



ESG

Green Jobs Barometer

Green jobs and opportunity: In pursuit of a competitive and equitable green jobs market

December 2023



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Foreword

We can't afford to take our eyes off the prize of a net zero economy. It's fundamental to combating climate change and promises everything from energy security to better health and greater growth.

But it's fair to say the goal can seem far from sight in a challenging economic and geopolitical landscape. And the transition to net zero will itself continue to bring disruption.

All of which risks pausing or slowing investment and transformation – when in reality success will only be achieved through a consistent pace of activity.

Now in its third year, PwC's Green Jobs Barometer provides a gauge of that investment and transformation, tracking the development of green jobs over time. As importantly, it examines how evenly and fairly spread these opportunities are, comparing different economic regions and sectors.

The picture it presents is an uneven one this year. Factors including higher borrowing costs and continued uncertainty have had a cooling effect on the job market. While green roles have proven slightly resilient, the reduction in the total number of green jobs being advertised compared to last year, across nearly every region and sector, is concerning. The green jobs market must right itself if the UK's net zero target is to be achieved.

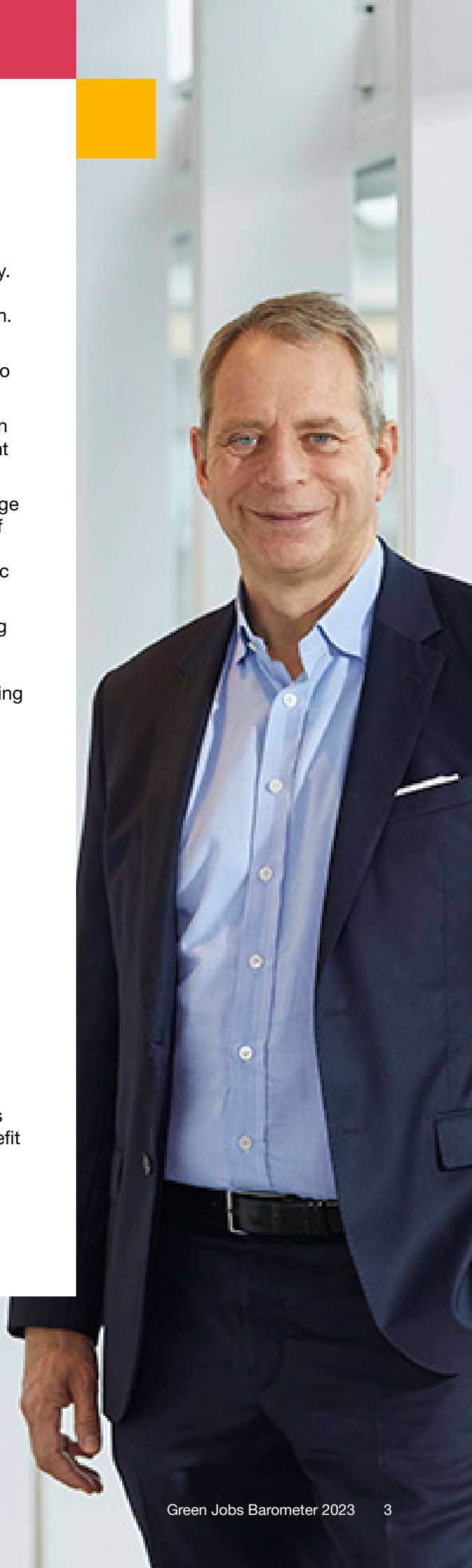
In addition, the continued concentration of green job creation in white collar and skilled professions, and mainly in a handful of regions, risks undermining the equity of the transition.

In this sense, the research should act as a wake-up call, and provides plenty to learn from and be encouraged by. It points to the sectors and regions leading the way, and sheds light on how they could improve the diversity and accessibility of opportunities.

Perhaps the most promising finding is that green jobs appear to be more fulfilling and can be better paid – adding to the prize of greening the UK's economy.

PwC will continue to highlight the importance of these issues, both in our conversations with clients and our engagement with policy makers across the country. We are committed to doing our part to ensure that confidence and trust in the net zero transition is maintained, and that the proceeds of green economic growth benefit the whole of the UK.

**Kevin Ellis, Senior Partner
PwC UK**



Executive summary

The world has been building momentum towards net zero since the 2015 Paris Agreement, with countries setting more stringent targets. From the UK's perspective, the transition to a net zero economy offers the potential of new, well-paying jobs in industries which will likely come to dominate the 21st century. Like all major economies, the UK is at the outset of this major economic shift, where every business, from energy companies to those in financial services, are required to make big changes to how they operate.

The environmental and economic benefits of the transition can be significant, but there are also associated costs and risks. Many workers may lose out in the process, particularly those employed in 'sunset' industries that are expected to decline. However, if managed correctly, the green economy can help tackle long-standing inequalities in society by equipping workers with the skills and tools to access the green opportunities of the future.

Now in its third year, the Green Jobs Barometer aims to map the pace and spread of the UK's transition to a greener economy, across sectors, economic regions, and the UK as a whole. This unique tool provides a valuable evidence base, tracking job creation, wider employment benefits, job loss, carbon intensity of employment, and worker perceptions.

Our data shows that green job creation continues its steady growth. However, a large proportion of these new roles are continuing to be based in London and the South East. If growth continues on this trajectory, the compounding effect means the green economy will increase London's dominance over other cities and regions; the need to secure a transition which is fair and equitable is therefore greater than ever.

This edition of the Green Jobs Barometer focuses on the opportunity to ensure a more competitive and equitable green jobs market, offering more detailed insight into the access to green jobs, particularly entry-level opportunities, and the quality of those jobs. The mix of wider accessibility and better quality can become the ingredients to solve pervasive inequalities.



Overview of the Barometer empirical framework

Broken down into economic regions and sectors, the Barometer measures performance through five key pillars. Each pillar captures a different aspect of the impact of a transition to a green economy on the UK labour market, and their aggregation into an index allows capturing overall performance (more details about the measurements are offered in the original report).¹

01	02	03	04	05
Green job creation	Wider benefits from green jobs	Sunset jobs to disappear	Carbon intensity of jobs	Green workplaces
The relative density of green job advertisement as a total of job advertisements.	The multiplier effect of direct new green jobs in creating additional employment, whether indirectly or induced via employment effects.	The number of jobs lost by 2030 as a result of a transition to environmental sustainability, in the absence of worker reallocation or upskilling.	Carbon dioxide emissions per employer. This provides information about the carbon intensity of different sectors and regions.	Worker sentiment about what the green transition means for their own role and workplace.

2023 Green Jobs Barometer economic region ranking

	Overall ranking	Pillar 1: Green job creation	Pillar 2: Additional jobs impact	Pillar 3: Sunset jobs to disappear	Pillar 4: Carbon intensity of jobs	Pillar 5: Green workplaces
Scotland	1	1	2	8	8	3
London	2	5	1	12	1	1
South West	3	2	9	6	3	9
South East	4	6	3	11	2	2
Northern Ireland	5	4	5	1	12	11
Wales	6	8	8	2	11	5
East of England	7	12	4	5	6	6
West Midlands	8	9	6	7	5	7
Yorkshire and The Humber	9	10	7	3	7	8
North West	10	3	12	9	4	10
East Midlands	11	7	10	4	9	12
North East	12	11	11	10	10	4

1. Green Jobs Barometer 2021: Monitoring the Fair Transition to a Green Economy: <https://www.pwc.co.uk/who-we-are/purpose/green-jobs-barometer.pdf>

Key findings from 2023

01

The demand for green skills has remained slightly resilient in a cooling labour market, but the reduction in the number of new green roles poses a challenge to the net zero transition.

Higher interest rates and increased borrowing costs have contributed to a decline in job vacancies across the UK, but the demand for green skills has demonstrated a comparative level of resilience. This year's Barometer has identified that the total number of UK jobs being advertised declined by 29% compared to last year's findings, equating to 4.4 million fewer roles. In comparison, the total number of green jobs reduced by only 26%, dropping from 336,821 to 249,359 roles advertised across the UK. This degree of resilience in demand has increased the proportion of the labour market made up of green jobs to 2.3%, up from 2.2% in 2022 and 1.9% in 2021.

However, when accounting for attrition, meeting the Government's target of 2 million green jobs by 2030, and ensuring the UK has the capacity to meet its net zero ambitions by 2050, will require an acceleration in the demand for green skills across the economy. Based on the large increase in demand we observed in last year's Barometer, we would have expected green jobs to have been more resilient, even within the context of a cooling labour market.

02

Despite an overall increase in the proportion of the UK labour market made-up of green jobs, not all areas have benefited.

Seven out of the twelve UK's economic regions, including Scotland, London, the South West and West Midlands all increased the proportion of green jobs advertised compared to total jobs, but Wales, the North East and the East of England all saw decreases. The South East and East Midlands remained the same. This demonstrates the increasing regional disparity in the growth of green jobs that was observed in previous editions of the Barometer.

Though the cooling labour market meant that most UK economic regions saw a decrease in the total number of green jobs being advertised compared to last year, Scotland and Northern Ireland achieved a 7.6% and 1.7% increase respectively. While Northern Ireland's welcome increase emerged from a comparatively small base, Scotland saw an extra 1,869 green roles advertised, contrasting the reduction of overall demand for green skills across the UK.

.....

2.3%

increase in the proportion of the labour market made up of green jobs

2022: 2.2%
2021: 1.9%

.....

7

out of the twelve UK's economic regions increased the proportion of green jobs advertised compared to total jobs

.....

1,869

extra green roles advertised in Scotland, contrasting the reduction of overall demand for green skills across the UK

03

Green jobs are found to be, on the whole, of a higher quality than non-green jobs, but come with longer working hours, are less secure, and often have higher skills requirements.

This year's Barometer has detected that green jobs in the UK tend to be of higher quality, both in terms of financial reward and how fulfilling workers find their roles. Though working hours do tend to be longer, and when compared to jobs that are not green, are slightly less likely to have permanent employment contracts.

When compared to the average salary for comparable roles, the higher levels of pay for green jobs were not only observed in a number of higher-skilled professions. This year's Barometer has recorded that entry-level green roles in 60% of occupations command an average pay premium of 23%. This includes higher than average pay in entry-level green jobs within agriculture, construction, sales, storage, and in factories.

However, the continued concentration of green jobs within white collar and skilled professions means that green jobs tend to require higher educational attainment than other jobs, with a higher proportion of employees holding a university degree when compared to the general workforce.

At least 50% of green jobs in each of the UK economic regions require occupational skill level 3 (non-degree level post-compulsory education) or level 4 (degree/equivalent relevant work experience). In London, the South East and Scotland, almost 40% of all the green jobs advertised require applicants to have a degree or equivalent work experience. These qualification requirements present a barrier to accessing green roles, which risks compounding the growing regional inequality the Barometer has observed, with certain economic regions facing a disparity in the requisite qualifications within their workforces. When combined with the underrepresentation of Black, Asian and minority ethnic communities within the fastest greening sectors, there is a risk that the limited accessibility of green jobs increases the risk that the benefits of the net zero transition are not being evenly distributed across different communities and economic regions.

.....

60%

of occupations command an average pay premium of 23% for entry-level green roles

04

Scotland continues its considerable lead in green job creation.

The Barometer identifies Scotland as the best performing region in the UK, ranking 1st in the overall index for the third year running. Scotland leads in green job creation, with 4.04% of all jobs advertised considered as green, a proportion 74% higher than the UK average.

Scotland also had the second largest number of green roles advertised within the financial and insurance sector, which increased by 69% compared with last year, at a time when the demand in London reduced. Scotland also saw a 32.5% increase in the total number of green professional, scientific and technical roles, while the leading economic regions for this sector (London, the South East, and the North West) all saw fewer green roles advertised than last year. Scotland was also the only region to increase the number of green construction jobs advertised, compared with last year's figures.

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4.04%

of all jobs advertised in Scotland are considered as green, a proportion 74% higher than the UK average

05

London and the South East both maintain a considerable lead on the total number of green jobs being advertised.

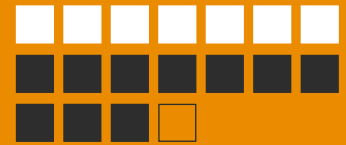
London and the South East show the largest absolute number of vacancies, accounting for 32.7% of all new green job postings in the UK. Despite London advertising for 10,350 fewer green jobs than last year, the capital maintained its considerable lead over the other regions, seeking to fill a total of 45,219 roles and enjoying the second highest regional increase in the proportion of green jobs. The South East was second with 33,917 new roles, followed by Scotland with 26,479 and the North West with 25,944.

06

Seven out of 18 UK sectors saw a proportional increase in their demand for green skills.

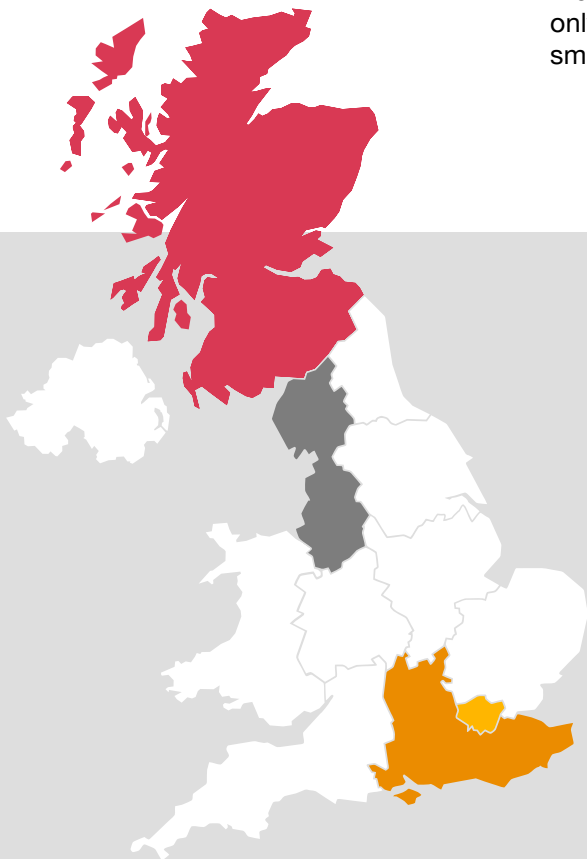
Seven UK economic sectors, including energy, construction, financial services, professional services, and scientific and technical activities, all saw an increase in the demand for green skills in proportion to the total number of advertised roles. Ten sectors, however, including those covering the water, transportation, manufacturing, mining and education industries, saw a decrease compared to last year. The water sector, while still the second greenest in the UK, saw a 34% drop in the total number of green jobs advertised compared to last year, even though its demand for all jobs only dropped by 16%, the second smallest reduction of any sector.

▲7



10▼

proportional change in the demand for green skills out of 18 UK sectors



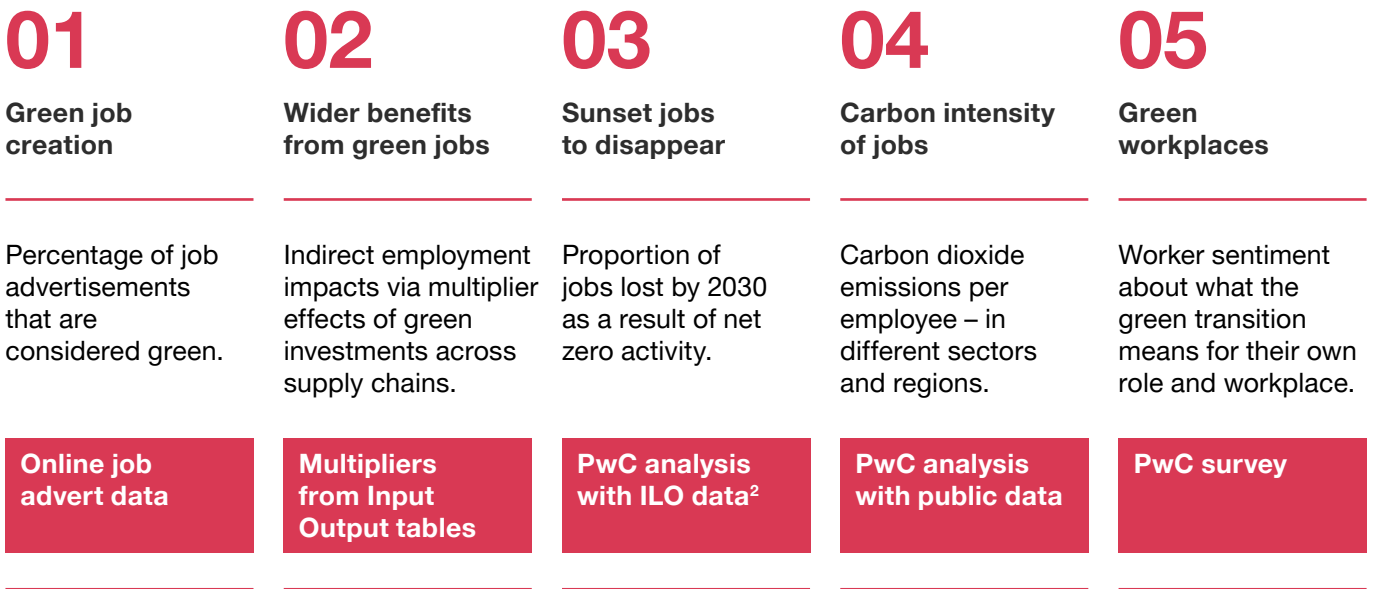
Green jobs advertised

01	London	45,219
02	South East	33,917
03	Scotland	26,479
04	North West	25,944



01 Overview of the Barometer in 2023

Figure 1: the five-pillar Barometer model



First published in November 2021, the Green Jobs Barometer was created to measure and track the jobs impacts of decarbonisation efforts and net zero activity,³ as well as the adoption of green practices in the workplace. Supported by its empirical framework to monitor, over time, several impacts across regions and industries (Figure 1), and by specialised research deep diving into key sectors undergoing transformations, the Barometer has become a point of reference in policy debates concerning employment, jobs and net zero activity.

As envisioned since it first launched, the Barometer continues to grow over time, with regular data updates, increased functionality and additional pieces of research in bringing more insight to policy conversations.

2. International Labour Organisation

3. The UK has legislated to achieve net zero annual carbon emissions by 2050 - together with its Paris Agreement-aligned nationally determined contributions (NDC) commitment of reducing economy-wide greenhouse gas emissions by at least 68% by 2030, compared to 1990 levels. It is increasingly clear that this requires a suitably skilled workforce and brings with it fundamental shifts in labour demands across the country. The Government's Net Zero Strategy notes that over the next 30 years, approximately 6.3 million jobs are likely to be affected by the green transition.



The 2023 edition of the Barometer continues building the data time series across its five pillars to monitor trends over time using the same framework.⁴

Overall, the greening of the economy continues to progress, even amidst a slowing labour market. Despite macroeconomic challenges, such as high inflation and a cost of living crisis, commitment to net zero in the UK over the period observed by the Barometer (Q3 2022 – Q2 2023) remained buoyant, which helped to catalyse change across an ever-increasing share of its economy.

Several sectors of the economy are undergoing transformations. In 2022, PwC’s in-depth research papers^{5,6} related to the Barometer characterised the growth of green jobs in sectors typically dominating net zero conversations, such as the energy sector and skills for retrofitting goals in the UK. This year, the Barometer research agenda has investigated the availability and preparedness for green skills in the financial services sector.

A common denominator of the green transition across sectors is that employment opportunities are expanding through the creation of numerous green jobs, though challenges persist in terms of inclusion and pervasive skills gaps.

With a specific focus on equitable access to green opportunities, the 2023 edition of the Barometer includes a more in-depth investigation of how inclusive green jobs are.⁷

What is a green job?

The first contribution of the Barometer was to produce a clear definition of green jobs based on the objectives linked to different jobs. Jobs are considered ‘green’ if their roles involve the following:



Producing and providing environmentally friendly products and services (e.g. producing solar panels or other forms of renewable energy, also includes environmentally friendly version of traditional products like energy-efficient light bulbs).



Adapting work processes to become more environmentally friendly or use fewer natural resources (e.g. beer brewed in solar-powered breweries, or operations that are managed from wind-powered offices).



Supporting the green economy indirectly (e.g. environmental advisors in business consulting, law and accounting).

More details about how this definition was reached are included in our [online Barometer](#).

4. The data on sunset jobs for Pillar 3, has not been updated this year

5. The Energy Transition and Jobs: <https://www.pwc.co.uk/who-we-are/our-purpose/building-trust-in-the-climate-transition/supporting-a-fair-transition/the-energy-transition-and-jobs.html>

6. Green skills as an enabler of UK retrofit: <https://www.pwc.co.uk/who-we-are/purpose/green-jobs-barometer-retrofit.pdf>

7. This paper adopts the International Labour Organisation’s definition of inclusivity, which involves the extent to which diverse people feel valued for who they are, the skills and experience they bring, and the extent to which they have a strong sense of belonging with others at work. Source: https://www.ilo.org/global/about-the-ilo/newsroom/news/WCMS_841085/lang-en/index.htm#:~:text=The%20new%20ILO%20report%20defines,belonging%20with%20others%20at%20work

Looking ahead, the green economy is expected to continue expanding, and can become a force of inclusive growth if properly capitalised on. Accelerating the pace of emissions reduction (to meet the UK’s sixth carbon budget limiting the volume of greenhouse gases emitted over a five-year period from 2033 to 2037) could result, by some estimates, in an increase of UK GDP of around 2 to 3%, and about 300,000 additional jobs by 2050,⁸ though numbers will likely be higher given the jobs expected in the energy sector alone.⁹ The UK could also capture export-related opportunities, potentially supporting a further 200,000 jobs by 2050.¹⁰

While the economic benefits are expected to be positive in the long term, our research has highlighted the risk that not all sectors, regions or workers currently gain from the transition to net zero. This poses not just an issue of job creation, but also one of job loss, and the urgent need to reskill or upskill as the growth of many sectors and trades is mirrored by the decline of others. Disparities across socio-demographic groups and also across regions exist,¹¹ which run the risk of undermining progress towards the UK’s levelling-up objectives.¹²

A transition which does not distribute the disruption and rewards equitably could become politically non-viable. This risk has been identified in many of our conversations with business leaders and policy makers across the UK, and globally, and there is a consensus that the equity and inclusiveness of the net zero transition is key to its success.

A just transition should be seen as an opportunity not only to address environmental concerns, but also to confront historic inequalities within the labour force. After presenting a high-level view of the 2023 Barometer findings, the question of inclusion is addressed by a mix of quantitative and qualitative insights: analysing data trends and identifying key themes from expert interviews.

Two main questions we explore this year are:



Access: mapping the location and characteristics (e.g. skills requirements) of the different types of green jobs available in the current labour market in the UK, and what this means for different socio-demographic groups – including younger populations.



Job quality: analysing perceived attributes of green jobs like pay, purpose and productivity to give a clearer picture of whether new green jobs are desirable as a career pathway and which segments of the population benefit the most.

Access and quality are mainly assessed using data from Pillar 1 and Pillar 5 of the Barometer, breaking down data on job vacancies (including at entry-level) and employee perceptions of their jobs. Both access and job quality are also examined prospectively by case studies of recent and expected trends in practices for growing sectors or nascent sectors, like nature, that promise better and more widely distributed opportunities.

8. The Climate Change Committee (CCC) commissioned research modelling economic opportunities emerging from accelerating the pace of emissions reduction to meet the UK’s sixth carbon budget and net zero. Source: <https://www.theccc.org.uk/publication/economic-impact-of-the-sixth-carbon-budget-cambridge-econometrics/>

9. In a report commissioned by National Grid, it is estimated that in order to reach UK net zero targets, 400,000 jobs will need to be recruited for in the energy sector alone by 2050, with 260,000 of these being new roles and 140,000 jobs replacing those that have left the workforce. Source: <https://www.nationalgrid.com/stories/journey-to-net-zero/net-zero-energy-workforce>

10. The Energy Innovation Needs Assessment (EINA) identifies £27 billion of Gross Value Added (GVA) opportunity in 2050 from decarbonising the UK domestic market by 80% compared to 1990 emissions levels, supporting approximately 300,000 jobs. Source: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/845652/energy-innovation-needs-assessment-overview-report.pdf

11. Although growth in green jobs is witnessed across all regions of the UK, this increase is mostly observed in London and the South East, which collectively represent around one-third of all new green jobs (as per the 2022 Edition of the Barometer).

12. First introduced in 2019, the UK Government’s Levelling Up agenda aims to create opportunities for everyone across the UK by investing in local projects and infrastructure with the £4.8 billion Levelling Up Fund. Source: <https://levellingup.campaign.gov.uk/#:~:text=Levelling%20Up%20means%20creating%20opportunities,and%20how%20you%20can%20benefit>



02 Green jobs in 2023

This section presents the latest trends from the data collected¹³ for the 2023 edition of the Barometer, including new data on job vacancies for Pillar 1, revised employment multiplier impacts for Pillar 2, updated data on emissions for Pillar 4 and new data from the national employee survey on green workplaces for Pillar 5.

Pillar 1: Green job creation

Pillar 1 of the Barometer, which measures and monitors the green jobs in demand, is calculated using updates of online vacancy data that took place between July 2022 and June 2023.¹⁴

Overall, the prevalence of green jobs (as a proportion of all jobs being advertised) is increasing with respect to previous editions of the Barometer. The 2022 edition had already seen an increase from 1.2% to 2.2% with respect to the 2021 edition, and the 2023 Barometer has observed this proportion increase again to 2.32% (an increase of 10% compared with last year).

However, in the context of a slowing labour market, the gross number of green jobs advertised has actually declined with respect to last year – from 336,821 to 249,359. These results demonstrate the growing importance and, to a degree, the comparative resilience of green employment in the face of a labour market downturn.¹⁵

Based on the large increase in demand we observed in last year's Barometer, we would have expected green jobs to have been more resilient, even within the context of a cooling labour market. Meeting the Government's target of 2 million green jobs by 2030, and ensuring the UK has the capacity to meet its net zero ambitions by 2050, will require an acceleration in the demand for green skills across the economy.

.....
2.32%

**prevalence of green jobs
(as a proportion of all jobs
being advertised) in 2023**

2022: 2.2%
2021: 1.2%

13. It is not possible to update all pillars of analysis more frequently than annually owing to availability of publicly available data upon which some pillars depend and the frequency with which they are published.

14. We commissioned Geek Talent to analyse over 10.7 million job advertisements similarly to the previous two iterations of the Barometer. The methodology for this analysis has evolved this iteration, with updates to regional mappings, the accuracy of timing for advertisements and the approach to apportionment of job advertisements updated to better reflect the market.

15. The Barometer is not able to account for green roles that are filled internally without an external job advert.

Table 1: Green jobs postings from Q3 2021 to Q2 2022, by region

	2023	2022	Position	Move	Green ads 2023	Green ads 2022
Scotland	4.0%	3.3%	1	=	26,479	24,610
South West	2.7%	2.4%	2	=	24,245	32,285
North West	2.5%	2.3%	3	=	25,944	31,896
Northern Ireland	2.4%	2.0%	4	▲ 7	2,223	2,185
London	2.2%	2.1%	5	▲ 2	45,219	55,569
South East	2.2%	2.2%	6	▼ 1	33,917	54,498
East Midlands	2.2%	2.2%	7	▼ 1	13,057	20,432
Wales	2.1%	2.2%	8	▼ 4	6,059	8,100
West Midlands	2.1%	2.0%	9	=	16,157	24,044
Yorkshire and The Humber	2.1%	1.9%	10	▼ 2	13,946	17,219
North East	1.9%	2.1%	11	▼ 3	4,868	7,594
East of England	1.9%	2.0%	12	▼ 2	17,181	25,982
Grand total*	2.3%	2.2%				

* Inclusive of 20,064 green remote jobs

Regional distribution of green jobs

While the proportion of the jobs market made up of green jobs has increased for the third year in a row, those green opportunities continue to be unevenly distributed. Scotland and the South West have the largest proportion of job vacancies classified as green, whereas London and the South East show the largest absolute number of vacancies, accounting for 32.7% of all new green job postings in the UK.

The skewed distribution of green jobs in London and the South East is driven in part by the size of the economies, and the corresponding absolute level of employment. Yet their concentration of jobs also appears to be growing, with London having the second highest regional increase in the proportion of green jobs.

An equitable transition does not mean that green jobs in every sector need to be equally distributed by geography. A just transition is about ensuring wider segments of population have access to new jobs. There are economic and social reasons behind the current regional concentration of green opportunities:

- Local characteristics and their economic history matter:** Scotland is the strongest performer in respect to green job creation (as a proportion of total employment) due in part to the thriving energy sector in Scotland's north east, where fossil fuel extraction and renewable activity are transforming in tandem.
- Access to production capabilities matters:** it makes sense to locate manufacturing of green components or the production of safe and cleaner energy in areas with the capital and skills to deliver; for instance, for assessing locations for its small modular reactors, Rolls-Royce SMR identified places that not only have a strong historical connection with the industry, but also communities with the skills to take on the new jobs.¹⁶

Although some green jobs are geographically mobile, for example financial services roles, regional specialisms are expected: largely a manufacturing bias in the North and Midlands and a services sector bias in London and the South East.¹⁷ One challenge is the potential perpetuation of regional biases towards existing sector specialisms, and whether this skews the creation of high quality green jobs geographically.¹⁸

16. Source: <https://www.rolls-royce-smr.com/press/rolls-royce-smr-prioritises-four-nda-sites-for-15-gw-of-new-nuclear-power>

17. Green industries tend to locate in areas where conventional manufacturing industries were previously concentrated, according to recent research. See the research findings of Park and Lee (2021). Source: <https://www.sciencedirect.com/science/article/abs/pii/S1364032117305695>

18. This challenge is highlighted in research by the UK Energy Research Centre. Source: https://d2e1qxpsswpcgz.cloudfront.net/uploads/2022/04/UKERC_Green-job-creation-quality-and-skills_A-review-of-the-evidence_Final.pdf

Scotland spotlight

The Barometer identifies Scotland as the best performing UK region, ranking 1st overall in the index for the third year running. Scotland continued to lead in green job creation, with 4.04% of all jobs advertised in the region considered as green, a proportion 74% higher than the UK average. Scotland is also best positioned to maximise the benefits of green investment with the second highest recorded multiplier effect of any region. As the overall demand for green skills contracted across the UK, Scotland was one of only two economic regions that saw an increase in the number advertised green roles compared to last year.

The demand for green jobs in Scotland, to a large extent, mirrors much of the UK by being driven in part from the utilities and energy sectors (where green jobs represent 28.51% of all job vacancies). The north east of Scotland is a thriving energy hub, hosting the largest pool of energy-related skills in the UK. Scotland has one of the highest concentrations of new renewable projects of any individual region, which is expected to impact on the demand for associated green roles created in the construction, scientific and technical and other support activities, demonstrating the green jobs multiplier effect in action. Depending on how the energy transition unfolds (and how far this region converts into a global energy hub), this region could see its offshore energy workforce increase up to 20% (54,000 people) by 2030.¹⁹ Scotland's skills base also provides it with an advantage to benefit from the observable concentration of green jobs within white collar and high skilled professions, having a surplus of its population being equipped to fill roles requiring higher education up to bachelor's degree level, as well as a good coverage of lower qualification level jobs. In short, the availability of skills helps attract green investment and the creation of green jobs.

This year's Barometer observed that Scotland was the only region to increase the number of green construction jobs advertised, compared with last year, and one of only two to see increases in green professional, scientific and technical roles. The mining and quarrying sector created more new green jobs in Scotland than in any other region, and Scotland has the second largest number of green roles within the financial and insurance sector, which increased by 69.2% compared with 2022, while the number of green financial roles advertised in London contracted by 1.7%. Scotland also saw a 32.5% increase in the total number of green professional, scientific and technical roles, at a time where the leading regions for this sector (London, the South East, and the North West) all saw fewer green roles advertised than last year.

Given Scotland's relatively higher employment in energy and utilities and mining roles, and other carbon intensive sectors, it is also at greater risk of experiencing a higher than average proportion of sunset jobs. Robert Gordon University estimates that in the north east of Scotland, this decline could reach a workforce reduction of 17,000 by 2030 if insufficient investment is made in the offshore energy sector.²⁰ The knock-on effect of a long-term decline continues to be impactful on the oil and gas industry even in spite of economic conditions which would typically encourage a ramping up of production and investment. Furthermore it is worth noting that, despite Scotland's comparatively strong performance in green job creation across a range of sectors, the total number of green roles advertised in its energy sector declined by 22.7% compared to the findings in last year's Barometer.

Nonetheless, whilst these sunset roles are anticipated to mainly occur in carbon intensive sectors such as oil and gas, our previous research has indicated that as much as 90% of workers in oil and gas and other 'hard to abate' sectors have the capability to reskill to transition to jobs in greener sectors like renewables.²¹

19. Research from Robert Gordon University maps future employment to four different scenarios: regional decline, incremental progress, UK energy hub and global energy hub- directly linked to the level of investment into the region. Robert Gordon University (2022) Making the Switch, The future shape of the offshore energy workforce in the North-East of Scotland. Source: <https://www.rgu.ac.uk/wp-content/uploads/2022/05/Making-the-switch-images.pdf>.

20. Robert Gordon University (2022) Making the Switch, The future shape of the offshore energy workforce in the North-East of Scotland. Source: <https://www.rgu.ac.uk/wp-content/uploads/2022/05/Making-the-switch-images.pdf>

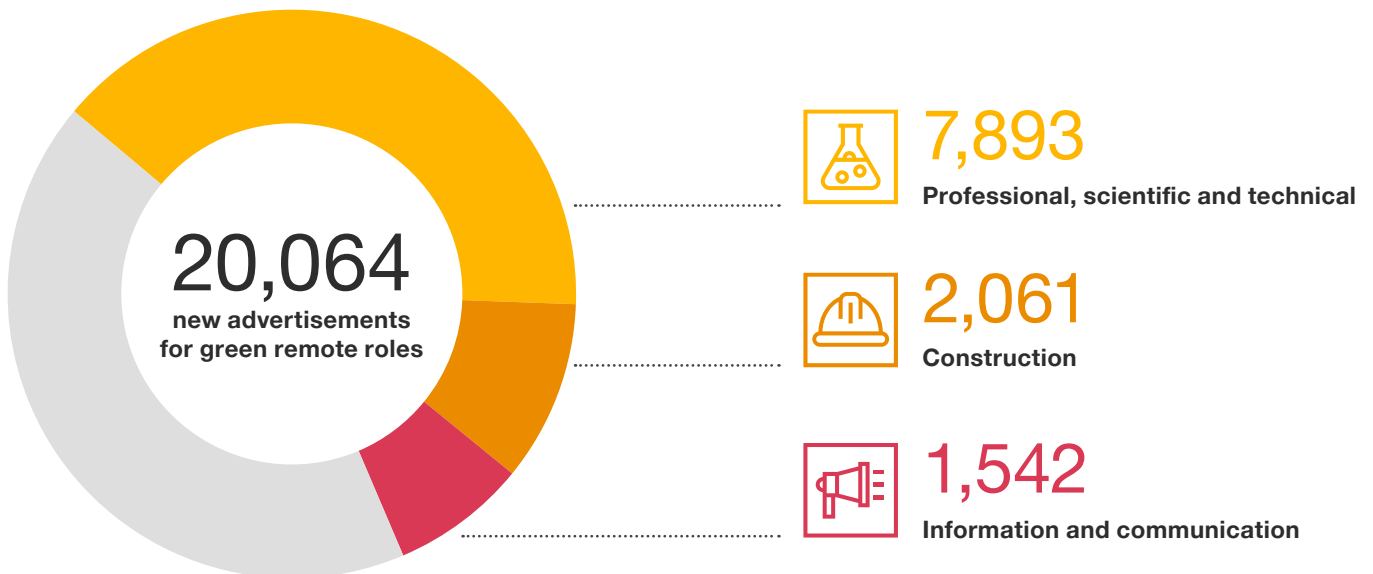
21. See 'The Energy Transition and Jobs: can people transition to new green jobs?', July 2022. Access: <https://www.pwc.co.uk/who-we-are/purpose/the-energy-transition-and-jobs.pdf>



Remote green jobs

As well as the geographically mappable demand for green skills, green remote roles are also contributing to the growth in green jobs, with the 2023 Barometer recording 20,064 new advertisements, accounting for 8.05% of the UK total, slightly down from 9.62% last year. Of that total, 7,893 jobs were in professional, scientific and technical activities, followed by 2,061 in construction and 1,542 in information and communication. It is perhaps too early to establish whether there is a trend of green jobs becoming more or less remote (i.e. location agnostic) than other types of jobs. However this year's data shows that a significant proportion of green jobs continue to be performed remotely. The remote working of green jobs therefore creates a clear opportunity to address the demand for green skills at a cost to employers which may be more competitive than consolidating these skill requirements in London and the South East. Moreover, such employment could provide the additional dividend of addressing regional inequalities within the labour force.

Figure 2: New advertisements for green remote roles



Sector distribution of green jobs

Highly associated with the ongoing decarbonisation of the grid, the highest proportion of green jobs are within the electricity, gas and steam sector, which accounts for 31.23% of all green jobs. Green energy creation is often coupled with a stronger geographic bias²² which has a distributing effect on green energy jobs located throughout the country. This sectoral distribution of green jobs is at present influenced by immediate sectoral needs for greening (see '[Workforce diversity in the Energy Sector](#)' below) and the extent of barriers to the greening of different sectors of the economy.

Table 2: Green jobs postings as a percentage of total jobs from Q3 2022 to Q2 2023, by sector

Sector	2023	2022	Position	Move	Green Ads 2023	Green Ads 2022
Electricity, gas, steam, and air conditioning supply	31.23%	29.52%	1	=	9,991	14,106
Water supply, sewerage, waste management, and remediation activities	18.57%	23.50%	2	=	24,514	35,238
Professional, scientific, and technical activities	7.04%	5.66%	3	▲ 2	96,660	114,968
Mining and quarrying	6.81%	7.74%	4	▼ 1	282	362
Public administration and defence, compulsory social security	4.69%	5.94%	5	▼ 1	8,342	8,459
Agriculture, forestry and fishing	4.40%	4.17%	6	=	825	1,742
Construction	3.54%	3.31%	7	▲ 2	24,514	35,238
Manufacturing	3.32%	3.37%	8	=	7,222	15,527
Financial and insurance activities	2.20%	1.66%	9	▲ 3	16,651	16,910
Information and communication	2.01%	1.93%	10	▲ 1	19,010	25,2023
Other service activities	1.91%	2.22%	11	▼ 4	7,652	450
Administrative and support service activities	1.81%	1.64%	12	▲ 1	13,625	18,843
Transportation and storage	1.47%	2.28%	13	▼ 3	10,899	25,360
Arts, entertainment and recreation	1.24%	1.2%	14	▲ 1	735	1,605
Wholesale and retail trade, repair of motor vehicles and motorcycles	1.10%	1.27%	15	▼ 1	18,207	28,496
Accommodation and food service activities	0.86%	1.23%	16	=	6,494	17,154
Human health and social work activities	0.31%	0.29%	17	▲ 1	4,291	5,685
Education	0.23%	0.33%	18	▼ 1	1,745	3,292

22. Nuclear power stations and wind farms in the UK are for instance associated with their proximity to coastal towns and communities.

Pillar 2: Employment multiplier of green jobs

This year, the wider benefits of green jobs have become more pronounced. For each green job created, on average 1.4 additional roles are created elsewhere across supply chains and/or across other sectors (compared to 1.3 in 2022).

This helps show the full benefits of green jobs, and means policy decisions can be based upon wider economic impacts rather than simply green job creation. These wider impacts are based on employment multipliers ([Table A2: Employment multipliers by region and sector](#)).

Pillar 2 is based on sectoral employment multipliers: a sector-specific parameter that tells us how many additional jobs are created in the economy (e.g. across supply chains relevant to that industry) for each green job created in that sector. The total employment impact in a given sector is the product of the sector-specific parameter and the size of green job creation in each sector-region pairing.

Employment multipliers summarise the employment spread and supply chain dynamics in the UK and, as such, remain relatively constant over the short to mid-term, with UK input-output tables being updated every three years. This year we have updated our analysis to reflect the latest release of the UK input-output analytical tables, moving the sector-specific multipliers slightly to reflect the latest information on supply chains and employment in the UK economy.

The wider employment effect in a given region (the regional multiplier) can still change based on the size and where the demand for green jobs is being created – and how such green job creation from Pillar 1 is distributed across sectors. For a given region, larger demand for green jobs in sectors with lower employment multipliers can actually lead to a lower regional (aggregated) multiplier.

The aggregated multipliers for regions, and for the UK, have on average increased, although with variation across the regions and sectors – somewhat compensating for the impact of a decrease in the growth of green jobs. This is good news for the economic value of investment in green employment, as there appear to be greater potential gains across the economy for each green job generated.

The economic regions with the largest multipliers are Scotland and London. The size of the multiplier effect on employment is shaped by the sectoral job composition across regions. Scotland, for example, has a larger share of employment in the energy sector, which tends to require higher employment per unit of output produced – each new green job in the sector creates an additional six jobs in the wider economy (with a multiplier of 7.5). In general, multipliers tend to be higher in sectors with more manual roles, as well as sectors which typically include technical roles. In London, for instance, the sector of finance and insurance has extensive supply chain impacts (each new green job in finance and insurance producing an additional two roles in the wider economy).



Pillar 4: Carbon intensity of employment

Pillar 4 compares carbon dioxide (CO₂) emissions in different UK regions and sectors to employment in the same UK regions and sectors. In this year's Barometer, we calculated there were eight tonnes of CO₂ emissions per employee, which is the same as last year's figure. However, there remain significant variations in emissions across sectors.

The emissions per employee calculation provides us with an indication of how environmentally friendly jobs are, independently of whether such jobs are considered green jobs or not. Importantly, it also gives an indirect indication of jobs that could lose out in the future as the green transition accelerates.²³ Consistent with Pillar 3 of the report, jobs in decline tend to be in the most carbon intensive sectors. As sectors and regions further decarbonise and work toward a net zero economy, we expect to see carbon intensity of employment reduce.

As we have seen since the Barometer's inception, the electricity, gas, steam and air conditioning sector dominates in terms of tonnes emitted per job. Emissions per job have increased to 604.75 tonnes, an increase of 7.25 tonnes from last year. The next most carbon intensive sector per job, mining and quarrying, saw a decrease in tonnes per job, down 39.93 tonnes from last year.

The UK's regional average remained at eight tonnes of CO₂ per employee, which has stayed consistent with findings across the other pillars, denoting a high demand for energy and a stagnation in job growth. A plateau in this year's emissions per employee can also be viewed as a positive trend, as we would have expected to see a rebound in emissions after the COVID-19 pandemic. Rather, emissions per employee are down from nine tonnes in 2021, a decrease which has happened concurrently with greater decarbonisation efforts in the UK.



23. It is important to add a caveat that while looking at emissions on a per employee basis also enables us to make allowance for the different sizes of UK regions and sectors, it is important to be aware that circumstances vary greatly across different UK regions and sectors, and in some cases are driven by many factors other than the working population.

Table 3: Carbon intensity of employment from Q2 2022 to Q3 2022, by sector

Sector	Tonnes of CO2 emitted per job	Carbon intensity of sector ranking
Electricity, gas, steam and air conditioning supply	604.75	1
Mining and quarrying	299.37	2
Manufacturing	30.17	3
Transportation and storage	28.60	4
Agriculture, forestry and fishing	27.67	5
Water supply; sewerage, waste management and remediation activities	22.57	6
Construction	4.44	7
Public administration and defence; compulsory social security	2.61	8
Wholesale and retail trade; repair of motor vehicles and motorcycles	2.52	9
Real estate activities	1.27	10
Accommodation and food service activities	1.23	11
Human health and social work activities	1.04	12
Administrative and support service activities	1.01	13
Other service activities	0.92	14
Arts, entertainment and recreation	0.78	15
Activities of households	0.76	16
Education	0.72	17
Professional, scientific, and technical activities	0.45	18
Information and communication	0.41	19
Financial and insurance activities	0.15	20

Pillar 5: Green workplaces

Pillar 5 measures how environmentally friendly employees perceive their jobs to be, and whether they expect this assessment to change over the next one-two years. PwC's annual Green Workplaces Survey asked over 2,000 respondents across the UK about the types of activities that might make up their job spanning across eight environmental outcomes – reducing waste, reducing carbon, reducing pollution, protecting biodiversity, improving resource efficiency, reducing water use, increasing reuse and recycling, and reducing energy consumption.

The water sector, as well as the finance and insurance sector, share the highest perceptions on the environmental friendliness of their workplaces. Across the regions, there are notable improvements for the South West and Northern Ireland in perceptions of workplace environmental friendliness; by contrast the North West and Yorkshire and the Humber have seen a decline. With these movements in regional performance, Northern Ireland continues to score lowest, with London maintaining the highest perception of workplace environmental friendliness.

Though employee sentiment has remained stable since the first report in 2021, we expect an overall upward trend to develop slowly over time. As the survey is conducted over a longer timeframe, we will acquire greater insights into the changing perceptions of how environmentally friendly jobs are becoming.



Special focus on the quality of green jobs

The employee survey also continues to measure attitudes related to the quality and accessibility of jobs. Job quality is a central tenet to ensuring the transition to a low carbon economy is a just transition – i.e. ensuring that the transition which prioritises net zero and decarbonisation efforts, also provides fair access to sustainable livelihoods.

Measuring job quality, as advocated by several stakeholders we have interviewed,²⁴ gives a clearer picture of whether new green job creation really translates into better standards of living and prosperity and, crucially, whether a viable job transition is a desirable one.²⁵

Career pathway analysis for the net zero transition often focuses on determining those job transitions that are considered viable from the point of view of skills (it is easier to transition to jobs that do not require a radically different set of skills) or feasible in the context of market, regulatory or geographical barriers that limit job mobility. However, there is limited analysis that pays attention to identifying ‘desirable job’ transitions. In general, the rise of green jobs is expected to create ‘decent work’ that is higher quality, better paid and at lower risk of automation.²⁶

What does the data from the Green Jobs Barometer tell us?

Green jobs are found to be generally higher quality across the UK economy – with our survey indicating that those in greener roles²⁷ find their jobs more fulfilling in every UK region and are financially rewarded more fairly across all UK regions, with the exception of Northern Ireland. Entry-level green jobs also prove to be well paid, with the majority of occupations at entry-level showing higher salary ranges than non-green jobs (at both the lower quartile and median).²⁸

While job satisfaction and financial reward appear higher, it is notable that, with the exception of Northern Ireland, working hours appear to be longer in green jobs, with respondents in greener jobs far more likely to work over 48 hours a week compared to those in less green jobs.

It is also of note that green jobs appear to have slightly less secure contracting terms than jobs considered less green jobs, with survey results indicating that 85% of those in greener jobs have permanent employment contracts, compared to 89% of those in less green roles. It is possible that this trend reflects businesses’ tentativeness to invest in permanent green positions at this stage, opting instead for temporary contracting.

When looking at pay by skill level and qualifications, this year’s Barometer has recorded that entry-level green roles in 60% of occupations command a 23% pay premium on average. As for occupations that traditionally require higher levels of qualifications, the picture is mixed, but we have detected that green roles in specialisms including health, business, media and public service, and science, engineering and technology do tend to attract a green pay premium.

24. Following the publication of the Green Jobs Barometer, a number of stakeholders, including the UK Department of Work and Pensions (DWP), highlighted the value of the analysis could be enhanced from their perspective through the inclusion of indicators of job quality.

25. The International Labour Organisation promotes the definition of green jobs as those that promote decent work. By contrast, many current recycling jobs recover raw materials and thus help to alleviate pressure on natural resources. However, the jobs involve a working practice that is often dirty and dangerous, causing significant damage to human health.

26. Valero A, Li J, Muller S, Riom C, Nguyen-Tien V and Draca M (2021) Are ‘green’ jobs good jobs? How lessons from the experience to-date can inform labour market transitions of the future. London: Grantham Research Institute on Climate Change and the Environment and Centre for Economic Performance, London School of Economics and Political Science. Source: <https://cep.lse.ac.uk/pubs/download/special/cepsp39.pdf>.

27. ‘Greener’ jobs in the survey sample are defined as those for which the current green performance score is over 50%.

28. Comparing compensation in entry-level green jobs to the relevant occupational class for 22-30 year old employees (considered at a Standard Occupational Classification (SOC) sub-major groupings).



03

Barriers to
accessing green jobs

Green jobs are emerging across the economy in various roles across all sectors. If managed correctly, the growth of the green economy and the subsequent expansion of quality jobs can help tackle long-standing inequalities in society, as well as contributing to poverty eradication and social inclusion by equipping workers with the skills and tools to access the green opportunities of the future. Further to the continued growth in the proportion of green jobs being advertised in the UK, there is a clear trend of green tasks and environmental considerations becoming increasingly prominent in the workplace.²⁹

Access to green jobs, however, is often limited, given pervasive skills gaps or other barriers that workers from different backgrounds face. As emphasised in previous editions of the Barometer, it is important to address areas of potential concern across the job market. Workforce diversity and the equality of opportunity, including for job access, continue to be important challenges in the UK.

Skills gaps are shaping differences in access to green job opportunities across different demographic groups, across sectors and regions. Our analysis of the types of skills and qualifications required by green jobs across sectors and regions, and also the skills possessed by current workforces, sheds more light on the challenge of accessing green jobs – many of which are highly skilled or in white collar professions.



29. Over 36% of workers were engaging in some level of green task by 2019 compared to 29% a decade prior. Source: <https://www.ons.gov.uk/economy/environmentalaccounts/datasets/timespentongreentasks>



Green jobs are continuing to concentrate in white collar and skilled professions

One current trend that is potentially limiting the access of many types of workers is that green jobs appear to be increasingly concentrated in specialist areas, with green employment growing faster in more technically demanding sectors of the economy.

Green jobs tend to require specialist skills. These include knowledge of the energy sector, expertise in sustainability and other subject specific skills, depending on the occupation.³⁰ Green occupations also exhibit higher levels of work experience and on the job training alongside high-level abstract skills.³¹ Our analysis of green jobs advertisements shows a significant proportion (22%) of new green jobs advertisements are in occupations within research, engineering and technology professions. Furthermore, an important share of job postings go to business professionals.³²

The skills and experience required by some green jobs can be a significant barrier. Though the types of green jobs in demand are quite diverse,³³ they tend to require higher educational attainment, with a larger proportion of employees holding a university degree compared to the general workforce.³⁴ Currently, at least 50% of green jobs in each of the UK economic regions³⁵ are occupational skill level 3 (non-degree level post-compulsory education) or level 4 (degree/equivalent relevant work experience). Of these, there are particularly significant weightings of highly skilled green occupations in London, the South East and Scotland, with each of these having almost 40% of green jobs advertised being occupational skill level 4.³⁶

For entry-level green jobs, in particular, roles seem less weighted towards specialist green skills and more towards generic skills. One potential reason is that specific green knowledge and processes are often learned on the job. Green roles also require a strong basis of skills that would be required in non-green employment such as management and communication skills. By equipping themselves with skills that cut across different tasks and job roles that are good for the labour market in general, young workers can have wider access to jobs that can build into more specialised green jobs paths as they progress in their careers.

50%

of green jobs in each of the UK regions are occupational skill level 3 or level 4

40%

of green jobs advertised in London, the South East and Scotland are occupational skill level 4

30. Further to defining skills requirements for jobs through qualification levels, we use European Skills/Competences, Qualifications and Occupations (ESCO) skills mappings to determine the knowledge, skills and competencies required for green jobs across different occupations.

31. Source: <https://digital.csic.es/bitstream/10261/132790/1/SWPSConsoli.pdf>

32. The occupations in 'business, media and public service professionals' and 'business and public service associate professionals' each account for more than 10% of green jobs advertisements over the previous year.

33. For instance, we observe 80% of workers with degrees in green finance and sustainability consulting vs. 35% in the building sector. By region, London demands jobs with more qualifications, whereas Wales and the Midlands have a comparatively higher proportion of the population with NVQ Level 2-3 qualifications and lower NVQ4 qualifications. Source: <https://cep.lse.ac.uk/pubs/download/special/cepsp39.pdf>

34. Source: <https://centrallondonforward.gov.uk/wp-content/uploads/2021/11/Green-Jobs-and-Skills-in-London-Final-Report.pdf>. *Note that whilst we recognise that London may not be completely representative of the whole UK, trends exhibited in London still provide useful insight.

35. Including the 'extra-regio' territory which is made up of parts of the national economic territory which cannot be attached directly to a single region that is part of the national geographic territory.

36. Source: <https://www.ons.gov.uk/methodology/classificationsandstandards/standardoccupationalclassificationsoc/soc2020/soc2020volume1structureanddescriptionsofunitgroups>



Regional disparities in skills profiles could slow the uptake of green jobs

Given the continued concentration of green jobs within these higher skilled, white collar occupations, a combination of the sector mix and skills base in different regions is likely to be constraining growth in green jobs outside of London, Scotland and the South East.

Regional disparities in the availability of skills, in particular, can impact the potential uptake of emerging green jobs, as well as the creation of green jobs in the first place. Often, new green investment and development cannot occur where there are insufficient skills. The proportion of workers with university degree equivalent qualifications ranges from 35% to 59% (North East and London respectively), whilst the proportion of workers with a highest qualification level of NVQ Level 2-3 ranges from 22% to 41% (London and North East respectively). These discrepancies in educational attainment profiles across the UK could lead to regional imbalances in both access to green jobs and the quality of green jobs available.

Despite the prominence of degree requirements for green jobs in London, the proportion of the labour force with degrees exceeds this demand ([Table A7: Skills gaps by region](#)), making the London labour force relatively well equipped to fill these roles. Scotland is also notably equipped for high skilled green jobs, with Scotland having a surplus of its population being equipped to fill roles requiring higher education up to bachelor's degree level and good coverage of lower qualification level jobs. The North East sees the highest disparity in qualification requirements for green jobs compared to the qualification levels of the local labour force, with the proportion of the population holding degrees 11% lower than the proportion of green jobs advertisements expected to require them.



Skills gaps for green employment across sectors

When digging deeper by sector, we see that gaps in white collar and skilled professions are more accentuated in some industries than others, while skills gaps can also be substantial in blue collar jobs.

Qualifications profiles across different sectors of the UK economy vary significantly, with degree requirements ranging from as low as 16% of jobs in transport and storage up to 63% of jobs in arts entertainment and recreation ([Table A4: Skills requirements in green jobs](#)). Green jobs in IT also have high levels of degree requirement compared to other sectors of the UK economy, with at least 60% of jobs requiring a degree as a minimum and little job availability at lower qualification levels. This contrasts to manufacturing, transport and accommodation services, which have relatively low degree requirements and substantial job availability at lower qualification levels.

Professional, scientific and technical activities, education and mining and quarrying are the only sectors which have a surplus in degree holders for current green jobs advertisements ([Table A5: Skills gaps in green jobs](#)). By contrast, agriculture, forestry and fishing and construction have a surplus of workers at almost every qualification level except degree level, suggesting that there are a disproportionate level of new green jobs in these industries that require degrees, relative to what the sector typically requires.

16%

of green jobs in transport and storage require degree-level qualifications

63%

of green jobs in arts entertainment and recreation require degree-level qualifications

Blue collar jobs can also face skills gaps. Some estimates indicate that approximately 75% of workers in electric vehicle manufacturing will require NVQ Level 2-3 qualifications, whilst the remaining 25% of workers will need higher level qualifications.³⁷ On another example, our own previous sectoral research shows that there are not enough people working in the retrofit sector.³⁸ Our analysis suggests between 10,000 and 66,000 new tradespeople will be needed each year as retrofit take up accelerates – with heating engineers, glaziers and insulation specialists the most in demand. In addition to these trades, many more green jobs will be required both in the retrofit sector – retrofit coordinators, receptionists, marketing – and in its wider manufacturing and distribution supply chains. However, since demand for labour in this sector has been limited until now, and has slowed markedly in the past decade as retrofit activity has decreased, people have not yet acquired the relevant skills. With the potential for demand for retrofits to surge, a lack of skilled workers could be a key bottleneck to solving the cost of living crisis, and to delivering both energy security and net zero.

37. Source: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1003570/gjtf-report.pdf

38. Source: <https://www.pwc.co.uk/who-we-are/purpose/green-jobs-barometer-retrofit.pdf>

Women and Black, Asian or minority ethnic communities are currently under-represented

Black, Asian or minority ethnic communities tend not to be well represented in the fastest greening sectors. For instance, when looking at employment within the greenest sectors in London (which create the highest absolute number of green jobs), workers from Black, Asian or minority ethnic backgrounds would represent 30% of the workforce, which is lower than the proportion of this group for the wider London economy (36%).³⁹ The energy sector has the lowest representation of workers from Black, Asian or minority ethnic backgrounds (6%), followed by homes, buildings and landscape (28%), and consultancy and finance (30%). More widely across the UK, approximately 90% of employees within the top four industries in terms of employment identify as ‘White’ compared to c.86% of the labour force, highlighting a lack of diversity.⁴⁰

The growth of green jobs also seems to be unevenly distributed across genders. Much of the growth of green jobs has been found in science, technology, engineering and mathematics (STEM) sectors and the manual trades, areas in which women have traditionally been under-represented.⁴¹ This represents a challenge in the instances where those emerging green jobs are also ‘quality’ jobs: those involving higher pay and more skilled work. In places like Scotland, where both the number and proportion of green jobs is among the largest in the UK, women may be missing those opportunities as further studies suggest that new and emerging green occupations are predominantly engineering and IT-related occupations.⁴²

The problem is recognised by industry, and sector deals often include ambitions around workforce diversity. The UK Offshore Wind Sector Deal,⁴³ for example, set goals regarding workforce mobility and gender ratio, including reaching a female employment ratio of 33% and a Black, Asian or minority ethnic background employment target of 9% (from 5% today). The Nuclear Sector Deal⁴⁴ aims to reach 40% women in the nuclear industry by 2030. It has a specific focus on investing in the future nuclear workforce including: skills strategy; knowledge retention; attracting skills from outside nuclear; and local apprenticeships with a focus on STEM subjects.

Still, there are also differences in the quality of green occupations currently filled by workers from Black, Asian or minority ethnic backgrounds. Only 37% of those in green jobs are in roles requiring an occupational skill classification of level 3 (non-degree level post-compulsory education) or 4 (degree/relevant work experience).⁴⁵ This compares starkly to the 45% of their white counterparts – despite them having lower qualification levels on average.⁴⁶

Research for other European countries indicates that people with lower qualifications (and particularly women) have limited opportunities to benefit from the greening of economies and a just transition.⁴⁷ Better access to further education or training is certainly important to broaden the range of suitable green opportunities available to wider segments of the population. However, there is also the need to pay attention to how best to promote awareness of green opportunities and a clearer picture of green career paths across different regions and groups of people, including for younger populations.

Many sectors are starting to widen the opportunities they offer to different populations. The next section shows that emerging green sectors are positioning as important drivers of inclusion.

39. Source: <https://centrallondonforward.gov.uk/wp-content/uploads/2021/11/Green-Jobs-and-Skills-in-London-Final-Report.pdf>

40. Source: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1003570/gjtf-report.pdf

41. Source: https://www.greenpolicyplatform.org/sites/default/files/downloads/resource/Green_jobs_and_women_workers_employment_equality_Sustainlabour.pdf

42. Source: A study conducted by Sofroniou and Anderson; access: https://pure.strath.ac.uk/ws/portalfiles/portal/117868215/Sofroniou_Anderson_ILR_2020_The_green_factor_unpacking.pdf

43. Source: <https://www.gov.uk/government/publications/offshore-wind-sector-deal/offshore-wind-sector-deal>

44. Source: <https://www.gov.uk/government/publications/nuclear-sector-deal>

45. “The third skill level applies to occupations that normally require a body of knowledge associated with a period of post-compulsory education but not normally to degree level. Several technical occupations fall into this category, as do a variety of trades occupations and proprietors of small businesses. In the latter case, educational qualifications at sub-degree level or a lengthy period of vocational training may not be a prerequisite for competent performance of tasks, but a significant period of work experience is typical. The fourth skill level relates to what are termed “professional” occupations and high-level managerial positions in corporate enterprises, or national or local government. Occupations at this level normally require a degree or equivalent period of relevant work experience.” - ONS

46. Source: levels observed, with 40% of ethnic minorities having a degree or equivalent qualification compared to 30% of white (source: Labour Force Survey)

47. See the study by the Rand Europe (Rand Corporation, 2022), “Green jobs and skills development for disadvantaged groups”, which covers France, Germany, Italy, Spain and the United Kingdom. It relies on analyses of Eurostat and Cedefop data, including a large dataset of online job vacancies (Skills-OVATE), which provides insights into the labour market needs at the national and regional levels



04

Widening access to
green opportunities

The green economy is expected to accelerate benefits and opportunities in the long term. Wider benefits range from natural resource efficiency (e.g. optimised production processed and reduced waste) to resilience to climate-related issues and energy price volatility.⁴⁸ More broadly, sustainable long-term growth can reduce inequalities by growing incomes and generating wealth more widely, while maintaining industrial competitiveness.⁴⁹

Furthermore, the public and private sector are becoming more active in promoting inclusion. More 'traditional' sectors like energy are already making efforts to expand opportunities to diverse populations, whereas nascent industries can create jobs that are closer to local populations (e.g. nature-based economy).



48. Source: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/183417/Enabling_the_transition_to_a_Green_Economy_Main_D.pdf

49. UK businesses will be well placed to take advantage of the expanding markets for greener goods and services, capitalising on the effectiveness of the UK in sectors such as financial services, business and professional services and IT services. Source: <https://www.pwc.co.uk/economic-services/ukey/ukey-nov16-trade-prospects-after-brexit.pdf>

Workforce diversity in the energy sector

The UK's transition to net zero will undoubtedly lead to a fundamental restructuring of the energy system and many other sectors aside, with greater diversification and technology incorporation. There is also an increasing urge to ensure energy security in light of the changes brought about by current geopolitical events. These factors promise an almost unprecedented boost for employment in the energy sector, especially in the rise of green jobs. A report commissioned by the National Grid⁵⁰ estimates that 400,000 roles will need to be filled to build the net zero energy workforce required to meet the UK's net zero targets.

Gender-related barriers in the energy sector

With a focus on understanding the inclusivity of job opportunities related to nuclear power and offshore wind, two established energy sources that will substantially alter the current energy workforce, it is clear that both industries can be 'forces' for more inclusive opportunities. For example, in order to meet the Government's 24 gigawatts (GW) nuclear capacity target by 2050, the current nuclear workforce of 65,000 people will need to more than double, requiring between 75,000 and 150,000 new recruits.

In terms of gender diversity, the energy sector has been historically male-dominated and has been named '*the least gender diverse sector in relation to employment*' by the United Nations Economic Commission for Europe.⁵¹ In the UK, research conducted by the ONS reveals that only 26% of the workforce of the energy sector identify as female in 2022.⁵² One of the potential drawbacks for gender inclusivity of the energy sector is the issue of pre-existing cultural and societal norms, which lead to the observed low rate of women's representation in the sector, especially in senior management and corporate leadership of energy companies in the UK.

A joint report published in 2023 by PwC UK and POWERful Women (PFW), assessed the composition of the boards of the UK's 80 largest energy employers (representing an estimated combined UK workforce of over 190,000 people). The study reveals that women occupy 29% of energy sector board positions (executive and non-executive). Although this is a rise of 2% on the previous year, it is still 11% lower than the cross-sector target for the FTSE 250, which has already met its 2025 target of 40% women on boards.⁵³

Moreover, 21% of the top UK energy companies (17 out of 80) still have no women on their boards. This means that women remain under-represented in leadership positions of companies in the energy sector in the UK. As a result, women at entry level positions may have fewer opportunities to connect with mentors, sponsors, and role models. This can hinder their career development and lead to a vicious cycle of fewer women entering into the energy sector as a result of unconscious bias and a perception that the energy sector is male-dominated.

Businesses, Government and other local stakeholders need to work together to prioritise the creation of a diverse workforce and share best practice across the energy sector. Addressing the gender barrier in the energy sector involves a number of strategies, and some recommendations as to how the Government can support women to enter into green jobs in the energy sector can be found below.



50. Source: <https://www.nationalgrid.com/stories/journey-to-net-zero/net-zero-energy-workforce>

51. Source: <https://unece.org/media/press/364526>

52. Source: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1001940/green-jobs-taskforce-report.pdf

53. Source: <https://www.pwc.co.uk/press-room/press-releases/women-are-progressing-into-leadership-and-management-in-uk-energy.html>



Ethnicity-related barriers in the energy sector

Research also suggests a potential lack of Black, Asian or minority ethnic background representation in the energy sector, with workers from those communities representing only 6% of the energy sector workforce in 2021, compared to 13% nationally.⁵⁴ The lack of diversity is also reflected in the nuclear sector, as revealed in the 2021 Nuclear Workforce Census where out of 2,244 workers from nine companies in the nuclear sector, over 94% declared their ethnicity as white.⁵⁵ A report published by the House of Commons Environmental Audit Committee reveals that many young people were discouraged to enter into the green energy sector due to the observed lack of ethnic diversity.⁵⁶

.....

6%

Black, Asian or minority ethnic background representation in UK energy sector workforce in 2021

Furthermore, results from a recent survey conducted by Wildlife and Countryside Link (WCL),⁵⁷ a coalition of environmental charities, displays further barriers for workers from Black, Asian or minority ethnic backgrounds to enter into the energy sector: namely the inability to take up volunteering or low-paid jobs in order to gain experience and a lack of a clear career progression in the sector. Further, the Green Jobs Taskforce reports that workers from Black, Asian or minority ethnic backgrounds make up less than 10% of enrolment in environment and energy-related courses (e.g. geography, environmental sciences, engineering), despite representing 22% of the higher education student populace in 2020.⁵⁸

Despite the clear need for the Government, businesses and society to address the lack of diversity in the energy workforce, there are examples of good practice and noticeable improvements both in businesses and in Government policies, largely due to the transition to new renewable and low carbon technologies in offshore wind and nuclear power.

54. Source: <https://e2.org/reports/diversity-in-clean-energy-2021/>

55. Source: <https://www.ecitb.org.uk/wp-content/uploads/2022/01/Census-Report-Nuclear.pdf>

56. Source: <https://publications.parliament.uk/pa/cm5802/cmselect/cmenvaud/75/7508.htm>

57. Source: <https://www.theguardian.com/environment/2022/oct/05/environment-sector-has-failed-to-become-more-inclusive-study-suggests>

58. Source: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1001940/green-jobs-taskforce-report.pdf



Policy case studies

The UK Nuclear and Offshore Wind Sector Deals, launched in 2018 and 2019 respectively, are two partnerships between companies and Government, which represented progress on improving gender and Black, Asian or minority ethnic backgrounds inclusivity in the energy workforce.



The **Offshore Wind Sector Deal** set wider industry goals regarding workforce mobility and gender and ethnic ratio, including a commitment to reach a female employment ratio of 33% (40% stretch target), and a Black, Asian or minority ethnic backgrounds employment target of 9% (12% stretch target) by 2030 respectively. In 2022, women made up 18% of the offshore wind workforce,⁵⁹ whilst Black, Asian or minority ethnic backgrounds workers represent 5%. The Offshore Wind Industry Council also published a Best Practice Guide on Diversity and Inclusion in 2021⁶⁰ which aims to help companies in the industry to improve ethnicity and gender inclusivity balance across their workforce, for instance through recommending specific measures like removing bias from job descriptions.



The **Nuclear Sector Deal** includes an aim to reach 40% women in the nuclear industry by 2030. Whilst this Deal does not include a specific target on Black, Asian or minority ethnic backgrounds representation, it focuses on investing in the future nuclear workforce e.g. through skills strategy and local apprenticeships with a focus on STEM subjects to ensure that the nuclear workforce is innovative and has the skills it needs.

59. Source: <https://www.renewableuk.com/news/606445/-New-project-launched-to-boost-number-of-women-working-in-offshore-wind-.htm>

60. Source: <https://www.owic.org.uk/best-practice-guide-introduction>



Expanding access in traditional industries: financial services sector example

The green transition is well under way and the financial services sector is a key enabler in multiple ways. Regulatory pressures, and pressure from the market, have continued to intensify, and the sector is already experiencing a number of transformations. Strategies, services and products are increasingly aligning with environmental outcomes, including the rise of green finance, all of which is in increased demand globally. And the UK is one of the leading financial centres leading this trend.

Amid these changes, green jobs continue expanding. Sustainability officers, climate strategists, and ESG analysts are examples of new jobs that are now becoming commonplace in financial institutions, as companies seek to strengthen their commitment to sustainability, navigate the complexities of changing regulations, and capitalise on the burgeoning demand for green investment opportunities. But many other more traditional roles like portfolio managers are also seeing part of their regular activities becoming green. The percentage of jobs that are considered green jobs in the sector has grown from 0.25% in the period of 2019/2020 to 2% in 2021/2022 – and it continues increasing, standing at 2.2% for 2022/23.

Among the skills in growing demand are some that perhaps are not the first to come to mind when talking about green skills, but that are boosted by the green transition. One example is the increase in AI and data skills for the expansion of green finance. A survey conducted by the Financial Services Skills Commission of its member firms indicates that data analytics and machine learning are among the most cited skills in the context of ESG (and digital skills dominate in general), particularly for the analysis of key sustainability metrics and for informing decision making.

To successfully navigate these transformations, the sector's workforce needs to develop the right green skills. As a result of either new job roles or traditional tasks in finance that now need more alignment to sustainability issues and processes, new skills are needed. Yet, amid the new opportunities emerging, there is talent scarcity when it comes to ESG and green skills. The financial services sector is lagging behind other industries in terms of the green skills used or available among its workforce – and one factor contributing to the skills gap is the lack of diversity and inclusion in the workforce.⁶¹

Acquiring and developing green skills through a range of channels (e.g. including via social enterprises) and from diverse segments of society, with different socio-economic backgrounds, can enlarge the talent pool. Supported by diversity and inclusion targets, they can use vehicles like the Apprenticeship Levy to direct efforts to relevant green apprenticeships, supporting key demographics and youth employment.

The financial services sector can improve diversity and inclusion within the industry through the use of apprenticeships. The Apprenticeship Levy – a tax on UK businesses to create funding for apprenticeships – can provide significant green upskilling opportunities, if utilised properly. Businesses could apportion part of their levy to focus on relevant green apprenticeships to support the green youth upskilling agenda.⁶² Those who do not use all of their funding also have the option to transfer their levy contribution to provide green apprenticeship programmes for SMEs. In offering apprenticeships, organisations should promote diversity by expanding their reach outside of Russell Group universities to acquire talent from different backgrounds. Implementing diversity and inclusion targets as well as gender reporting to apprenticeship schemes will ensure that organisations are promoting diversity across their hiring practices.

61. Women and workers from Black, Asian or minority ethnic backgrounds are traditionally under-represented in the financial services sector. Whilst there has been progress in certain aspects, with the number of women working in authorised positions in the UK banking sector rising from 9% to 20% between 2001 and 2020, ethnic minorities continue to face hurdles, though it has likely improved since 2018 less than 1 in 10 management jobs in the finance industry are held by employees from Black, Asian or minority ethnic backgrounds. FCA, [diversity and inclusion in the financial sector - working together to drive change](#), 2021; Randstad, [Paying Attention](#), 2018

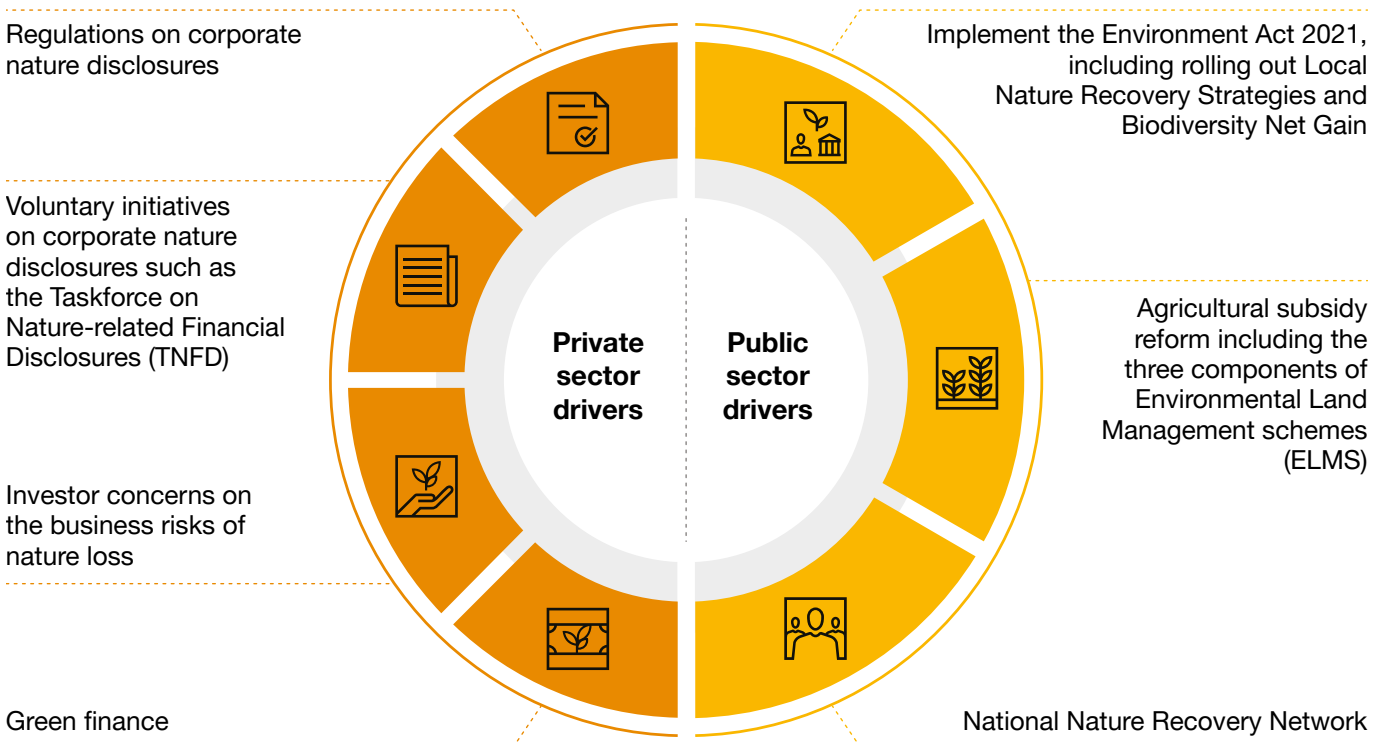
62. However current restrictions outlined in the Apprenticeship Levy framework limit the scope of training activities and therefore make it difficult to link apprenticeship training to business needs an assessment undertaken by the Chartered Institute of Personnel and Development (CIPD) found that from 2016 to 2020 the annual number of total apprenticeships was in decline. Furthermore, employer investment into training, which the levy was supposed to boost, had also declined. See: Skills and Net-Zero, Professor Dace Reay, Climate Change Committee 2023, <https://www.theccc.org.uk/publication/skills-and-net-zero-expert-advisory-group/>; CIPD, [Apprenticeship Levy has failed on every measure](#), 2021

Sectors of the future: nature positive for inclusive development

The UK recognises the intrinsic link between the protection of the natural world and the need to decarbonise in order to reach net zero targets. Hence, there are a number of policies and proposals as part of the UK Government’s *Net Zero Strategy: Build Back Greener*⁶³ that cover nature restoration, use of natural resources, land management and the nature-positive economy. It is also relevant when considering the transition to a green economy, to recognise the double dividend a nature-positive economy creates, both in delivering the transition and in creating employment opportunities that have the potential to address workforce inequalities, especially for rural communities. Moreover, the protection, restoration and enhancement of biodiversity and ecosystems is an important objective independent of its valuable contributions to net zero, and the UK’s obligations as a party to the United Nations Convention on Biological Diversity have supported much of the UK’s legislation and policy designed to this over the past 30 years.

Nature related jobs are a subset of green jobs, usually involving the management and protection of nature and biodiversity. Traditionally, nature related jobs have been highly location specific, often in more rural settings, and frequently have both physical and seasonally specific components requiring a broad range of skills. As the UK progresses towards a nature-positive economy, these traditional roles are evolving and are being joined by a demand for new jobs and skills from emerging drivers. There are also wider benefits of nature-related work that make a growth in this part of the economy highly beneficial, improving wellbeing, benefiting mental health and physical health are all associated with greater exposure to nature, as are significant community-focused initiatives and positive impacts on local economies.^{64,65}

Figure 3: Drivers of a nature positive UK economy



63. Source: <https://www.gov.uk/government/publications/net-zero-strategy>

64. Source: <https://besjournals.onlinelibrary.wiley.com/doi/10.1002/pan3.10432>

65. Source: <https://www.rspb.org.uk/globalassets/downloads/documents/positions/economics/natural-foundations---conservation-and-local-employment-in-the-uk.pdf>



Rural communities, for example, can face higher levels of exclusion from the labour market due to geography and a lack of employment opportunities, and hence usually face higher risk of depopulation of working age people which can contribute to increased rural poverty. However, if nature-positive jobs are to increase at the rate some research suggests, then employment prospects may significantly improve for rural populations.⁶⁶ As well as the benefits mentioned above, research shows the nature-positive sector is more inclusive of particular age groups and lower socio-economic backgrounds, as well as those with learning disabilities, compared to other green sectors. As the sector poised to deliver on many of the public sector goals linked to a nature-positive UK economy, the agricultural sector is known to have an ageing workforce, the corollary of which is an inequality of youth access.⁶⁷ By attracting workforce entrants into this sector, through the appeal of nature related green jobs, there is the potential to address some of these challenges.

Whilst potentially highly beneficial, access to this emerging part of the economy is unlikely to catalyse without meaningful interventions to signpost career pathways and support the right skills development. Nature-related jobs are noted to be less inclusive, impacted by their rural location and the lower distribution of Black, Asian and minority ethnic communities in those areas. However, as opportunities to engage in nature recovery extends to the urban setting, through trends such as urban green infrastructure and urban rewilding, there are increasing opportunities to both bring the benefits of nature into urban environments, and bring the benefits and skills of people from diverse backgrounds into the nature-positive workforce, with some projects seeking to enhance the role urban settings have in nature recovery.⁶⁸

The UK Government's recently unveiled *Green Infrastructure Framework*⁶⁹ provides guidance to developers which aims to create nature-rich towns and cities, as well as helping urban environments realise the benefits of accessing nature. Coupled with the introduction of biodiversity net gain legislation, which will see developers having to quantify, minimise and offset their impact on biodiversity prior to development, there is increasing business rationale to create additional nature-related employment in sectors such as construction and planning.⁷⁰

Commenting on contemporary research suggesting much nature-related work is male dominated, Dr Liz Barron-Majerik from Lantra, one of the leading awarding bodies for training in the land-based industries, explained that:

“There are a number of reasons that women face barriers to accessing nature-related work. These include training opportunities being held at short notice and in locations far from their home, which conflicts with childcare requirements, the expense of training courses, and also the fact that many roles are male dominated.

Despite these barriers, there have been noticeable improvements in inclusivity for women, largely due to the introduction of new policies and financing mechanisms to give women opportunities to obtain nature-related skills and hence access nature-related jobs. For example, the Scottish Government's Women in Agriculture Practical Training Fund⁷¹ and its Women in Rural Economy Training Fund⁷² have been designed to provide women with opportunities in land-based training for sectors such as aquaculture, conservation, fisheries, forestry, horticulture, land-based engineering and wildlife management. In some cases, these funds also reimburse travel and accommodation expenses, as well as training.”

66. Source: https://www.nature.scot/sites/default/files/2020-12/Publication%202020%20-%20NatureScot%20Research%20Report%201257%20-%20Supporting%20a%20green%20recovery_%20an%20initial%20assessment%20of%20nature-%20based%20jobs%20and%20skills.pdf

67. Source: https://www.nature.scot/sites/default/files/2020-12/Publication%202020%20-%20NatureScot%20Research%20Report%201257%20-%20Supporting%20a%20green%20recovery_%20an%20initial%20assessment%20of%20nature-%20based%20jobs%20and%20skills.pdf

68. Funded by the Government's Green Recovery Challenge Fund, Groundwork's Natural Neighbourhoods project created jobs for young people, trained people at risk of long term unemployment, and unlocked voluntary action on nature recovery and climate change. The project successfully increased job retention, enhanced 105 site locations, upgraded 1,389 hectares of land, planted 38,172 trees and shrubs as well as 174,055 soiree meters of wildflowers.

69. Source: <https://www.gov.uk/government/news/natural-england-unveils-new-green-infrastructure-framework>

70. Source: <https://www.gov.uk/government/news/natural-england-unveils-new-green-infrastructure-framework>

71. Source: <https://www.gov.scot/publications/women-agriculture-practical-training-fund-2021-2022-evaluation-report/>

72. Source: <https://www.gov.scot/news/addressing-rural-scotlands-gender-imbalance/>

Call to action

Businesses need to begin a nature-positive journey by identifying how and where businesses interface with nature and develop a strategy that turns insights into actions (see PwC's Nature Strategy Handbook for details).⁷³

Prioritise urban greening that delivers benefits to both nature and society, particularly where they employ nature-based solutions which enhance the climate resilience of urban areas and communities.

Create platforms and programmes that translate the opportunities of the evolving nature-related economy to enable practical experience and exposure that lead to jobs.

Better data on nature-positive jobs, economy and demographics can help decision makers with targeted responses to workforce challenges around nature and biodiversity.



73. Source: <https://www.pwc.co.uk/issues/esg/now-for-nature.html>



05

What next?

Conversations we have held over the last year, with several stakeholders across Government and the private sector, have allowed us to identify avenues to continue developing the Barometer, and research related to it, to make it more useful for decision makers. They have also given us an indication of the key challenges that specific local economies, industry sectors and employers are facing, and the kind of evidence that they need to act effectively.

Looking ahead, the Green Jobs Barometer will continue monitoring trends over time, benchmarking sectors and UK regions, and also progress with respect to our starting point in 2021.

There are key elements that need more work as we continue expanding the initiative, including:

- **Targets:** long-term and defined economy-wide, or for specific industry sectors, targets provide a benchmark for how a respective region or sector is performing against its own objectives.
- **Granular occupational and careers analysis:** with the goal of identifying how existing jobs are being reconfigured as a result of greening of activities, and the relevant reskilling needed, as well as career pathways for those occupations in sunset industries for a just transition.
- **Capture job quality:** to give a clearer picture of whether new green jobs are desirable as a career pathway, and which segments of the population benefit the most.
- **Understanding regional and sectoral drivers:** delivery of net zero is highly complex, achieving desirable outcomes is contingent on cross sector and regional collaboration.
- **The Barometer as a platform for conversations:** the Barometer is helping to drive the green jobs agenda by giving agency to some of the businesses most exposed to a transitioning economy.

The more granular occupational focus, which further complements the regional and sectoral lenses, is a key ingredient to further understand job transitions amid the greening of the economy, and to identify career pathways for people moving from declining jobs to growing jobs (for instance, as those being created in clean energy generation). A clear understanding of career pathways is also key to motivating young people to pursue green jobs in sectors like energy that are often subject to skills shortages.⁷⁴

Granular measurements of green tasks and activities are also important to understand the demand for skills and address prevailing skills gaps. In future releases of the Barometer, the ‘green skills density’⁷⁵ of different occupations will be elaborated upon through greater analysis of job vacancy and CV data.⁷⁶ Clear taxonomies of green skills and measurement of the green density of occupations (based on how much they use green skills as part of their work) will help plan initiatives in education and training.

Linking existing, or new, occupational classifications to green jobs will allow us to better understand who will be positively and negatively impacted by these transitions. Identifying these exposed sub-populations, supported by more granular data on gender education and income groups, is particularly important to policy makers who are tasked with ensuring the green transition is a just transition.⁷⁷

Furthermore, further research will investigate the generic skills that are needed to succeed in most green jobs. Skills needed for green jobs include primarily attitudes (such as the ability to adapt to change, ability to work independently, being reliable and motivated) and ‘general’ skills (communication, teamwork, management skills). The development of wide skills and generic sustainability knowledge can equip diverse groups of workers for green jobs, not only in the ‘typical’ green economy (e.g. renewable energy sector) but also in traditional sectors that are greening, like finance or even accounting. The emphasis on generic rather than technical skills could unlock green jobs for people from disadvantaged groups, including those with low qualifications.

74. Our research shows that within power, employers are struggling to fulfil existing demand for skills related to a number of occupations: e.g. technical engineering roles (including commissioning, instrumentation & control, power systems, etc), quantity surveyors, project managers, piping and cable specialists as well as various roles such as data scientists which were increasingly in need of digital competencies. In addition, attracting and retaining young people, particularly those with STEM qualifications was repeatedly cited as a challenge to workforce planners within the industry.

75. In the initial version of the Barometer, the green job creation analysis of Pillar 1 involves a binary classification of green versus non-green jobs. In future updates, there will be different shades of green, based on the activities and skills associated with specific types of jobs and occupations.

76. Green jobs are evolving, as is our understanding of what jobs meet the definition of green. Our evolved understanding will be reflected in our future analysis with some jobs being gained and others being lost.

77. Insights from stakeholder engagements suggest that the people that are able to retrain/ take up green jobs are currently mostly higher-educated professions, which highlights the importance to address questions of social mobility and green jobs.



06

Appendix: data tables

Table A1: Green jobs in Scotland (Pillar 1)

Sector	Number green jobs (absolute)			% of green jobs		
	2021	2022	2023	2021	2022	2023
Financial and insurance activities	285	1,374	2,217	0.97%	3.16%	5.57%
Other service activities	3	612	598	0.85%	2.68%	2.91%
Human health and social work activities	239	494	272	0.18%	0.40%	0.27%
Professional, scientific and technical activities	3,849	9,143	11,410	7.20%	12.15%	16.17%
Administrative and support service activities	490	1,305	1,283	2.09%	2.95%	3.73%
Agriculture, forestry and fishing	48	80	31	17.45%	6.23%	3.71%
Information and communication	141	1,753	2,401	0.24%	3.19%	4.92%
Construction	1,215	2,337	2,571	2.64%	4.51%	6.22%
Arts, entertainment and recreation	14	65	39	0.70%	1.82%	2.49%
Mining and quarrying	24	8	38	63.16%	4.65%	8.07%
Manufacturing	294	712	415	2.45%	3.81%	4.62%
Electricity, gas, steam and air conditioning supply	1,302	2,256	1,638	27.43%	31.98%	28.51%
Wholesale and retail trade, repair of motor vehicles and motorcycles	205	1,788	1,148	0.33%	1.53%	1.07%
Education	55	163	102	0.14%	0.49%	0.52%
Public administration and defence, compulsory social security	453	1,343	1,186	3.44%	3.71%	1.69%
Accommodation and food service activities	86	1,013	476	0.25%	1.27%	1.14%
Water supply, sewerage, waste management and remediation activities	9	90	37	11.25%	36.44%	23.87%
Transportation and storage	418	1,308	617	1.08%	2.82%	1.49%

Table A2: Employment multipliers by region and sector

	North East	North West	Yorkshire and The Humber	East Midlands	West Midlands	East of England	London	South East	South West	Wales	Scotland	Northern Ireland	United Kingdom
Agriculture, forestry and fishing	3.5	2.9	3.3	2.9	2.4	2.5	2.2	1.8	3.1	2.1	3.3	2.7	2.2
Mining and quarrying	6.2	4.4	6.1	6.7	4	5.2	4.8	7.8	6.4	5.2	4.1	5.5	4
Manufacturing	2.5	2.6	2.4	2.4	2.4	2.7	2.4	2.7	2.4	2.5	2.7	2.3	2.3
Electricity, gas, steam and air-conditioning supply	4.9	5.2	9.1	6.1	8.9	8.7	8.8	8.3	7.5	7.4	8.5	12.1	7.5
Water supply; sewerage and waste management	2.4	2.2	2.1	2.1	2.2	2.3	2.3	2.6	2.3	2.1	2.4	2.2	2.1
Construction	2.9	2.9	2.7	3.2	3.1	3.4	3.9	3.3	2.8	2.9	2.6	3.4	2.9
Wholesale and retail trade; repair of motor vehicles	1.8	1.9	1.8	1.8	1.8	1.9	2	2	1.9	1.8	1.9	2.1	1.8
Transportation and storage	2	2.1	2	1.9	2	2.2	2.6	2.3	2	2	2.2	2.3	2
Accommodation and food service activities	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.7	1.7	1.7	1.7	1.8	1.7
Information and communication	2	2.2	2	2	2.3	2.1	2.5	2.4	2	2.1	1.9	1.9	2.1
Financial and insurance activities	2.8	2.7	2.7	2.6	2.9	2.8	3.7	2.7	2.6	2.7	3	2.4	3
Real estate activities	2.6	3.1	3.4	3.4	3	3.7	2.9	4.6	3.5	3.3	3.2	3.5	-
Professional, scientific and technical activities	1.6	1.6	1.7	1.7	1.7	1.7	2.1	1.9	1.7	1.7	1.8	1.8	1.7
Administrative and support service activities	1.6	1.7	1.7	1.7	1.7	1.8	2	1.9	1.9	1.7	1.7	1.6	1.7
Public administration and defence; compulsory social security	1.9	2	2.1	2.1	2.1	2.2	2	2.5	2.5	1.9	2.1	1.9	2
Education	1.7	1.7	1.7	1.8	1.7	1.8	1.8	1.7	1.8	1.7	1.7	1.6	1.6
Human health and social work activities	1.7	1.8	1.8	1.8	1.7	1.8	1.7	1.7	1.8	1.8	1.8	1.7	1.6
Arts, entertainment and recreation	1.8	1.8	1.8	1.8	1.9	2	2.3	2.1	1.7	1.7	1.7	1.7	1.9
Other service activities	1.9	1.6	1.6	1.7	1.8	1.7	1.6	1.7	1.8	1.9	1.8	1.7	1.5
Activities of households as employers	-	-	-	-	-	-	-	-	-	-	-	-	-
All sectors	2.1	2.1	2.2	2.1	2.3	2.4	2.9	2.5	2.2	2.2	2.6	2.3	2.4

Table A3: Differences in average survey scores between greener and less green jobs

Region	Fairly rewarded ⁷⁸	Satisfied with hours	I find my job fulfilling	Working hours ⁷⁹	Employment contract situation	Salary
North East	1.0	0.9	0.9	-1.1	-1.0	0.7
North West	0.4	-0.3	0.3	-2.8	0.3	1.3
Yorkshire and The Humber	0.2	0.0	0.3	-1.1	-0.1	0.9
East Midlands	0.1	-0.5	0.6	-3.0	-0.3	1.2
West Midlands	0.4	0.1	1.0	-1.7	0.0	1.0
East of England	0.4	-0.3	0.9	-2.7	-1.1	0.4
London	0.8	0.1	0.5	-2.1	-0.4	1.5
South East	0.0	0.1	0.3	-1.6	0.1	0.1
South West	0.7	-0.6	0.1	-3.6	-0.2	1.0
Wales	1.1	-0.4	1.4	-2.8	0.1	1.0
Scotland	0.5	-0.3	0.2	-1.8	0.6	1.3
Northern Ireland	-0.3	-0.4	0.4	0.1	-1.4	0.0

78. Fairly rewarded - "I am fairly rewarded financially for my work"; Satisfied with hours - "I am satisfied with the hours that I work (i.e. I do not wish to work more hours in my current role, and I am not looking for an additional or replacement job that offers more hours)"; I find my job fulfilling - "I find my job fulfilling". Each of these are scored on a scale of "strongly disagree" to "strongly agree".

79. Working hours - Defined as how often one works over 48 hours a week (a lower score means working over 48 hours more often); Employment contract situation - defined as whether or not one has a permanent employment contract and if they desire one. Salary - defined as self reported salary bands.

Table A4: Skills requirements in green jobs

	1 Degree or equivalent	2 Higher education	3 GCE A level or equivalent	4 GCSE grades A*-C or equivalent	5 Other qualification	6 No qualification
A: Agriculture, forestry and fishing	44%	8%	21%	17%	6%	4%
B: Mining and quarrying	32%	9%	21%	19%	13%	6%
C: Manufacturing	23%	7%	22%	22%	15%	11%
D: Electricity, gas, steam and air conditioning supply	46%	9%	23%	14%	5%	2%
F: Construction	45%	9%	21%	15%	6%	3%
G: Wholesale and retail trade; repair of motor vehicles and motorcycles	44%	9%	22%	17%	5%	3%
H: Transportation and storage	16%	7%	22%	26%	17%	13%
I: Accommodation and food service activities	18%	7%	21%	25%	15%	14%
J: Information and communication	60%	8%	18%	10%	3%	2%
K: Financial and insurance activities	51%	8%	19%	15%	5%	2%
M: Professional, scientific and technical activities	48%	9%	23%	13%	5%	2%
N: Administrative and support service activities	38%	9%	22%	20%	6%	4%
P: Education	51%	12%	19%	12%	3%	2%
Q: Human health and social work activities	47%	10%	20%	16%	5%	3%
R: Arts, entertainment and recreation	63%	9%	15%	9%	3%	1%
S: Other service activities	47%	9%	20%	15%	6%	3%
E: Water supply; sewerage, waste management and remediation activities	39%	9%	23%	17%	8%	5%
O: Public administration and defence; compulsory social security	47%	9%	20%	16%	5%	3%

Table A5: Skills gaps in green jobs

	1 Degree or equivalent	2 Higher education	3 GCE A level or equivalent	4 GCSE grades A*-C or equivalent	5 Other qualification	6 No qualification
A: Agriculture, forestry and fishing	-27%	3%	2%	9%	7%	7%
B: Mining and quarrying	9%	7%	0%	-6%	-5%	-2%
C: Manufacturing	2%	3%	5%	0%	-4%	-4%
D: Electricity, gas, steam and air conditioning supply	-13%	4%	8%	3%	-1%	0%
F: Construction	-27%	0%	14%	7%	4%	3%
G: Wholesale and retail trade; repair of motor vehicles and motorcycles	-25%	-2%	5%	12%	6%	5%
H: Transportation and storage	0%	1%	2%	3%	1%	-3%
I: Accommodation and food service activities	-1%	0%	7%	5%	-2%	-6%
J: Information and communication	0%	1%	0%	1%	0%	0%
K: Financial and insurance activities	-4%	-1%	5%	4%	-2%	-1%
M: Professional, scientific and technical activities	12%	0%	-6%	-1%	-2%	-1%
N: Administrative and support service activities	-14%	-1%	0%	5%	6%	6%
P: Education	9%	-2%	-4%	-1%	0%	0%
Q: Human health and social work activities	-5%	6%	0%	1%	0%	0%
R: Arts, entertainment and recreation	-25%	0%	9%	13%	2%	2%
S: Other service activities	-16%	1%	10%	4%	1%	1%
E: Water supply; sewerage, waste management and remediation activities	-16%	0%	-1%	8%	8%	4%
O: Public administration and defence; compulsory social security	-2%	3%	2%	2%	-2%	-2%

Table A6: Skills requirements by region

	1 Degree or equivalent	2 Higher education	3 GCE A level or equivalent	4 GCSE grades A*-C or equivalent	5 Other qualification	6 No qualification
Remote	45%	9%	21%	15%	6%	4%
North East	39%	9%	22%	17%	8%	5%
North West	42%	9%	22%	16%	7%	4%
Yorkshire and The Humber	38%	9%	23%	17%	8%	5%
East Midlands	38%	9%	23%	17%	8%	5%
West Midlands	40%	9%	22%	17%	8%	5%
East of England	39%	9%	22%	17%	7%	5%
London	49%	8%	20%	14%	5%	3%
South East	43%	9%	21%	16%	7%	4%
South West	41%	9%	22%	16%	7%	5%
Wales	36%	8%	22%	18%	9%	6%
Scotland	44%	9%	21%	15%	7%	4%
Northern Ireland	42%	9%	22%	16%	7%	4%

Table A7: Skills gaps by region

	1 Degree or equivalent	2 Higher education	3 GCE A level or equivalent	4 GCSE grades A*-C or equivalent	5 Other qualification	6 No qualification
Remote	-9%	-1%	1%	5%	1%	3%
North East	-11%	-1%	3%	8%	-1%	3%
North West	-10%	-2%	1%	7%	0%	4%
Yorkshire and The Humber	-7%	-2%	1%	6%	-1%	3%
East Midlands	-9%	-1%	2%	6%	0%	2%
West Midlands	-7%	-2%	0%	6%	0%	3%
East of England	-7%	-1%	0%	7%	0%	1%
London	5%	-3%	-5%	-2%	3%	2%
South East	-5%	-1%	1%	5%	0%	1%
South West	-6%	-1%	3%	5%	-2%	0%
Wales	-5%	0%	1%	4%	-2%	3%
Scotland	-8%	7%	1%	-1%	-2%	4%
Northern Ireland	-9%	0%	-1%	4%	-1%	8%

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