



Green Jobs and Skills in West London

Final Report

A WPI Economics Report for and Institute for Employment Studies Report for West London Alliance

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Executive Summary

This report examines the potential scale and nature of green jobs across the West London sub-region. This report is accompanied by the Cross London report as well as reports for each of London's three other sub-regional partnerships.

Councils in West London will play a vital part in helping to deliver net zero. Based on extensive stakeholder engagement, Boroughs across West London are engaged in a number of crucial activities in relation to decarbonising the energy supply, homes and buildings and working with businesses. These activities, as well as the wider drivers in West London, are helping to drive the green economy of the future in the capital.

Modelling for this report takes a mission-based approach to defining the green economy and identifying green jobs in West London, building on the Green Jobs Taskforce definition. This was applied to the Low Carbon and Environmental Goods and Services (LCEGS) data from kMatrix (a consultancy) and The Data City Real Time Industrial Classification tool ¹ in order to provide an estimate of the number of green jobs in West London. This was then combined with a number of assumptions and use of datasets including research from the Climate Change Committee (CCC) and ONS Labour Force and business surveys to create a series of projections for future numbers of jobs, as well as to provide additional skills analysis.

Green jobs today in West London

West London has just over 1 in 7 of the capital's green jobs, totalling 31,600 green jobs in 2020. This represents 3.2% of the sub-region's total jobs. Within these, the top sectors, also among the most prominent across London as a whole, are Power and Homes and Buildings. These two sectors account for almost 8 in 10 of the sub-region's green sector jobs.

Green skills today in West London

Workers in green jobs in West London are predominantly in higher level managerial, professional and associate professional occupations – 64% are in these three occupational groups, which compares with 53% of green workers across the country as a whole, but below the proportion of green workers across the whole of London (70%). Skilled craft manual workers (e.g. electricians and plumbers) are over-represented in green jobs in West London in comparison with the whole of London. There is variation by sector, with jobs in power and green finance/consultancy sectors being predominantly professional and associate professional, while the largest group in sectors related to homes, buildings and infrastructure, and reduce, reuse, recycle is skilled craft workers.

Around three fifths (59%) of West London residents in green jobs have degrees (above the proportion of graduates in all jobs in West London of 52%, and the proportion of graduates in green jobs across the UK as a whole of 38%). The vast majority of workers in power and green finance/consultancy

¹ LCEGS (Low Carbon and Environmental Goods and Services) is a dataset commissioned by the Greater London Authority which includes a broader set of activities than other official datasets, such as green finance. The Data City Real-Time Classification tool uses guided machine learning to find companies working within specific fields. More details can be found in the report.

sectors are graduates, although in homes, buildings and infrastructure and reduce, reuse, recycle the proportions of graduates are lower, at around 25%.

There are higher than average proportions of male workers, and white workers, in green jobs compared with all jobs in West London. Furthermore, the green workforce has an older than average age profile, in comparison with all workers in West London.

Analysis at the national level shows that green sectors tend to draw relatively few workers straight from education, and rely more on workers from other sectors. In West London, the pool of workers likely to have green-related skills but working in other sectors is around four times as large as the number of green workers, although this potential supply is only twice as large as the workforce in the power and homes, buildings and infrastructure sectors.

There are around 9,000 learners aged 19+ in further education (FE) and in apprenticeships (all ages) in relevant subject areas to green jobs. These represent nearly 30% of the current green workforce, higher than the level across the whole of London (18%), indicating a relatively large education and training pipeline at FE level within West London. The HE institutions in West London produce a relatively large number of business/finance and maths/computing graduates in relation to the numbers of graduate workers in green jobs with degrees in these subjects, although much smaller numbers of graduates in engineering and physical/environmental sciences in relation to the size of the graduate workforce with these degrees in green jobs.

The need for the workforce of the future to have climate literacy and be environmentally aware is acknowledged by West London's FE providers consulted in the course of the research, with some indications that these less technical 'light green' skills are being woven into wider curricula, but that challenges exist in doing this given the need to relate course content to the sectoral/occupational focus of any course.

Green jobs in West London in the future

This report sets out future projections for the number of green jobs in the future, using three scenarios (low, central, high) to account for uncertainty of future activity to meet net zero and its impact on the growth of the green economy (such as the speed of innovation in low carbon technology, the rate of uptake and behaviour change, and how far future Government policy encourages change). The total number of jobs in the central scenario is projected to rise from 32,000 in 2020 to 64,000 in 2030 – a doubling of the green economy workforce over a decade – and rising to 112,000 in 2050 (a near-4-fold increase from 2020). Within this scenario, three sectors account for over 8 in 10 (84.5%) of West London's total number of green jobs by 2030:

- Power (23,200), representing 36% of total green jobs
- Homes and Buildings (18,800), representing 29% of total green jobs
- Low Carbon Transport (12,100), representing 19% of total green jobs.

By 2050, the three sectors continue to dominate:

- Power (42,600), representing 38% of total green jobs.
- Homes and Buildings (24,200), representing 22% of total green jobs.
- Low Carbon Transport (21,600), representing 19% of total green jobs.

Furthermore, there will be a small positive impact of policies to transition to a net zero economy in line with the CCC on West London, increasing net employment by around 10,200 jobs in 2030 and around 3,700 jobs in 2050.

Future skills projections

Under the central scenario, the fastest growth rate is projected for skilled craft workers (140% increase to 2030), and this occupation group is also projected to experience the largest increase in numbers of workers (9,800 increase). Under the high growth scenario, skilled craft workers will increase by nearly 23,000, or 323%.

In addition to the growth in numbers, there will be a need to replace workers who retire or leave the labour market. It is estimated that this replacement demand represents one third of the current employment level, with only minor variation across the occupational groups.

These projected total demands for workers in green jobs in the central scenario are large in relation to the outputs from FE and HE, and especially so for skilled craft workers. The annual increase in consultancy-based jobs represents a quarter (12%) of the annual output from education and training, while the annual increase in craft-based job is slightly larger than the total education and training output in craft-based subjects (2% larger). As outlined in recommendations below, increasing local skills supply would set the sub-region up for this anticipated increase in demand.

Jobs at risk of decarbonisation

We define carbon intensive sectors as ones that either have emissions over 100tCO₂e per job or which contribute more than 2% of annual total UK emissions. On this definition the research finds that West London has 117,000 jobs in carbon intensive sectors that will need to change substantially due to the transition. This represents 12% of employment in West London, and is higher than the London-wide average of 7%.

- Construction, aviation and land transport account for the large majority of these jobs
- One third of London's transport and storage jobs are in Hounslow and Hillingdon, and Heathrow Airport is a key source of jobs for Hillingdon and neighbouring boroughs
- The top three boroughs for manufacturing jobs are in West London: Ealing, Hillingdon and Brent
- Overall, we estimate the carbon intensive sectors in West London are likely to have a slightly higher proportion of non-White workers, and also tend to be male dominated.

This suggests a need for reskilling at scale to enable those currently in carbon-intensive sectors to adapt to changes to their jobs or to seize alternative employment opportunities in emerging sectors.

Recommendations

The analysis in this report highlights a few areas where there is a potential for central, London, and local government to work with stakeholders to fully realise the benefits of the net zero transition.

- **Long term policy certainty and clarity:** This has been identified as a key contributor towards green jobs and growth, by providing the long term signals needed by firms, workers and providers. The Net Zero strategy goes some way to creating this through the high-level signals

and intentions, but the CCC has highlighted a range of areas where more concrete actions are required to translate this into delivery.¹ Ultimately this requires leadership from **central Government, but London government (the boroughs – individually, at sub-regional level and through London Councils – and the Greater London Authority)** also have a role in stressing the importance of delivering certainty in a jobs and skills context.

- **Shape skills provision to equip London’s future green workforce: Employers, sector bodies and skills providers** need to work together to help shape skills provision so that a pipeline of skilled individuals is available to support delivery plans for net zero and other environmental goals, including reskilling opportunities for existing workers.
- **Promote the opportunities of the green economy:** Shaping skills provision needs to be supported by careers information, advice and guidance to promote opportunities in green sectors to learners and increase progression rates to employment within green sectors. **Skills providers, schools, employers and industry bodies** have a role in delivering this.
- **Monitor the growth of the green economy:** **London government** should measure the growth of the green economy over the coming years using a consistent framework, and identify areas where there are challenges in meeting skills needs which are holding back growth and limiting our ability to tackle emissions.

In addition, with respect to skills provision, there is an urgent need to:

- **Increase education provision in subjects and courses that are relevant for green jobs:** **Skills providers** should particularly ensure there is increased provision related to craft-based jobs (particularly in roles for which there are existing skills shortages) in the Homes, Buildings and Landscape and Power through Further Education and apprenticeships, given the size of projected increases in employment in relation to current skills provision;
- **Increase the proportion of those taking relevant courses who progress to employment within green sectors:** **Skills providers, working with employers and sector bodies**, should ensure there is sufficient information and guidance for careers in the green economy, that informs learners of the growing range of opportunities within green sectors; and
- **Skills providers should consider increasing targeted reskilling training**, working with **employers and sector bodies** to increase the flows of potential recruits from non-green sectors into green jobs.

2. Introduction

Policymakers and stakeholders across London have a critical opportunity to put meeting net zero targets at the heart of the capital's economic recovery from the pandemic. Delivering this is a necessity in order to meet the ambitious target of net zero across the capital by 2030.

Furthermore, analysis in the Green Jobs and Skills Cross London reportⁱⁱ suggests that this also presents real economic potential for the city; a green economy could provide over a million jobs by 2050 based on a net zero policy pathway.ⁱⁱⁱ This would be reflective of a growth rate for the green economy that is bigger than previously identified growth rates for the digital economy. Furthermore, London would see an overall net increase in jobs.

Seizing this agenda is vital not just for the Capital itself, but also for the whole of the UK. London has a major contribution to make in driving a strong economic recover across the UK, and in growing and strengthening the industries that will underpin the green economy of the future. The West London economy contributes 4% of national GVA, amounting to £74 billion before the covid pandemic.^{iv}

The West London sub-region encompasses varied local economies, with significant differences between boroughs. West London comprises greener-than-average suburban areas, such as Barnet, alongside large regeneration developments like Wembley and the Great West Corridor and London's largest industrial estate in Park Royal. As well as residential areas and a population of 2 million, the sub-region is home to over 100,000 businesses and a higher proportion of start-ups and microbusinesses than the rest of London – 23% of businesses are less than two years old.^v The area is also home to large multinationals like Sky, Diageo and Disney, and university and tech spin-outs such as Imperial White City campus and Brunel University.

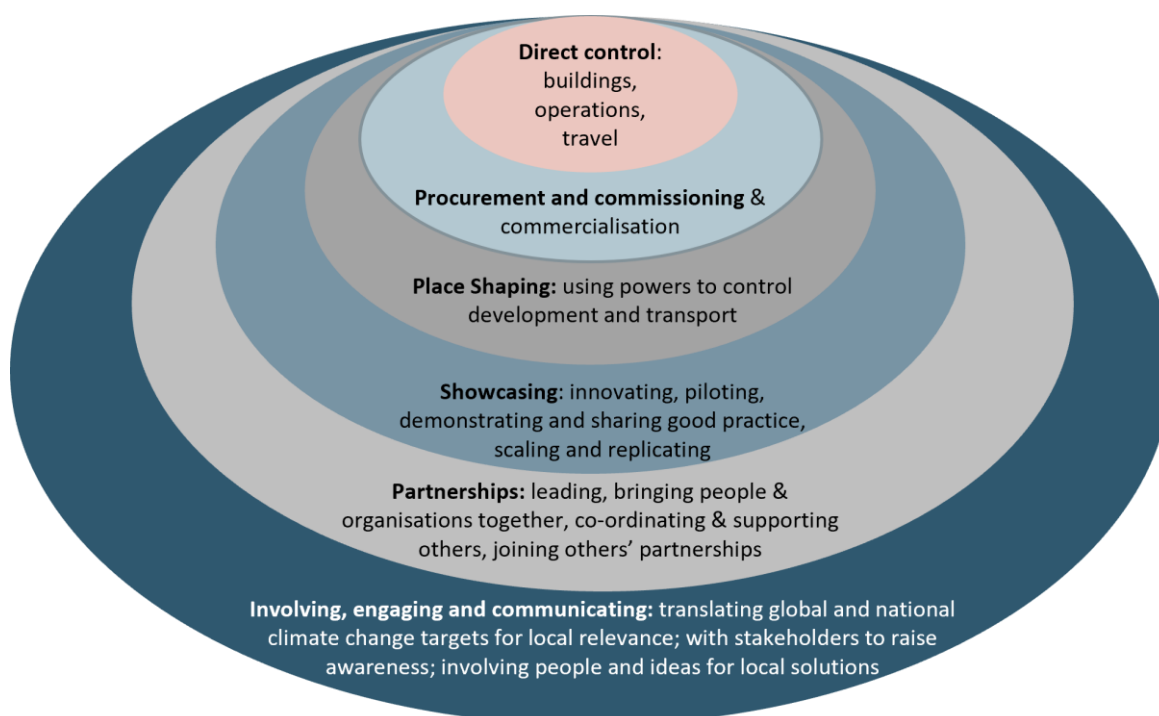
The green recovery in West London

Analysis commissioned by the West London Alliance estimated the most immediate impact of the pandemic has been felt by the West London economy, with an estimated loss of the equivalent of £8.1 billion GVA.^{vi}

The partnership has put a green recovery at the heart of the economic recovery from the pandemic, with the green economy as one of seven themes in West London Alliance's 'Build & Recover' Economic Recovery Strategy.^{vii} Ambitious climate targets are in place in London – 28 London boroughs have declared a climate emergency and the majority have announced a net zero ambition in advance of central Government's legal target, including the majority of WLA member councils.

Although as organisations themselves they are only generally responsible for 2-5% of the emissions of a local area, local authorities are well placed to play a wide strategic role in a variety of ways due to their expert knowledge of the communities they serve.^{viii} These are summarised by the below diagram, which was reproduced by the CCC in a document to support the Sixth Carbon budget.

Figure 1: How local authorities control and influence emissions



Source: CCC Sixth Carbon Budget^{ix}

It is clear from our borough engagement that West London's local authorities are already undertaking actions across the types of activity outlined in the above diagram. West London's local authorities are currently developing a low carbon procurement toolkit to capitalise on the sub-region's combined buying power and drive sustainable procurement practices in the sub-region. Other activity at early stages is also being developed, such as building up buy-in for pilots which councils hope will be able to be rolled out further, and putting training in place to equip residents and local businesses to take action.

In particular, there is considerable activity in developing strategies (including a sub-regional focus on developing 'investible propositions' to deliver a green recovery), and delivery has already commenced in a range of areas; common activities include making use of government grants for the retrofit and upgrading of council buildings and housing stock, installing electric vehicle charging points, enhancing and preserving the local natural environment, and scoping of potential activities post-COP.

Alongside ambitions and activity to deliver them, West London faces a number of challenges. For example, West London has a relatively higher proportion of jobs in high-emitting sectors, including Transport and Storage (one in three Transport and Storage jobs are in Hounslow and Hillingdon) which is the industry group responsible for the highest share of greenhouse gas emissions in London, and Manufacturing, where the three boroughs with the highest share of manufacturing jobs are in West London.^x To give an idea of the importance of the Transport and Storage sector to the local economy, Heathrow is estimated to provide 130,751 direct, indirect and induced jobs in the local area.^{xi}

Innovation and emerging green sector businesses

However, the area is also home to innovative green employers and green innovation through its anchor institutions and the research and development and knowledge sectors. In some areas (such as Hammersmith and Fulham), these are on the whole smaller start-ups rather than large volume employers. Nevertheless, they represent considerable value to the green recovery. Examples of innovative green companies based in the area include Vantage Power, Biohm and Polymateria (see below case studies for more information). We also heard about plans for expanding upon this foundation of expertise; Hounslow announced its plans for an innovation hub to facilitate innovation, knowledge exchange and engagement with a range of stakeholders (including residents, experts, agencies) to help develop and deliver a green recovery.^{xii}

Box 2: Innovation to support net zero at the White City Incubator, Imperial

Imperial's White City Incubator is an innovation facility for early-stage and growing companies, bringing together business expertise, scientific innovation and an entrepreneurial community into a collaborative hub.^{xiii}

The Incubator combines office and lab space and a network of investors and expertise to support businesses to grow. The Incubator has hosted companies developing products such as Skipping Rocks Lab's 'Ooho' – edible, plastic free packaging for liquids, which among other achievements was part of the world's first plastic-free marathon – and Polymateria's technology to change the properties of plastic to make it biodegradable.^{xiv} More recently, start-ups in cultivated meat technology, renewable energy storage and hydrogen storage have joined the White City Incubator.^{xv}

The success of its tenant companies demonstrates the value of start-ups. For example, Skipping Rocks Labs has grown its team considerably, developed an additional product (NOTPLA) and has attracted financing through crowdfunding, venture capital, and most recently closed a £10 million Series A financing round.^{xvi}

Box 3: Creating and sharing expertise on sustainable practices at the Brunel Centre for Entrepreneurship and Sustainability (CES)

The Centre for Entrepreneurship and Sustainability was launched in 2018 to lead and advance interdisciplinary research on entrepreneurship and sustainability, and how creativity and entrepreneurship – individuals, businesses and societies – can be harnessed to solve social and environmental challenges. The CES fosters dialogue between different stakeholders including scholars and business leaders, and knowledge creation and sharing. The CES has worked on a range of studies, addressing local, national and international challenges.

Understanding food waste reduction barriers in Harrow: This study produced preliminary qualitative research to explore householder disengagement with the Council's food waste reduction schemes, prompted by the Council finding that up to 40% of black bag waste in Harrow was food waste, despite the existence of dedicated food waste collection. The research was funded by HEIF Innovation Voucher.^{xvii}

Research into how the tax system could contribute to Net Zero: Researchers engaged in dialogue with business stakeholders in sustainability leadership roles to explore their experiences and concerns about the current UK environmental tax system and gathered insights into the potential risks and issues in attempting to improve the current system.^{xviii}

Decarbonising existing and future buildings and developments

A little under a quarter of the UK's total greenhouse gas emissions directly (e.g., heating) and indirectly (e.g., electricity use for appliances in the home) come from buildings, indicating the importance of decarbonisation of homes and other buildings.^{xix} Since the majority of buildings which will be in use in 2050 are already built, retrofit and other measures to improve efficiency in existing buildings is a key component of achieving net zero.

The Green Homes Grant Local Authority Delivery Scheme is part of a West London consortium carrying out energy efficiency retrofits of homes with an EPC rating of D or below, with measures such as insulation, low carbon heating systems and smart heating controls. The scheme is funded by BEIS and will deliver retrofit in West London to up to 700 homes. Ealing aims to deliver 50,000 energy efficiency measures in private homes by 2025, and deliver deep retrofit of 200 low income and energy inefficient homes through the Green Homes Grant.^{xx} The council aims for all council homes will be EPC B or above by 2030, and Brent has a similar target to achieve an average EPC B rating across all council stock by 2030.^{xxi}

Harrow, capitalising on the nature of much of its housing stock – 3-4 bed properties with ample roof space – foresees solar panel installation as a key area of growth in the borough, and to this end has begun to participate in a group-buying scheme for solar panels and battery storage in 2021. Since this launch, 1500 residents have registered an interest in taking part. The Public Sector Decarbonisation Fund is enabling councils in the sub-region to decarbonise their own buildings; Brent has received a £3.2 million grant to decarbonise 15 of its buildings, and Harrow will utilise its £2.4 million grant to decarbonise six schools and corporate sites among other buildings. Works include loft and cavity wall insulation, solar panels, and air source heat pumps among other upgrades.

Given projected population growth and demand for homes, as well as other types of buildings, West London boroughs are coupling this anticipated increase in demand with sustainability through affordable homes development plans and regeneration projects. For example, as part of the South Kilburn Regeneration Programme an installation of a neighbourhood heating system has been proposed.^{xxii}

Box 4: Vattenfall community heating in the Brent Cross Regeneration development

Part of the Brent Cross regeneration development in Barnet will include the Vattenfall heat pump installation, which at 8MW is anticipated to be the largest of its kind in the UK and operational by 2023.^{xxiii} It will provide over 80% of total heat requirements to the Brent Cross South site, providing low carbon heating and hot water to 6700 new homes.

The development exemplifies the borough's interest in forging close links between business, training providers and local jobs brokerages; the council has engaged Vattenfall in supporting local residents to upskill to enter the industry, as well as a partnership with Barnet and Southgate College to explore options for skills training.^{xxiv}

Encouraging change in resident and local employer behaviour

It is estimated that business activities are responsible for around half of all emissions in the UK, meaning that businesses are critical in reaching net zero.^{xxv} (Large businesses are more likely to have developed decarbonisation policies, while account for a greater proportion of the UK's business emissions relative to their number). However, smaller businesses – estimated to be responsible for around half of business emissions – are crucial in the transition. Research from the British Business

Bank highlights a range of barriers faced by smaller businesses in decarbonising, including a lack of information, cost, and feasibility, reflected in the finding that 76% of businesses surveyed are yet to implement a decarbonisation strategy.^{xxvi} However, this is not indicative of complacency, as just under half of businesses stated that carbon reduction was a high or very high priority.^{xxvii}

Decarbonising council activity alone will not be sufficient to achieve net zero, and boroughs across the sub-region are equipping local businesses and residents to adopt net zero-aligned changes and help overcome barriers to implementing climate mitigation practices. For example, Brent has developed bespoke Green Business Guides tailored to its five main business sectors, to support them to decarbonise commercial operations within the borough. SME emissions are an area of focus for Ealing's Climate Action Scrutiny Panel, and part of its strategy to address this is to make carbon measurement, monitoring and reduction easy to use and implement. Similarly, Hounslow is supporting SMEs to decarbonise their processes through the Better Futures funding from the Greater London Authority.

Local authorities in West London are also acting to support residents to make greener choices. Hammersmith and Fulham already has one of the largest EV charging networks in the UK,^{xxviii} and Ealing has introduced a target for all residents to be within a five minute walk of an EV charge point by 2025. Hounslow is developing a strategy for EV charging infrastructure, and encouraging developments to include both active charging points and passive charging for future connections aligned to the London Plan. Hounslow is addressing barriers to resident behaviour change through distributing bicycles throughout the borough, including in areas of deprivation to improve access to active travel options for people less able to afford them, while Brent is aiming to increase the number of trips made by cycling to 7-10%, up from just 2% in 2017-18.

Definition of 'Green Jobs'

As discussed in more detail in the [cross-London report](#), to develop a common definition of 'green jobs' for London, we conducted a review of existing definitions of 'green jobs' – and related concepts, such as the green economy and sectors – from UK statistics, research- or mission-specific uses and academia, and held roundtables and interviews with a range of stakeholders to gather feedback on the potential approaches. With practicality, applicability and political salience in mind, we have adapted the approach employed by the Green Jobs Taskforce to better reflect London's labour market and business makeup, informed by our literature review and stakeholder engagement. This definition comprises the following sectors, adapted from those of the Green Jobs Taskforce to reflect London's economy.

Mission-based definition: proposed sectors for a London based definition

Net zero focus

1. **Homes and buildings:** Including retrofit, building new energy-efficient homes, heat pumps, smart devices and controls, heat networks and hydrogen & electric boilers;
2. **Low carbon transport:** Including low or zero emission vehicles, aviation and maritime, rail, public transport and walking or cycling;
3. **Power:** Including renewables (such as wind, solar and hydropower), nuclear power, grid infrastructure, energy storage and smart systems technology;
4. **Business and industry:** including hydrogen production and industrial use, carbon capture, utilisation & storage (CCUS) and industrial decarbonisation;
5. **Green Finance:** The concentration of financial activity in London means that in our context Green Finance could be a key area to separately identify;
6. **Climate change research & development:** Including private sector, academic and public research;
7. **Climate change strategy, policy, monitoring and planning:** Including public, private and NGO sector strategy and policy, outreach to citizens, environmental monitoring and use of planning system to achieve net zero;
8. **Climate adaptation:** Including flood defences, retrofitting of buildings to be resilient to extreme weather/climate events, nature-based solutions to reduce climate impacts and civil and mechanical engineering for infrastructure adaptation.

Broader environmental goals (may have some impact on climate change goals)

9. **Reducing localised pollution:** Including air pollution, water pollution and noise; London has ambitious goals across all three of these areas;
10. **Reduce, reuse, recycle:** Including waste management and circular economy;
11. **Green and blue infrastructure:** Within a London context this will focus on urban green and blue infrastructure, and include activity aimed at increasing biodiversity directly or through offsetting

Source: WPI Economics

Due to limitations of available data, we have combined three of the above sectors – climate adaptation, green and blue infrastructure and reducing localised pollution – for each of the sub-regional reports.

There will be a number of sectors of industry that are cross cutting in relation to the 11 missions above, by helping to deliver net zero and broader environmental goals across several of them. For example, the waste and resources sector plays an important role in reducing consumption based emissions through ‘Reduce, Reuse, Recycle’, as we know that 45% of CO₂e emissions are from products and agriculture.^{xxix} In addition, there are applications for waste in low carbon transport, particularly in the context of Sustainable Aviation Fuel (SAF)^{xxx}. Furthermore, when combined with Carbon Capture and Storage, energy produced from waste can produce negative emissions in the Power and Business and Industry sectors.^{xxxi}

3. Green jobs in West London today

Overall, our analysis finds that this sub-region has just over 1 in 7 of the capital's green jobs, totalling 31,600 green jobs in 2020. This represents 3.2% of the sub-region's total jobs. Within these, the top sectors, also among the most prominent across London as a whole, are Power and Homes and Buildings. These two sectors account for almost 8 in 10 of the sub-region's green sector jobs.

Table 1: Number of green jobs in West London, 2020

Sector	Definition	West London	
		Numbers of jobs	% of total employment
Power	Including renewables (such as wind, solar and hydropower), nuclear power, grid infrastructure, energy storage and smart systems technology;	15,200	1.5%
Homes and Buildings	Retrofit, building new energy-efficient homes, heat pumps, smart devices and controls, heat networks and hydrogen boilers	9,300	0.9%
Low Carbon Transport	Low or zero emission vehicles, aviation and maritime, rail, public transport and walking or cycling	2,400	0.2%
Reduce, reuse, recycle	Waste management and circular economy	2,400	0.2%
Climate change strategy, policy, monitoring and planning	Including public, private and NGO sector strategy and policy, outreach to citizens, environmental monitoring and use of planning system to achieve net zero	640	0.1%
Climate change Research and Development	Including private sector, academic and public research	630	0.1%
Climate adaptation, green infrastructure and reducing localised pollution	Including flood defences, retrofitting of buildings to be resilient to extreme weather/climate events, nature-based solutions to reduce climate impacts and civil and mechanical engineering for infrastructure adaptation; Urban green infrastructure, including activity aimed at increasing biodiversity directly or through offsetting; Reduction of air pollution, water pollution and noise.	500	0.1%
Green finance	Structured financial activity that's been created to ensure a better environmental outcome	300	0.03%
Industrial decarbonisation, hydrogen and carbon capture	Including hydrogen production and industrial use, carbon capture, utilisation & storage (CCUS) and industrial decarbonisation	230	0.07%
Total		31,600	3.2%

Source: WPI Economics calculations based on data supplied by kMatrix on their Low Carbon Environmental Goods and Services methodology and The Data City, and ONS Business Register and Employment Survey for total employment by sub-region.

A few interesting data points to consider in relation to present day green jobs in West London

- Power accounts for almost 1 in 2 (48.1%) green jobs in West London, and for 1.5% of total employment in the sub-region. Almost 1 in 5 (18.3%) green jobs in Power in the capital are in West London.
- Homes and Buildings represent almost 3 in 10 (29.4%) green jobs in West London, and 0.9% of total employment in the sub-region. Just under 1 in 6 of London's green Homes and Buildings jobs are in West London.
- Despite its relatively small size, representing 0.7% of green jobs in the sub-region, Industrial Decarbonisation, Hydrogen and Carbon Capture is the green sector whose employment is most concentrated in West London, which hosts almost 1 in 4 (24%) of all London jobs in this industry. These jobs are specifically concentrated in Barnet.
- Compared to the cross-London picture, Green Finance, accounts for a considerably lower share of the sub-region's green employment (0.6% v 21.6% in London).

Table 2 on the following page sets out these results further broken down on a borough level basis. In order to maintain the robustness and credibility of these figures, we have not represented the specific number of jobs in the table where this is under 50. Broadly the sector specific numbers outside the larger sectors (such as Power and Homes and Buildings) should be treated with some caution given their size.²

Some key insights to note in relation to the larger sectors include:

- Green jobs are a higher proportion of overall employment in Barnet (5.7%) than any other borough, having the highest number of jobs in almost all green sectors.
- In general terms, the biggest sources of green employment across the boroughs are Power and Homes and Buildings, relatively consistently.

² As with any data analysis, there is a confidence level around the accuracy of the data. Much of our underlying data is supplied by kMatrix, who monitor the confidence level through a rigorous source selection process. Confidence levels vary by activity, geography and by projection year. All borough level employment data has a confidence level of over 80%

Table 2: Estimated number of green jobs, by borough and sector 2020

Borough	Climate adaptation, green infrastructure, reducing localised pollution	Climate change Research and Development	Climate change strategy, policy, monitoring and planning	Green finance	Homes and Buildings	Industrial decarbonisation, hydrogen and CCUS	Low Carbon Transport	Power	Reduce, reuse, recycle	All Green Jobs
Barnet	120	190	190	80	2,700	70	300	3,580	680	7,900
Brent	90	60	80	60	1,050	<50	260	1,920	250	3,800
Ealing	<50	70	70	<50	1,060	<50	330	1,800	320	3,800
Hammersmith and Fulham	<50	60	50	<50	800	<50	460	1,630	160	3,200
Harrow	60	80	80	50	1,110	<50	190	1,670	310	3,600
Hillingdon	60	100	100	<50	1,740	<50	530	3,060	420	6,000
Hounslow	<50	70	60	<50	870	<50	340	1,560	280	3,300

Source: WPI Economics calculations based on data supplied by kMatrix on their Low Carbon Environmental Goods and Services methodology and The Data City

Table 3: Estimated green jobs as proportion of total employment, by borough and sector 2020

Borough	Climate adaptation, green infrastructure, reducing localised pollution	Climate change Research and Development	Climate change strategy, policy, monitoring and planning	Green finance	Homes and Buildings	Industrial decarbonisation, hydrogen and CCUS	Low Carbon Transport	Power	Reduce, reuse, recycle	All Green Jobs
Barnet	0.1%	0.1%	0.1%	0.1%	2.0%	0.1%	0.2%	2.6%	0.5%	5.7%
Brent	0.1%	0.05%	0.1%	0.05%	0.8%	-	0.2%	1.5%	0.2%	2.9%
Ealing	-	0.05%	0.05%	-	0.8%	-	0.2%	1.3%	0.2%	2.7%
Hammersmith and Fulham	-	0.04%	0.04%	-	0.6%	-	0.3%	1.1%	0.1%	2.2%
Harrow	0.1%	0.1%	0.1%	0.1%	1.4%	-	0.2%	2.1%	0.4%	4.6%
Hillingdon	0.0%	0.1%	0.1%	-	0.9%	-	0.3%	1.6%	0.2%	3.0%
Hounslow	-	0.04%	0.04%	-	0.5%	-	0.2%	0.9%	0.2%	2.0%

Source: WPI Economics calculations based on data supplied by kMatrix on their Low Carbon Environmental Goods and Services methodology and The Data City

The value of the green economy in West London

The green economy represents substantial value to the West London economy. Our mapping of the LCEGS dataset to the 11 green economy sectors we have identified allows us to report the total revenue each sector accounts for, in combination with our bespoke Data City company lists for the two sectors not covered by LCEGS. In total we estimate that the 11 green economy sectors accounted for around £4.9 billion in 2020/21, with Power accounting for just under half of this total. Estimates for each sector are presented below.

Table 4: Estimated value of the green economy by sector

Sector	Estimated sales
Climate adaptation, green infrastructure and reducing localised pollution	£0.05 billion
Climate change Research and Development	£0.1 billion
Climate change strategy, policy, monitoring and planning	£0.09 billion
Green finance	£0.05 billion
Homes and Buildings	£1.5 billion
Industrial decarbonisation, hydrogen and carbon capture	£0.03 billion
Low Carbon Transport	£0.38 billion
Power	£2.3 billion
Reduce, reuse, recycle	£0.34 billion
Total	£4.9 billion

Sources: WPI calculations based on kMatrix Low Carbon and Environmental Goods and Services estimates and Data City calculations for climate adaptation / green and blue infrastructure (allocated proportionately to job estimates in each sub-region).

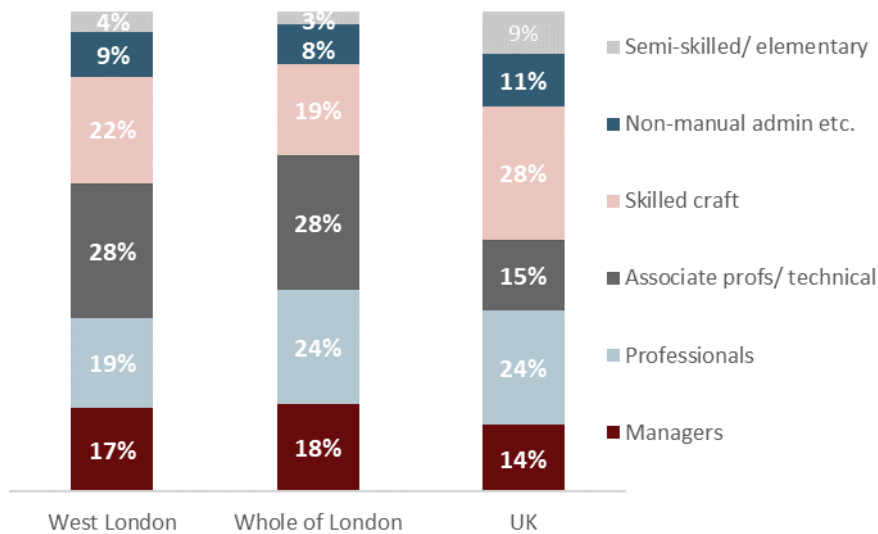
Notes: We have had to project total sales from 2017/18 figures for LCEGS, as more up to date figures for London had not been published by the time of writing. We updated 2017/18 figures in line with national growth, as reported in kMatrix (2021) – <https://kmatrix.co/uk-lcegs/>. Numbers may not sum due to rounding.

Occupational patterns of employment

In comparison with green jobs across the whole of London, green jobs in West London are over-represented among skilled craft occupations, and under-represented among professional occupations (for green job examples under these occupational categories, see Annex). Just over one in five West London residents who work in green jobs (22%) are in skilled craft roles, compared with 19% across the whole of London (but below the national proportion of 28%), while 19% of green workers in West London are in professional occupations, below the pan-London proportion of 24%. The proportions in

managerial occupations, and in associate professional/technical occupations, are similar to those across the whole of London.

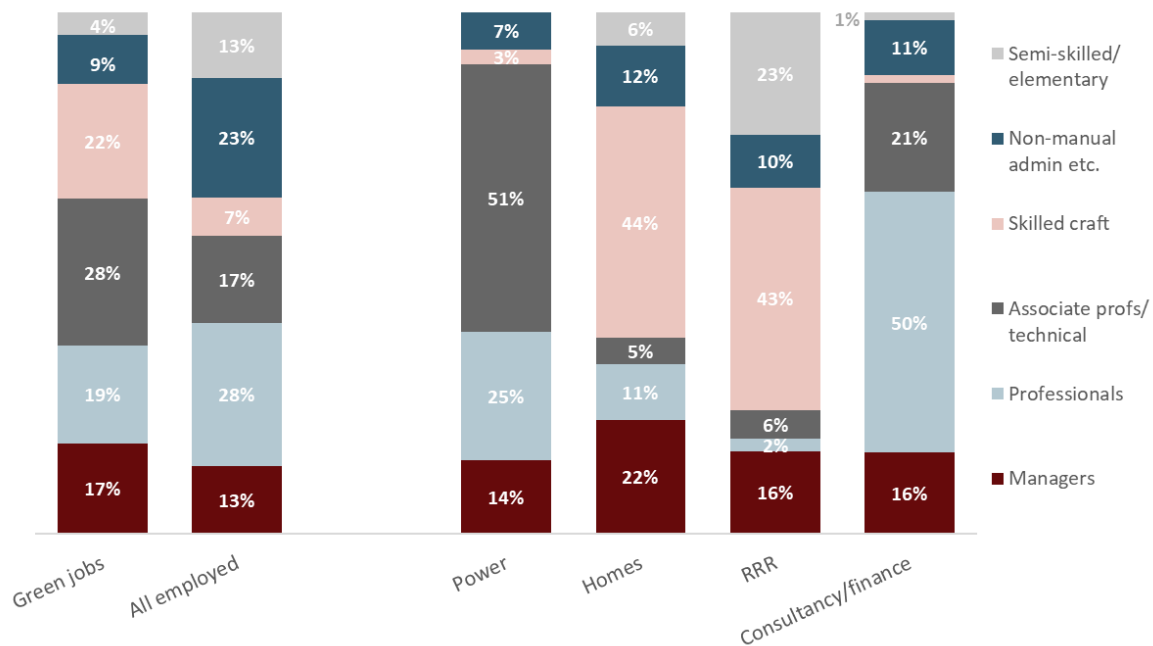
Figure 2: Occupational breakdown of green jobs, whole of London and West London



Source: WPI Economics analysis: see cross-London report for methodology^{xxxii}

Figure 3 shows the occupational breakdown of green jobs in West London in comparison with all jobs in West London. Managerial and associate professional jobs are over-represented in green sectors, although the proportion of professional occupations in green sectors is below the overall proportion (19% and 28% respectively). There are more than three times as many skilled craft jobs in green sectors compared with all sectors (22% and 7% respectively). Figure 3 also shows the breakdown within each of the four broad sectors within green jobs. Within the Power sector, half of all jobs are in associate professional or technical occupations, while in consultancy and finance, 50% of jobs are in professional occupations. Within the Homes, Buildings and Infrastructure, and reduce, reuse, recycle (RRR) sectors, the largest occupational group is skilled craft workers, and while these sectors have low proportions of professional and associate professional occupations, there are large proportions in managerial occupations.

Figure 3: Occupational breakdown of green jobs overall, and by broad sector, West London, 2020



Source: Quarterly Labour Force Survey, Jan-Mar 2020 to Oct-Dec 2020 combined

Detailed occupations

The sample size for the power sector in outer London in the LFS is below the recommended threshold for reliable estimates, and so it would not be safe to draw conclusions for this sector in the outer London sub-regions from the Labour Force Survey data. The pan-London profile has therefore been used for the Power sector and so the main detailed occupations in this sector in West London will be the same as those presented for the whole of London in the pan-London report.

Within the **Homes, Buildings and Landscape** sector in West London, electricians and electrical fitters are the largest group (15% of all jobs in this sector in West London, compared with 14% in UK), followed by production managers and directors in construction (9%, compared with 4% in UK), gardeners and landscape gardeners (9%, compared with 17% in UK), and plumbers and heating and ventilation engineers (8%, compared with 14% in UK).

Within the **Reduce, Reuse, Recycle** sector in West London, electricians and electrical fitters are the largest group (15% of all jobs in this sector in West London, compared with 4% in UK), followed by vehicle valeters and cleaners (10% compared with 3% in UK), managers and proprietors in other service sectors (8%, compared with 1% in UK), metal working production and maintenance fitters (6%, the same proportion as in the UK as a whole) and refuse and salvage occupations (5%).

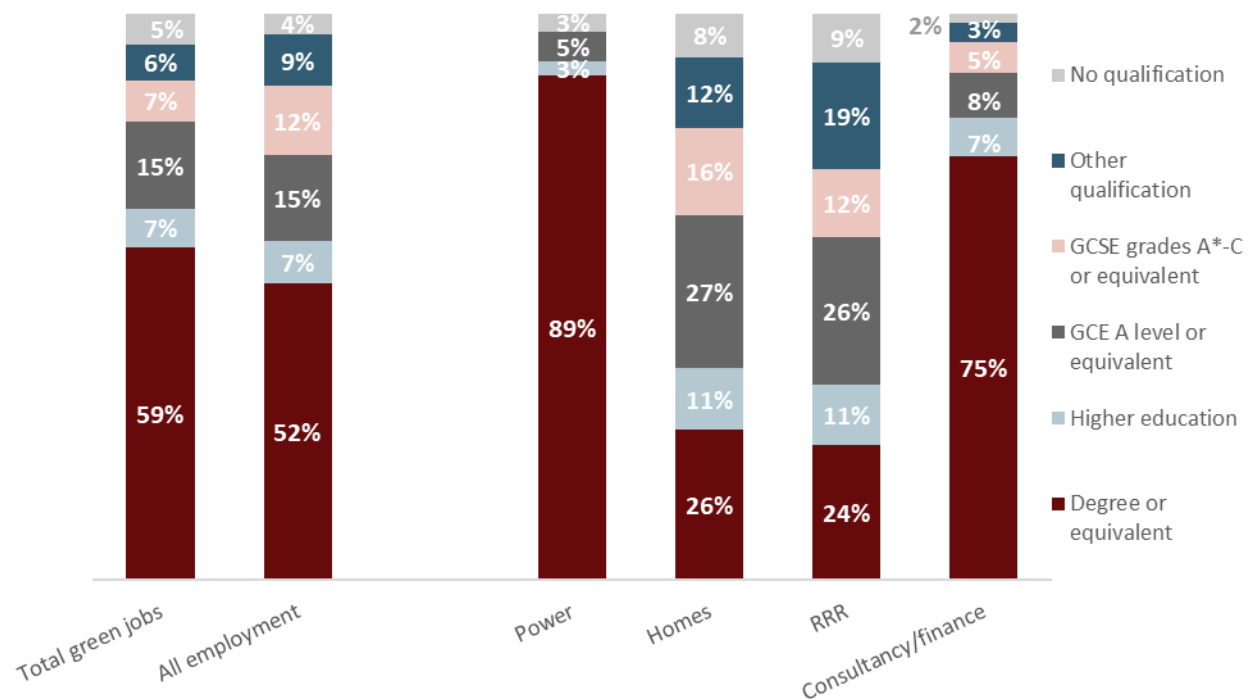
Within the **Consultancy and Finance** sector in West London, management consultants and business analysts are the largest group (16% of all jobs in this sector in West London, compared with 8% across the country as a whole), followed by programmers and software development professionals (4%), sales accounts and business development managers (4%), general administrative occupations (4%) and chartered surveyors (3%).

Qualifications

Residents in West London who work in green jobs are very highly qualified. Almost three fifths (59%) of workers in green jobs in West London hold first degrees or equivalent or higher qualifications. This is above the proportion of all West London workers with qualifications at this level (52%), although it is below the proportion of green workers across the whole of London with at least a first degree or equivalent (65%). Across the UK, 38% of green workers have first degrees or equivalent or higher qualifications, 8% had HE qualifications below degree level, and 26% had A-levels/Level 3 qualifications as their highest qualifications.

The vast majority of workers in the power sector are graduates (89%), as are three quarters of workers in Consultancy and Finance. Around one in four workers in Homes, Buildings and Landscape, and Reduce, Reuse, Recycle, are graduates, and similar proportions have qualifications at NVQ level 3/A-levels or equivalent.

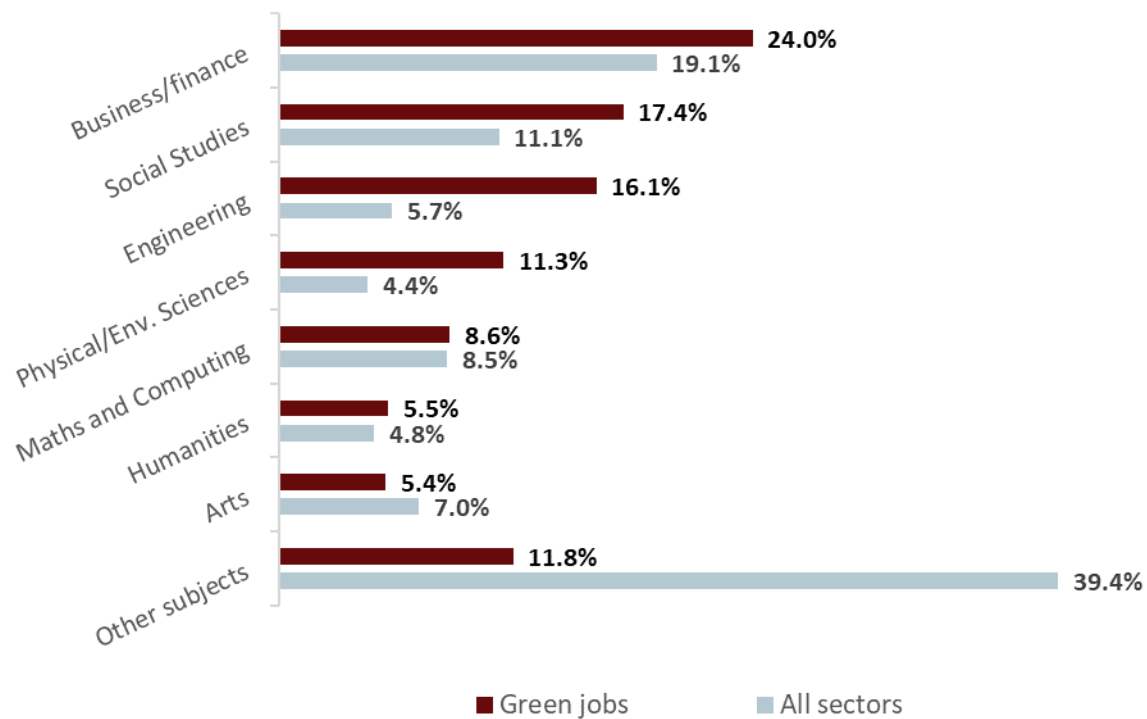
Figure 4: Workers in green sectors by level of highest qualification, West London, 2020



Source: Quarterly Labour Force Survey, Jan-Mar 2020 to Oct-Dec 2020 combined

The most common degree subjects among graduate workers in green jobs in West London are business/finance, and social studies, accounting for 24% and 17% of all graduate green workers respectively, and both groups are over-represented in green jobs compared with all sectors. The proportion of graduate workers with degrees in engineering is nearly three times as high among green sectors than across all sectors (16% compared with 6%) and there is also a similar sized over-representation of physical/environmental science graduates (11% of green workers compared with 4% of all graduates).

Figure 5: First degree subject of graduates, West London, 2020



Source: Quarterly Labour Force Survey, Jan-Mar 2020 to Oct-Dec 2020 combined

The largest vocational subject areas among workers in green jobs in West London were building and civil engineering, accounting for one in three workers in green jobs with vocational qualifications, compared with 6% of workers with vocational qualifications across all sectors, and electricity and energy, accounting for 29% of green workers with vocational qualifications, compared with 3% across all sectors. On the business side, qualifications in finance, banking and insurance were held by 11% of green workers with vocational qualifications, and qualifications in statistics and broad business and administration programmes were over-represented among green workers.

Table 5: Proportion of workers in green jobs and in all sectors with vocational qualifications by subject area, West London

	Green jobs	All sectors
Building and civil engineering	33.6%	5.9%
Electricity and energy	29.0%	2.9%
Finance banking insurance	11.1%	4.9%
Engineering and manufacturing trades	5.2%	1.2%
Statistics	3.8%	0.4%
Broad programmes in business and admin	3.2%	2.3%
Proportion of all workers with one of the above	85.9%	17.5%

Source: Quarterly Labour Force Survey, Jan-Mar 2020 to Oct-Dec 2020 combined

Demographics

The green workforce in West London is very male-dominated, and with a much higher proportion of white workers than across all sectors. This is in line with the patterns for the whole of London. Just over three quarters of all green workers who live in West London are male, compared with just over half of workers across all sectors, although this proportion is much lower in consultancy/finance, at 57%, than in the other three broad sectors.

Just under one in six green workers across all green sectors (17%) are from Black, Asian and Minority Ethnic backgrounds, around half of the overall level across all sectors (34%). The proportion of workers from Black, Asian and Minority Ethnic backgrounds is highest in the consultancy and finance sector (40%) and reduce, reuse, recycle sector (32%).

Green workers in West London are slightly older on average than all workers – just under one in three green workers (30%) are aged under 35, compared with 33% of all workers in West London and 33% of green workers across the UK, while 49% of green workers in West London are aged between 35 and 54, compared with 47% of all workers (and 45% of green workers in the UK), and 21% of green workers are aged over 55, compared with 19% of all workers (and 22% of green workers in the UK).

Table 6: Demographic breakdown of green jobs within our definition, West London

	All green jobs	All sectors	Power	Homes	Reduce, re-use and recycle	Consultancy / finance
Male	77%	53%	77%	81%	76%	57%
Female	23%	47%	23%	19%	24%	43%
White	83%	62%	94%	74%	68%	60%
Black, Asian and Minority Ethnic	17%	38%	6%	26%	32%	40%

Source: Quarterly Labour Force Survey, Jan-Mar 2020 to Oct-Dec 2020 combined

Skills supply

The investigation of skills supply for green sectors looked at three topics:

- The current flow of people into green jobs, allowing us to understand where these individuals have come from and the likely scale of future supply from these sources.
- The number of people in other sectors that have the requisite skills and could be attracted to green jobs in the future.
- Current provision of courses in further and higher education, which could provide individuals with the requisite skills.

Flows of labour/skills into green sectors

This analysis, conducted at a national level rather than local level because of sample size issues in the LFS, found that the bulk of new entrants to green jobs came from those working in other sectors, and that relatively few new entrants came straight from education. Of the total workforce in green jobs, only 1% had been in full-time education in the year before, compared with the average across all sectors of 3%. This suggests that green sectors tend to draw staff primarily from those already in employment, who may have developed appropriate transferable skills through their initial employment, rather than directly recruiting those straight from education. To meet the rapid growth projected in green jobs (presented below), it is likely that employers will continue to draw staff from other sectors, at least in the short term while the education and training sector and green employers forge closer links to meet employers' needs for green skills.

In terms of where new entrants from other sectors come from, entrants from manufacturing are a major source for all four broad sectors, while construction was a key source for homes, buildings and landscape, and ICT and professional services sectors were important for consultancy and finance. (Full details of the results are presented in the pan-London report.)

Workers with potential green skills outside of green sectors

The second of the skills supply topics examined is an investigation of the potential supply of skills that is currently in the West London labour market but working in non-green sectors. This analysis identifies the number of workers in the key occupations for each of the four broad green sectors who are working in non-green sectors, to quantify the number of people with potentially relevant skills for green jobs who are working in non-green jobs, and understand the potential pool of labour that green sector employers could draw on. So for Homes, Buildings and Landscape, we estimate the numbers of workers in the key green occupations, such as electrical and plumbing trades and production managers in construction, who are working outside of the sub-sectors that make up the Homes, Buildings and Landscape sector, for example, in other non-green parts of Construction or in other sectors such as manufacturing – thus workers in green-related jobs but not working in green sectors. Given the finding above about the low level of entrants straight from full-time employment, in-flows from other sectors are the main source of new labour and skills for green sectors.

Table 7 shows that overall, the size of this potential supply is four times as large as the number of green jobs, although there is substantial variation between the four sectors. The potential supply for consultancy and finance is some 40 times the size of the workforce, while for power, and homes, buildings and landscape, the potential supply is around twice as large as the current workforce. This suggests that skills shortages are much more likely to emerge within homes, buildings and landscape, and in power, than in the other two broad sectors. Other research^{xxiii} has identified that there are current skills shortages for many of the key roles in some green sectors (electricians and plumbers in the homes, buildings and infrastructure sector, engineers and technicians in power), which combined with the relatively smaller pools of potential labour in these sectors, means that employers in these sectors face the “double whammy” of current shortages and a relatively small pool of skills to draw on. There is likely to be considerable value for FE apprenticeship providers focusing their efforts on increasing provision in these areas given the size of likely increases in demands from employers.

Table 7: Number of green jobs and workers in key occupations for each sector that are currently working in other sectors, West London

	Power	Homes	RRR	Consultancy/ finance	Total green
Green jobs estimate	15,200	12,430	2,400	1,570	31,600
Workers in key occupations in other sectors	28,200	26,900	12,700	63,200	131,000
Potential supply / current jobs	186%	216%	529%	4025%	415%

Source: Quarterly Labour Force Survey, Jan-Mar 2020 to Oct-Dec 2020 combined

- In the power sector, the bulk of the potential supply is among associate professional occupations across a wide range of sectors, with the largest numbers in the financial services and ICT sectors, but also in manufacturing, and wholesale/retail.
- Skilled craft workers in other construction sectors outside of green sectors make up a quarter of the potential supply for the home, buildings and landscape sector, and there is also potential supply at managerial level elsewhere in construction, and in the real estate and administration/support services sectors.
- The main areas of potential supply for the reduce, reuse, recycle sector are skilled and semi-skilled manual workers in transport, and managers in manufacturing.
- The financial services sector is a major source of potential skills at managerial, professional and associate professional level for the consultancy/finance sector, accounting for almost one third of the total potential supply, and three quarters of the potential supply of associate professional skills. Professional workers with relevant skills can also be found in the public administration and professional services sectors, while managers can be found across most service sectors, particularly ICT, professional services, administrative and support services, and wholesale and retail.

Current provision in Further Education (FE) in West London

Table 8 shows trends in numbers of adult (19+)³ learners studying for qualifications at Level 2 and above in curriculum areas associated with green skills in west London from 2014/15 to 2018/19 (the most recent full academic year for which data are available by location and subject area). Total provision has increased by nearly one fifth over the last five years, from 4,300 to 5,100; representing

³ The analysis in this report covers 19+ learners, as these are the data available that can be split by location / provider. In addition to these learners, there will be some 16-18 learners in FE colleges studying subjects relevant to green courses (and not on apprenticeships, where data is also presented). The size of this group (in terms of relevance for our analysis) will be relatively small, as it is likely that a high proportion will progress to study either at 19+ in FE, or in HE, for which we present the data. Thus, while our estimates will be a lower bound on the relevant FE learners, this will not fundamentally change our view of the mismatch between supply and demand.

16% of the current employment level in green jobs, which is above the average across the whole of London of around 10%.

Looking in more detail, there has been growth in provision at Levels 2 and 3, although a decline in provision above Level 3. At Level 2, the introduction of Level 2 provision in environmental conservation (West London College) has boosted learner numbers, while there has also been growth in numbers in business management and transport operations and maintenance courses. Level 3 provision in building and construction has doubled over the last five years, more than making up for a small decline in provision at Level 2, although there have been decreases in numbers on engineering courses at both Levels 2 and 3.

The flows analysis of new entrants to the sector found that nationally, only one per cent of workers in green sectors had entered into the sector from full-time education in the previous year into the sector. Applying that proportion to the London workforce suggests that the sector recruits around 300 workers from full-time education, which is equivalent to 6% of the relevant provision in FE each year, below the proportion across the whole of London of around 10%. It should also be remembered that new entrants to green sectors from full-time education will include some people who studied subjects outside of these core areas in the definition of relevant provision.

Table 8: Numbers of Further Education learners in qualifications associated with green skills, West London

	2014/15	2015/16	2016/17	2017/18	2018/19	% change 2014/15- 2018/19
Level 2						
Accounting and Finance	591	644	508	508	370	-37.4
Building and Construction	720	600	711	727	593	-17.6
Business Management	653	893	843	660	1,069	63.7
Engineering	166	133	223	164	56	-66.3
Environmental Conservation	34	0	0	3	561	1550.0
Manufacturing Technologies	71	40	19	4	9	-87.3
Transportation Operations and Maintenance	307	91	270	486	565	84.0
Level 3						
Accounting and Finance	337	400	258	196	131	-61.1
Building and Construction	234	276	476	441	511	118.4

Business Management	656	601	678	573	917	39.8
Engineering	144	166	172	148	116	-19.4
Environmental Conservation	0	0	0	0	0	-
Manufacturing Technologies	0	2	13	52	25	-
Transportation Operations and Maintenance	49	39	16	30	23	-53.1
Above Level 3						
Accounting and Finance	262	78	51	66	29	-88.9
Building and Construction	3	15	29	12	27	800.0
Business Management	70	7	13	6	79	12.9
Engineering	0	4	8	2	3	-
Environmental Conservation	0	0	0	0	0	-
Manufacturing Technologies	0	0	2	2	0	-
Transportation Operations and Maintenance	4	1	0	0	0	-100.0
Total	4,301	3,990	4,290	4,080	5,084	18.2

Source: Department for Education, Education and Training by Sector Subject Area

Table 9 shows the proportion of total provision in the largest publicly-funded FE providers. Key points to note are:

- West London College had introduced Level 2 provision in environmental conservation in 2018/19, being the sole provider in the WLA area, and it also has specialisms in accounting and finance, and engineering.
- Barnet and Southgate College is the largest provider of training in transportation operations and management among the publicly-funded FE providers, and also has specialisms in building and construction, and accounting and finance.
- United Colleges Group provides around one quarter of all training in building and construction, and engineering in West London.
- HCUC is the largest provider of training in engineering, accounting for just over a quarter of all provision, and is also over-represented in provision in transportation operations and management, building and construction, and accounting and finance.

- West Thames College and Stanmore College have much smaller provision in green-related subject areas than the other colleges, but both have relative specialisms in engineering, while West Thames also has a relative specialism in building and construction, while Stanmore accounts for a sizeable proportion of provision in accounting and finance.

Table 9: Provision in publicly funded FE providers located in West London

	Accounting and finance	Building and Construction	Business Management	Engineering	Manufacturing Technologies	Transportation Ops and Maintenance	Total
West London College	27.9	7.9	6.3	18.3	100.0	3.6	19.3
Barnet & Southgate College	27.9	15.7	1.5	0.0	0.0	17.7	9.1
United Colleges Group	12.5	25.2	0.2	23.4	0.0	0.0	7.8
HCUC	11.3	8.2	6.4	28.0	0.0	8.3	7.6
West Thames College	1.1	4.5	2.9	6.9	0.0	2.2	2.8
Stanmore College	15.7	0.0	1.3	12.6	0.0	0.0	2.6
All providers above	96.4	61.5	18.7	89.1	100.0	31.8	49.1
Total learners	530	1,131	2,065	175	561	588	5,084

Source: Department for Education, Education and Training by Sector Subject Area

Apprenticeships

In addition to the potential supply of new labour market entrants from the FE sector, there is the pool of apprenticeship learners combining on-the-job training with study at college. Table 10 shows the latest apprenticeship starts and achievements in sector subject areas that are relevant for green jobs in West London, based on learners' borough of residence.

Across the three relevant sector subject areas there were 4,200 starts in 2018/19, representing 13% of the current employment level in green jobs, above the pan-London figure of just over 8%, although slightly smaller than the number of adult learners in FE at Level 2 and above. The number of FE learners and apprenticeship learners combined represents 29% of the green workforce in West London, compared with 18% across the whole of London, so green employers in West London have a relatively large pool of FE and apprenticeship learners to draw on to meet their current, and rapidly growing future needs.

Apprenticeship starts in **construction, planning and the built environment** accounted for 4% of all apprenticeship starts (the same proportion as across the whole of London), although it accounts for a slightly higher proportion of intermediate apprenticeships (i.e. at Level 2). The number of starts at intermediate and advanced level are lower than the number of learners studying in FE at those levels (Level 2 and 3), while the number of higher apprenticeship starts is substantially higher than the number of FE learners above Level 3; thus provision above Level 3 is mostly in apprenticeships whilst provision at Levels 2 and 3 is mostly in FE. Starts in **engineering and manufacturing technologies** are higher than in construction, accounting for 10% of all apprenticeship starts, and 13% of all intermediate apprenticeship starts. By contrast, **business, administration and law** accounts for nearly three fifths all higher apprenticeship starts, and around one third of all starts.

The patterns of apprenticeship achievements by subject sector area and level are broadly in line with the patterns of starts. Overall, there were around nearly 700 achievements in the skilled craft subject areas of construction and engineering (around a quarter of total achievements in these subjects across the whole of London), and almost 900 achievements in business subjects (around 20% of total achievements across London), in the 2018/19 academic year.

Table 10: Numbers of Apprenticeship starts and achievements in qualifications associated with green skills, West London, 2018/19

	Starts		Achievements	
	Number	% of total	Number	% of total
Construction, Planning and the Built Environment				
Intermediate Apprenticeship	160	6.3	110	7.5
Advanced Apprenticeship	110	3.9	30	1.7
Higher Apprenticeship	90	4.1	0	0.0
Total	360	4.1	140	4.0
Engineering and Manufacturing Technologies				
Intermediate Apprenticeship	340	13.3	260	17.7
Advanced Apprenticeship	520	8.3	280	16.1
Higher Apprenticeship	50	2.3	0	0.0
Total	910	10.3	540	15.6
Business, Administration and Law				
Intermediate Apprenticeship	430	16.8	340	23.1
Advanced Apprenticeship	1,290	10.5	400	23.0
Higher Apprenticeship	1,250	57.3	140	46.7
Total	2,970	33.6	880	25.4

Source: Department for Education

Detailed data on courses directly related to green jobs was obtained from all six FE colleges within West London, and are presented in Table 11 below. The data show that most provision is within building maintenance/services, which includes electrical installation/maintenance, plumbers and heating installation, and building maintenance. There were 1,720 learners across all levels in 2020/21, rising to 1,910 in the current academic year, with a large increase in Level 3 provision between the two years. Within this area, there were around 350 apprenticeships at Level 3 and around 100 at Level 2, with the rest of the provision split between 16-19 provision and adult skills/community learning – 16-19 learners comprised half of all provision below Level 2, around one third of provision at Level 2, and around 10% of provision at Level 3. United Colleges Group was the largest provider in this subject area, although there were learners at all other colleges except West Thames College.

In 2020/21 there were 350 learners in green-related mechanical engineering at Level 3 and above, although numbers in 2021/22 were down somewhat. Within mechanical engineering around 90% of provision at Level 3 was 16-19 learners, in contrast to building maintenance/services. The other subject area with large-scale provision was environmental protection/conservation, with 400 learners in the current academic year, although most were learning at below Level 2 (around two thirds 16-19 and one third adult learners).

Table 11: Numbers of Further Education learners in qualifications associated with green skills, West London

	< Level 2	Level 2	Level 3	> Level 3	Total
2020/21					
Environmental Protection/Conservation	0	90	0	0	90
Recycling Collection/Treatment	0	0	0	0	0
Glazing/Insulation	20	10	0	0	30
Building Maintenance/Services	610	630	480	0	1,720
Mechanical Engineering	0	0	220	130	350
Power/Energy Engineering	0	0	0	0	0
Total	630	730	700	130	2,200
2021/22					
Environmental Protection/Conservation	380	20	0	0	400
Recycling Collection/Treatment	0	10	10	0	20
Glazing/Insulation	0	0	0	0	0
Building Maintenance/Services	590	680	630	0	1,910
Mechanical Engineering	0	0	200	70	270
Power/Energy Engineering	30	0	0	0	30
Total	1,000	720	850	70	2,630

Source: West London FE colleges

Current provision in Higher Education (HE) in West London

Turning to *HE provision*, London has a large student population, and universities located in West London – Middlesex, Brunel and The University of West London - teach 20 per cent of all HE first degree students in London, while other universities have satellite locations in the WLA area.

Table 12 presents data on the estimated numbers of workers in green jobs with degrees in the main subject areas related to green jobs in West London (based on the data present above of qualifications of green workers), along with data on undergraduate student numbers in those same broad areas in West London HE institutions. Nearly one in four graduate workers in green jobs (24%) have degrees in business and finance, very similar to the proportion of undergraduate provision (25%). The next largest subject areas are social studies (17% of graduate workers) and engineering (16% of graduate workers). These subjects account for much lower proportions of university provision in West London – 9% and 6% respectively. There is relatively little provision in physical/environmental sciences, while maths and computing accounts for 10% of all provision in West London universities, above the proportion of maths and computing graduates in green jobs (9%).

The table also presents the size of the annual cohort in each subject area (assuming three years of first degree undergraduate study) in relation to the size of the graduate workforce with degrees in that subject area. This gives an indication of how the ratio of new graduates to current green workers within each subject area, albeit bearing in mind that a large proportion of graduates in these subjects will not necessarily go into green jobs, and that green employers recruit relatively few staff straight from education. The annual flows of graduates with engineering degrees into the labour market is around one third of the size of the green workforce with engineering degrees, while in physical/environmental sciences, the flow of graduates is very small in relation to the employed graduate population, representing just 5% of the employed workforce. In business and finance, and maths and computing, the annual supply of graduates is nearly as large as the employed workforce with degrees in these subjects. Thus the flow of graduates from West London universities is much larger in relation to the number of graduate workers in green jobs in the subject areas of business and finance, and maths and computing, than for engineering, and physical/environmental sciences.

Table 12: Undergraduate student enrolments in London Higher Education providers in relation to workforce size for selected broad subject areas, West London

	Green jobs		HE provision			HE Cohort as % of employment
	% of graduate workers	Estimated number	Total first degree enrolments	Estimated annual cohort	% of total	
Business/finance	24.0	4,400	12,000	4,000	24.6	89.9
Social Studies	17.4	3,200	4,300	1,400	8.9	44.8
Engineering	16.1	3,000	2,900	1,000	5.9	32.3
Physical/Env. Sciences	11.3	2,100	300	100	0.6	4.8
Maths and Computing	8.6	1,600	4,600	1,500	9.5	97.0

Source: Quarterly Labour Force Survey, Jan-Mar 2020 to Oct-Dec 2020 combined and HESA student numbers 2019/20

Brunel University accounts for around two thirds of provision in engineering in West London, while The University of West London teaches the majority of physical/environmental sciences undergraduate students in the area. All three universities have substantial numbers of students in business and finance, and in social studies.

Responses to a bespoke data request for data on provision in specific detailed courses related to green jobs were received from some West London universities. These responses suggest that within engineering, just over half of all learners are in green-related subjects, including:

- Civil engineering, including energy resources and environmental engineering, which accounts 20% of all engineering provision;
- Mechanical engineering, which accounts for 18%;
- Electronic and electrical engineering, which accounts for 8%;
- Engineering design, which accounts for 7%.

Furthermore, around one third of social sciences first degree students are taking courses or modules in green-related subjects, such as energy economics, environment economics or natural resources economics in economic degrees, or environmental/green studies in politics degrees.

If these patterns are reflected across all HE provision in West London, it is likely that each year there are around 500 engineering graduates and around 500 social sciences graduates with green-related skills.

4. Projecting green jobs and skills in the sub-region in the future

The methodology for projecting the number of green jobs in the coming decades combines a range of sources estimating the future growth of the green economy and specific sectors within it. We map the growth rate on the assumption that the fastest growth will occur in the next decade and somewhat slower approaching 2050 as net zero targets begin to be met and the green sector matures. Further details of our approach can be found in the cross-London report.^{xxxiv}

Sub-regional results

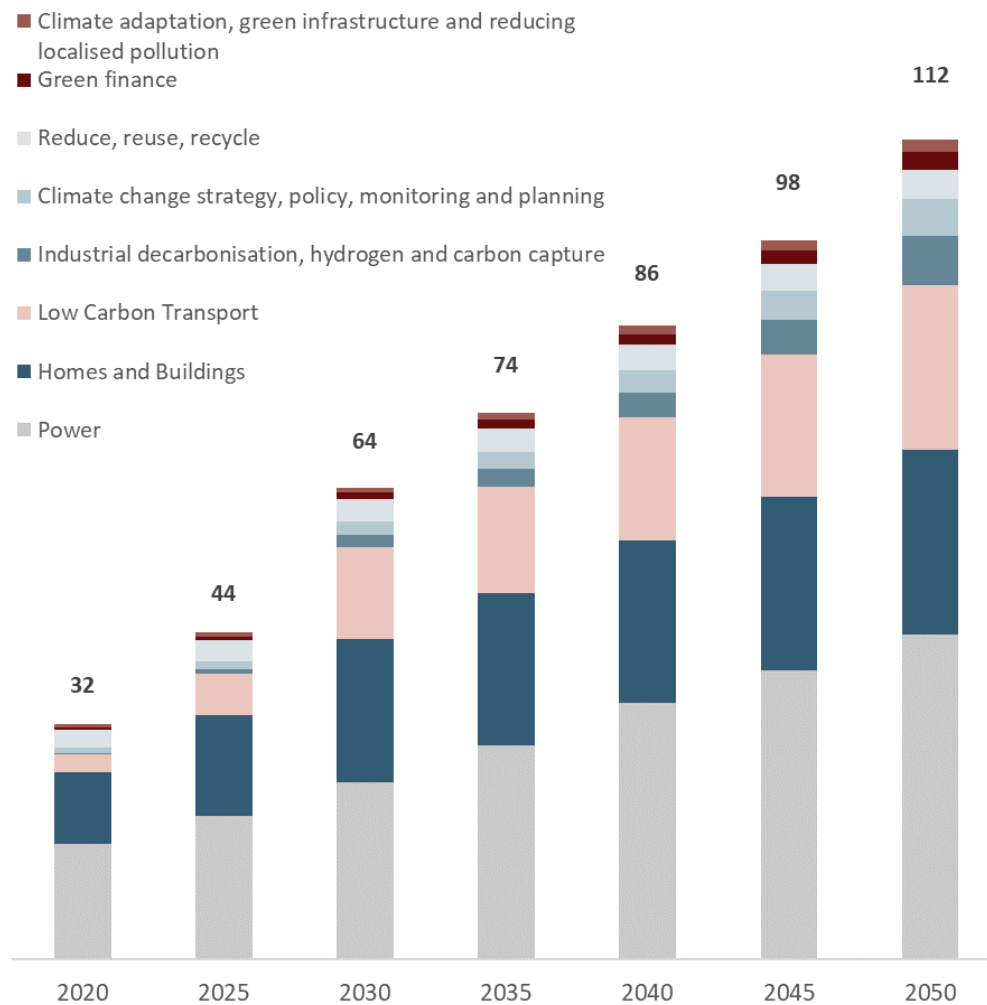
The total number of jobs in the central scenario is projected to rise from 32,000 in 2020 to 64,000 in 2030 – a doubling of the green economy workforce over a decade – and rising to 112,000 in 2050 (a near-4-fold increase on the base). Within this scenario, three sectors account for over 8 in 10 (84.5%) of West London’s total number of green jobs by 2030:

- Power (23,200), representing 36% of total green jobs
- Homes and Buildings (18,800), representing 29% of total green jobs
- Low Carbon Transport (12,100), representing 19% of total green jobs.

By 2050, the three sectors continue to dominate:

- Power (42,600), representing 38% of total green jobs.
- Homes and Buildings (24,200), representing 22% of total green jobs.
- Low Carbon Transport (21,600), representing 19% of total green jobs.

Figure 5: Projections of green jobs: central scenario (thousands)



Source: WPI Economics analysis: see cross-London report for methodology^{xxxv}

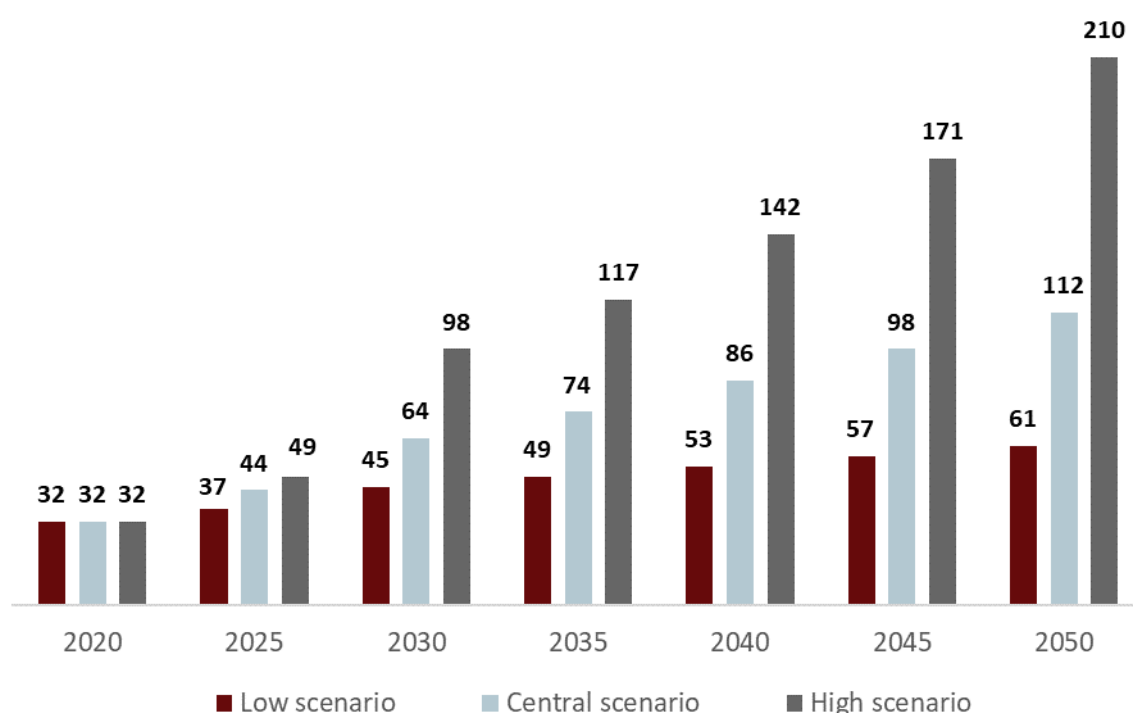
We present different scenarios (low, central, high) to account for uncertainty and different variations in policy and activity in the green economy. Whether scenarios are met in each sector will depend on a number of complex and interrelated factors, including policy action from national and local government around innovation, skills, trade and regulation. The Climate Change Committee considers the broad factors which could influence how the green economy evolves, and, taking a range of analyses into account, outline two key determinants:

- **Engagement and behaviour change** – to what extent do members of the public and businesses adopt low carbon options and behaviours (such as installing energy efficiency measures in homes)?
- **Innovation** – How does technology which helps to replace fossil fuels to reduce energy consumption evolve over the coming decades (such as through the scaling of heat pumps, hydrogen or CCUS)?

Government policy such as the recently announced £5000 grant to encourage households to retrofit their homes is an example of how government policy may influence the above.

The different scenarios are presented below. The low scenario for the number of green jobs by 2030 is 45,000, while the high scenario projects there to be 98,000. For 2050, the low scenario projects 61,000 jobs in the green economy, while the high scenario puts this figure at 210,000.

Figure 6: Scenarios for projections of total green jobs in West London (thousands)



Source: WPI Economics analysis: see cross-London report for methodology^{xxxvi}

Table 13: Low, central and high projections of green jobs in West London in 2030 and 2050

Sector	2020	2030			2050		
		Low	Central	High	Low	Central	High
Power	15,200	18,800	23,200	28,500	25,600	42,600	70,500
Homes and Buildings	9,300	13,300	18,800	31,400	15,100	24,200	24,200
Low Carbon Transport	2,400	5,600	12,100	24,800	7,400	21,600	58,800
Reduce, reuse, recycle	2,400	2,500	3,000	3,800	2,600	3,800	6,100
Climate change strategy, policy, monitoring and planning	600	1,400	1,700	2,200	3,200	4,900	7,400
Climate change Research and Development	600	1,400	1,700	2,100	3,200	4,800	7,300
Climate adaptation, green infrastructure and reducing localised pollution	500	600	700	800	900	1,600	2,400
Green finance	300	600	800	1,000	1,500	2,300	3,500
Industrial decarbonisation, hydrogen and carbon capture	200	600	1,600	3,800	1,300	6,500	29,400
Total	32,000	45,000	64,000	98,000	61,000	112,000	210,000

Source: WPI Economics analysis: see cross-London report for methodology^{xxxvii}

Overall, these figures represent very fast growth of West London's green economy over the next three decades. The following discussion refers to the central scenario figures unless otherwise stated.

- Power remains the sector with the largest employment in the sub-region's green economy throughout the projected period, albeit concentrating a decreasing share of total employment (from almost half in 2020 to just below one third in 2050). This is a result of a relatively modest growth, just above 50%, from 2020 until 2030 and from the latter until 2050.
- Homes and Buildings remains the second largest sector in the sub-region, with a share of total employment that, despite remaining around 29% between 2020 and 2030, falls to 21.6% by 2050. This is a result of a more intensive growth rate during the first decade of our projections, doubling its employment numbers between 2020 and 2030, which only increase by a further 29% between 2030 and 2050.
- Low Carbon Transport consolidates its prominent position within the sub-region's green economy, increasing its share of green employment from 7.5% to 19.3%. In 2030, Low Carbon Transport is projected to employ 12,100 people, 5 times more than in 2020, further increasing to 21,600 in 2050 (8 times more than in 2020).
- Starting from a very small level in 2020, Industrial decarbonisation, hydrogen and carbon capture is the sector with the highest predicted growth, increasing its employment by 8 times between 2020 and 2030, and by more than 30 times by 2050. Growth rates are even more impressive in the high scenario, which predicts a near-20-fold increase by 2030.
- Other smaller sectors are also projected to experience very large growth rates until 2050, with Climate change Research and Development; Climate change strategy, policy, monitoring and planning; and Green Finance employing around 8 times more people in 2050 than in 2020.

Implications of the scenario results for skills provision

In the context of the focus of this report, skills provision and associated policy responses are a vital part of getting that policy landscape right.

The central employment projections suggest an increase in the green-jobs workforce of around 3,200 per year to 2030. Overall, this represents an increase in the total green workforce of 102% from its current level. The key issues are how this increase compares with the current level of skills provision, how easy it will be for green businesses to meet their future skills needs, and how can skills providers best help meet these needs.

The first thing to note is that there are markedly different rates of increase across the different sub-sectors. The increases are broadly similar to those projected for the whole of London, with reduce, reuse, recycle increasing by 25%, power increasing by just over 53%, homes, buildings and landscape increasing by almost 170%, and consultancy and finance increasing by around 180%.

The key questions from a skills point of view are:

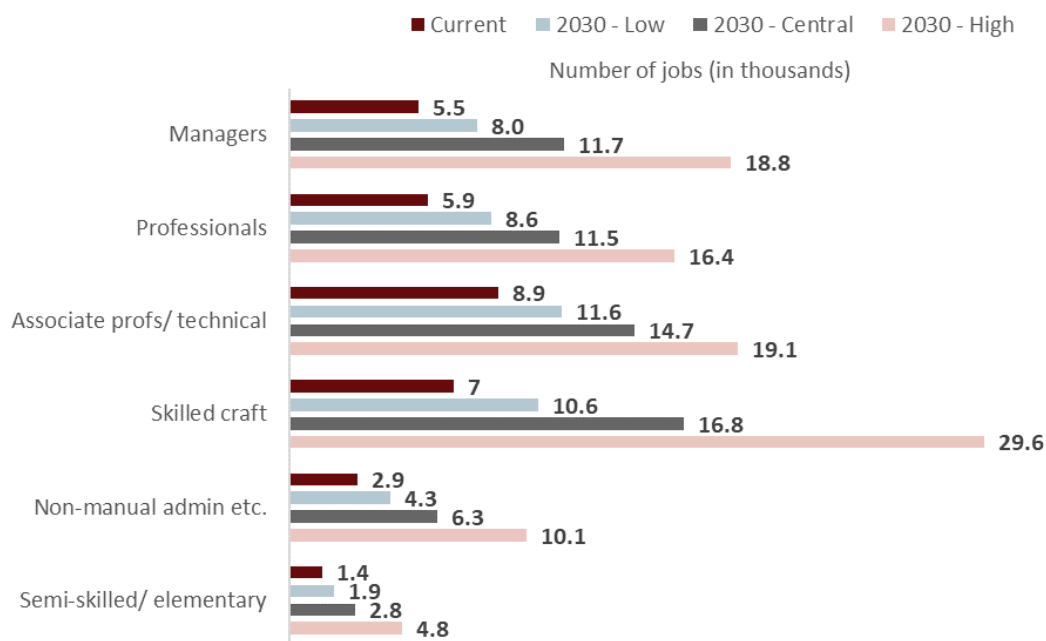
- What the likely occupational changes over this period are; and
- How this increase compares with the current level of skills provision, and how easy it will be for green businesses to meet their future skills needs.

Figure 7 shows the projected changes by occupational group to 2030, while Table 14 shows the detail behind the figure. The projections are calculated by applying the growth rate in each of the four broad sectors to the estimated number of current workers in each occupation in that sector, to

project the number of workers in that sub-sector and occupation in 2030 under the different scenarios. These are then summed to give the total for green jobs in the different occupational groups. This method assumes that the skills mix within each of the four broad sub-sectors will be the same in 2030 as it is now, but the mix across all green jobs will change as some sectors are projected to grow much faster than others.

Considering the central projection first, the largest increase, in numeric and percentage terms, is among skilled craft workers, whose numbers are projected to increase by almost 10,000 to reach 17,000 in 2030, an increase of 140%. In 2030, skilled craft workers are projected to be the largest occupational group, as the other major groups are projected to have much smaller increases – 113% growth in managerial occupations, 95% growth in professional occupations, and 65% growth in associate professional occupations. West London’s FE and apprenticeship providers are well placed to address the increasing need for skilled craft workers.

Figure 7: Change in occupational group to 2030



Source: IES calculations from WPI Economics analysis and Quarterly Labour Force Survey data

Under the low jobs projection, the total number of jobs is projected to rise by 1,300 per year to 2030. Skilled workers are projected to experience the largest increase in percentage terms, at 51%, slightly faster than the growth in managerial and professional occupations (46% in both groups), and also in numeric terms, with an increase of 3,600, although they will still be smaller in number than associate professional workers in 2030.

Table 14: Change in employment by occupational major group, West London

Occupational group	Current	2030	Change	% change
Central projection				
Managers	5,500	11,700	6,200	113
Professionals	5,900	11,500	5,600	95
Associate profs/ technical	8,900	14,700	5,800	65
Skilled craft	7,000	16,800	9,800	140
Non-manual admin etc.	2,900	6,300	3,400	115
Semi-skilled/ elementary	1,400	2,800	1,400	109
Low projection				
Managers	5,500	8,000	2,500	46
Professionals	5,900	8,600	2,700	46
Associate profs/ technical	8,900	11,600	2,700	30
Skilled craft	7,000	10,600	3,600	51
Non-manual admin etc.	2,900	4,300	1,400	47
Semi-skilled/ elementary	1,400	1,900	500	39
High projection				
Managers	5,500	18,800	13,300	242
Professionals	5,900	16,400	10,500	177
Associate profs/ technical	8,900	19,100	10,200	114
Skilled craft	7,000	29,600	22,600	323
Non-manual admin etc.	2,900	10,100	7,200	245
Semi-skilled/ elementary	1,400	4,800	3,400	251

Source: IES calculations from WPI Economics analysis and Quarterly Labour Force Survey data

The high scenario projects that there will be an average increase of 6,700 workers per year across all green sectors to 2030, with a quadrupling in the number of skilled craft workers, from 7,000 currently to 30,000 in 2030 (326% increase), almost three times the increase for associate professional workers (114%). Skilled craft workers will become by far the largest occupational group in 2030 under this scenario, with a projected employment level of nearly 30,000.

In addition to the need for workers to meet the expansion demands of the sector to meet the policy goals, there will be a need to replace leavers from the sector, for retirement or other career breaks. Estimates of these replacement demands are taken from the Working Futures employment projections for London for the period 2017 to 2027 for the major occupational groups; it is assumed that green workers in each major occupational group will experience the same replacement rates as all workers in that occupational group.⁴ Table 15 shows the estimates of the replacement demands for green workers in West London in the major occupations. In total, it is estimated that green sectors will need to recruit 10,400 workers over the coming 10 years to replace leavers – this is around one third of the expansion demand under the central scenario of 32,100, although around three quarters of the expansion demand under the low growth scenario. Thus the need to replace leavers makes a substantial contribution to the total expansion requirement for employers in green sectors in West London.

Table 15: Estimated replacement demand by occupational major group, South London

	Current	10 yr replacement demand rate %	Replacement demand
Managers	5,500	38.5	2,100
Professionals	5,900	34.8	2,100
Associate profs/ technical	8,900	32.8	2,900
Skilled craft	7,000	27.6	1,900
Non-manual admin etc.	2,900	33.0	1,000
Semi-skilled/ elementary	1,400	32.8	500
Total	31,600		10,400

Source: IES calculations from Quarterly Labour Force Survey data and IER Working Futures projections

Table 16 shows the detailed occupational unit groups with the largest projected increase in numbers to 2030. The number of business and related associate professionals not elsewhere classified (business systems analysts, data analysts, project coordinators etc.) is projected to increase by 4,000, accounting for 12% of the total increase, although this is the lowest growth rate among the occupations with the largest increases in numbers, at 56%. There are large projected increases for electricians (3,000, increase of 146%), gardeners and landscape gardeners (2,200, 168%) and plumbers (1,700, 168%), reflecting the large projected increase for homes, buildings and landscape. The other occupations with large projected increases in numbers are production managers in construction, and other miscellaneous construction trades.

⁴ Data are available at <https://warwick.ac.uk/fac/soc/ier/wf7downloads/>

Table 16: Occupations with the largest projected increases in employment to 2030 under central scenario, West London

	Current	2030	Change	% change	% of total increase
3539 'Business and related associate professionals n.e.c.'	7,100	11,100	4,000	55.6	12.2
5241 'Electricians and electrical fitters'	2,000	5,000	3,000	145.9	9.1
5113 'Gardeners and landscape gardeners'	1,300	3,400	2,200	167.7	6.7
5314 'Plumbers and heating and ventilating engineers'	1,000	2,700	1,700	167.8	5.2
1122 'Production mngrs and directors in construction'	1,000	2,700	1,700	167.8	5.1
5319 'Construction and building trades n.e.c.'	900	2,200	1,300	156.7	4.1
1132 'Marketing and sales directors'	1,400	2,400	1,000	75.9	3.2
2136 'Programmers and software development professionals'	1,800	2,800	1,000	57.1	3.2
1131 'Financial mngrs and directors'	500	1,400	900	168.2	2.8
1251 'Property, housing and estate mngrs'	500	1,400	900	168.0	2.7

Source: IES calculations from WPI Economics analysis and Quarterly Labour Force Survey data

Note: "n.e.c" here stands for "not elsewhere classified".

Having looked at the likely occupational changes over the coming decade, we turn to comparing with future increases in demand with the size of the output from education and training provision to provide insights into how easy it may be for employers to meet their future skill needs. It should be remembered that green sectors currently draw very few workers directly from full-time education, with most new entrants coming in from other sectors. Nevertheless, with the rapid projected growth over the coming decade, employers will need to both increase the number of workers attracted from other sectors and draw more new workers directly from education. Under the central scenario, the expansion demand of 3,200 and replacement demand of 1,000 gives rise to a total annual requirement of 4,200 workers.

The current data on skills provision show that across London there are around 9,000 learners per year in FE and in apprenticeships in relevant subject areas, and around 8,000 HE leavers each year in relevant subjects, giving an annual output from FE and HE of around 17,000 students.

Thus, if the projected expansion of the sector were to be met solely from new entrants from full-time education (and given the current in-flows from education this is a rather unlikely assumption), green employers would need to attract a quarter (25%) of all education leavers with potentially relevant skills, and this proportion would need to be higher if FE leavers progress to HE rather than entering the labour market. The current analysis of flows suggests that the sector recruits around 300 education leavers per year, so this suggests businesses would need to recruit 13 times as many

workers straight from education than they currently do, if the growth in demand was met solely from education leavers and not from those switching sectors/occupations.

The relationships between subject areas and broad sector are such that it is only advisable to look at the balance between future labour demand and current skills provision at a broad level of consultancy-based jobs and skills, and craft-based jobs and skills. The former covers the consultancy and finance sector, and the majority of the power sector, while the latter cover the homes, buildings and landscape, reduce, reuse, recycle, and the rest of the power sector. The balance of future demand and current supply in these under the central scenario in west London are as follows:

- The number of consultancy-based jobs is projected to increase by around 900 per year over the coming decade, and with replacement demand of 300, giving a total annual requirement of 1,200. Current FE and HE provision is around 10,000 students per year, so future demand equals 12% of the annual output from education.
- The increase in craft-based jobs is projected to be much higher, at around 2,300 per year, which with replacement demand of 800, gives a total requirement of 3,100 per year. Provision is slightly smaller than this level of increase, at around 3,000, so future demand will exceed the total supply from education by around 2%.

These analyses show that to meet the rapid expansion of the sector over the coming decade there is an urgent need to:

- Increase education provision in subjects and courses that are relevant for green jobs, particularly provision related to craft-based jobs (mostly in FE and apprenticeships) given the size of projected increases in employment in relation to current skills provision;
- Increase the proportion of those taking relevant courses who progress to employment within green sectors, for example through careers information, advice and guidance that informs learners of the growing range of opportunities within green sectors; and
- Increase the flows from other, non-green, sectors into green sectors, including through re-skilling training.

Additionally, in the short-term while education and training providers increase their provision, green employers could look to make increasing use of migrant labour to meet their skills needs, although it is recognised that this would not be as easy as in the past due to the tightening of migration rules as a result of the UK's departure from the EU.

While these are priorities across green sectors as a whole, there is an urgent need for action in the craft-based sectors – homes, buildings and landscape, and reduce, reuse, recycle – as the projected increases are much larger in relation to the size of the education pipeline than is the case for consultancy-based roles. Roles in these sectors/occupation in London have been increasingly filled by EU nationals in recent decades, and so are vulnerable to shortages as a result of reduced in-migration and increased out-migration post-Brexit. West London stakeholders need to ensure that provision is expanded to at least meet the likely needs of the sector, as there will be competition from employers elsewhere in London and beyond for this limited pool of skills, and wage rates on offer may be higher than in west London, e.g. in central London. This highlights the need for concerted action across London, for example, between various stakeholders in London government (local authorities, sub-regional partnerships, London Councils and the GLA) and others.

The green sector currently recruits a far higher proportion of new entrants from other sectors than directly from education, but the skills pipeline also needs to supply replacements for these workers, as well as expand to increase supply directly to the green sector. In summary, the green sector in London will experience large increases in employment, even under the low growth scenario, and employers will face challenges recruiting the skills to meet future needs. They currently source a far higher proportion of new entrants from other sectors than straight from education, and this is unlikely to change in the short term. However, over the medium term, employers and education providers will need to work together to increase provision in current and emerging green areas, and a growing awareness of and interest in sustainability among young people should support this expansion of provision, with a clear steer from government and the funding systems. Consultancy and finance based green sectors may find it easier to meet future needs from the large professional services sector in the capital, and the large output from education providers in these subject areas; however, employers of skilled craft labour may find it much harder to recruit the skills they need, given a much smaller supply in other sectors, much smaller numbers of students taking these courses, and current skills shortages in these occupations (potentially exacerbated by Brexit and the ending of freedom of movement). This presents an opportunity for the FE sector and apprenticeship providers to expand provision to meet these increased demands. Across all green sub-sectors there is a need to widen access to groups that are currently under-represented, to maximise the potential skills supply and to reduce existing labour market inequalities.

Barriers, challenges and issues in green skills provision

Interviews were conducted with a range of FE and HE providers across London, including in West London, to explore their perspectives on barriers and challenges to offering (more) green skills provision, and wider issues.

Recruiting FE teachers – mismatches in remuneration between working in construction, engineering and STEM trades, and the salaries of teachers in FE, make it difficult to attract and retain teachers in these subject areas with sufficient industry expertise and experience. This has been exacerbated in the short-term by the impacts of a surge in activity following lockdowns and staff shortages as a result of Brexit. This has led to large increases in demand for construction courses, but had negative impacts on the ability to get teaching staff. More education-business partnership activity, where employers commit some of their staff to work with providers and deliver training, could be a potential solution to the sector-wide issues.

Cost of facilities and equipment – equipment and facilities for practical courses e.g. in construction, engineering and STEM, need to be maintained which is a considerable expense for colleges. This could lead to this provision being consolidated in the larger colleges, as many colleges that are financially strained, or do not have the volumes going through on these courses, will not be able to support these facilities. Industry sponsorship can help, but there is still a large outlay for colleges. Other possible solutions are to share facilities across colleges.

Lack of confidence in future demand due to a lack of a long-term strategy for green, and previous short-lived green initiatives – the lack of a clear steer from central government in terms of green/low carbon priorities was raised in the initial scoping stage of the research and again when asking providers about barriers and challenges to provision – “*what are the strategic priorities in the UK? Hydrogen, solar? Where is the investment going to be?*”. This lack of clarity means that the typical ‘demand-led’ skills system, where employers know what their skills needs are, and providers and potential learners pick up those signals, and deliver/take courses that will give employers the skills required, does not function effectively – learners do not necessarily know about future career options

within green sectors. Some providers gave examples where they invested in facilities to put on courses related to green priorities, prompted by local boroughs highlighting their need to undertake retrofit work, but then had no take up for these courses. There was a feeling that it was falling between the stools of providers, funders and government, without co-ordination to ensure that where provision was put on it was successful. As one respondent said – *“Throwing a bunch of green qualifications at this isn't the right solution because every time we've had green-type qualifications, nobody wants to do them. So just supplying qualifications and saying if we build it, they will come, is not true”*. An awarding body commented that there were three necessary conditions for green provision to gain traction – solid demand from employers for staff/consumers for green products; ability of the supply side to respond in a timely way which feeds into the academic cycle in the case of publicly-funded provision; and engagement from awarding organisations to unlock the state funding mechanism. In some cases this does not need to be new courses, but updating or adding to existing courses to make them more related/relevant to green jobs and skills. The changes to funding introduced by the GLA has helped more adults enter courses, including construction and engineering.

There is a clear role for central government in setting out a clear policy framework which gives businesses certainty, and the Net Zero Strategy and Homes and Buildings strategy should help boost business confidence in investing in green skills. With increased confidence, employers and sector bodies can work together with education and training providers to articulate more clearly their likely future skills needs so that the training sector can respond appropriately, and together with employers and sector bodies can promote opportunities in green jobs via careers information, advice and guidance to young people and adults looking for new opportunities.

One respondent raised the idea of local authorities building up their direct labour departments in construction/engineering workforces, as the high proportion of self-employment and micro-businesses who take on the work as sub-contractors do not have the capacity to take on trainees. Glasgow was cited as an example of this, with the council employing over 2,000 workers with around 60 apprentices a year. Joint initiatives between local authorities and training providers should improve the supply of skills through the training pipeline, as the current system with developers or lead contractors building up the labour force on developments through sub-contracting rather than being directly-employed labour makes engagement with the training sector more difficult.

Addressing diversity imbalances – women remain under-represented in engineering, construction and STEM subjects, including much of current green skills provision, and there are long-standing and recognised issues about encouraging female students into craft-based courses, which providers were looking to actively address through initiatives to promote female enrolment, such as awareness campaigns or mentoring programmes jointly delivered with industry partners. For example, one respondent reported that they introduced short courses (e.g. 6-week evening course) with “Women” in the title, e.g. “Women in construction”, which were very successful at attracting female students and giving them the confidence to go on to longer courses and gain qualifications. In terms of imbalances by ethnicity, the profile of learners was felt to generally reflect that of local populations, so as these learners entered the labour market, and older workers (more likely to be white and male) retired, the ethnic diversity imbalances in the workforce should lessen over time.

Specific provision vs embedding environmentalism – respondents mentioned starting down the road of interweaving sustainability and green issues into all of their qualifications and delivery, although it was not as straightforward as having a generic module on ‘sustainability’, the input has to be related to the sector/occupation of the qualification. However, gaining the appropriate understanding of how sustainability influences the different sectors was still a work in progress. But one respondent felt that embedding climate and energy literacy into Level 2 courses could be a good springboard to getting

learners onto green-specific Level 3 courses or apprenticeships. As part of this “whole-system” approach, providers mentioned the need to ‘intervene early’ – that is, learners should begin to develop an awareness of environmental and sustainability issues as early as primary school. This creates a coherent programme of learning that progresses fluidly across different levels of education.

Drawing on the above engagement, analysis of existing skills provision and projections for future green skills need, we recommend the following skills-specific recommendations in addition to the broader skills outlined in the executive summary:

- **Increase education provision in subjects and courses that are relevant for green jobs:** **Skills providers** should seek to increase their offer in courses needed for the green economy, particularly provision related to craft-based jobs given the size of projected increases in employment in relation to current skills provision (mostly in FE and apprenticeships); previous research has highlighted skills shortages for key roles in green sectors, such as electricians, plumbers (Homes, Buildings and Infrastructure sector) and engineers and technicians (Power sector).
- **Increase the proportion of those taking relevant courses who progress to employment within green sectors:** **Skills providers, together with employers and industry bodies**, can encourage this through for example careers information, advice and guidance that informs learners of the growing range of opportunities within green sectors; and
- **Increase the flows from other, non-green, sectors into green sectors:** **Skills providers** should consider increasing targeted reskilling training, working with employers and sector bodies to increase the flows of potential recruits from non-green sectors into green jobs.

5. Impact on net jobs

The previous chapter considered the impact of transition to net zero on gross jobs in West London. However, not all of these will be additional jobs to the West London economy because:

- i. A non-green job may have become a green job; for example, a fossil-fuel based energy job becoming a renewable energy job; and
- ii. Some jobs may cease to exist.

The Committee on Climate Change (CCC) commissioned modelling to look at the impact on the UK economy of the sixth carbon budget,^{xxxviii} which included the policy changes necessary to reach net zero. This analysis modelled the impact on net jobs – i.e. how overall employment levels will be affected by the transition to net zero.

This modelling found that **there will be an increase in the net number of jobs over the next three decades in the UK due to the change to a net-zero carbon economy by 2050, alongside increases in both GDP and incomes.** We project a net increase in jobs of 10,200 by 2030 and an additional 3,700 by 2050. This is because:

- i. The transition to a low carbon economy requires that investment is brought forward into capital-intensive technologies, stimulating economic demand;
- ii. The decarbonisation of power reduces the imports of oil and gas, which in turn increases domestic production, leading to increases in GDP and employment; and
- iii. Electricity prices are expected to fall, as economies of scale for low carbon energy technologies are substantial. Low electricity prices boost GDP and employment and also reduces consumer prices across the economy.

Table 17 shows our estimate of the impact of net zero on net jobs in the West London economy, based on the methodology set out in the cross London report. This suggests that there will be a small positive impact of a change to net zero policies on London, increasing net employment by around 10,200 jobs in 2030 and around 3,700 jobs in 2050.

Table 17: Estimated impact of net zero policies on net employment in West London

Sector	Jobs in West London (2019)	Estimated jobs in West London (2030)			Estimated jobs in West London (2050)		
	Latest data	Based on current policies	With net zero policies	Change due to net zero policies	Based on current policies	With net zero policies	Change due to net zero policies
Agriculture	200	200	200	0	200	200	0
Mining and refinery	800	700	600	-100	500	500	0
Utilities	4,100	3,700	3,900	200	2,900	3,900	1,000
Manufacturing and construction	86,500	83,500	84,500	1,000	76,200	76,600	400
Distribution, retail, hotel and catering	229,000	237,800	242,100	4,300	238,900	241,000	2,100
Transport and communications	183,500	190,000	193,800	3,800	191,700	191,900	200
Services	460,300	516,000	517,000	1,000	592,300	592,300	0
Total - West London	964,000	1,032,000	1,042,000	10,200	1,103,000	1,106,000	3,700
Whole of London	5,368,000	5,853,000	5,900,000	47,200	6,443,000	6,462,000	19,400

Source: WPI Economics calculations based on Climate Change Committee (2020) and ONS Business Register and Employment Survey

6. Equality implications of decarbonisation in the sub-region

London's high degree of service sector jobs means that it is somewhat less susceptible to the effects of decarbonisation than other parts of the country. However, West London has an over-representation of jobs in at-risk sectors, such as aviation (within Transport and Storage) and Manufacturing.^{xxxix} Furthermore, across London these sectors have a higher proportion of BAME employees; half of workers in Transport and Storage are from BAME groups.^{xl}

To understand the potential implications of the findings in this report, we have assessed eleven carbon intensive industrial activities as a proxy for those areas likely to undergo the most substantial change in the coming decades. The eleven sectors we look at follow the report *Greening the Giants* (Onward, 2021)^{xli} which identifies sectors that either have emissions above 100tCO₂e per job or which contribute more than 2% of annual total UK emissions as carbon intensive with the exception of retail as a recent LSE study that shows the sector is 91% non-exposed to the transition.

We identify 117,000 of West London's 964,000 jobs in these sectors in 2019, shown in Table 18 below. This represents 12% of employment, which is a higher proportion than the London-wide average of 7% of employment in these sectors. Around 40% of these jobs are in the construction sector, and 55% of the jobs in aviation and land transport combined.

Table 18: Jobs (employments) in carbon intensive sectors – West London Partnership sub-region

	SIC code section	Employment, 2019 West London Alliance	Proportion of employees that identify as an ethnicity other than "White"		Proportion of people in employment that identify as female		Proportion of people in employment aged 16-64 that are under 25		Proportion of people in employment aged 16-64 that are over 50	
			London	United Kingdom	London	United Kingdom	London	United Kingdom	London	United Kingdom
			<i>NB/ This data is at the SIC code section level only for London and the United Kingdom, not lower level geographies</i>							
Construction	F	45,000	24%	7%	-	14%	4%	10%	35%	38%
Aviation	H	34,555	55%	18%	39%	22%	4%	7%	22%	31%
Land Transport	H	29,940	55%	18%	39%	22%	4%	7%	22%	31%
Waste and sewerage	E	2,765	56%	7%	-	23%	8%	8%	19%	31%
Carbon intensive manufacturing	C	2,240	38%	9%	-	27%	10%	9%	35%	36%
Electricity, gas, steam and air conditioning supply	D	965	44%	10%	-	23%	8%	8%	19%	31%
Oil and gas	B	640	44%	7%	-	23%	8%	8%	19%	31%
Shipping and fishing	Mostly H	470	55%	18%	39%	22%	4%	7%	22%	31%
Agriculture	A	170	4%	1%	-	26%	N/A	14%	30%	62%
Steel	C	70	38%	9%	-	27%	10%	9%	35%	36%
Total in carbon intensive sectors		117,000								
All industries		964,000	36%	13%	-	48%	7%	11%	27%	34%

Source: ONS Business Register and Employment Survey (BRES) and Annual Population Survey (APS)

Notes: The data on gender breakdown of industries in London for SIC codes A-F is not available; the ONS say the figures are suppressed as they are statistically unreliable. The Onward Greening the Giants report included the Retail sector as it accounts for over 2% of UK emissions, even though it has a relatively low amount of emissions per job. However, they excluded the sector from their cross-sectional analysis as they noted a recent LSE study that shows the sector is 91% non-exposed to the transition. We therefore also exclude the retail sector. We use total Employments from the BRES survey, including self-employed workers.

(*) Note that for London, data on the gender split on industries is only in the public domain for groups of SIC code sectors; in particular for this table SIC code H (Transport & Storage) is combined with SIC code J (Information and communication)

Although it is not possible to get demographic data at a detailed industrial breakdown, we can get some understanding of potential equalities implications using the broad section level SIC codes for each of the eleven areas. However, as sub-regional equalities data is not in the public domain we can only report the London-wide equalities data for the relevant industrial groups.

For West London, the key findings are:

- Construction has a lower proportion of BAME workers than compared to all industries across London (24% versus 36%), and the national data suggests it is male-dominated (14% of workers are women, compared to an average of 48% across all industries). The sector also tends to employ fewer younger workers and a greater number of older workers than other industries.
- Land Transport and Aviation are both part of the Transport and Storage industrial sector. This sector has much higher proportion of BAME workers than compared to all industries across London (55% versus 36%). Data on gender at a London level is only available in the combined Transport and Communication grouping, in which 39% of workers identified as female. This is higher than the Transport and Storage average across Great Britain, but below the all-industry average. Transport and Storage also employs fewer younger workers (under 25), but also fewer older workers (over 50) than the average of all industries.

While the green economy presents significant economic opportunity, it is important to give consideration to ensure there is a just transition (a transition towards a more sustainable economy without leaving communities in exposed sectors behind), and that distributional challenges identified in carbon-intensive sectors – such as overrepresentation of BAME workers in Transport and Storage – are not simply replicated in new or growing sectors.

Annex

Table A1: Example green occupations within each occupational group

Occupational group	Example green occupations
Managerial occupations	'Production managers and directors in construction'
	'Financial managers and directors'
	'Property, housing and estate managers'
Professional occupations	'Management consultants and business analysts'
	'Business and financial project management professionals'
	'Programmers and software development professionals'
	'IT business analysts, architects and systems designers'
	'Environment professionals'
Associate professional and technical occupations	'Electrical engineers'
	'Chartered surveyors'
	'Business and related associate professionals not elsewhere classified (business systems analysts, data analysts, project coordinators etc.'
Skilled craft occupations	'Marketing associate professionals'
	'Sales accounts and business development managers'
	'Electricians and electrical fitters'
Non-manual admin. etc.	'Plumbers and heating and ventilating engineers'
	'Gardeners and landscape gardeners'
	'Vehicle technicians, mechanics and electricians'
Semi-skilled/elementary	Administrative and secretarial occupations
	Caring, leisure and other service occupations
	Sales and customer service occupations
	Process, plant and machine operatives
	Elementary occupations

Endnotes

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