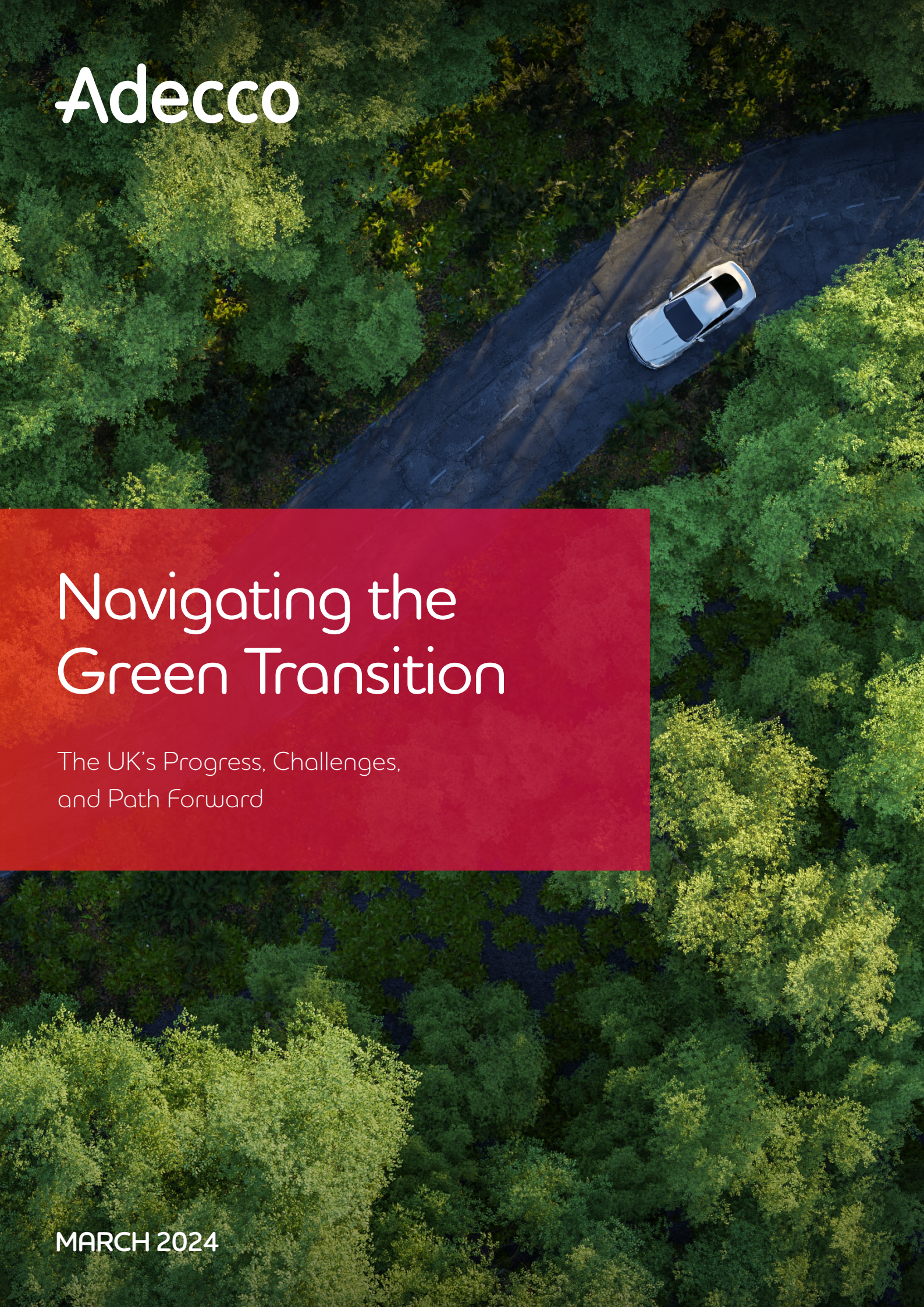


An aerial photograph of a white car driving on a dark, winding road that cuts through a dense, lush green forest. The car is positioned in the upper right quadrant of the frame, moving towards the bottom left. The forest is composed of various shades of green, indicating different types of trees and foliage. The lighting suggests it might be late afternoon or early morning, with some shadows visible on the road.

Adecco

Navigating the Green Transition

The UK's Progress, Challenges,
and Path Forward

MARCH 2024



Contents

Foreword:

We would like to express our sincere appreciation to the individuals whose expertise and insights have significantly enriched the discussions surrounding net zero employment and green skills development, which form the cornerstone of this white paper. These are:

Martin Baxter, Deputy CEO of the Institute of Environmental Management and Assessment (IEMA), for sharing his profound understanding of the net zero landscape and its impact on green employment. His contributions have provided invaluable context and clarity, guiding our understanding of the challenges and opportunities ahead.

Dr. Anna Valero, Distinguished Policy Fellow and Director of the Growth Programme at the LSE's Centre for Economic Performance, for offering her expertise in green skills training and knowledge distribution. Her insights have illuminated pathways for equipping the workforce with the necessary skills to thrive in a sustainable economy and the imperative of effective net zero policymaking.

Edward Davison, Public Policy Manager at Uber, for contributing his expertise on the role of transportation in achieving net zero goals. His contribution was pivotal, offering valuable perspectives on upskilling the workforce and the importance of collaboration.

Jacqui Bateson, Managing Director at HACT, for her insights into the housing sector workforce. Her expertise has deepened our understanding of the intersection between housing and sustainability, highlighting the importance of multifaceted practices in achieving a low carbon-ready workforce in a sector that is vital in meeting net zero objectives.

Together, their collective expertise and support have been instrumental in shaping the discussions and recommendations presented in this white paper. We are profoundly grateful for their contributions and collaborative spirit in advancing our shared vision of a sustainable and resilient workforce.

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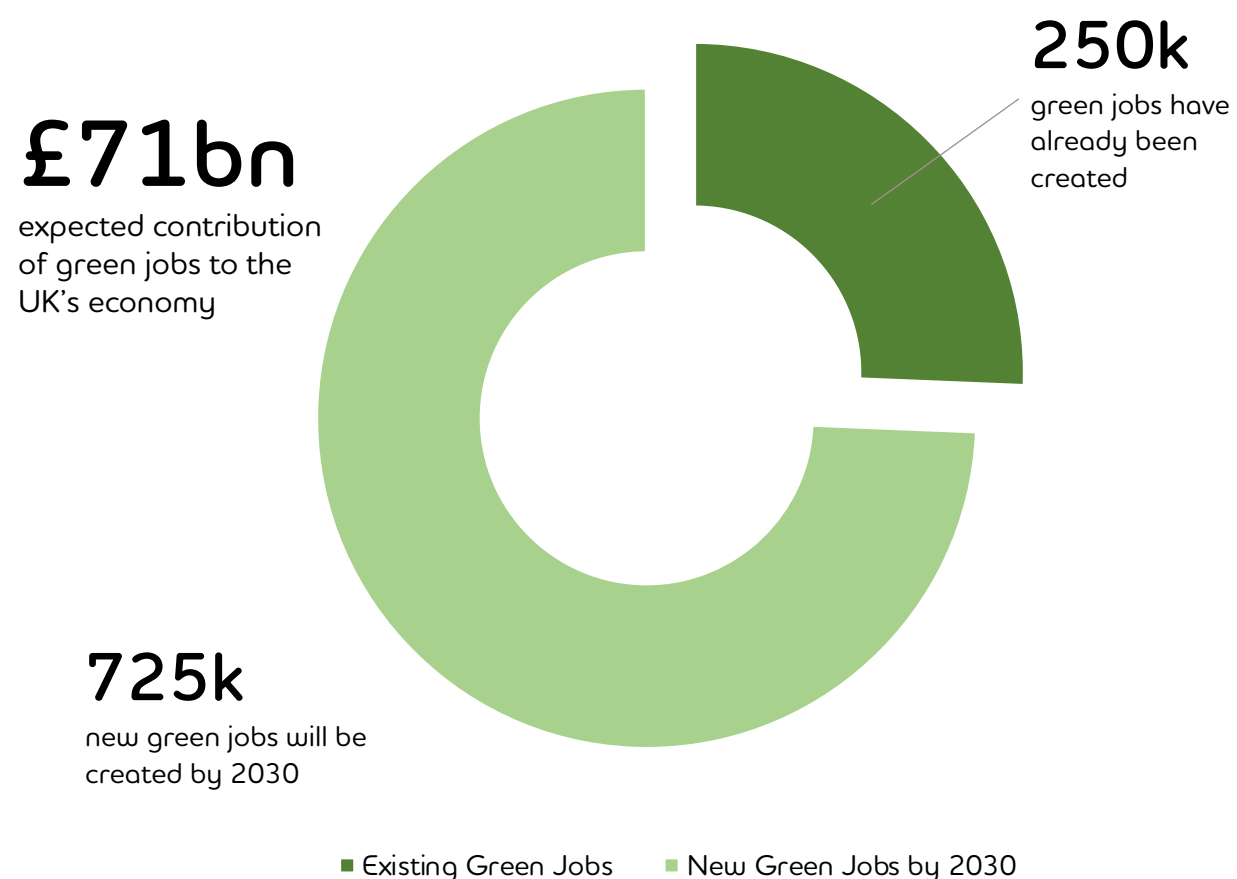
1 Introduction

The transition to a low-carbon economy is a focal point on the global agenda. As we approach the mid-2020s – widely recognised as a decisive decade for addressing environmental risks – its significance has been acknowledged across both developed and developing nations. Both sides of the political spectrum perceive net zero as not just a mandatory point in environmental policy, but also as a key lever of economic growth and future prosperity. Its magnitude poses an opportunity to reinforce markets, ensure energy sovereignty, promote innovation, and propel economic resilience.

The industrial embedment of this transition is critical to achieving the goals outlined in the Nationally Determined Contributions (NDCs) as part of the Paris Agreement, which seeks to limit global temperature increases through collaborative international actions and commitments within the United Nations. Its impact on employment cannot be overstated; the emergence of low-carbon markets and the transformation of processes, products, and supply chains from high to low emissions will directly affect workforce skills and demand. **Already, 250,000 jobs have been created, with projections indicating an uplift to 725,000 roles by 2030, contributing an estimated £71 billion to the UK economy.**^[1,2] Establishing the best approach to maximise employment benefits, whilst alleviating potential risks, is a crucial yet complex process requiring partnership between policymakers, education, and industry.



Green Jobs Breakdown



Source: Climate Change Committee

Building a carbon-neutral workforce is instrumental in meeting any net zero targets and achieving sustainable economic growth. Scarcity of green talent, low productivity, and lack of strategic investment are among the factors identified in this paper that can undermine this transition. The coming pages explore the context and importance of green skills, and ultimately how industrial strategy-making and business initiatives can ensure a successful green transformation supported by a resilient, sustainable, and future-proof workforce. We analyse the UK landscape's relative strengths and weaknesses in pursuing more sustainable production and consumption patterns, and how these goals may influence the economy and the labour market.

Particularly, we look at this in relation to industries expected to play an integral part in meeting net zero and will consequently experience the transition's immediate effects. These are energy production, surface transportation, and construction. We also examine the potential influence of artificial intelligence on sustainability and the expected benefits of augmenting human skills with technology. We examine challenges in the sector and provide recommendations affecting policymaking, upskilling and reskilling practices, possible collaborations, and business approaches to cultivating a green workforce for a sustainable future.

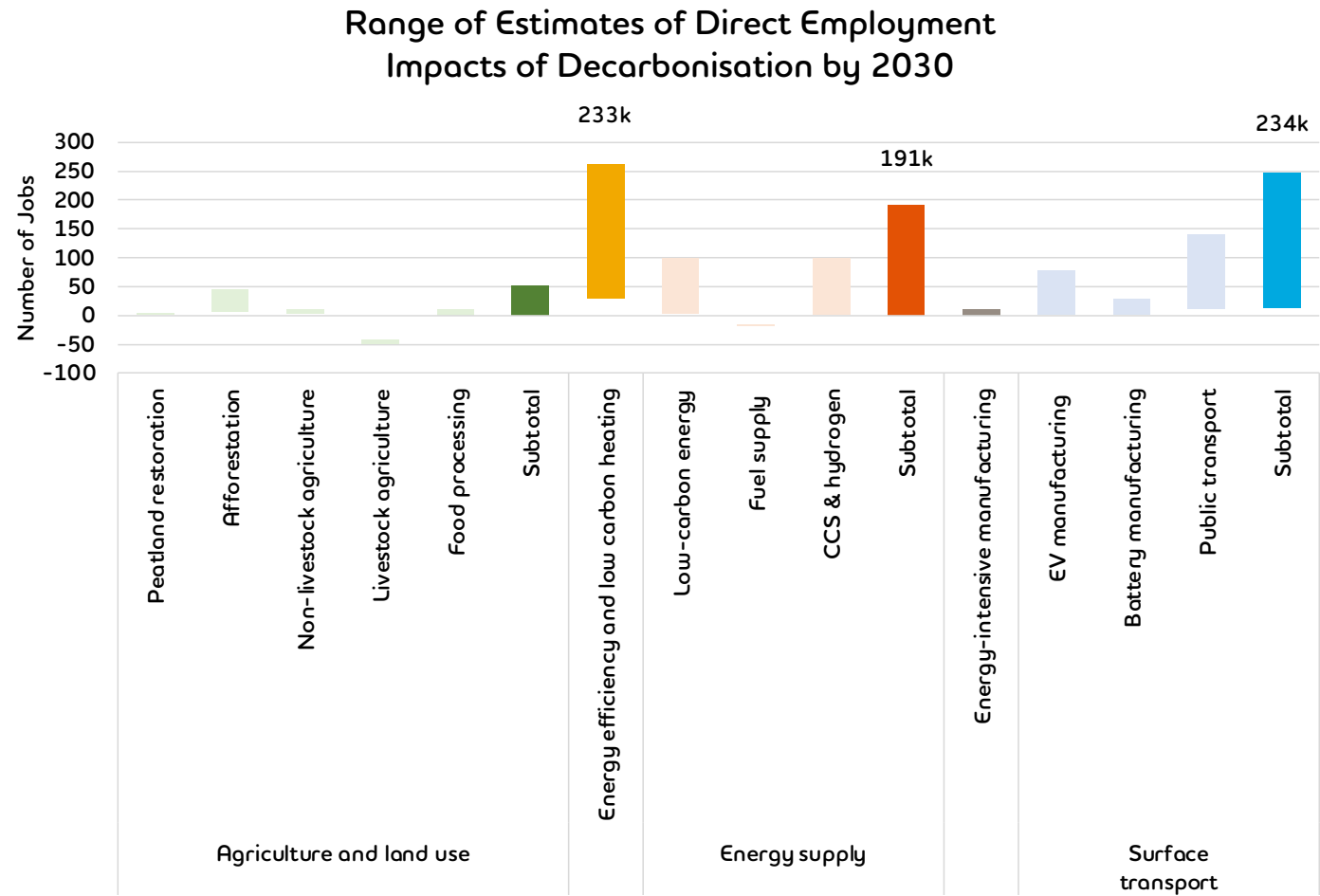
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2 The UK's Promising Net Zero Progress

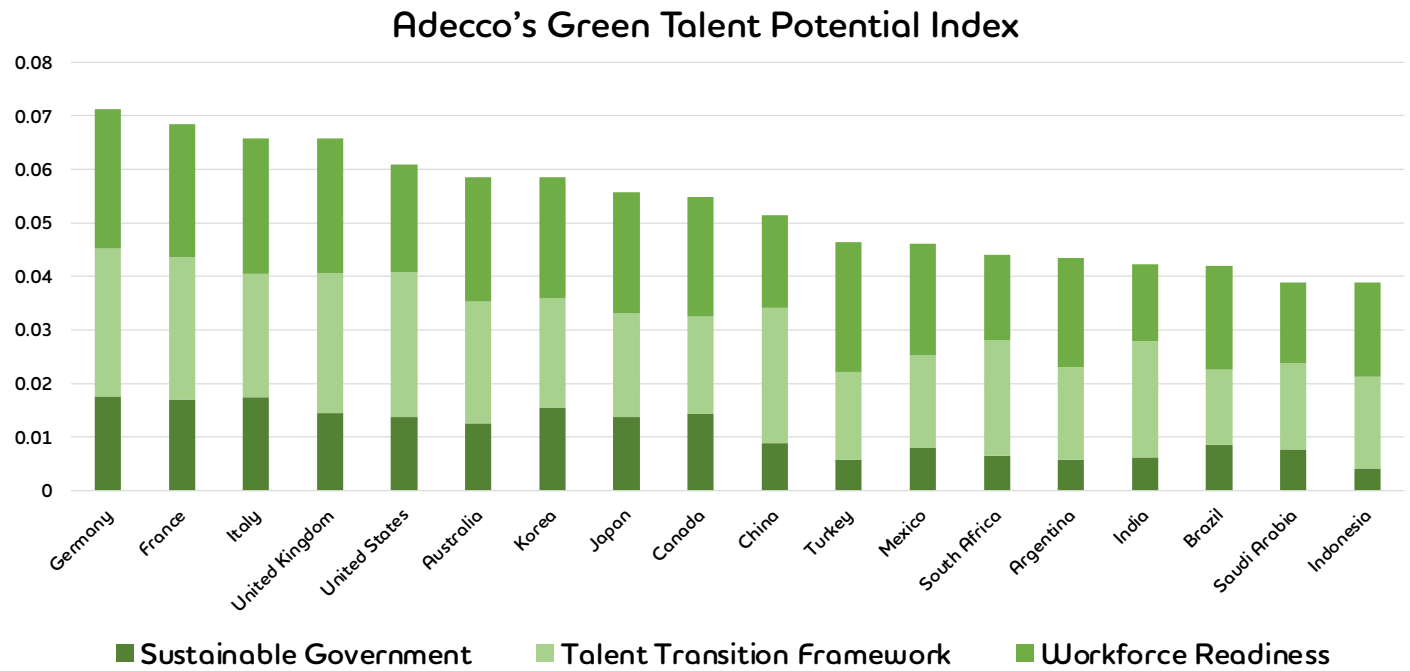
The United Kingdom has shown its capability to lead the way to net zero, having achieved a **67% reduction** in its greenhouse gas emission intensity since 1990 and being the only major economy committed to reducing carbon emissions by **77% by 2050**.^[3,4] Despite the revised commitments presented by Prime Minister Rishi Sunak in September 2023 – including postponements in the banning of diesel and petrol car sales, oil and Liquefied Petroleum Gas (LPG) boiler installations, and new coal-heating for off-gas-grid homes to 2035 – the intention to move to a net zero economy remains clear and has been adopted cross-party.



90% of new green jobs will result from the expected growth in the construction, energy supply, and surface transport sectors.

Source: Climate Change Committee

Although the current situation requires greater net zero skills availability (meaning a workforce equipped with specialised skills that will cover the demand for employment in existing and emerging net zero occupations) to ensure a smooth shift to sustainable patterns of production and consumption,^[5] the UK appears to be ahead of most G20 economies in green talent potential.



Source: The Adecco Group

Similarly, despite the need for significant industrial changes in the British labour market that will impact ways of working and labour force demographics, this will not be the first time it undergoes such a revolution. The UK navigated the decline of coal and steel in the 1970s and 1980s, along with the move to a more service-based economy over the past 100 years.

The net zero transformation promises more sustainable and future-proof benefits for both businesses and workers. For this to happen, however, there are necessary actions to be taken to mitigate existing and emerging risks.

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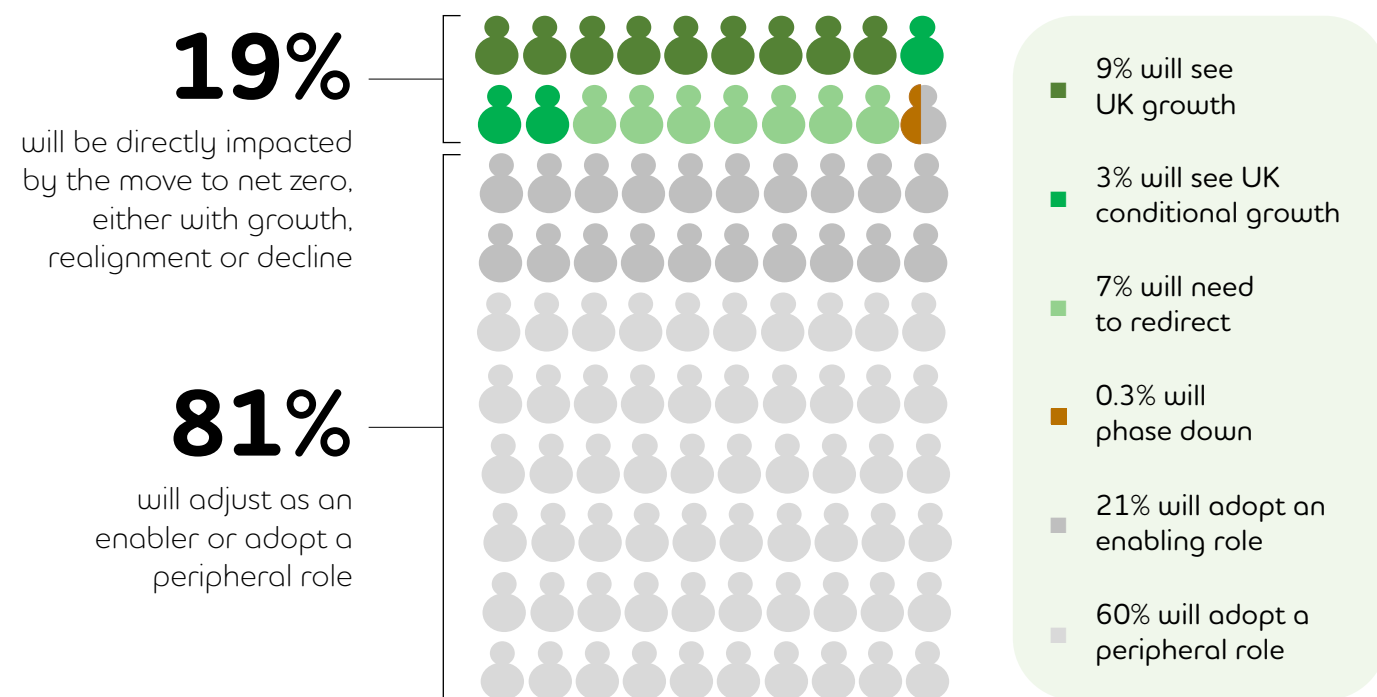
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3 The Scale of the Green Transformation

Concerns about the progress of decarbonisation have been expressed by the Climate Change Committee (CCC), the UK's independent adviser on tackling climate change. **The committee has flagged the necessity to accelerate the reduction of emissions across all sectors and expand the Carbon Budget Delivery Plan to provide incentives to the public to make low-carbon choices.**^[6]

Key areas expected to be affected by the decarbonisation trajectory include energy, construction, and transportation — industries associated with the highest pollution levels according to the CCC's 2023 data.^[7] These sectors currently account for nearly a fifth of the existing workforce (19%) and will have an extensive effect on the way they operate – either in terms of growth or transit – while the rest is expected to adjust in the changes the net zero economy will bring. The following paragraphs delve into various aspects of these fields in the transition to a low-carbon economy.

Share of Workforce by Net Zero Impact



Source: Climate Change Committee

Sources

^{6,7} [Climate Change Committee, Progress in Reducing UK Emissions - 2023 Report to Parliament, Jun 2023 \(accessed 23 Feb 2024\)](#)



Energy

Energy production is the most polluting sector globally, contributing approximately 60% of emissions, as large parts depend on the extraction of fossil fuels.^[8] In the UK, the sector accounts for a quarter of carbon dioxide emissions (24.8%) according to 2022 data, coming second to transportation (34%).^[9] Demand for energy is expected to see a 47% rise by 2050.^[10] The need for action to meet the Paris Agreement means the industry will witness increased activity in renewable energy sources as part of the decarbonisation process. Low-carbon energy sources, such as wind and solar, will not only deliver environmental benefits, but also protect the UK’s energy security from global headwinds driving up fossil fuel import prices.

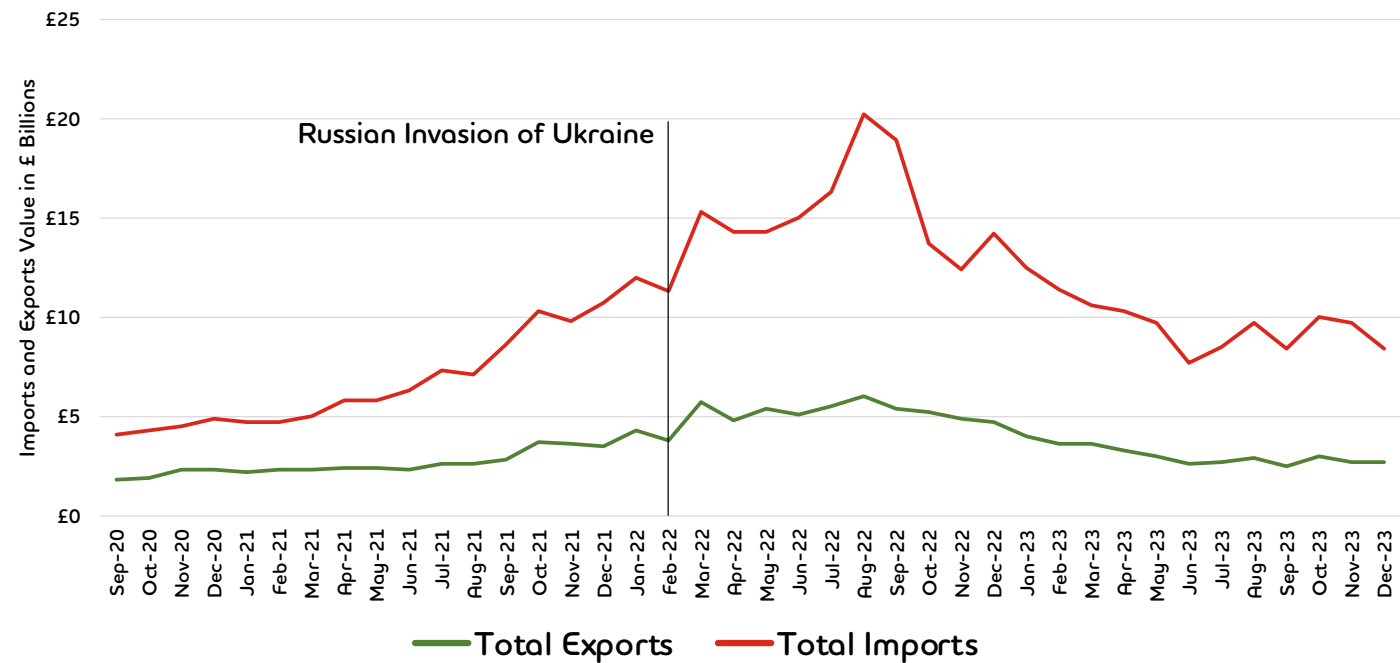
Currently, the UK imports 46% of the gas it consumes. Since 2021, fuel imports from overseas, particularly in gas, have surged due to escalating wholesale gas prices in the face of geopolitical uncertainty. In the year leading to April 2022, these imports amounted to £76.6 billion, marking a substantial £50.4 billion (192%) upswing compared to 2021.^[11] Decarbonisation of the energy sector would help transition away from high-polluting energy dependency and its associated cost spikes, which have impeded households and businesses in recent years.

However, the lack of a well-equipped and trained workforce is particularly evident in this sector. The energy industry is impacted heavily by an ageing workforce, with one in five employees due to reach retirement by 2030 and an inadequate pipeline of young talent.^[12] In the UK, the growth of a Low Carbon and Renewable Energy Economy (LCREE) as a whole is expected to need 400,000 workers by 2050, notably more than the existing oil and gas workforce, which is estimated at 144,000 according to National Grid.^[13,14] These staff numbers are vital to achieving the decarbonisation targets set by the government.

Although in-demand skills for the LCREE – such as engineering, project management, and technical knowledge and expertise – already exist within the energy sector, training on adaptability, creativity, and innovation are essential to building resilience as the industry evolves. Further research and monitoring to understand gaps in both existing and new skills is crucial in this field.

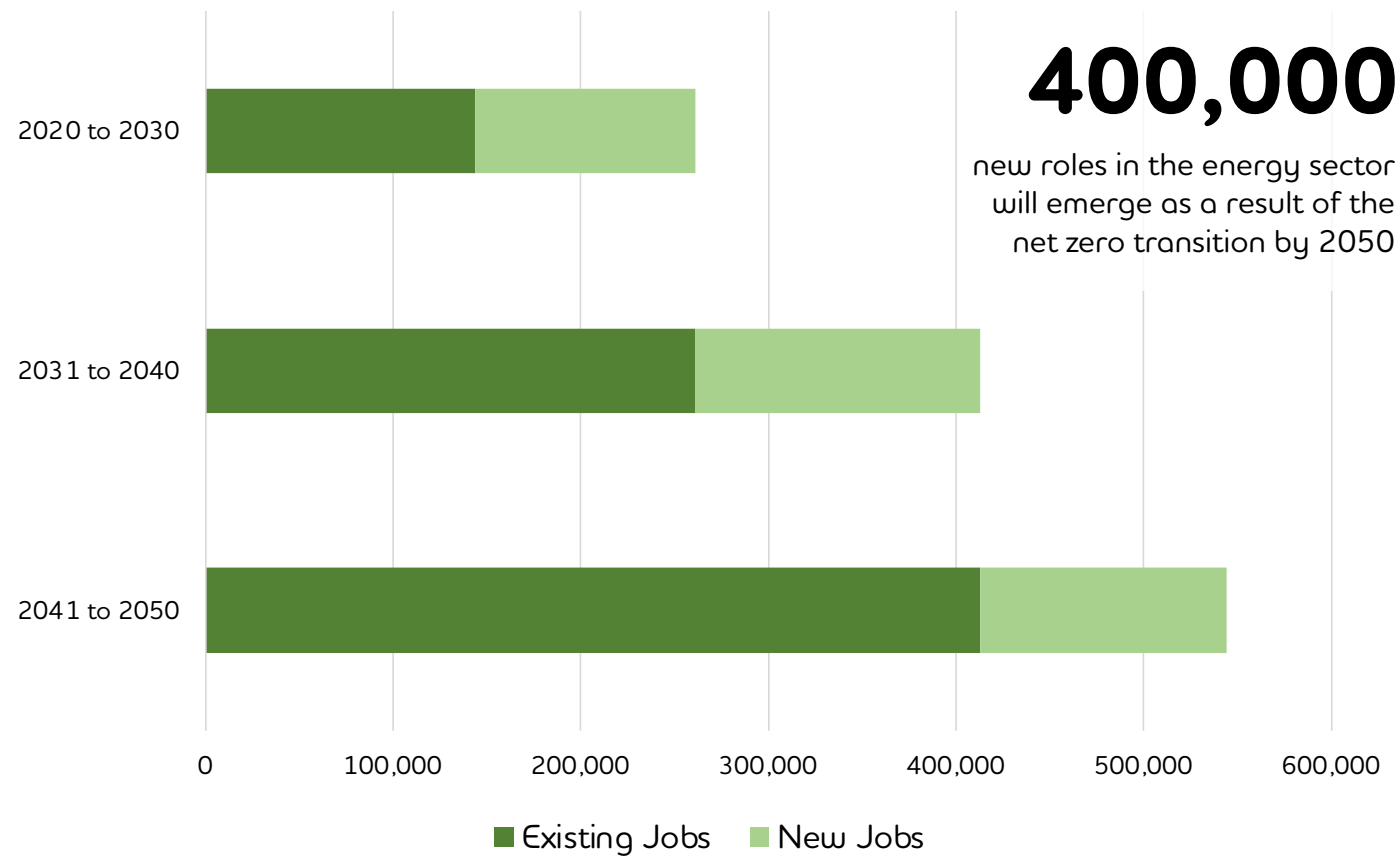


Value of Fuel Exports and Imports Over Time in the UK



Source: ONS

New Jobs in the UK’s Energy Sector Breakdown



Source: National Grid

Sources

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Transport

Surface transport – encompassing vehicles such as cars, vans, lorries, and public transportation like buses, coaches, and trains – contributes up to 70% of the UK’s total emissions from transport and constitutes 23% of the country’s overall greenhouse gas emissions.^[15] The government aims to more than halve all surface transport emissions by 2035.

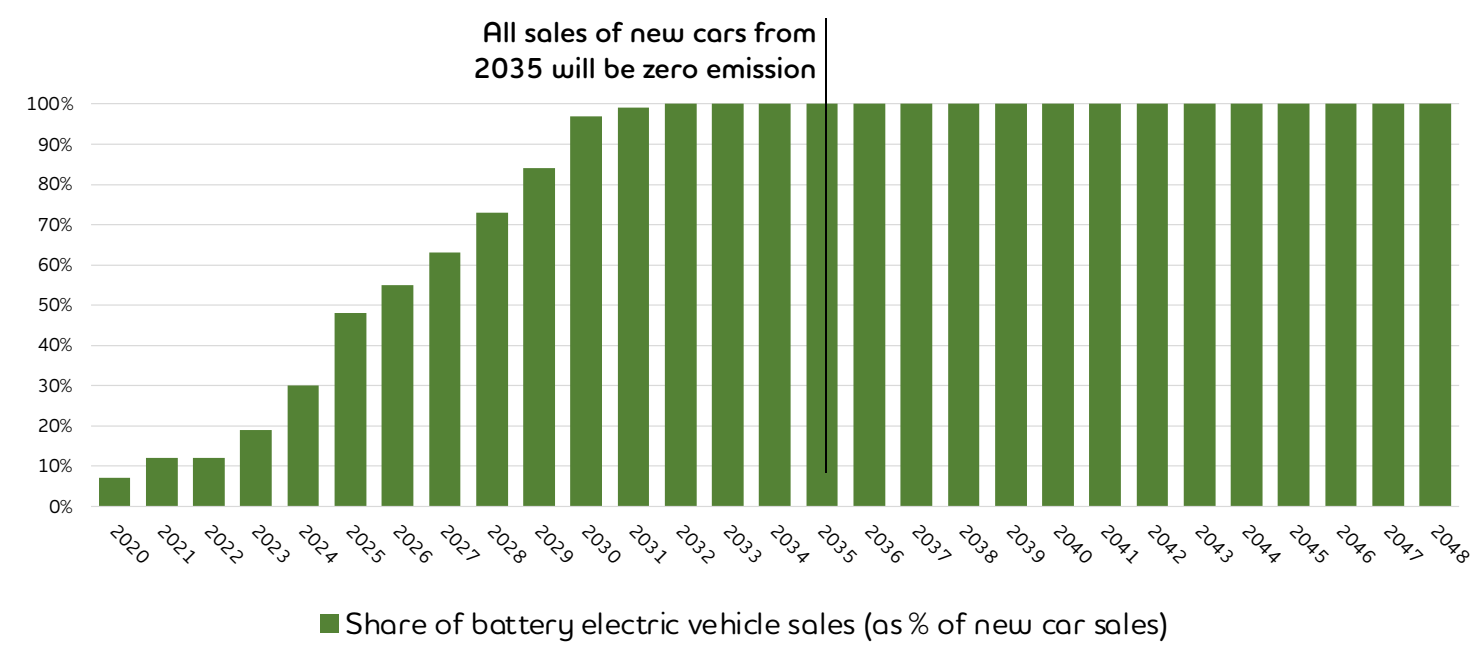
Despite its pronounced bearing on carbon emissions, the transport sector has exhibited resilient adaptability with the sound growth of the electric vehicle (EV) industry. **As of 2022, there were 16.5 million electric cars on the roads, leaving space for optimism in the net zero transition, with predictions indicating that by 2030, 24% of total cars per capita will be electric.^[16,17] In addition, the UK government’s targets indicate that all sales of new cars from 2035 will be zero-emission.^[18] To meet this demand, it is estimated that 185,000 EV qualified technicians will be required by 2035 according to latest estimates from the Institute for the Motor Industry.^[19] Although signs show that the EV technician skills transition is making promising progress, driven by investment and the popularity of the sector, an ageing workforce along with increased costs of training presents a threat.^[20] In addition, further constraints in the rise of EVs are indicated in the lack of infrastructure and the initial financial outlay for individuals when purchasing electric vehicles. This dual impact relates to both slowing investment and the absence of relevant policymaking.**

Transport providers are adopting various initiatives to facilitate the flow of transferable skills and knowledge among workers. Uber, for instance, has been investing in awareness sessions, providing information, advice, and guidance to assist drivers who are considering the transition to an electric vehicle. These sessions aim to help Uber drivers understand the nuances and benefits of electric vehicles, explore available options, and gather feedback from drivers who have already made the switch.

Discussing the rollout of EV infrastructure and policymaking, **Edward Davison, Public Policy Manager at Uber, highlighted the importance of collaboration with the state: “We work closely with governments, local, and regional administrations and with other organisations to accelerate the path to electrification. Climate is a team sport and requires strong partnership across the public and private sector.”**

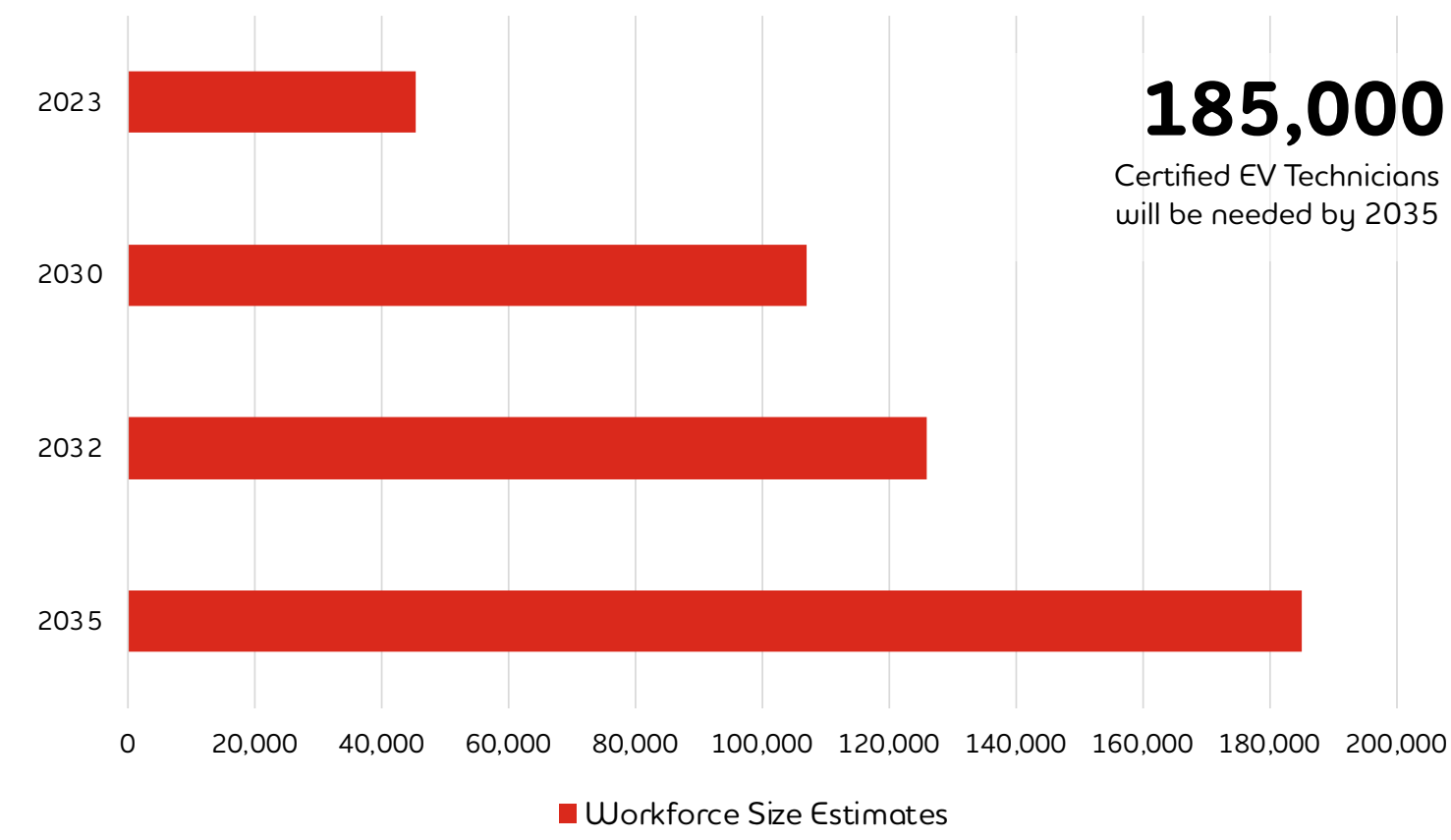


New Jobs in the UK’s Energy Sector Breakdown



Source: Climate Change Committee

Forecast Gap for Electric Vehicles Certified Technicians in the UK



Source: Institute for Motor Industry

Sources

¹⁵ Climate Assembly UK, "The Path to Net Zero", ND (accessed 23 Feb 2024)

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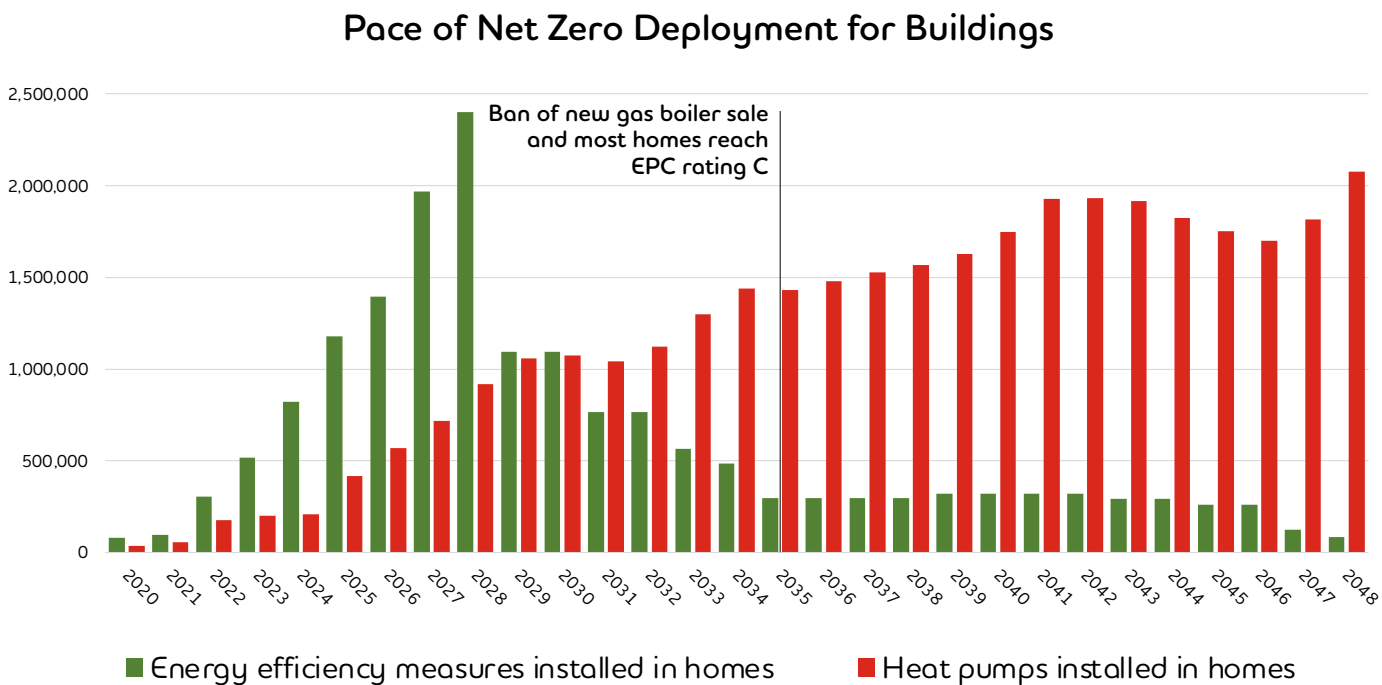
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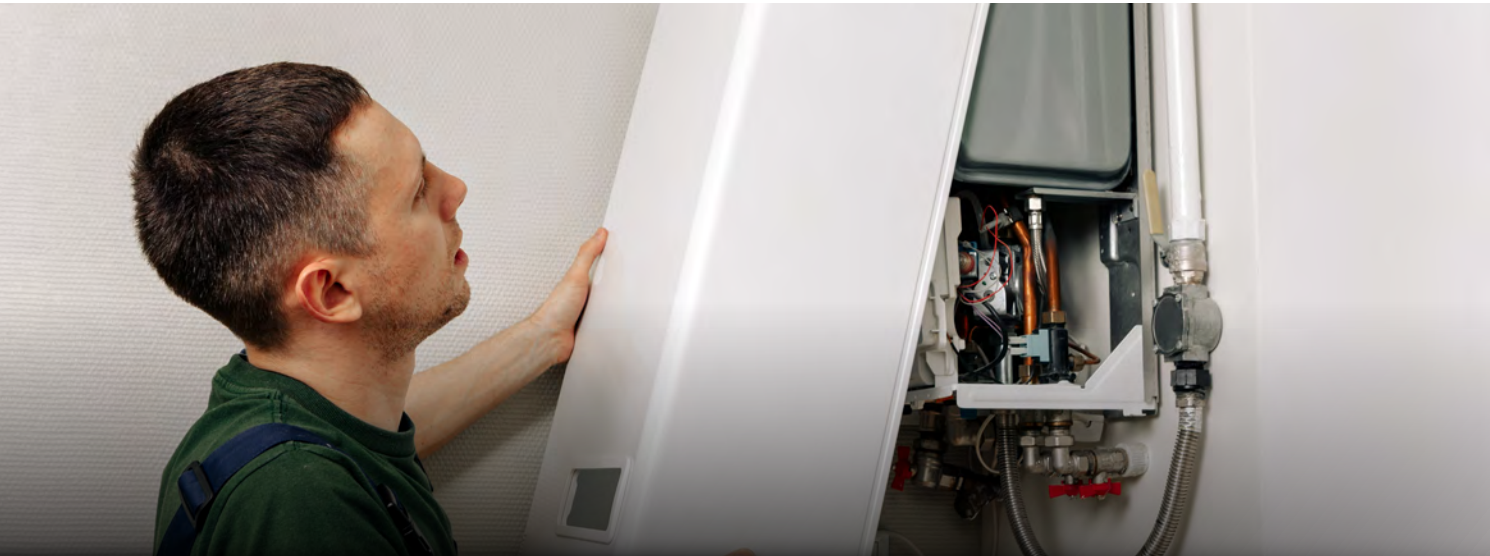
Construction

To address the rising demand for energy and its pivotal role in meeting net zero targets, housing decarbonisation is essential. In its 2023 report to the UK Parliament, the CCC revealed that carbon emissions related to buildings remain stubbornly high, accounting for a fifth of the UK’s annual emissions. The vast majority derives from homes,^[21] of which there are approximately 28 million in the UK. Nearly two-fifths were built before 1946 and over half before the Building Regulations 1965 first required thermal insulation, underscoring the scale of the challenge.^[22] The construction sector, currently employing 2.15 million workers in the UK, is concentrated in London, the South East, and the East of England, with fewer workers in the North and Midlands.^[23]

Retrofitting the entire UK housing stock for energy efficiency and low-carbon heating to meet climate targets faces a considerable challenge due to a shortage of skilled workers. The Institute for Public Policy Research (IPPR) suggests that approximately 750,000 construction workers could retire by 2035, coinciding with government goals for home retrofits and phasing out gas boilers.^[24,25] A skills deficit has also led to the postponement of the Future Homes Standard to 2025, as developers cite insufficient staff and skills needed to enable targets to be met any earlier.

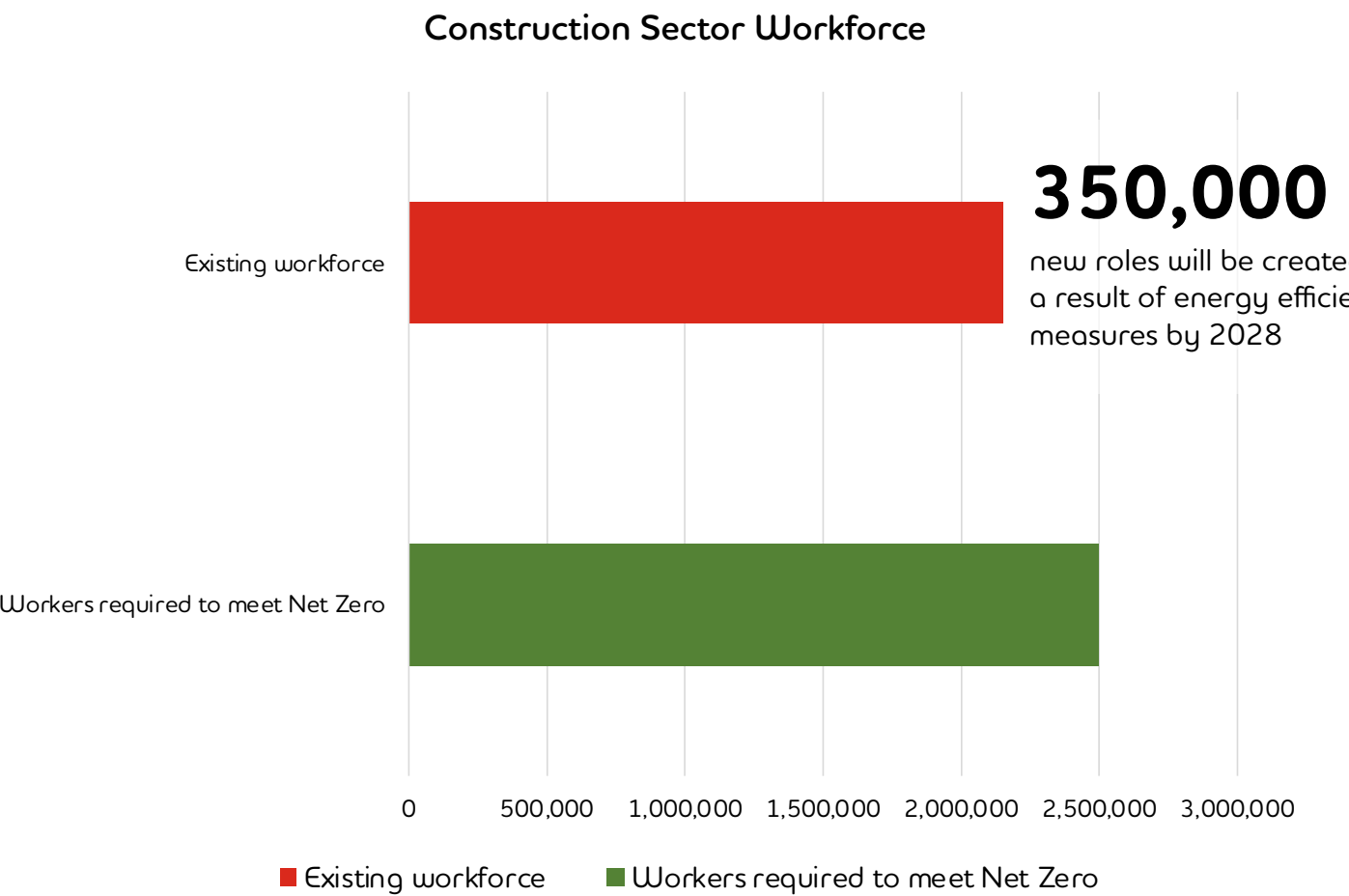


Source: Climate Change Committee



Apart from retrofitting, the government has proposed to scale up the market for heat pump installations to 600,000 by 2028, offering £1.5 billion of funding. However, current rates are approximately one-ninth of this target and are not accelerating at the required pace.^[26] Installation rates of energy efficiency measures continue to be below necessary levels, despite a 20% rise in installations recorded during 2023.^[27] The Heat Pump Association predicts a demand for 12,400 installers by 2025 to handle the set-up of 300,000 heat pumps annually, escalating to 50,200 installers by 2030 for a total of one million heat pumps. For building retrofit, 12,000 upskilled workers are needed yearly for the first four years, climbing to 30,000 annually for a decade, resulting in a total workforce increase of 230,000 by 2030. Additionally, the heat network sector could generate between 20,000 and 35,000 direct jobs by 2050, while boosting UK manufacturing to supply 300,000 heat pumps annually by 2025 and creating over 10,000 manufacturing jobs.^[28]

Key skill gaps crucial for addressing this challenge include shortages in energy efficiency engineers, retrofit coordinators, heat pump installers, and digital professionals to meet the growing demand in domestic buildings. Larger projects, such as commercial buildings, are also witnessing a surging requirements for passive house designers and energy auditors.^[29]



Source: CITB

Sources

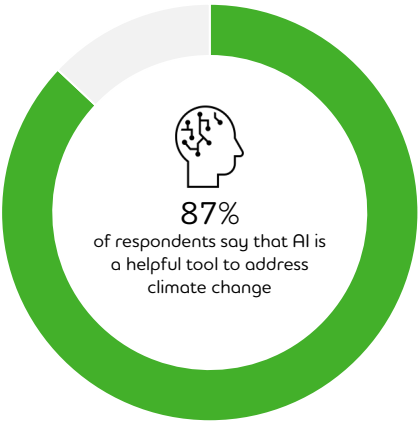
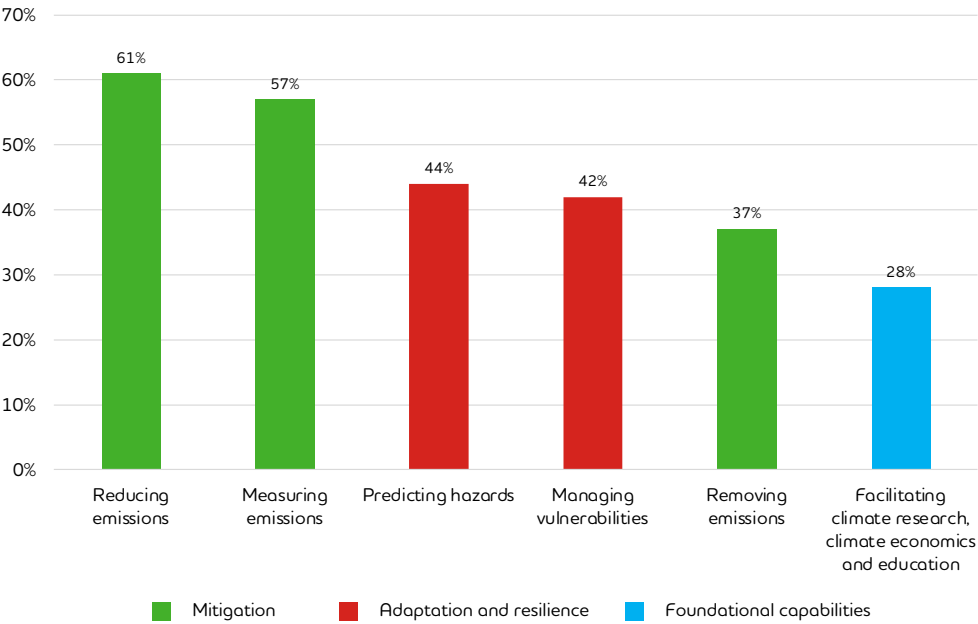
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The Digital Transformation Intersection

It should also be noted that, alongside decarbonisation, another disruptive and powerful megatrend – digitalisation – has taken centre stage in recent years. Working in tandem, these developments could trigger seismic advancements in our journey towards net zero. Artificial intelligence (AI)’s revolutionary impact on people’s livelihoods and employment showcases how it could perceivably affect the greening of critical infrastructure. As we will observe in the coming paragraphs, it can contribute to climate action by reducing emissions, guiding adaptations to inevitable climate change outcomes, and providing foundational capabilities that enable climate initiatives. The possibilities for AI in driving positive climate action are emphasised by 87% of executives recognising AI’s potential in solving climate issues.

Leaders Believe AI can Play a Role in Climate Action, Especially in Helping to Reduce Emissions

Q: In which areas of climate-related advanced analytics and AI do you see the greatest business value for your organisation? (%)



Source: BCG Climate AI Survey 2022. All respondents have decision-making authority over climate or AI topics at their organisations. Respondents were permitted to give more than one answer.

According to a recent report by PwC, *How AI Can Enable a Sustainable Future*, using AI for environmental applications can boost global GDP by 3.1% - 4.4%, while also reducing global greenhouse gas emissions by around 1.5% - 4.0% by 2030, relative to Business as Usual.^[30] These projections hinge not only on AI, but also on the integration of a broader complementary technological infrastructure. For example, in transportation, AI-enabled autonomous vehicles need to provide more than energy efficiency benefits through intelligent navigation and eco-driving; they must ultimately be electric vehicles and encourage ride-shares to counteract the anticipated rebound effect of increased vehicle miles.

Sources

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The rapid advancement of technology means we have devised new capabilities to tackle core climate change concerns head on. As far back as 2016, Google’s DeepMind deployed AI algorithms to reduce energy consumption in its data centres. **Their AI-based recommendations led to a 40% reduction in cooling costs, illustrating how AI can make a sizable impact on large-scale energy efficiency.**^[31]

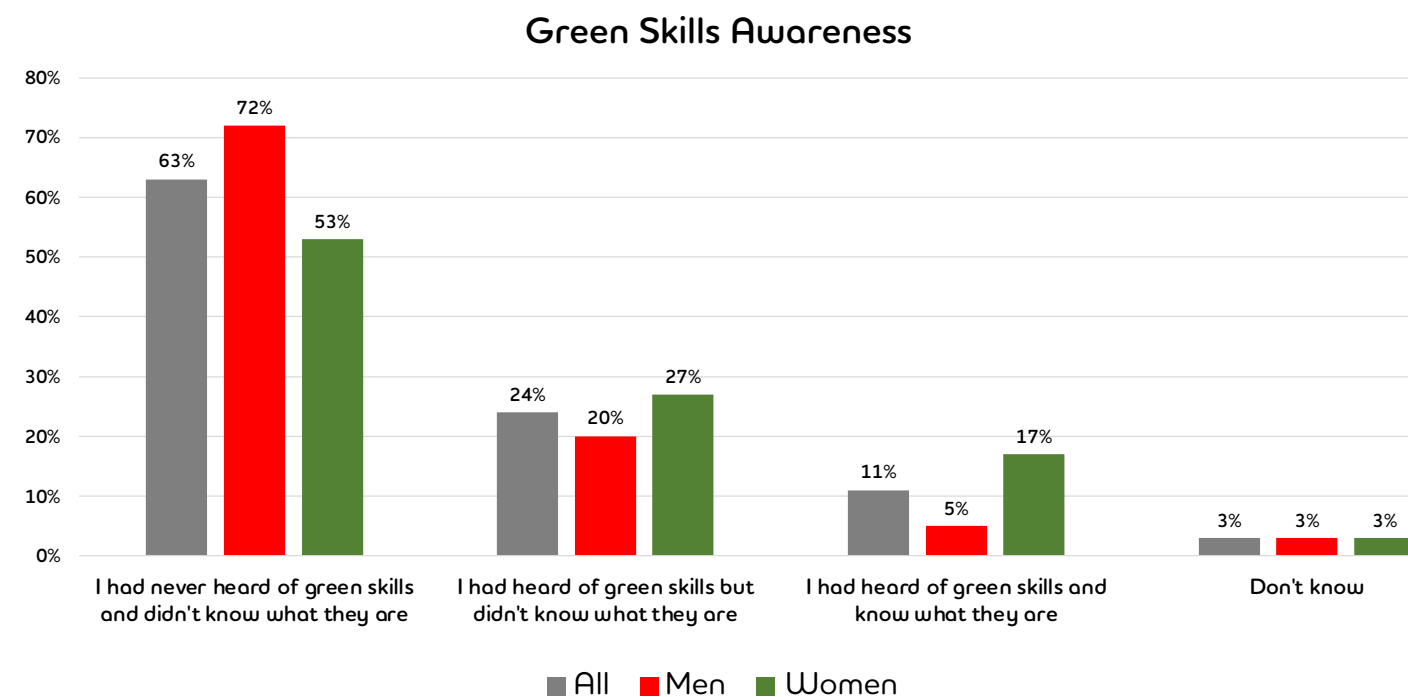
There are considerable future applications of AI in core sectors, which can support sustainability and expedite the transition to net zero. For example, AI can aid in the development of renewable energy sources such as wind and solar power by predicting energy output, optimising performance, and improving maintenance. This has already been adopted by GE Energy, which has installed AI in its wind turbines to enhance their performance. These turbines are equipped with sensors and algorithms that can predict changes in wind conditions and adjust the turbine’s operation accordingly. **Additionally, AI-driven maintenance scheduling is used to proactively identify and address issues, reducing downtime and maintenance costs.**^[32]

4 The Challenges of Net Zero Transition

Green talent scarcity substantially threatens to the move to next zero. To overcome this, collaborative efforts, including workforce development initiatives, training programmes, and education, play a pivotal role. Building a workforce equipped with the necessary expertise, skillsets, and knowledge is essential to reap benefits from the shift to a low-emission economy. For this to happen, it is important to take into account a number of challenges that can potentially present barriers to the decarbonisation of the workforce.

4.1 Lack of Awareness and Visibility of Green Careers

Targeted education and open dialogue ensure all parties share a concrete understanding of what the term “green skills” signifies. **This is a vital component for the implementation of green strategies and policies.**^[33] Not only is it crucial in preparing for and adapting to the green transformation, but it can also provide extrinsic motivation, allowing workers to place their role within “the bigger picture”. **The current communication deficit is evident across young generations, with only one in ten young people (aged 16–24) having a conclusive understanding of what green skills entail, according to a Learning and Work Institute report.**^[34] Yet the same study highlights that eight in ten would choose to work for an organisation with a green agenda.



Source: World Skills UK & Learning and Work Institute

Clear communication serves as a catalyst in overcoming various challenges stemming from a lack of common perceptions of net zero, including determining which skills to focus on and identifying skills that can transition from non-green to green occupations. In a broader context, beyond the workforce, methodical communication drives effective understanding, ensuring a smooth transition to the net zero economy for both the public and the communities impacted by decarbonisation changes.



4.2 The Global Green Talent Shortage

Green talent scarcity is not solely a UK challenge, with its magnitude spreading across most developed and developing economies. **Data from LinkedIn pinpoints a mismatch between demand for skills associated with net zero industries and current availability across 48 countries; the number of job postings requiring at least one green skill rose by 22.4% between 2022 and 2023, outpacing the growth of the share of green talent in the workforce, which stood at 12.3%.**^[35] According to the same source, only one in eight workers possessed green skills or relevant experience in 2023.

The Adecco Group’s **Creating the Green Talent Pool for Climate Action** report observed that **government accountability, labour market inclusivity and agility, and incentives play an instrumental role in getting workers to reskill across G20 economies.**^[36] Indeed, the report highlighted that economies within the G20 featuring a combination of country-wide sustainable innovation, government inclusiveness, and governance quality are more likely to produce better climate outcomes and smoother adoption for their respective labour markets. Deteriorating factors that are likely to impede the green transition on a global scale are associated with levels of informal employment, youth unemployment, and low awareness of climate risks, with China and India amongst the key examples for this case, according to the same study.

As green talent availability has become a global challenge, observing the performance and behaviour of countries that play a leading role in the transition can offer useful demonstrations of policymaking and collaboration. These learnings can provide the necessary support and incentives to the workforce to successfully take part in the decarbonisation process.

Sources

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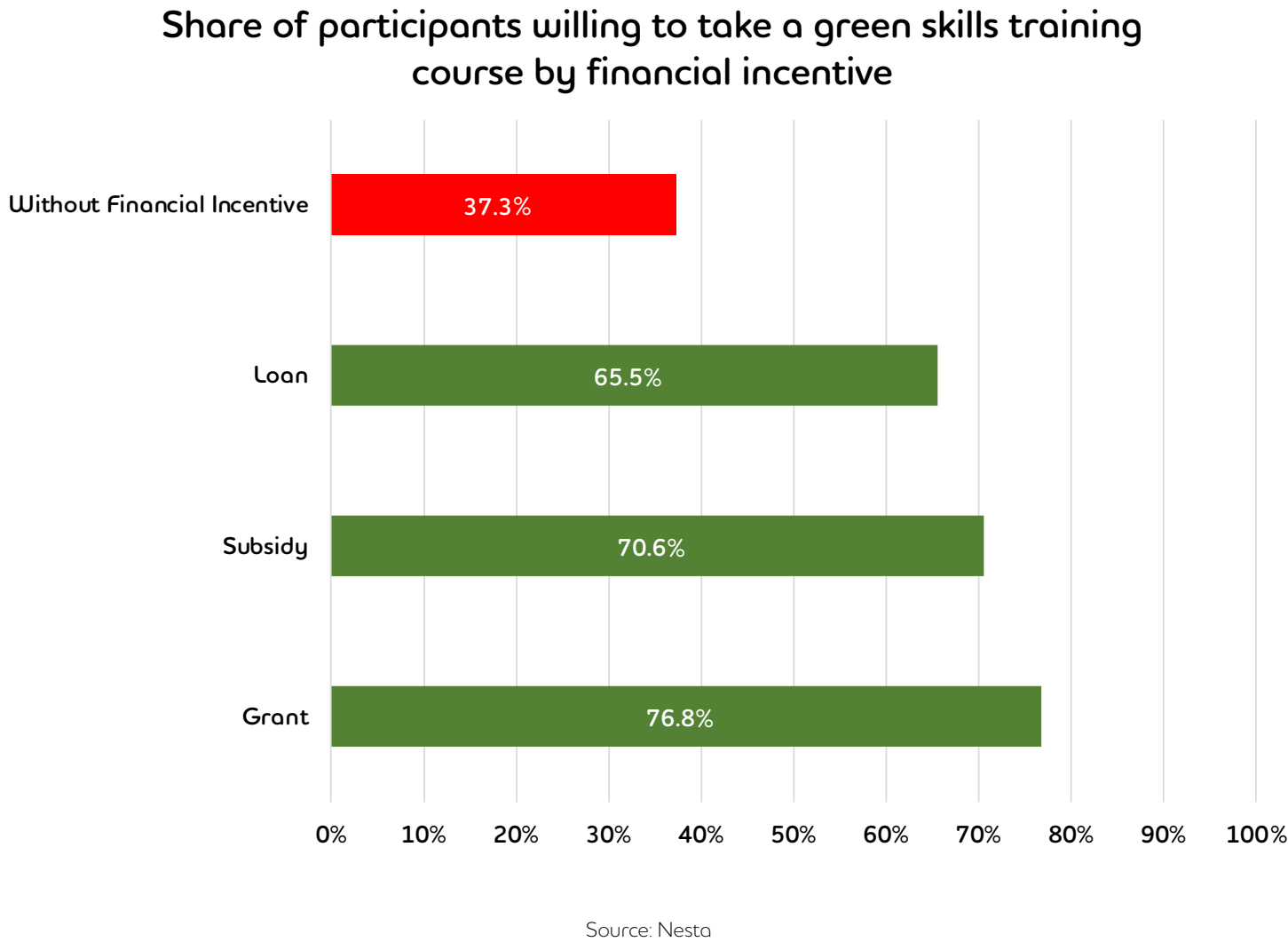
³⁶ The Adecco Group, “Creating the Green Talent Pool for Climate Action: Introducing the Green Talent Potential Index, a Country Benchmark on Which Country Is Building and Retaining the Best Workforce to Mitigate Climate Change”, 2023 (accessed 23 Feb 2024)

4.3 Lack of Incentives and Accessibility of Training

Identifying ways to acquire green skills is a key factor demanding a considered approach. Education, upskilling, reskilling, and visibility of job opportunities are critical components in forming a net zero workforce.

The proposed system for an Advanced British Standard for education, encompassing both classroom and on-field experience on technical skills, can effectively deal with the development of a green workforce.^[37] For example, T-levels – technical-based qualifications developed in collaboration with employers and businesses – offer useful learnings, theoretically constituting an ideal route for green skills acquisition. Notwithstanding that, the two-year courses have not yet been fully adopted while challenges of coherence and structure are still not entirely addressed.

From a training perspective, the Apprentice Levy scheme could, on paper, partially cover upskilling and reskilling the workforce in the short term. However, the scheme has been extremely underutilised, with growing calls to reform it into a skills-based programme and assess possible barriers to training. Reforms should aim to make the initiative simpler and more accessible by both education leavers (estimated at 794,000 as of 2023) and the existing workforce, regardless of the business size that will need to be reskilled to meet the mounting demand for green capabilities.

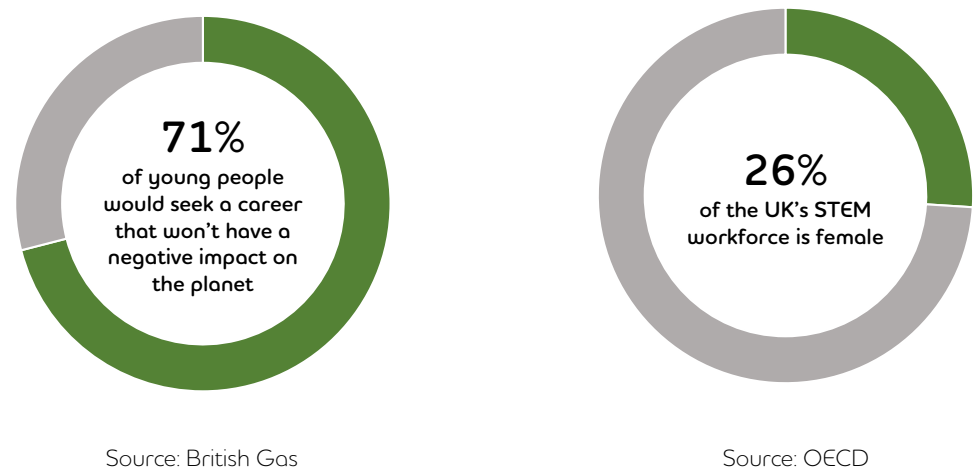


Observing and acting on worker motivations to participate in training could widen the appeal of green jobs. A recent survey from Nesta found that financial incentives, such as grants or loans covering either partial or full training costs, would make green roles considerably more attractive to young workers. **According to the study, 76.8% expressed interest in accessing a fully funded training course, while 65.5% would consider a loan that must be repaid.**^[38] Similarly, the same study spotlighted the importance of flexible training formats to cover evolving working practices. **Nearly two in five employees (38%) prefer online training, 20% prefer in-person, and 35% prefer a hybrid approach.**^[39]

Touching on visibility, Nesta’s study found **74% of participants were aware of the importance of green jobs, but fewer than half had sight of relevant opportunities (43%) or knew where to look for them (42%).**^[40] This disconnect emphasises the value of clear progression pathways and bespoke job matching services.

4.4 Diversity and Inclusion Challenges

The integration of Equality, Diversity, and Inclusion (ED&I) is a cornerstone in driving forward the green transition. Yet, despite concerted efforts towards fairness and inclusivity, diversifying the UK’s workforce is proving challenging. Data suggests that much work still needs to be done to increase diversity in the transition to net zero, especially for critical-impact sectors such as energy and construction. Disparities have been evident across various underrepresented demographics, including young people who are not in education, employment, or training (NEET), and women.



The Gender Representation Gap

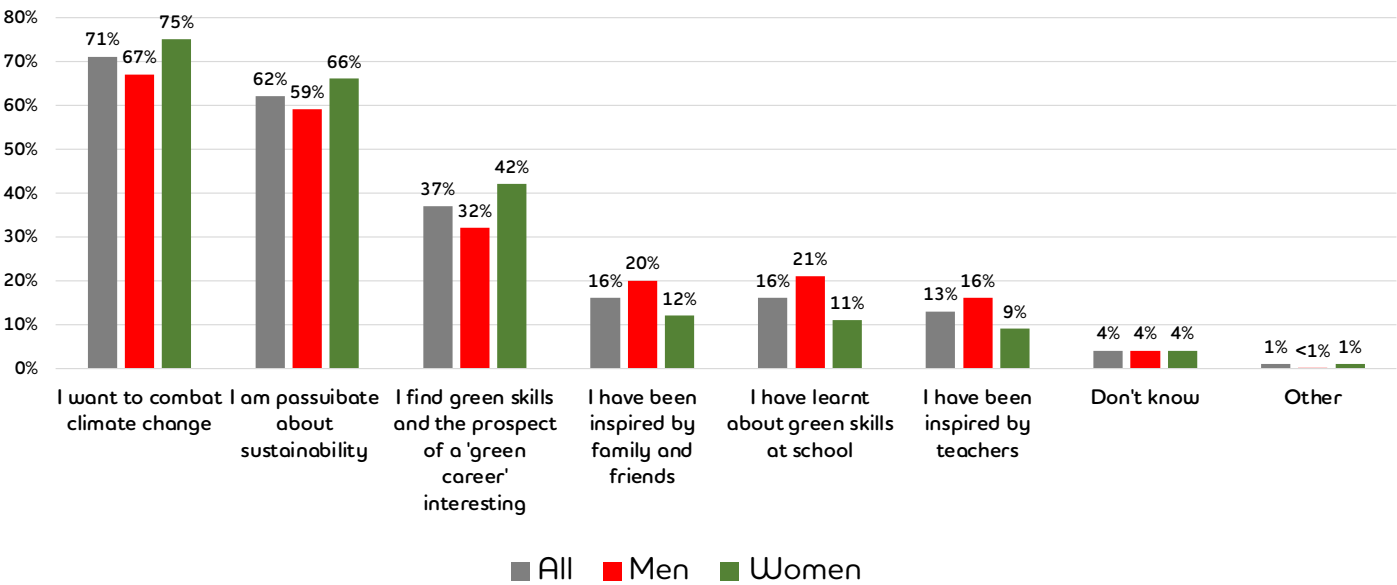
Gender equality challenges have been evident globally, with men holding 72% of green jobs in the 38 member countries and regions of the Organisation for Economic Co-operation and Development (OECD), **spotlighting a marked gender disparity.**^[41] To achieve gender parity, approximately 20 million women in the OECD would need to transition to relevant roles. This gap not only means missed opportunities for women in emerging green sectors, but also perpetuates the gender pay gap, as green jobs typically offer wages up to 20% higher than non-green jobs.

A key obstacle lies in the underrepresentation of women in critical occupations driving the green transition, with only 26% of the UK’s STEM workforce being female, a figure projected not to reach gender parity until 2070. Research also reveals a stark imbalance in green skills, with nine out of 10 women lacking any green skills compared to 16% of men. **Moreover, globally, women constitute only 33% of individuals with green skills or experience.**^[42]

Youth Not in Education, Employment, or Training (NEET)

A survey commissioned by British Gas, involving 1,000 individuals aged 15 to 25, reveals that 71% want a career that won't have a negative effect on the planet. **Within this segment, 94% want to help protect the future of our natural environment, and 72% like the idea of a job that helps people to live their lives more sustainably.**^[43]

Reasons for Pursuing a Green Career



Source: World Skills UK & Learning and Work Institute

Whilst this is certainly reassuring, not all green jobs are created equal in the eyes of our younger population. A further study by The Prince's Trust found that, when questioned about various roles related to net zero, young individuals demonstrated the least enthusiasm for positions anticipated to be most sought after. **For instance, only 7% would pursue a heat pump engineer job, while 19% are more inclined to be a farmer, and 22% show interest in conservationist roles.**^[44] Without substantial efforts to alter young people's perceptions and understanding of green jobs, there is a considerable risk of these positions remaining unfilled.

Further research reveals that young people from lower-income backgrounds and those not in education, employment, or training (NEET) show slightly less desire to hold a green job. **Among NEET respondents polled by Public First, 41% expressed interest in green job training, compared to 58% overall.**^[45] This is likely due to the perception that green jobs are generally low-paying and lack purpose-built pathways for advancement. NEET individuals were also more inclined to view a lack of experience and skills as their primary barriers to securing these roles.

Sources

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⁴⁹ Office for National Statistics (ONS), "Output per Worker: Whole Economy SA Index 2019=100, UK," Office for National Statistics, Labour productivity time series (PRDY), 15 Feb 2024 (accessed 23 Feb 2024).

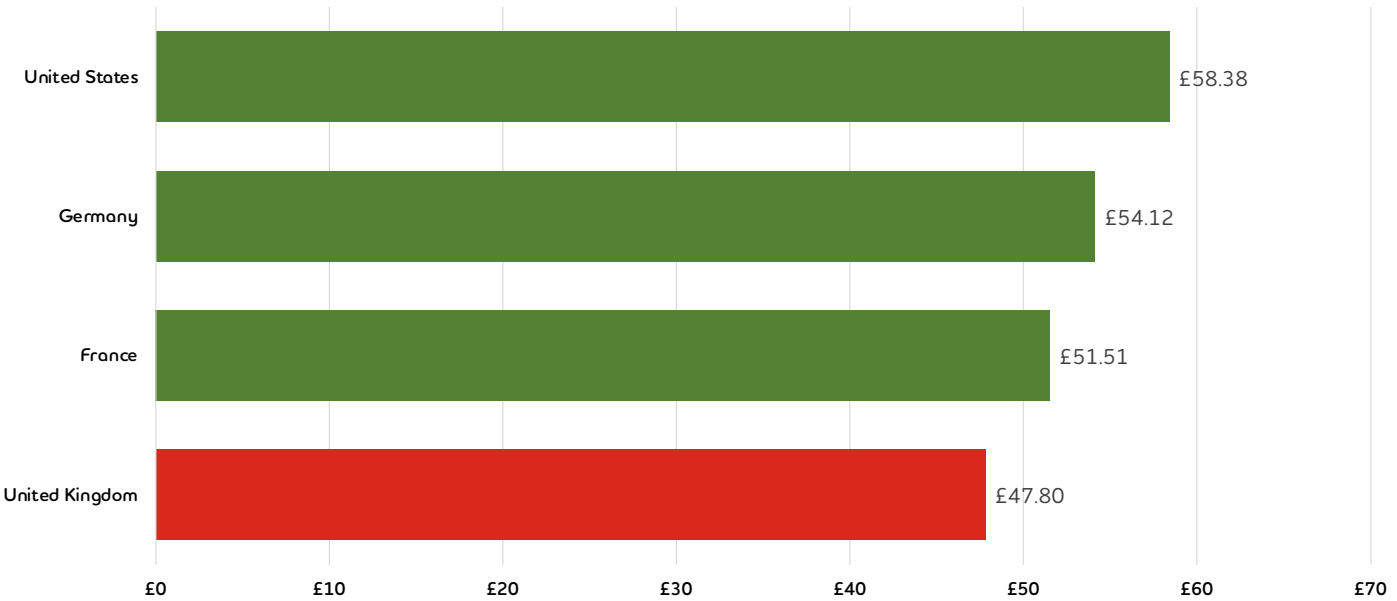
⁵⁰ Office for National Statistics (ONS), "Productivity flash estimate and overview, UK: October to December 2023 and July to September 2023," Office for National Statistics, 15 Feb 2024 (accessed 23 Feb 2024).



4.5 The UK's Productivity Gap

Setting industrial strategies to enable the shift to net zero plays a pivotal role in controlling challenges existing beyond the low-carbon economy in the long run. **Labour productivity – that is how much a typical worker produces each hour – is among the top factors that can be impacted by this transition.**^[46] According to the latest OECD data from 2022, the UK's labour productivity currently lags behind other advanced economies, with an estimated annual output per hour worked at £48.35, below the likes of France (£52.13) and Germany (£54.83).^[47]

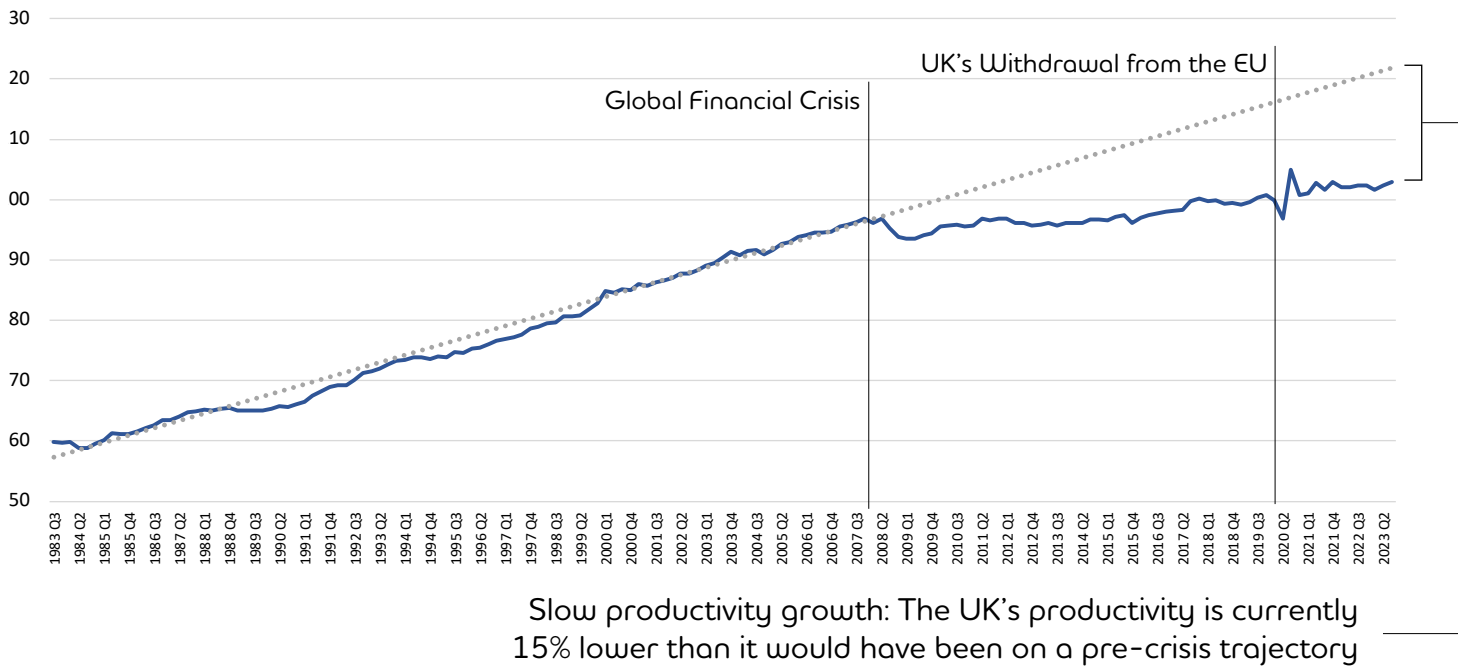
Output Per Hour Worked in GBP



Source: OECD

Low productivity levels are not a new problem. **Historical data shows that root cause stems back to the 1970s, with the years after the global financial crisis between 2008 and 2010 exhibiting particularly slow growth.**^[48] Data from ONS reveals that UK productivity output index in Q3 2023 was 15% lower than it would have been had it followed a pre-crisis trajectory based on rates from the last 30 years.^[49] Moreover, amidst economic headwinds in 2023, core sectors that are expected to be reshaped by the net zero transition, such as energy and transport, saw negative annual growth in output per hour worked (-8.7% and -3.4% respectively), while gains were recorded for construction (3.7%).^[50]

UK Labour Productivity Output per hour Worked over Time



The blue solid line presents the UK's Labour Productivity Output Per Hour Worked, Seasonally Adjusted over Time (Index 2019 Q1 = 100), while the dashed line exhibits the forecasted trend as it would have been prior to the Global Financial Crisis based on linear regression using the figures between 1983 Q3 and 2007 Q4. Data was obtained by the Office for National Statistics' Labour productivity time series (PRDY) published on 15 February 2024.

In terms of workforce preparation, the risks posed by slow productivity growth seen in the UK have multidimensional effects on greening the economy. One dimension of the problem is that labour productivity shortfall is partly a result of low investment growth, which is crucial for the net zero transition. **Currently, the UK sees a sizable investment deficit, with the CCC reporting that annual low-carbon investments must increase to £50 billion to meet the government's net zero targets.^[51]** In that sense, although it would be invalid to argue that changes will deliver immediate results, the transformation to a low-carbon economy presents an opportunity to address this aspect of the issue in a microeconomic level through green investments.

Another dimension regarding declined productivity touches on skills and the workforce's capabilities to produce higher output. Changes in Britain's labour force demographics in recent years, fuelled by macroeconomic forces, including the UK's withdrawal from the European Union and the impacts of the pandemic, have led to a pervasive skills deficit. **This has been evident from the UK's unfilled jobs remaining at historically high levels – close to one million by the end of 2023.^[52] Establishing a framework with a concrete focus on education and skills would help bridge the productivity gap and provide opportunity for long-term environmentally friendly investments and consequently, more sustainable economic growth.^[53]**

In addition to a more robust framework for education and skills development, we see possibilities to improve productivity by applying evolving technologies such as artificial intelligence and robotics to maximise human resourcefulness. Supplementing an effective skills-based education system with a digital framework can significantly curb the low productivity problem.

In conjunction with targeted distribution of opportunities to support regional growth, these initiatives will not only help solve what analysts describe as the UK labour market's "Productivity Puzzle", but also drive prosperity across communities.^[54]



4.6 Regional Variation in Green Jobs Opportunity and Demand

Over recent decades, the UK labour market has exhibited large regional disparities, underlining inequalities in the distribution of employment and training accessibility with a damaging effect on communities and the potential for prosperity. The transition to net zero could help to mitigate these disparities by providing a broad distribution of employment opportunities.

The existing risks are visible in the labour market outlook across areas with high unemployment rates, such as Birmingham (7.3%), Leicester (6.1%), and the West Midlands metropolitan area (6%).^[55] Additional investment targeting the provision of training and employment access to this part of the population will not only fill vacancies crucial for achieving net zero, but also in part address the issue of levelling up in marginalised areas.

Collaboration between local and regional authorities, businesses and the education sector is vital to achieving this. Examining the distribution of green career options across places, **Dr Anna Valero, Director of the Growth Programme at the Centre for Economic Performance at the London School of Economics and Political Science (LSE), argues: “Understanding the local labour market, and what the opportunities for local people are, is important. Ultimately, people are not completely mobile geographically. They don’t simply move to where the jobs are.”**

An in-depth evaluation of green jobs distribution in the UK published by The Centre for Climate Change Economic and Policy and the Centre for Economic Performance reveals an interesting landscape. Currently, most net zero jobs roles are clustered in specific regions.^[56] For example, “green-enhanced skills” occupations are more prevalent in Wales, the West Midlands, and the South East. **We are also seeing new and emerging green roles in the South of England, with considerable prospects in Scotland and the North West.** Positions with increased demand in the green sector are concentrated in Northern Ireland, the North of England, and the Midlands.^[57] Further analysis identifies hotspots in the Scottish Highlands/Islands, Devon, Cornwall/Isles of Scilly, Tees Valley/Durham, and the Gloucestershire/Wiltshire/Bristol/Bath area.^[58]

Research by the thinktank Onward further suggests that regions with high exposure to green jobs grapple with large-scale skills gaps. Scotland and the East and North East regions of England face deficits in green skills compared to the available jobs in those places. **This indicates that geographical location may hinder access to green jobs, especially when these roles are situated in regions with skill shortages.**^[59] Addressing the mobility of skills across these areas not only poses logistical challenges, but also underscores the importance of a just transition that considers the broader economy.

Sources

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^{53, 54} Tuckett, Alex and Dinh, Thanh, “The Productivity Puzzle revisited: why has UK productivity lagged behind other advanced economies?”, PricewaterhouseCoopers (PwC), 2019 (accessed 23 Feb 2024)

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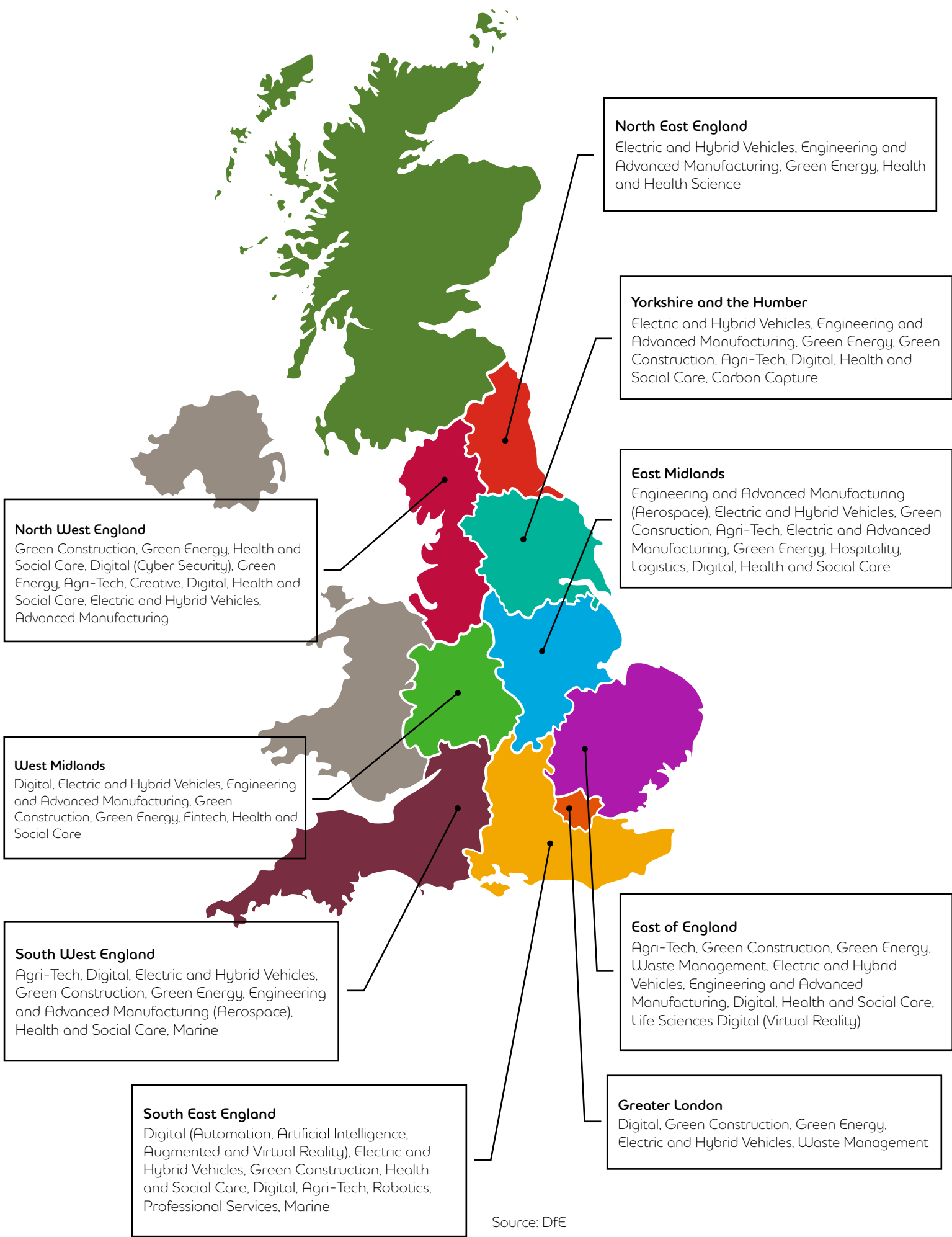
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UK Map showing Green Industry Focus Areas



5 Recommendations for a Successful Transition

The shift from a high-carbon to a low-carbon or carbon-neutral economy offers numerous opportunities with perceivable benefits for the UK economy and individuals alike. These include fostering a resilient workforce, driving innovation, stimulating economic growth, empowering communities, and enhancing people's livelihoods and health.

In the previous chapters, we discussed net zero talent availability as a key area requiring attention, emphasising the significance of structured education and green skill pathways and the development of advanced technologies in mitigating risks that could undermine the success of the transition. Further areas for consideration include the need to:

- Increase awareness and communication regarding the context of the green transition.
- Establish clear, accessible education and training pathways to safeguard the stimulus of an adequately skilled and inclusive workforce.
- Introduce predictability in policymaking.

The UK is in a prime position to lead – rather than follow – this transition. This can serve not only as a recovery lifeline from the damage posed by the global pandemic and subsequent headwinds, but also as an opportunity to establish solid foundations resulting in a future-proof, long-term, and inclusive workforce. Acknowledging and addressing challenges that could impede the pace of green change is critical in meeting these ambitions and requires strong strategic planning.



5.1 Effective Communication of Green Skills and Jobs

The concept of green skills is diverse, encompassing not only technical skills, but also competencies, values, and attitudes. Establishing mechanisms to ensure workers have the opportunity to develop green skills and pursue definitive career pathways, either through education or training schemes, is imperative.

Understanding and communication regarding “what green skills are” has been a particularly challenging notion, affecting both employers and workers. In our previous publication, **Greening the Workforce: Net Zero Skills for a Sustainable Future**, we explored various factors to formalise a definition, which is subject to change in the process of decarbonisation:

When discussing green skills, we refer to the knowledge, competencies, values, and attitudes required to thrive in, contribute to, and promote a sustainable and resource-efficient society. These skills encompass existing competencies applied to tasks associated with achieving net zero performance in various industries, such as builders adopting alternative materials while employing similar techniques.

They also include novel skills that emerge to support new processes, like energy auditors acquiring knowledge to assess the energy efficiency of homes or buildings. The significance of green skills in establishing a carbon-neutral economy can't be overstated, as they impact a wide range of sectors. These capabilities span practical or technical abilities, as well as long-term strategic thinking, monitoring, and interpersonal proficiencies.

Mechanisms to upskill and reskill workers are critical to fulfilling green job market demands and ensuring a smooth and efficient net zero transition.^[60]

In an industrial context, **Deputy CEO for the Institute of Environmental Management and Assessment (IEMA), Martin Baxter, highlighted that: “We are going through a significant economic transformational change. That means that people will have to do things differently as businesses, products, and supply chains will change drastically. For some roles, it will require organisations to incorporate additional skills sets, such as design engineers applying life-cycle assessment tools into new product development processes. Skills enhancement will also open up new opportunities, for example a qualified electrical installer can take on micro-certifications to acquire the competencies required for solar panel installation in domestic properties or businesses, heat pumps, or the installation of public vehicle electric charging infrastructure. This transition is based on a lot of existing skills needed for the green economy, as well as developing new skills in areas such as hydrogen.”**

In addition to understanding what green skills are, identifying ways to acquire them is also a key factor requiring a considered approach. Looking at the application of such skills in net zero workplaces, it becomes apparent that there is no “one-size-fits-all” solution, considering the particularities and nature of tasks across different sectors.

Sources

⁶⁰ Adecco UK and Ireland, “Greening the Workforce: Net Zero Skills for a Sustainable Future”, Oct 2023 (accessed 23 Feb 2024)

Contributing to the discussion over accessing skills and knowledge required for a low-carbon workforce, **Dr Valero explained: “There’s a combination of skills that are either delivered through formal higher or further education or via work-related training. For instance, technical skills, such as the ones used in roles associated with energy efficiency in buildings, do not necessarily need a university degree but do require training to acquire.”**

Touching on the barriers to training, **Dr Valero added: “A general issue is that work-related training has been in decline in recent years, and there can be particular issues for small and medium-sized enterprises (SMEs) that often find it particularly challenging to have their staff taking time out to go and do training and face more financial constraints in doing that. The construction sector – key for decarbonising homes – accounts for a high share of the UK’s SMEs.”** Based on the latest UK data from the Department for Business and Trade, small and medium-sized enterprises accounted for 16% of employment in the construction industry in 2023.^[61]

5.2 Structured Education and Green Skill Pathways

The risk of a green skills crisis has become evident across sectors already experiencing extensive growth in the net zero transition, placing climate goals at risk. **Globally, a mismatch between green talent demand and supply has been documented, with organisational appetite for low-carbon skills outpacing qualified candidate availability.**^[62]

Focusing on young talent to help stimulate green skills for the future is amongst the strongest solutions to meet demands for net zero occupations.^[63] However, the appeal of green careers among young generations is limited. **According to a November 2023 Prince’s Trust poll of participants aged between 16 and 25 years old, the least popular roles were in industries that will experience the greatest demand, including heat pump installer (7%) and retrofit coordinator (9%).**^[64]

In a more short-term scope, the role of those currently active in the workforce cannot be underestimated, as they bring valuable skills and experience that can contribute drastically to industrial decarbonisation. However, a lack of incentives and problems with training accessibility pose significant threats. Speaking to Adecco about the challenges in green skills availability, **Managing Director at HACT, Jacqui Bateson, explained: “When we’re talking about green skills, very often the discussion is around getting young people into apprenticeships and training. And whilst on the face of it, this is a good solution, it does take a long time for that pipeline to deliver enough to support demand. I think that the real challenge around recruitment is how we tempt people who are already in the workplace to retrain to do these kinds of jobs.”**

Sources

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⁶⁵ The Organization for Economic Cooperation and Development (OECD), “OECD Skills Outlook 2023: Skills for a Resilient Green and Digital Transition”, OECD Publishing, 2023 (accessed 23 Feb 2024)

5.3 AI-Facilitated Learning and Development

Investments in skills are critical to building a resilient green and digital transition. However, the speed of environmental and digital transformations is outpacing the rate of change in education and skills policies and their capacity to respond to emerging trends and needs in society and labour markets.

There are strong indicators that AI could facilitate skills development at scale. **This is crucial not only to align capabilities more adeptly with labour market demands, but also to enable societies to fully leverage the capabilities of artificial intelligence and robotics, facilitating a smooth transition toward a net zero economy, as outlined in the OECD’s Skills Outlook 2023.**^[65]



AI can also assist with green job market insights, swiftly processing large volumes of data to analyse market trends, identifying high-demand green skills and occupations. This information can guide educational institutions and policymakers in aligning training programmes with the evolving needs of the green job market.

There are more specialist applications for AI in high-impact sectors that are central to the green transition. In this way, AI can augment the role of the worker. For example, within renewable energy, skilled staff can leverage AI tools to monitor and optimise the performance of solar panels, wind turbines, and other green infrastructure. Similarly, workers responsible for maintaining and improving smart grids could benefit from AI-driven predictive maintenance, ensuring the reliability and efficiency of the grid infrastructure, reducing downtime, and maximising resource allocation.

Whilst the application for AI in both green jobs and green skill development is evident, it does pose a challenge in itself as AI skills are increasingly in demand and difficult to source. **According to a joint OECD-Lightcast report, demand for artificial intelligence skills boomed by 33% from 2019 to 2022.** [66] Advancements in generative AI and additional investment and awareness are likely to further steepen this trajectory. It is then prudent to consider green skills and digital skills advancement as interlinked, and therefore explore the benefits and risks of these interdependencies when assessing the future green skills workforce.

Sources

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5.4 Tailored Strategies for a Green and Inclusive Workforce

As decarbonisation accelerates, it is imperative to foster pathways for individuals from varied backgrounds to engage and make meaningful contributions to the green economy. The benefits of a more diverse workforce are considerable and include:



Innovation and creativity

Diverse teams bring together individuals with varied perspectives, experiences, and problem-solving approaches. This diversity fosters innovation and creativity, essential elements for developing sustainable solutions and driving advancements in green technologies.



Access to a wide talent pool

ED&I practices ensure that the green sector has access to a broader talent pool. By attracting individuals from different backgrounds, industries, and demographics, the green workforce can tap into a rich array of skills and expertise.



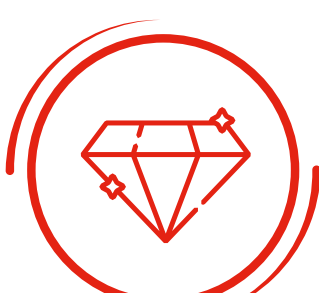
Community engagement

A diverse and inclusive approach is crucial for engaging with communities affected by environmental changes. Understanding and respecting various cultural perspectives fosters more effective community outreach, collaboration, and the adoption of sustainable practices.



Social equity

The green transition should not exacerbate existing social inequalities. ED&I practices ensure that the benefits of the transition are distributed equitably, addressing historical disparities and promoting social justice.



Resilience

A diverse and inclusive workforce enhances the resilience of the green sector. Different viewpoints and skill sets contribute to a more adaptable and robust industry capable of navigating challenges and uncertainties.

5.5 Policy Predictability to Allow Long-Term Strategy Setting

One of the key learnings from Adecco's green skills roundtable event in October 2023 was that business representatives from most sectors are concerned about policy certainty and a lack of predictability.^[67] Stability in policymaking is integral for market growth to occur, and the same holds true for much-needed green investment. In this case, predictability translates into a consistent course of action, with certainty and security fuelling critical business decisions such as budgeting, workforce planning, and broader strategic decision-making.

Key drivers of policy stability in the case of green skills can be reflected by credible and unwavering commitments to net zero goals, targeted funding to deal with investment deficits, and financial incentives to drive higher activity (e.g., heat pumps and retrofitting). Fact-based policymaking to ensure long-term resources for workers to access skills is essential. These are more likely to help organisations build confidence and move with conviction into forward-looking planning and strategy making.

5.6 Public-Private Partnerships to Maximise Investment Impact

The magnitude of decarbonisation in the UK economy makes it clear that actions must be taken to tackle both existing and emerging risks while maximising workforce benefits. However, while it may appear that we are making progress in developing green skills to meet net zero targets, the gap between talk and action remains significant, as amplified at COP28 in late 2023. Even though some businesses have implemented bottom-up and top-down initiatives, the majority have not truly considered embedding green skills throughout their entire organisation. This is even more evident at SME level.

Collaboration across multiple sectors is necessary to bridge the gap between ambition and action. This is the platform upon which parties can align on goal setting, policymaking, and incentivising sustainable business practices. Investment is crucial to developing relevant green skills and meeting growing demand for the green economy.

The green transition presents a meaningful opportunity to confront deep-rooted issues affecting the UK's workforce, such as regional disparities, inequalities, and access to reskilling and upskilling. A credible long-term strategy in this context has the potential not only to support the greening of UK employment, but also to contribute to social capital and empower communities. For this to happen, government, businesses, and educational providers must work together.

5.7 Measurement and Evaluation Tools to Monitor and Report on Achievements

Data use and monitoring mechanisms play an important part when setting green strategies. Ongoing evaluation enables stakeholders to gain visibility on the performance of existing policies, assess emerging demand for green skills, and redirect when necessary. This includes examining skills that might emerge in the future and offering insights on strategy setting and policy effectiveness. **The example of job distribution or skills deficit highlights how implementing such measures can offer the required evidence for well-informed decision-making – a key challenge for the net zero transition according to the CCC.**^[68] The requirement for data-led approaches makes this mechanism a prime example of green transition and digital transformation combined, presenting significant benefits to all involved parties.

A United Approach From the Public and Private Sectors

In terms of policy, joint efforts by government and industries are fundamental when agreeing on incentives for adopting low-carbon practices, funding allocation, and setting realistic targets in the net zero pathway.

From an education perspective, there are a wide range of possible initiatives, which could include:

- Teaching green skills at schools for pupils less interested in traditional academia.
- Offering incentives to assess upskilling and reskilling for those at mid-career points.
- Establishing a monitoring mechanism to observe the progress of the greening workforce, making adaptations when necessary.

Following the above, the journey to low carbon poses a unique opportunity for Public-Private Partnerships (PPPs), which denote collaborative arrangements between public and private entities, whereby both sectors combine their resources, expertise, and responsibilities to execute public infrastructure, services, or projects. For the green transition, the benefits of this approach include:

1



Meeting decarbonisation standards:

The increased focus on heat pump installations aligns with the goal of reducing carbon emissions and transitioning to cleaner energy sources. Public-private collaboration can streamline efforts and resources, ensuring a more effective and efficient transition.

2



Supporting the energy production sector:

The energy production sector plays a pivotal role in the decarbonisation process and is at the core of industries affected by these changes. By aligning market demand with the transition, the sector can adapt more smoothly and efficiently.

3



Accelerating retrofitting services:

Investing in construction industries for energy-efficient housing and retrofitting services is vital. Public-private collaboration can drive innovation, technology adoption, and cost-efficiency in these endeavours.

4



Market demand and investment:

The collaboration should aim to create a favourable market environment that encourages private sector investment in sustainable solutions. Incentives, subsidies, and regulatory frameworks can be tailored to stimulate growth in the energy-efficient housing and retrofitting services market.

6 Conclusion

The UK's move to a low-carbon economy is not a matter of choice. Global warming and the deepening climate change crisis have made decarbonisation a time-bound necessity. Without wholesale alterations to production, consumption, and working practices, the planet and its people face a problematic future.

What we can decide is how we respond and rise to the net zero challenge – and how we create a green-skilled workforce to carry us through. What comes next goes further than protecting our natural world; it defines our financial future. The shift to net zero has already created 250,000 jobs, and 725,000 roles are anticipated by 2030, representing an estimated £71 billion contribution to the UK economy. How effectively we equip workers for a sustainable tomorrow shapes energy sovereignty, fiscal resilience, and competitive edge.

It also provides a clean slate and critical social reset. Managed correctly, greening the UK workforce can address centuries-old systemic issues of diversity, representation, and pay disparity. It's a make-or-break moment to connect with underrepresented groups, remedy employment cold spots, and engage a generation of young people either unsure about their prospects – or primed for a purpose-led career.

The raw talent is out there, but refining it to meet demand is a race against the clock. Recent LinkedIn data reveals a glaring – and growing – green skills gap across the globe. Job postings requiring at least one green skill rose by 22.4% between 2022 and 2023. However, the current share of green talent within the workforce stands at 12.3%, and seven out of eight employees lack net zero skills or experience. What's more, only one in ten young people have a clear understanding of what green skills entail.

For organisations already struggling to meet sustainability targets, the skills shortfall and depleted talent pipeline could jeopardise a successful green transition – with consequences far beyond the bottom line. Because where industry falters, the economy and environment are likely to follow.

Closing the divide requires commitment and collaboration across industry, government, and education. Together, we must take definitive action to upskill, retrain, and re-enlist existing and dormant talent – including employed, economically inactive, and retired individuals – and fast-track future candidates to fill crucial roles.

Access, awareness, and appetite are key. To achieve a critical mass of low-carbon capabilities, we must establish a golden thread of green knowledge across early education, post-16 pathways, employment outreach, workplace training, and career development at all levels. Alongside, we must focus on repurposing our workforce while those efforts bear fruit.

Targeted partnerships between employers, schools, and leadership can unlock the UK's expansive pool of transferable skills. Turning electricians and HVAC technicians into heat pump engineers, solar panel specialists, and retrofit co-ordinators. Incentivising young people to explore green pathways. Using AI to plan alternative career routes and accelerate progress. Helping companies invest in and implement transformative training strategies.

Navigating the net zero transition is a significant challenge – and a decisive second chance. By collaborating to solve climate change and upskill for the low-carbon economy, we have an opportunity to make work mean more. To create fairer, more inclusive, more accessible cultures. And to protect our planet while championing its people.

The UK's green workforce is waiting – and it's our shared responsibility to realise its potential.

Niki Turner-Harding

Senior Vice President, Adecco UK & Ireland



7 Glossary

Terminology Explanation	
Term	Definition
Net Zero or Low-Carbon or Carbon Neutral economy	An economy with greenhouse gas or carbon emissions as close to zero as possible.
Low-Carbon Transformation vs. Green Industrial Revolution	Low-Carbon Transformation refers to the gradual reduction of carbon emissions through the transition to cleaner energy sources and practices. The Green Industrial Revolution represents a swift, wide-scale overhaul of industries, technologies, and systems, typically powered by far-reaching policy, innovation, and investment.
Green Skills or Net Zero Skills	The knowledge, abilities, values, and attitudes needed to live in, develop, and support a sustainable and resource-efficient society.
Employment Rate	The number of people in paid work as a proportion of the population.
Unemployment	The number of people as a proportion of the population being without a job, actively seeking work in the past four weeks, and available to start work in the next two weeks.
Economic Inactivity	The number of people as a proportion of the population who are neither working nor looking for work.
Sustainable Market	A business or economic system in which the production, consumption, and distribution of goods and services are conducted in a manner that minimises negative impacts on the natural environment.
Talent Shortage	A significant disparity between the skills employers need for their organisations to thrive and the number of available employees or job seekers with those skills.
Upskilling	The process of training an employee to acquire additional skills for an existing role.
Reskilling	The process of training an employee to acquire new skills needed to do an entirely different role.
STEM	Abbreviation for Science, Technology, Engineering, and Mathematics (as subjects of study).

Organisations Explanation	
Term	Definition
CCC	The Climate Change Committee is an independent non-departmental public body, formed under the Climate Change Act to advise the United Kingdom and devolved Governments and Parliaments on tackling and preparing for climate change.
CEP	The Centre for Economic Performance is an interdisciplinary research centre at the London School of Economics dedicated to the study of economic growth and effective ways to create a fair, inclusive and sustainable society.
IEMA	The Institute of Environmental Management and Assessment is the global professional body for everyone working in sustainability. IEMA's growing membership works at the interface between organisations, the environment and society to create long-term value and minimise risks. They guide and lead the changes that will be required for a sustainable future and play an important role in supporting organisations on the transition to a net-zero, sustainable future. IEMA's professional qualifications are well regarded by employers across all sectors of the economy, regularly being cited as a requirement/ desirable for people being employed in "green" roles. IEMA also developed the Green Careers Hub, which provides information and opportunities on green skills, jobs and careers.
IPPR	The Institute for Public Policy Research is a progressive think tank based in London. It was founded in 1988 by Lord Hollick and Lord Eatwell, and is an independent registered charity.
OECD	The Organisation for Economic Co-operation and Development is an intergovernmental organisation with 38 member countries, founded in 1961 to stimulate economic progress and world trade.
ONS	The Office for National Statistics is the executive office of the UK Statistics Authority, a non-ministerial department which reports directly to the UK Parliament.
POID	The Programme on Innovation and Diffusion (POID) carries out cutting-edge research into how to boost productivity through nurturing innovation – ideas that are new to the world – and how to diffuse these ideas across the economy.



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