



## Green Jobs and Skills in Local London

### Sub-regional Report

A WPI Economics and Institute for Employment Studies Report for Local London

James Edgar – Chief Economist – [james.edgar@wpieconomics.com](mailto:james.edgar@wpieconomics.com)

Joe Ahern – Senior Consultant – [joe.ahern@wpieconomics.com](mailto:joe.ahern@wpieconomics.com)

Christina Bovill Rose – Junior Consultant – [christina@wpieconomics.com](mailto:christina@wpieconomics.com)

Matthew Williams - Senior Research Fellow – [matthew.williams@employment-studies.co.uk](mailto:matthew.williams@employment-studies.co.uk)


18/02/2022

PRIVATE & CONFIDENTIAL



 [www.wpieconomics.com](http://www.wpieconomics.com)

 [info@wpieconomics.com](mailto:info@wpieconomics.com)

 [@wpi\\_economics](https://twitter.com/wpi_economics)

---

## About WPI Economics

WPI Economics is an economics, data insight and public policy consultancy that specialises in conducting research, analysis and modelling that makes an impact on important social and economic policy debates, such as health and wellbeing, poverty and the recovery from pandemic. We are driven by a desire to make a difference, both through the work we undertake and by taking our responsibilities as a business seriously. We work with a range of organisations – from FTSE 100/250 companies to SMEs and charities and Central and Local Government.

## About Institute for Employment Studies

The IES mission is to help bring about sustainable improvements in employment policy and human resource management. We achieve this by increasing the understanding and improving the practice of key decision makers in policy bodies and employing organisations.

IES was established in the financial year 1968-69 to be an independent, national centre of expertise on productivity, manpower planning and labour market change. Since that time it has expanded and diversified to become a leading UK independent centre for research and evidence-based consultancy in employment, labour market and human resource policy and practice. It is not-for-profit, its activities being funded through research and consultancy commissions, and from its corporate membership programme.

## About Local London

Local London is a partnership of 8 London boroughs of Barking & Dagenham, Bexley, Enfield, Greenwich, Havering, Newham, Redbridge, Waltham Forest in the north and east of the capital working to respond to a set of mutual issues and challenges. Representing around 2.5 million residents and nearly 100,000 businesses, we are a champion for this sub-region to ensure it benefits from existing and emerging opportunities. Our work is varied and wide-ranging. As a collective, our intention is to deliver outcomes which benefit all our member boroughs.

## Disclaimer and legal

This report has been produced by WPI Economics, an independent economics and policy consultancy. The views expressed in the report are based on independent research and represent solely the views of the authors. They are provided for informative purposes only. Whilst we undertake every effort to ensure that the information within this document is accurate and up to date, neither WPI Economics nor the report's authors accept any liability for direct, implied, statutory, and/or consequential loss arising from the use of this document or its contents.

## Executive summary

This report examines the potential scale and nature of green jobs across the Local 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 Local London will play a vital part in helping to deliver net zero. Based on extensive stakeholder engagement boroughs across Local 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 the Local London sub-region, will drive substantial growth in green jobs over the coming years.

Modelling for this report takes a mission-based approach to defining the green economy and identifying green jobs in Local London, building on the Green Jobs Taskforce<sup>1</sup> definition. This was applied to data from LCEGS and Data City in order to provide an estimate of the number of green jobs in Local London. This was then combined with a number of assumptions and the use of datasets including research from the Climate Change Committee<sup>2</sup> (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 Local London

Overall, our analysis finds that this sub-region has just over **1 in 10 of the capital's green jobs**, totalling **32,130 green jobs in 2020**. This represents **4.6% of the sub-region's total jobs**.

- Power represents nearly half (46%) of the sub-region's green jobs, and 2.1% of total employment in the Local London area. Nearly 1 in 5 (18%) of green Power jobs are in the sub-region.
- Homes and Buildings accounts for a third (33%) of Local London's green jobs, and 1.5% of all jobs in the area. Nearly 1 in 5 (19%) of all of London's green Homes and Building's jobs are in the Local London area.
- A quarter (24%) of the capital's Reduce, Reuse, Recycle jobs are in the Local London sub-region. This sector accounts for 0.5% of the sub-region's total employment, and just over 10% of its green jobs.

In total, we estimate that sales for the 11 green economy sectors accounted for around **£5 billion in 2020/21** in Local London, with Power accounting for just under half of this total.

## Green skills today in Local London

Workers in green jobs in Local London are predominantly in higher level managerial, professional and associate professional occupations – 62% are in these three occupational groups, which compares with 53% of green workers across the country as a whole, but is below the proportion of all workers in the Local London sub-region in these occupational groups (70%). There is variation by sector. Jobs in

---

<sup>1</sup> The Green Jobs Taskforce is a body of members from industry, the skills sector, trade unions, convened as part of the Government's Ten Point Plan.

<sup>2</sup> The Climate Change Committee is an independent organisation which advises the UK Government on its actions to address climate change and reports on progress in reducing emissions.

Power and Green Finance/Consultancy sectors are predominantly professional and associate professional. Meanwhile, the largest group in sectors related to Homes, Buildings and Infrastructure, and Reduce, Reuse, Recycle is skilled craft workers (e.g. electricians and plumbers).

Nearly three fifths (57%) of Local London residents in green jobs have degrees (above the proportion of graduates in all jobs in Local 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 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 Local London. Furthermore, the green workforce has an older than average age profile, in comparison with all workers in Local London.

Analysis at the national level shows that green businesses tend to draw relatively few workers straight from education, and rely more on workers from other sectors. In the Local London sub-region, 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 12,000 learners in FE (19+) and in apprenticeships (all ages) in subject areas relevant to green jobs. They represent nearly 40% of the current green workforce, twice the level across the whole of London, indicating a relatively large education and training pipeline at FE level within the Local London sub-region. The HE institutions in Local 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.

## Projections of green jobs in Local London

The total number of jobs in the central scenario is projected to rise from **32,000 in 2020 to 110,000 in 2050, representing an above-3-fold increase**. Within this scenario, three sectors account for almost 8 in 10 (77.6%) of Local London's total number of green jobs by 2050:

- Power (41,800), representing 38% of total green jobs.
- Homes and Buildings (27,400), representing 24.9% of total green jobs.
- Low Carbon Transport (16,100), representing 14.6% of total green jobs.

Overall, there will be a small positive impact of a change to net zero policies on Local London, increasing net employment by around **6,700 jobs in 2030** and around **3,900 jobs in 2050**.

## Future skills projections

Under the central scenario, the fastest growth rate is projected for skilled craft workers (113% increase to 2030), and this occupational group is also projected to experience the largest increase in numbers of workers (8,300 increase). Under the high growth scenario, skilled craft workers will increase by nearly 20,000, or 263%.

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. The annual increase in consultancy-based jobs represents a quarter (22%) of the annual output from education and training, while the annual increase in craft-based job represents a much higher proportion the education and training output (63%).

## Recommendations

The analysis in this report highlights a few areas where there is 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.<sup>1</sup> **Local authorities, together with the Mayor and London Councils**, have a role in making the case to Central Government to deliver on the CCC's recommendation.
- **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, including adult education, 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.

## 1. 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 report 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.<sup>ii</sup> 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 recovery across the UK, and in growing and strengthening the industries that will underpin the green economy of the future.

Local London is the sub-regional partnership for East and North East London, for its member boroughs of Barking and Dagenham, Bexley, Enfield, Greenwich, Havering, Newham, Redbridge and Waltham Forest. The Local London area covers a population of 2.5 million people and around 100,000 businesses. Wholesale and retail, health and social work, and education are the main sectors by share of employment in 2019, with significant shares of employment also in construction, transport and storage, and manufacturing, higher than London as a whole.<sup>iii</sup> The area is home to a number of the Greater London Authority's 'Opportunity Areas' (areas with capacity to support either 2500 new homes or 5000 new jobs).

### The green recovery in the Local London sub-region

The green economy offers considerable opportunity for the sub-region. A key characteristic of Local London is the availability of industrial land and other spaces for development, and the vast potential this could present for the sub-region's green economy. For example, the sub-region is home to a number of Strategic Industrial Land sites, brownfield sites, and low-cost floor space (such as in Enfield), and is served by key transport links. Along with an existing and growing knowledge economy – such as the Innovation Corridor linking London, Stansted and Cambridge – the Local London sub-region presents exciting prospects as a key player in the green economy and the capital's path to net zero.

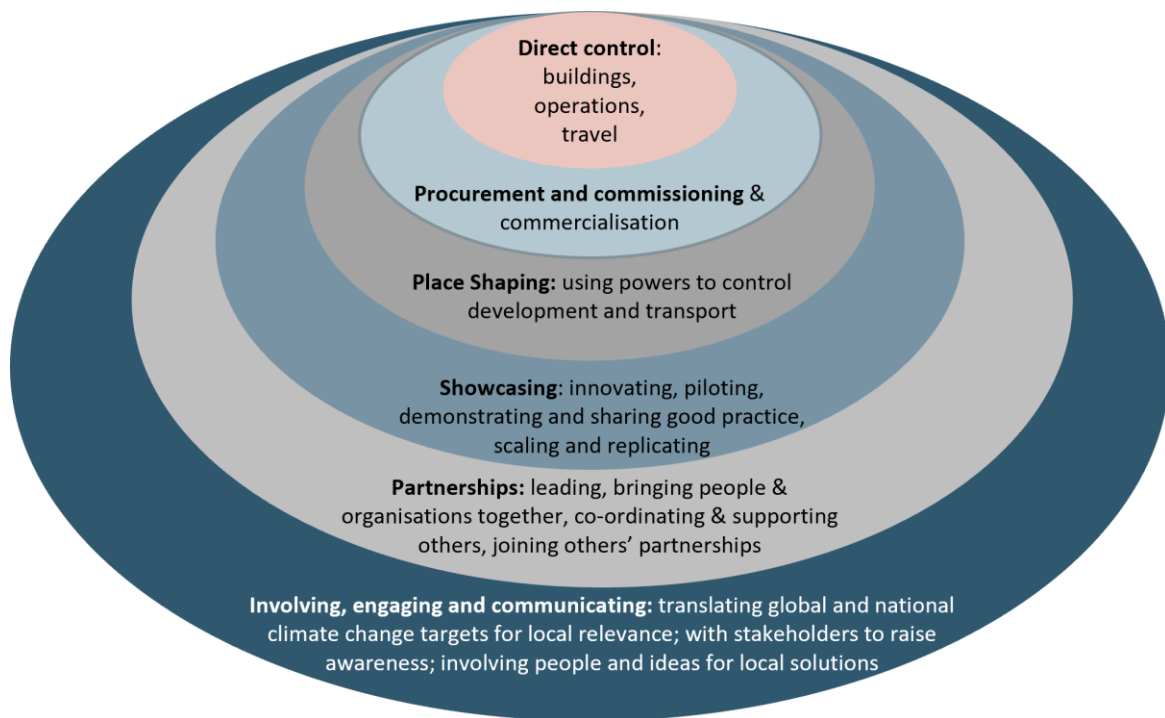
#### **Box 1: The potential for light freight on the Thames**

Research commissioned by the Thames Estuary Growth Board and the Port of London Authority highlights the environmental and economic opportunity of a light freight model on the Thames. The study finds that making greater use of the Thames as a freight transport network can help reduce emissions and be part of the solution of decarbonising freight transport, as well as improved air quality and net job creation.<sup>iv</sup>

This is not to say that a green economy is yet to be established in the sub-region, nor that its member boroughs are not already acting to address climate change; we note some examples of existing and planned activity in the sub-region in the next section, spanning a range of areas and subsectors. Although, as organisations themselves, councils are only generally responsible for 2-5% of the emissions of a local area, they are well placed to play a wide strategic role due to the expert knowledge of the communities they serve.<sup>v</sup> These are summarised by the below diagram, which was

reproduced by the Climate Change Committee (CCC) – an independent statutory advisory body - in a document to support the Sixth Carbon budget.

**Figure 1: How local authorities control and influence emissions**



Source: CCC Sixth Carbon Budget<sup>vi</sup>

Our engagement with Local London's member boroughs shows a range of activity under various strands outlined in the above diagram. For example, among other activities, boroughs are encouraging residents to adopt changes to reduce their carbon footprint, incorporating sustainability principles into regeneration projects, and coordinating a range of local organisations to collaborate to address the climate crisis.

### **Box 2: Thames Estuary Hydrogen Route Map**

Connecting London with ports in the East and South East of England, the Thames Estuary is a key growth area for Local London sub-region, as well as for the rest of the capital and the UK. The Thames Estuary Growth Board (TEGB/the Board) has ambitions for the Estuary to support the UK's net zero target through driving the UK's hydrogen manufacture and supply and to be the cleanest riverside region in the world.<sup>vii</sup>

Plans for the Estuary include the development of a hydrogen ecosystem for the UK, as well as a cluster for research and development into hydrogen technologies. The TEGB anticipates considerable potential for hydrogen, identifying distribution, logistics, construction, aviation, industry and residential use among the sectors with potential hydrogen demand, providing £3.8 billion of cumulative GVA by 2050.<sup>viii</sup>

The Board estimates that seizing the hydrogen opportunity in the Thames Estuary could enable a 5.9 million tonne reduction in CO<sub>2</sub> emissions a year by 2050.<sup>ix</sup> With five of Local London's member boroughs in the Thames Estuary, the site presents a key opportunity for the North and East London area. The project is estimated to bring 9000 new jobs to the Thames Estuary as a whole, some of which will be located in the Local London sub-region.

Along with the vast local opportunity, the sub-region faces a number of challenges. Some borough stakeholders mentioned common issues such as skills gaps in the measures needed to reach net zero, for example in retrofit and heat pump installation. Other issues were different across boroughs, for example, Havering has commercial spaces which are underoccupied, while Greenwich faces lower land availability. Characteristics of the sub-region, such as a lower likelihood of sustainable transport use as is the case in much of Outer London also present challenges in targeting emissions.<sup>x</sup> However, boroughs and other local stakeholders are addressing these in a number of ways. Examples of activity in the built environment, low carbon energy, business and biodiversity are outlined below.

**Box 3: Enjoy Waltham Forest – the borough’s ‘Mini Holland’**

Enjoy Waltham Forest is one of the schemes developed as part of the Mayor’s Healthy Streets approach, making the area more cycling-friendly. 22 km cycle tracks, 300 bike hangars and 1200 cycle stands have been installed, as well as 40 modal filters to stop the use of residential streets as bypasses. As a result, bike journeys have been made safer, more enjoyable and more accessible; the borough has delivered cycling training to 7500 children and 5000 adults.<sup>xi</sup>

As well as the environmental benefits of reduced reliance on transport by car and other vehicles, 700 trees have been planted and there are 15 pocket parks in the area, which have also improved pedestrian spaces.<sup>xii</sup>

Furthermore, the infrastructure enables residents and businesses to make more environmentally friendly choices and boosts the local green economy; OrganicLea, a local food cooperative, credits the scheme as part of the reason it can operate as an emissions-free business. The infrastructure has also enabled ZED delivery service – bicycle couriers – to operate effectively to make zero-emissions deliveries in the area, and in addition the borough has loaned out 300 cargo bikes free of charge to local businesses.<sup>xiii</sup>

## Meeting net zero through the built environment

### *Regeneration and new developments*

**Box 4: Thames Freeport**

The Thames Freeport, one of the UK’s first to open, will be a hub of trade, industry and innovation. Part of this 34 kilometre-wide economic corridor is situated in Havering and Barking and Dagenham, as well as areas outside London, connecting the capital to the South East and beyond and bringing together industry, the public sector and education. This represents a major opportunity to deliver net zero as well as levelling up, with advanced logistics, manufacturing and the circular economy listed among its areas of focus. Among other activities to achieve net zero, the freeport will champion low carbon alternatives for freight transportation, such as a modal shift from road to the River Thames, and pilot clean energy and alternative fuels. In addition, London Gateway has received £300 million of investment into the UK’s largest battery, as well as supporting the Port of London Authority to reach net zero by 2040.

The site as a whole is expected to create over 21,000 new jobs, with more still in supply chains. Thames Freeport will also be investing in a Skills Accelerator to ensure people develop the relevant skills to take the opportunities of the freeport, identifying skills gaps and addressing these through skills plans. A Skills Fund will ensure there is sufficient investment for skills training and innovation of the skills system.



A considerable amount of regeneration and development is taking place in the Local London sub-region, making use of the large brownfield sites available for development, such as in Barking and Dagenham, and industrial and commercial premises such as in Havering, and addressing the need for more housing to meet demand. Councils have used place-shaping powers to require developments to support climate goals, or be adaptable for future technologies; for example, Redbridge Council has ensured that new developments, such as the Metro Tower, Harrison and Gibson site and Britannia Music Scheme, must be able to connect to any future District Heating System.<sup>xiv</sup> The Greenwich Builds programme aims to tackle both the 19,000-household waiting list for council homes and the climate crisis through 750 new council homes built with ‘minimal’ environmental impact and a target to be built to a zero carbon specification, making use of air-source heat pumps and solar panels.<sup>xv</sup>

#### ***Box 5: Meridian Water Regeneration***

Meridian Water is a regeneration project from Enfield Council which in addition to creating 10,000 homes and 6000 jobs, includes plans for a range of features to support net zero in the borough, incorporating a holistic approach to sustainability.<sup>xvi</sup> The plan includes using zero carbon construction on the development, renewable power with aims to generate much of this locally, and integrating energy efficiency measures.<sup>xvii</sup> It will also facilitate the local circular economy and stimulate a local zero carbon supply chain, through eliminating waste and building through a regenerative approach.<sup>xviii</sup> The regeneration will also meet wider environmental objectives through setting aside nearly a third of land for green space and restoring the natural environment to encourage an increase in biodiversity.<sup>xix</sup>

#### ***Box 6: The Royal Docks Enterprise Zone***

The Royal Docks is one of Newham’s key regeneration areas, comprising a 125 hectare site in the borough. The site houses businesses in a range of sectors, from aviation (London City Airport) to food (Tate & Lyle) and Education (University of East London, Queen Mary University of London and Newham College). A £314 million programme of investment is being delivered at the site with greener, sustainable development at its core, including developing an incubator for green technology and the London City Institute of Technology.

In addition to their place-shaping powers, boroughs are supporting the delivery of training and equipping the workforce with skills needed to undertake net zero activity in construction. For example, a programme in partnership with London South East Colleges (LSEC) as part of the Mayor’s Construction Academy will deliver training aligned to the construction industry with a green and digital emphasis, harnessing the use of modern technology. As a long-term aim, this programme will allow students to learn, get work experience and have a job offer in industry upon completion of the programme.<sup>xx</sup>

#### ***Decarbonising existing buildings***

Given the contribution of buildings to energy use and emissions, councils have been undertaking a range of measures to ensure existing buildings also meet energy efficiency requirements essential to meeting net zero. For example, Newham will be starting a retrofit programme across council properties, while ensuring poor efficiency in the private rented sector is addressed by utilising landlord licensing.<sup>xxi</sup> Redbridge began retrofitting its housing stock in 2021, and launched the Go Green Grant to support private landlords to improve the energy efficiency of their properties.<sup>xxii</sup> As part of a £17 million programme combining council funds with grants, Barking and Dagenham is delivering energy conservation measures and deep retrofit to hundreds of homes and public sector buildings, and linking this to upskilling the local workforce.<sup>xxiii</sup>

### **Box 7: 47 Greenleaf Road: Waltham Forest's Eco Home<sup>xxiv</sup>**

47 Greenleaf Road is a Waltham Forest council-owned, 4-bed Victorian property which has become the Council's first eco show home. Its retrofit included resolving structural heat loss problems (e.g. through a new front door and smart ventilation bricks), installing external and internal wall, roof and floor insulation, and an air-source heat pump and a heat recovery unit, among other measures. The retrofit, managed by Aston Group, saw the home's EPC rating rise from band E to band A, and is estimated to reduce its energy usage from over 17,000kWh to under 8000kWh a year.

## Low carbon energy in the Local London sub-region

As well as reducing energy use in the built environment, the Local London sub-region is also looking at how its energy can be more sustainable. Redbridge Council has undertaken analysis to identify opportunities to connect 600 new council homes to district heating systems.<sup>xxv</sup>

Enfield has established a fully council-owned, community heat network, Energetik. It supplies heat and hot water to at least 15,000 homes and businesses across North London from a range of heat sources, such as waste heat from the North London Heat and Power Project which would otherwise go unused. Built with the future in mind, Energetik forms part of a 'future-proofed' energy infrastructure, meaning it can be adapted to embrace changes in heat generation technology and increase capacity to meet increased energy demand.<sup>xxvi</sup>

## Businesses and innovation

Business has a crucial responsibility in local action to green the economy, with council- and business-led activity – and partnership approaches, including with local education providers – harnessing expertise and innovation to drive green growth. For example, the London Sustainable Industries Park (LSIP), located at Dagenham Docks, is part of a venture spanning Newham, Barking and Dagenham, and Havering. It will host the largest concentration of environmental industries in the UK, and is already home to London's first anaerobic digestion and composting plant.<sup>xxvii</sup> Meanwhile, Waltham Forest Council, building on its rich history in the textiles industry, has formed partnerships with local fashion organisations (such as the London Fashion District and the London College of Fashion) to promote and facilitate the development of sustainable fashion practices and innovation.<sup>xxviii</sup> Bexley is hosting a series of business support events to help local businesses recover from the shock of the pandemic and to build resilience; within this series is a workshop to inform businesses about the climate emergency and to set out the changes they can be making to reduce their environmental impact. In turn, workshops like this will build up council knowledge of the kinds of support businesses need to engage in decarbonisation. Newham, recognising that the vast majority of local businesses employ fewer than 10 people, has developed the Community Wealth Building Pledge to encourage these businesses to prioritise sustainability and respond to the climate emergency.

### **Box 8: Barking Riverside**

Barking Riverside is a multi-purpose site based in Barking and Dagenham, which houses an ecology centre, events and exhibition space, and a pioneering automated underground waste collection system by Envac. *Every One Every Day*, a local community network, runs a programme of activities at the centre while the University of East London provides ecology programming.

Building on Walthamstow's focus on local, independent business, Harvest London is a hydroponic vertical farming business, whose approach avoids soil degradation, minimises environmental damage

and waste, and is able to cultivate fresh produce year-round for local catering businesses and restaurants using renewable energy.

## Green and blue spaces and biodiversity

As well as the regeneration and development taking place in the Local London sub-region, there are also established and growing green spaces and activity in enhancing local biodiversity. For example, Redbridge Council has increased the number of tree positions by 24% (1100 trees) since May 2019, and restored 1.5 square miles of wildlife habitat.<sup>xxxix</sup> It has also established a Nature and Environment Scrutiny Task and Finish Group to evaluate opportunities for further increasing biodiversity in the borough.<sup>xxx</sup>

Large wetlands in the sub-region accommodate biodiversity while also providing water services and flooding mitigation to the local communities. Walthamstow Wetlands is the main water supply for 3.5 million people, as well as a Site of Special Scientific Interest and a nature reserve.<sup>xxxi</sup> Dagenham Beam Washlands is home to wet woodland habitats and 12 hectares of ponds, and also constitutes a crucial system managing flood risk in the area, providing flood defence for 570 homes, 90 businesses and major infrastructure in the area.<sup>xxxii</sup>

## Definition and methodology

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 UK Government 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 Central London means that in our context Green Finance could be a key area to separately identify. Although not a large employer outside central London, it will draw employees from other subregions including Local London.
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

The methodology for this report follows that of the cross-London report. To summarise, we use the mission-based definition to examine the number and types of green jobs in the sub-region (figures are for Full-Time Equivalents, but we use the term 'job' for convenience). We use two sources to quantify gross number of jobs in the sectors outlined above:<sup>3</sup>

- **The Low Carbon Environmental Goods and Services (LCEGS) sector dataset:** This dataset is prepared by the consultancy kMatrix and commissioned regularly for London by the Greater London Authority. This dataset includes a broader set of activities than official definitions such as the ONS Environmental goods and services sector (EGSS) and Low carbon and

---

<sup>3</sup> A key difference from the cross-London report is the merging of three sectors – climate adaptation, green and blue infrastructure and reducing localised pollution – due to data availability at a sub-regional level. This difference is the same across all sub-regional reports.

renewable energy economy (LCREE) data, including green finance. It includes the supply chain for green activities as well as the activities themselves.

- **The Data City Real-Time Industrial Classification tool:** This guided machine learning tool allows us to find companies working within specific fields, based on the way companies describe themselves on their websites. We worked with the Data City team to provide an initial “training set” of companies and keywords, and then iteratively improved the results by guiding the machine learning algorithm regarding which companies should be excluded or included. This tool allows us to identify data for the two sectors that the LCEGS data does not (such as Climate Adaptation and Green and Blue Infrastructure) and identify a broad range of companies within each sector that are operating within London. As it is a tool geared towards finding companies, it is more limited in its ability to identify green jobs within firms that are not fully within our definition of the green economy.

To allocate the jobs identified within LCEGS to our sectors we have:

1. Mapped data from the 2017/18 LCEGS dataset to our green jobs categories, using “level 3” data from this dataset which looks at 127 distinct industrial activities.
2. Estimated 2020 job figures using UK growth rates from the most recent LCEGS estimates. London figures for the period 2018/19 to 2020/21 have not been published yet, so we have currently assumed that growth for London has been in line with UK growth rates.

Our findings are presented in the following chapters.

## 2. Green jobs and skills in the sub-region today

Overall, our analysis finds that this sub-region has just over 1 in 10 of the capital's green jobs, totalling 32,130 green jobs in 2020. This represents 4.6% 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 Local London, 2020**

Sector	Definition	Local 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	14,900	2.1%
Homes and Buildings	Retrofit, building new energy-efficient homes, heat pumps, smart devices and controls, heat networks and hydrogen boilers	10,500	1.5%
Reduce, reuse, recycle	Waste management and circular economy	3,300	0.5%
Low Carbon Transport	Low or zero emission vehicles, aviation and maritime, rail, public transport and walking or cycling	1,300	0.2%
Climate change Research and Development	Including private sector, academic and public research	680	0.1%
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 systems to achieve net zero	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	400	0.1%
Industrial decarbonisation, hydrogen and carbon capture	Including hydrogen production and industrial use, carbon capture, utilisation & storage (CCUS) and industrial decarbonisation	220	0.0%
Green finance	Structured financial activity that's been created to ensure a better environmental outcome	200	0.0%
<b>Total</b>		<b>32,130</b>	<b>4.6%</b>

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

Note: Our total green jobs estimate is slightly lower than that identified by kMatrix for London as we do not include some activity in the water sector and waste collection where it does not fall within the scope of our mission-based definition

- Power represents nearly half (46%) of the sub-region's green jobs, and 2.1% of total employment in the Local London area. Nearly 1 in 5 (18%) of green Power jobs are in the sub-region.
- Homes and Buildings accounts for a third (33%) of Local London's green jobs, and 1.5% of all jobs in the area. Nearly 1 in 5 (19%) of all of London's green Homes and Buildings' jobs are in the Local London area.
- A quarter (24%) of the capital's Reduce, Reuse, Recycle jobs are in Local London. This sector accounts for 0.5% of the sub-region's total employment, and just over 10% of its green jobs.
- Unlike London as a whole, for which Green Finance represents 21.6% of green jobs, this sector represents a negligible share of Local London's green jobs. However, central London is a major hub for green finance and draws workers from Local London and the other sub-regions.

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

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

- Barking and Dagenham has over a quarter (27.8%) of Local London's green jobs, the highest share of the capital's green jobs of Local London's green jobs of any of its boroughs.
- Across boroughs, Power and Homes and Buildings are on the whole the largest sources of green job employment, though the number of jobs in these sectors varies between boroughs.

*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
<b>Barking and Dagenham</b>	170	350	350	50	6,330	80	120	6,730	1,460	15,600
<b>Bexley</b>	<50	<50	<50	<50	450	<50	<50	800	290	1,700
<b>Enfield</b>	<50	90	90	<50	1,230	<50	240	2,050	570	4,300
<b>Greenwich</b>	<50	<50	<50	<50	460	<50	180	830	170	1,800
<b>Havering</b>	<50	<50	<50	<50	470	<50	180	670	170	1,600
<b>Newham</b>	<50	<50	<50	<50	170	<50	250	870	180	1,500
<b>Redbridge</b>	<50	50	<50	<50	640	<50	180	1,600	330	2,900
<b>Waltham Forest</b>	<50	<50	<50	<50	720	<50	150	1,320	190	2,500

Source: WPI Economics analysis of The Data City and LCEGS



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
Barking and Dagenham	0.3%	0.6%	0.6%	0.1%	11.3%	0.1%	0.2%	12.0%	2.6%	27.8%
Bexley	-	-	-	-	0.6%	-	-	1.0%	0.4%	2.2%
Enfield	-	0.1%	0.1%	-	1.1%	-	0.2%	1.9%	0.5%	3.9%
Greenwich	-	-	-	-	0.5%	-	0.2%	0.9%	0.2%	2.1%
Havering	-	-	-	-	0.5%	-	0.2%	0.8%	0.2%	1.8%
Newham	-	-	-	-	0.2%	-	0.2%	0.8%	0.2%	1.3%
Redbridge	-	0.1%	-	-	0.8%	-	0.2%	1.9%	0.4%	3.4%
Waltham Forest	-	-	-	-	1.0%	-	0.2%	1.8%	0.3%	3.3%

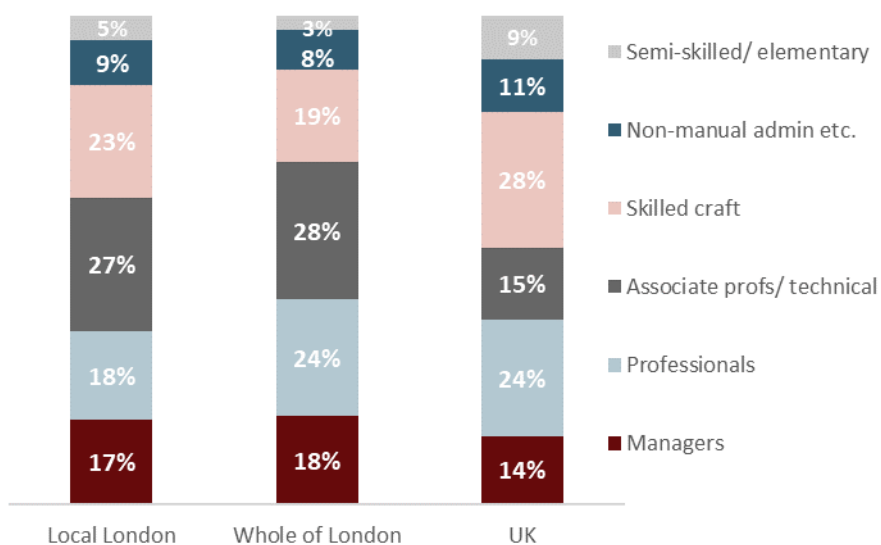
Source: WPI Economics analysis of The Data City and LCEGS

## Green skills in the Local London sub-region

### *Occupational patterns of employment*

This section explores the occupational distribution of workers in green jobs across geographical areas, as well as the distribution in the green jobs sector compared to all employed. Figure 2 exhibits the distribution of workers across different green jobs occupations in Local London, the whole of London, and the UK. In comparison with green jobs across the whole of London, green jobs in the Local London sub-region are over-represented among skilled craft occupations, and under-represented among professional occupations. Of the people who live in the Local London sub-region and work in green jobs, just under one in four (23%) are in skilled craft roles, compared with 19% across the whole of London. Meanwhile, 18% of local residents 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. In comparison with green workers in the UK as a whole, there are more workers in managerial, professional and associate professional roles (62% compared with 53% nationally) and fewer in skilled craft roles (23% compared with 28% nationally).

**Figure 2: Green workers by major occupational group, Local London, whole of London, and UK**



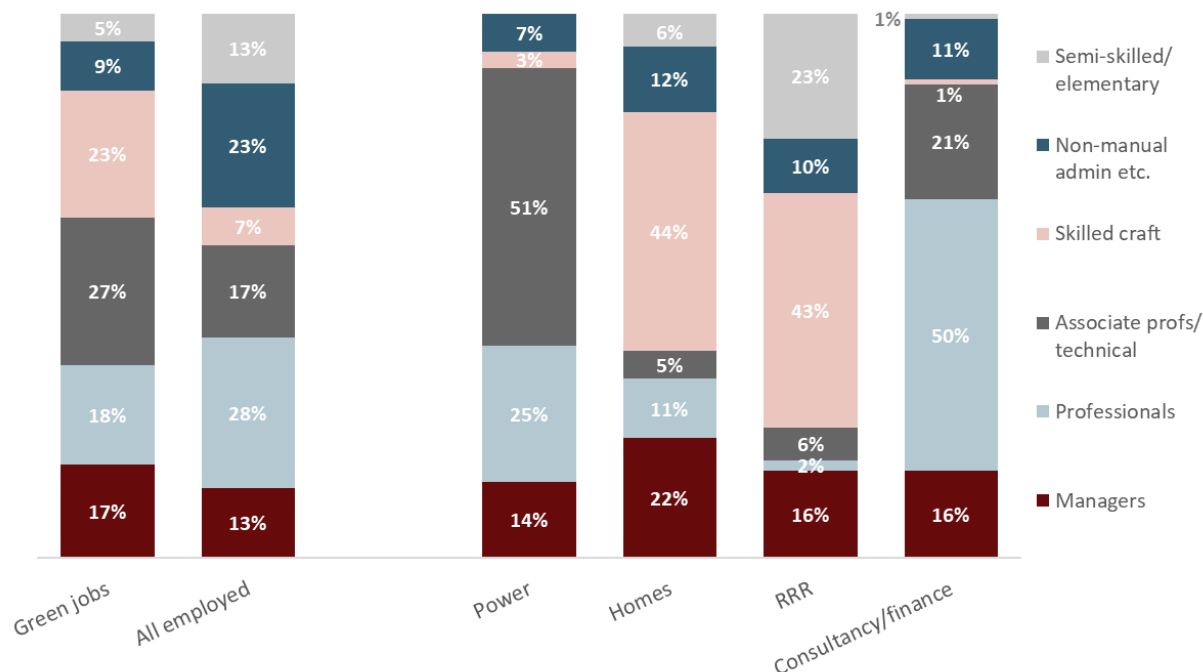
Source: Quarterly Labour Force Survey, Jan-Mar 2020 to Oct-Dec 2020 combined

Figure 3 shows the occupational breakdown of green jobs in the Local London sub-region in comparison with all jobs in the area. 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 (18% and 28% respectively). There are more than three times as many skilled craft jobs in green sectors compared with all sectors (23% 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 sectors, the largest occupational group is skilled craft workers, and while these sectors have low proportions of professional and associate professional

occupations, there is an above average proportion in managerial occupations in the Homes, Buildings and Infrastructure sector.

**Figure 3: Green workers by major occupational group in comparison with all workers, and by green sub-sector, Local London**



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 Labour Force Survey (LFS) is below the recommended threshold for reliable estimates, and so it would not be sensible to draw conclusions for this sector in the outer London sub-regions from the LFS data. The pan-London profile has therefore been used for the Power sector, meaning the main detailed occupations in this sector in the Local London sub-region 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 the Local London area, electricians and electrical fitters are the largest group (15% of all jobs in this sector in the Local London area, 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 the Local London area, electricians and electrical fitters are the largest group (15% of all jobs in this sector in Local London, compared with 4% in UK), followed by vehicle valeters and cleaners (10% compared with 3% in UK), managers and proprietors in other service sector (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 the Local London area, management consultants and business analysts are the largest group (16% of all jobs in this sector in Local London, compared with 8% across the country as a whole), followed by programmers and software development

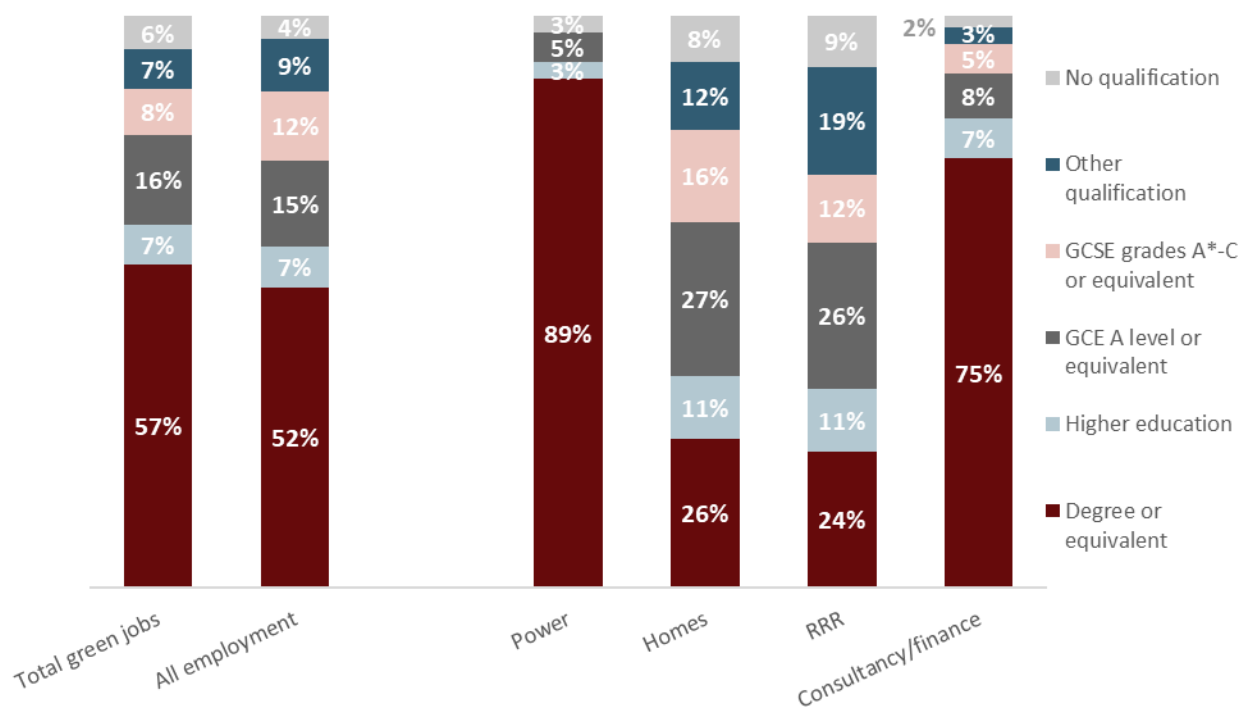
professionals (4%), sales accounts and business development managers (4%), general administrative occupations (4%) and chartered surveyors (3%)

### Qualifications

Residents in the Local London area who work in green jobs are highly qualified. Well over half (57%) of workers in green jobs in Local London hold first degrees or equivalent or higher qualifications. This is slightly higher than the proportion of all Local 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/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.

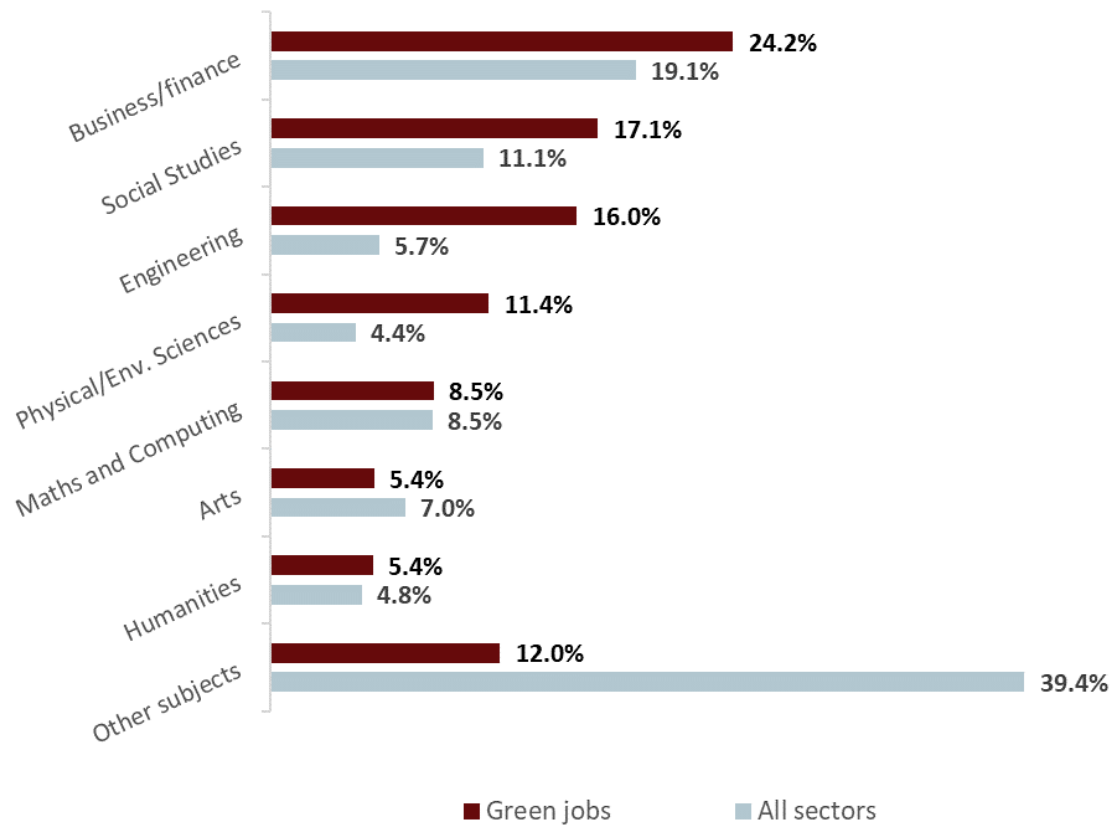
**Figure 4: Highest qualification level of green workers in comparison with all workers, and by green sub-sector, Local London**



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 the Local London sub-region are business/finance and social studies, accounting for 24% and 17% of all graduate green workers respectively. Both groups are over-represented in green jobs compared to 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%). There the over-representation of physical/environmental science graduates is slightly higher, at 11% of green workers, compared with 4% of all graduate workers.

**Figure 5: Graduate workers in green jobs by degree subject in comparison with all graduates, Local London**



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

In the Local London sub-region, the largest vocational subject areas among workers in green jobs with vocational qualifications 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 4: Subject breakdown of workers in green jobs with vocational qualifications in all sectors, Local London**

	Green jobs	All jobs
Building and civil engineering	32.9%	5.9%
Electricity and energy	29.0%	2.9%
Finance banking insurance	10.7%	4.9%
Engineering and manufacturing trades	5.1%	1.2%
Statistics	3.8%	0.4%
Broad programmes in business and admin	3.5%	2.3%
Proportion of all workers with one of the above	85.0%	17.5%

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

### Demographics

The green workforce in the Local London sub-region is very male-dominated, and with a much higher proportion of white workers than across all sectors. Just over three quarters of all green workers in the Local London area 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.

Nearly one in five green workers across all green sectors (18%) are from Black, Asian and Minority Ethnic backgrounds, half of the overall level across all sectors (38%). The proportion of workers from Black, Asian and Minority Ethnic backgrounds is highest in the consultancy and finance sector (40%) followed by the reduce, reuse, recycle sector (32%).

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

**Table 5: Demographic breakdown of green jobs, Local London**

	All green jobs	All jobs	Power	Homes	Reduce, re-use and recycle	Consultancy / finance
<b>Male</b>	77%	53%	77%	81%	76%	57%
<b>Female</b>	23%	47%	23%	19%	24%	43%
<b>White</b>	82%	62%	94%	74%	68%	60%
<b>Black, Asian and Minority Ethnic</b>	18%	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 in London, only 1% had been in full-time education in the year before; this compares 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*

Given the above finding 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; therefore, to understand the skills supply for green jobs in the sub-region, we also investigate the sub-region's potential supply of skills currently 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. Thus for Homes, Buildings and Landscape, we estimate the size of workers in, for example, electrical and plumbing trades and production managers in construction working outside of the sectors that make up the Homes, Buildings and Landscape sector, for example, in other non-green parts of Construction or in other sectors.

Table 6 shows that overall, the size of this potential supply is more than 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 46 times the size of the workforce, while for Power and Homes, Buildings and Landscape, the potential supply is around twice the size of the current workforce. For Reduce, Reuse, Recycle it is around four times as large. This suggests that skills shortages are much more likely to emerge within Homes, Buildings and Landscape, and in Power in the Local London sub-region, than in the other two broad sectors. Other research<sup>xxxiii</sup> 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.

**Table 6: Number of green jobs and workers in key occupations for each sector that are working in other sectors, Local London**

	Power	Homes	RRR	Consultancy / finance	Total green
<b>Green jobs estimate</b>	14,900	12,420	3,300	1,510	32,130
<b>Workers in key occupations in other sectors</b>	30,700	29,200	13,800	68,700	142,400
<b>Potential supply / current jobs</b>	206%	235%	418%	4550%	443%

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 major source of potential skills at managerial, professional and associate professional level for the Consultancy and 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 the Local London sub-region*

Table 7 shows trends in numbers of adult (19+) FE learners studying for qualifications at Level 2 and above in curriculum areas associated with green skills<sup>4</sup> in the Local London sub-region from 2014/15 to 2018/19 (the most recent full academic year for which data are available). This includes provision at all FE providers, not just colleges (for example, private and independent providers, and learners in adult education centres in local authorities).

Despite the growing demand for green jobs in Local London, total provision has remained broadly stable at around 6,000 learners, representing 19% of the current employment level in green jobs in the Local London area, almost double the average across the whole of London of around 10%. This indicates a health potential supply from the FE pipeline in comparison to the pan-London average.

Looking in more detail, provision at Level 2 has fallen by just over 10% over the five year period, although there was a large fall from 4,100 learners in 2014/15 to 2,600 in 2015/16, and numbers have climbed to 3,500 in 2018/19. Provision in building and construction has fallen overall, although there have been large annual fluctuations, while there have been increases in provision in business management (19%), transport operations and maintenance (101%) and the introduction of large-scale provision in environmental conservation in 2018/19 with over 300 learners.

By contrast, provision at Level 3 has increased by over 50% between 2014/15 and 2018/19, although numbers of learners peaked in 2016/17 at just over 3,100, before falling back to 2,400 in 2018/19. This has been driven by a trebling of provision in building and construction, from 500 in 2014/15 to 1,500 in 2018/19. There is little provision above Level 3.

The flows analysis of new entrants to the sector found that nationally, only one per cent of workers in green sectors had entered from full-time education in the previous year into the sector. Applying that proportion to the South London workforce suggests that the sector recruits around 300 workers from full-time education, which is equivalent to 5% of the relevant provision in FE each year, below the proportion across the whole of London of around 10%. It should be also 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.

---

<sup>4</sup> These curriculum areas are based on the main vocational qualification subjects of green workers across the whole of London, presented in the pan-London report.

**Table 7: Numbers of adult (19+) Further Education learners in qualifications associated with green skills, Local London<sup>5</sup>**

	2014/15	2015/16	2016/17	2017/18	2018/19	% change 2014/15- 2018/19
<b>Level 2</b>						
Accounting and Finance	576	357	246	270	271	-53.0
Building and Construction	1,339	824	1,028	769	1,109	-17.2
Business Management	699	438	1,013	887	834	19.3
Engineering	870	577	284	257	227	-73.9
Environmental Conservation	52	49	16	4	326	526.9
Manufacturing Technologies	195	63	94	120	37	-81.0
Transportation Operations and Maintenance	370	266	511	811	745	101.4
<b>Level 3</b>						
Accounting and Finance	207	160	148	115	113	-45.4
Building and Construction	507	897	1,377	1,410	1,530	201.8
Business Management	554	1,073	1,267	485	569	2.7
Engineering	145	212	287	136	113	-22.1
Environmental Conservation	0	0	0	0	0	-
Manufacturing Technologies	0	2	8	81	52	-
Transportation Operations and Maintenance	127	67	63	47	39	-69.3
<b>Above Level 3</b>						

<sup>5</sup> 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.

Accounting and Finance	214	74	73	54	41	-80.8
Building and Construction	4	13	20	12	26	550.0
Business Management	43	24	29	14	20	-53.5
Engineering	10	4	1	7	1	-90.0
Environmental Conservation	0	0	0	0	0	-
Manufacturing Technologies	0	0	0	0	0	-
Transportation Operations and Maintenance	3	0	0	0	0	-100.0
<b>Total</b>	<b>5,915</b>	<b>5,100</b>	<b>6,465</b>	<b>5,479</b>	<b>6,053</b>	<b>2.3</b>

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

Table 8 shows the proportion of total provision across these key subject areas in the largest publicly-funded FE providers. Key points to note are:

- Barnet and Southgate College is the largest provider in the Local London area, accounting for nearly one third of provision in transport operations and maintenance, and one quarter of all building and construction provision. The college covers learners in Enfield and Greenwich.
- New City College, Havering accounts for nearly one quarter of provision in engineering, and one fifth of provision in accounting and finance, and in transport operations and maintenance (New City College Redbridge Campus is also in the Local London sub-region, although the data show very few 19+ students in green-related provision at Level 2 and above in 2018/19).
- Newham College accounts for one third of all accounting and finance provision, and is over-represented in engineering provision (14% of all engineering provision in Local London).
- Green provision at Waltham Forest College provision is mostly focused on accounting and finance, and building and construction.
- Barking and Dagenham College offers provision in engineering, and transportation operations and maintenance.
- Capital City Colleges Group offers provision mainly in transportation operations and maintenance, to learners in Enfield.
- London South East Colleges has small numbers of learners from Bexley and Greenwich in building and construction, transportation operations and management, and business management.

Overall, these six providers account for around three quarters of all provision in transportation operations and management, 70% of all provision in accounting and finance, and just over half of all provision in building and construction and engineering in the Local London area, but only one fifth of all provision in business management, and very little provision in environmental conservation or manufacturing technologies.

**Table 8: Provision in publicly funded FE providers located in Local London sub-region, 2018/19**

	Accounting and finance	Building and Construction	Business Management	Engineering	Environmental Conservation	Manufacturing Technologies	Transportation Ops and Maintenance	Total
<b>Barnet &amp; Southgate College</b>	0.0	25.3	0.7	5.0	0.0	0.0	29.7	15.4
<b>New City College, Havering</b>	22.4	13.9	2.0	23.8	0.0	0.0	20.7	12.2
<b>Newham College of Further Education</b>	32.0	4.5	4.8	13.8	0.0	0.0	3.6	6.6
<b>Waltham Forest College</b>	12.0	6.0	4.6	0.3	0.0	1.1	1.9	4.9
<b>Barking and Dagenham College</b>	3.3	2.9	4.4	9.1	1.5	0.0	5.6	3.9
<b>Capital City College Group</b>	0.0	1.7	2.8	0.9	0.0	0.0	13.1	3.1
<b>London South East Colleges</b>	0.5	2.3	1.3	0.3	0.0	0.0	1.7	1.6
<b>All providers above</b>	70.1	56.7	20.8	53.1	1.5	1.1	76.3	47.7
<b>Total learners</b>	425	2,665	1,423	341	326	89	784	6,053

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

In addition to these providers, West London College's Level 2 provision in environmental conservation, introduced in 2018/19, has learners from Bexley, Enfield, Newham, Havering and Waltham Forest. A number of private/independent training providers also have relevant provision in the Local London area, including BCTG Ltd (building and construction, and manufacturing technologies provision across the area, but mainly in Newham, Redbridge and Waltham Forest), Millennium Academy Ltd (building and construction provision in Barking and Dagenham), and the LTE Group (provision in building and construction, and manufacturing technologies in Greenwich). Capel Manor College has around 650 learners at Level 2 and above, mostly in horticulture and forestry, but also in animal care/veterinary science, and crafts, creative arts and design. Four of the seven hubs of the Mayor's Construction Academy serve the Local London sub-region (College of North East London, London South East Colleges, and Boroughs of Barking and Dagenham, and Newham), with the aim of improving the supply of skilled construction workers across London. In terms of future developments in education and training provision, the London City Institute of Technology, a collaboration between Queen Mary University of London, Newham College, and employers opens next year and will

specialise in delivering higher technical education and apprenticeships with a strong focus on green technology provision.

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 in college. Table 9 shows the latest apprenticeship starts and achievements in sector subject areas that are relevant for green jobs in the Local London sub-region.

Across the three relevant sector subject areas there were around 6,400 starts in 2018/19, slightly larger than the number of FE learners in relevant subject areas, and representing 20% of the current employment level in green jobs compared with the pan-London figure of just over 8%. Thus the number of FE learners and apprenticeship learners combined represents 39% of the green workforce in Local London, around twice the size as across the whole of London. Thus, green employers in the Local London sub-region have a relatively large pool of FE and apprenticeship learners to draw on to meet their current and future needs.

Apprenticeship starts in **construction, planning and the built environment** accounts for 5% of the total (similar to the 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 level is lower than the number of learners studying in FE at Level 2, and the number of starts at advanced level is substantially lower than the number of Level 3 learners, while the number of higher apprenticeship starts is substantially higher than the small number of FE learners above Level 3. Starts in **engineering and manufacturing technologies** are higher than in construction, accounting for 10% of all apprenticeship starts, and 15% of all intermediate apprenticeship starts. By contrast, **business, administration and law** accounts for half all higher apprenticeship starts, and just over 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 1,000 achievements in the skilled craft subject areas of construction and engineering (just under 40% of total achievements in these subjects across the whole of London), and 1,500 achievements in business subjects (35% of total achievements across London), in the 2018/19 academic year.

**Table 9: Numbers of Apprenticeship starts and achievements in qualifications associated with green skills, Local London, 2018/19**

	Starts		Achievements	
	Number	% of total	Number	% of total
<b>Construction, Planning and the Built Environment</b>				
Intermediate Apprenticeship	250	6.5	150	7.4
Advanced Apprenticeship	170	4.4	100	3.5
Higher Apprenticeship	160	5.3	0	0.0
<b>Total</b>	<b>580</b>	<b>4.6</b>	<b>250</b>	<b>4.7</b>
<b>Engineering and Manufacturing Technologies</b>				
Intermediate Apprenticeship	570	14.7	360	17.7
Advanced Apprenticeship	700	10.0	360	12.7
Higher Apprenticeship	40	1.3	0	0.0
<b>Total</b>	<b>1,310</b>	<b>10.4</b>	<b>720</b>	<b>13.5</b>
<b>Business, Administration and Law</b>				
Intermediate Apprenticeship	930	24.0	550	27.1
Advanced Apprenticeship	1,960	16.4	700	24.6
Higher Apprenticeship	1,580	52.7	240	50.0
<b>Total</b>	<b>4,470</b>	<b>35.6</b>	<b>1,490</b>	<b>27.9</b>

Source: Department for Education, Apprenticeships Data Pack

More up-to-date information on learner numbers in specific subject areas were obtained from some of the FE colleges in the Local London area, in response to a bespoke data request. These data showed that for the current 2021/22 academic year, there were:

- 600 learners at Level 2 and 100 at Level 3 in building maintenance/services, which includes electrical installation/maintenance, plumbers and heating installation, and building maintenance (also 440 learners below Level 2);
- 30 learners at Level 2 and 70 at Level 3 in green-related mechanical engineering courses (also 30 learners below Level 2);
- 40 learners at Level 2 in glazing/insulation courses (also 50 learners below Level 2).

One responding college had provided data for 2021/22 only, but among those that provided it for 2020/21 as well, patterns of provision were broadly stable between the two years.

### Current provision in Higher Education (HE) in the Local London sub-region

Turning to *HE provision*, London has a large student population, and large, non-specialist universities located in the Local London sub-region – University of East London, and University of Greenwich –

teach around one in ten of all HE first degree students in London, while many central London universities are located just outside the sub-region, there are also satellite campuses of non-London universities located in the Local London area.<sup>6</sup>

Table 10 presents data on the estimated numbers of workers in green jobs in the Local London area with degrees in the main subject areas related to green jobs (based on the data presented above of qualifications of green workers), along with data on undergraduate student numbers in those same broad areas at Greenwich and UEL. One in four graduate workers in green jobs (24%) have degrees in business and finance, similar to the proportion of undergraduate provision (21%). The second largest subject areas are social studies and engineering (accounting for 717% and 16% of graduate workers respectively), and these subjects account for much lower proportions of university provision – 11% and 4% respectively. There is relatively little provision in physical/environmental sciences, while maths and computing accounts for 10% of all provision in Local London universities, slightly above the proportion of maths and computing graduates in green jobs (8%).

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 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 flow of graduates with engineering degrees into the labour market is 13% of the size of the green workforce with engineering degrees, while in physical/environmental sciences, the student population is much smaller in relation to the employed graduate population, representing just 5% of the employed workforce. In the other main subject areas, which relate to consultancy-based jobs rather than craft-based jobs, the annual cohorts of students represent much higher proportions of the graduate workforces with degrees in these subjects – in business and finance, the annual supply of graduates is more than one third of the employed workforce, and in maths and computing the annual supply of graduate is nearly half of the employed workforce. Therefore, the flow of maths/computing and business/finance graduates from Local London HE institutions is much larger in relation to the number of graduate workers in green jobs with maths/computing and business/finance degrees, than is the case for engineering and particularly physical/environmental sciences.

---

<sup>6</sup> It is not possible to present student numbers for these satellite campuses as they are included within the university total.

**Table 10: First degree student enrolments in London Higher Education providers in relation to workforce size for selected broad subject areas, Local London sub-region**

	Green jobs		HE provision			HE Cohort as % of employment
	% of graduate workers	Estimated number	Total first degree enrolments	Estimated annual cohort	% of total	
<b>Business/finance</b>	24.2	4,500	5,000	1,700	21.1	37.0
<b>Social Studies</b>	17.1	3,200	2,500	800	10.7	26.4
<b>Engineering</b>	16.0	3,000	1,100	400	4.8	12.9
<b>Physical/Env. Sciences</b>	11.4	2,100	300	100	1.4	5.4
<b>Maths and Computing</b>	8.5	1,600	2,200	700	9.5	47.1

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

Greenwich has greater numbers of undergraduate students in the science and engineering courses than the University of East London. Greenwich accounts for 55% of all engineering students, 62% of all maths and computing students, and around three quarters of all students in physical/environmental sciences.

Aside from the two large, non-specialist universities, the new Coventry University Campus at Greenwich Peninsula opened in November 2020 and offers green-related degree courses (e.g. energy management), and the new Institute of Technology and Creativity at The Ravensbourne University London (also based on the Greenwich Peninsula) aims to be an active contributor to environmental sustainability.



### 3. Projecting future green jobs and skills in the Local London sub-region

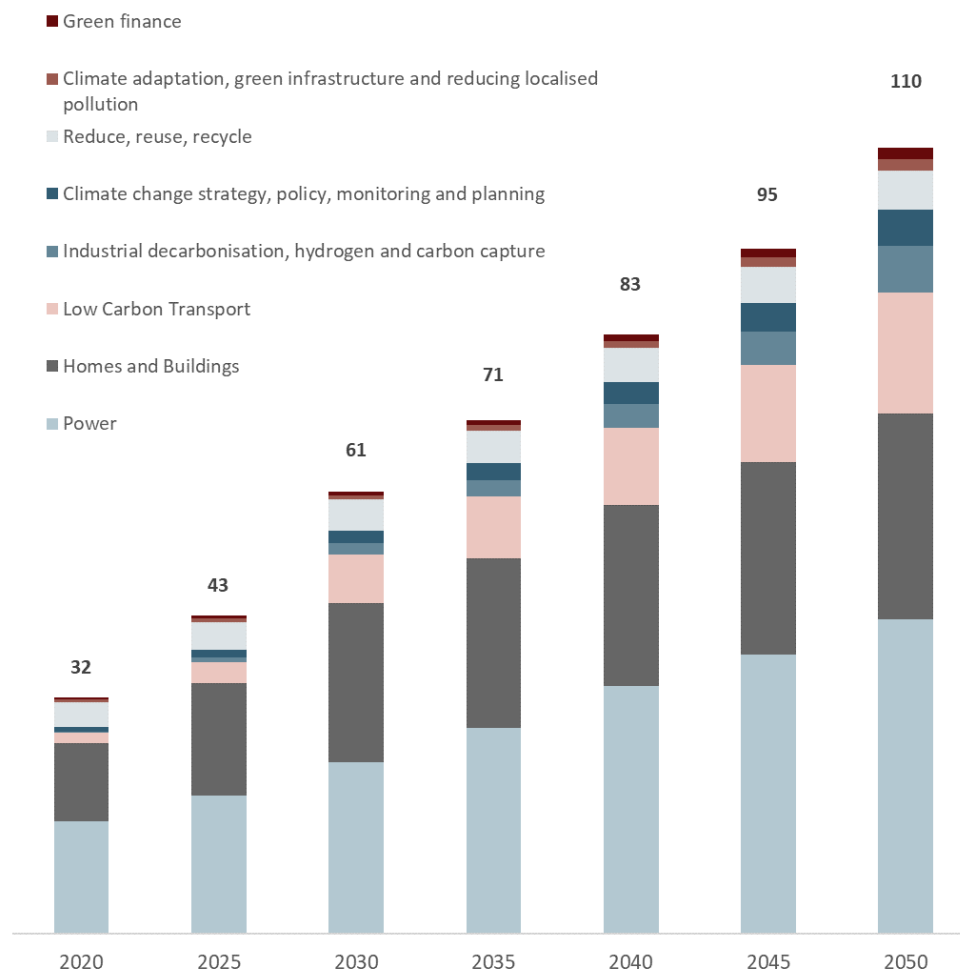
The methodology for projecting the number of green jobs in the coming decades combines a range of sources estimating the future growth of the green economy and specific sectors within it. We map the growth rate on the assumption that the fastest growth will occur in the next decade and somewhat slower 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.

#### Sub-regional results

We developed three scenarios of growth – low, central, and high – to account for a range of variations. The total number of jobs in the central scenario is projected to rise from 32,000 in 2020 to 110,000 in 2050, representing an above-3-fold increase. Within this scenario, three sectors account for almost 8 in 10 (77.6%) of Local London’s total number of green jobs by 2050:

- Power (41,800), representing 38% of total green jobs.
- Homes and Buildings (27,400), representing 24.9% of total green jobs.
- Low Carbon Transport (16,100), representing 14.6% of total green jobs.

Figure 6: Projections of green jobs: central scenario (thousands)



Source: WPI Economics analysis: see cross-London report for methodology<sup>xxxiv</sup>

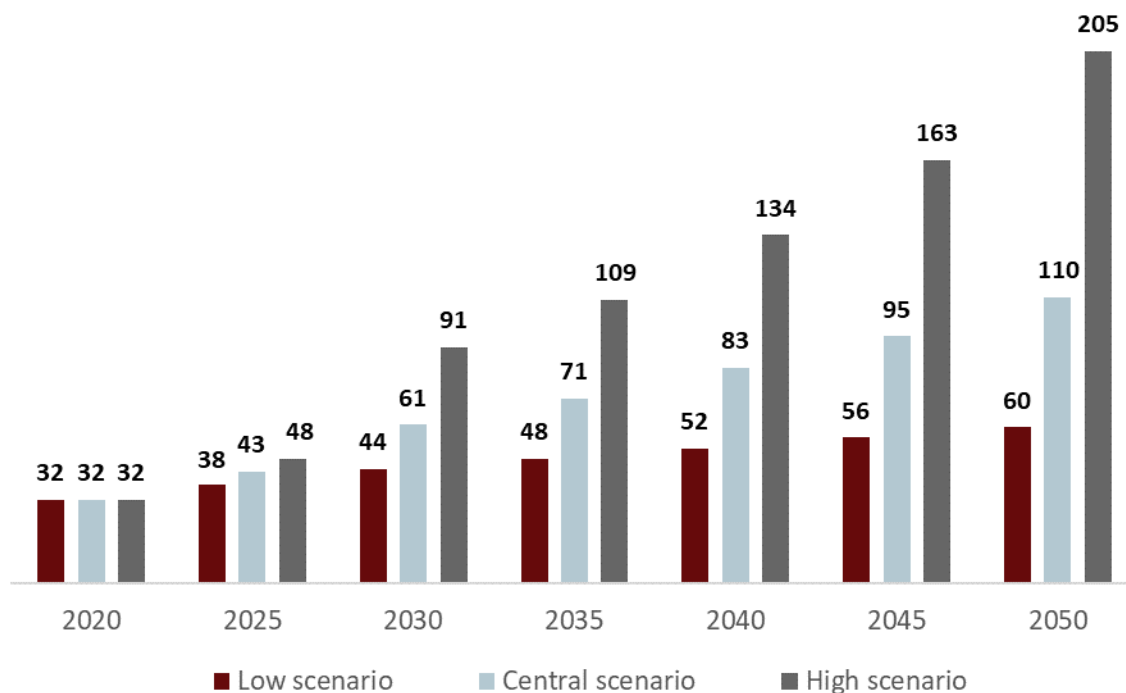
We present different scenarios (low, central, high) to account for uncertainty and different variations in policy and activity in the green economy. Whether scenarios are met in each sector will depend on a number of complex and interrelated factors, including policy action from national and local government 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 £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 44,000, while the high scenario projects there to be 91,000. For 2050, the low scenario projects 60,000 jobs in the green economy, while the high scenario puts this figure at 205,000.

**Figure 7: Scenarios for projections of total green jobs in Local London (thousands)**



Source: WPI Economics analysis

Table 10: Low, central and high projections of green jobs in Local London in 2030 and 2050

Sector	2020	2030			2050		
		Low	Central	High	Low	Central	High
Climate adaptation, green infrastructure and reducing localised pollution	400	500	<b>600</b>	700	700	<b>1,500</b>	2,200
Climate change Research and Development	700	1,500	<b>1,800</b>	2,300	3,400	<b>5,200</b>	7,900
Climate change strategy, policy, monitoring and planning	600	1,400	<b>1,700</b>	2,100	3,200	<b>4,800</b>	7,300
Green finance	200	400	<b>500</b>	700	1,000	<b>1,500</b>	2,300
Homes and Buildings	10,500	15,000	<b>21,200</b>	35,400	17,100	<b>27,400</b>	27,400
Industrial decarbonisation, hydrogen and carbon capture	200	600	<b>1,500</b>	3,600	1,300	<b>6,300</b>	29,000
Low Carbon Transport	1,300	3,000	<b>6,500</b>	13,400	4,800	<b>16,100</b>	51,200
Power	14,900	18,500	<b>22,800</b>	28,000	25,100	<b>41,800</b>	69,100
Reduce, reuse, recycle	3,300	3,400	<b>4,100</b>	5,200	3,600	<b>5,200</b>	8,400
<b>Total</b>	<b>32,000</b>	<b>44,000</b>	<b>61,000</b>	<b>91,000</b>	<b>60,000</b>	<b>110,000</b>	<b>205,000</b>

Source: WPI Economics analysis

Overall, these figures represent very fast growth of Local 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 40% 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 one third between 2020 and 2030, falls to 24.9% 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 is projected to become more prominent in the sub-region's green economy, increasing its share of green employment from 4.1% to 14.6% in 2050. In 2030, Low Carbon Transport is projected to employ 6,500 people, 5 times more than in 2020, further increasing to 16,100 by 2050 (12 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 more than 7 times between 2020 and 2030, and by more than 30 times until 2050. Growth rates are even more impressive in the high scenario, which predicts an 18-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 between 7 and 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 in the Local London sub-region of around 2,900 per year to 2030. Overall, this represents an increase in the total green workforce of 89% from its current level. The key issue is 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.

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 24%, power increasing by 53%, homes, buildings and landscape increasing by 140%, and consultancy and finance increasing by almost 170%.

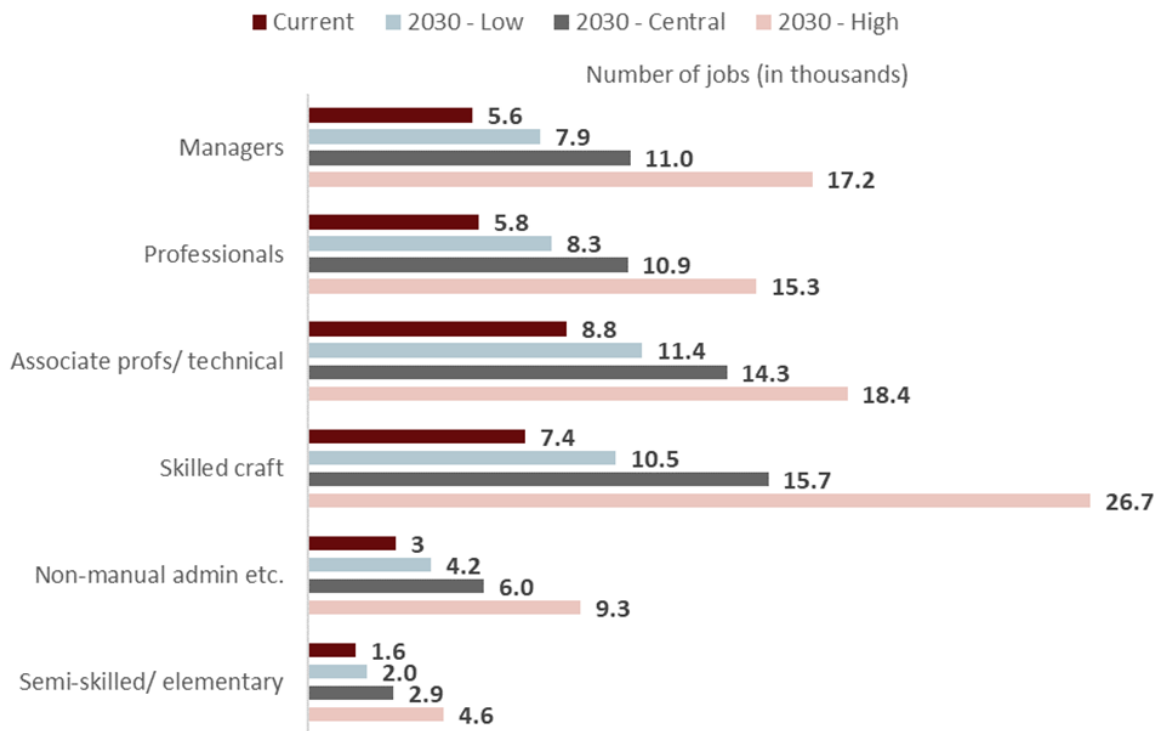
The key questions from a skills point of view are:

- What are the likely occupational changes over this period; 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 8 shows the projected changes by occupational group to 2030, while Table 11 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 forecast the number of workers in that sub-sector and occupation in 2030 under the different scenarios. These are then summed to give totals 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 forecast to grow much faster than others.

Considering the central forecast first, the largest increase, in numeric and percentage terms, is among skilled craft workers, whose numbers are projected to increase by just over 8,000 to reach 15,700 in 2030, an increase of 113%. In 2030, skilled craft workers are projected to be the largest occupational group, as the growth rate for associate professional workers is set to be much lower, at 63%, with numbers rising by 5,500 to 14,300 in 2030. The projected increases for managerial and professional workers are 98% and 87% respectively, with increases of 5,400 and 5,100 respectively, so that the 2030 employment level in each group will be 11,000.

**Figure 8: Future occupational employment levels for scenarios for projections of total green jobs in Local London (thousands)**



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

Under the low jobs forecast, the total number of jobs is projected to rise by 1,200 per year to 2030. Skilled workers are projected to experience the largest increase in numeric terms, at 3,100, with the percentage increase similar to that for managerial and professional workers, at 43%. The increase in associate professional workers is projected to be 29%, with numbers increasing by 2,600, slightly above the increases in managerial and professional workers of 2,300 and 2,500 respectively.

**Table 11: Change in employment by occupational major group, Local London sub-region**

Occupational group	Current	2030	Change	% change
<b>Central projection</b>				
Managers	5,600	11,000	5,400	98
Professionals	5,800	10,900	5,100	87
Associate profs/ technical	8,800	14,300	5,500	63
Skilled craft	7,400	15,700	8,300	113
Non-manual admin etc.	3,000	6,000	3,000	98
Semi-skilled/ elementary	1,600	2,900	1,300	84
<b>Low projection</b>				
Managers	5,600	7,900	2,300	41
Professionals	5,800	8,300	2,500	43
Associate profs/ technical	8,800	11,400	2,600	29
Skilled craft	7,400	10,500	3,100	43
Non-manual admin etc.	3,000	4,200	1,200	41
Semi-skilled/ elementary	1,600	2,000	400	30
<b>High projection</b>				
Managers	5,600	17,200	11,600	208
Professionals	5,800	15,300	9,500	162
Associate profs/ technical	8,800	18,400	9,600	110
Skilled craft	7,400	26,700	19,300	263
Non-manual admin etc.	3,000	9,300	6,300	210
Semi-skilled/ elementary	1,600	4,600	3,000	194

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

The high jobs forecast projects an average increase of nearly 6,000 workers per year across all green sectors to 2030, with the number of skilled craft workers increasing by nearly 20,000 (263% increase), and the number of managerial workers increasing by 11,600 (208% increase). The projected increases for professional and associate professional workers are smaller, at 162% and 110% respectively.

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<sup>7</sup> for the period 2017 to 2027, for the major occupational groups, and it is assumed that green workers in each major occupational group will experience the same replacement rates as all workers in that occupational group. Table 12 shows the estimates of the replacement demands for green workers in the Local London sub-region in the major occupations. In total, it is estimated that green sectors will need to recruit 10,600 workers over the coming 10 years to replace leavers – this is just over one third (37%) of the expansion demand under the central scenario of 28,600, although it represents 87% 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 the Local London sub-region.

**Table 12: Estimated replacement demand by occupational major group, Local London subregion**

	Current	10-year replacement demand rate %	Replacement demand
Managers	5,600	38.5	2,200
Professionals	5,800	34.8	2,000
Associate profs/ technical	8,800	32.8	2,900
Skilled craft	7,400	27.6	2,000
Non-manual admin etc.	3,000	33.0	1,000
Semi-skilled/ elementary	1,600	32.8	500
<b>Total</b>	<b>32,200</b>		<b>10,600</b>

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

Table 13 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 3,900, accounting for 13% of the total increase, although this is the lowest growth rate among the occupations with the largest increases in numbers, at 55%. There are large projected increases for electricians (2,500, increase of 117%), gardeners and landscape gardeners (1,800, 140%) and plumbers (1,400, 140%), reflecting the large projected increase in employment in homes, buildings and landscape. The other occupations with large projected increases in numbers are production managers in construction, and other miscellaneous construction trades.

<sup>7</sup> Data are available at <https://warwick.ac.uk/fac/soc/ier/wf7downloads/>

**Table 13: Occupations with the largest projected increases in employment to 2030 under central forecast, Local London sub-region**

	Current	2030	Change	% change	% of total increase
<b>3539 'Business and related associate professionals n.e.c.'</b>	7,000	10,800	3,900	55.3	13.4
<b>5241 'Electricians and electrical fitters'</b>	2,100	4,600	2,500	117.2	8.7
<b>5113 'Gardeners and landscape gardeners'</b>	1,300	3,100	1,800	140.3	6.3
<b>5314 'Plumbers and heating and ventilating engineers'</b>	1,000	2,400	1,400	140.4	4.9
<b>1122 'Production mngrs and directors in construction'</b>	1,000	2,400	1,400	140.4	4.8
<b>5319 'Construction and building trades n.e.c.'</b>	900	2,000	1,100	128.3	3.9
<b>1132 'Marketing and sales directors'</b>	1,800	2,800	1,000	56.9	3.5
<b>2136 'Programmers and software development professionals'</b>	1,400	2,300	1,000	70.7	3.4
<b>1131 'Financial mngrs and directors'</b>	500	1,300	800	141.4	2.6
<b>1251 'Property, housing and estate mngrs'</b>	500	1,300	700	140.8	2.6

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

Having looked at the likely occupational changes over the coming decade, we turn to comparing the future increases in demand with the size of the output from education and training provision to expose 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, although 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 straight from education. Under the central scenario, the expansion demand of 2,860 and replacement demand of 1,060 gives rise to a total annual requirement of 3,900 workers.

The current data on skills provision show that across the Local London sub-region there are around 13,000 learners per year in FE and in apprenticeships in relevant subject areas, and around 3,700 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 almost a quarter (22%) 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 320 education leavers per year, so this suggests businesses would need to recruit 12 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 sectors make it sensible 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 under the central scenario in Local London is as follows:

- The number of consultancy-based jobs is projected to increase by around 840 per year over the coming decade, and with replacement demand of 310, it gives a total annual requirement of 1,150. Current FE and HE provision is around 5,400 students per year, so future demand equals 22% of the annual output from education.
- The increase in craft-based jobs is projected to be much higher, at around 2,000 per year, which with replacement demand of 750, gives a total requirement of 2,750 per year. Provision is around 4,400, so future demand equals 63% of the annual output from education.

This analysis shows 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;
- Increase the proportion of those taking relevant courses who progress to employment within green sectors; and
- Increase the flows from other, non-green, sectors into green sectors, including through re-skilling training.

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. Stakeholders in the Local London sub-region need to ensure that provision, including adult education, is expanded to at least meet the likely needs of the sector, as there will be competition from employers in neighbouring SRPs for this limited pool of skills, and wage rates on offer may be higher in central London, for example. This highlights the need for concerted action across London's sub-regional partnerships.

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. 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; this will include ensuring sufficient foundation/stepping stones provision to allow young learners or those transitioning from other sectors to embark on a career within green sectors.

## Barriers, challenges and issues in green skills provision

Interviews were conducted with a range of FE and HE providers across London, including in the Local London area, 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. 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 provision being consolidated in the larger colleges, as many colleges that are financially strapped, or do not have the necessary volumes of students attending 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 for 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 the responsibility was falling between the stools of providers, funders and government, without co-ordination to ensure that the supplied provision 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, these do not need to be new courses; updating or adding to existing courses to make

them more related/relevant to green jobs and skills may be sufficient. The changes to funding introduced by the GLA have 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/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 of developers or lead contractors building up the labour force on developments through sub-contracting rather than directly-employed labour makes engagement with the training sector more difficult.

**Addressing diversity imbalances** – there were long-standing issues about encouraging female students into craft-based courses. In terms of ethnicity, the profile of learners was felt to reflect that of local populations, so the ethnic diversity issues in the workforce should lessen over time as these learners enter the labour force and older workers (more likely to white and male) retire. However, women remain under-represented in engineering, construction and STEM subjects, including much of current green skills provision. Providers recognise the under-representation of women and therefore implement initiatives that promote female enrolment. These initiatives may take the form of awareness campaigns or mentoring programmes jointly delivered with industry partners. One respondent reported that they introduced short courses (for instance, 6-week evening courses) 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.

**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. 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 would create a coherent programme of learning that progresses fluidly across different levels of education.

### *The value of the green economy in the Local London area*

The green economy represents substantial value to the Local 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 £5 billion in 2020/21, with Power accounting for just under half of this total. Estimates for each sector are presented below.

**Table 14: 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	£0.11 billion
Climate change strategy, policy, monitoring and planning	£0.09 billion
Green finance	£0.03 billion
Homes and Buildings	£1.6 billion
Industrial decarbonisation, hydrogen and carbon capture	£0.03 billion
Low Carbon Transport	£0.21 billion
Power	£2.4 billion
Reduce, reuse, recycle	£0.49 billion
<b>Total</b>	<b>£5.0 billion</b>

Source: WPI calculations based on kMatrix Low Carbon and Environmental Goods and Services estimates and Data City calculations

## 4. Impact on net jobs

The previous chapter considered the impact of transition to net zero on gross jobs in the Local London sub-region. However, not all of these will be additional jobs to the Local 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 Climate Change Committee (CCC) commissioned modelling to look at the impact on the UK economy of the sixth carbon budget,<sup>xxxv</sup> which included the policy changes necessary to reach net zero. This analysis modelled the impact on net jobs – i.e. how will overall employment levels 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.** 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 15 shows our estimate of the impact of net zero on net jobs in the Local London economy, based on the methodology set out in the cross-London report.<sup>xxxvi</sup> This suggests that there will be a small positive impact of a change to net zero policies on Local London, increasing net employment **by around 6,700 jobs in 2030 and around 3,900 jobs in 2050.**

Table 15: Estimated impact of net zero policies on net employment in Local London

Sector	Jobs in Local London, 2019	Estimated jobs in Local London, 2030			Estimated jobs in Local 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	300	300	300	0	200	200	0
Mining and refinery	200	100	100	0	100	100	0
Utilities	7,600	6,800	7,200	400	5,300	7,200	1,900
Manufacturing and construction	80,500	79,500	80,400	900	75,200	75,600	400
Distribution, retail, hotel and catering	166,000	171,600	174,700	3,100	171,000	172,600	1,600
Transport and communications	72,000	73,700	75,200	1,500	72,900	72,900	0
Services	359,200	399,900	400,700	800	453,300	453,300	0
<b>Total - Local London</b>	<b>686,000</b>	<b>732,000</b>	<b>739,000</b>	<b>6,700</b>	<b>778,000</b>	<b>782,000</b>	<b>3,900</b>
<b>Whole of London</b>	<b>5,368,000</b>	<b>5,853,000</b>	<b>5,900,000</b>	<b>47,200</b>	<b>6,443,000</b>	<b>6,462,000</b>	<b>19,400</b>

Source: WPI Economics calculations based on Climate Change Committee (2020)<sup>77</sup> and ONS Business Register and Employment Survey

---

## 5. 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, the transition to net zero will put certain sectors at greater risk.

To understand the potential implications of the findings in this report, we have assessed eleven carbon-intensive industrial activities as a proxy for the areas likely to undergo the most substantial change in the coming decades. The 11 sectors we look at follow the report Greening the Giants (Onward, 2021) which identifies sectors that either have emissions above 100tCO<sub>2</sub>e per job or which contribute more than 2% of annual total UK emissions (with the exception of retail as a recent LSE study that shows the sector is 91% non-exposed to the transition).

We identify 84,000 of Local London's 686,000 jobs were in exposed sectors in 2019, shown in Table 16 below. This represents 12% of employment, which is a higher proportion than the London-wide average of 7% of employment in these sectors. 58% of these jobs are in the construction sector, and a third of the jobs are in land transport.

Table 16: Jobs (employments) in carbon intensive sectors – Local London sub-region

	SIC code section	Employment, 2019	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	
			Local London	London	United Kingdom	London	United Kingdom	London	United Kingdom	London
			<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	48,500	24%	7%	-	14%	4%	10%	35%	38%
Land Transport	H	27,485	55%	18%	39%	22%	4%	7%	22%	31%
Waste and sewerage	E	4,280	56%	7%	-	23%	8%	8%	19%	31%
Electricity, gas, steam and air conditioning supply	D	1,645	44%	10%	-	23%	8%	8%	19%	31%
Carbon intensive manufacturing	C	1,505	38%	9%	-	27%	10%	9%	35%	36%
Shipping and fishing	Mostly H	325	55%	18%	39%	22%	4%	7%	22%	31%
Agriculture	A	190	4%	1%	-	26%	N/A	14%	30%	62%
Steel	C	40	38%	9%	-	27%	10%	9%	35%	36%
Aviation	H	5	55%	18%	39%	22%	4%	7%	22%	31%
Oil and gas	B	0	Not applicable as zero jobs in sub-region							
Coal and lignite mining	B	0	Not applicable as zero jobs in sub-region							
<b>Total in carbon intensive sectors</b>		<b>84,000</b>								
<b>All industries</b>		<b>686,000</b>	<b>36%</b>	<b>13%</b>	<b>-</b>	<b>48%</b>	<b>7%</b>	<b>11%</b>	<b>27%</b>	<b>34%</b>



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 in 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 a detailed industrial breakdown of the demographic data, 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 Local London, the key findings are:

- Construction and Land Transport are the largest exposed sectors, respectively accounting for nearly 6 in 10 (58%) and over 3 in 10 (33%) of jobs in Local London's exposed industries.
- Construction has a lower proportion of non-white 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 a much higher proportion of non-white workers 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 opportunities, it is important to ensure there is a just transition towards a more sustainable economy, without leaving communities in exposed sectors behind. Crucially, distributional challenges identified in carbon-intensive sectors – such as overrepresentation of BAME workers in Transport and Storage, or underrepresentation in green sectors – should not be replicated through the transition.

## 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

---

- <sup>i</sup> The CCC (2021) Independent Assessment: The UK's Net Zero Strategy. Available here: <https://www.theccc.org.uk/publication/independent-assessment-the-uks-net-zero-strategy/>
- <sup>ii</sup> WPI Economics (2021) Green Jobs and Skills in London. Available here: [Green Jobs and Skills in London: cross-London report - WPI Economics](#)
- <sup>iii</sup> Local London. About. Available here: [About | Local London](#)
- <sup>iv</sup> WSP and Thames Estuary Growth Board (2022) Light Freight on the River Thames: Feasibility Study. Available here: [PowerPoint Presentation \(thamesestuary.org.uk\)](#)
- <sup>v</sup> LGA (2021) Councillor workbook: The local pathway to net zero. Available here: [A councillor's workbook on the local pathway to net zero | Local Government Association](#)
- <sup>vi</sup> The CCC (2020): Local Authorities and the Sixth Carbon Budget. Available here: <https://www.theccc.org.uk/wp-content/uploads/2020/12/Local-Authorities-and-the-Sixth-Carbon-Budget.pdf>
- <sup>vii</sup> Thames Estuary (2021) A Good Place for the Future: Hydrogen Route Map. Available here: [Thames-Estuary-Hydrogen-Route-Map-V1-Final.pdf \(thamesestuary.org.uk\)](#)
- <sup>viii</sup> Thames Estuary (2021) A Good Place for the Future: Hydrogen Route Map. Available here: [Thames-Estuary-Hydrogen-Route-Map-V1-Final.pdf \(thamesestuary.org.uk\)](#)
- <sup>ix</sup> Thames Estuary (2021) A Good Place for the Future: Hydrogen Route Map. Available here: [Thames-Estuary-Hydrogen-Route-Map-V1-Final.pdf \(thamesestuary.org.uk\)](#)
- <sup>x</sup> Redbridge Council (2021) Redbridge Climate Change Action plan. Available here: [Climate Change Action Plan June 2021 \(redbridge.gov.uk\)](#)
- <sup>xi</sup> London Borough of Waltham Forest: About Enjoy Waltham Forest. Available here: [About Enjoy Waltham Forest | Enjoy Waltham Forest](#)
- <sup>xii</sup> London Borough of Waltham Forest: About Enjoy Waltham Forest. Available here: [About Enjoy Waltham Forest | Enjoy Waltham Forest](#)
- <sup>xiii</sup> London Borough of Waltham Forest: About Enjoy Waltham Forest. Available here: [About Enjoy Waltham Forest | Enjoy Waltham Forest](#)
- <sup>xiv</sup> Redbridge Council (2021) Redbridge Climate Change Action plan. Available here: [Climate Change Action Plan June 2021 \(redbridge.gov.uk\)](#)
- <sup>xv</sup> Royal Borough of Greenwich: Greenwich Builds. Available here: [Greenwich Builds | Royal Borough of Greenwich \(royalgreenwich.gov.uk\)](#), London News Online (2021) Zero carbon council housing set to be built in Greenwich. Available here: [Zero carbon council housing set to be built in Greenwich – South London News \(londonnewsonline.co.uk\)](#)
- <sup>xvi</sup> Meridian Water: About. Available here: [Meridian Water | About](#)
- <sup>xvii</sup> Meridian Water: Sustainability. Available here: [Meridian Water | Sustainability](#)
- <sup>xviii</sup> Meridian Water: Sustainability. Available here: [Meridian Water | Sustainability](#)
- <sup>xix</sup> Meridian Water: Sustainability. Available here: [Meridian Water | Sustainability](#)
- <sup>xx</sup> Communication from London Borough of Bexley
- <sup>xxi</sup> Newham Council (undated) Housing Delivery Strategy. Available here: [housing-delivery-strategy \(newham.gov.uk\)](#)
- <sup>xxii</sup> Redbridge Council (2021) Redbridge Climate Change Action plan. Available here: [Climate Change Action Plan June 2021 \(redbridge.gov.uk\)](#)
- <sup>xxiii</sup> Communication from London Borough of Barking and Dagenham
- <sup>xxiv</sup> London Borough of Waltham Forest: Eco Home – 47 Greenleaf road. Available here: [Eco Home - 47 Greenleaf Road | London Borough of Waltham Forest](#)
- <sup>xxv</sup> Redbridge Council (2021) Redbridge Climate Change Action plan. Available here: [Climate Change Action Plan June 2021 \(redbridge.gov.uk\)](#)
- <sup>xxvi</sup> Enfield Council: Energetik. Available here: [Energetik · Enfield Council](#)
- <sup>xxvii</sup> London Borough of Barking and Dagenham: Our Growth Hubs. Available here: [Our growth hubs | LBBDD](#)
- <sup>xxviii</sup> Waltham Forest Culture: Waltham Forest Fashion. Available here: [Waltham Forest Fashion | Borough of Culture \(wfculture19.co.uk\)](#)

---

<sup>xxix</sup> Redbridge Council (2021) Redbridge Climate Change Action plan. Available here: [Climate Change Action Plan June 2021 \(redbridge.gov.uk\)](https://www.redbridge.gov.uk/Climate-Change-Action-Plan-June-2021)

<sup>xxx</sup> Redbridge Council (2021) Redbridge Climate Change Action plan. Available here: [Climate Change Action Plan June 2021 \(redbridge.gov.uk\)](https://www.redbridge.gov.uk/Climate-Change-Action-Plan-June-2021)

<sup>xxxi</sup> London Wildlife Trust: Walthamstow Wetlands. Available here: [Walthamstow Wetlands Nature Reserve | London Wildlife Trust \(wildlondon.org.uk\)](https://www.wildlondon.org.uk/walthamstow-wetlands-nature-reserve)

<sup>xxxii</sup> Environment Agency (2013) Dagenham, Beam Washlands. Available here: [Dagenham\\_washland\\_PF\\_final.pdf \(eacg.org.uk\)](https://www.eacg.org.uk/dagenham-washland-pf-final.pdf)

<sup>xxxiii</sup> Friends of the Earth (2021) Emergency Plan on Green Jobs for Young People [https://policy.friendsoftheearth.uk/sites/default/files/documents/2021-03/EMERGENCY\\_PLAN\\_GREEN\\_JOBS\\_FEB\\_2021.pdf](https://policy.friendsoftheearth.uk/sites/default/files/documents/2021-03/EMERGENCY_PLAN_GREEN_JOBS_FEB_2021.pdf)

<sup>xxxiv</sup> WPI Economics (2021) Green Jobs and Skills in London. Available here: [Green Jobs and Skills in London: cross-London report - WPI Economics](https://www.wpi-economics.com/green-jobs-and-skills-in-london)

<sup>xxxv</sup> Climate Change Committee (2020) Economic Impact of the Sixth Carbon Budget (Cambridge Econometrics)

<sup>xxxvi</sup> WPI Economics (2021) Green Jobs and Skills in London. Available here: [Green Jobs and Skills in London: cross-London report - WPI Economics](https://www.wpi-economics.com/green-jobs-and-skills-in-london)