Nottingham Trent University





# Levelling up and greening out: A just and holistic transition to low carbon jobs

An analysis of challenges and opportunities for the UK, the Midlands and Bolsover

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Authors:

Professor Richard Bull, School of Architecture, Design and Built Environment. Nottingham Trent University. richard.bull@ntu.ac.uk

Dr Ana Rita Domingues, School of Architecture, Design and Built Environment. Nottingham Trent University. rita.domingues@ntu.ac.uk



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# Executive Summary

The UK is facing unprecedented challenges as it emerges from a global pandemic and considers its response to climate change and achieving net-zero by 2050. The impacts of the COVID-19 pandemic create a unique opportunity to 'Build Back Better' using a holistic lens that views reskilling its workforce as the integral to economic, social and environmental sustainability. The UK Government has defined key areas of focus: Infrastructure, skills and innovation. It commits to level up the UK to decrease social inequalities, support the transition to net-zero to minimise environmental impacts, and support a Global Britain vision as an answer to the implications of Brexit. Nevertheless, the effects of the pandemic present a challenge to achieving this. Some areas are significantly vulnerable to the pandemic's impacts and risk *being left behind* in the transition to low carbon jobs. This report analyses the challenges and opportunities of vulnerable areas in the transition to a low carbon economy, including local authorities in the Midlands.

Addressing this challenge, this report describes multiple strategies and policies implemented at the national and regional levels to support a low carbon economy transition:

- Some of the initiatives include financial support to help people gain low carbon skills.
- More opportunities for low carbon jobs are expected in the following years, mainly related to low-carbon electricity and heat, energy-efficient products and services, and low-emission vehicles and infrastructure.
- Most low carbon jobs will be associated with manufacturing, energy supply and construction industries, which male workers currently dominate.
- Consequently, the transition to a low carbon economy can disproportionally affect men and women and potentially maintain or increase the gap in access to job opportunities.

The low carbon jobs are related to significantly new skills that might not yet exist in the workforce. Thus, training will be essential in the transition to a low carbon economy. This transition needs to start immediately to minimise costs, unemployment and potentially lose competitiveness and capabilities. Training related to most low carbon jobs is expected to be Level 4 and below, including a significant number at level 3.

The Midlands is committed to potentially becoming a role model on the transition to a low carbon economy. However, considering multiple vulnerable areas within the region, including Bolsover, all initiatives towards green or low carbon growth need to be supplemented with social policies to avoid unemployment and inequality. For instance, it is essential to support families in accessing skills to transition to low carbon jobs. This is particularly true in the case of Bolsover, which is associated with lower qualifications and income compared to the median earnings in the Midlands and England. Consequently, there is a need to equip people with higher capabilities to avoid the risk of transitioning to equally low-paid jobs. Other areas with similar characteristics might also be vulnerable to the transition to low carbon jobs.

**The key recommendations are:**

1. **New courses:** Training providers need to develop the necessary training and short courses to enable people to learn, share and practice low carbon and green skills. Courses need to be developed based on equity and fairness, accessible to everyone and considering a holistic transition to jobs associated with technologies that lead to less environmental impact. This is related explicitly to decent, life-enhancing, solidary, environmental-sensitive and intergenerational-minded skills for work (McGrath, Powell 2016). We have noted in section 4.2 the specific need for **clear progression opportunities from lvl 2-7.** This includes the development of T Levels, HTQs and apprenticeships alongside flexible [and funded] short courses (including on-line) to support lifelong across the region. Specifically, courses need developing around low carbon heating solutions, including retrofit technologies and energy efficiency alongside low emission vehicles and infrastructure. Finally, they need to be **flexible and funded.**
2. **A Partnership approach:** This is essential to deliver this strategy. Whilst individual FE and HE providers can develop individual courses to address specific skills gaps; concerted action is required to establish partnerships between local authorities, SMEs and education providers to develop provision.
3. **Regional strategy and support:** Further work is required to locate the D2N2 regional skills strategy into tangible and coordinated outputs. Specific local solutions need to sit alongside regional variations, for example, between urban and rural priorities and specific course development and implementation
4. **Dedicated support for SMEs**: The barriers to reach SMEs are well known. Support needs to be targeted, easy to access and free as much as is possible.
5. **Further research and consultation:** SMEs are a heterogenous sector, and further research is required with stakeholders, inc. FE/HE providers, local authorities and [crucially] SMEs to explore and understand the specific opportunities and barriers around support, skills coordination and focus.

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# *Build back better*: The national socio-political and economic context

# Section One – 'Build back better': The national socio-political and economic context

In his seminal work, *Risk Society*, the German sociologist Ulrich Beck (1992) argued that the mark of our society is no longer social class or wealth but the global distribution of risk. He could not have foreseen that the last two years would be dominated by two global threats in Western societies: Coronavirus and Climate Change. Yet, whilst no one is left unaffected by these two global risks, social class, geography, and wealth have played a massive part in how severely the impacts of these risks are felt. Both globally and locally, the poor are disproportionally affected.

This short report is structured as follows. This first section reflects on the social-political and economic opportunity of low carbon jobs to address the economic impact of COVID-19 through the UK Government's 'levelling up' agenda. The second section presents the definition and future potential of the green and low carbon skills/jobs. Section three details the specific context of Bolsover and the East Midlands. Section four discusses recommendations for skills and course development to reskill and recover. Section five identifies recommendations for both action and further research.

Society is slowly emerging from a global pandemic. COVID-19 has resulted in over 5 million deaths worldwide, with over 140k deaths reported in the UK. Economically, the impact has been no less severe as the UK experienced three successive national lockdowns to stem the spread of the virus. A national recession saw UK GDP drop by 9.8% (Figure 1), the most significant decline since records began in 1948 (Harari, Keep 2021).

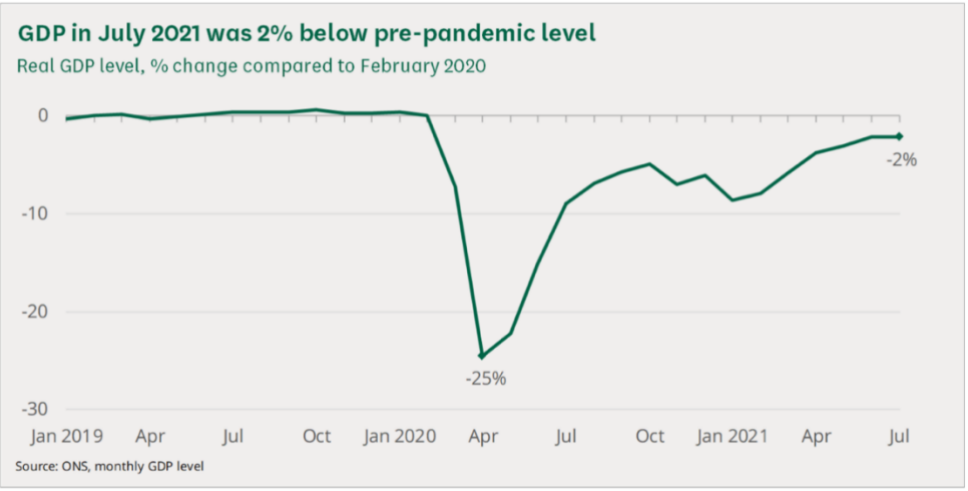



*Figure 1: National GDP July 2021.*

There was an initial economic bounce after the March 2021 lockdown, but there is no doubt that the last 18 months have left the UK in a challenging financial situation. Since the October Budget, the Office for Budget Responsibility (OBR) has revised its 2021 growth forecast from 4.5% to 6.5%, followed by 6% in 2022 and 2.1%, 1.3% and 1.6% over the next three years, respectively. The OBR has also downgraded its unemployment forecast from 12% to 5.2%. Despite this, the Chancellor warned of *challenging months ahead* due to the fallout of the pandemic, telling Parliament inflation is *likely to rise further* due to supply chain squeezes and rocketing energy prices.

Given this context, the UK Government launched its 'Build Back Better' policy in March 2021, in which Prime Minister Boris Johnson introduced the concept of levelling up (HM Treasury 2021):

> *Our mission is to unleash the potential of our whole country and restore the energy and confidence of the Victorians themselves. Just as the Government has done whatever it takes to support lives and livelihoods throughout the Covid crisis, so we will turn that same ambition and resolve to the task of our recovery. We will level up our country, so the map of our whole United Kingdom is lit up with competitive cities and vibrant towns that are centres of life – places people are proud to call home, with access to the services and the jobs they need to thrive.*

The policy outlines three key areas of focus: Infrastructure, skills and innovation. It draws together a series of wider policy themes of the current Government, including its industrial strategy and lifelong learning. It recognises that inherent inequalities must be addressed through what is referred to as 'levelling up', countering the impacts of Brexit through enhancing 'Global Britain' and supporting the transition to net-zero (see figure 2).

| | |
|---|---|
| **Level up the whole of the UK** | Regenerate struggling towns in all parts of the UK viathe UK Shared Prosperity Fund and the UK-wide Levelling Up Fund.<br><br>Realise our long-term vision for every region and nation to have at least one globally competitive city at its heart to help drive prosperity. This includes City and Growth Deals, £4.2 billion in intra-city transpo settlements from 2022-23, and continued Transforming Cities Fund investment to 2022-23.<br><br>Catalyse centres of excellence, supporting individuals across the country to access jobs and opportunities by ensuring digital and transport connectivity, by establishing a new UK Infrastructure Bank in the North of England and by relocating 22,000 Civil Service roles out of London.<br><br>Strengthen the Union, creating Freeports across the country – including in Scotland, Wales and Northern Ireland – and delivering the Union Connectivity Review, reviewing options to improve our sea air and land-links across the four nations. |
| **Support the transition to Net Zero** | Invest in net zero to create new opportunities for economic growth and jobs across the country, including supporting up to 60,000 jobs in the offshore wind sector, 50,000 jobs in carbon capture, usage and storage (CCUS) and up to 8,000 in hydrogen in our industrial clusters.<br><br>Grow our current net zero industries and encourage new ones to emerge. This includes working with industry, aiming to generate 5GW of low carbon hydrogen production capacity and capture 10Mt CO2/year using CCUS by 2030, and ending the sale of new petrol and diesel cars and vans in 2030. |
| **Support our vision for Global Britain** | Cooperate with partners to inspire and shape international action on our domestic priorities, including through our G7 Presidency and COP26.<br><br>Role-model openness to free and fair trade, working internationally to strengthen the multilateral system and the World Trade Organization and using preferential agreements and bilateral trade relationships to directly expand trading opportunities for UK businesses.<br><br>Develop a new export strategy to align our support for exporters with our plan for growth and sectoral priorities, opening UK Government trade hubs in Scotland, Wales and Northern Ireland and increasing UK Export Finance lending capacity. |

*Figure 2: Three key features of Building Back Better (HM Treasury 2021).*

Whilst the Government has pledged to level up so that, as the Prime Minister notes, the *whole United Kingdom is lit up with competitive cities and vibrant towns that are centres of life*, analysis by the Centre for Progressive Policy has shown that the effects of the pandemic present a challenge to this agenda. In their 'Back from the Brink' report the CPP note that the UK's productivity crisis will deepen,

vulnerable places will be left further behind, regional inequalities will increase, house finances of the most vulnerable will take a big hit, and the great national wage stagnation will continue (Alldritt et al. 2020). They rank the most vulnerable local authorities (LA), and it is striking to note that 16 out of the 20 are in the Midlands or North West (see figure 3). Of those 20 LA, the 20 worst hits have the highest proportion of jobs in manufacturing.

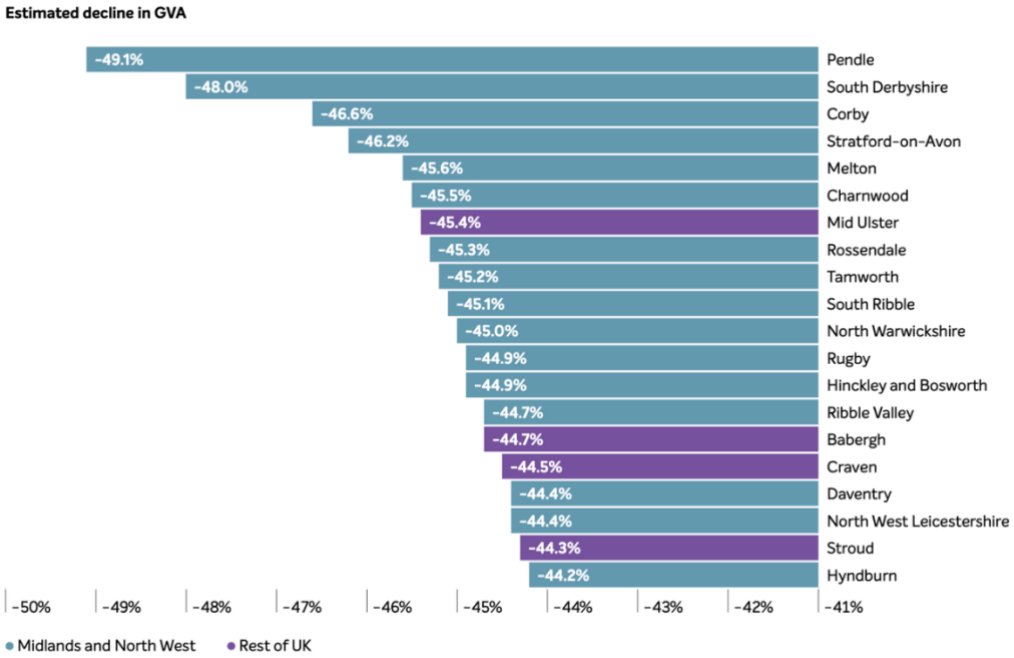



*Figure 3: Estimated decline in GVA by region (Alldritt et al. 2020).*

In this context of a challenging and unequal distribution of risk, the opportunity of green and low carbon economy presents itself. Section 3 will address the specific context of the Midlands and Bolsover. Section 2 first examines what green or local carbon jobs mean in practice and what the scale of opportunity might be.

# 2.
# *Build back greener*:
# The transition to net-zero

# Section Two – 'Build back greener': The transition to net-zero

## 2.1. From carbon reduction to net-zero

To understand what is meant by 'green jobs' the environmental policy landscape must be understood. The UK Government published the Climate Change Act 2008 that defined a framework to reduce the UK Greenhouse Gas (GHG) emissions by at least 80% by 2050 (using 1990 as baseline) (Climate change Committee 2021). In 2019, in line with the Paris Agreement that legislated national Governments to commit to net-zero targets by 2050, the UK revised its targets and committed to reducing GHG to net-zero by 2050.

The aim is to limit global warming to below 2°C above pre-industrial levels, ideally keeping it below 1.5°C. The recent COP26 in Glasgow saw the agreement of the 'Glasgow Climate Pact', which restated a commitment to this target with a recognition of the need to speed up the progress towards the 2030 targets and commit to phasing down coal use.

The UK Government plans to achieve net-zero by reducing GHG emissions, carbon capture and storage, and offsetting an equivalent amount of GHG emitted. Since 1990, the UK has decreased 44% of its territorial[1] GHG (as of 2019) (BEIS 2021). Accordingly, the most significant reduction has been within the waste management and the energy supply sectors. Transport, energy supply, businesses and households were the largest emitting sectors in the UK in 2019 (BEIS 2021). These sectors have a significant potential to contribute to the UK commitment towards net-zero, but more and new jobs to support this transition are needed.

In October 2021, the UK Government finally launched its Net Zero Carbon reduction strategy entitled 'Build Back Greener'. It weaves together key themes of levelling up and the skills agenda alongside the need for economic growth. Amongst its many aspirations around the skills agenda, it states the UK Government will (HM Government 2021):

- Publish sector and supply chain development plans for key low carbon sectors and work with businesses to encourage investment in *green skills and industries* in the UK.
- Support the development of a *skilled, competitive supply chain* for key green industries in the UK.
- *Reform the skills system* so that training providers, employers and learners are incentivised and equipped to play their part in delivering the transition to net-zero
- *Deliver a Lifetime Skills Guarantee and grow key post-16 training programmes* (such as apprenticeships, Skills Bootcamps, and T levels). These will be in line with the needs of employers in the green economy, helping individuals get the training they need for a job in the green economy, either at the start of their careers or when retraining or upskilling once already in the workforce.

[1] *Territorial GHG emissions only include national production-based estimates, excluding international air travel and shipping, UK residents abroad, UK Crown dependencies and overseas territories, the burning of biomass, land such as peatland and the production of goods and services that the UK imports from other countries*(Office for National Statistics 2019).

- Introduce a *sustainability and climate change strategy for education and children's services*, which will focus on equipping children and young people with the knowledge and skills they need to contribute to the green economy.

In the latest budget, the Chancellor confirmed these commitments with total spending on skills to increase by £3.8bn by 2024-25 – an increase of 42%. Extra funding was announced to provide additional hours in the classroom for up to 100,000 T-level students by 2024-25 and fund 40 additional hours of learning per student per year for 16- to 19-year-olds. The Lifetime Skills Guarantee will also increase so more adults in England can access funding for in-demand Level 3 courses and scale-up Skills Bootcamps. Also, there will be £2.8bn skills capital investment for improvements to the condition of the post-16 estate; new places in post-16 education; more specialist equipment and facilities for T-levels; and delivery of the commitment to 20 Institutes of Technology across England. Finally, £68m by 2024-25 to level up the adult skills system and ensure local areas can spend funding where it is needed most[2].

The Net Zero strategy notes that it hopes to support up to *440,000 jobs across net-zero industries in 2030, contributing towards a broader pivot to a greener economy that could support 2 million jobs in green sectors or by greening existing sectors* (HM Government 2021). The following section explores what skills are required to support this transition.

## 2.2. The skills required: defining green jobs

**Green jobs** are decent jobs[3] related to goods and services that preserve or restore the environment [4](e.g., green buildings, clean transportation or solar-powered water-heating systems) and contribute to processes with fewer environmental impacts (e.g., reducing water consumption, controlling air pollution or improving recycling services) (van der Ree 2019). According to this report, green jobs can be associated with traditional sectors like manufacturing and construction, or emerging sectors related to renewable energy and energy efficiency, which will provide new job opportunities.

Research has shown that the skills related to green and non-green jobs are significantly different (Consoli et al. 2016). Green jobs are intensively high-level cognitive and interpersonal and portray higher levels of standard dimensions of human capital, such as formal education, work experience and on-the-job training (Consoli et al. 2016). Green jobs are associated with higher levels of non-routine analytical skills, such as creative problem-solving.

The commitment countries like the UK have made to decrease GHG emissions will lead to an expansion of the employment opportunities along the supply chains and in service sectors related to green jobs. For instance, the path to convert the production and distribution activities towards more sustainable standards needs to be created. The transition to a low carbon economy requires great attention to skills. Failing to acknowledge the existing skills and the possible need to reskill the UK workforce might jeopardise the low carbon transition and lead to skills shortages (Jagger et al. 2013; Rowley, Walker

[2] Figures' courtesy of D2N2 Provider Network Update 2/11/21.

[3] Decent jobs are well paid, do not constitute a significant health and safety hazard, offer permanent contracts, the employer recognises unions, and offer paid training.

2020). Consequently, it is imperative to guarantee that the UK has the necessary skills to fill green jobs requirements.

Due to new policies and financial incentives, the low carbon transition will undoubtedly disrupt the existing market and government mechanisms. In the specific case of low carbon technologies, there is likely to be a shortage of skills due to the technology's risk and uncertainty and the technology's novelty and scale and granularity, embeddedness and inertia (Jagger et al. 2013). Unless the UK workforce is equipped with the necessary skills for the transition, it might face increased costs, time, unemployment and loose competitiveness and capabilities (Jagger et al. 2013).

As mentioned before, transport, energy supply, businesses and households were the largest emitting sectors in the UK in 2019 (BEIS 2021). Thus, employment to reduce GHG emissions in these sectors is expected to increase in the next years. Table 1 details the expected effects on employment resulting from climate change and green economy policies. The most significant impact is expected in transforming jobs (occupational profiles) related to the built environment, agriculture or transport, all sectors where energy and resources efficiency are introduced, and jobs related to sustainable or green investment.

*Table 1: Expected effects on employment of climate change and green economy policies (based on van der Ree, 2019).*

| Effects | Examples | Expected scale |
|---|---|---|
| **New jobs will be created (in existing and new occupations)** | • Solar panel technicians;<br>• Organic farmers;<br>• Recycling managers;<br>• Staff in eco-tourism resorts;<br>• Workers in natural resource conservation and restoration;<br>• Environmental advisers;<br>• Workers in bicycle shops. | Modest |
| **Certain jobs may be eliminated** | • Coal miners;<br>• Workers in the bottling industry adopting water; and material-saving technology;<br>• Staff of obsolete or prohibited packaging materials industry. | Small |
| **Jobs will be substituted (occupations change)** | • Jobs in transport systems moving to rail;<br>• Electric cars and shared vehicles;<br>• Waste management jobs in landfilling/dumpsite moving to incineration and recycling;<br>• Jobs in quarries for construction using new building materials and re-use of left-overs and waste. | Modest |
| **Most jobs will be transformed (occupational profiles change)** | • Workers, operators and managers in greening sectors notable buildings, agriculture or transport: all learning to manage new technology and operating practices;<br>• Workers in all sectors where energy and resource efficiency is introduced (cleaner production in manufacturing, retail services without packaging, bottle companies, changing to new materials and products);<br>• Staff in financial institutions adopting sustainable investment strategies. | Large |

In the UK context, the term *low carbon job* narrows down the activities associated with green jobs. Low carbon jobs are related to specific economic activities that deliver goods and services related to lower GHG emissions. According to the Office for National Statistics (2021), low carbon jobs are related to the seventeen activities divided by six Low Carbon and Renewable Energy Economy (LCREE) (see table 2). Currently, low carbon jobs account for around 185,000 full-time workers. Currently, the majority of the workforce is related to energy efficiency lighting, products and energy monitoring, saving or control systems(ecuity 2020).

*Table 2. LCREE groups and description of the activity (based on Office for National Statistics, 2021).*

| Group | Sector | % of the workforce in 2018 (ecuity 2020) |
|---|---|---|
| **Energy-efficient products** | • Energy-efficient lighting;<br>• Energy-efficient products;<br>• Energy monitoring, saving or control systems. | 71% |
| **Low-carbon electricity** | • Carbon capture and storage;<br>• Hydropower;<br>• Nuclear power;<br>• Offshore wind;<br>• Onshore wind;<br>• Other renewable electricity;<br>• Solar photovoltaic. | 12% |
| **Low-emission vehicles and infrastructure** | • Fuel cells and energy storage systems;<br>• Low emission vehicles and infrastructure. | 7% |
| **Energy from waste and biomass** | • Alternative fuels;<br>• Bioenergy. | 5% |
| **Low-carbon heat** | • Renewable combined heat and power;<br>• Renewable heat. | 3% |
| **Low-carbon services** | • Low carbon financial and advisory services. | 2% |

The energy-efficient products sector has been the largest sector within the LCREE context in terms of turnover and employment since data started to be gathered in 2014 (Office for National Statistics, 2021). Table 3 presents the range of activities related to this sector.

*Table 3. LCREE sectors and descriptions of activity with highest turnover and employment in 2019 (based on Office for National Statistics, 2021b).*

| Sector | Description |
|---|---|
| **Energy-efficient lighting** | The design, manufacture and installation of energy-efficient bulbs, tubes, fittings and so on, designed to use less energy to produce the same or greater amount of light. |
| **Energy-efficient products** | The design, manufacture and installation of energy-efficient products. Examples include:<br>• energy-efficient doors and windows;<br>• heating and ventilation, such as condensing boilers, ventilation and heating recovery;<br>• insulation such as loft, external wall, roof insulation, reducing energy consumption for heat or air conditioning by minimising *leakage* of heat;<br>• energy-efficient building materials or technologies;<br>• sustainable buildings and architecture;<br>• materials with greater insulation properties or durability properties or those requiring significantly less carbon emission in their manufacture or recycling waste materials in their manufacture. |

| Sector | Description |
|---|---|
| | Exclude: *Smart* goods such as TVs and freezers. |
| **Energy monitoring, saving or control systems** | The design, manufacture and installation of systems that reduce energy consumption through effective heat or energy management. Include equipment and related systems for doing this.<br>Examples include:<br>• smart heating controls;<br>• condensation control;<br>• control system components;<br>• energy management systems;<br>• energy management software. |

Research published by Ecuity Consulting on behalf of the Local Government Association (ecuity 2020) has estimated that the total number of low-carbon jobs supported by England's net-zero transition could increase threefold to 694,000 direct jobs by 2030 England, rising to over 1.18 million by 2050. This is a higher projection than the Government, which, in their Net Zero Strategy, conservatively suggest up to 440,000 jobs by 2030 with 100,000 of those linked to the built environment. The Ecuity Report (2020) breaks down the roles as follows:

- Nearly half (46%) of the total low-carbon jobs by 2030 will be in clean electricity generation and providing low-carbon heat for homes and businesses. These jobs will include manufacturing wind turbines, deploying solar PV, constructing nuclear reactors, installing heat pumps, and maintaining energy-system infrastructure.
- Over one-fifth (21%) of jobs by 2030 will be involved in installing energy efficiency products ranging from insulation, lighting, and control systems.
- Around 19% of jobs in 2030 will involve providing low-carbon services (financial, legal and IT) and producing alternative fuels such as bioenergy and hydrogen.
- A further 14% of jobs will be directly involved in manufacturing low-emission vehicles and the associated infrastructure. These jobs will include manufacturing electric vehicles (and hydrogen vehicles), manufacturing EV batteries from the proliferation of gigafactories in England and sustaining low-carbon mobility by installing electric vehicle charge-points and hydrogen refuelling stations.

Jobs related to the above groups are associated with manufacturing/production, construction/installation, operation and maintenance. These areas are dominated by male workers. Consequently, the transition to low-carbon jobs will impact men and women differently and potentially increase the gap in accessing new job opportunities. Figure 4 illustrates the disproportional distribution of employment between men and women in the manufacturing and construction industries. The existent power asymmetries related to access and resource distribution need to be addressed to undermine the replication and transfer of the same structural inequalities to the low carbon energy world (Johnson et al. 2020). Consequently, a just and holistic transition needs to underscore measures to guarantee equal access to the opportunities towards low carbon jobs by creating conditions to increase the share of low carbon jobs for women.

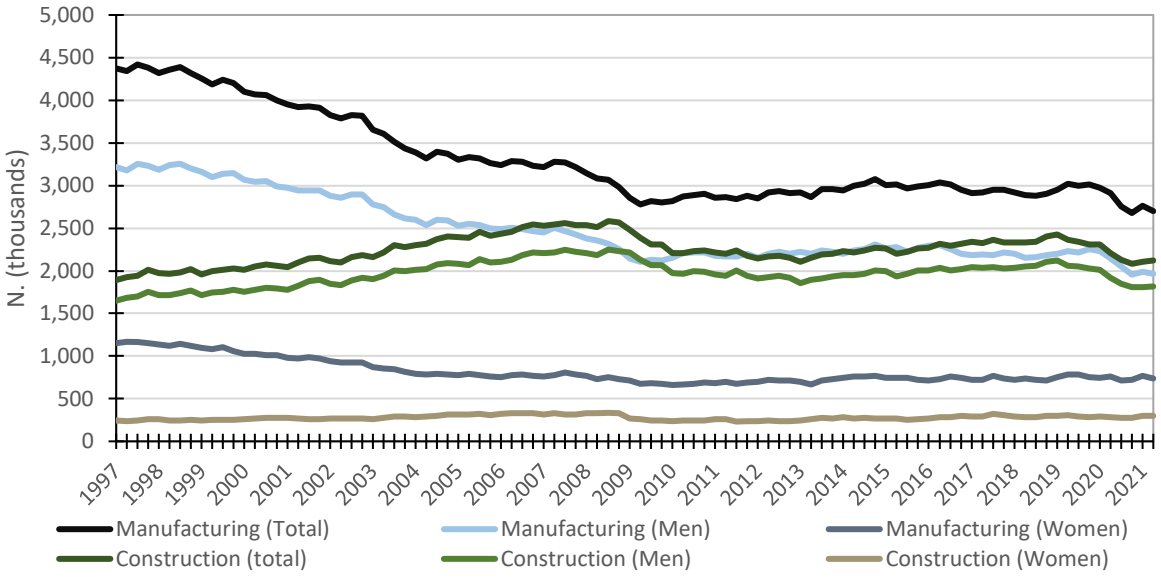



*Figure 4. Employment in the UK by industry: manufacturing and construction (Office for National Statistics 2021a).*

### 2.2.1. The construction sector

Most LCREE activities occur in the manufacturing, energy supply and construction industries (Office for National Statistics, 2021). According to Office for National Statistics, businesses within these industries accounted for 82% of all LCREE turnover and 74% employment in 2019. In its recent 'Industry Skills Plan' (Construction Leadership Council 2019), the Construction Leadership Council take a broad definition of the construction sector to include the associated supply chains and professional services that enable the industry to function (see figure 5). The construction and built environment sectors account for approximately 40% of the UK's greenhouse gas emissions but, according to the CITB, can influence over half of the UK's emissions.

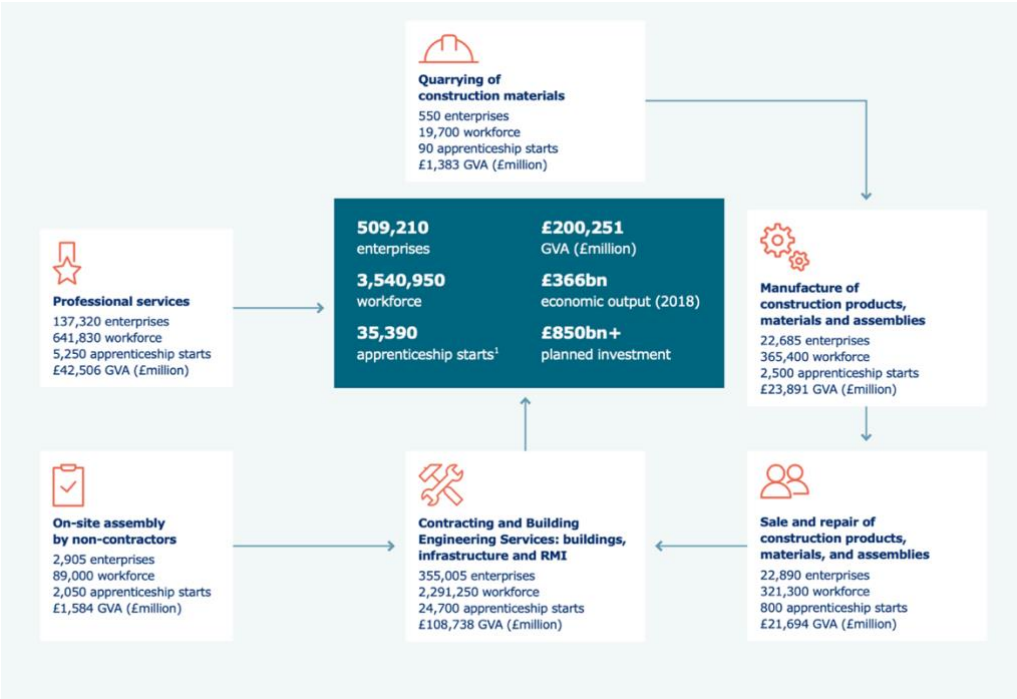



*Figure 5: An overview of the construction section (Construction Leadership Council 2019).*

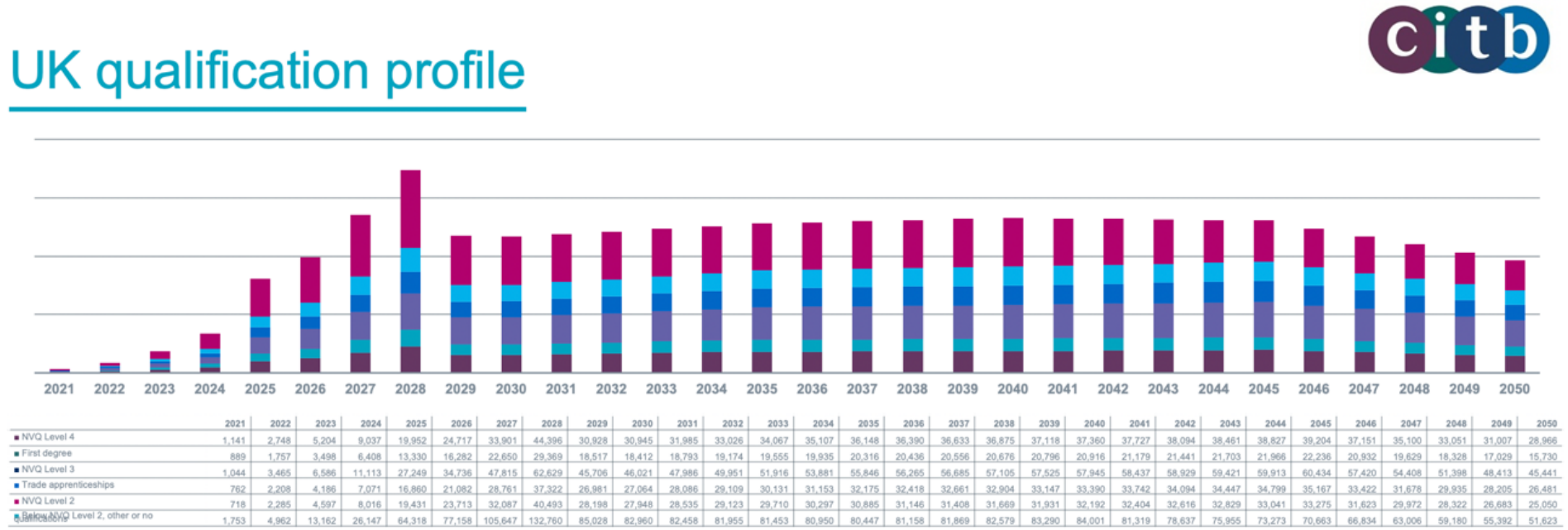
The UK construction sector is characterised by primarily low skills, including vocational training based on voluntarism and short courses (Killip 2020). According to the same author, if the UK construction sector continues its low skills equilibrium, it will fail to implement the low carbon agenda, including the large-scale deployment of energy efficiency retrofits and low carbon technologies. The UK needs large-scale deployment of energy efficiency retrofits and low carbon technologies. Besides performing a specific skill, low carbon jobs will need to understand the bigger picture as each situation will be considerably different. In the particular case of the construction sector, employees need to be able to manipulate tools and materials and analyse and create solutions based on theoretical principles and a common shared responsibility for good-quality outcomes (Killip 2020). Also, according to Killip (2020), low-carbon projects require the integration of multiple tasks at the project level. It is essential that the people involved in projects shares processes and practices among project teams to support learning.

These academic reflections chime well with research produced for the CITB that maps out very clearly the scope and scale of skills and jobs required to enable the governments Net Zero Strategy to be delivered. Adopting an energy efficiency first approach, the CITB projects a steep increase in employment up to a peak of around 350,000 FTE workers in 2028. After an initial drop in employment in 2029, they believe that, after completing most of the retrofit works, employment is sustained by repair and replacement at an average of around 240,000 FTE. Construction Project Managers peak at just over 86,000 in 2028 (includes Retrofit Co-ordinator roles). Specifically, they note the following key roles:

- Construction Trades Supervisors peaks at just under 24,000 in 2028;
- Building Envelope Specialists peak at around 33,000 in 2028 (this includes Insulation Installers);
- Plumbing and HVAC trades will require over 59,000 in 2028, peaking at 91,500 in 2045.

The projected qualification profile the CITB has prepared is of interest as it maps out the scale needed if retrofit Level 3 and below (see figure 6). Figure 7 shows the same workforce profile by specialist training that would be required. This includes, for example:

- Asbestos Awareness training – 15,000 by 2025;
- Heat Pump Installer training – 19,500 needed by 2028;
- Trustmark Retrofit Co-ordinator – peaking at just over 7,000 in 2027.




| | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 | 2041 | 2042 | 2043 | 2044 | 2045 | 2046 | 2047 | 2048 | 2049 | 2050 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NVQ Level 4 | 1,141 | 2,748 | 5,204 | 9,037 | 19,952 | 24,717 | 33,901 | 44,396 | 30,928 | 30,945 | 31,985 | 33,026 | 34,067 | 35,107 | 36,148 | 36,390 | 36,633 | 36,875 | 37,118 | 37,360 | 37,727 | 38,094 | 38,461 | 38,827 | 39,204 | 37,151 | 35,100 | 33,051 | 31,007 | 28,966 |
| First degree | 889 | 1,757 | 3,498 | 6,408 | 13,330 | 16,282 | 22,650 | 29,369 | 18,517 | 18,412 | 18,793 | 19,174 | 19,555 | 19,935 | 20,316 | 20,436 | 20,556 | 20,676 | 20,796 | 20,916 | 21,179 | 21,441 | 21,703 | 21,966 | 22,236 | 20,932 | 19,629 | 18,328 | 17,029 | 15,730 |
| NVQ Level 3 | 1,044 | 3,465 | 6,586 | 11,113 | 27,249 | 34,736 | 47,815 | 62,629 | 45,706 | 46,021 | 47,986 | 49,951 | 51,916 | 53,881 | 55,846 | 56,265 | 56,685 | 57,105 | 57,525 | 57,945 | 58,437 | 58,929 | 59,421 | 59,913 | 60,434 | 57,420 | 54,408 | 51,398 | 48,413 | 45,441 |
| Trade apprenticeships | 762 | 2,208 | 4,186 | 7,071 | 16,860 | 21,082 | 28,761 | 37,322 | 26,981 | 27,064 | 28,086 | 29,109 | 30,131 | 31,153 | 32,175 | 32,418 | 32,661 | 32,904 | 33,147 | 33,390 | 33,742 | 34,094 | 34,447 | 34,799 | 35,167 | 33,422 | 31,678 | 29,935 | 28,205 | 26,481 |
| NVQ Level 2 | 718 | 2,285 | 4,597 | 8,016 | 19,431 | 23,713 | 32,087 | 40,493 | 28,198 | 27,948 | 28,535 | 29,123 | 29,710 | 30,297 | 30,885 | 31,146 | 31,408 | 31,669 | 31,931 | 32,192 | 32,404 | 32,616 | 32,829 | 33,041 | 33,275 | 31,623 | 29,972 | 28,322 | 26,683 | 25,050 |
| Below NVQ Level 2, other or no qualifications | 1,753 | 4,962 | 13,162 | 26,147 | 64,318 | 77,158 | 105,647 | 132,760 | 85,028 | 82,960 | 82,458 | 81,955 | 81,453 | 80,950 | 80,447 | 81,158 | 81,869 | 82,579 | 83,290 | 84,001 | 81,319 | 78,637 | 75,955 | 73,273 | 70,663 | 66,834 | 63,006 | 59,180 | 55,392 | 51,623 |

*Figure 6: Projected qualification profile of Construction (Oswald et al. 2021)*


| | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 | 2041 | 2042 | 2043 | 2044 | 2045 | 2046 | 2047 | 2048 | 2049 | 2050 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| F Gas | 1,922 | 2,286 | 2,608 | 2,786 | 5,141 | 6,904 | 8,561 | 12,508 | 14,123 | 14,429 | 15,258 | 16,088 | 16,917 | 17,747 | 18,576 | 18,698 | 18,819 | 18,941 | 19,062 | 19,184 | 19,621 | 20,059 | 20,497 | 20,934 | 21,372 | 20,620 | 19,868 | 19,117 | 18,365 | 17,613 |
| Refrigeration, Heating & Ventilation qualification | 1,922 | 2,286 | 2,608 | 2,786 | 5,141 | 6,904 | 8,561 | 12,508 | 14,123 | 14,429 | 15,258 | 16,088 | 16,917 | 17,747 | 18,576 | 18,698 | 18,819 | 18,941 | 19,062 | 19,184 | 19,621 | 20,059 | 20,497 | 20,934 | 21,372 | 20,620 | 19,868 | 19,117 | 18,365 | 17,613 |
| Electricity for plumbers course | 2,416 | 3,067 | 3,812 | 4,805 | 8,372 | 10,652 | 13,642 | 18,609 | 16,848 | 17,094 | 18,130 | 19,167 | 20,203 | 21,239 | 22,276 | 22,405 | 22,534 | 22,664 | 22,793 | 22,922 | 22,901 | 22,879 | 22,858 | 22,836 | 22,814 | 21,956 | 21,098 | 20,240 | 19,382 | 18,524 |
| Diploma in smart metering | 1,013 | 1,691 | 2,734 | 4,451 | 6,801 | 7,967 | 11,029 | 13,305 | 6,254 | 6,266 | 6,626 | 6,986 | 7,346 | 7,706 | 8,066 | 8,074 | 8,082 | 8,090 | 8,098 | 8,106 | 8,046 | 7,986 | 7,925 | 7,865 | 7,805 | 7,265 | 6,725 | 6,185 | 5,645 | 5,105 |
| Hydrogen boiler conversion courses | 198 | 765 | 884 | 971 | 680 | 999 | 1,325 | 1,467 | 472 | 1,585 | 2,138 | 2,892 | 3,245 | 3,799 | 4,352 | 4,352 | 4,352 | 4,352 | 4,352 | 4,352 | 4,252 | 4,152 | 4,051 | 3,951 | 3,851 | 3,968 | 4,085 | 4,203 | 4,320 | 4,437 |
| Battery Storage Systems course | 321 | 507 | 782 | 1,311 | 1,839 | 2,171 | 3,030 | 3,707 | 1,517 | 1,519 | 1,672 | 1,825 | 1,978 | 2,131 | 2,284 | 2,284 | 2,284 | 2,284 | 2,284 | 2,284 | 1,994 | 1,703 | 1,413 | 1,123 | 832 | 763 | 694 | 625 | 556 | 487 |
| Warm water underfloor heating systems installer | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gas Smart | 299 | 473 | 729 | 1,222 | 2,802 | 3,126 | 3,953 | 4,520 | 2,472 | 2,303 | 2,367 | 2,431 | 2,495 | 2,559 | 2,623 | 2,644 | 2,666 | 2,687 | 2,709 | 2,730 | 2,427 | 2,123 | 1,820 | 1,517 | 1,213 | 1,149 | 1,084 | 1,020 | 955 | 891 |
| CITB SMSTS (Site Management Safety Training Scheme) | 33 | 67 | 114 | 181 | 345 | 393 | 516 | 609 | 335 | 319 | 273 | 227 | 181 | 135 | 89 | 91 | 93 | 95 | 97 | 99 | 95 | 90 | 86 | 81 | 77 | 70 | 63 | 56 | 49 | 42 |
| Heat pump installation course | 9,608 | 11,429 | 13,040 | 13,931 | 25,703 | 34,520 | 42,807 | 62,541 | 70,616 | 72,145 | 76,292 | 80,440 | 84,587 | 88,734 | 92,882 | 93,489 | 94,097 | 94,704 | 95,311 | 95,919 | 98,107 | 100,295 | 102,483 | 104,671 | 106,860 | 103,101 | 99,342 | 95,584 | 91,825 | 88,066 |
| BPEC, Award in the Installation and Maintenance of Small Scale Solar Photovoltaic Systems (Level 3) | 290 | 458 | 706 | 1,184 | 2,715 | 3,028 | 3,829 | 4,379 | 2,394 | 2,231 | 2,293 | 2,355 | 2,417 | 2,479 | 2,541 | 2,561 | 2,582 | 2,603 | 2,624 | 2,645 | 2,351 | 2,057 | 1,763 | 1,469 | 1,175 | 1,113 | 1,050 | 988 | 926 | 863 |
| BPEC, Working at Heights Access Training | 145 | 231 | 355 | 594 | 2,187 | 2,365 | 2,797 | 3,045 | 2,075 | 1,865 | 1,855 | 1,846 | 1,837 | 1,827 | 1,818 | 1,845 | 1,872 | 1,899 | 1,926 | 1,952 | 1,793 | 1,634 | 1,475 | 1,316 | 1,157 | 1,113 | 1,069 | 1,025 | 981 | 937 |
| BPEC, Solar Thermal Systems NOS Mapped | 1 | 2 | 2 | 2 | 829 | 851 | 882 | 856 | 878 | 749 | 709 | 668 | 628 | 588 | 548 | 564 | 581 | 597 | 613 | 630 | 618 | 606 | 594 | 581 | 569 | 557 | 544 | 531 | 518 | 506 |
| TrustMark retrofit coordinator | 2,176 | 3,843 | 6,496 | 10,288 | 15,143 | 17,898 | 25,251 | 30,568 | 15,120 | 15,446 | 16,059 | 16,671 | 17,284 | 17,897 | 18,510 | 18,510 | 18,510 | 18,510 | 18,510 | 18,510 | 20,451 | 22,392 | 24,333 | 26,274 | 28,215 | 26,298 | 24,381 | 22,464 | 20,547 | 18,630 |
| Pro-Fitter/GIGF: windows and doors – novice/QQA-accredited | 869 | 1,372 | 2,116 | 3,548 | 4,978 | 5,877 | 8,201 | 10,035 | 4,108 | 4,111 | 4,525 | 4,940 | 5,354 | 5,769 | 6,183 | 6,183 | 6,183 | 6,183 | 6,183 | 6,183 | 5,397 | 4,611 | 3,825 | 3,039 | 2,253 | 2,066 | 1,879 | 1,692 | 1,505 | 1,319 |
| Pro-Fitter/GIGF: surveyors | 153 | 242 | 373 | 626 | 879 | 1,037 | 1,447 | 1,771 | 725 | 725 | 799 | 872 | 945 | 1,018 | 1,091 | 1,091 | 1,091 | 1,091 | 1,091 | 1,091 | 952 | 814 | 675 | 536 | 398 | 365 | 332 | 299 | 266 | 233 |
| Asbestos Awareness Training | 2,899 | 4,579 | 7,061 | 11,842 | 27,145 | 30,283 | 38,292 | 43,786 | 23,944 | 22,311 | 22,930 | 23,549 | 24,168 | 24,787 | 25,405 | 25,614 | 25,823 | 26,032 | 26,241 | 26,450 | 23,510 | 20,571 | 17,631 | 14,691 | 11,751 | 11,128 | 10,504 | 9,880 | 9,256 | 8,632 |
| TrustMark retrofit assessor | 242 | 427 | 722 | 1,143 | 1,683 | 1,989 | 2,806 | 3,396 | 1,680 | 1,716 | 1,784 | 1,852 | 1,920 | 1,989 | 2,057 | 2,057 | 2,057 | 2,057 | 2,057 | 2,057 | 2,272 | 2,488 | 2,704 | 2,919 | 3,135 | 2,922 | 2,709 | 2,496 | 2,283 | 2,070 |
| TrustMark retrofit advisor | 242 | 427 | 722 | 1,143 | 1,683 | 1,989 | 2,806 | 3,396 | 1,680 | 1,716 | 1,784 | 1,852 | 1,920 | 1,989 | 2,057 | 2,057 | 2,057 | 2,057 | 2,057 | 2,057 | 2,272 | 2,488 | 2,704 | 2,919 | 3,135 | 2,922 | 2,709 | 2,496 | 2,283 | 2,070 |
| TrustMark retrofit designer | 1,934 | 3,416 | 5,774 | 9,145 | 13,460 | 15,910 | 22,445 | 27,171 | 13,440 | 13,729 | 14,274 | 14,819 | 15,364 | 15,909 | 16,453 | 16,453 | 16,453 | 16,453 | 16,453 | 16,453 | 18,179 | 19,904 | 21,630 | 23,355 | 25,080 | 23,376 | 21,672 | 19,968 | 18,264 | 16,560 |
| TrustMark retrofit installer | 242 | 427 | 722 | 1,143 | 1,683 | 1,989 | 2,806 | 3,396 | 1,680 | 1,716 | 1,784 | 1,852 | 1,920 | 1,989 | 2,057 | 2,057 | 2,057 | 2,057 | 2,057 | 2,057 | 2,272 | 2,488 | 2,704 | 2,919 | 3,135 | 2,922 | 2,709 | 2,496 | 2,283 | 2,070 |

*Figure 7: Projected training required (Oswald et al. 2021).*

The scale of work required to retrofit the UK housing stock is echoed by the Retrofit Academy who notes that approximately 27 million homes will be requiring retrofitting by 2050. This equates to 900,000 homes per year or 2466 per day (The Retrofit Academy 2020). The British Standards for retrofit defines specific roles required for the retrofitting process from assessment to design, installation and evaluation, including evaluators, advisors, coordinators, assessors, designers and installers (see figure 8).


*Figure 8: The required retrofit roles according to British Standard PAS2035 (image courtesy of the Retrofit Academy) (The Retrofit Academy 2020).*

## 2.3. Conclusion: National Skills gap

To conclude the second section, the following key points can be made.

1. The policy requirement to 'level up' reflects the significant regional inequalities that currently exist, with the Midlands currently one of the most deprived areas.
2. The Government's 'Build Back Greener' Net Zero Strategy shows the opportunity for green jobs that is underpinned by significant investment via the 'Build Back Better' policy initiative and skills agenda. Between 450,000 and 700,000 jobs are expected to be created by 2030 in the green skills/low carbon area.
3. Approximately 46% of the total low-carbon jobs by 2030 will be in clean electricity generation and providing low-carbon heat for homes and businesses. 20% will be involved in installing energy efficiency products and a further 20% providing low-carbon services. 14% of jobs will be directly involved in manufacturing low-emission vehicles and the associated infrastructure.

4. The majority of these jobs will be Level 4 and below (a significant number at level 3). There needs to be a high initial influx of roles to enable the hitting of the 2030 target before the number of roles required will level off.
5. The transition to a low carbon economy does not guarantee that the jobs offered will be inclusive and just. Low carbon jobs are associated with industries currently dominated by men. The outcome will depend on the structural socio, political and economic power dynamics in each area. The new labour market needs to address the structural dynamics to equal opportunities between men and women.

Section three now explores the local context of the Midlands and Bolsover and provides a more focused view on the specific challenges and opportunities that are levelling up and greening out presents.

# 3.
# Introducing the Midlands and Bolsover

# Section Three – Introducing the Midlands and Bolsover

## 3.1. The Midlands and the Midlands Engine for green growth

Green growth is associated with increasing consumption, carbon taxes, energy efficiency, renewable energy and high labour productivity (O'Neill 2020). Research has shown that while green growth might reduce GHG emissions, it needs to be supplemented with social policies to avoid unemployment and inequality (D'Alessandro et al. 2020). Consequently, green growth needs to be supported by policies that facilitate a just and holistic transition. Policies need to drive the delivery of adequate training associated with green and low carbon jobs and guarantee that knowledge is accessible to everyone to avoid unemployment and inequality.

Local authorities across the Midlands have committed voluntarily to reach carbon neutrality at the local level. An example is Nottingham city council, which aims to be carbon neutral by 2028. Consequently, multiple initiatives have emerged to support financially the implementation of measures needed for the transition. Notably, the Chancellor has committed £400m to the next generation of Midlands Engine Investment Fund to be delivered by the British Business Bank (D2N2 2021b).

The Midlands Engine sets a ten-point plan to achieve Midlands net-zero, shape a green future for the Midlands and the UK through a shared commitment and support the government agenda on levelling up, net-zero, nature's recovery, post-COVID and post-Brexit economic growth (Midlands Engine 2021). Accordingly, the Midlands Engine aims to create more than 196,000 jobs, reduce 36% of the carbon emissions and generate more than £24.2 billion Gross Value Added (GVA). Figure 9 details the ten-point plan for green growth in the Midlands Engine, including places, energy, and enablers.


*Figure 9. Ten-point plan for green growth in the Midlands Engine (Midlands Engine 2021).*

The enablers of the Midlands Engine plan highlight the need for green innovation, including design, having a highly-skilled energy workshop that is inclusive and diverse, and investment to support the opportunities. They also reflect a need to rethink the manufacturing, energy supply and construction industry (also identified in section two). Most LCREE activities include the **manufacturing, energy supply and construction industries** (Office for National Statistics, 2021).

As the birthplace of the Industrial Revolution and national and internationally renowned brands (e.g., HP Sauce, Hovis, Marmite, Bird's Custard, Typhoo Tea, Walkers, and Boots), the Midlands have the potential to steer the so-called green revolution. The D2N2 area is committed to *lead the most ambitious carbon turnaround in the country* (D2N2 2020)(Figure 10), including a focus on innovation and knowledge transfer to ensure the expertise in low carbon in all industrial sectors is adopted fast and extensively across all sectors and places.

| WHAT WILL WE DO? | HOW? |
|---|---|
| 1. Deliver an ambitious programme to convert our existing energy assets to low carbon to support the ambitions of our area to get to net carbon zero before the 2050 deadline. | • Deliver a globally significant energy production, innovation, education and storage cluster based around Ratcliffe-on-Soar power station, complementing plans for a Freeport, our vision for a low carbon Gigafactory and the greenest HS2 station in the country at Toton.<br>• Develop a network of hubs making the best use of similar power stations including Cottam and High Marnham power stations to ensure all parts of the region benefit from locally generated low carbon energy.<br>• Lead the development of a green themed East Midlands Freeport at Ratcliffe-on-Soar. Working with our partners including Leicester and Leicestershire Local Enterprise Partnership (LLEP), the Midlands Engine Development Corporation and East Midlands Airport. |
| 2. Immediately stimulate our economy, increase skill levels and tackle fuel poverty by investing in regional energy efficiency programmes. | • Stimulate demand for the adoption of clean hydrogen to incentivise investment in its production across the region through a new energy partnership. |
| 3. Maximise the power of our natural assets to contribute to carbon sequestration and mitigating the economic impacts of climate change. | • Test, demonstrate and apply transformative technologies such as carbon sequestration.<br>• Support the Peak District's National Park in becoming Zero-Carbon by 2030.<br>• Establish more charging points in the Peak District and other rural areas to incentivise electrified transport. |
| 4. Focus on innovation and knowledge transfer to ensure the expertise in low carbon in all of our industrial sectors including manufacturing, housing, logistics and agriculture is adopted quickly and widely across all sectors and places. | • Deliver a ground-breaking programme with Homes England and the private sector to decarbonise our housing supply chain.<br>• Invest in an ambitious D2N2-wide social housing retrofit programme, decarbonising existing housing stock with testbeds in Mansfield and Nottingham building on the existing best practice already underway by Nottingham City Council<br>• Target our housing and construction skills investments on sites and programmes that promote and deliver modern methods of construction.<br>• Develop planning policy for new housing developments which surpass national standards. |

*Figure 10. D2N2 Low carbon growth guiding principle (D2N2 2020).*

In the East Midlands, Small and Medium Enterprises (SMEs) represent 99.6 % of all businesses, while in Bolsover, SMEs constitute 99.3% of all businesses (Nomis 2021). SMEs are in the early stages of their transition to net-zero, as the British Business Bank (2021) discussed in their report *Smaller businesses and the transition to net-zero*. SMEs are generally aware of the low carbon agenda, but few have implemented actions to reduce carbon emissions. This might be due to the inherent heterogeneity that characterises SMEs. Nevertheless, even though SMEs face different challenges due to diversity,

nature of their operations and legal requirements, they are often characterised by a shared resource limitation compared to multi-national companies.

Cost is often mentioned as a barrier to net-zero actions (British Business Bank 2021). Figure 11 illustrates the perceived usefulness of enablers for net-zero actions. It can be seen that the tax incentive is the enabler higher perceived across England. In the Midlands, besides a tax incentive, more information and advice about options, costs and benefits, and external finance, including grant funding and loans, are also considered necessary. Paterson et al. (2018) suggest apprenticeships could support SMEs to implement pro-environmental business activities. According to the same authors, SMEs need support to keep up with new technologies and technical, leadership and management skills.

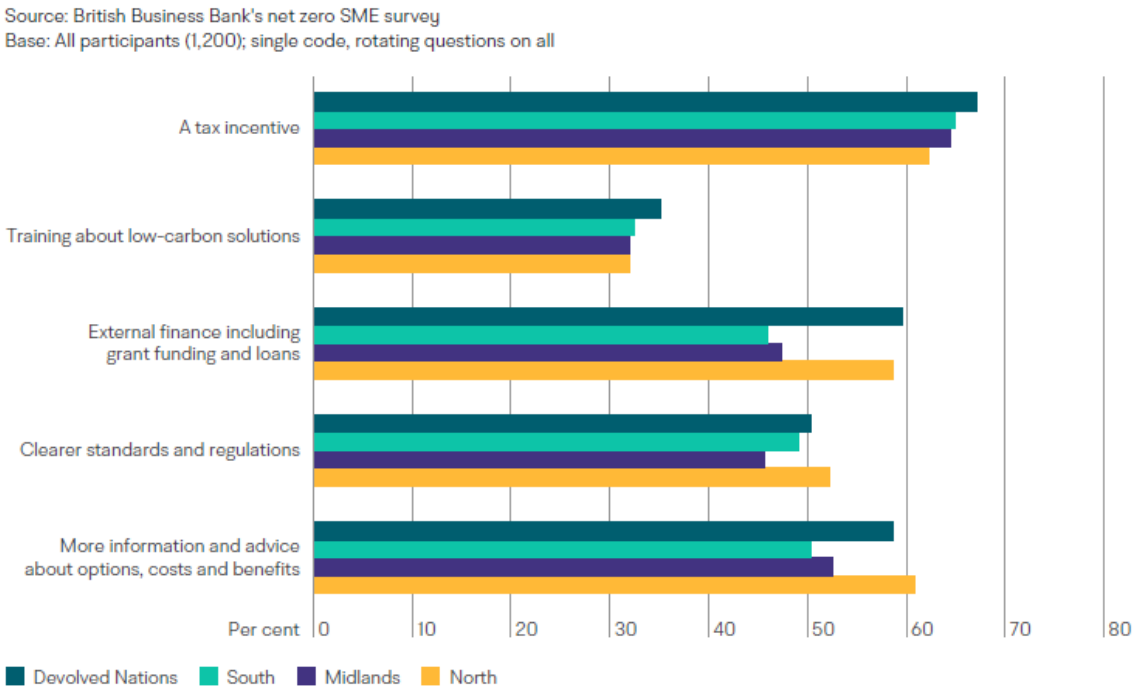



*Figure 11. Perceived usefulness of enablers for net-zero actions by enabler and macro-region (British Business Bank 2021).*

Besides having a crucial role in decreasing carbon emissions related to their activities, SMEs can also actively develop activities to deliver the low carbon agenda by offering low carbon jobs. This role, which can potentially be an additional role in many situations, depends on the SMEs' characteristics in terms of their size and sector of activity.

It is expected 194,000 low-carbon jobs across the Midlands by 2050 (ecuity 2020). Figure 12 presents the jobs breakdown per type of green job. Most jobs expected in the Midlands are related to low carbon electricity and heat, energy efficiency and low emission vehicle and infrastructure.

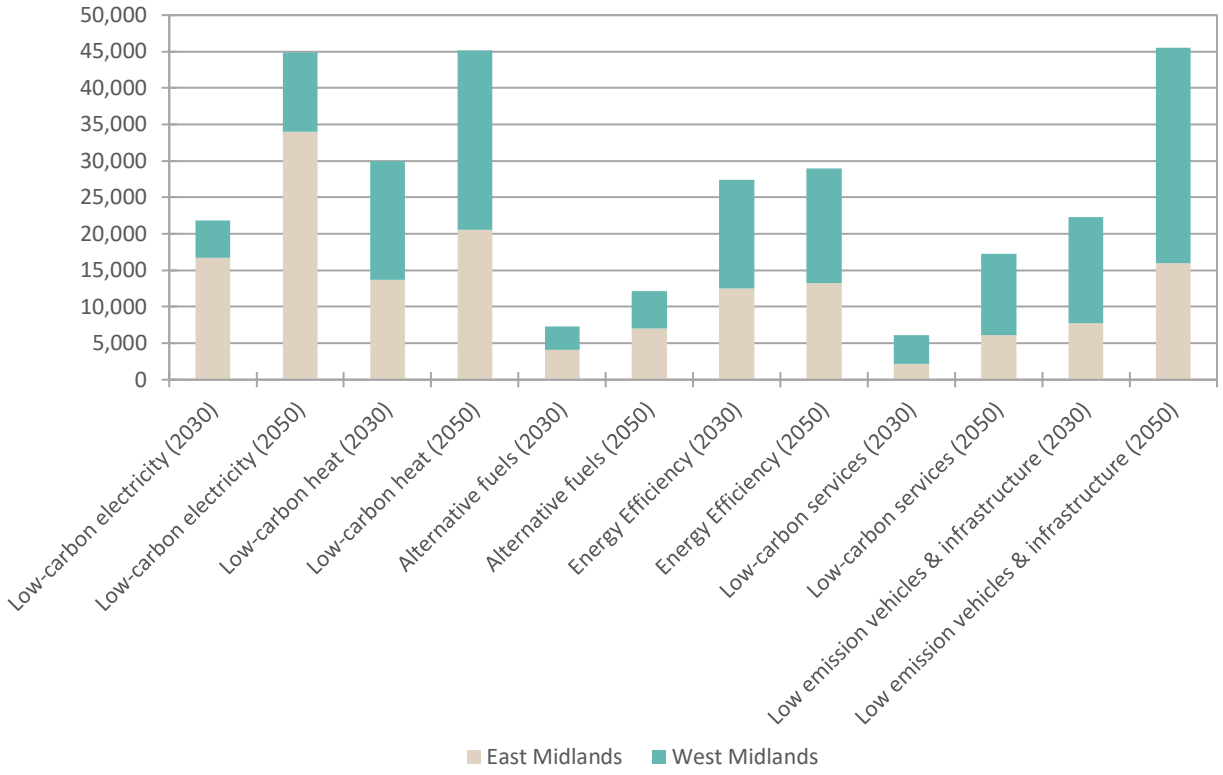



*Figure 12. The number of green jobs in East and West Midlands for 2030 and 2050 (based on LGA Research 2020).*

The Sustainable Business and Green Economy Research Cluster (2018) study highlights the possible shortage of specialist design skills in the construction sector, mechanical, electrical and software engineers. In the case of construction, the new skills are related to net-zero standards, specialist installation, eco-design/smart homes, responsible sourcing and product transparency and circularity and recycling. In the Midlands Energy Hub area, significant roles gaps are expected in some roles, such as production engineers, power distribution engineers, and technicians (kMatrix 2021). There is a significant demand for people with specific technical skills that can apply sustainability practices relevant to construction and engineering (Paterson et al. 2018). Consequently, D2N2 has identified the need to invest in low carbon energy production and adoptions, modern construction methods, retrofits, and other low carbon adaptations.

## 3.2. Bolsover

The transition to a society with fewer carbon emissions will necessarily be different between countries, regions, and the local level. Bolsover will need to adapt to a new economy by learning new skills and staying in the same industry or moving to sectors. Its capacity to change to a low carbon economy while maintaining jobs rests on its economic vulnerability.

Figure 13 depicts local authorities' ranking in terms of economic vulnerability. Most high-risk areas are associated with rural agricultural communities with lower populations, intermediate-level qualifications, and heavy manufacturing communities (Franklin, Hochlaf 2021).

Bolsover has ranked 11th LA associated with the highest risk in terms of economic vulnerability, even though it is not among the areas with the highest reliance on high emitting industries for employment. Nevertheless, it will be detailed below that Bolsover has more people with low-level qualifications and low paid jobs when compared to the average in the East Midlands.

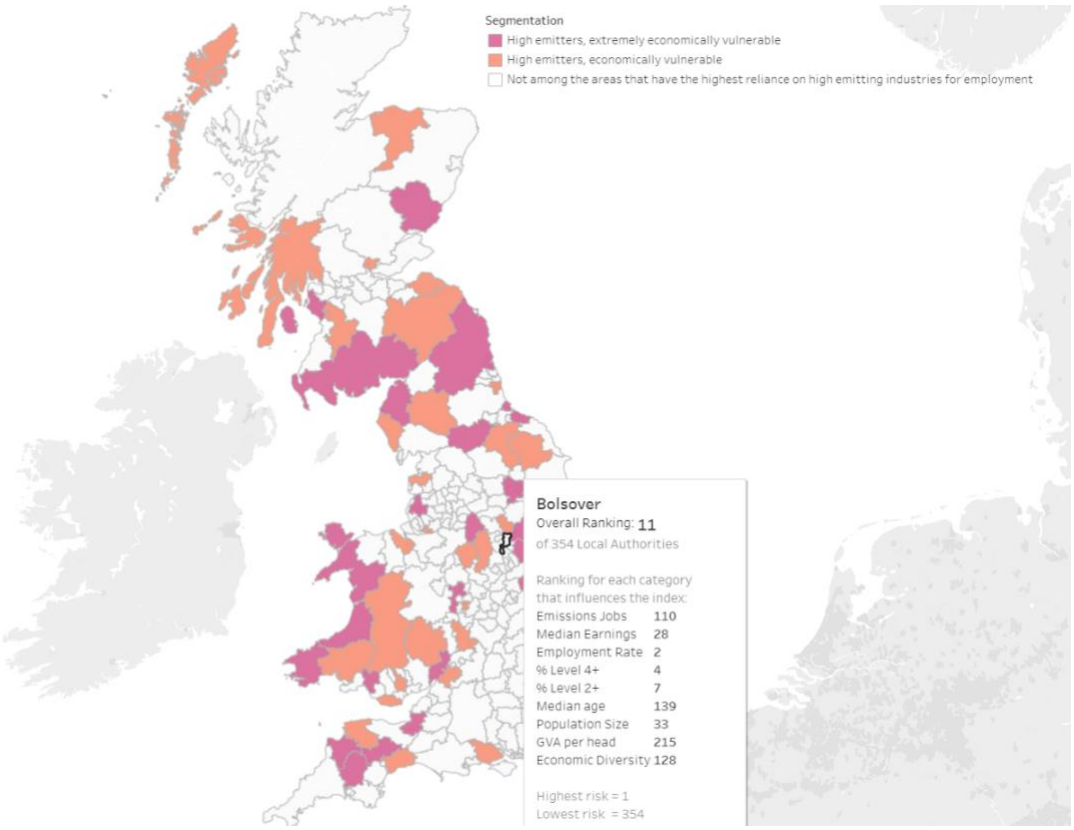



*Figure 13. Bolsover ranking in terms of economic vulnerability (Franklin, Hochlaf 2021).*

Manufacturing constitutes the second largest industry in terms of jobs in the East Midlands (13%) and Bolsover (14%) (Nomis 2021). It is only overtaken by wholesale and retail trade, repairing motor vehicles and motorcycles (17% in the East Midlands and Bolsover) (Nomis 2021). The Midlands Engine goal on net-zero transport could also constitute an opportunity in the East Midlands and Bolsover for new skills. Employers involved in repairing motor vehicles and motorcycles will need to adapt to new types of vehicles.

Most people working in Bolsover and across the East Midlands and England are employed under SOC 2010 Major Group 1-3 (see figure 14). This is associated with managers, directors and senior officials, professional occupations and associate professional and technical. Compared to the Midlands and England, Bolsover is associated with a higher percentage of lower skills such as Caring, Leisure and Other Service Occupations; Sales and Customer Service Occupations; Process Plant & Machine Operatives and Elementary Occupations. There is an opportunity then for Bolsover and other LA to identify multiple sources that can support the local economy in making a just and holistic transition and ensuring employees acquire the necessary skills for the new job requirements. For example, by exploring the creation of new jobs and *develop a pipeline of skills locally* by identifying funding for

skills and training (e.g., from European funding, UK Shared Prosperity Fund, other national initiatives and programmes and private investment) and be linked to the industry and further education institutions (ecuity 2020). According to these authors, this will guarantee that LA implement an integrated and long—term approach to skills and training in the low carbon sector.

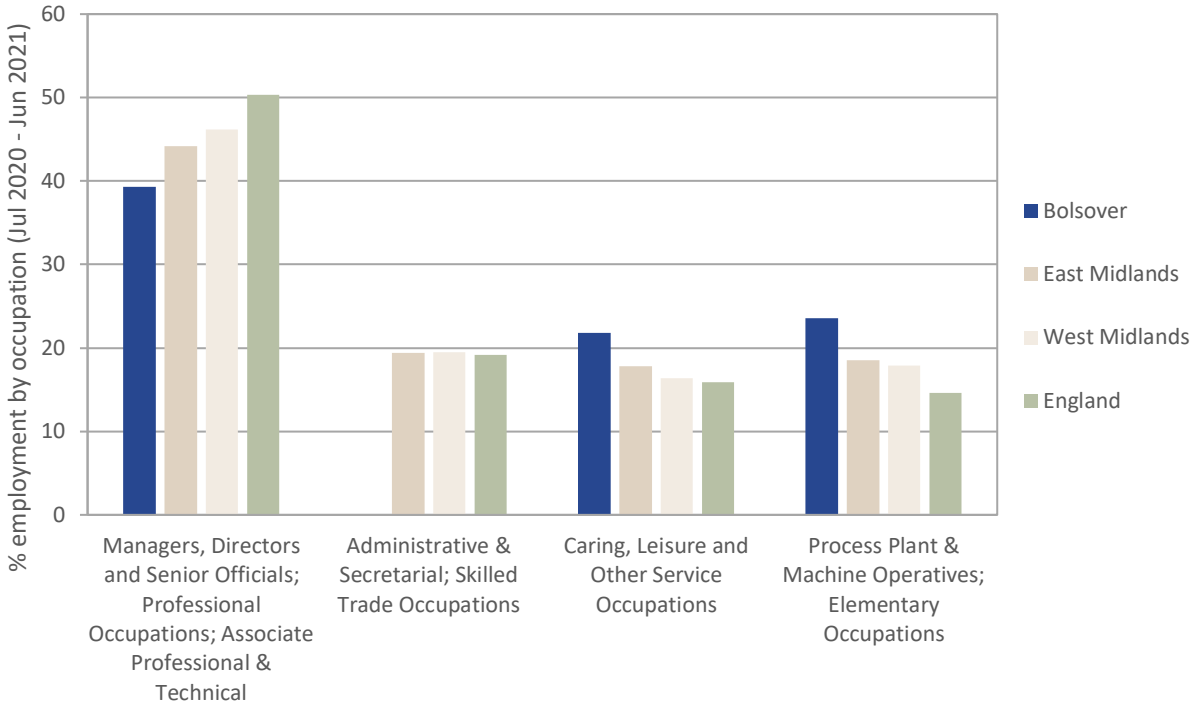



*Figure 14. Employment by occupation (Jul 2020-Jun 2021) (based on Nomis 2021)* [5].

Bolsover differentiates from East Midlands and England in terms of employment qualifications (see figure 15). While in the Midlands and England, most people have at least NVQ3 qualifications, in Bolsover, 46% of people have qualifications equal to NVQ2 or below. This shows a need to increase the level of qualifications in Bolsover to a percentage similar to what exists in the East Midlands (58% of people have at least NVQ3), West Midlands (57% of people have at least NVQ3) and England (61% of people have at least NVQ3). This presents a unique opportunity given the CITB research presented earlier in Figure 6 that shows the need to increase the numbers of NVQ4 to enable the low carbon transition.

[5] Sample size is too small for reliable estimate about Administrative & Secretarial and Skilled Trades Occupations for Bolsover (Nomis 2021).

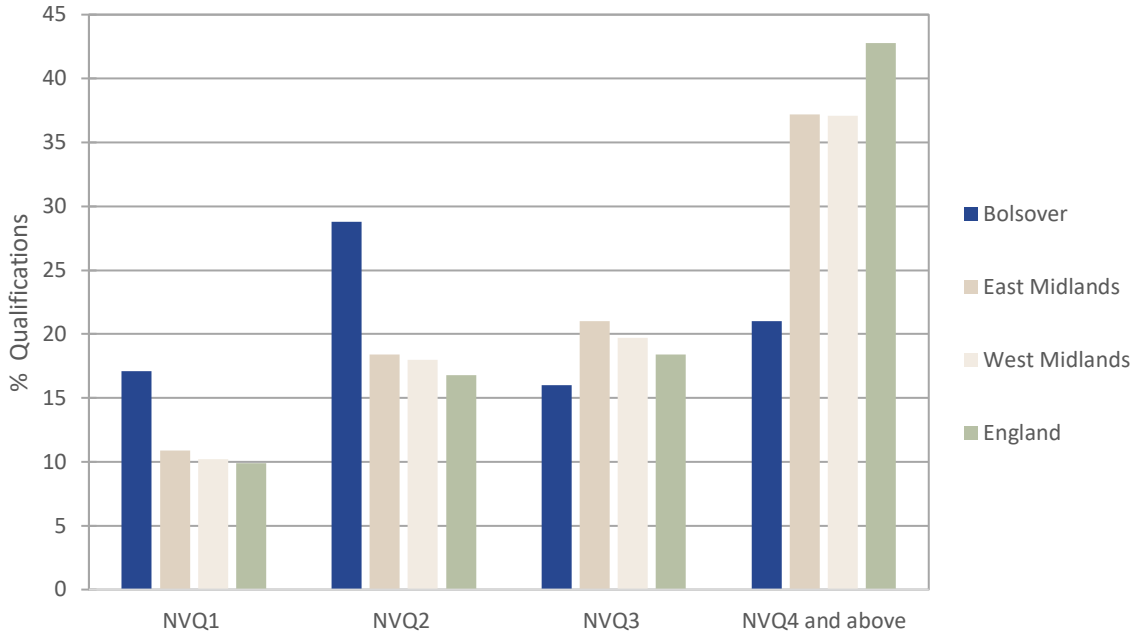



*Figure 15. Qualifications (Jan 2020-Dec 2020) (based on Nomis 2021).*

Most low carbon jobs are associated with higher qualifications than the predominant level of qualifications in Bolsover at the moment. Also, in 2019, Bolsover only had 19.1% of higher-level qualifications, the lowest level in the D2N2 area, and one of the highest levels of lower-level qualifications, similar to Derbyshire Dales and Ashfield (Figure 16). There is an opportunity to level up the qualifications in Bolsover to the East Midlands and England. At the same time, employees gain skills to support the transition to net-zero.

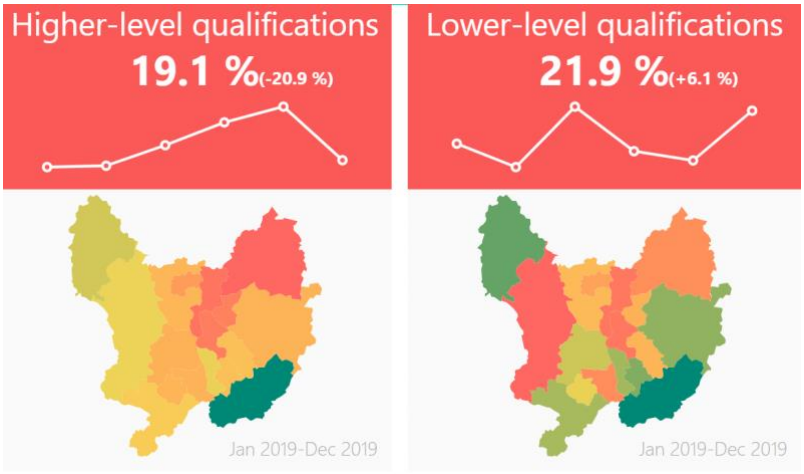



*Figure 16. Higher- and lower-level qualifications in Bolsover in 2019 (D2N2 2021a).*

Bolsover belongs to the top three local authorities within the D2N2 with the lowest activity rate (Figure 17). Nottingham presents the lowest activity rate (72.1%), followed by Bassetlaw (78%) and Bolsover (75.8%). Considering the D2N2 area, Bolsover, Nottingham, Mansfield, Ashfield, and Derby stand out

with relatively large proportions of neighbourhoods in the 10% most deprived (D2N2 2021c). Nottingham remains one of the most deprived cities in the country (ranked 10th in IMD 2019). The deprivation in education, skills and training is more pronounced than in employment and income (except for Bolsover). Worryingly, the measures of deprivation have worsened for most D2N2 districts since IMD 2015. According to the same report, compared to the English average, D2N2 has lower proportions of the workforce qualified at Level 4 and above and higher proportions qualified at Level 3. For both adult FE education and training and apprenticeships, D2N2 has proportions of achievement at or slightly below the levels for England in most subjects. HE achievements are largely in line with the national averages (expect for Bolsover – Figure 15).

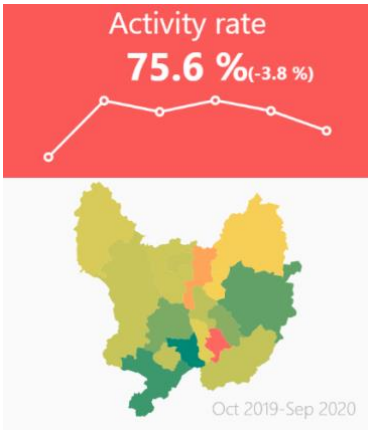



*Figure 17. Activity rate in Bolsover Oct 2019 - Sep 2020 (D2N2 2021a).*

Besides the level of qualifications, Bolsover also lags in terms of the median earnings compared to East and West Midlands and England (Figure 18). The gross weekly pay in Bolsover is similar to other LA close to Bolsover, such as Mansfield and Chesterfield.

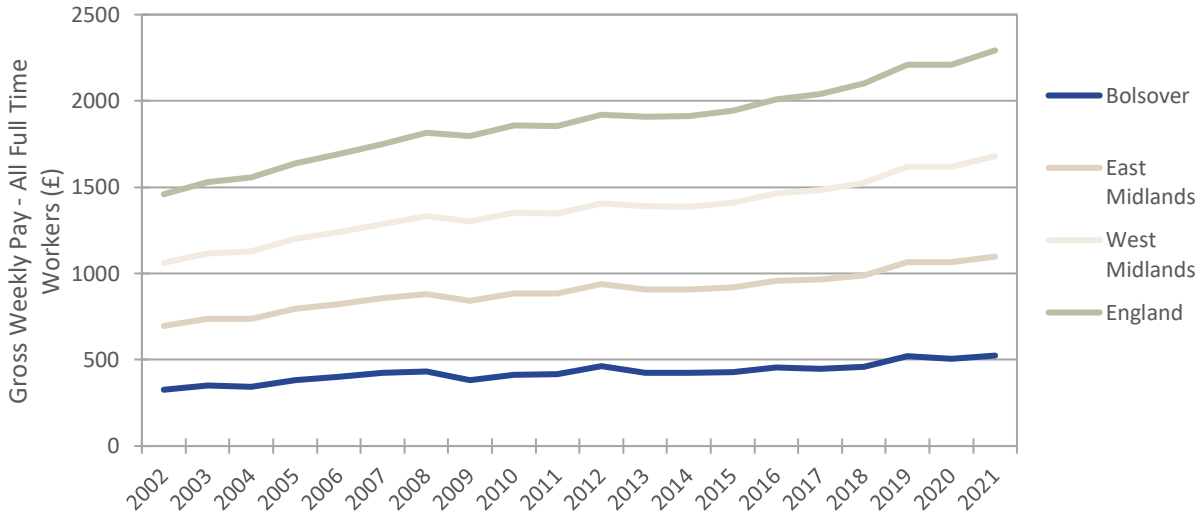



*Figure 18. Gross weekly pay – all full-time workers (median earnings in pounds for employees living in the area) (based on Nomis 2021).*

In the transition to low carbon jobs, Bolsover needs to ensure that employees in the area increase their qualifications to avoid the risk of making a transition to equally low paid jobs. The public sector will have a crucial role in supporting employees and their families to attend training to gain higher qualifications and adequate skills for low carbon jobs. This will be applicable to all workers who will transition to a new job, and also it can be an opportunity to increase the activity rate in Bolsover.

Nevertheless, while a higher percentage of men work compared to women in the East Midlands in England, in Bolsover, a higher percentage of women work when compared to men (see figure 19). It might give Bolsover the chance to be an example in closing the gap between men and women in terms of the proportional distribution of low carbon jobs.

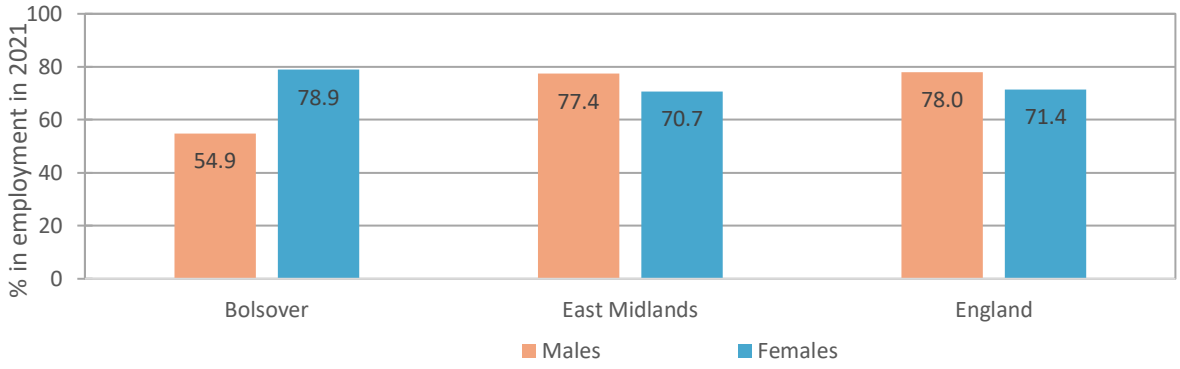



*Figure 19. Percentage of employment by sex in 2021 (based on Nomis 2021).*

In Bolsover, it is expected that most green jobs created will be related to low-carbon heat, energy efficiency and low-carbon emission vehicles and infrastructure (Figure 20). In addition, jobs related to low-carbon heat are expected to be in high demand across the Midlands (see figure 21).

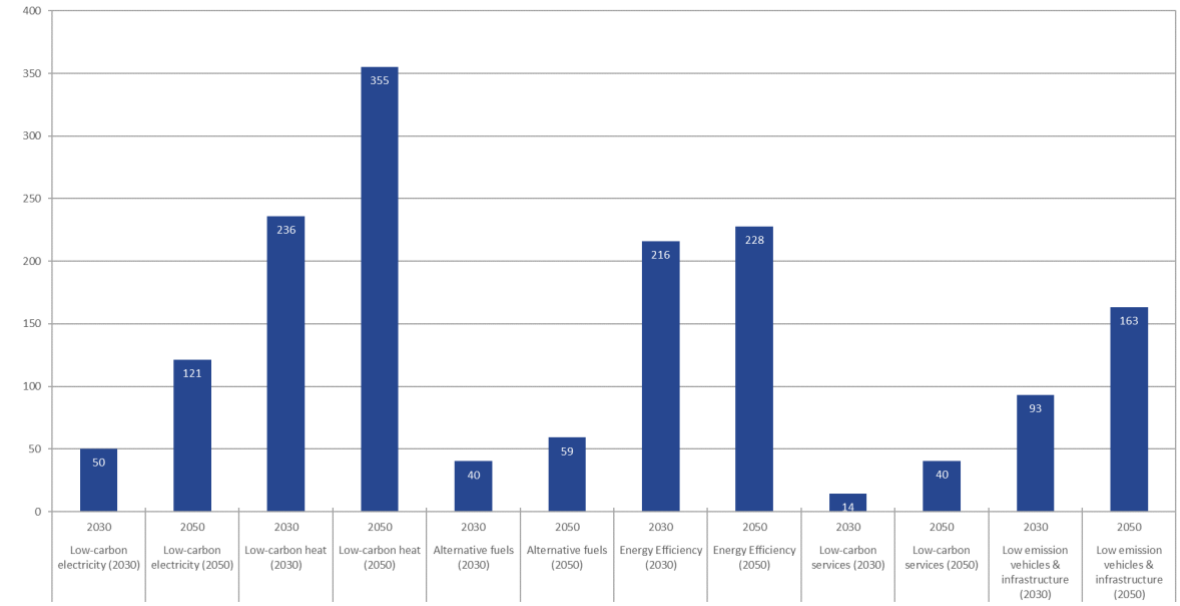



*Figure 20. Projected green jobs in Bolsover (LGA Research 2020).*

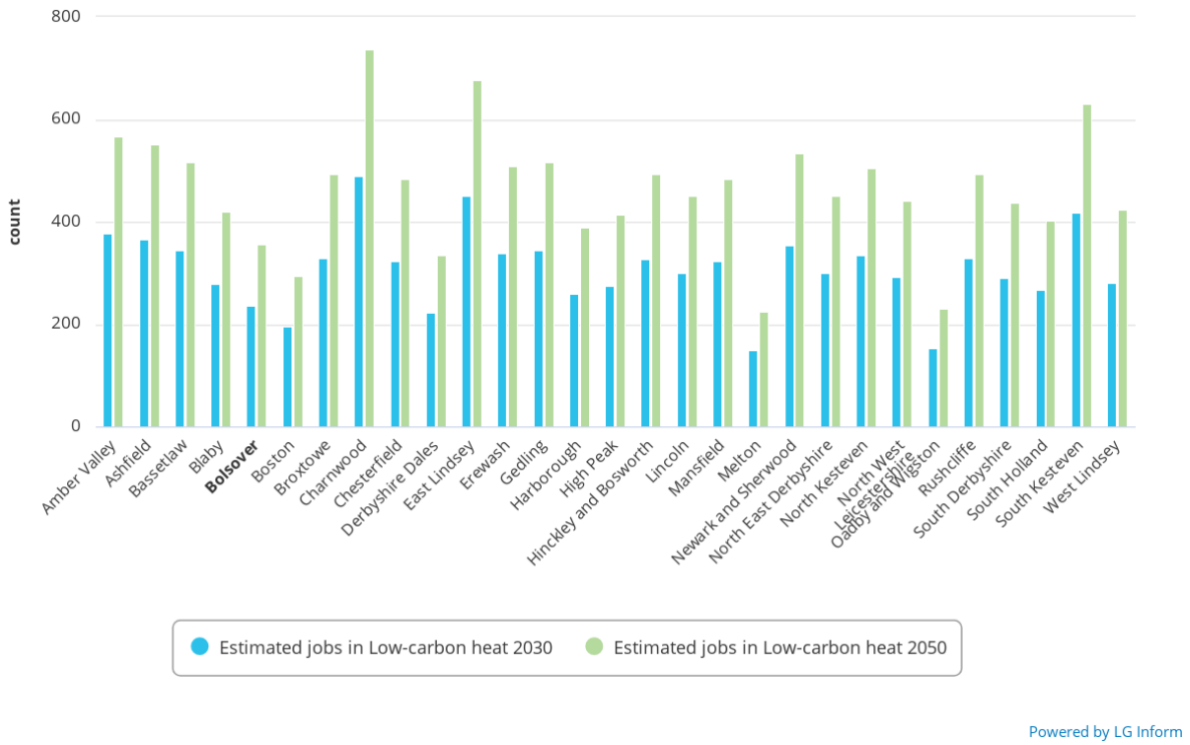



*Figure 21. Estimated number of direct jobs in low-carbon heat (2013 and 2050) for all local authority districts in East Midlands (LGA Research 2020).*

The characteristics described above make Bolsover a significant vulnerable area in the transition to low carbon jobs. There is a high risk to worsen its already economic vulnerability as many jobs will be replaced by new ones. Most employers are organised in sector-based organisations, but the required training and skills are often acquired in occupations transversal to more than one sector (Jagger et al. 2013). Consequently, it seems that specific low carbon skills need to be developed and enable future employees to work in a range of sectors. For instance, knowledge on designing, manufacturing, and installing systems that reduce energy consumption through effective heat or energy management can be applied to more than one sector.

## 3.3. Conclusion: Regional and Local Skills gap

To conclude this third section, the following key points can be made:

1. The Midlands Engine has made a high-level strategic commitment to the low carbon skills agenda. This offers significant potential with an estimated 115,00 jobs in the region by 2020 and approximately 200,00 by 2050.
2. Considering the characteristics of Bolsover, there is a significant potential to use low carbon jobs as an opportunity to level up. 'Sustainable' carbon jobs will be an opportunity to address and eradicate poverty, inequality and injustice (McGrath, Powell 2016) if social policies are implemented (e.g., incentives to join low carbon-related training).
3. Bolsover has a below-average number of NVQ4 qualifications, and this presents both a challenge and a significant opportunity for focused skills development.

4. Bolsover has a higher percentage of women in work. The implications of this need for future skills and retraining require further consideration to increasing the proportion of women in the manufacturing, energy and construction sectors.
5. It is expected that most green jobs in Bolsover will be related to low-carbon heat, energy efficiency and low-carbon emission vehicles and infrastructure.
6. The characteristics of Bolsover, including low qualifications and low paid jobs, are also seen in other LA in the country. Thus, the challenges identified in this document are potentially applicable in LA facing the same issues.

# 4.

# Reskill and recover: Recommendations for skills and course development

# Section Four – Reskill and recover: Recommendations for skills and course development

So far, this report has outlined the policy context for levelling up and argued that this can be addressed via working towards net-zero by 2050. Firstly, the need to transition to a low carbon economy associated with low carbon jobs has been shown. Secondly, the case has been made that there is a demonstrable skills gap to address net-zero by 2050. Thirdly, this presents the region and Bolsover specifically with a real opportunity – both socially, economically, *and* environmentally. Section four deals with the 'how'. First, the national policy context for skills is briefly outlined before considering how this can be implemented locally.

## 4.1. National policy context: Skills for Jobs White Paper

The Plan For Jobs (HM Treasury 2020) outlines that the UK government should spend £1.6 billion to boost work search, skills, and apprenticeships. The UK Government plans to support people to build the skills needed to get into work. At the same time, it plans to spend £1.1 billion in creating jobs in the public sector and social housing decarbonisation. For example, the Public Sector Decarbonisation Scheme aims to halve GHG emissions from the public sector by 2032, while the Social Housing Decarbonisation Fund will help social landlords to improve energy efficiency. As outlined in section 2.1, the Chancellor confirmed these commitments with total spending on skills to increase by £3.8bn by 2024-25 – an increase of 42%. These funding commitments underscore the commitments outlined in the Skills for Job White Paper that outlined the planned reforms to the FE and technical training system. The White Paper proposed five core reforms, three of which are highly relevant for this review:

*1. Putting employers at the heart of post-16 skills:*

This places a requirement on regions to develop new Local Skills Improvement Plans that shape technical skills provision to meet local labour market skills needs. There is an expectation to pilot Local Skills Improvement Plans in Trailblazer local areas and explore an approach where they are led by accredited Chambers of Commerce and other business representative organisations in collaboration with local providers; and engage employer and provider groups to ensure models of employer representation. The Department for Education revealed the pilot areas for the new £65 m Strategic Development Fund. Eighteen winners have now been announced, of which eight will be Local Skills Improvement Plans trailblazer and development fund pilot areas.

*2. Providing the advanced technical and higher technical skills the nation needs:*

There is a strong commitment to increasing technical education for post-16 technical and higher technical education and training to employer-led standards set by the Institute for Apprenticeships and Technical Education. This includes improving and growing apprenticeships so more employers and individuals can benefit from them as part of the Lifetime Skills Guarantee. There is a new £2.5 billion National Skills Fund to enhance the funding to support adults to upskill and reskill. There is further mention of this later as NTU has received funding under this scheme that is very relevant to Bolsover. Post 16 education is a priority with a proposal to roll out T Levels to prepare students for entry into

skilled employment or higher levels of technical study and a new form of level 4 and 5 Higher Technical Qualifications, which will be expanded on below.

*3. A flexible Lifetime Skills Guarantee*

'Lifelong learning 'is one of the watchwords of this policy, and there is a plan to implement a flexible Lifelong Loan Entitlement to the equivalent of four years of post-18 education from 2025 (NB the loan entitlement will be useable for modules at higher technical and degree levels [levels 4 to 6] regardless of whether they are provided in colleges or universities, as well as for full years of study). In a speech on 24th November the Minister for Higher and Further Education, Michelle Donelan, restated her commitment to this lifelong learning entitlement stating that education is the "engine for powering our levelling up agenda"[6].

## 4.2. Local opportunities for reskilling

The latest D2N2 Midlands Engine Local Skills Report (D2N2 2021c) notes the following three priorities for skills development across the region: low carbon growth, productivity, and connectivity and inclusion (see Figure 22).


*Figure 22: The D2N2 Recovery and Growth Strategy guiding principles (D2N2 2021c)*

So far in this report, the particular skills underpinning *low carbon growth* have been clearly identified. All well and good, but having determined the 'what', the 'how' needs addressing, i.e., what particular courses, training and qualifications are required to address the low carbon skills gap. This is especially pertinent for Bolsover given the levels of deprivation and current qualification profile (see Figure 15).

[6] https://www.gov.uk/government/speeches/higher-and-further-education-minister-speech-at-times-higher-education-event

The D2N2 skills report (2021c) contains some pertinent research around the destination of 16–18-year-olds, adult FE and skills destinations and the relationship to apprenticeships. The following observations are highly relevant.

- **Larger proportions of D2N2 16-18 leavers enter sustained apprenticeships** at all levels than the England averages. At level 2, though, there is a significant difference: a much smaller proportion of D2N2 16–18-year-olds go into sustained education than the England average, while larger proportions go into sustained apprenticeships and employment. This may be due to increased opportunities at Level 2 compared with England as a whole, or it may indicate a lack of a clear progression path and guidance.
- **D2N2 has a lower proportion of adult FE and skills learners going into skills development,** with a higher proportion going into sustained employment instead.
- Overall, D2N2 features **slightly higher proportions of apprenticeship learners** than England across all levels of apprenticeships.
- Within D2N2, there is a **rural-urban split**; skills deficits are higher in the cities of Derby and Nottingham than in the counties (although Bolsover is very close behind Derby and Nottingham in terms of key deprivation related to income, employment and skills).

There is a clear need then for a considered and coordinated strategy for low carbon skills. The D2N2 report *The heart of the UK's Green Revolution* (D2N2 2020) acknowledges this with five specific recommendations around skills to address the regional skills gap:

- Award D2N2 an Institute of Technology.
- Revenue funding for an employment programme for those disproportionately excluded from the labour market and a parallel programme to promote and embed inclusive recruitment practices and to upskill and reskill workers impacted by Covid-19.
- Revenue and capital funding for a digital reskilling programme to reduce digital exclusion in disadvantaged areas and amongst disadvantaged groups and address key skills gaps across many sectors.
- A careers guidance guarantee backed by the funding to roll out of Careers Hubs to all parts of D2N2.
- Flexibility for all unspent Apprenticeship Levy across D2N2 to be pooled by our upper-tier LAs to enable comprehensive, locally tailored skills, apprenticeship and T-Level support service.

The scale of the challenge is evident when considering the current state of the provision in this area. NTU recently conducted a review of Level 2/3 courses offered by colleges based in the East Midlands and D2N2 region. No colleges offered a Sustainability course, so property and construction related courses were reviewed to see if sustainability is mentioned on the course website. As these are low-level courses, the website content just mentions areas of study rather than specific modules. A couple of courses mention sustainable practice, environment, and energy, but it is unclear if these are sound modules learnt/ just content that will be touched on briefly. To expand the research, we also looked at private providers in the UK, using a Google search for ‘level 2’/’level 3’, ‘property’ / ‘construction’. However, there were no relevant courses that offered sustainability in the curriculum (see table 4).

*Table 4: Review of relevant lvl2/3 curriculum in D2N2*

| College | ADBE[7] related courses on offer | Course content (if any mention of Sustainability) |
|---|---|---|
| **Nottingham College** | Bricklaying level 2 | No mention. |
| | Bricklaying level 3 | No mention. |
| **Vision West Notts College** | Property Maintenance Operative – Intermediate Apprenticeship – Level 2 | **What will I study?**<br>**-**Understand and demonstrate the importance of Health and Safety in the workplace;<br>-Comply with organisational safety, policies and procedures and identify hazards and reduce them;<br>-Consider Safety compliance with a diverse sector of client groups;<br>-Understand and demonstrate the importance of working safely at height;<br>-Carry out repairs to the fabric of a building, for example, repairs to walls, doors, doorframes, skirting boards or plaster damage to internal walls;<br>-Understand and maintain plumbing and drainage systems, for example, repairs to WC systems, leaking taps or water testing and unblocking drains;<br>-maintain high levels of water hygiene within a building;<br>-Understand and maintain electrical distribution, safe repair of electrical installation to legal requirements, for example, replacing damaged sockets, plugs, lighting and fuses;<br>-Understand and maintain plant, Safety systems and equipment;<br>**-Demonstrate and implement energy, environmental and sustainable practices;**<br>-Understand and maintain grounds and external fabrication of a building, such as drainage and guttering;<br>-Understand and demonstrate the safe use of hand tools, for example, screwdrivers, power drills, pliers, paper strippers; and a variety of other tools used in plumbing and carpentry;<br>-demonstrate and Understand the importance of the control of resources and stock;<br>-Understand and demonstrate the principles of Planned Preventative Maintenance;<br>-Understand how to prepare for refurbishment or deep clean of equipment and surfaces;<br>-Carry out repairs and reactive maintenance;<br>-Understand the importance of customer service;<br>-Record and report information accurately, either internally or externally. |
| | Technical Certificate in Brickwork – Level 2 | No mention |
| | Extended Certificate in Construction and the Built Environment – Level 2 | **What will I study?**<br>This qualification is built on four mandatory units that form the fundamental knowledge and understanding of construction principles.<br>You will study the following units: |

[7] ADBE: Nottingham Trent University – School of Architecture, Design and the Built Environment.

| College | ADBE[7] related courses on offer | Course content (if any mention of Sustainability) |
|---|---|---|
| | | -Construction technology;<br>-Construction & design;<br>-Scientific & mathematical applications for construction;<br>**-Sustainability in construction;**<br>-Construction process and operations;<br>-The construction industry. |
| | Extended Diploma in Construction and the Built Environment - Level 3 | **What will I study?**<br>This qualification is built on four mandatory units that form the fundamental knowledge and understanding of construction principles.<br>You will study the following units:<br>-Construction technology;<br>-Construction & design;<br>-Scientific & mathematical applications for construction;<br>**-Sustainability in construction;**<br>-Construction process and operations;<br>-The construction industry. |
| **North Notts College** | Level 2 Carpentry and Joinery Apprenticeship (RFECN011) | **What will I study?**<br>-Work Safely and be aware of key Health, Safety and Welfare Issues;<br>-Plan and carry out work to Commercial Standards of Quality and Speed;<br>-Moving, Handling and Storing Resources and Materials;<br>-Legislation and Guidance;<br>-Interpret and Follow Verbal and Written Instructions;<br>-Select the Required Materials such as correct Timber, Tools and Fixings;<br>-Access, Interpret and Use Drawings and Specifications;<br>-Communication and Complying with Instructions and Directions from Trade Supervisors and Site Managers;<br>-Understanding and Interpreting Relevant Product Information and Specifications;<br>-Understand How to Calculate Quantity, Length, Area and Wastage of Resources;<br>**-Understand the Characteristics, Quality, Uses, Sustainability, Limitations and Defects associated with Timber and Timber-based Products and Components.** |
| | Level 2 Bricklayer Apprenticeship (NFECN010) | No mention. |
| | Level 2 Bricklaying (NFECN003) | No mention. |

| College | ADBE[7] related courses on offer | Course content (if any mention of Sustainability) |
|---|---|---|
| **Chesterfield College** | Diploma in Brickwork - Level 2 & 3 | No mention |
| | Level 3 Extended Certificate/Diploma in Construction and the Built Environment | No mention |
| **Derby College** | Diploma in Brickwork – Level 3 | **What will I study?**<br>-Health and safety;<br>-Material Science;<br>-Advanced craft skills;<br>**-Environmental issues;**<br>-Managerial studies;<br>-Architectural design. |
| | Diploma in Brickwork - Level 2 | No mention. |
| | Diploma in Groundworks – Level 2 | No mention. |

The extensive review of skills provision by Paterson et al (2018) notes good level 7 provision, notably strong MSc provision around renewable energy, but this is not where the pressing need for skills currently is. For example, only one course at Nottingham College looked at electric vehicle maintenance. Paterson et al (2018) also found that most SMEs prefer on-line courses with the option for in-house courses delivered by external partners.

With this in mind and being aware of these broad recommendations from D2N2, this report proposes **four specific areas of focus:**

1. **Clear progression opportunities from lvl 2-7.** There is a requirement for clear, flexible routes for both post -16 education and opportunities for reskilling and retraining. Currently, few FE Colleges offer the new Technical (T-Level) qualifications that the Government has introduced[8]. T Levels recently announced include Design, Surveying and Planning for Construction; Onsite Construction and Building Services Engineering for Construction. Clear progression routes need to be available at lvl 4 and beyond. The new 'Higher Technical Qualification' (HTQ) route for lvl4/5 offers FE and HE providers an opportunity to develop relevant, flexible delivery patterns.[9] For example, Nottingham Trent University is developing a lvl 4 HNC in Modern Methods of Construction to be delivered at Vision West Notts College on Mansfield. This will be available full and part-time. More is required, though, if we are to address the specific lvl4 shortage in the region.
2. **Enhanced and supported apprenticeship** provision to capitalise on the positive trends in this regard. Apprenticeships offer an affordable and meaningful route to gain the key skills required to reskill. The region already has good take-up for apprenticeships, but providers need to partner with the industry to develop new standards to address the skills gap, especially around retrofit technologies.
3. **Flexible [and funded] short courses** (including on-line) to support learners across the region. The Skills for Jobs White Paper promises to fund 'lifelong learning'. Potentially this is just for courses such as HTQs but for many short courses, or micro-credentials will be a more realistic option to retrain and reskill, particularly for adult learners in existing employment who wish to retrain. Again, this is especially pertinent for the D2N2 region, given the low numbers of adults undertaking skills training. Specific opportunities include, for example, lvl 4 short courses (five credits) Nottingham Trent University are developing around digital and low carbon skills. There will be funded places available through European Social Funding and our Reskill and Recover programme.
4. **A Partnership approach** is essential to deliver this strategy. Frederickson (2007)observed that *partnership working is capable of achievements that would not be feasible if individual partners worked in isolation*. Whilst individual FE and HE providers can develop individual courses to address specific skills gaps concerted action is required to develop partnerships between local authorities, SMEs and education providers to develop provision – T-Levels,

[8] Currently within the D2N2 region only Derby College is offering a limited range of T-Levels inc. Construction and Building Services: https://www.derby-college.ac.uk/t-levels/
[9] Full details of available standards are here https://www.instituteforapprenticeships.org/about/

HTQs, and short courses to plug this gap and deliver the essential skills to enable a just transition and truly level up.

Funding is obviously key to all of this. To help develop these future initiatives, it is worth being aware of the potential funds available under the current Government levelling up agenda (see table 5). NTU's Knowledge Exchange team can help with these and provide further information and support where appropriate.

*Table 5: Future funding opportunities.*

| Funding stream | Focus |
|---|---|
| **Levelling Up Fund Round 2** | The Levelling Up Fund funds infrastructure improvements that contribute to the levelling up agenda. The first round of projects was announced in October, with around £1.7b funded. The allocated budget was £4.8b, so subsequent rounds are expected but with no details at present. Successful bids for Round 1 include town centre and high street improvements and investment in cultural and heritage assets. |
| **Shared Prosperity Fund** | This is the Government's primary replacement for EU structural funds following Brexit and is expected to launch in 2022. The funding will be worth £2.6B over 3 years, with the annual budget increasing year on year from £0.4B in 2022-23 to £1.5B in 2024-25. It is expected that there will be a strong emphasis on skills and employment programmes, and £560m has already been allocated to the 'Multiply' numeracy and literacy programme. |
| **Connecting Capability Fund Wave 3** | The CCF complements HEIF funding by supporting collaboration between HE institutions and businesses to commercialise research outputs. Although business support is not directly funded, all activities that link academic expertise with business/investors are in scope. CCF was not mentioned explicitly in the spending review, but £25m has been allocated through the Innovation Strategy to extend existing projects, and there appears to be an intention to build upon the success of previous waves. |
| **Strength in Places Fund Wave 3** | £127m has been allocated through the Innovation Strategy to develop R&D capacity and local growth through the Strength in Places Fund Wave 2. As of late October, there is no mention of further SIPF, but this may form part of the expected R&D Place Strategy promised in the Government's R&D roadmap (January 2021). |
| **Prosperity Partnerships** | Prosperity Partnerships are funded through EPSRC and support an established research partnership between business and academic. These must be business-led but co-created and delivered between all partners, with activity focused around TRL 1-3. The fifth round is currently closed to applications but will likely be repeated to form part of UKRI's long term strategy. |
| **Severn Trent Community Fund** | This is a bit of a departure from the opportunities above, but it funds not-for-profit organisations (in Severn Trent areas) to support people, place and environment projects up to £250k. Deadlines are rolling and are batch assessed quarterly. |

## 4.3. Conclusion: Reskill and Recover

To conclude this fourth section, the following key points can be made:

1. The Skills for Jobs White Paper offers a real opportunity to bring a renewed focus on technical qualifications for post-16 and adults.
2. The D2N2 regional skills strategy is welcome but requires detail around specific course development and implementation.
3. A partnership approach is vital for the successful deployment and delivery of suitable courses for the right audience.
4. Further research and consultation are required with stakeholders, inc. FE/HE providers, local authorities and [crucially] SMEs to explore and understand the specific opportunities and barriers.

# 5.
# Conclusions and recommendations

# Section Five – Conclusions and recommendations

## 5.1. Conclusions

The report addresses the challenges and opportunities in low carbon jobs for the UK, the Midlands and Bolsover. The UK has seen an increase in demand for low carbon jobs. This will only continue due to the various governmental policies and finance and broader institutional conditions.

Bolsover is a local authority (LA) associated with low qualifications and low paid jobs. The low carbon skills and jobs literature have paid less attention to LA like Bolsover, which are at high risk in a disadvantaged and deprived economy. The imminent and vital low carbon transition could potentially be an opportunity to address the challenges and level up areas like Bolsover. However, it must be just and holistic – the young, women, and those in low paid work need to be supported. For instance, the construction and manufacturing sectors are associated with many opportunities for low carbon jobs. However, as men currently dominate it, it might restrict the access to women to low carbon jobs. Training providers should encourage and provide specific support and opportunities for women to gain low carbon skills to work in the construction and manufacturing sectors.

The UK Government plans to achieve net-zero by reducing GHG emissions, carbon capture and storage, and offsetting an equivalent amount of GHG emitted. We believe it should be a priority to start by reducing GHG emissions to decrease carbon dependency. This goal will support the transition to a low carbon economy in the medium and long term. Technologies for carbon capture and storage are still in the early stages of development and offsetting an equivalent amount of GHG emitted still contributes to environmental externalities.

Low carbon jobs can support the transition to a low carbon economy, but they might not be enough. Local and national authorities have a crucial role in implementing policies to reduce and re-compose consumption from carbon-intensive to low carbon sectors, e.g., through legislative limits, green taxes, public investment and working hour reductions (Hickel, Kallis 2020). This transition will lead to a decrease in carbon dependency and an increase in low-carbon jobs. Carbon taxes and other incentives for the transition have already been included in the latest Fiscal risks report (Office for Budget Responsibility 2021).

Alongside clear and consistent national policy, a local partnership approach must be across the public sector, educational providers such as FE Colleges and Universities and the business community, especially the SME sector. The relationship between NTU and Vision West Notts College presents an interesting example of what is possible, but D2N2 and the Chamber of Commerce have an essential role in supporting this transition. It is hoped that local and regional organisations move forward in a spirit of collaboration and partnership rather than competition.

Lastly, failing to deliver a just and holistic transition to low carbon jobs will intensify the sense of unfairness and unequal access to opportunities in parts of the population. It will lead to an increased division of the society, damage all efforts towards uniting a post-Brexit Kingdom and jeopardise the

United Nations Sustainable Development Goals and the UK Government flagship on *leaving no one behind*.

## 5.2. Recommendations

Brief recommendations and reflections have been offered at the end of each section. The following five recommendations draw these all together:

1. **New courses:** Training providers need to develop the necessary training and short courses to enable people to learn, share and practice low carbon and green skills. Courses need to be developed based on equity and fairness, accessible to everyone and considering a holistic transition to jobs associated with technologies that lead to less environmental impact. This is related explicitly to decent, life-enhancing, solidary, environmental-sensitive and intergenerational-minded skills for work (McGrath, Powell 2016). We have noted in section 4.2 the specific need for **clear progression opportunities from lvl 2-7.** This includes the development of T Levels, HTQs and apprenticeships alongside flexible [and funded] short courses (including on-line) to support lifelong across the region. Specifically, courses need developing around low carbon heating solutions, including retrofit technologies and energy efficiency alongside low emission vehicles and infrastructure. Finally, they need to be **flexible and funded.**
2. **A Partnership approach:** This is essential to deliver this strategy. Whilst individual FE and HE providers can develop individual courses to address specific skills gaps; concerted action is required to establish partnerships between local authorities, SMEs and education providers to develop provision.
3. **Regional strategy and support:** Further work is required to locate the D2N2 regional skills strategy into tangible and coordinated outputs. Specific local solutions need to sit alongside regional variations, for example, between urban and rural priorities and specific course development and implementation
4. **Dedicated support for SMEs**: The barriers to reach SMEs are well known. Support needs to be targeted, easy to access and free as much as is possible.
5. **Further research and consultation:** SMEs are a heterogenous sector, and further research is required with stakeholders, inc. FE/HE providers, local authorities and [crucially] SMEs to explore and understand the specific opportunities and barriers around support, skills coordination and focus.

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