UKCS workforce dynamics 2018-2035: shaping the skills of tomorrow.

RGU OIL AND GAS INSTITUTE.

2018

UKCS Workforce Dynamics 2018–2035

Shaping the skills of tomorrow

May 2018

OPITO
RGU ABERDEEN OIL & GAS INSTITUTE

Foreword

As the oil and gas industry emerges from the downturn, it is vital that we take a longer term look at the future UK skills requirements. This will enable us to take action now to secure the required capabilities and take full advantage of diversification opportunities.

The move towards automation and digitisation will have an impact, but it will also create new roles that don't exist today in data science, analytics and remote operations. This will require a focus on up-skilling and attracting the next generation of professionals into our industry.

As the use of technology and digitalisation expands in all sectors, our industry will increasingly experience competition for people who possess transferable skill sets in core areas such as programming, big data analysis and the development of robotics. The findings in this report highlight the need to drive forward a new skills strategy that will ensure our industry remains relevant and attractive to new entrants.

By collectively getting behind Vision 2035 and actions set out in the sector deal to stem production decline and create new opportunities from the low carbon transition, tens of thousands more roles can be safeguarded over the next two decades and our industry will continue to be one of the most vital industrial sectors in the UK.

John McDonald
CEO, OPITO

Technology, innovation and the transition to a lower carbon future is likely to re-shape the oil and gas sector in the next few decades.

Against this backdrop, we will need an increasingly adaptable and technology enabled workforce to ensure the UK retains its position as a world leader in the energy business.

Based on detailed industry input, this report highlights some of the key UKCS workforce dynamics over the next 20 years and provides insight into what can be done to set the industry up for success. Over 35 companies and organisations have contributed to this report and the input and guidance received from this stakeholder group has been greatly appreciated.

The findings of the review are aimed at stimulating a constructive discussion on the way forward and hopefully will help to ensure the sustainability of the sector for many years to come.

Paul de Leeuw
Director, Oil and Gas Institute – Robert Gordon University

Executive summary

The oil and gas industry remains a hugely valuable asset to the UK, currently employing and supporting around 1 out of every 100 jobs in the UK.[1] There are still up to an estimated 20 billion barrels of remaining hydrocarbons to be recovered, however, these will become increasingly more challenging to extract.

To provide a clear sense of direction for the sector, the Oil and Gas Authority in collaboration with Oil and Gas UK created a new vision for the industry – Vision 2035. This 'Vision 2035'[2] provides a compelling future for the industry, based on maximising economic recovery from the UK Continental Shelf (UKCS) and a doubling of the international footprint of the UK based supply chain by 2035. The industry's Vision 2035 captures the ambition of the industry to produce an additional 3 billion barrels of oil and gas by 2035, and to double the UK's share of the global oil and gas supply chain market from around 3.7% to over 7% by 2035. Successful delivery of Vision 2035 could generate £290 billion of additional revenue for the UK.

However, a significant number of fields will reach the end of their life resulting in increased decommissioning activity. Combined with a drive for a lower carbon economy and an increased use of technology and automation, the potential impact on the number and types of jobs required to support the industry over the next few decades, could be material.

To support the UK oil and gas sector in understanding the change in skills requirements, OPITO, in partnership with Robert Gordon University's (RGU) Oil and Gas Institute, undertook a UKCS Workforce Dynamics Review to assess the changing skills requirements for the industry over the next 20 years.

As part of the review, workforce data was gathered from the operator and supply chain communities. The workforce data collected totalled around 34,000 roles, representing c. 50% of the gross operated production in the UKCS and c. 20% of the total UKCS direct and indirect workforce. The extensive data collected and its analysis provides a unique insight into the make-up of the workforce engaged in the UKCS.

The review is a 2035 outlook aimed at ensuring that appropriate action can be taken across the industry to sustain more jobs and to ensure that the workforce has the required skills to take advantage of the new roles that will emerge.

1 Office for National Statistics 2018

2 https://www.ogauthority.co.uk/about-us/vision-2035/

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Key findings can be summarised as follows:

The **'here and now'**:

- Employment supported by the oil and gas industry is estimated to be around 302,000 jobs in 2017[3], of which c. 170,000 are direct and indirect jobs (roles in service of extracting oil and gas), with the remainder (c. 132,000) representing employment associated with the redistribution of the income from the oil and gas sector.
- Following the downturn between 2014 and 2017, the industry lost over 70,000 direct and indirect jobs (a decline rate of c. 10% per year).
- The operator/non-operator (i.e. petroleum licence holders) community represents c. 11% of the UKCS workforce, with the supply chain community representing the remaining 89%.
- Technical roles (e.g. drilling & wells, operations, engineering etc.) represent c. 73% of the roles in the UKCS, with the remaining 27% in business or support roles (e.g. commercial, procurement & supply chain management, HSE, HR, finance, IT etc.).
- Five job families (operations, engineering, technicians, projects and finance) account for over 67% of all the roles in the industry.

> *We know from Vision 2035 that there is still a lot to play for across the UKCS. This study shows how the industry needs to continue to attract and retain high calibre talent in existing and emerging disciplines."*
>
> **Andy Samuel**
> CEO of the Oil and Gas Authority

Looking forward to 2035 and assessing the impact of different scenarios, the analysis shows that:

- The existing UKCS workforce is likely to continue to decline from the 2017 baseline of 170,000, with the overall number of people expected to reduce in line with production, ongoing decommissioning activities and investment.
- On the basis that the industry can achieve its goals around Vision 2035 and the broader energy diversification, the workforce requirements are estimated to be around 130,000 people by 2035. This represents an annual decline rate of around 1.5% from the 170,000 baseline in 2017 (compared to 10% per year between 2014 and 2017).
- Over 80,000 workers are likely to retire or leave the sector for other reasons by 2035.
- The sector will likely need to recruit over 40,000 people between 2018 and 2035 to offset natural attrition and to ensure it can support Vision 2035 and the broader energy diversification agenda. This includes around 10,000 new people in new areas such as data science, data analytics, robotics, material science, change management and remote operations.
- Closer collaboration is required between industry and training providers to up-skill and re-skill the workforce to enhance technology skills and capabilities across the industry, with a key focus on the skills required to deliver Vision 2035 and the broader energy diversification.

Next steps

The delivery of the industry's Vision 2035 and the successful up-skilling of the UK workforce to service oil and gas, as well as other energy sectors, will be critical to ensure the UK remains a world leader in energy related skills and to preserve and expand the capabilities built up over the last 50 years.

Key next steps:

- The industry is developing a roadmap to deliver Vision 2035 and the wider energy diversification, thereby safeguarding the sustainability of the industry for decades to come.
- The skills strategy that will emerge and be informed by this review will provide a clear direction for the development of future skill sets required to support the industry.
- OPITO and others to work with employers, trade unions, governments, agencies, educational establishments and commercial training providers to develop appropriate programmes and courses in support of the skills strategy.
- Industry to establish common standards and work practices across energy sectors to create a more flexible workforce.
- Training providers, vocational institutes and universities to ensure provisions and delivery mechanisms are in place to support the up-skilling and multi-skilling required to deliver Vision 2035 and the broader energy diversification.

With over 40,000 people potentially entering the industry over the next 20 years and with a substantial proportion of the workforce to be up-skilled, there is a critical role for training providers, vocational institutes and universities to help future-proof the sector and to ensure the UK retains its reputation as a leading energy basin in the world.

Over 40,000 people will potentially enter the industry over the next 20 years

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UKCS Workforce Dynamics Review scope and methodology

To support the UK oil and gas sector in understanding future workforce dynamics, OPITO in partnership with Robert Gordon University's (RGU) Oil and Gas Institute undertook a review to better understand the skills requirements for the industry over the next 20 years. The project was focused on three key areas:

1. Map and characterise the current UKCS workforce
2. Assess the possible impact of technology and innovation on the UKCS workforce
3. Develop scenarios to define future UKCS workforce requirements

The analysis was based on interviews and information received from over 35 companies and organisations. The information collected comprised representative data from both the operator and supply chain communities. The workforce data collected totalled c. 34,000 roles, representing c. 50% of the gross operated production in the UKCS and c. 20% of the total UKCS direct and indirect workforce.

The data was split into 23 job families comprising 74 distinct job functions, representing the majority of roles in the industry. For the purposes of this analysis, a job family was defined as a series of related jobs within a certain discipline (e.g. drilling and wells) or associated with related activities (e.g. business support). Job functions are more specialised areas within each job family, representing roles requiring a similar skill set (e.g. chemical/process, electrical, mechanical, naval/marine engineering job functions in the engineering job family). The job family structure is appropriate to both the operator and supply chain communities. Although most roles mapped relatively easily into the key job families and job functions, some judgement was required to categorise the more specialist roles.

The data was scaled up to reflect the total UKCS workforce as per the Oil and Gas UK 2017 Economic Report[4]. The impact of technology on the workforce was subsequently assessed against each of the job families.

A scenario planning approach was used to assess the possible 2035 UKCS workforce and skills requirements. Oil and Gas UK and the Oil and Gas Authority's production, activity and Vision 2035[5] data was used to shape three scenarios for the UKCS, representing a realistic range of future outcomes. The review and associated scenarios considered both the number and the nature of future jobs required to support the industry.

4 Oil and Gas UK Economic Report – September 2017

5 https://www.ogauthority.co.uk/about-us/vision-2035/

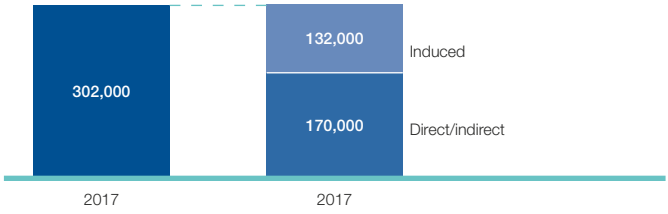
The 'here and now'

The UK oil and gas industry continues to be one of the key industrial sectors in the UK. In 2017, Oil and Gas UK, supported by Experian, estimated that the employment supported by the oil and gas industry is around 302,000 people, of which c. 170,000 are direct and indirect jobs (roles in service of extracting oil and gas), with the remainder (c. 132,000) representing induced employment associated with the redistribution of the income from the oil and gas sector (see figure 1).

Following the downsizing in the sector over the last few years, the focus of the UKCS Workforce Dynamics Review has been on understanding the make-up of the c. 170,000 people directly and indirectly employed in the industry, both from an operator (petroleum licence holder) and supply chain perspective. With supply chain companies often servicing both UKCS and overseas activities from the UK, the review has attempted to capture the overall number of people working in the UK on both UKCS and international activities.

Based on the information gathered, the operator community currently comprise c. 18,000 roles, with the supply chain representing the remaining c. 152,000 roles. The operator workforce includes people working directly with operators and those working for non-operators and/or affiliated organisations.

Employment supported by the UK offshore oil and gas industry

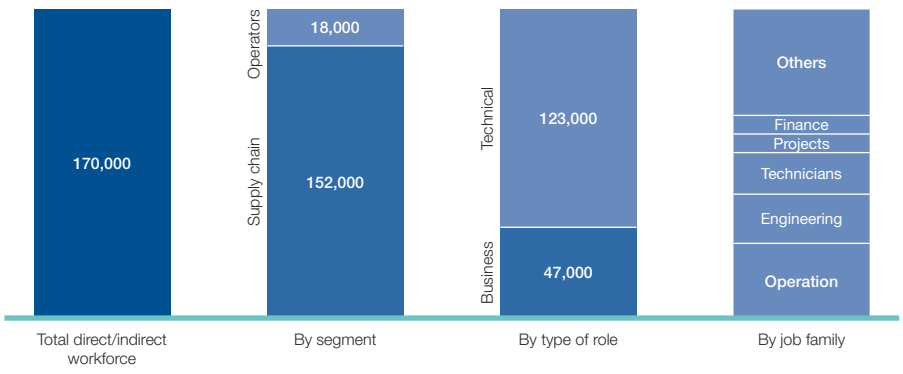


Source: Oil and Gas UK/Experian Economic Report – September 2017

Figure 1

The data illustrates that c. 73% of the people in the UKCS are in technical roles (e.g. drilling & wells, operations, engineering etc.), with the remaining 27% in business or support roles (e.g. commercial, procurement & supply chain management, HSE, HR, finance, IT etc.). Five job families – operations, engineering, technicians, projects and finance – account for over 67% of all the roles in the industry (see figure 2).

Characterisation of 2017 direct/indirect total UKCS workforce



Source: Company data, interviews and RGU analysis (numbers rounded)

Figure 2

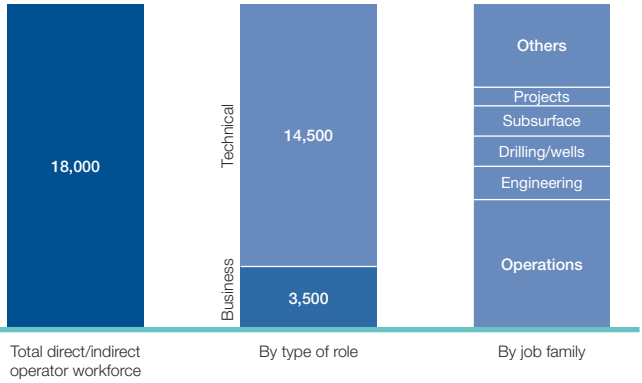
The findings in this review will support a new skills strategy to safeguard jobs and prepare for up-skilling the workforce

Supporting UKCS average daily production of 1.63 million boe/d[6], the overall UKCS operator community is estimated at around 18,000 roles, comprising operating companies, non-operators, pre-production operators and affiliated organisations.

The operator community comprises around 11% of the total UKCS direct and indirect workforce. The top five job families in the operator community are: operations, engineering, drilling & wells, subsurface and projects, which represent c. 74% or 13,300 of all the roles in the companies (see figure 3).

Supporting UKCS annual supply chain spend of over £30 billion[7], the overall UKCS supply chain community is estimated at around 152,000 roles, comprising around 89% of the total UKCS direct and indirect workforce. The top five job families in the supply chain community are operations, engineering, technicians, finance and projects, which represent c. 67% or around 101,000 of all the roles in the supply chain companies (see figure 4).

Characterisation of 2017 direct/indirect operator workforce

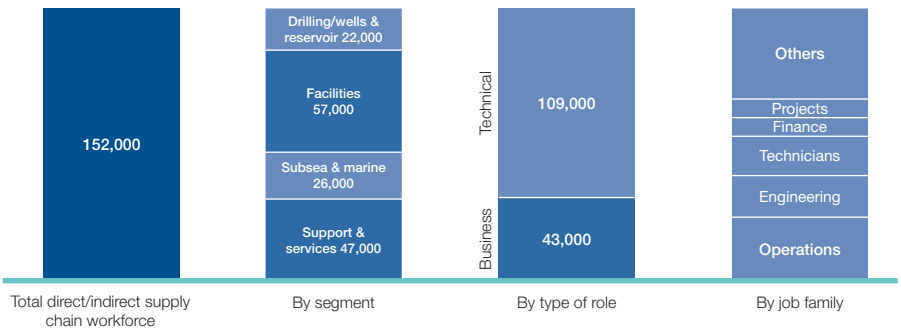


Source: Company data, interviews and RGU analysis (numbers rounded)

Figure 3

Oil and gas will remain a critical part of the energy mix for decades to come

Characterisation of 2017 direct/indirect supply chain workforce



Source: Company data, interviews and RGU analysis (numbers rounded)

Figure 4

6 https://itportal.ogauthority.co.uk/pprslive/production-data

7 EY Review of the UK oilfield service industry – January 2018

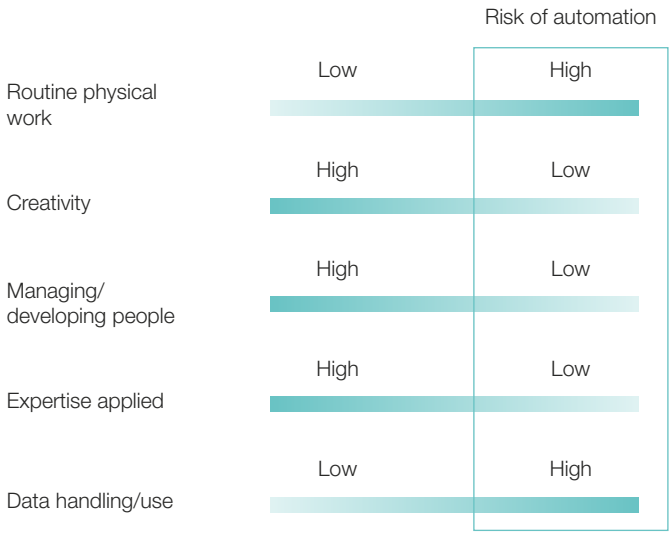
The possible impact of technology and innovation on the UKCS workforce

Technology advancements are continuing to change the way businesses are operating across the world. A recent McKinsey report[8] indicated that the impact of automation will likely vary by country and is a function of income level, demographics and industry structure. The same report estimates the overall impact for the UK of current work activities to be displaced by automation (between 2016 and 2030) could be over 20% across all sectors. This displacement is likely to increase productivity and reduce overall people demand. It will also create new opportunities and new jobs, which currently don't exist.

With the rapidly evolving technology agenda impacting businesses across the globe, there is a real opportunity for the oil and gas and the wider energy sector to be a more pro-active adopter of new technology and innovation. Although the industry has a long-standing track record of applying new technology, other sectors such as retail and banking have been quicker to adapt to the opportunities presented by the technology revolution.

Based on trends in other sectors, the typical roles most susceptible to automation or computerisation can be characterised as having a higher degree of routine, having less decision making, having a larger component of data handling, and/or are often more transactional in nature (see figure 5).

Job characteristics



Source: RGU analysis

Figure 5

8 McKinsey – Jobs lost, jobs gained: Workforce transition in a time of automation (December 2017)

Although there will be a negative impact as automation directly displaces workers from tasks they were previously performing ('displacement' effect), there will also be a positive impact as it diminishes risk exposure, reduces repetitive tasks and enhances productivity ('productivity' effect).

As part of the UKCS Workforce Dynamics Review, the possible impact of technology and innovation was assessed against the 23 job families identified in the sector. Although every job family is affected, some job families are likely to be more susceptible to automation than others. Figure 6 shows the 170,000 people in the UKCS split by key job family, with the colour coding highlighting the possible impact of technology on each job family.

> *Our industry is evolving and it's important that the supply chain prepares for the future by continuing to invest in young talent and adapting to embrace new opportunities created by technology and innovation."*
>
> **Sian Lloyd Rees**
> UK Country Manager & SVP EMEA
> CM Aker Solutions

Technology impact by job family

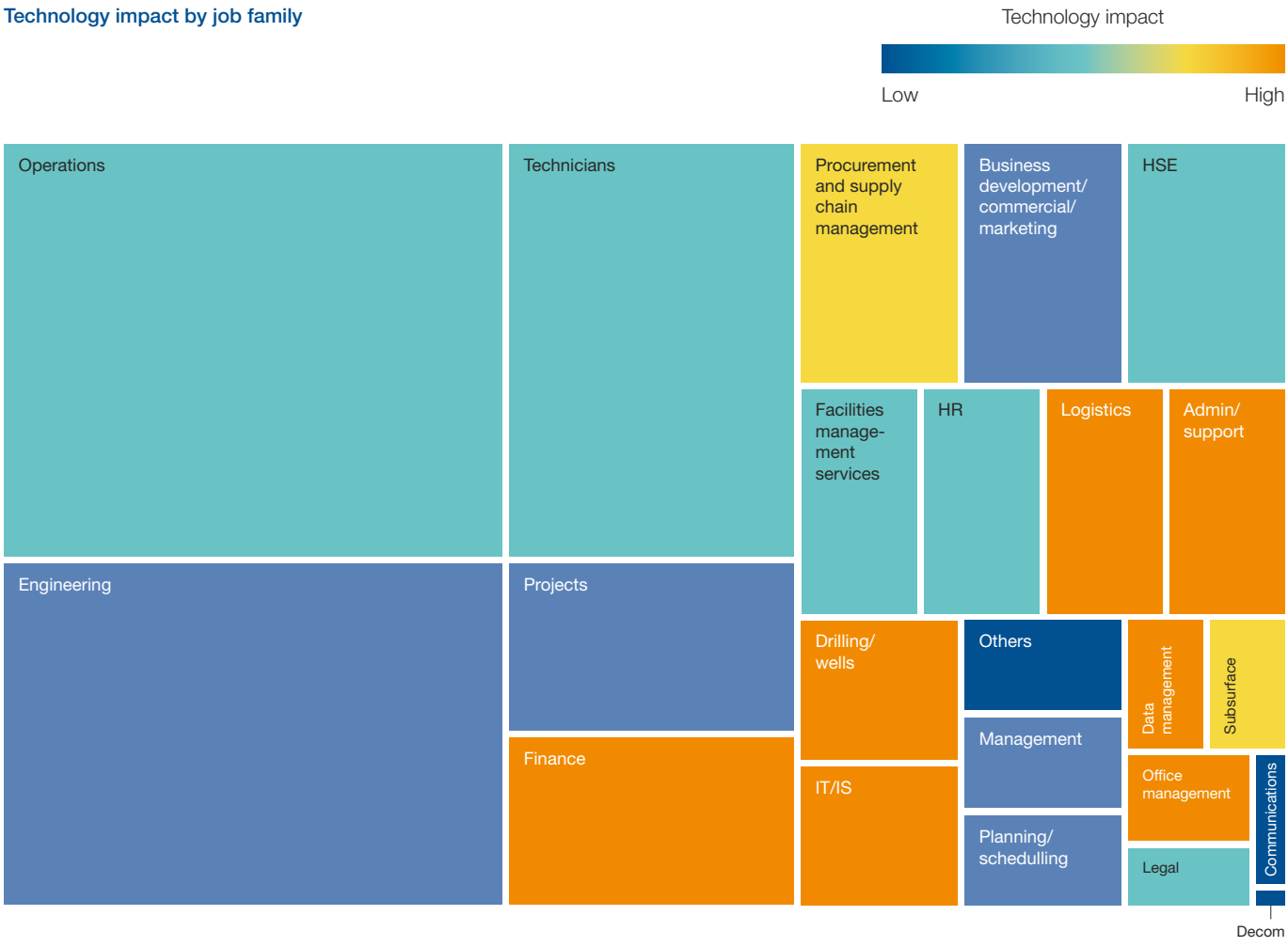


Figure 6 – Robert Gordon University analysis; Low <10% risk of activity displacement; High > 40% risk of activity displacement

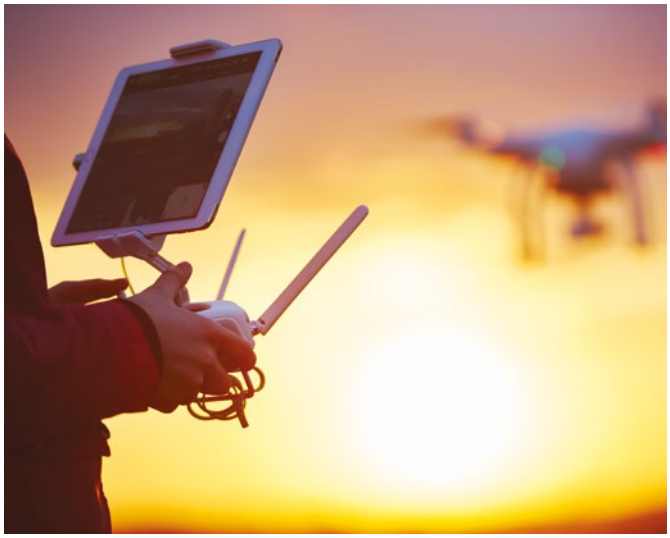
In addition to the displacement effect, increased automation and computerisation will also impact the oil and gas sector in other ways, such as:

Greater separation between expertise and execution
With the availability of simulation, visualisation, augmented reality and real-time information sharing, it is likely that the industry will see an increased separation between the provision of expertise and actual execution. Many of the tasks currently done on location will in the future be managed from onshore centres (where the key expertise will be), with the execution happening on site by 'multi-skilled' operatives, following clear procedures and instructions from the onshore centres. To some extent this is already happening through the application of remote control centres. However, it is expected that this agenda will accelerate significantly, which will present a new set of opportunities for companies operating in the oil and gas sector.

New applications for data analytics, data science and people/machine interaction
Although the principles of robotics, artificial intelligence (AI) and machine learning have been around for decades, there has been a real acceleration in capabilities in the last 10 years. The ability to combine recognition, cognition, problem solving, robotics and remote operations is transforming businesses across the globe. The impact on the oil and gas sector is already seen in areas such as seismic interpretation, real-time monitoring, offshore robotics, drones and predictive maintenance. AI and machine learning will likely speed up the existing trend of computer-related automation, requiring people to acquire new skills even more quickly than has been the case in the past.

It is likely that not only will the sector require fewer people, but also that some of the future skills requirements for the UKCS will look very different to what is in place today. New roles will be required in areas such as data science, data analytics, robotics, material science, change management, remote operations and person/machine interface, new materials, nano-technology, change management and cyber security.

10,000 new jobs could be created by 2035 in roles such as data science and robotics that don't exist today



New business models and increased focus on technology development and application
The Maximising Economic Recovery (MER) UK strategy requires there to be a technology plan for every asset in the UKCS. The increased focus on technology, combined with the international nature of the oil and gas sector, and the growing focus on the energy transition to a lower carbon world will likely significantly change the business model for many oil and gas/energy companies. It also has the potential to create significant new opportunities for the sector to leverage transferable skills and to build on the world-class track record of the oil and gas supply chain companies in the UK.

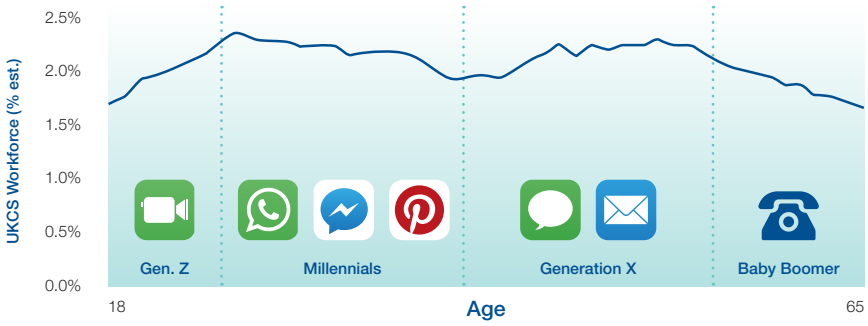
> *"I'm optimistic about the future of our industry in the UKCS. However, we cannot become complacent, we need to continue to find ways to be more efficient; by thinking differently, taking advantage of new technologies and embracing digital transformation. We have made progress but we still have a long way to go."*
>
> **Ray Riddoch**
> Managing Director U.K. & SVP Europe, Nexen Petroleum U.K. Limited

Future scenarios

With UKCS production projected to decline by over 40% between 2018 and 2035[9] and a significant number of installations and facilities to be decommissioned during this period, the future skills demands are inevitably going to change.

Over the same timeframe, potentially over 80,000 people (versus a 170,000 baseline) could leave the sector as a result of retirement and natural attrition. Not only will the industry lose this experience, it will also mark a handover from the 'Baby Boomer' and 'Gen X' generations to the 'Millennials' and 'Generation Z'. The characteristics of how the industry will operate, communicate and solve problems will likely change significantly as the 'changing of the guard' occurs in the coming decades (see figure 7).

UKCS workforce demographics 2017



Source: Office for National Statistics, UK & Aberdeen/Aberdeenshire population data (2017 – averaged)

Figure 7

> *This insightful report shows while overall direct employment is likely to fall, we will need over 40,000 new people in the industry to deliver Vision 2035 and to continue to diversify in response to the energy transition. Vision 2035 will enable us to extend the productive life of the basin, double our share in global supply chain markets and support our UK wide workforce."*
>
> **Deirdre Michie**
> Chief Executive of
> Oil & Gas UK

9 https://www.ogauthority.co.uk/media/4647/projections-of-uk-oil-and-gas-production-and-expenditure-march-2018.pdf

Although many of these skills will need to be replaced, the overall people demand will depend on the future shape and footprint of the sector. To assess future skills demand, three workforce scenarios for the UKCS were considered to enable high level modelling of both the number and nature of future skills required.

The workforce scenarios considered were:

Scenario 1 Base decline	Scenario 2 Vision 2035	Scenario 3 Vision 2035 + diversification
• Production declines by **5%** per year	• Production declines by **3%** per year • Exports from UKCS supply chain to double by 2035	• As scenario 2 • UK oil and gas supply chain diversification into wider energy business

> *I've always been drawn to practical, hands-on work. The skills landscape may be changing, but for me this just creates opportunities for new learning experiences and enhanced career development."*
>
> **Ryan Fernando**
> Electronic Technician
> at Aker Solutions

The production profiles underpinning the scenarios were based on 2018 forecasts issued by the Oil and Gas Authority.[10]

Scenario 1 reflects an ongoing production decline of the UKCS, supported by ongoing investment in the industry. Scenario 2 (or Vision 2035) assumes an additional 3 billion boe is recovered from the UKCS, which is equivalent to reducing the overall production decline rate of the basin to 3% per year (see figure 8).

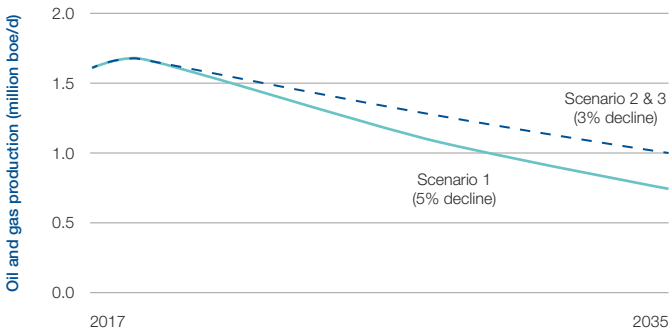
Scenario 2 also assumes that the UK will double its oil and gas supply chain exports to other parts of the world, thereby enhancing the UK's revenue market share from around 3.7% to over 7% of the international oil and gas market.

Scenario 3 assumes both the delivery of Vision 2035 and a successful diversification of the UK supply chain into other energy sectors, thereby increasing the demand on a UK-based workforce.

It was assumed that the impact of new technology and innovation will be inevitable and as such has been included in each of the three scenarios. Technology and innovation will create new roles as well as reduce the number of existing roles and the scenarios include the net impact of both increases and reductions.

The focus on a lower carbon future, the increased convergence between hydrocarbons and other energy sources, and the potential for increased international supply chain activity from the UK will partly offset the lower demand for people to support UKCS operations, but it is unlikely to fully replace the roles affected by the underlying basin decline.

UKCS oil and gas production



Source: Oil and Gas Authority (2018) and RGU analysis

Figure 8

Based on the various scenarios, the UK oil and gas direct and indirect workforce[11] demand in 2035 is projected to be between 65,000 and 130,000 people depending on which scenario will play out (see figure 9). With a current workforce of 170,000 and with a potential attrition of around 80,000 people between 2018 and 2035, natural attrition will likely deliver most of the right-sizing of the sector.

The roles that remain by 2035 are likely to change in nature with the balance of some roles shifting from offshore to onshore, from manual to non-manual, from non-technical to more technical and from UKCS to more international. It is also expected that many of the remaining roles will be 'higher value' jobs.

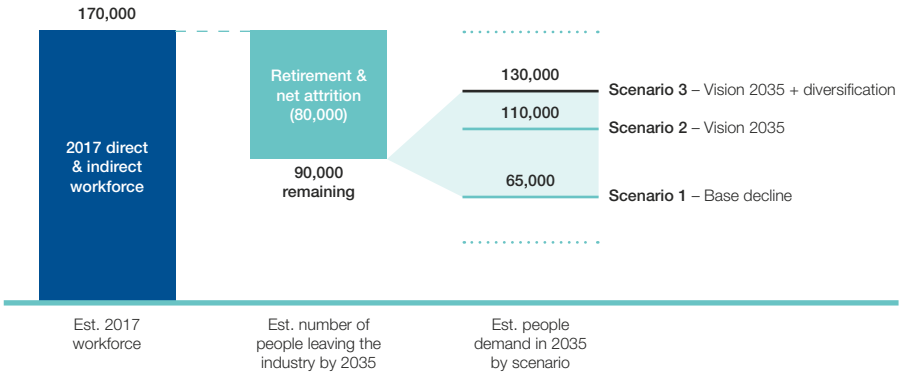
10 https://www.ogauthority.co.uk/data-centre/data-downloads-and-publications/production-projections/

11 Roles in service of extracting oil and gas, which excludes any roles associated with the redistribution of the income from the oil and gas sector.

Refreshing and developing some completely new skills in the workforce will be essential to success in all three areas for the proposed sector deal – transformational technology, underwater engineering and decommissioning."

Trevor Garlick
Industry Champion for the Oil and Gas Sector Deal

Future workforce demand scenarios



Source: RGU analysis (numbers rounded)

Figure 9

If the industry takes the steps now to stem production decline as set out in Vision 2035 and make the most of energy diversification and transition opportunities, it has the potential to secure around 65,000 additional jobs, representing the difference between the outcomes in scenarios 1 and 3.

In scenario 3, the sector will need to recruit over 40,000 people between 2018 and 2035 to offset the impacts of retirement and natural attrition and to ensure it can support Vision 2035 and the broader energy diversification agenda.

For the long-term future of the basin and to retain the extensive skills and capabilities built up in the UK over the last 50 years, it is critical that all efforts are focused on ensuring the delivery of Vision 2035 and the broader energy diversification (scenario 3).

Attracting young people into our industry is an absolute priority for OPITO. Technology will change how we produce and consume energy; it's vital that we inspire the best people to join us by demonstrating the interesting and exciting roles on offer for decades to come."

Mike Horgan
Chair of OPITO in the UK

Contextualising the likely new skills requirements

With new technology transforming our world at an ever increasing speed, many businesses are responding accordingly. Based on current projections, there will be a demand for a new generation of industry professionals skilled in areas such as data science & engineering, data analytics & management, data systems & governance, data security, artificial intelligence, remote operations, robotics and new materials.

For the purpose of this review, it was assumed that around 10,000 new jobs will be created in the Vision 2035 and the broader energy diversification scenarios. This assumption is consistent with industry analysis, which suggests that in 2035 over 10% of the workforce could be in roles which do not exist today[12].

Although most of the newly created roles are likely to be in technical positions, there will be a key requirement for additional skills in areas such as change management, project management and the social impacts of the technology revolution.

> *"My technical apprenticeship is giving me a great grounding in the skills I need for my future career and I look forward to continuing to learn and adapt when I qualify and enter the industry full-time."*
>
> **Ashley Thomas**
> Trainee
> Oil and Gas Technical Apprentice Programme

The oil and gas sector will have to actively compete for these new skills and capabilities with other industrial sectors. Closer collaboration is required between industry, and training and education providers to:

- Up-skill and re-skill the existing workforce to improve the technology and data science literacy across the industry.
- Establish common standards and work practices across energy sectors, creating a more flexible workforce.
- Establish new programmes and courses to develop the next generation of technologist, data scientist and change managers, using a range of different pathways, including degree programmes, short courses and other training programmes.
- Ensure key skills and job family development is prioritised in service of Vision 2035 and the energy diversification.

12 McKinsey – Jobs lost, jobs gained: Workforce transition in a time of automation (December 2017)

Acknowledgement
We would like to take the opportunity to thank the over 35 companies and organisations who have contributed to this report. The input and guidance received from this stakeholder group was greatly appreciated and – where possible – the comments and information received are reflected in this report.

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May 2018

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