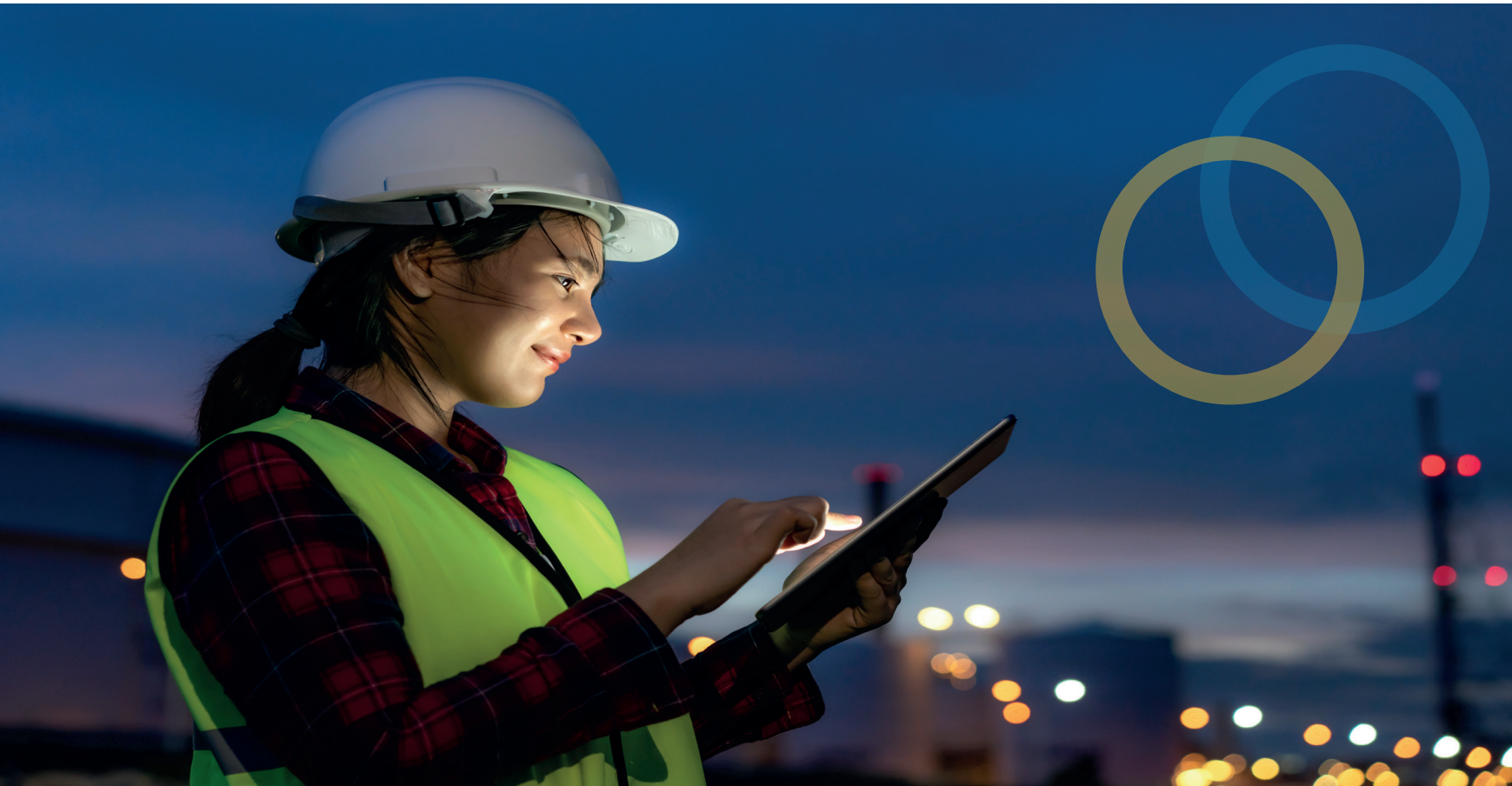
Cogent skills
for science industries

UKPIA

FUTURE SKILLS FOR THE DOWNSTREAM SECTOR



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WORKING IN PARTNERSHIP

About UKPIA

The United Kingdom Petroleum Industry Association (UKPIA) is the trade association for the whole UK downstream sector. We represent the interests of our members and associate members across the industry, who are involved in the refining, distribution and marketing of hundreds of traditionally crude-derived products that are increasingly from sustainable sources.

UKPIA's Workforce and Skills Committee brings together many of UKPIA's members to discuss shared concerns relating to skills and our workforce – who, ultimately, are the people who deliver value for the sector. Our workforce is vital to the downstream sector's everyday running as well as its long-term health where their skills, passion, and ingenuity will be essential in delivering the energy transition.

About Cogent Skills

Cogent Skills is the UK's strategic body for skills in the science industries. Our purpose is entirely focused on skills and supporting the skills needs and ambitions of individual employers and their employees. We are sector-based, working with companies from across the science industries embracing Life Sciences, Industrial Sciences and Nuclear. We have particular expertise in STEM vocational education and industry regulation with respect to skills and competence. Cogent Skills also supports and facilitates the Science Industry Partnership (SIP) and the Nuclear Skills Strategy Group (NSSG).

Cogent Skills has a long history of producing skills research publications that provide clarity and strategic direction on the issues that matter most to UK science employers. Recent publications include:

- SIP Life Sciences 2030 Skills Strategy
- Skills Report for the Chemical Industries Association
- SIP Apprenticeship Survey 2020
- Life Sciences: Equality, Diversity and Inclusion

FOREWORD BY UKPIA

This report on skills in the UK downstream sector is an important milestone in the industry's progress towards Net-Zero and comes at a time when energy supply is firmly in the spotlight.

At the time of writing, the unfolding crisis in Ukraine continues to cause disruption and uncertainty to energy markets around the world. The impact of which is already shaping the national conversation around energy supply, security, and dependency. Such events again highlight the continuing importance of hydrocarbons in our society and how crucial it is to maintain confidence and resilience in our prevailing energy systems as we move towards a greener future.

The unwavering focus of employers' remains on ensuring the UK's extensive fuel supply network continues to operate while simultaneously building a stronger, more sustainable industry capable of delivering lasting growth and prosperity. This will only be possible if companies have access to the skills they need to deliver the transformative innovation required.

This report makes a valuable contribution to our understanding of the sector's skills issues and provides a timely opportunity to drive change and improve the outlook of both the existing and future workforce.

It is clear that the downstream sector will be challenged in the coming years. While the industry has proven its enduring ability to respond to transformative changes, the need to secure the long-term availability of suitably skilled people is clear. These skills must come from both within the industry, through upskilling and retraining opportunities, and from outside, by transferring skills, knowledge, and fresh ideas into the sector.

This report identifies four themes that will be particularly important in the downstream sector's efforts to continue to attract and retain the skills it needs: the role of apprentices; addressing perceptions of the industry; understanding skills gaps; and promoting industrial clusters. Cogent Skills have produced findings in these areas which can be taken forward now to address existing issues and prepare for the world ahead.

As we work to rebuild a post-pandemic economy and reliably supply the fuels that consumers demand whilst transitioning to Net-Zero, the need to retain access to a skilled workforce will be pivotal to the future success of the industry.

To that extent, UKPIA and Cogent Skills look forward to working in collaboration to address the challenges outlined in this report.

Elizabeth de Jong

Elizabeth De Jong
Chief Executive Officer
UKPIA

FOREWORD BY COGENT SKILLS

In the coming years, the UK downstream sector faces a number of critical challenges. From transitioning to a low carbon future to the evolution of digital technologies, the scale and pace of change will doubtless bring opportunities, fresh ideas and new approaches. And as the industry continues to adapt and evolve, recent world events have again emphasised the importance of maintaining a robust and responsive domestic energy and fuel supply network.

Based on insight provided by senior leaders within the downstream industry, we find a vibrant, dynamic and innovative sector, determined to play its part in leading the nation's clean energy transition. The significant level of investment already taking place in areas such as low carbon hydrogen production and carbon capture, utilisation and storage is a clear indicator of the sector's ability to rise up and respond to the challenge.

Advancing the sector's sustainability agenda will also require the adoption of new technologies and processes into existing working practices to improve productivity and efficiency. Less understood are the precise skills requirements that will be necessary to capitalise on these advancements whilst also maintaining operational resilience.

Survey responses indicate some uncertainty around workforce preparedness for Net-Zero, with employers citing a lack of available skills as a cause of disruption to current business operations. This is in addition to the challenge of introducing the new technologies and working practices necessary for transformative change. Equally, there was a belief that increasing competition for highly sought after skills will continue to exacerbate a tightening of the labour market in the short term. Longer-term, therefore, it is crucial that the sector has a strong understanding of both current and potential skills gaps to anticipate demand and respond more effectively.

Perhaps now more than ever before it is vital that companies continue to live up to the standards and expectations of the modern workforce. This means communicating a clear plan for the future of the sector that is consistent with society's broader sustainability goals. It also means a solid commitment to Equality, Diversity & Inclusion to help unlock the value of a wider talent pool and ensure the sector workforce is representative of the communities in which it operates.

Employers have reported a strong commitment to providing existing employees with opportunities for training and continuing professional development. This will be important not only in meeting upskilling and reskilling requirements but also in attracting talent into the sector with rewarding, long-term career prospects.

There is also an opportunity to develop and expand apprenticeship recruitment across the sector. Vocational learning can play an integral role not only in identifying and training new talent but also in upskilling and retraining the existing workforce, supporting the retention of valuable experience, and updating knowledge to meet the demands of new processes and technologies.

Cogent Skills looks forward to working with UKPIA to address the challenges outlined in this report and deliver a future-ready workforce for the downstream sector.

Justine Fosh
Chief Executive Officer
Cogent Skills

BACKGROUND AND METHODOLOGY

The downstream sector is at the forefront of change which will see business and process diversification, modification, and innovation as it supports the UK Government's move towards a Net-Zero future. However, this will only be possible if employers have access to the skills they need as the sector evolves, and yet there is currently limited insight into the future skills landscape.

This report seeks to plug the gap and provide an evidence base that will inform UKPIA and its members, as individual companies continue developing and advancing their skills strategies. The report focuses on the skills that are essential to current and future core industry roles, predominantly in refining, manufacturing and production.

Cogent Skills conducted two separate surveys with key personnel from UKPIA members to inform the research. The respondents were predominately senior management staff from across Human Resources, Learning & Development, and Operations, as well as several senior technical roles.

The main survey used qualitative research methods to explore the many challenges sector companies face in recruiting and retaining a highly-skilled workforce. Therefore, the results provide an understanding of the considered professional opinions of key staff regarding issues such as skills shortage areas, future demand, sector attractiveness, and more.

A second accompanying survey used quantitative research methods to provide detail on the current sector workforce and add context to the discussion. This includes data on sector demographics such as age and gender profiles, as well as the use of apprenticeships and graduate programmes.

At least one senior employee from each of UKPIA's refining members responded to the qualitative survey. Equally, they each provided a company response to the quantitative survey. The data should not be considered exhaustive, but the results do reflect the experiences of senior personnel from a significant proportion of the overall UKPIA membership base.

All data has been aggregated and anonymised so that the opinions expressed cannot be linked to individual employers. Percentages may not sum to 100 due to rounding.

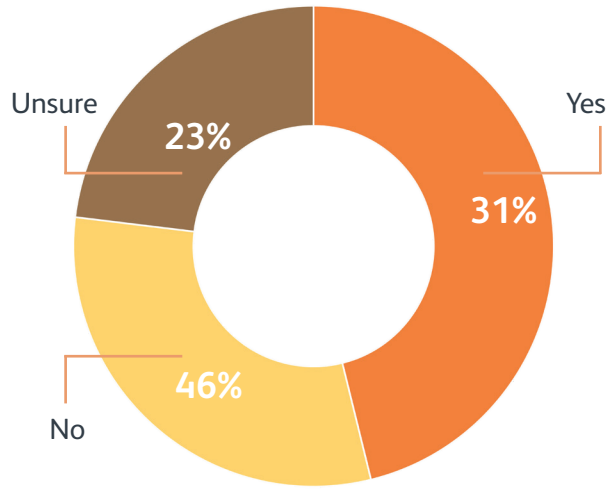
This report uses a combination of the aforementioned survey responses and official statistics, together with a wider literature review to explore a broad range of relevant topics. It is intended to be an honest, reflective, non-judgmental report that will help the sector understand its current position and inform the future action plan.

THE FUTURE WORKFORCE

To better understand the aptitude of the current downstream workforce in regard to achieving the sector's challenging sustainability objectives, employers were asked: 'Do you believe that your current workforce has the right skill set to support your organisation's transition to Net-Zero with sustainable technologies?'

Less than a third (31%) of respondents believe their current employees do have the right skill set to support their organisation's transition to Net-Zero. 46% selected 'No', while the remaining 23% were 'Unsure'. The data, therefore, suggest that a majority of sector companies have reservations about how prepared their current workforce is to support their transition.

Do you believe that your current workforce has the right skill set to support your organisations transition to Net-Zero with sustainable technologies?



"I don't see the technical challenges of Net-Zero transition as greatly different to those we currently face, and therefore the current skill set is transferrable. There will be learning on specific issues (such as CO2 handling), but this is a normal part of CPD."

"The specific knowledge on safely operating and managing carbon capture is currently not available. The development of associated projects would bring that knowledge to an already capable workforce."

In 2019, the downstream sector provided 96% of the energy used in the UK transport system and supplied over 44% of the UK's final energy demand.[1] Although the overall demand for liquid hydrocarbons is expected to reduce over the coming decades, downstream companies will continue to play a central role. Reducing carbon emissions will require careful management to avoid disruption to our daily lives, minimise rising costs, and mitigate wider economic impacts. Therefore, it is paramount that sector companies have access to the skills they need to maintain resilience while they continue to advance their strategies for long-term sustainability.

The employers were then asked what they expect to happen to the size of their overall workforce. Responses varied, with 15% of companies expecting it to 'increase somewhat'. However, the most common response was to 'stay about the same', which was reported by 46%, while 31% expect it will 'decrease somewhat', and 8% say 'decrease significantly'. This is largely consistent with recent Cogent Skills research into the UK Chemicals sector, which faces similar challenges around digitalisation and sustainability. The feeling is that, generally, new technologies will augment human effort and not necessarily replace it.[2]

1. *HM Government: Downstream oil resilience draft bill, 2021*
2. *Cogent Skills: Skills Report for the Chemical Industries Association, 2022*

To add some detail to this discussion, employers were asked about the expected demand for six specific occupational categories within their organisation over the next ten years.

The majority (62%) of respondents expect increased demand for 'engineering professionals', with 46% expecting an increase in 'Operations/ maintenance technicians and operatives'.

Do you expect the following roles to become more or less in demand in the next 10 years?

	LESS DEMAND	SIMILAR DEMAND	INCREASED DEMAND
Engineering professionals (various disciplines)	0%	38%	62%
Operations/Maintenance Technicians and Operatives	8%	46%	46%
Supervisory	8%	54%	31%
Technical Authority / Operational Management	0%	77%	23%
Business support functions (eg. finance, recruitment, HR, etc)	8%	77%	15%
Senior Executive	15%	85%	0%

RECRUITMENT AND RETENTION OF SKILLED WORKERS

There were mixed views regarding how attractive the employers believe their sector is to potential new recruits, with 46 % stating it is 'somewhat attractive' compared to 38 % who said 'somewhat unattractive'. The respondents were also asked to provide a rationale to support their position. A selection of the comments can be seen opposite.

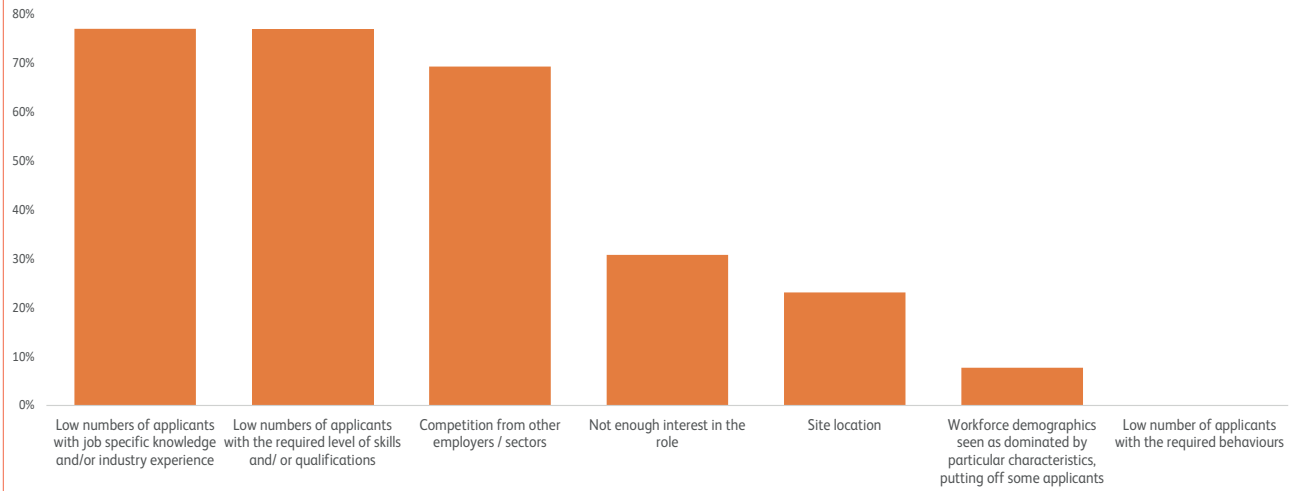
The two most commonly experienced challenges regarding recruitment were 'low numbers of applicants with job-specific knowledge and/or industry experience' and 'low numbers of applicants with the required level of skills and/or qualifications', both reported by 77 % of respondents. 'Competition from other employers/ sectors' was another significant issue reported by 69 % of respondents. Nearly a third (31 %) said that more generally, there is just 'not enough interest in the role'.

"The perception is that it is an industry with an uncertain future. Whilst there are conversations about where refining sits within the sustainability agenda, these are insufficient at this time to suggest security."

"It is still providing some attraction due to the higher than average salaries, but this is notably reducing, and more questions are being asked about sustainability. We are focusing recruitment/job adverts on educating on the good things we are doing in this area, but student recruitment is reduced."

"The number of recruitment applications still demonstrate high interest in the industry. However, we are seeing increased competition from other sectors."

What are the main challenges in recruiting the right skills for your company?



Despite 46% of respondents reporting they believe the sector is still 'somewhat attractive' to new recruits, there appears to be low engagement from candidates with the desired level of skill and experience. This suggests a couple of potential possibilities. There is either a genuine lack of appropriately qualified/ experienced candidates, or the sector must do more to attract potential recruits in an increasingly competitive environment where employee attitudes are changing. The reality may be somewhere in the middle.

The quantitative survey results show that 83% of sector companies offer formal graduate scheme placements. It is unclear from this research whether there are any particular problems with graduate recruitment for the sector. However, official statistics show that out of approximately 377,000 graduates from the academic year 2018/19, fewer than 80 were employed in the downstream sector within 15 months of completing their course.[3] Direct comparisons are difficult, however, the same data show that approximately 780 graduates entered the Chemicals sector that year, while 1,255 joined Pharmaceutical companies.

Survey responses have revealed that engineering professions are currently where skills shortages are most acutely felt within the sector. Moreover, it is the area where demand is expected to increase most over the coming years.

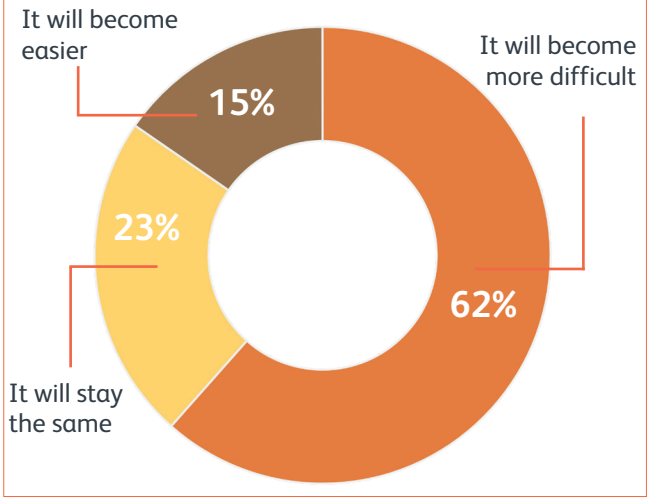
Among the 80 recent graduates who entered the sector, the two most commonly studied subject areas were 'chemical, process and energy engineering' and 'mechanical engineering'. These two disciplines provided the sector with approximately 20 graduates from academic year 2018/19. For context, a total of 8,830 people graduated from 'chemical, process and energy engineering' and 'mechanical engineering' courses across all UK HE institutions that year.

The most common industry destinations were 'architectural and engineering activities; technical testing and analysis', 'manufacture of motor vehicles, trailers and semi-trailers', and 'education'. This is not to say that there is an abundance of engineers across the wider economy. However, it does suggest that there is scope to improve graduate recruitment of engineers in particular amidst intense competition from other sectors.

The sector must act now to address longevity concerns and reposition itself as an industry of the future that is at the heart of the transition to a Net-Zero economy.

When asked about their expectations of future recruitment challenges, nearly two thirds (62%) of respondents predict it will become increasingly difficult to hire staff with the right skills. In contrast, just 15% of employers believe finding the right staff will become easier in the future.

Do you expect it to become easier, or more difficult, to recruit staff with the right skill set in the future?



3. HESA Graduate Outcomes Survey Results Record 2018/19

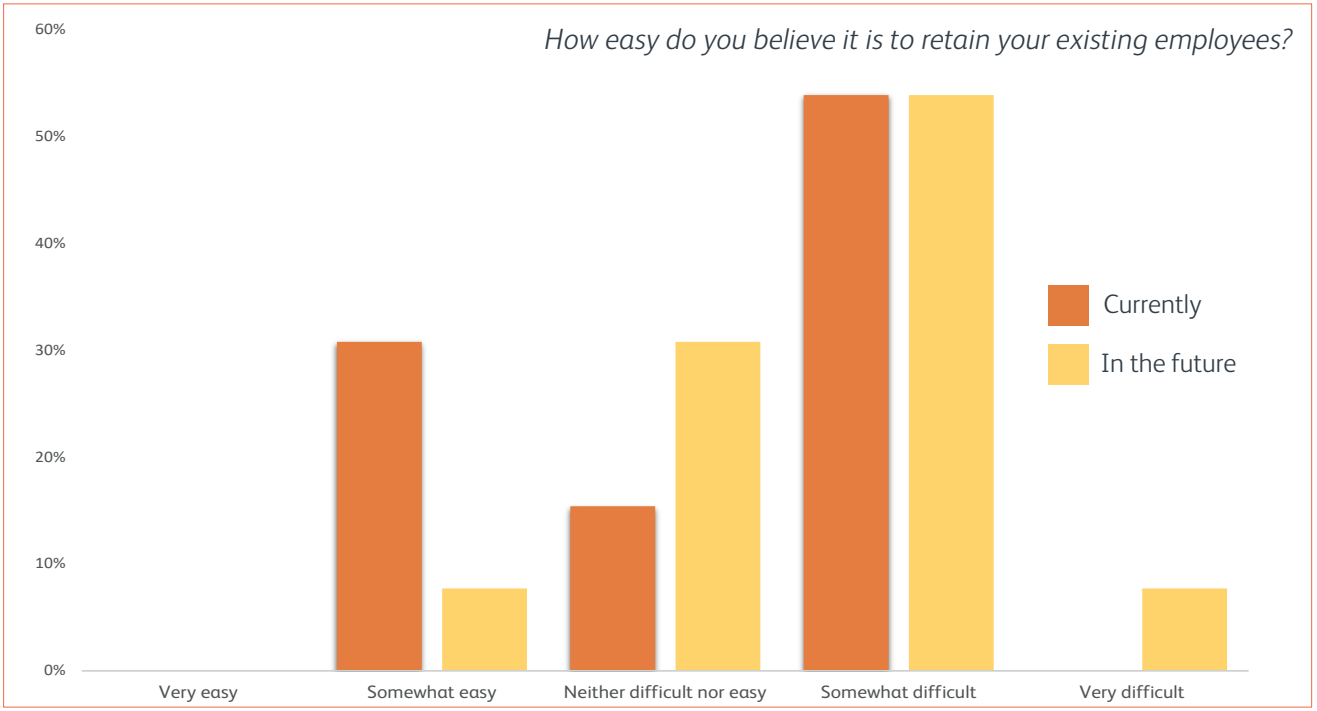
Respondents were then asked two separate questions, how easy do you believe it currently is to retain your existing employees, and how easy do you believe it will be in the future. Despite a majority of respondents (54%) saying it is currently 'somewhat difficult' to retain their existing employees, there are mixed feelings on the subject, with 31% instead believing it is 'somewhat easy'.

However, when asked about the future, there appears to be a shift with employers becoming more pessimistic about their prospects of keeping hold of their workforces. Just 8% of respondents believe it will be 'somewhat easy' in the future, with 54% thinking it will be 'somewhat difficult' and 8% thinking it will be 'very difficult'. This again illustrates a general feeling within the sector that things will get increasingly more challenging in the coming years.

"Retention rates are slowly decreasing with more of those with fewer years' service making the decision to leave over the last couple of years."

"Particularly difficult at the moment due to a restructuring process which the company has gone through to downsize the workforce. This has meant employees have looked elsewhere as they are concerned about their future and found there are lots of other jobs out there that are much more attractive with longer-term futures."

"As the focus and interest move more and more toward renewables, we face more competition for the same types of skills, from all levels, operators, technicians, professionals."

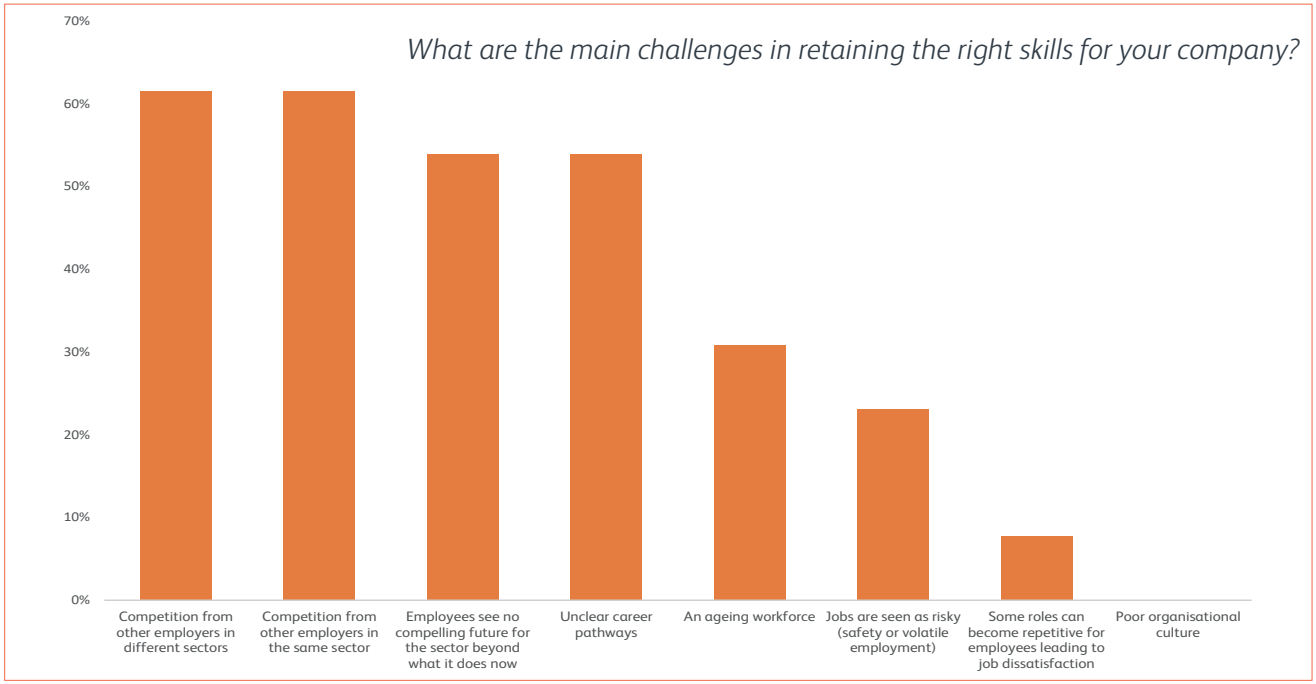


The employers were then asked about the challenges they face in retaining talented workers. The two most common issues were 'competition from other employers in different sectors' and 'competition from other employers in the same sector', which were both reported by 62 % of respondents. 54 % of respondents also reported 'unclear career pathways' as a prominent issue, while 54 % stated that 'employees see no compelling future for the sector beyond what it does now'.

Sustainability is undoubtedly a priority for the sector, and companies are already investing considerable time and resources to plot their way forward. There are, in fact, a variety of potential pathways, including new technologies and processes to improve efficiency, lowering the carbon footprint of energy usage, production of lower-carbon fuels, and 'carbon capture, utilisation and storage' (CCUS).

Regardless of the shape these changes may take, the fact remains that there will still be an essential role for liquid hydrocarbons in the short, medium and long term. However, it is highly likely that the hydrocarbons used in the future will be produced far less, potentially not at all, from fossil sources.

There are a number of sustainable and, in some cases, renewable feedstocks that can be used to produce the low carbon fuels of the future. UKPIA has considered the routes to production of such fuels in greater detail, as well as the sector's potential role in hydrogen and electricity supply chains in publications such as the 'Future of Mobility in the UK' (2021) and 'Transition, Transformation, and Innovation' (2020) reports.[4,5]



4. UKPIA Future of Mobility in the UK 2021
5. UKPIA Transition, Transformation, and Innovation, 2020

As a result, a successful downstream sector should not be considered in conflict with society's low-carbon goals. Instead, the sector will have a pivotal role in the UK's low-carbon energy future.[6] Even so, the responses suggest that the perception of an uncertain future, together with intense competition for skills, is hindering the ability of companies to hold onto talented workers. This also proposes the question that if some within the current workforce feel uncertain about the future of their sector, what impact is this having on recruitment?

Research by National Grid suggests that more than three-quarters of UK adults (78 %) think it's important to play a part in the UK's journey to reaching Net-Zero emissions. More than half (57 %) are interested in working for an organisation that specifically contributes to reaching Net-Zero.[7]

To reassure workers that they continue to offer exciting career prospects aligned with modern expectations, companies must be able to communicate a clear strategy and vision for future sustainability.

31 % of respondents reported that 'an ageing workforce' is a main challenge for them. The quantitative survey results show that the sector does have an ageing workforce, with approximately 48 % of its workers over the age of 45. This compares to around 40 % in Life Sciences or 44 % in the total UK workforce.[8] Estimates for the wider energy sector suggest that as much as 20 % of current engineering, craft and technical workers are set to retire by 2030.[9] This is likely to exacerbate existing problems with many talented people leaving the sector when they are needed most.

As new technologies to reduce carbon emissions become mainstream, there will undoubtedly be growing demand for an array of new emerging roles and specialisms across the sector. That said, the sector will only be able to seize the opportunities that Net-Zero presents if companies can successfully harness the ingenuity and expertise of the current workforce.

Through initiatives such as career development plans, mentoring relationships, and proactive succession planning, there is an opportunity to ensure this expertise and experience can be shared and the knowledge transferred to the next generation of downstream workers.

6. UKPIA Future Vision: The Downstream Oil Sector in a Low-Carbon World, 2019
7. National Grid: Building the Net-Zero energy workforce, 2020
8. Office for National Statistics: Labour Force Survey 4 Quarter Average, 2019
9. Energy and utilities workforce renewal and skills strategy, 2020

SKILLS RISKS AND OPPORTUNITIES

Skills shortages are being most keenly experienced among the more technical roles within the sector, particularly in engineering. In total, 69 % of respondents stated that they are experiencing either a moderate or severe skills shortage among 'engineering professionals (of various disciplines)'.

There is longstanding recognition of a need for more engineers across the UK economy, with associated occupations consistently appearing on the government's shortage occupations list.[10] Furthermore, Engineering UK recently estimated a shortfall of between 37,000 and 59,000 in meeting the annual national demand for core engineering roles requiring level 3+ skills.[11]

'Operations/ maintenance technicians and operatives' came second, with 54 % of respondents stating they have either a moderate or severe skills shortage. Third was 'supervisory roles' with 46 %, and fourth was 'technical authority/ operational management' with 38 %.

In contrast, the vast majority of respondents stated they had either no skills shortages or low skills shortages in the non-technical roles of senior executive and business support functions (e.g. finance/ HR).

Beyond the initial survey results, feedback from UKPIA's Workforce and Skills Committee has suggested significant concern around the availability (short and long-term) of tradespeople for major maintenance and project works on sites.

> *"The most pressing concern for future skills is the availability of crafts and trades personnel. It was noted of a report that the average age of a rigger is 57 in the UK and that there are very few apprentices in that space nationally, which will exacerbate the issue."*
>
> *[Feedback from UKPIA Workforce and Skills Committee discussion December 2021]*

Do you believe there is currently a skills shortage at any of the following levels in your organisation?

	NO SKILLS SHORTAGE	LOW SKILLS SHORTAGE	MODERATE SKILLS SHORAGE	SEVERE SKILLS SHORTAGE
Engineering professionals (various disciplines)	15 %	15 %	38 %	31 %
Operations/Maintenance Technicians and Operatives	23 %	23 %	38 %	15 %
Supervisory	23 %	31 %	38 %	8 %
Technical Authority / Operational Management	31 %	31 %	31 %	8 %
Business support functions (eg. finance, recruitment, HR, etc)	54 %	23 %	15 %	8 %
Senior Executive	46 %	38 %	15 %	0 %

10. https://www.gov.uk/government/publications/skilled-worker-visa-shortage-occupations/skilled-worker-visa-shortage-occupations, accessed 23 Feb 2022

11. Engineering UK: Excel Resource 2019

Office for National Statistics data suggest that this problem is unlikely to be unique to the downstream sector, with figures showing approximately 36 % of the UK construction workforce are aged 50+.[12] Further research by Powered Now looking at specific occupations indicates that 20 % of tradespeople are over the age of fifty, and 15 % are in their sixties.[13]

The activities undertaken during site turnarounds are vital to operations, and worker shortages can result in extended downtime for sites at a significant cost. Longer-term, this could hamper the ability for companies to deliver the large disruptive technological improvements required to meet Net-Zero when such works should be an opportunity to create jobs and support the UK's transition.

The sector and its stakeholders must consider actions to address the skills shortages experienced in the sector, particularly those that have resulted in disruptions/ increased costs to operations and difficulties introducing new technologies. This will be vital for the nation's energy transition and the ability to meet the government's Net-Zero goals.

Respondents were then asked whether they expect to see further skills shortages in the future across the same six occupations within their organisation. The overall pattern remained relatively consistent with skills shortages concentrated around the more technical roles. Again, the responses show that employers are generally more pessimistic for the future and expect skills shortages to worsen across all six roles and levels. For example, 46 % of respondents expect a severe skills shortage for 'engineering professionals' in the future (currently 31 %), with 38 % saying the same for 'operations/ maintenance technicians and operatives' (currently 15 %).

Do you expect there will be future skills shortages at any of the following levels in your organisation?

	NO SKILLS SHORTAGE	LOW SKILLS SHORTAGE	MODERATE SKILLS SHORAGE	SEVERE SKILLS SHORTAGE
Engineering professionals (various disciplines)	15 %	15 %	23 %	46 %
Operations/Maintenance Technicians and Operatives	8 %	46 %	8 %	38 %
Technical Authority / Operational Management	23 %	15 %	38 %	23 %
Supervisory	23 %	23 %	46 %	8 %
Senior Executive	38 %	31 %	31 %	0 %
Business support functions (eg. finance, recruitment, HR, etc)	46 %	38 %	15 %	0 %

12. Office for National Statistics: Annual Population Survey, 2020
13. https://www.powerednow.com/blog/skilled-trades-are-high-in-demand-in-the-uks-ailing-jobs-market

To understand the impact that skills shortages are having on the sector, respondents were asked, 'Have these skills shortages caused any of the following problems to your business?'

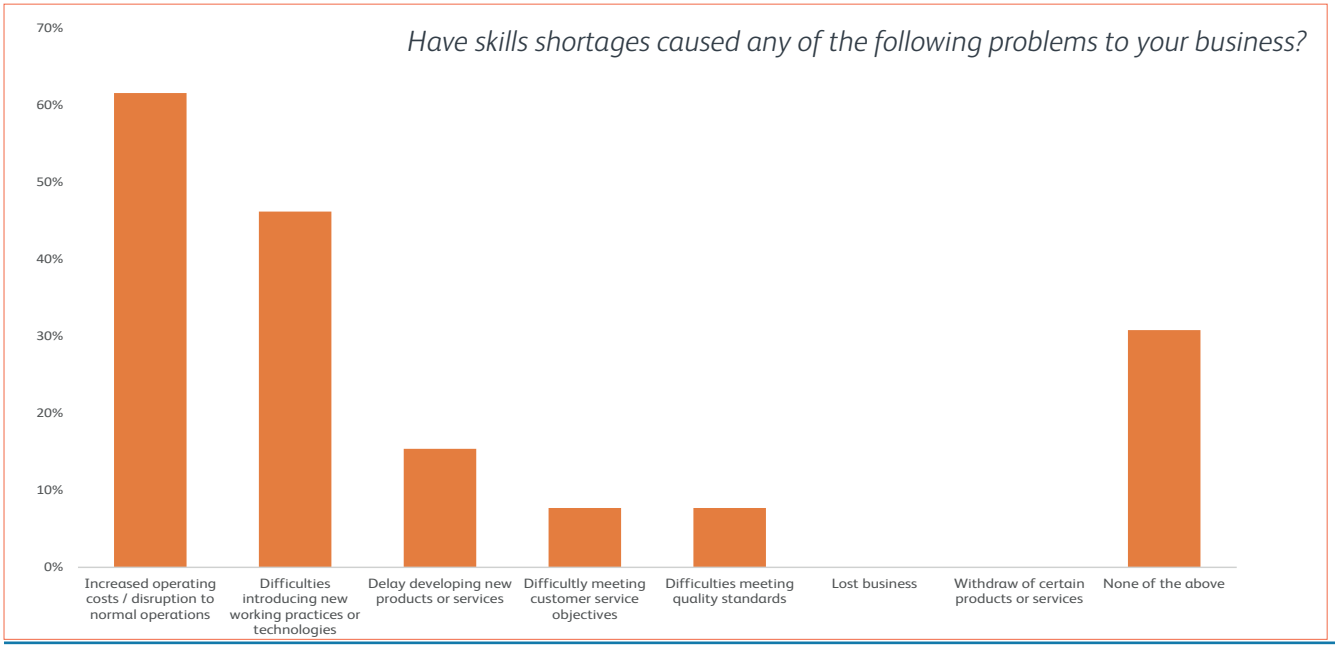
The most prominent issue was 'Increased operating costs/disruption to normal operations', which 62% of respondents reported. Second was 'Difficulties introducing new working practices or technologies', which was reported by 46% of respondents. These responses, therefore, suggest that skills shortages are likely to exacerbate many of the challenges facing the sector over the coming years.

As we move toward a Net-Zero future, sector companies will increasingly need to find innovative ways to improve process efficiency and introduce new technologies that can help them to decarbonise. Equally, scenarios looking at the energy transition required to achieve a Net-Zero carbon economy show a marked reduction in demand for liquid hydrocarbons in the decades ahead.[14]

Skills shortages are pushing operating costs up at a time of uncertain future demand and impeding progress against decarbonisation by making it more difficult to introduce new working practices and new technologies.

A recent example of the type of disruption possible was the recent fuel demand shock in September 2021, which was exacerbated due to a shortage of HGV drivers and hauliers.

Respondents were given a list of 22 relevant Knowledge, Skills and Behaviours (KSBs) and asked to rate how important each of them are to their current business. In line with industry norms for working with potentially hazardous products, the top three areas of current importance were 'health & safety', 'compliance', and 'managing risk'.



14. UKPIA Future Vision: The Downstream Oil Sector in a Low-Carbon World, 2019

How important are the following 'Knowledge, Skills and Behaviours' to your current business?

	NOT IMPORTANT AT ALL	SOMEWHAT UNIMPORTANT	NEITHER UNIMPORTANT NOR IMPORTANT	SOMEWHAT IMPORTANT	VERY IMPORTANT/ ESSENTIAL
Health & Safety	0 %	0 %	0 %	0 %	100 %
Compliance	0 %	0 %	0 %	23 %	77 %
Managing risk	0 %	0 %	8 %	8 %	85 %
Communication	0 %	0 %	0 %	31 %	69 %
Team working / collaboration	0 %	0 %	0 %	46 %	54 %
Data analysis and interpretation	0 %	0 %	15 %	38 %	46 %
Managing change	0 %	0 %	15 %	38 %	46 %
People / Team management	0 %	8 %	8 %	31 %	54 %
Data management and handling (reporting)	0 %	0 %	15 %	46 %	38 %
Digital security	0 %	8 %	8 %	38 %	46 %
Mentoring / Coaching	0 %	0 %	15 %	46 %	38 %
Problem solving/ critical thinking	0 %	0 %	15 %	54 %	31 %
Project / Programme management	0 %	0 %	31 %	31 %	38 %
Designing, implementing, controlling & optimising new processes	0 %	0 %	46 %	8 %	46 %
Digital skills	0 %	8 %	23 %	46 %	23 %
Innovation	0 %	0 %	38 %	38 %	23 %
Technology identification and application	0 %	15 %	8 %	54 %	23 %
Creative thinking	0 %	0 %	38 %	46 %	15 %
Networking skills	0 %	15 %	31 %	38 %	15 %
Working with other companies (domestic partnerships / clusters)	8 %	8 %	23 %	46 %	15 %
Negotiation	8 %	8 %	23 %	62 %	0 %
Working Internationally (overseas partners)	15 %	23 %	23 %	15 %	23 %

Respondents were then given the same list of 22 relevant KSBs and asked to consider whether they expect them to become more or less in demand over the forthcoming decade. The top six areas expected to see the most significant increase in demand are 'digital skills', 'innovation', 'digital security', 'managing change', 'managing risk', and 'technology identification and application'. These responses are largely consistent with recent findings for the wider UK oil & gas sector.[15]

Demand for these skills will be extensive throughout much of the economy, particularly across the STEM sector, with ever-increasing importance placed on new technologies, digitalisation and sustainability. For example, a recent skills gap analysis performed by the Association of the British Pharmaceutical Industry (ABPI) identified data and digital skills as a top priority for Life Sciences companies.[16] They concluded the issue was primarily with the quantity of candidates rather than the quality. There are candidates with the right skills, but there are simply not enough of them, as these skills are highly sought after by a growing number of sectors.

Competing for these skills will require the sector's narrative to be compelling; a forward-looking industry of the future that harnesses the value of diversity in the workforce and offers an exciting career trajectory helping to solve the societal challenges of decarbonisation.[17]

15. UKCS Workforce Dynamics: The Skills Landscape 2019 - 2025
16. ABPI: Bridging the skills gap in the biopharmaceutical industry, 2022
17. UKPIA: Transition, Transformation, and Innovation report, 2020

Do you expect the following 'Knowledge, Skills and Behaviours' to become more or less in demand in the next 10 years?

	LESS DEMAND	SIMILAR DEMAND	INCREASED DEMAND
Digital skills	8 %	23 %	69 %
Innovation	0 %	38 %	62 %
Digital security	8 %	31 %	62 %
Managing change	0 %	46 %	54 %
Managing risk	0 %	46 %	54 %
Technology identification and application	0 %	46 %	54 %
Compliance	0 %	62 %	38 %
Creative thinking	8 %	46 %	46 %
Designing, implementing, controlling & optimising new processes	8 %	46 %	46 %
Health & Safety	0 %	62 %	38 %
Problem solving / critical thinking	0 %	62 %	38 %
Data analysis and interpretation	0 %	69 %	31 %
Data management and handling (reporting)	0 %	69 %	31 %
Project / Programme management	0 %	69 %	31 %
Communication	0 %	77 %	23 %
Working with other companies (domestic partnerships / clusters)	8 %	62 %	31 %
Mentoring / Coaching	0 %	85 %	15 %
Networking skills	8 %	69 %	23 %
People / Team management	0 %	85 %	15 %
Team working / collaboration	0 %	85 %	15 %
Negotiation	8 %	77 %	15 %
Working Internationally (overseas partners)	15 %	62 %	23 %

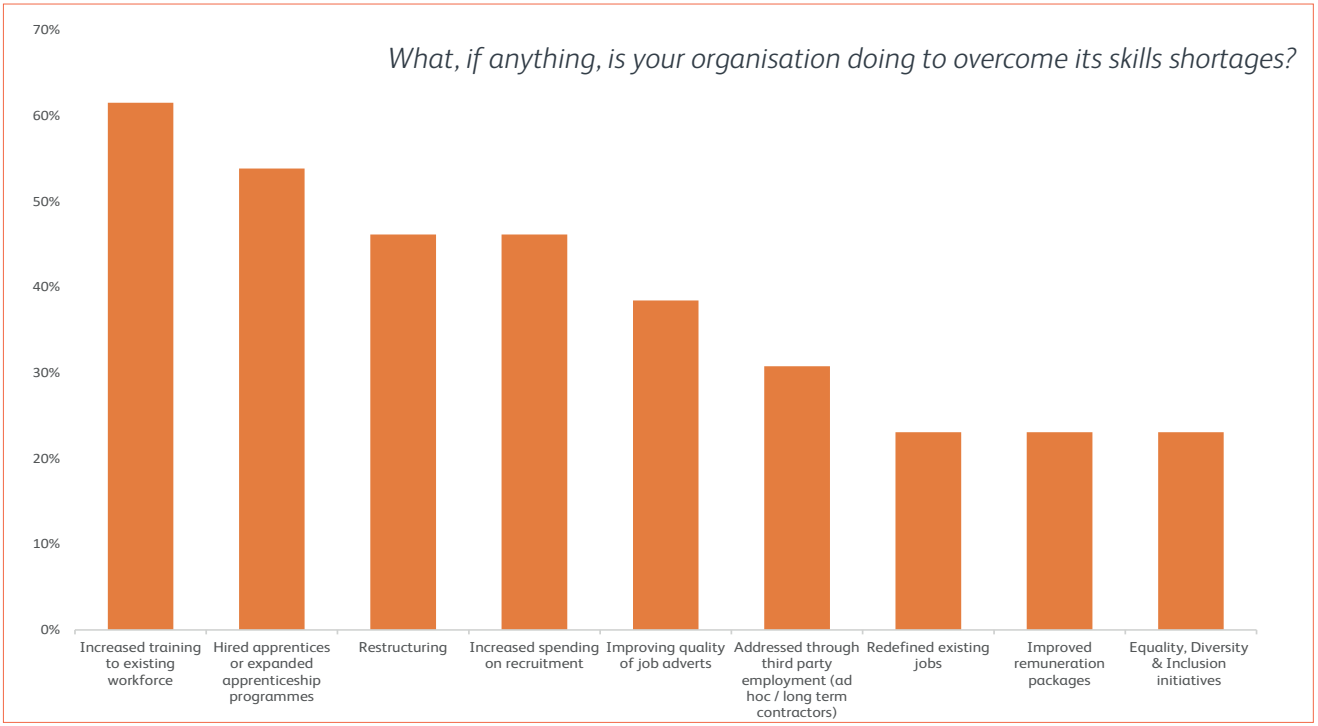
OVERCOMING SKILLS CHALLENGES

As set out already, employers have identified some skills areas that are challenging to employ with respondents expecting that things may become more challenging in future years as more industries come to rely on STEM and trades skills in particular. Employers have reported lower numbers of applications from candidates with the required level of skills and/or experience and, similarly, respondents report difficulty retaining existing talent due to intense competition for skills, with some employees seeing no obvious compelling future for the sector beyond what it does now.

> *"There is a lack of quality technicians coming through the systems, so we are reliant on bringing through apprentices."*

To better understand the current prevailing strategies around skills, respondents were asked: 'What, if anything, is your organisation doing to overcome these skills shortages?'. The most common approach has been to 'increase training to existing workforce' as reported by 62% of respondents, highlighting the sector's urgent upskilling and retraining need. Second was to 'hire apprentices or expand apprenticeship programmes' – reported by 54% of respondents. Other popular tactics include 'restructuring', 'increased spending on recruitment' and 'improving the quality of job adverts'.

What, if anything, is your organisation doing to overcome its skills shortages?



	Annual apprenticeship starts in England[18]					
Academic Year	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Apprenticeship starts	509,400	494,900	375,800	393,400	322,500	321,400

The total number of apprenticeship starts across all sectors have fallen since the apprenticeship levy system was introduced in April 2017 and have not recovered. The figures also reveal that the levy disproportionately affects young people, with a significant drop in the number of apprenticeships going to both under 19s and 19-24-year-olds. Perhaps most concerning is that overall employer investment in training has also declined, with employer-funded off-the-job training in England falling by £2.3bn between 2017 and 2019.[19]

Businesses with an annual pay bill above £3 million pay the levy at a rate of 0.5 % per month, with firms able to draw down from a company 'pot' to spend on apprenticeship training. However, most companies' utilisation rates of levy funds remain low, largely due to the restrictive nature of how the funds can be spent.[20]

For all their potential benefits and relative versatility, apprenticeships are not always the most appropriate way to reskill or upskill workers. Some workers will only require an update or a top-up to the gaps in their skill set, and using apprenticeships may duplicate some of the functional and technical skills they have already gained. Yet apprenticeship programmes must be at least a year in length, and those at higher levels can take several years to complete. At the same time, the 20 % off-the-job training requirement is often not conducive to business needs.

Consequently, the current system means that many large organisations have a substantial financial obligation in paying the levy, with restrictions limiting their ability to spend it on the training that works for them. The situation is compounded further as levy funds do not cover some of the costs associated with hiring apprentices, such as onboarding or salaries.

Cogent Skills and the SIP have thus repeatedly advocated that government should introduce flexibilities to apprenticeships and use of the levy to increase company engagement.[21,22]

In April 2021, the SIP conducted a short survey with 20 employers from across the science sector, asking companies to rank potential flexibilities to the apprenticeship system in order of importance to their business. The top three potential flexibilities that companies wanted to see introduced were:

1. Relax the 20 % off-the-job training requirement for upskilling/ retraining existing employees
2. The ability to spend Apprenticeship Levy funds on non-apprenticeship training (i.e. Continuing Professional Development, short courses, etc.)
3. Increase the amount of time available to spend Apprenticeship Levy funds (currently 24 months)

18. Department for Education (DfE) Apprenticeships and traineeships data
19. CIPD: Apprenticeship Levy has failed on every measure – Press release, 2021
20. Confederation of British Industry: Learning for life: Funding a world-class adult education system, 2020
21. Science Industry Partnership: Apprenticeship Survey 2018
22. Science Industry Partnership: Apprenticeship Survey 2020

Despite its limitations, the levy system has incentivised some organisations to consider new ways of incorporating apprenticeship-based training into their wider learning and development plans. For instance, approximately 60 % of Industrial Sciences apprentices are now existing employees using apprenticeship-based training to upskill or retrain.[23] This highlights the multifaceted nature of apprenticeships, with some companies now using them in a growing variety of disciplines such as leadership & management, marketing, human resources, and IT. It has also been encouraging to see an uptick in the number of Higher Level, and Degree Level apprenticeships as employers attempt to address the growing demand for much sought after skills.

Our quantitative survey asked respondents about their current use of apprenticeships. Of those respondents who reported that they are currently employing apprentices, only 20 % stated that they are using their apprenticeship programme to help upskill and retrain their existing workforce. This represents a missed opportunity.

The downstream sector should review its current use of apprenticeships and consider how they could be used in some circumstances to address the growing upskilling and retraining need. Equally, the government must work with industry to understand what flexibilities are needed to allow employers to realise the benefits of the levy system and invest more effectively in the future workforce.

In March 2022 during its Spring Statement, the UK Government announced it will "consider whether the current tax system, including the operation of the apprenticeship levy, is doing enough to incentivise businesses to invest in the right kinds of training". We welcome this commitment by the government and would equally welcome an opportunity to feed into any upcoming consultation on the performance of the levy system.

To address skills shortage areas and overcome the challenges of an ageing workforce, the sector will need to attract and retain a diverse workforce of talented people from across all our different communities. The quantitative survey results show an approximate gender profile for the sector of 83 % male to 17 % female. This compares to approximately 61 % male to 39 % female in the UK Chemicals sector.[24] Available data covering ethnicity is too granular to state with any confidence. For context, research by the All-Party Parliamentary Group on Diversity and Inclusion in STEM found that approximately just 9 % of the UK's 2.5million engineering STEM workforce are women.[25] The same research also found that the engineering STEM workforce was less ethnically diverse than the wider economy and had a smaller proportion of workers classed as having a disability.

Employee attitudes are shifting significantly as society welcomes more Millennials and Generation Z's into the workplace. For many in those younger generations engagement with Equality, Diversity & Inclusion (ED&I) is non-negotiable. It is no longer a 'nice to have'. The motivation for engaging with ED&I is therefore clear. It is ethically right, strategically important and compatible with operational performance.[26]

A strong commitment to ED&I will be important both now and in the future as companies work to address attraction and perception issues. Despite a relatively small proportion of respondents selecting 'ED&I initiatives', this appears to be down to a misunderstanding of what was meant by the word initiatives. When questioned, UKPIA's Workforce and Skills Committee showed overwhelming support for ED&I practices, indicating widespread adoption throughout sector companies.

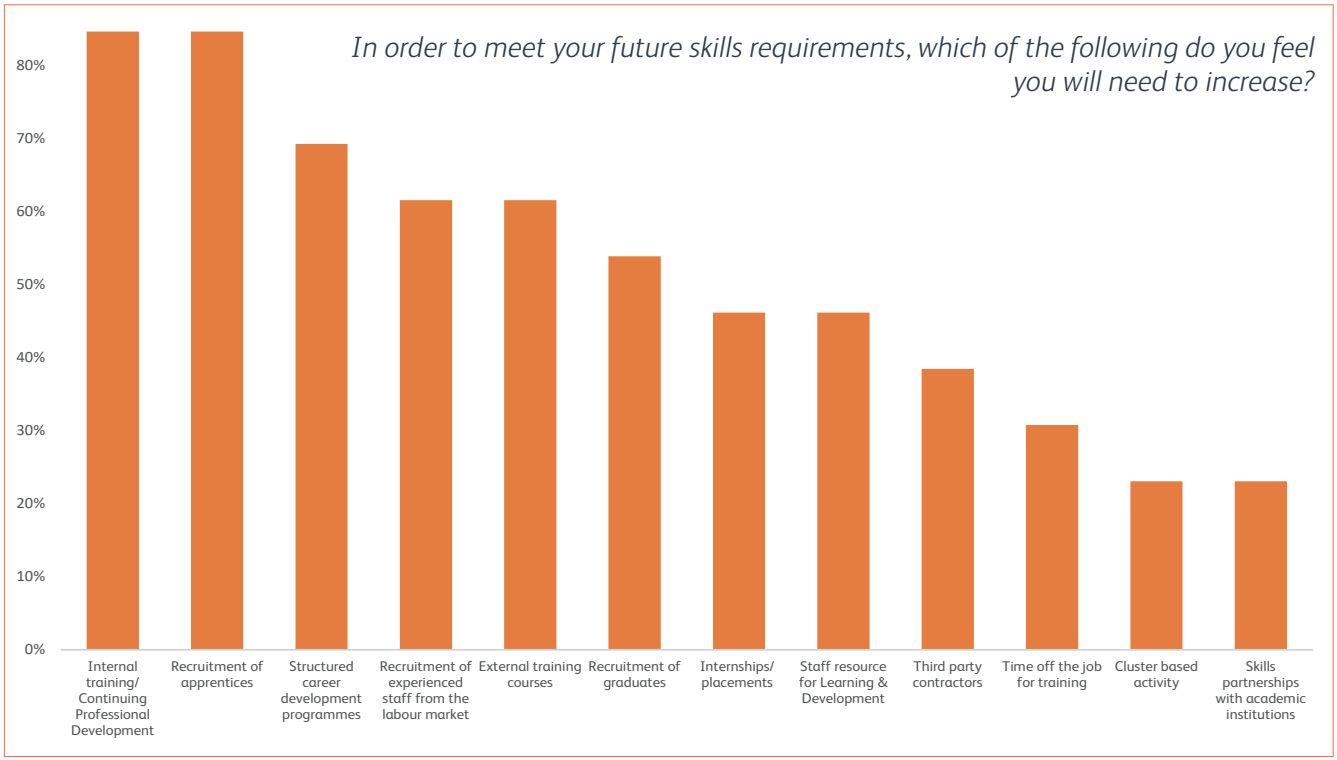
To further advance and support this agenda, the sector should collect and share non-commercially sensitive best practice regarding ED&I, considering best practice in other industries where available.

23. Science Industry Partnership: Apprenticeship Survey 2020
24. Office for National Statistics, Annual Population Survey 2020
25. APPG on Diversity and Inclusion in STEM: Inquiry into the STEM Workforce - Data Analysis Brief, 2020
26. CIPD: Diversity management that works, 2019

To better understand how the sector plans to address skills challenges in the future, we asked the question, 'In order to meet your future skills requirements, which of the following do you feel you will need to increase?'. The two most common responses were 'internal training/ continuing professional development' and 'recruitment of apprentices' - both reported by 85 % of respondents. These two areas also came top when we asked about current activity. There was also strong support for 'structured career development' programmes which was reported by 69 % of respondents.

Research by PWC suggests that having 'opportunities for career progression' is the most important factor that makes an organisation an attractive place to work. While 'a lack of opportunities for career progression' was cited as the number one reason an employee decided to leave their previous job.[27]

Loyalty to an employer is therefore often driven by an understanding and support of career ambitions, as well as providing realistic and fair opportunities for progression. Accordingly, structured career development programmes can be a hugely effective way of keeping employees motivated and committed, and thus in helping companies to overcome their skills challenges.



27. PWC: Winning the fight for female talent, 2017

A similar question was asked during recent Cogent Skills research with the Chemicals sector and produced the same top three responses, albeit in a different order. One notable difference between the two datasets is that only 23% of downstream companies stated the need to increase 'skills partnerships with academic institutions', compared to 50% for Chemicals.[28]

Office for National Statistics data suggest that the downstream sector is highly qualified. Approximately 44% of its workforce holds a degree or equivalent level qualification (Levels 6-7), compared to 39% in the wider economy.[29] Despite this, data referenced earlier in this report show that fewer than 80 graduates from the academic year 2018/19 entered into downstream sector employment within 15 months of completing their course.

Both academic and vocational routes will be important in supplying a sustainable pipeline of new talent into the sector. With this in mind, companies must be proactive in their approach and take a long-term view of recruitment. The current apprenticeship system is employer-led, meaning that employers design the standards and subsequently create the demand for apprentices.

In much the same way, employers should be involved in the academic process to ensure that courses meet the requirements of modern industry and students are kept up to date with advancements in technology.

Young people and their influencers (parents, guardians, teachers, career advisers, and siblings) often lack awareness of the breadth of opportunities available in the sector, meaning it is not always seen as a career destination of choice. Moreover, evidence shows that career aspirations are set early as the top four sectoral preferences aged 7-8 are also three of the top four aged 17-18.[30] Despite this, some 82% of teachers say they lack the necessary knowledge to offer careers information to their students.[31]

The Department for Education (DfE) Careers Strategy (2017) recommends that pupils spend more time with employers from an early age. It concluded that employers play an integral role in careers advice by providing inspiring encounters and opportunities to learn about what work is like and what it takes to be successful in the workforce.[32]

28. *Cogent Skills: Skills Report for the Chemical Industries Association, 2022*
29. *Office for National Statistics: Labour Force Survey 4 Quarter Average, 2020*
30. *Education and Employers: Disconnected - Career aspirations and jobs in the UK, 2020*
31. *Enthuse Placements. STEM Learning, 2020*
32. *Department for Education: Careers strategy: making the most of everyone's skills and talents, 2017*

ESSO CASE STUDY

Apprenticeships have formed the backbone for downstream training programmes for decades and will continue to be important in future. ExxonMobil's Fawley petrochemical complex continues to welcome new intakes of apprentices, with some former apprentices having stayed with the company for 40 years.

While Fern, Krishdeep, Jake and James joined ExxonMobil's apprenticeship scheme in mechanical maintenance and instrumentation roles and are getting hands-on, practical experience as well as 1 to 1 learning from instructors and their employer, they can look to other people in the company who have been apprentices and gone on to varied careers in the sector.

Mark, Phil, Andy and Dave all joined ExxonMobil in 1981 and have worked in roles right across the refinery starting from welding, electrician and pipefitting roles to working in project teams across the globe, and leading process operations, running labs and advising across all maintenance activities.

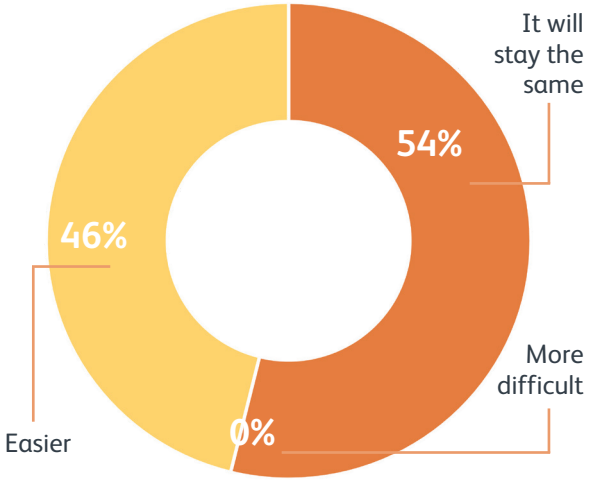
SUPPORT FOR INDUSTRIAL CLUSTERING

The last few years have seen the promotion by Government and engagement by industries to develop industrial clusters – many of which have a particular focus on decarbonisation. Given the rise of such clusters, involvement in industrial clustering activities could impact the ability for companies to recruit and retain skilled individuals. In the survey, 46 % of respondents think it will make it easier, compared to 54 % who believe it will stay the same. None of the respondents believe it will make things more difficult.

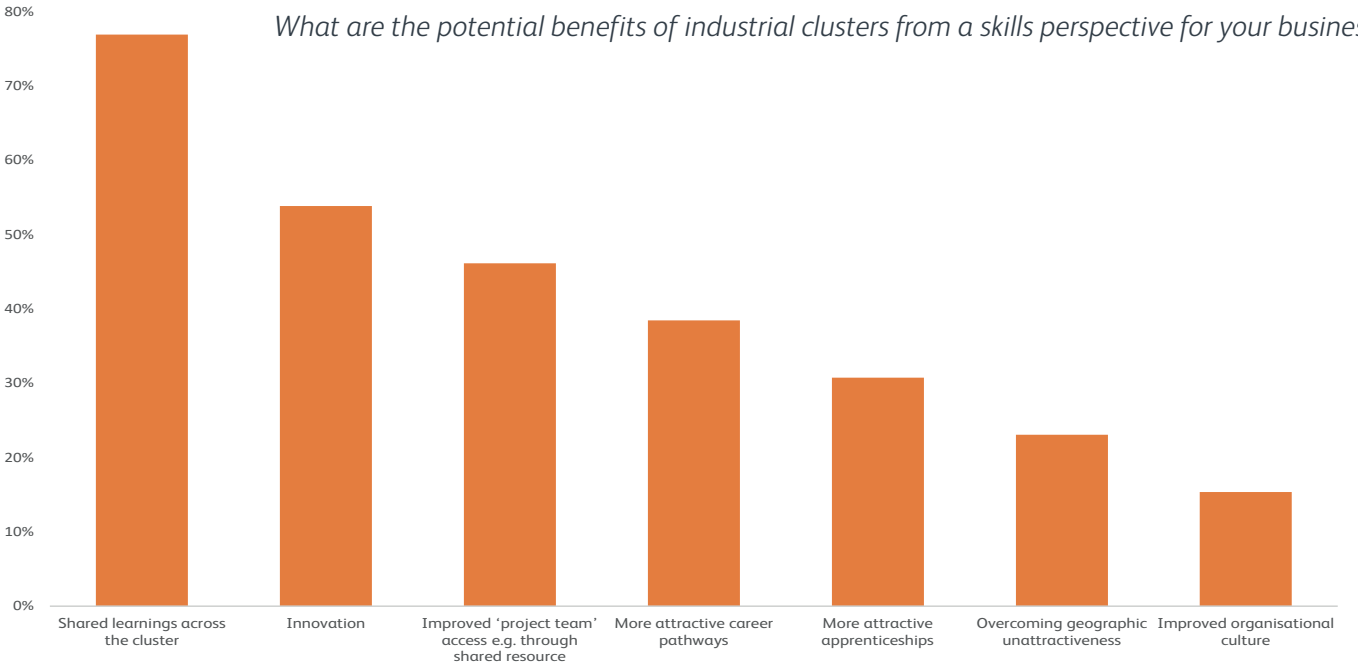
There may be many benefits associated with industrial clustering, with their role and scope still being explored. Survey respondents have been asked to rank the potential benefits with 'Shared learnings across the cluster' as the most common response, reported by 77 % of respondents. Second was 'innovation' with 54 % believing that clusters can offer increased opportunities in that space, followed by 'improved project team access, e.g. through shared resource' with 46 %. 38 % of respondents think that industrial clustering activities may support 'more attractive career pathways' with some early cluster projects suggesting that shared resource across a cluster could offer a more comprehensive early training path as well as the ability to share a pooled, expert resource across a cluster's businesses.[33]

33. *https://www.edie.net/news/6/North-West-industrial-upskilling-roadmap-set-up-to-assist-with-net-zero-cluster/*

Do you believe that active involvement in industrial clustering activities will make it easier or more difficult for your business to recruit and retain the right people and skills?



What are the potential benefits of industrial clusters from a skills perspective for your business?



FINDINGS AND FURTHER CONSIDERATIONS

A Net-Zero future represents significant change in the downstream sector as throughout wider society. To ensure an orderly transition, it is vital to maintain secure supplies of fuel to the people and businesses whose livelihoods depend on it. To achieve this, the sector must have access to the essential skills it needs to minimise disruption and deliver the innovation required to improve efficiency and reduce carbon emissions. This period of change also presents an opportunity to transform the sector as forward-looking with a unique and critical role in helping to deliver the nation's clean energy transition.

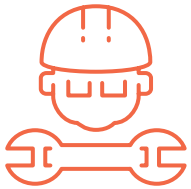
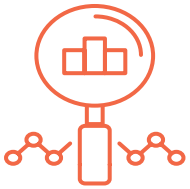
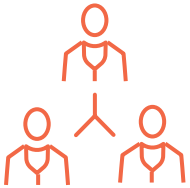
In recognition that the sector will continue to play a pivotal part in the UK's low-carbon energy future, companies must continue to be proactive in their approach and take a long-term view on skills. The findings in this report show there is some uncertainty around the future attractiveness of the sector in a world that is gradually shifting away from traditional energy sources and where the precise role for the sector in a Net-Zero world is not yet clear - despite efforts to identify new technologies that could transform the sector.

It is still important to understand the sector's current positioning on skills and take appropriate action to address any critical areas of concern. For instance, this report evidences concern around the immediate availability of skilled workers in key technical roles amidst intense competition from other sectors.

A key strategic objective for the sector must be to strengthen its understanding of current and potential skills gaps to anticipate demand and respond more effectively. This report is the first step towards achieving that aim. It has provided an opportunity to engage with sector companies, revealing some important insights and highlighting key areas of concern. In turn, the findings have enabled UKPIA and Cogent Skills to form some initial conclusions and set out the steps that we believe will advance the interests of downstream employers.

The next step would be for UKPIA to work with an expert skills partner to develop a comprehensive, overarching skills strategy through which the sector can come together to define and respond to key priorities.

A key strategic objective for the sector must be to strengthen its understanding of current and potential skills gaps to anticipate demand and respond more effectively.

Strategic Themes		Considerations
	Develop and expand apprenticeships and facilitate take-up of apprentices	Consider the suitability of existing apprenticeship standards and how programmes can be developed to support maximum uptake. Review how potential flexibilities to the apprenticeship levy system could increase the number of places offered by companies in the sector. Review how the apprenticeship system might be used to upskill or retrain the existing workforce.
	Address attraction and perception issues	Consider actions to address perception issues by clarifying the sector's short, medium and long-term strategy for sustainability and its essential role in the nation's energy transition and wider society. Consider increased engagement with careers outreach programmes to inform and enthuse young people and their career influencers to enter the sector. Consider sharing of best practice regarding ED&I activities of sector companies, considering best practice in other industries where available.
	Understand, anticipate and respond to current and potential skills gaps	Explore how skills partnerships with academic institutions could help ensure curriculum and courses meet the requirements of modern industry and match technological advancements. Consider actions to address immediate skills gaps, in particular those that have resulted in disruptions to operations and difficulties introducing new technologies.
	Promote and support industrial clustering	Consider means to support skills related benefits of industrial clustering activities, working to build more attractive career pathways and coordinated apprenticeship programmes.