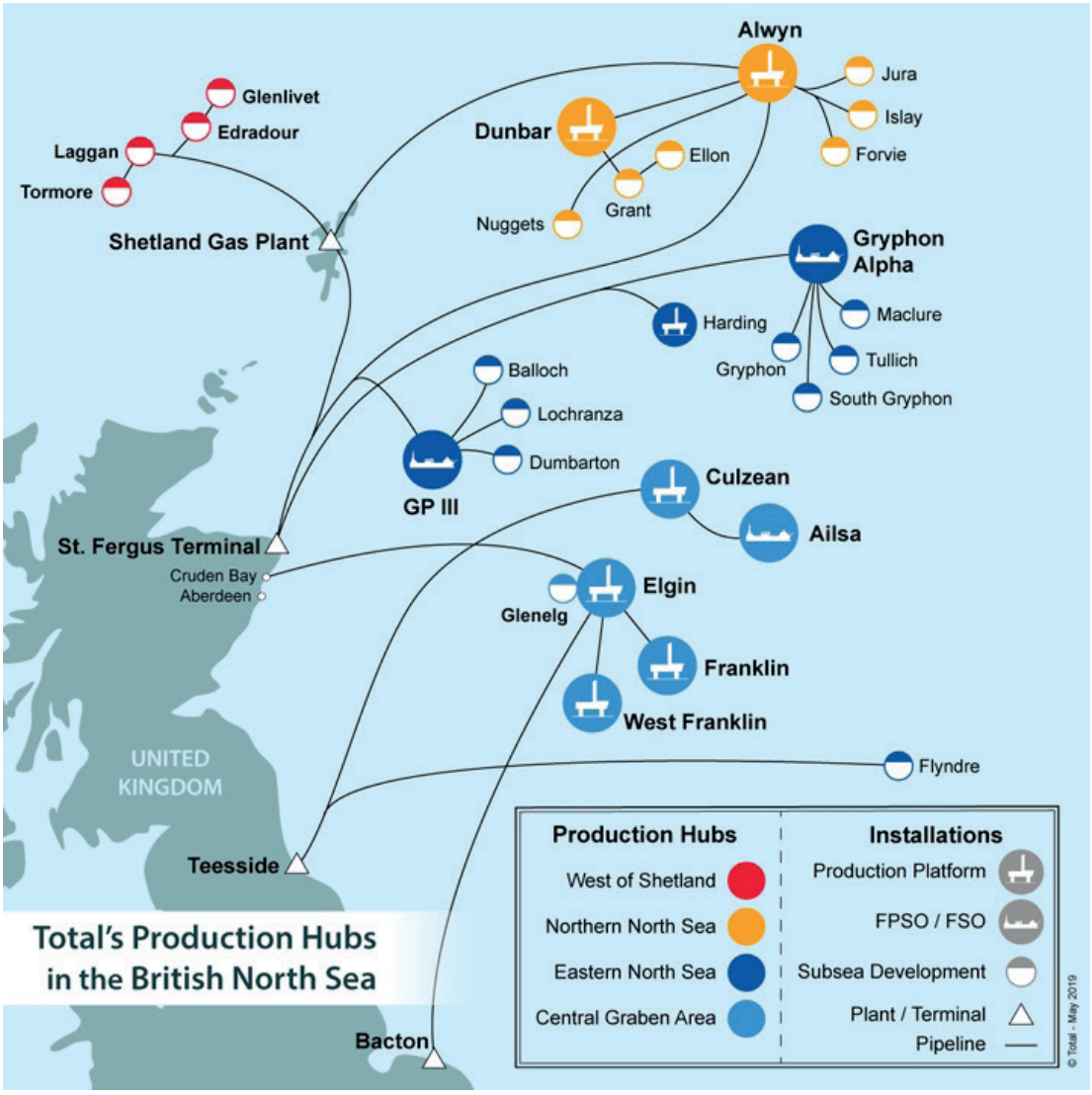


Image above: 2018 saw the installation of topsides at the field.

and Hereema, Claus highlights close, collaborative relationships with suppliers including Wood Group, Semco Maritime, Bilfinger, Baker Hughes, Emerson, Siemens, Bel Valves and others. All told, around 52% of the project value has been delivered from the UK supply chain, in addition to the 200 permanent jobs required for ongoing management of the field itself.

The collaboration extends to government and to regulators. In particular, Culzean benefited from strategic support from the OGA and HM Treasury in the form of the HPHT Cluster Allowance, a tax benefit designed to enable the development of these costlier and more technically challenging fields. "I think it's fair to say that around project sanction and FID the UK policies and regime put in place were quite helpful and basically part of the make-or-break for it going ahead, so it definitely played a significant role in that respect," Claus adds.

Beyond that, he says that the OGA has maintained a close interest in the project, particularly as it looks ahead to future exploration and production opportunities around the infrastructure.

Other highly specialised components necessitated international co-operation, particularly when it came to the high-grade steel needed for well cases and linings in order to cope with the highly saline and corrosive environments found in the HPHT reservoir. For these, Maersk reached out to Sumitomo in Japan.

The next generation of HPHT

With Culzean up and running, Total is now moving to a new operational blueprint, described as a "one-asset model." This involves the combination of Culzean with nearby Elgin-Franklin — also an HPHT field — to create a single Central North Sea (CNS) asset. Current plans are to have this completed by October 2019, effectively creating one operation with total combined production of 230,000 boepd.

Claus says that Total has always planned to develop a North Sea ultra-HPHT hub, and the combination of Elgin-Franklin and Culzean represented a good fit for the existing portfolio: "First and foremost [the hub] is about knowledge-sharing and optimising processes. The longstanding expertise within HPHT in Total is a great thing for both assets."

Looking at the two assets in tandem, the potential efficiencies were clear: "Some of the obvious candidates will be in logistics — the two fields are located only 15 miles from each other,

"First and foremost the HPHT hub is about knowledge-sharing and optimising processes. The longstanding expertise in Total is a great thing for both assets."

and they are both 240 miles from shore, so optimisation with logistics boats and helicopters would be natural."

Onshore, the goal is to move asset management operations for both fields into a single, digitally enabled 'smart room'. For the new Culzean infrastructure, this support includes a full digital twin model — part of Total's drive to run the facilities as "21st Century platforms." This digital archive incorporates records for every piece of equipment on the platform, identified via QR codes and/or RFID tags, meaning personnel can pull up performance and maintenance records in seconds using mobile devices, allowing engineering or performance issues to be solved on site, with advice provided from onshore.

With planned operating expenditure of around £100 million per year over the field's 13-year minimum operational life, the hope is that new technologies and processes like these can have a significant impact on bottom lines.

As for the future, additional capacity at Culzean and the larger CNS hub means new prospects could be tied back in the coming years. Current production capacity is 500 million cubic feet of gas throughput per day, 25,000 barrels of liquid handling and 5,000 barrels of water, but Culzean does have space to host another 2,000-tonne topside module to cope with an influx of additional resources — or even another bridge-linked platform (BLP) should the team find something of major scale.

"It's fair to say that we haven't found the next Culzean project yet," Claus says (although Glengorm may well be poised to take up the mantle). "But we are targeting other prospects in the area — not in the same scale, but as with any new asset in a new area we will always be looking to see what the future is and if we can fill the hopper with prospects."

While Culzean may be unseated from its record-holding heights by the likes of Glengorm and Glendronach, its importance — to Total and to the UK — cannot be understated. Its unification with Elgin-Franklin under the CNS model not only cements the supermajor's expertise in North Sea HPHT, but also helps secure the future of these assets for many years to come. In the meantime, he says that drilling will continue to ensure production rates over the medium term. "The best way to get access is to drill more wells, so we're working on that to generate more future for Culzean."

Digital and dynamic: A new direction for UK skills

OPITO's latest *UKCS Workforce Dynamics* report explored the skills needed for an increasingly digital energy sector of the future. Now the skills body is charting the path to make it a reality.

The energy industry of 2025 will be very different to that of 2019. Developments in technology, regulation, business composition and corporate strategy will lead to profound changes in how the industry works over the next decade, for oil and gas in particular. It will be the industry workforce who drive much of this change, many of whom will work in new roles and with new tools at their disposal; but how can they be trained, supported and empowered to get there?

Central to this conversation is OPITO, the global not-for-profit skills body for the energy industry. Its primary remit is to ensure the industry supports a safe and skilled workforce, and it does so through over 200 accredited training centres in 45 countries worldwide. These centres certify over 350,000 people annually.

OPITO is also playing a strategic role in driving the skills agenda. In looking to the future of the oil and gas workforce, it has produced detailed reports that explore the skills landscape. In turn, these will help inform and prepare a route map that will guide all stakeholders on the way ahead.

This newly formulated route map will set out the journey the UK energy industry will have to make if it is to possess the requisite skills and competencies for a successful future. It will outline how multiple parties can work together between now and 2025 to shape a workforce profile that is fully equipped for the digital age. The process represents nothing less than a transformation in terms of the skills, disciplines and specialisms that will be part and parcel of a new era for the industry.

The new normal

"We have to accept there is a 'new normal' and, now that we are beginning to understand what the possibilities are for the future, we have to find a way a way of getting there," explains OPITO chief executive John McDonald. "Over the past few years, great strides have been made in terms of industry modernisation and efficiency, and we saw an ideal opportunity to drive the development of a skills strategy."

OPITO has moved the issue forward in partnership with other industry bodies. Specifically, its series of *UKCS Workforce Dynamics* reports assess the industry's evolving skills and capability requirements. The first of these, issued in 2018, looked at the period to 2035. The second, published this year, focused on an intermediate timeframe to 2025 and pinpointed several specific areas of development.

"It reflects the impact of technology, innovation and rapidly-changing business models," explains John. "There is a greater number of smaller, more nimble organisations in both the operator and contractor communities, and that's creating new opportunities and new ways of working. These, in turn, require new skills and competencies.

"While our industry has a very successful track record in technological development, there is scope to accelerate the pace of that work — the successful work of the Oil & Gas Technology Centre [OGTC] is an example of how that can be done – and to increase the pace of skills development work also."

The *2019 UKCS Workforce Dynamics: The Skills Landscape 2019–2025* report, developed in conjunction with Robert Gordon University's Energy Transition Institute, surveyed around 1,000 people across 140 organisations. Released in May of this year, it charts where and how skills are changing, and where there are opportunities for UK-based companies and their employees.

The report estimates that the UKCS industry will need to attract 10,000 new people in the period to 2025, in part to counteract attrition and retirement trends. Some of those will fill an estimated 4,500 roles that do not yet exist. "That for me is an exciting proposition — how do we prepare not just 'new' people but also the existing workforce for those new roles?" says John. "We have to figure out precisely what those jobs are, and how we get people ready for them."

The UKCS Workforce Dynamics report also helps explore how and where those personnel will be working. While operators lead much of the conversation around oil and gas activity their staff will make up only 9% of the 2025 workforce, the OPITO report estimates that 91% will work for contractors and the wider supply chain. Additionally, three-quarters of all personnel are forecast to work in technical roles, and 25% in business.

The subsequent route map being developed by OPITO is designed to find a way through a complex learning environment that encompasses everything

Image above:
OPITO chief executive
John McDonald.

from primary and secondary education through to colleges, universities and specialist training providers. "All of these — and more — are part of the supply chain that provides the industry with the skills and expertise it needs, and we know many parts of that chain want to contribute ideas about the changes we need to see," he adds.

Forging Alliances

As a key step forward, OPITO has issued a call to action to a wide range of stakeholders — including OGUK, organisations across industry, education and the public sector — to join a new Skills Alliance. It's hoped the first meeting of the Alliance will take place before the end of 2019, after which groups will be established to deal with specific and varied challenges faced in this arena. These groups will then report back to the Alliance.

"We believe it's how we effect change — bringing the best people together to look at the challenges and develop solutions," says John. "It's also important, and welcome, that we have the support of both the Scottish and UK Governments in this work, through ministers, civil servants and agencies such as Skills Development Scotland [SDS]," he adds. "They're asking us how government can help the process, and that's encouraging."

"There is a greater number of smaller, more nimble organisations in both the operator and contractor communities, and that's creating new opportunities and new ways of working."

"We need to keep attracting young people into the industry and I'm absolutely convinced that these new opportunities, based as they are on advanced technology, will help to us to do that."

John says the ultimate goal is to shape, and sustain, an increasingly flexible, multi-skilled and technology-enabled workforce — one which will feature new titles, roles and responsibilities in the fast-emerging digital oilfield. "We've envisaged what certain jobs might look like in the future, with titles such as system anthropologist, artificial intelligence & machine learning specialist and augmented reality experience creator. In truth, it probably includes roles we can't anticipate yet."

OPITO is also confident that the challenges and skills demanded by these new roles will help attract a new generation. "We need to keep attracting young people into the industry and I'm absolutely convinced that these new opportunities, based as they are on advanced technology, will help to us to do that."

The same principle forms part of the industry's moves to position itself as part of the long-term, low-carbon solution, which should engage young people who want to help find answers to the questions around long-term sustainability issues.

Retain, retrain

For people in the existing workforce — more than 80% of whom are expected to still be working in the industry by 2025 — the strategy places much of the focus on retaining and retraining – two of its four guiding principles. In doing so it places a premium on upskilling — i.e. equipping people with new capabilities to broaden their skills set and position them to perform better in their current job – or reskilling, which equips them to take on new industry roles and responsibilities.

The increasing automation of so-called transactional work — tasks typically defined as routine or repetitive activities — is also seen as a means of enhancing efficiency and productivity. The report notes that significant upskilling and reskilling will be needed to realise those gains; it refers to workforce expectations that transactional activity will be reduced by around 40% by 2025, shifting staff activity towards more operational and strategic activities.

Similarly, the learning and development methods used by educational institutions and training providers will also need to be the subject of radical, technology-led change. "It is already turning learning on its head — from the traditional methods of a trainer standing in front of a classroom of people, to a new world of self-study, virtual classrooms and groups, using online learning, engagement and assessment," says John.

"It's the same with simulation, which is transforming the way we learn in areas such as drilling and lifting. And anyone who doubts the value of simulation should remind themselves of how pilots and astronauts learn their trade."

He believes the industry will face growing competition from other sectors in the modern-day working world, forging their careers based on their specialist discipline rather than an individual industry. "I think young people are increasingly looking at opportunities across different industries, and that is something we need to take into account," says John.

Employers looking to recruit and retain staff will also have to be cognisant of the push towards decarbonisation and the challenges of meeting net zero. It's no small issue, but something that John believes the industry can respond to positively. "What I would say is: 'Come and join us, come and help us realise net-zero carbon as a reality. Work in this dynamic, technology-led industry that is going to be around for a long time to come.'"

With 2025 just a few short years away, the seeds of any meaningful skills strategy must be sown now if the energy sector is to equip itself with the staff and knowledge it needs. Encouragingly, OPITO's report and the subsequent routemap being developed will offer a positive pathway towards ensuring this is made a reality, and with the support of the UK's supply chain companies, universities, trade groups, training providers and governments, the future of the digitally native energy workforce looks assuredly bright.

2019-2025 Route Map

The 2019-2025 route map is in effect intended to be the hub of all relevant skills development activities.

It is based on four central components: Retain, Retrain, Recruit and Renew.

The first two of those are focused on those already working in the industry – the report estimates around 80% of those will still be active in the sector in 2025.

The latter are all about bringing new people on board, either young people accessing one of the range of pathways into the industry or workers filling new jobs that will exist in the coming years.

From these components flow a series of themes, activity areas and actions that together are designed to deliver a new-look development framework.

Full disclosure

Alongside maximising economic recovery, the spotlight on accountability in oil and gas production has grown in recent years. The UK's participation in the EITI is one route towards ensuring the industry operates transparently across the globe.

Given the importance of hydrocarbons to both political and corporate agendas, it is paramount that governments and oil producers can demonstrate responsibility in their activities. One key route to supporting this is the Extractive Industries Transparency Initiative (EITI), an international standard for openness around the management of revenues from natural resources.

EITI is designed to improve accountability and public trust for the revenues paid and received for a country's oil, gas and mineral resources. Although EITI is principally aimed at developing countries where there may be concerns over the stewardship of these resources, many in industry and civil society in the UK — along with the government — see participation as an important demonstration of leadership and solidarity. Accordingly, May 2013 saw the Prime Minister announce that the UK would subscribe to this standard. Implementation of the initiative was launched the same July and the UK was admitted as a candidate country in October 2014. The UK is currently being assessed against its compliance with the standard and the outcome is expected later this year. As part of this process, the UK EITI Multi-Stakeholder Group (MSG), which oversees EITI implementation, is looking to increase support and awareness within the industry.

Setting the standard

In practice, participating extractive companies are required to disclose specific, group-level payments or repayments to government agencies (such as HMRC, the Oil and Gas Authority, Crown Estate and Crown Estate Scotland) that total £86,000 or more. These figures are audited by the EITI's independent administrator and published along with contextual information in an annual report.

Although the initiative is voluntary, the UK's continued participation in EITI helps maintain momentum in the drive for more transparency worldwide, which is vital in tackling international corruption and economic crime. This requires the active involvement of companies from the sector, including many OGUK members.

Comprised of representatives from across industry, civil society and government, the MSG is responsible for overseeing and agreeing all decisions on implementation. Other functions include determining the scope of UK EITI, developing the work plan and appointing an administrator to carry out the reconciliation of payment data received from government and industry. OGUK, along with some OGUK members, hold seats on the group; if you are interested in getting involved please contact OGUK external affairs adviser Tom Evans.

Above: The UK stand at the 2019 EITI Global Conference in Paris
Credit: Andrew Wheeler

Right: EITI National Co-ordinators at the 2019 EITI Global Conference
Credit: Hervé Cortinat

Participation in the initiative helps enhance accountability to the UK public on the revenues generated from extractive industries, and in turn helps increase public understanding of their social and economic impacts. At a global level, alignment also supports moves towards common reporting standards in oil, gas and mining and helps ensure a level playing field for business in the UK and internationally.

As well as societal benefits, there are upsides for participating members — even in highly regulated markets such as the UK. Participating members can point to their involvement in the process as a sign of their commitment to transparency, good governance and responsible business, and for many, may also help to meet environmental and/or corporate and social responsibility (CSR) goals.

Companies are also asked to provide information relating to individuals that have a material influence on the company through their shareholding in the company, including individuals with political influence. In the UK, this is achieved via beneficial ownership records, known as the People with Significant Control (PSC) register, which has been in use since 2016. The PSC register is the first publicly accessible company beneficial ownership register in the G20 and one of the first of its kind anywhere in the world.

In setting up the PSC register, the UK has already fulfilled one of its EITI requirements, ensuring that all oil, gas and mining companies that bid for, operate or invest in extractive projects in their country disclose their real owners.

Its next milestone achievement will be validation against the EITI Standard. The process was carried out by the EITI International Secretariat during 2018 and is intended to provide all stakeholders with an impartial assessment of whether EITI implementation in the UK is consistent with the provisions of the standard. The validation committee will submit its final report to the EITI Board for discussion and a final decision is expected in late autumn 2019.

The UK MSG plans to publish its fifth UK EITI report in December 2019, followed by the planned launch of a standalone UK EITI website in spring 2020. The report will include data on extractive industries payments to and repayments by UK government agencies in 2018, as well as background information on the UK extractives sector and the EITI itself.

Sixty-two companies were included in the EITI reconciliation process for 2017, with 97% of the total in-scope payments reported by UK government agencies being reconciled. As awareness of the EITI standard increases, this may well grow further in the coming years.

Companies interested in participating in the EITI should contact Michael Nash at michael.nash@beis.gov.uk, or visit www.eiti.org for more information.

Participation in EITI helps maintain momentum in the drive for more transparency worldwide, vital in tackling international corruption and economic crime.

Tackling emissions, together

Operators are responsible for the emissions that result from the production of oil and gas. It is imperative that companies consider all options for lowering their emissions, including collaborating with others.

The energy transition and the need for drastic change is at the centre of almost every public conversation operators and policy makers are having — and rightly so. The special report presented by the Intergovernmental Panel on Climate Change (IPCC) last year highlighted the need to hold global warming to 1.5°C rather than 2°C; currently, we are on course to exceed a 2°C carbon budget as soon as 2037.

In May 2019, the Committee on Climate Change (CCC) published its formative report titled, *Net Zero: The UK's contribution to stopping global warming*. In this report, the CCC — an independent body established under the Climate Change Act 2008 that advises the government on setting and meeting carbon budgets and preparing for climate change — outlines the actions that need to be taken to ensure the UK achieves net-zero carbon emissions by 2050.

The extraction, stabilisation and export of hydrocarbons requires processes that result in the emission of greenhouse gases (GHGs) like CO_2, methane, and oxides. These processes include combustion to provide electrical power and drive compressors and pumps, the flaring of excess gas for safety or during well testing and tank loading. Incidental releases of GHGs also occur from other platform equipment such as refrigeration.

The CCCs analysis considers four technologies for lowering industry emissions: electricity or hydrogen connections to offshore platforms; flare gas recovery; on-site carbon capture; and leak detection and repair (LDAR) for reducing methane leakage.

In 2018, emissions resulting from the production of oil and gas at offshore installations in the UK accounted for 3% of total UK GHG emissions, or 14.63 million tonnes of carbon dioxide equivalent (CO_2e). The recommendation from the CCC is that, if we are to achieve the goal of being carbon neutral in 2050, this figure needs to fall to under 0.5 million tonnes CO_2e by 2050.

Many operators in the North Sea have begun deploying and trialling new technologies to reduce emissions from the two activities that contribute the most to production-related emissions: offshore power generation and gas venting/flaring.

Powering offshore activity

The biggest contributor to offshore emissions is power generation, which is responsible for 74% of emissions on the UKCS. As such, it is one of the areas where the greatest impact can be had.

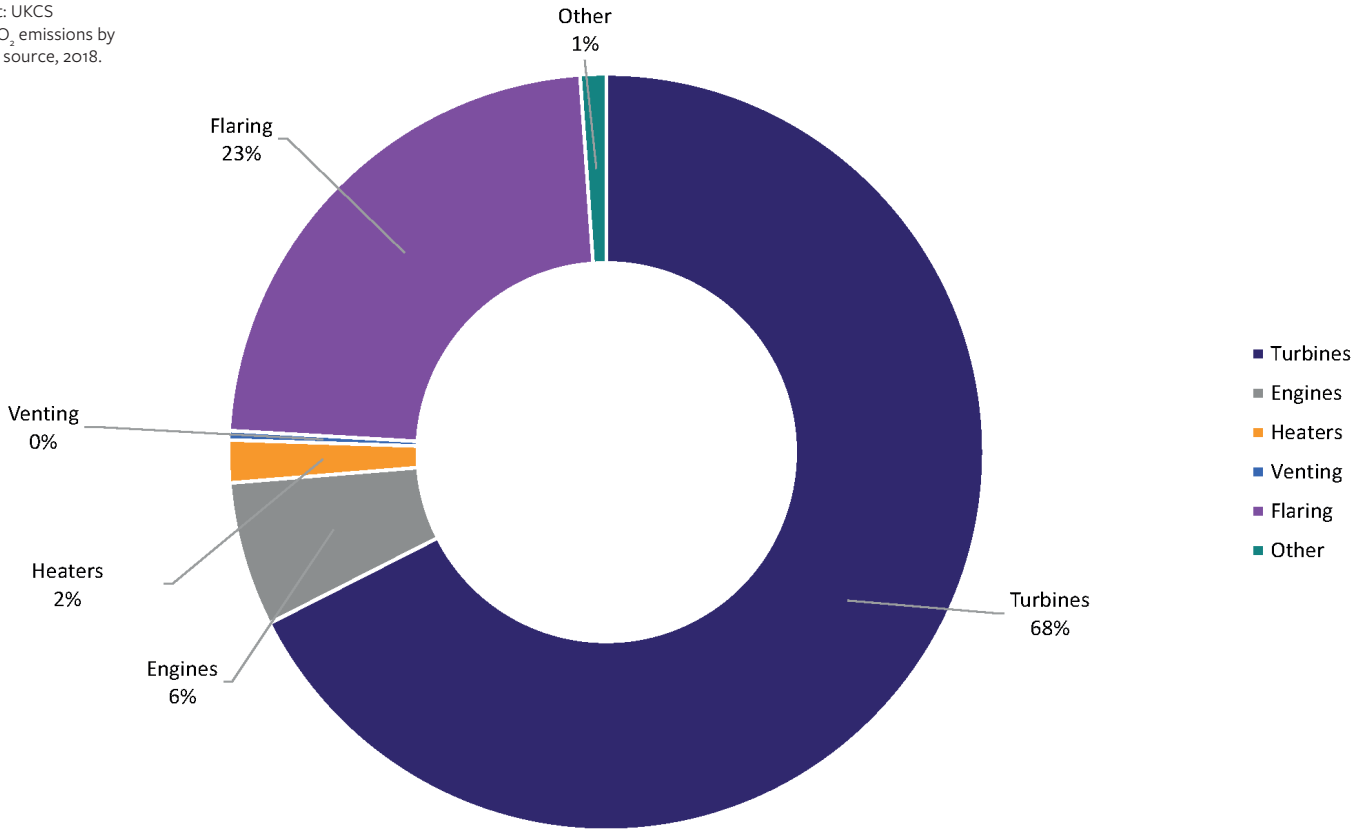
Power is needed offshore to run operations and support crew living quarters. This power is typically supplied via a small power plant (usually a gas turbine) on the offshore platform. Connecting platforms to the onshore power grids (supplying power from existing infrastructure on land), removes the need to generate power separately offshore.

Connecting to the grid also enables access to more efficient power plants and to other, lower-carbon sources of electricity such as natural gas or renewable energy from wind and solar.

Norway is leading the way in this area, having pushed for electrification from shore on many of the newer platforms on the Norwegian Continental Shelf, maintaining its status as one of the world's most carbon-efficient oil and gas producers. This change came as a result of a Norwegian carbon tax introduced in 1991 on CO_2 emitted from the production of oil and gas. As a result of this tax, Norwegian companies were driven to introduce technology like carbon capture and

Production of oil and gas in the UK accounted for 3% of total UK GHG emissions, or 14.63 million tonnes CO_2e. This figure needs to fall to under 0.5 million tonnes CO_2e by 2050.

Image right: UKCS offshore CO_2 emissions by generation source, 2018.



storage (CCS) at the site of production and electrifying as many of their platforms as possible.

In May 2018, Equinor began laying a cable to supply its Johan Sverdrup oilfield, one of the country's five largest fields, with power from onshore. By using onshore power, Equinor estimates that emissions will be around 80% lower than they would using gas turbines on the platform. It is now exploring the possibility of electrifying other installations.

Electrifying major offshore oil and gas installations is not easy. There are challenges, both technical and financial, and many installations are in areas with little possibility for connecting to land-based power.

Where electrification may not be practical, there are other ways of lowering the emissions intensity of offshore assets. On-site CCS is another powerful technology for lowering emissions, allowing CO_2 released from offshore activity to be captured and transported to a storage site. The captured CO_2 may also be used, for exmaple, injected into oil fields to stimulate production or be to create building and other materials, although this amount will be significantly smaller than the amount that must be stored.

Gas venting and flaring

Associative or by-product gas is produced as a result of oil production. Composed largely of CO_2 and CH_4 (methane), most platforms do not have the infrastructure to collect this gas for productive use so it is disposed of by releasing it into the atmosphere (venting) or combustion (flaring). These processes are first and foremost safety procedures, designed to remove highly combustible gas from the vicinity of an installation's personnel and infrastructure.

Burning this associative gas (producing CO_2 and water) is preferred to directly venting it. This is because methane is a powerful greenhouse gas, estimated to be 25 times more potent at trapping heat than CO_2. For this reason, it is vital that methane releases from installations are monitored and prevented by improving gas recovery or flaring where possible. Methane leakage from gas networks can be reduced through periodic leakage detection and repair or continuous monitoring.

OGUK member BP plans to incorporate continuous measurement of methane emissions in all its future oil and gas processing projects. The data generated from this will be used to identify the largest opportunities to target methane emissions and improve practice.

Gas flaring is subject to strict regulation and operators must report all flaring activity in the UK's Environmental and Emissions Monitoring System (EEMs), with permissions needed for certain volumes of flaring over limited time periods from the Oil and Gas Authority. Operators are expected to minimise flaring as much as possible; where power generation represents 74% of CO_2 emissions from the UKCS, flaring accounts for 23%.

BP is one of seven UK operators to sign onto the global 'Zero Routine Flaring by 2030' initiative set up by the World Bank Group. Flaring is a variable element of the industry's GHG emissions and the solutions that exist to lower emissions from this process will require collaboration among operators. Emissions related to flaring can be tackled by building low- or no-routine -flare infrastructure, including a viable gas export for oil installations, or increasing the amount of gas pumped back into the reservoir at site.

Waste heat from offshore operations also has the potential to be useful. Eltiera is a start-up participating in the Oil and Gas Technology Centre (OGTC) TechX Accelerator programme. Its goal is to develop a way to generate electricity from waste heat produced on platforms offshore. This project, founded by Dr Ilia Cherezov, is in its early stage, but the implications are major, with potential applications ranging from waste heat recovery to geothermal power. "By harnessing the vast quantities of heat produced offshore, it is possible to extend the life of assets and delay decommissioning whilst also reducing the environmental footprint of operations to help the UKCS become the world's first net-zero basin," Dr Cherezov tells *Wireline*.

The future is electric

Changes in the production of grid-based electricity will also push change in the oil and gas industry.

DNV GL's global Energy Transition Outlook forecasts that the share of electricity in the final energy demand mix will rise to 40% in 2050, almost two-thirds of which will be generated by solar PV and wind. Natural gas will supplement variable renewables by meeting demand during peak periods. The report further forecasts that by mid-century, gas will account for 29% of the world's energy supply.

If gas consumption is to increase, however, corresponding efforts must be made to decarbonise its use. The *Net Zero* report found that CCUS and hydrogen technology developed in regional industrial clusters will be essential to the UK achieving a net-zero carbon economy by 2050.

Drax Group and National Grid Ventures have also partnered with Equinor to deliver the UK's first zero-carbon cluster in Humber, England. The region has been a strategically important industrial cluster for the UK, and crucially has the skills, industrial capabilities and offshore storage opportunities to enable transformation into a low-carbon hub.

The partnership will explore opportunities for developing a large-scale hydrogen demonstrator within the Drax site. It is also looking to scale-up the bioenergy CCS project currently underway at the Drax power station. A study outlining the technical, economic and societal opportunities for CCS and hydrogen in the Humber region will be published by the partners later this year.

"Our industry is crucial in delivering a net-zero economy. Not solely in delivering indigenous oil and gas for decades to come, thereby reducing our reliance on international imports, but through the transfer of skills and expertise that have been developed through a world-leading supply chain," OGUK lead business adviser Harry Thorne reflects.

"As committed to in Roadmap 2035, industry will play its part in delivering net-zero emission produced oil and gas from the UKCS by 2050, but looking beyond to wider society's emissions, are already leading the charge in developing a CCUS industry at scale, through the maturing CCUS cluster projects."

A consortium like this has the collective expertise, credibility and means needed to deliver the recommendations set out by the CCC. Operators are limited by what they can do, or what is realistic, when working independently.

Thorne continues: "The lines of what it means to be an oil and gas company have blurred, none more so than in the contractor community who are already out there delivering solutions across multiple industries, including oil and gas, renewables, maritime, defence and many more."

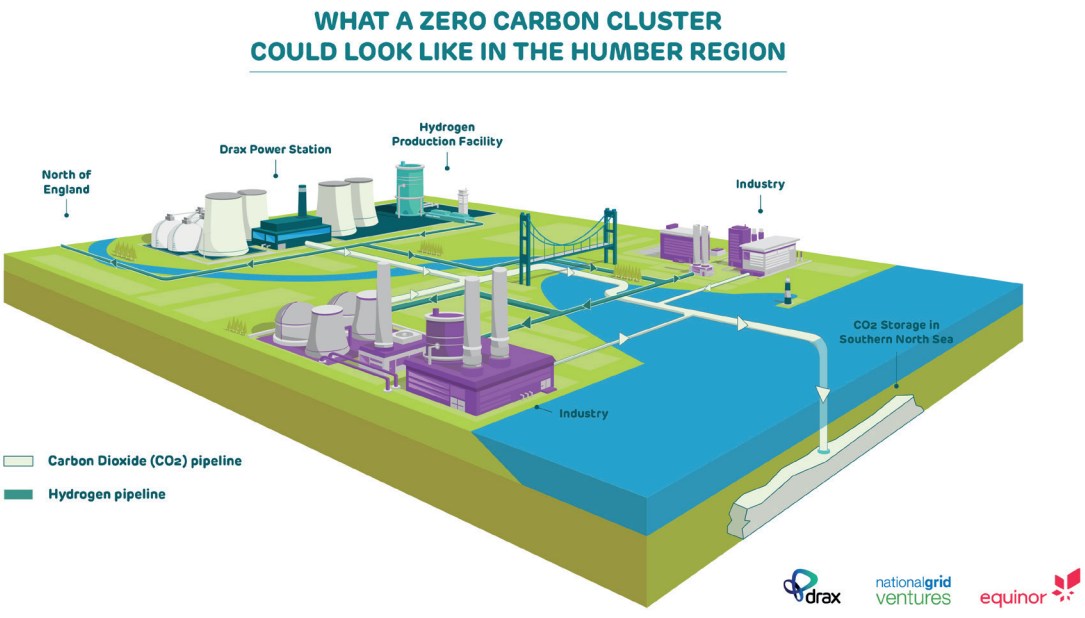


Image left: Drax, Equinor and National Grid Ventures have partnered to develop a zero-carbon cluster. Copyright Drax Group.

Image right: Drax Power Station. Copyright Drax Group.

A push from policy

It is in the industry's interests to show investors and the wider public that it is acting to lower emissions at sites of production. Corporate environmental performance (which many companies disclose in annual reports and to regulators) is playing an increasingly important role in securing funding for projects, and as a result, making concerted efforts to reduce production-related emissions sends positive signals to investors and shareholders that industry is doing its part in addressing climate change.

Ultimately, operators and contractors within the oil and gas industry globally act within the parameters that policy makers put in place. Therefore, it is vital that governments support the industry in adopting better practices that can reduce emissions and provide the support required to deliver more renewable energy. If emissions-reducing technologies are deployed rapidly and ubiquitously, their costs will fall quickly, setting up a self-reinforcing effect.

This can only succeed if enabling policies are strengthened and enforced nationally. According to the report from CCC, current policy is insufficient even for the carbon targets that existed prior to the commitment to net zero by 2050.

"Net-zero emissions by 2050 is a challenge to all industries across the UK. Whilst a huge amount of emissions reductions have already been made across the nation, all sectors are working out exactly how they are to reach the necessary targets. Offshore oil and gas has many individual challenges relating to the difficulty in managing these changes on small structures hundreds of miles from shore. Collaboration and lesson sharing will be key in driving the cultural step change required to enable emerging solutions," Thorne adds.

Collaboration as a solution

The Humber partnership exemplifies the need for operators to adopt collaboration to implement the necessary changes in practice that will support the UK's low-carbon ambitions. By teaming up, operators can offset the potential costs associated with moving on from old practices.

Ultimately, the competitiveness of the UK as a basin will depend on lowering emissions from production — and providing evidence of how it can be achieved. Forming strategic partnerships with companies that already have the required expertise and infrastructure will strengthen businesses. As Remi Eriksen, Group President and CEO of DNV GL, says: "Existing technology can deliver the future we desire — including meeting the 1.5°C target set out in the Paris Agreement."

When operators share their knowledge and successes in the process of fighting climate change, great strides can be made.

Growing places

Oilfield service companies and the supply chain alike are signalling their confidence in the UK, as evidenced by a string of multi-million pound investment programmes. *Wireline* explores the significance of some of these new world-leading facilities.

The evidence suggests companies are thinking big when it comes to bolstering their UK capabilities to support customers internationally. Two major investment programmes completed in Scotland in recent months exemplify how organisations are not only identifying new ways to help energy operators address modern-day challenges and opportunities — but are committed to acting and investing to make it happen.

These investments, however, are about more than just infrastructure. Highly skilled employees, technological advances, public sector partnerships, and positive local community relationships are all part of the equation for businesses which commit to new, long-term operations in the UK.

"It's not just about the buildings — it's about our great partnership with the Scottish government, our links with the local community, and our people that work with us," says Baker Hughes vice-president of oilfield equipment global supply chain Rich Morin. The company opened a new £31 million enhanced centre of excellence (CoE) facility in Montrose earlier this year to support engineering, test and assembly services and advances in deepwater technology.

"Investment is one thing, but at the heart of any operation is the people. We have world-class people, and everyone works together to drive solutions," he continues.

Meanwhile, TÜV SÜD National Engineering Laboratory officially opened a new £16 million Advanced Multiphase Facility (AMF) in October at the company's site in East Kilbride. With a test range beyond anything currently available in the world, the high-pressure, high-flow rate AMF is a globally significant project and marks the largest capital investment to date by German-based TÜV SÜD in its UK business.

"The investment is seeing us bring even more high-calibre people on board and represents a positive endorsement of the existing capabilities here," says head of infrastructure Muir Porter, who led the development project.

The AMF's capabilities allow for the development, testing and verification of multiphase flow components in real-life operating conditions and with full-scale flows. Muir says its capabilities will underpin the effective performance of flow technologies in conditions with high operating pressures and flow rates — and therefore support the production objectives of operators in extreme, deepwater environments. Possible functions include reviewing the performance of flow meters, the development of measurement technologies and advanced modelling of everything from multiphase to wet gas conditions, remote testing and new flow imagery.

"Those kinds of issues call for a very high performance facility with a broad range of process flows," he adds. "There are a number of flow facilities at present, including our existing multiphase flow facility which operates at a lower pressure. Those have served the industry well, but over the years our understanding of multiphase flow and the associated technology have moved on."

Although the industry is very much global, the challenges posed by UK developments and the strategic demands of the basin have also spurred interest in the AMF and its capabilities. "Maximising economic recovery, and the demand for solutions which realise that, is one of the big drivers behind the investment," Muir continues. Scottish Enterprise supported the AMF development with £4.9million of research and development funding, alongside £11.1 million of investment by TÜV SÜD National Engineering Laboratory's parent company.

"It's the hub of our network within subsea and offshore as well as within our services footprint, and it partners with other sites around the world."

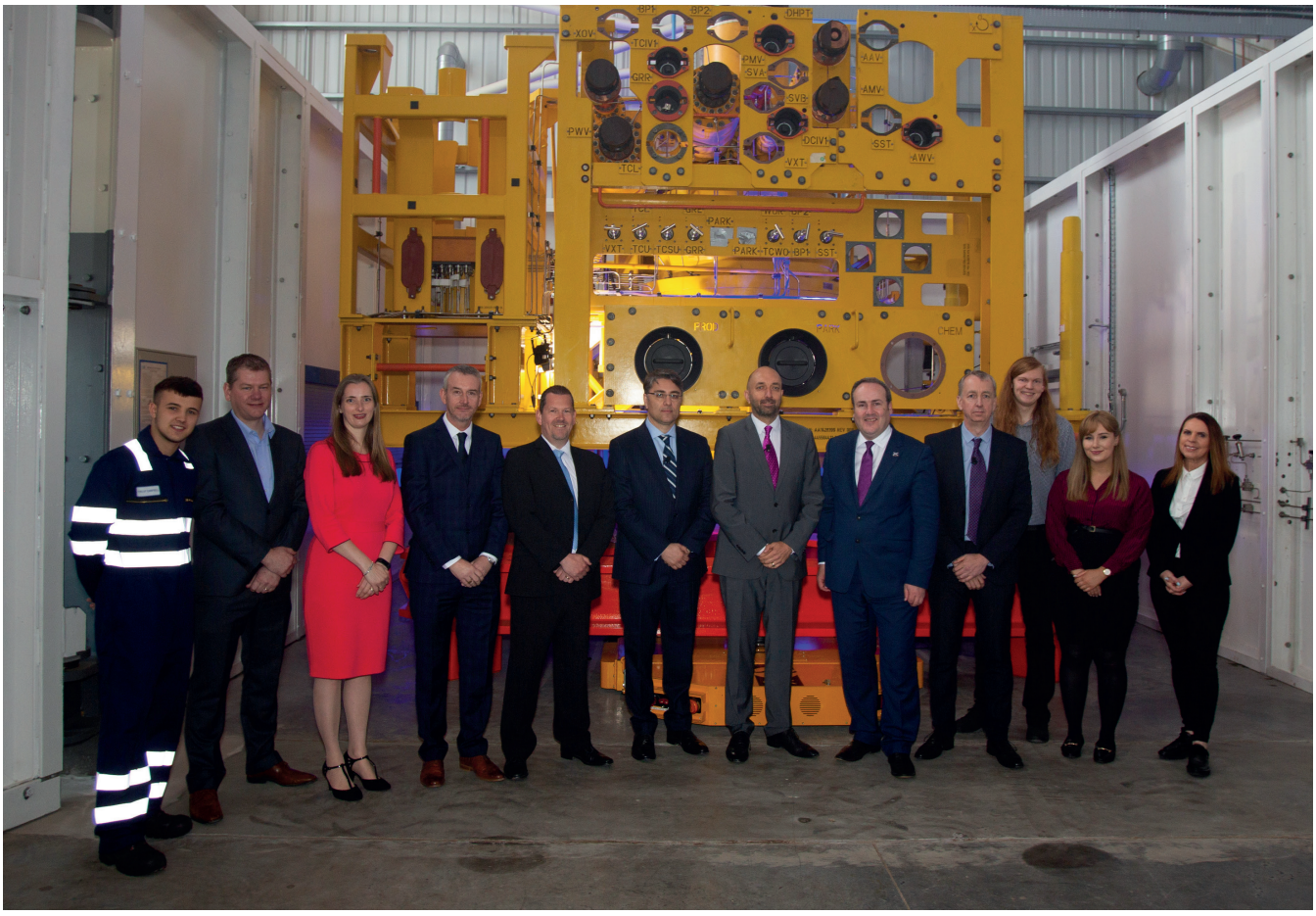


Image top: A tour of the Baker Hughes Montrose CoE during its opening in June 2019.

Image above: Attendees at the opening ceremony, including Minister for Energy, Connectivity and the Islands, Paul Wheelhouse MSP.

Thinking globally

Similarly, Baker Hughes' upgraded and expanded CoE at Montrose was supported by a £4.9 million grant from the Scottish Government through Scottish Enterprise. The campus, spread across more than 35 acres, supports the design, manufacture, test and assembly of advanced subsea technology and solutions in one location. Equipped with a range of advanced tools and processes, it represents the largest footprint of Baker Hughes' oilfield equipment division.

"With the large advances we're going to need in technology and equipment — and given the challenges our customers are seeing in deepwater operations — we saw an opportunity to relocate our strategy and how we support our market and our customers," explains Rich. He says Montrose represents the global hub for Subsea Systems operations and is now set to deliver everything from design and development to shipment and servicing.

Features of the new-look facility include an indoor system integration test (SIT) area which, he says, has prompted positive feedback from customers because of the way it has further improved quality and customer delivery standards. The site is also now home to Baker Hughes' Aptara Design Centre, focused on its Aptara™ Totex-lite solution — a family of modular, technology-focused products designed for the life of field.

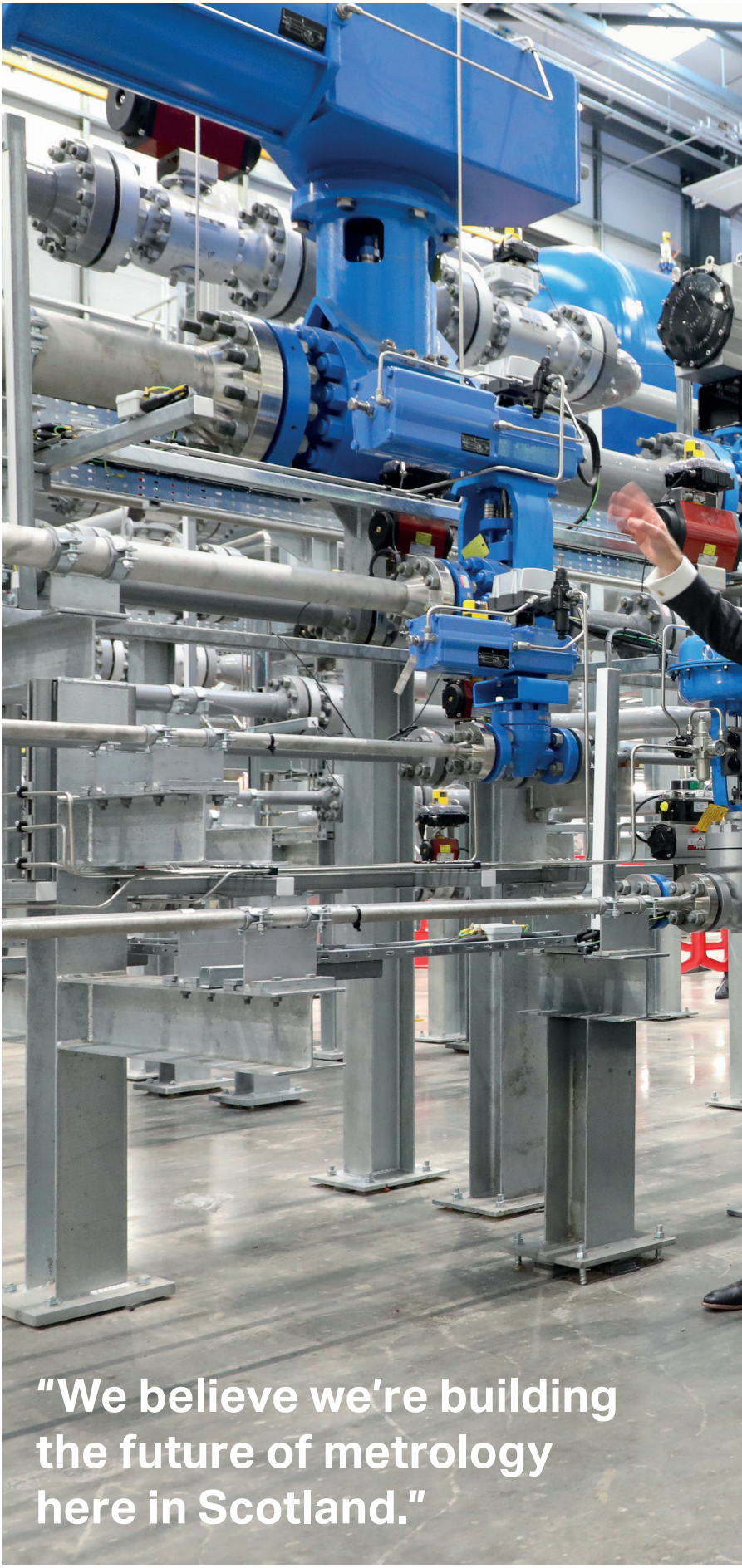
Baker Hughes has had a presence in the Angus port since the early 1980s and Rich says the enhancement of the facility is a logical extension of that relationship: "The level of investment is a vote of confidence in the UK and in our operations, and equally signals to customers how we are going to drive solutions for them — not just in this area of the world but globally," he adds.

"The work of this site feeds around the world — we've had shipments to the APAC region and to Egypt recently, for example. It's the hub of our network within subsea and offshore as well as within our services footprint, and it partners with other sites around the world."

He believes that those capabilities — and flexibility, in manufacturing terms — help customers to achieve greater productivity: "Just as important is the way it supports collaboration with our customers, who can come and work with us. Many modern-day fields are very complicated, and the technology needed to support them is much more complex."

Grow with the flow

One of the core features — and core benefits — of the AMF at TÜV SÜD National Engineering Laboratory is the three-phase gravity separator system, which Muir says has been conservatively designed to allow for the separation of components at very high pressures and flow rates.



(L-R) Muir Porter, Head of Infrastructure TÜV SÜD National Engineering Laboratory; Prof Axel Stepken, Chairman of Board of Management TÜV SÜD AG; Derek Mackay, MSP, Cabinet Secretary for Finance; David Smith, Director of National Opportunities at Scottish Enterprise; Dr Rainer Block, CEO Industry Services Division TÜV SÜD; and William McKnight, Director TÜV SÜD UK.

"Investment is one thing, but at the heart of any operation is the people. We have world-class people, and everyone works together to drive solutions."

The closed-loop flow circuit operates at pressures of up to 140 bar and temperatures of up to 43°C. "Various closed-loop flows exist around the world but none with this scale and capability," says Muir. "Overall, this new facility is a really good fit for our business, creating a proposition with capabilities and flexibility not available anywhere else."

It represents another transformational move for the National Engineering Laboratory, which was established in the 1940s and has seen its role evolve considerably over the decades. In recent years, explains Muir, its focus has primarily been upon fluid flow measurement and fluid mechanics, and it has a formal designation as the UK's National Measurement Institute, responsible for managing the national standard for flow measurement.

"The AMF also gives us an opportunity to develop our understanding of the physics of fluid flow at higher pressures and temperatures," adds Muir. "Previously we had flow maps developed at lower pressure but, now that we are operating at up to around 140 bar, we are able to move that work on as well."

He says the centre's existing multiphase flow customer base is already global, "but we expect it to grow further now that the new facility is up and running. Not only are our customers global — the staff we have brought in also come from all parts of the world."

Hosting a site of global excellence offers opportunities for staff as well. The completion of the AMF has resulted in 17 new jobs at the centre, "All highly skilled — metrologists, engineers, specialist technicians," Muir says. "Bringing these new people in was part and parcel of the investment programme. We believe we're building the future of metrology here in Scotland."

TÜV SÜD National Engineering Laboratory also runs a Modern Apprenticeship programme. It currently features around nine participants, and the AMF will feature in their overall training experience.

There is work at postgraduate level too; the centre has its own programme of flow research doctorates, with five metrologist colleagues finalising PhDs into fluid flow. "It supports the personnel development agenda but also reflects our research effort," adds Muir.

Expanding capabilities also offers a route towards greater diversification. "Our customer base is primarily oil and gas," notes Muir, "But because of our capabilities it extends into other sectors, including clean fuels, and also encompasses technology development projects by organisations looking to develop instrumentation for operation in hostile conditions, as well as academic research and joint industry programmes."

Image above: Operating the gravity test separator at the TÜV SÜD Advanced Multiphase Facility.

Act locally

At Baker Hughes, Rich says the strategic decision to invest at Montrose reflects not only the capabilities of the workforce there, "but also about where we are as a company." He adds: "We're part of the communities where we operate and we have a responsibility to support those. We're happy with the work we've done with the Scottish government in terms of investment, developing our workforce and supporting employment in the region - in short, being good corporate citizens."

Baker Hughes too has increased the size of its local apprenticeship programme — it now typically features over 40 trainees — and it also encompasses around 10 internships through partnerships with universities. "I visited the site recently and saw the work we're doing in additive manufacturing, artificial intelligence, data analytics and other areas. It's clear we need young talent to support us in that work," adds Rich.

The investment programme at Montrose has also led to an enhanced learning and development capability at the site, encompassing not just subsea training but also leadership, customer and wider group training.

"It's all about driving the technology and the solutions forward for our customers in the ever-challenging space in which we work," he continues. "This centre allows us to develop the technology and the people. We have the capability to work in conjunction with our customers to take this space forward. With that, clearly, comes additional growth. I feel very optimistic about our ability to take energy solutions forward through this site."

Muir shares that optimism with regards to TÜV SÜD's confidence in its site and its skilled people: "The development is a positive message to our staff in terms of securing the future, but it's also very positive for Scotland and the UK. On a global basis it anchors the future of multiphase flow testing in Scotland."

Anchoring expertise in the UK is vital to the future of the domestic supply chain, and by extension, the UKCS as a basin. OGUK supply chain director Matt Abraham notes that: "These are great examples of how the supply chain is fundamental to pioneering the cutting-edge technological solutions we need to deliver safe and secure energy from the UK North Sea, developing expertise that is highly exportable and contributing to the creation of a net-zero carbon economy." It's therefore encouraging to see commitment from government and companies to centres of excellence such as the AMF and Montrose subsea facility, particularly as the industry works to double its export opportunities as part of the strategy set out in Roadmap 2035. Moreover, the training and upskilling of new generations of staff will help secure that expertise for many years to come.

Image: BP's Na Kika platform, Gulf of Mexico. Inverted, spherical image captured by R2S.

Augmented reality uplifts offshore workers

Martin MacRae, Technical Director for R2S, part of James Fisher Asset Information Services (AIS), speaks with *Wireline* about the R2S AR application which aims to bring augmented reality technology offshore.

Aberdeen-based James Fisher Asset Information Systems (AIS), the digital arm of James Fisher and Sons plc, has enlisted the expertise of mobile application specialist Mozenix to bring immersive technology solutions to the oil and gas industry.

The R2S Augmented Reality (AR) product will enable users onsite to access valuable real-time operational data, overlaid on any image, like the maintenance history of a piece of equipment, or its engineering drawings. Through this app, users will be able to coordinate activities more efficiently and immediately identify equipment and access detailed asset information.

"The enterprise application of immersive technologies was an area that sparked our interest early on; and an area oil and gas was significantly trailing in when we embarked upon this journey in 2016. Our peers in, for example, the aerospace and automotive industries had already begun to realise value of immersive applications like AR and VR in multiple phases of operation," R2S technical director Martin MacRae tells *Wireline*.

The R2S AR app is all about accessibility. With pressure on increasing skills and flexibility, software like this can play a major role in digitally empowering offshore workers. R2S AR puts relevant information in the hands of personnel, reducing time that would be spent searching for it and providing on site assurance. This is particularly helpful for those unfamiliar with a site, and provides access to records and equipment in real-time. "[We are] bringing a system to industry that has immediate application and return on investment," MacRae continues.

R2S has supported the oil and gas industry globally by photogrammetrically capturing and building over 150 assets (from platforms to FPSOs and refineries) into R2S software. The software produces high quality 360° spherical images which join to create a walk-through environment for the user. "We recognised the value of these assets to users and wanted to extend this value to workers offshore by enabling remote access to assets," MacRae explains.

Such software has created time and cost efficiencies for companies and enhanced collaboration. R2S concluded that developing an augmented reality dimension would be the next step that would extend the benefits of the software to users, quickly.

"One of the many challenges in the development of immersive technologies is the generation of content. We had the content; from the navigable photogrammetric interface of R2S, to the layers of data accessible both in and from the software. By developing an AR application as opposed to its more immersive VR sibling, we could deliver immediate value to our users — maximising access to and use of their data," MacRae continues.

Content being a non-issue, the next challenge for R2S was safety. AR technology is typically consumed through large headsets, however this is not practical for offshore workers. "Our research was telling us that that the use of onsite headsets or goggles presented physical safety concerns, but also a significant behavioural shift, so, we focused our development on phone and tablet application," MacRae reflects.

R2S is currently working on the rolling out the software to users globally. "There is also clear technology transfer value [to this project], and we are already working with other industries, such as construction and offshore wind, where similar challenges are faced operationally," he adds.

"This application has the potential to reduce the industry skills gap by digitally empowering offshore workers."

Strategic collaboration

James Fisher AIS's relationship with Dundee based tech start-up Mozenix (part of Waracle) began prior to the AR project. "When the project was green-lighted for development, it was clear that the Mozenix team was uniquely placed to help us, bringing with them knowledge from the gaming industry that was put to good use tackling the challenge of accurately locating tags and visualising data, for example," MacRae explains.

"We are learning from our customers and the industries we work in all the time and feedback on the application and reach of R2S AR extends from the boardroom to the underdeck. [The app] is also an enabler for further digitalisation for oil and gas, for areas such as analytics and automation," MacRae adds.

Another major project the company is working on is a Visual Positioning System (VPS) which will allow people and machines to identify their location on complex offshore assets via data captured from wearable devices with cameras. "We are all very excited about bringing [R2S VPS] to market in the not too distant future. This project received significant funding from the OGTC and not only involves BP as our industry partner, but technical development from Microsoft, as well as a Scottish innovation and expertise from the likes of Waracle and Aberdeen-based Codify," MacRae shares.

"There are so many directions we could take with R2S AR."

The R2S VPS aims to improve the efficiency and safety of technicians, ROVs, and AUVs while operating in very difficult offshore conditions.

"Our clients and their wider supply chains are involved with our innovation at all levels, from research and feasibility studies through to field trials and testing to knowledge sharing events. There are many more projects we can't share just yet, and a range or iterative developments to our existing software and products too," he adds.

"There are so many directions we could take with R2S AR," MacRae reflects. "Not all will solve immediate problems for our clients, and some won't happen at all, but it's good to start big and work with our clients, users and industry to ensure that we are continuing to meet their needs – and exceed expectations."

Image above: BP's Mango platform, Trinidad and Tobago. Cropped, flattened spherical image taken by R2S.

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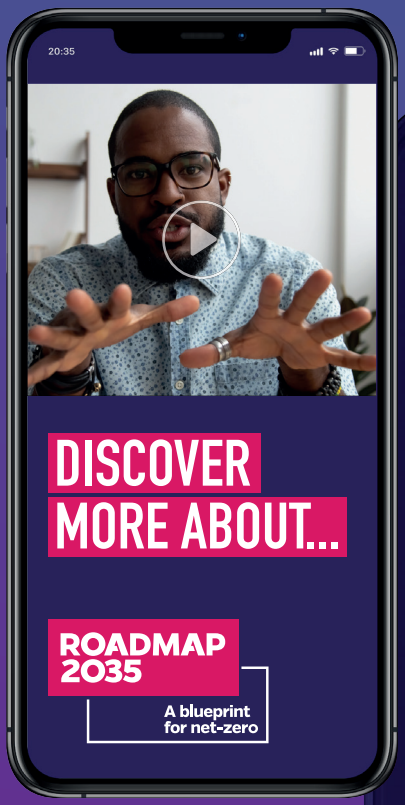

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