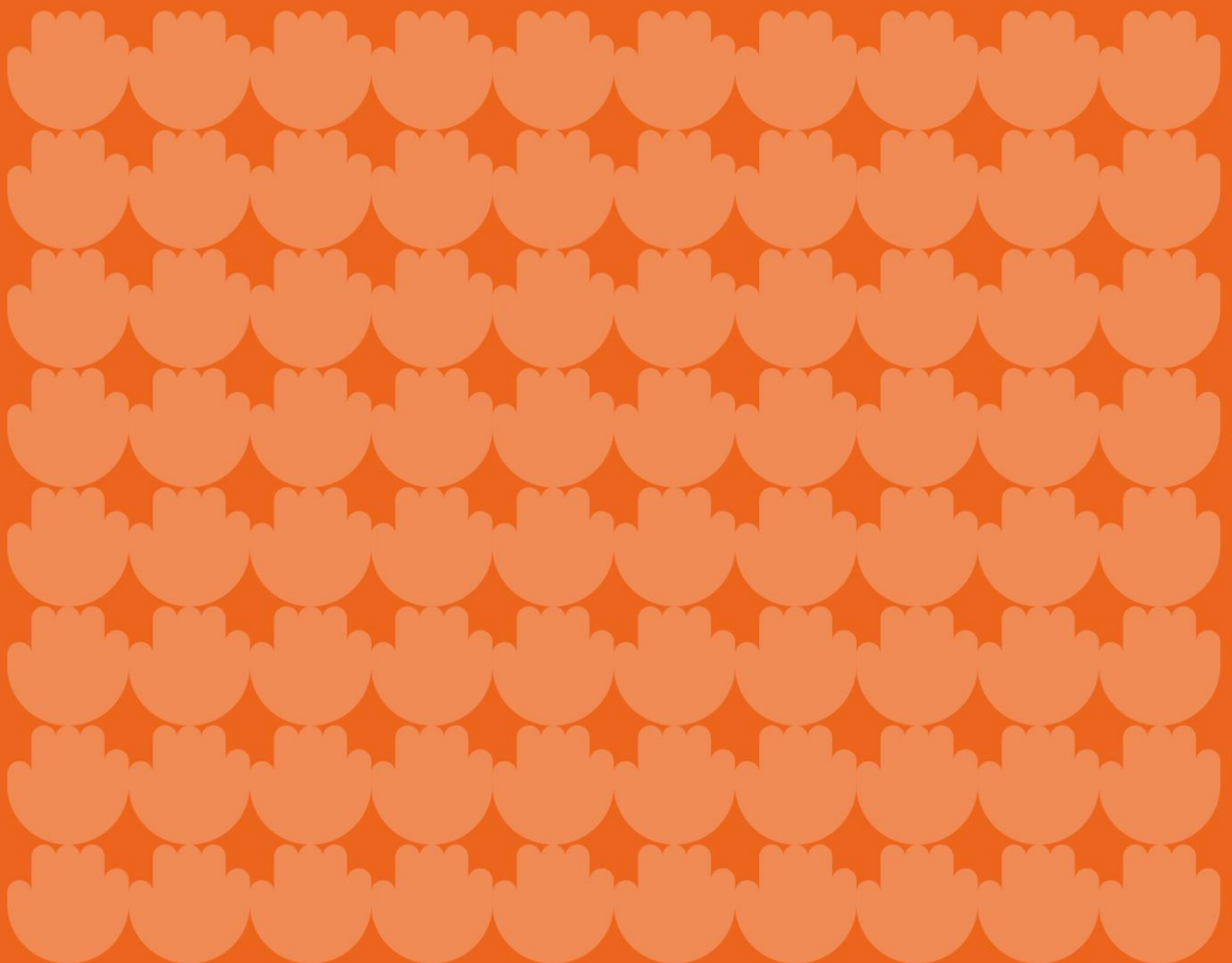


Industry Labour Market and Skills Intelligence Report

GREEN ECONOMY

Published February 2022



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Purpose of Report

This report provides a sector led measure of skills and talent needs required in the Green Sector in Greater Manchester (GM). The intelligence has been gathered from a large range of sources including existing employer networks and bodies who work with the sector. These include GM Chamber of Commerce, Universities, MIDAS, Growth Company, Local Authorities, and national skills facilitating organisations.

This work is for a range of stakeholders to aid in understanding the skills and talent needs within the GM Green Sector. Recommendations made will not always lead to GMCA led work and skills action. They are to help sum up and support stakeholders to understand where their actions may fill gaps and support talent growth for the sector. The Green Sector is loosely defined and wide-ranging, but is featured as one of the 4 key sectors for Greater Manchester in the Local Industrial Strategy (published June 2019). This report aims to make clear some of the key structures, sub-sectors, and job roles of the Green Sector.

GMCA will work on wider sharing and translation of this intelligence for varied audiences in GM. GMCA will also look across devolved powers in the work and skills team to see where the skills system can better align to the needs of the sector. The vision for this work is to be a key resource in a fully aligned labour market response in GM where there is credible, current, employer led and shared insight of the jobs, talent, and skills employers need across our Local Industrial Strategy (LIS) frontier and foundation sectors.

The report sets out an overview of the intelligence available relating to the skills required to meet wider Green Economy requirements across Greater Manchester. The objectives of this intelligence are as follows:

- Provide a better understanding of the progression pathways to roles within the Green Economy in GM
- Identify which occupations need to be prioritised

- Better inform and guide existing skills provision for the benefit of GM residents and employers
- Identify opportunities for the skills system to increase the available pathways for new entrants and upskilled/reskilled workers into priority occupations needed
- Understand how skills provision can best fit with COVID-19 recovery plans.

This intelligence is accurate as of the release date of this report and is an initial version of a report which will be built on and updated by GMCA. The COVID-19 pandemic continues to shift the economy as well as new technological developments and pipeline of development evolving at a fast pace - GMCA understands the need to regularly update this intelligence accordingly.

CONTACT OFFICER:

Joe Crolla, GMCA, joseph.crolla@greatermanchester-ca.gov.uk

Executive Summary

Climate change is the single biggest challenge facing communities, countries, and humanity as a whole. With the effects being increasingly felt across the globe, reducing greenhouse gas emissions is critical. Shifting away from the use of fossil fuels and towards renewable technologies is becoming increasingly important to achieve a less damaging temperature rise over the next 50-100 years. This mission has started in many corners of the economy, with the push towards “Net Zero”.

This report examines the skills and labour market picture of the Green Economy in Greater Manchester. It aims to better inform and guide responses from GMCA, local authorities, employers, training providers, and other stakeholders. In this report, as in much other work, the Green Economy is approached along 5 sub-sector lines – Buildings, Transport, Energy, Waste, and Nature. Each of these sub-sectors has unique challenges, dependencies, and opportunities for providing high-skilled jobs and opportunities for residents.

Key findings from the report include:

- Greater Manchester has ambitious targets to be Net Zero by 2038. The biggest opportunities for achieving this lie in fast and deep carbon emissions reductions, particularly in Buildings and Transport, not necessarily in some of the emerging innovations and niche specialities in ‘green technologies’ that are high value and have future potential but are currently relatively immature in commercial (and labour market) terms.
- Measuring the size and scope of the Green Economy is difficult – many employers and job roles contribute heavily towards “green” objectives in an indirect way.
- Job roles within the Green Economy are often in highly technical occupations, and much of the shift to Net Zero will involve improvements in infrastructure, transport, consumer habits, and business practices.
- Many green technologies are approaching mass-adoption stage, including electric vehicles, low carbon heating technology, and renewable energy production. This will bring changes to the volume, make-up, and skill levels of hundreds of different occupations.
- Employers in some sub-sectors like construction have seen stop-start subsidies and government initiatives, which has diminished trust in the pipeline of “green” opportunities, and the level of upskilling.
- Perceptions of careers in the Green Economy are outdated, with many still referring to environment-linked jobs as traditional “green” career pathways.
- A transition to Net Zero will impact most sectors, but this will be in varying degrees. Human-based sectors like education, health and social care, or hospitality will see little change, whereas sectors like construction, manufacturing, and logistics will see big changes.
- Young people are keen to work in carbon-neutral or carbon-negative careers, but often don’t know what occupations are available.

Recommendations

A list of the core recommendations can be found below. These recommendations are not likely to be short-term fixes, and several require a long-term system change around the Green Economy.

1. Enthusiasm from young people leaving schools and colleges for a career in a “Green” role should be harnessed and used to promote key in-demand occupations that aren’t traditionally thought of as Green Jobs.
2. Local Authorities, Schools, Colleges, and Universities should take advantage of the opportunities brought about through Public Sector Decarbonisation – particularly helping students understand the technology being deployed.
3. Central government policy should provide certainty over chosen technologies and solutions, so that the employer market can respond by upskilling staff.
4. Accreditation and certification, particularly in green construction, should be given focus and funding – improving clarity around required qualifications to work on green projects is critical.
5. Priority should be given to reskilling individuals so-called “sunset jobs” – roles which will see decline in the shift to Net Zero, in the same way that retraining in other industries is being prioritised for occupations at risk of automation.
6. GM should seize opportunities to become a centre of excellence around Retrofit training and technology, electric vehicle infrastructure skills, and electrical engineering skills.
7. Links should be improved between local skills policy, planning authorities, and transport authorities, to ensure that skills capacity and development are given due thought in early project stages.
8. Employers should be encouraged to take a positive view of the transition to Net Zero, and prepare their workforce for the future in different roles or sectors.

1. Introduction

- (1.1) On the 12th November 2020, the UK government announced the formation of a Green Jobs Taskforce – a group of business leaders and experts in the sector to advise on the transition to a zero-carbon economy. The activity of the taskforce was converted into a report¹ which tied the objectives in with the wider government objectives of recovering from COVID19, and with building a modern economy with employers closer to the heart of the skills system.
- (1.2) One of the core messages from this work is that “every job has the potential to become ‘green’”. While this is a general statement which doesn’t really help with pinning down where activity should be focused, it is a good way to start the positioning of the so-called “Green Economy”. For the purposes of this work, a narrower focus will be used when referring to Green Jobs or Green Skills i.e. if a job or skill is directly linked to the decarbonisation of industry, homes or transport, or if it is directly linked to any of the supporting professional services.
- (1.3) The UK government set a target of 2 million new “green jobs” to be created – many of these will be brand new professions which don’t already exist, but the bulk will be generated by increased demand for critical existing professions like electricians. More unclear is the number of “sunset” jobs – roles that will no longer be required in a Net Zero Economy. Recent work from PWC² revealed that 5.3% of workers thought that their job would no longer exist after the transition – this is likely higher, given the number of “high carbon” jobs (i.e. gas engineers, car mechanics, power plant workers). With approximately 1.7 million roles (5.3% of the UK workforce) likely to disappear, managing the movement of these workers into new or different roles is crucial.

¹ [BEIS Green Jobs Taskforce Report](#) – July 2021

² [PWC](#) – November 2021

- (1.4) After the Paris Agreement at global community level, the Tyndall Centre at the University of Manchester developed a budget³ for the city region (i.e. the maximum permissible level of carbon emissions) based on the objective of keeping global temperature rises “well below 2°C”. The budget states that “average annual mitigation rates of CO2 from energy need to be between 10% and 20%” for the city region. The report describes this as a “rapid and deep reduction”, that “represents a much greater level of ambition than is embedded in current national policy”. As of 2019 (latest data), GM is behind on this objective – immediate action is needed.
- (1.5) To achieve the 2038 mission, the GM 5-Year Environment Plan outlines our ‘fair’ carbon budget contribution of 67 mega tonnes for 20 years. The critical focus is not exceeding our total budget. As shown below in Figure 1, across 2015-19, GM’s emissions were 8.3MtCO2 above the Tyndall budget, i.e. an additional 8.3MtCO2 savings need to be made on top of the Tyndall budget. This deficit has been increasing year on year.

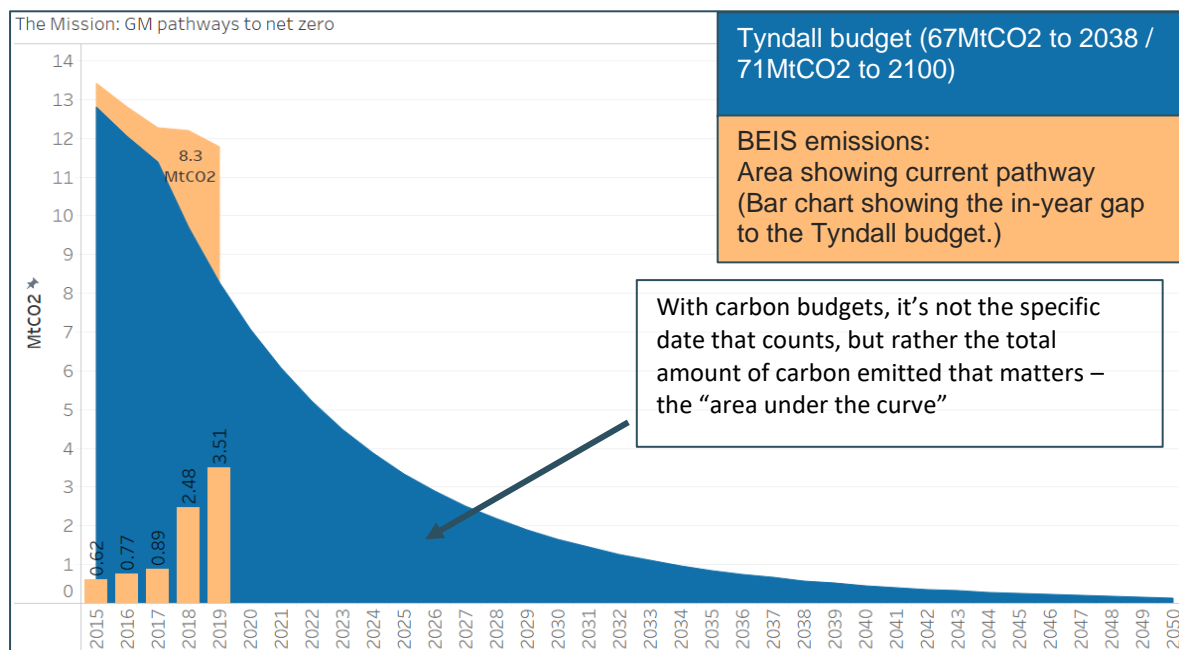


Figure 1 – GM's Pathway to Net Zero

³ Tyndall Centre – March 2018

- (1.6) Greater Manchester is responsible for approximately 3.6% of the UK's annual CO2 emissions⁴, and has set a number of targets for the city region around its contribution to the transition to Net-Zero Carbon. In March 2019, the Mayor set out an ambition⁵ to reach carbon-neutrality by 2038, 12 years ahead of the national target. At our current rate of emissions, our entire budget will be gone in 6 years. Bringing the rate of emissions down is central to the work of GMCA, local authorities, and other key stakeholders within the region.
- (1.7) With a clear target in place, the importance of the Green Economy will only increase over the coming years. In October 2021, the UK Government produced a national Net Zero Strategy detailing a roadmap of how the 2050 objective would be met. It refers directly to how crucial the Skills system will be. The GM Skills system should throw its full support behind the sector and ensure that the residents and businesses of GM are well equipped to take advantage of the opportunities and jobs that will be created.
- (1.8) The regional impacts of the shift to Net-Zero are still developing – the UK Government's Green Jobs Taskforce⁶ identified opportunities for areas based on current profile and geography. As a result, the opportunity for GM will likely focus on transport infrastructure, energy infrastructure, and retrofit (rather than, for example, offshore wind, Electric Vehicle (EV) manufacture, or solar / nuclear power generation).
- (1.9) Figure 2 below details the breakdown of GM's emissions, categorised by use. Transport appears as the largest category, largely due to the volume of road transport across Greater Manchester. Domestic emissions features as the sector highest category, with gas emissions far outweighing electricity use – this speaks to the scale of the Retrofit challenge⁷ in Greater Manchester. The

⁴ [Energy Monitor](#) – July 2021

⁵ [GMCA](#) – March 2019

⁶ [BEIS Green Jobs Taskforce Report](#) – July 2021

⁷ [GMCA](#) – May 2021

remaining areas show the scale of commercial, industrial, and public sector emissions.

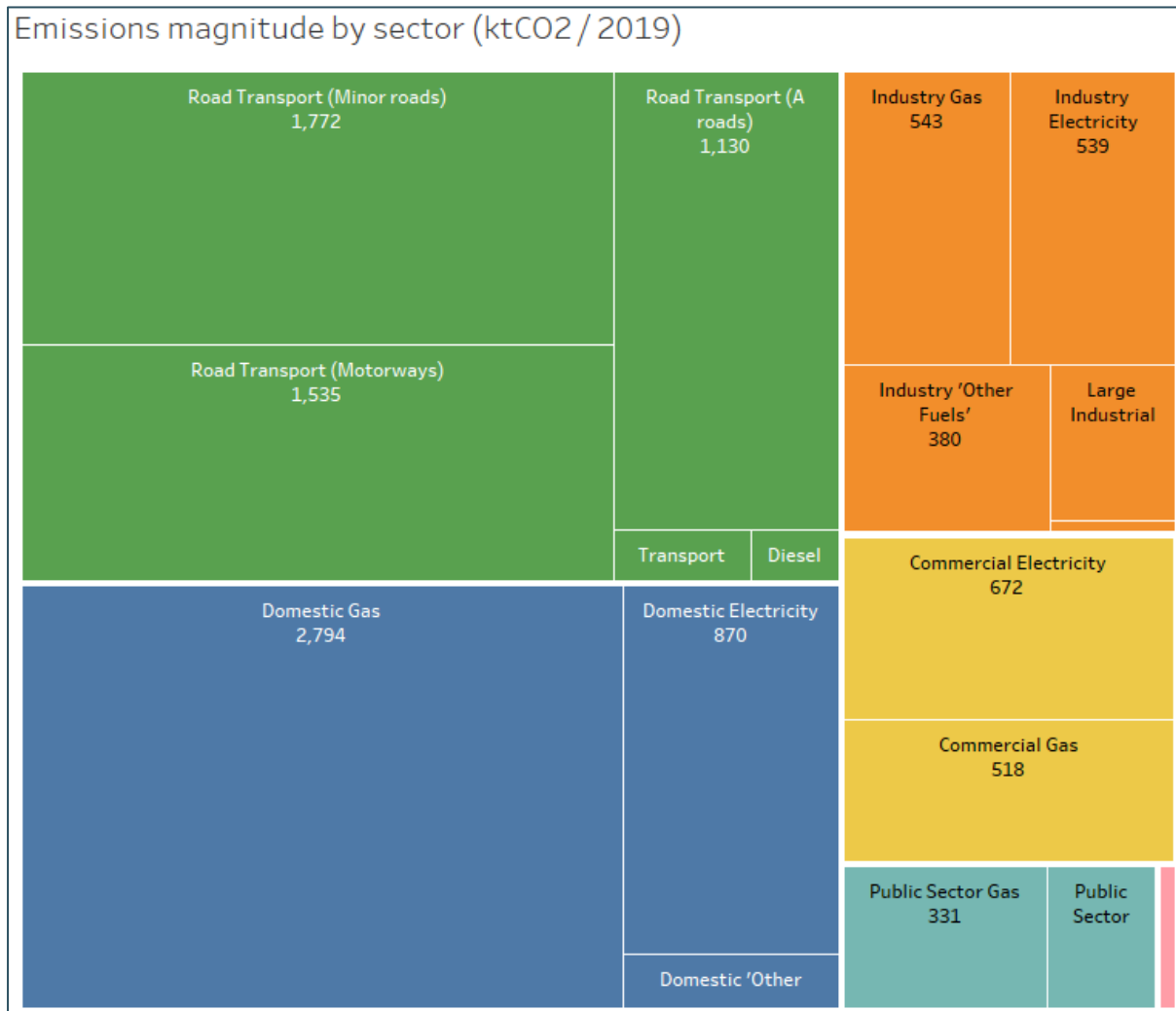


Figure 2 – Greater Manchester Emissions by Category (2019)

(1.10) Given the scale of investment required with the global shift to Net-Zero, along with the lifestyle changes that will be required, there is increasing importance that the transition to be a “just transition”. With emission contributions split starkly at a global level, seeing the richest 1% pollute as much as the poorest 50%⁸, both investment, new infrastructure, and lifestyle changes need to be planned carefully so as not to increase inequality. While this difference is not

⁸ [Cambridge Sustainability Commissions](#) – April 2021

as stark within the UK, there is still risk for any green policy changes to worsen inequality (i.e. increased fuel duty, increased taxes on unsustainable food sources, restrictions on manufacturers driving up costs). The ambition in GM is to ensure that any green transition is also a just transition – helping the poorest in society first, generating high-paying green jobs, and improving public services at the same time.

Challenges and Opportunities

(1.11) As with many industries, the Green Economy sees several challenges and opportunities:

- Challenges around definition and categorisation make any kind of robust labour market analysis extremely difficult. In the UK, Standard Industrial Classification (SIC) and Standard Occupational Classification (SOC) codes struggle with new and emerging jobs and sectors.
- Public and employer perceptions of the Green Economy are largely out-dated. Many still think of traditional environment-linked roles (commonly Ecologists, Land Managers, Marine Biologists) as being “Green Jobs”.
- From a technological standpoint, there are a number of different paths in front of governments, employers, and training providers. For example, many are hesitant to develop training or staff around a specific heating technology, because it’s not clear where the government will support (i.e. hydrogen or heat-pumps or biomass or electric boilers).
- Similarly, in the medium to long-term, more advanced technology may become critical to the Green Economy, such as electric aircraft, synthesis of new fuels from CO₂, and direct carbon capture and storage. The impact on skills for these is difficult to measure, as it’s not clear whether and to what extent these technologies will be used.
- STEM (Science, Technology, Engineering, and Maths) skills are absolutely critical to the Green Economy. However, STEM learners are already being

increasingly drawn to careers in the digital, technology, and advanced manufacturing sectors. While some of these roles will support the Green Economy, employers will need more STEM-qualified employees over the course of the transition.

Industry Context

(1.12) Released alongside the declaration of a Climate Emergency in 2019, the 5-Year Environment Plan⁹ sets out the priority challenge areas¹⁰ as follows:

- **Energy Supply** – Shifting to renewable sources of energy
- **Transport** – How we move and transport goods across the city region
- **Buildings** – Heating the places we live and work
- **Resources** – How we produce goods and recycle them after use
- **Natural Environment** – Air, Land, Water and Biodiversity
- **Resilience and Adaptation** – How well the city region will cope with the effects of climate change

(1.13) Not covered among these challenge areas are the adjacent careers in existing sectors – Green Finance experts, sustainability consultants, or environmental law. There are some skills needs in each of these areas, but they are generally well-served by existing provision and upskilling. As a result, the focus of this work will be primarily on skills needs for the key challenge areas.

(1.14) Each of these areas has an associated Mission Challenge Group set up by GMCA. These groups are made up of key actors, including industry stakeholders, employers, and local authorities, who aim to address the

⁹ [GMCA](#) – March 2019

¹⁰ [GM Green City](#) – November 2021

challenges of each area specifically by instigating and supporting relevant activity and projects. These groups have an understanding that responsibility for long-term system change that these challenges require cannot be completed by any one organisation or sector, so a combined approach is the only thing that will produce sustainable city-wide change.

- (1.15) When thinking about skills and jobs required within the Green Economy, it is easiest to frame these in terms of the challenge areas above. There are dozens of different key occupations and job roles many would expect to see under each of the challenge areas. While these are not the sum of the total “Green Jobs” required, they provide a useful framework for categorising the wider sector – the remainder of this report will be along these terms, with the exception that Resilience and Adaptation is cross-cutting and will look different within each area.
- (1.16) Defining the size and scope of the workforce directly in these sectors is perhaps easier than the Green Economy as a whole. It is important to understand the size and depth of changes that will take place in each of the relevant employment sectors effected by the transition to a Net-Zero economy. These range from transformations and entirely new professions (e.g., in transport, retrofit, or energy), to slight alterations in the way existing professions work (e.g., accountants or financiers dealing with green finance agreements, carbon measurements, or carbon taxes).
- (1.17) Each of the challenge areas has a sizeable direct workforce in the associated sectors (i.e., engineers in the energy area; mechanics and operators in the transport area; builders, designers and architects in the buildings area). In addition to these occupations, there are cross-cutting roles in each of the areas that will see growth as each of the areas grows. The professional and support occupations in each area are extensive – including customer service, sales, technical support, administrative, and project management.
- (1.18) While it is an exciting time of growth in many sectors, with thousands of new jobs in the region being created over the transition to Net-Zero, it is important

to remember that the transition will also result in reductions some sectors of the economy and some occupations. For the most part, the heavily impacted areas of the economy have limited exposure in Greater Manchester – the Oil and Gas sector, Automotive/Aerospace Manufacturing, and heavy (often fossil-fuel reliant) industry like Steel Manufacturing.

2. Background

- (2.1) Current law requires that the UK government reach net zero carbon emissions by 2050. This will require some of the biggest economic and cultural shifts since the Industrial Revolution. Over the last 30 years, the UK has shown that economic success and environmental responsibility go hand in hand. GDP expanded by 75% while emissions were reduced by 43%.¹¹ Continued reduction in emissions will result in further structural and economic changes which will have big impacts on the labour market and skills provision.
- (2.2) The biggest impacts over the past 30 years have been in the decarbonisation of energy production. Data from the ONS¹² demonstrates this well – Figure 3 below shows the contribution of electricity generation dropping from 217 million tonnes (CO2e) to 88 million tonnes over the time period. Similar progress is seen across manufacturing processes, while household and transport emissions have remained around the same levels. All 4 areas given by the ONS need focus, but the reductions in energy and manufacturing emissions are expected to continue as the country moves away from traditional fossil fuel usages in these areas.

¹¹ [BEIS](#) – Nov 2021

¹² [ONS](#) - 2021

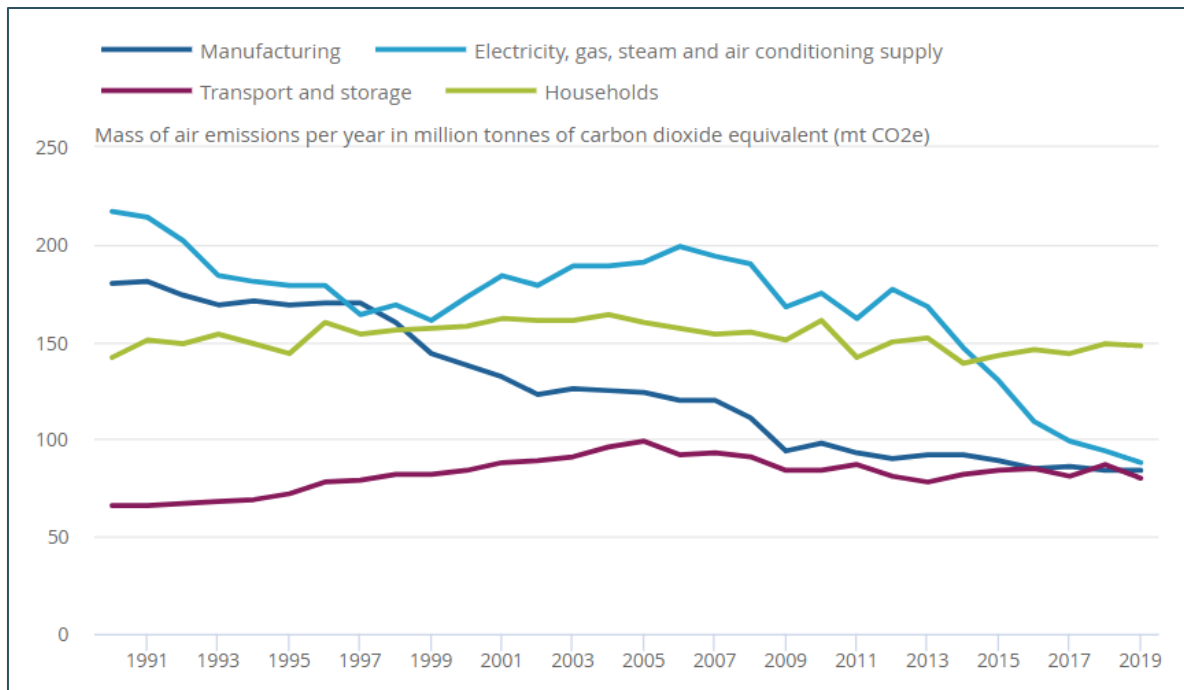


Figure 3 – UK Carbon Emissions by Category

- (2.3) In Greater Manchester, the opportunities to decarbonise lie in all 4 of these areas, but primarily in transport, domestic, and manufacturing. Transport and households make up nearly two-thirds¹³ of the region's total carbon emissions. In addition, with an extensive and varied Manufacturing base, the city region will need to support individual manufacturers in their journey to Net-Zero. Harder to manage is the electricity generation simply by virtue of geography – much of the electricity used within GM is not generated in GM.
- (2.4) With recent development already having an impact on the Greater Manchester labour market, it is important that the city region is well prepared to take advantage of the shift to Net Zero. This requires a number of varied elements to be aligned, which in many cases are not currently. The challenge is particularly clear in the Skills landscape – most of the changes to the economy will require additional STEM skills, advanced digital skills, and a range of construction and infrastructure skills. Work is already going on in

¹³ [EnergyMonitor](#) – July 2021

each of these areas across the city region, but it is often disparate and disconnected from the conversation around Green Economy skills.

- (2.5) Taking a comprehensive view of Green Economy skills for the city region also requires keeping in mind the long-term nature of all of the changes. The horizon of the current targets (2038 for GM and 2050 the UK) will include a range of likely technological changes and policy changes, which as a result will impact the likely high-demand job roles and skillsets. Many young people currently in the schools and colleges of GM will work in jobs that don't exist yet. Preparing these young people for future jobs requires a focus on flexible skills and agile mindsets. Currently, GM has a reasonably good forecast in terms of upcoming Green policy.

Policy Landscape

- (2.6) National Green policy has been defined in recent years and months in papers such as the Ten Point Plan for a Green Industrial Revolution¹⁴, the Net Zero Strategy¹⁵, the Treasury's Net Zero Interim Report¹⁶, and more recently, the Levelling Up Whitepaper¹⁷. Each of these papers reveals pieces of the overall national strategy. The Levelling Up Whitepaper stated that "*The Net Zero transition could create huge opportunities for many of the UK's left-behind places, but also poses risks for them which, if unmanaged, could be damaging*". Generally speaking, the UK government aim to mobilise billions in private financing and investment through strategic public investment in order to keep and accelerate momentum towards Net Zero. In October 2021, COP26 took place in Glasgow, bringing together the global community to set targets for decarbonisation, agree on investment and support for developing nations, and share best practice examples in policy and technology.

¹⁴ [BEIS](#) – November 2020

¹⁵ [BEIS](#) – October 2021

¹⁶ [HMT](#) – October 2020

¹⁷ [DLUHC](#) – February 2022

(2.7) While activity goes on at UK level, Greater Manchester has been and will be working to deploy the full force of the public, private, and third sectors to support the aims of Net Zero. Key recent and upcoming developments in the Green Economy within the GM city region include:

- Development of the **GM Local Energy Market**¹⁸ will enable energy generators and end users to access a more flexible and integrated market. As energy generation becomes more diffuse with the installation of solar/wind generation and battery storage at residential, commercial, and industrial properties, the market will be less centralised. This allows for an approach where energy can be generated and used within locality and doesn't need to be transported on the existing energy infrastructure.
- Development of the **Local Area Energy Plans (LAEPs)**, which aim to support individual local authority areas to fully understand the make-up and extent of decarbonisation that needs to happen within the locality. The LAEPs¹⁹ combine the current understanding of consumer habits, demand, investment, and technologies into clear pathways to decarbonisation for each area.
- Work on the **retrofitting of homes, commercial property, and the public sector estate** across GM will accelerate with the continuation of the Green Homes Grant²⁰ in GM, the launch of the government's Boiler Upgrade Scheme²¹, and the launch of the Retrofit Accelerator²² in 2022. All of these schemes will increase both supply and demand of retrofit delivery funding, and skills, moving the city region closer to the challenging targets around heat decarbonisation.

¹⁸ [GMCA](#) – July 2020

¹⁹ [GMCA](#) – July 2021

²⁰ [GMCA](#) – November 2021

²¹ [BEIS](#) – October 2021

²² [GMCA](#) – November 2021

- Ongoing rollout of the **IGNITION²³ Project** aims to develop funding solutions for investing in GM's Natural Environment. It involves green space improvement as well as "nature-based solutions" deployed in urban environments.
- Planned **expansion of the Bee Network²⁴** will see thousands of miles of additional walking and cycling routes across the city region. Building on the increase in cycling seen over the course of the COVID19 Pandemic, the Bee Network will also include 1,500 bikes for hire rolled out across the city region²⁵. The expansion of the network will support the shift away from polluting forms of transport and private cars.
- Planned introduction of the **GM Clean Air Zone²⁶** in 2022. The zone, which will be the largest outside London and covers nearly 500 sq. miles, will require drivers of polluting commercial vehicles (HGVs, LGVs, Buses, Coaches, Taxis) to pay a daily charge to drive on roads within the city region. While the scheme is ostensibly to reduce pollutants and particulates in the pursuit of public health, it is expected that the charges will hasten the transition to electric vehicles within GM, therefore accelerating the shift to Net Zero.

(2.8) With the increasing level of investment in the Green Economy, both from national/local government and the private sector, it is important for the skills system to support employers. Commissioners, stakeholders, and government must ensure that workers have the right sort of skills to work in the expanding and niche sub-sectors of the Green Economy. With the considerable existing levels of decarbonisation, high levels of investment, and the strength of the UK's knowledge economy and service sector, there is a good chance to position the country as a world leader in the sector. Ensuring that the

²³ [GMCA](#) – April 2021

²⁴ [TfGM](#) – November 2021

²⁵ [TfGM](#) – November 2021

²⁶ [Clean Air GM](#) – November 2021

workforce is equipped to work in the roles employers require is a crucial part of this ambition.

- (2.9) Some skills policy is changing at a national level to support the delivery of Green Economy skills. The Institute for Apprenticeships and Technical Education formed the Green Apprenticeships Advisory Panel²⁷ in March 2021 to work with employers and key stakeholders around the agency's response to the growing demand for Green Economy skills. The panel's initial work is around the adjustment of existing apprenticeship pathways to support the sector, rather than the development of new apprenticeship pathways.
- (2.10) In the summer of 2021, GMCA commissioned £1.5m of initial skills delivery specifically supporting skills for retrofitting in construction. These programmes aimed up skill 1,100 existing members of the workforce, and to attract approx. 200 new entrants to the workforce. Both programmes were based on work done around the Low Carbon Buildings Skills Intelligence Report²⁸. The programmes are part of a wider package of measures to support the sector, including additional Adult Education Budget flexibility, direct skills commissioning, and work to influence and guide curriculum of existing training providers. The aim is to work on a similar basis after the release of this report.

Greater Manchester Ecosystem

- (2.11) The Greater Manchester Local Industrial Strategy identifies the Green Economy as one of the 4 priority sectors for the city region. It identifies the low-carbon economy as comprising of 2,500 companies and 45,000 people already, with huge potential for both of these metrics to grow as the wider ecosystem develops. These businesses range from large scale multinational organisations providing low-carbon power generation, to SME and self-employed consultancies. GMCA's environment team work along the lines of

²⁷ [IFATE](#) – March 2021

²⁸ [GMCA](#) – August 2020

the 5 challenge areas, and run groups for employers in each of the areas to facilitate networking and collaboration.

- (2.12) Sitting at the heart of the North West, GM has a key role to play in regional networks like Net Zero NW²⁹. Bringing together industry leaders like Peel, Siemens, Inovyn, and TATA, Net Zero NW is a group aiming to accelerate industrial decarbonisation and clean growth projects. Its 2021 Economic Investment Prospectus³⁰ details the opportunities for skills development and job creation within the Green Economy. GM will need to work with the wider region towards Net Zero – networks like this are important for driving projects, investment, and skills across the region.
- (2.13) Within GM, many businesses are supported by the Business Growth Hub – this extends to Green Economy businesses, where businesses can tap into support from the Low Carbon team³¹. Hundreds of businesses are currently listed on the Low Carbon Network³² site where organisations can search for specific services or products related to the Green Economy (e.g., green finance, EV suppliers, heating/electrical engineering). This serves an important function in bringing together the wide variety of Green Economy businesses to benefit from the effects being part of a sector network.
- (2.14) Greater Manchester has a strong heritage in certain sectors, many of which will see significant change over the transition to Net Zero. Understanding the reach of the transition and the impact it will have on existing industry is an important part of the skills picture for the Green Economy. For example, the Manufacturing base of GM has a strong history, a sizeable workforce of approximately 110,000 people, and a large geographic footprint. With automation and digitalisation already disrupting many businesses within the

²⁹ [Net Zero NW](#) – January 2022

³⁰ [NetZero NW](#) – July 2021

³¹ [Business Growth Hub](#) – December 2021

³² [Business Growth Hub](#) – December 2021

sector, the impact of Net Zero, (particularly on the workforce) needs to be better understood.

- (2.15) The Universities of Greater Manchester form a key part of the Green Economy ecosystem. Along with data analysis forming policy in line with the Tyndall Budget, the innovation, research, and business support that the universities provide is an important part of the sector. The University of Salford's Energy House³³ project supports with the testing and development of low-carbon building materials and technologies by providing a controllable test centre which can simulate a variety of weather conditions. Manchester Metropolitan University's Fuel Cell Innovation Centre³⁴ enables industry to explore and develop the fuels of the future, including hydrogen fuel cells.
- (2.16) Another unique benefit Greater Manchester has when working towards Net Zero is a devolved transport authority – Transport for Greater Manchester (TfGM). Given the scale of emissions from road transport, there is a huge opportunity for reducing emissions by providing high-quality, affordable, renewable public transport. The Metrolink tram network is powered by renewable energy and has seen increases in passenger numbers every year for the past decade (in 2019/20 FY, it hosted 44.3m journeys). Further work is ongoing on the bus network – regional operators like Stagecoach

Key Trends & Market Forces

- (2.17) There are several trends within the Green Economy at the moment, many of which have an impact on the skills and labour market picture:
- Shifts in consumer preference drive much of the activity and growth in the Green Economy. For example, adoption of Electric Vehicles is dramatically increasing (from 3% market share in 2018 to over 17% in 2021³⁵) as consumers start to trade in their petrol/diesel models for hybrid/electric

³³ [University of Salford](#) – December 2021

³⁴ [MMU](#) – December 2021

³⁵ <https://www.nextgreencar.com/electric-cars/statistics/> - December 2021

models. This has been driven by improvements in affordability and variety, consumers' social conscience, and the style of EVs matching consumer tastes. The pace of this change has created shortages and supply chain issues, and has already dented ambitions to create a GM-wide Clean Air Zone, delaying the project from an intended May 2022 implementation.

- In many areas, the Green Economy is attracting increasing amounts of investment, both from governments and from private investment sources. Tens of billions in capital investment is fed into the Green Economy every year, ranging from venture capital for start-ups to “patient capital” like pension funds for established renewables projects.
- Many green technologies have followed a standard adoption curve as pricing and efficiencies have helped to sustain growth – solar (photovoltaic (PV)) panels are a good example. Other technologies are much further back on the adoption curve and are still benefitting from “priming” funding from governments. As a result, the stage at which some green technologies become commercially viable varies wildly.
- Where quick development of new technology requires new skillsets, this generates a difficult problem for the skills system and training providers. Experts and researchers in new technology are often still in the industry, and don't know the best way to pass on their skills to others. Teachers (and as a result, their students) within the skills system often don't have the direct link to industry to keep their awareness and skills up to date. This is seen both in the digital sector (where new programming languages and software are common), and the Green Economy.

3. COVID-19: Impact on the Green Economy

- (3.1) Along with the transition to Net Zero, the biggest recent impact on the economy is the ongoing COVID19 pandemic. Lockdowns and social distancing restrictions have changed the way many sectors work, with organisations switching to home-working or hybrid working models to comply with the restrictions. Many jobs already in the green economy (especially in energy and low carbon buildings), haven't been impacted badly – Construction was one of the most resilient sectors, with many sites getting back to work shortly after the first national lockdown.
- (3.2) Greater Manchester's labour market has recovered reasonably well from the effects of the pandemic. Employers saw a sharp drop in trading and hiring during the first lockdown, however, vacancy numbers recovered to pre-pandemic levels in the summer of 2021 (as shown in Figure 4 below).

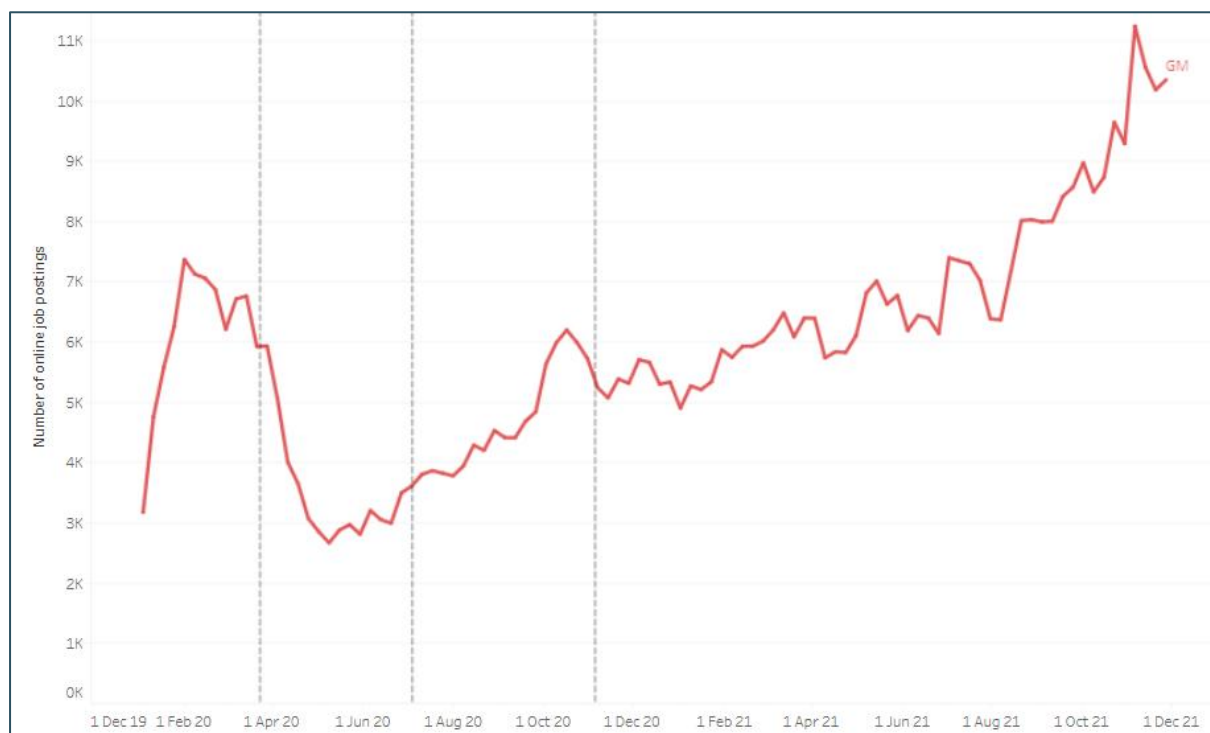


Figure 4 – Total vacancies advertised in GM (dotted lines indicate lockdowns)

- (3.3) During the first lockdown, carbon emissions dropped dramatically as power demand decreased and use of air, road, and rail transport dropped. The ONS

estimated that emissions in 2020 from personal transport use dropped to 1995 levels³⁶. While the pause in economic activity slowed carbon emissions for the periods of the lockdown, as the economy reopened, they quickly returned to previous levels. One of the few accepted positives of the lockdowns is that they gave people a glimpse of a future with fewer cars, cleaner air, and more use of outdoor space.

- (3.4) The shift in working patterns will also contribute to the shift to Net Zero. Many workers are finding themselves working from home either full-time or on a hybrid basis. Less use of personal cars and increased use of remote meeting software has already changed commuting and business travel, impacting areas of the high-carbon economy like aviation. While some businesses are planning to get back to normal with their business travel, many others are planning to keep operating through digital means³⁷, to continue contributing to the carbon emissions reduction.
- (3.5) The Green Economy will need a large number of digital specialists. The need for “smart” systems and software-controlled energy production will drive the demand for digital skills as the Net Zero economy grows. The COVID19 pandemic has already increased the requirement for digital skills as businesses have moved to remote working models, eCommerce, and integrated digital booking/ordering systems. With digital skills in short supply, increasing and improving provision will be a key part of both the recovery from the pandemic and the transition to Net Zero.

³⁶ [ONS](#) – December 2021

³⁷ [TIME](#) – October 2021

4. Labour Market Information

- (4.1) Measuring the size and make-up of the labour market in the Green Economy is complex and hard to do accurately. This is largely due to how new many of the businesses in the sector are – Standard Industry Classifications (SICs) don't capture many of the businesses that many would include in the Green Economy. A piece of work conducted for the Business Growth Hub³⁸ in 2018 uses six different sector definitions: LCEGS, filtered LCEGS, Business Growth Hub's bespoke definition (BGH), an updated and expanded version of LCEGS (LCEGSS), Low Carbon and Renewable Energy (LCRE) and Environmental Goods and Services Sector (EGSS).
- (4.2) The different definitions above give a wide range of employment number estimates for the Green Economy from 12,653 (EGSS), to 53,627 (LCEGSS) – with an average of around 40,000 people. While this is a sizeable workforce, it makes up less than 3% of the Greater Manchester workforce, and is dwarfed by sectors like Retail/Hospitality (344,200), Public Sector (356,700), or Professional Services (309,000). However, it's important to remember that these definitions won't capture a huge proportion of workers that are working on "green" projects like construction workers on retrofit, rail infrastructure workers on electrification, etc.
- (4.3) PWC's recent Green Jobs Barometer³⁹ is an attempt to measure the impact and opportunity of the transition to Net Zero on the labour market. It assesses across 5 metrics including the number of direct and indirect Green Economy Jobs, the carbon-intensity of employment (how much carbon any one job produces), the number of "sunset" jobs to disappear, and the "greenness" of existing workplaces. The Barometer places the North West rank 6 (of 12 UK regions).

³⁸ [Business Growth Hub](#) – August 2018

³⁹ [PWC](#) – November 2021

- (4.4) Though regional rather than on a GM basis, it's worth reviewing a few highlights from this report. It emphasises the importance of the indirect and induced effects of Green Jobs – where jobs in the green economy aid growth in other sectors. It estimates that “1 additional green job in the electricity and gas sector yields 6 additional jobs in the economy as a whole”. Focusing on these high yield sectors would be a good way to create additional high-value jobs for the city region. The report ranks the North West 3rd in terms of the total number of “sunset” jobs which are likely to be lost as a result of the shift to Net Zero. The North West contain around 11% of the total “sunset” jobs, though many of these will exist in coastal regions (where oil/gas exploration in the Irish Sea is common), and in other areas which have a focus on Automotive or Aerospace Manufacturing (i.e. Merseyside and Cumbria).
- (4.5) Green Economy jobs, however they are defined, have the unique challenge of being linked to technology which have had or will have expiration dates set in law. Gas boilers and diesel/petrol vehicles in particular are both cited as examples of these, with ambitions to wind down both markets over the next 10-15 years. This will impact the labour market in a number of ways – primarily a shift in the type of work that the workforce in those sectors is doing. While outright bans on new equipment in both examples are likely however, there is unlikely to be a forced upgrade. The difficulty around these “sunset” technologies is that young people and new entrants are unlikely to see longevity in these careers, so there will be fewer and fewer new entrants as we approach the wind-down dates. This will hit the labour market in both Manufacturing and Construction particularly hard, as both already feature an ageing workforce.
- (4.6) Given the difficulty with measuring the size and make-up of jobs in the Green Economy, vacancy data can be a good proxy for measuring growth in the type of jobs that are available. The BurningGlass Labour Insights tool gives a filter for “Green Jobs”⁴⁰, which covers a wide range of job roles which might be

⁴⁰ [BurningGlass](#) – December 2021

important to the Green Economy. When this filter is used to assess roles within Greater Manchester, it lists 6,198 vacancies over the whole of 2021. This is around 1.6% of the total vacancies advertised. The graph below shows the most common occupations within this data. Unsurprisingly many of the most common jobs are linked directly to engineering and infrastructure.

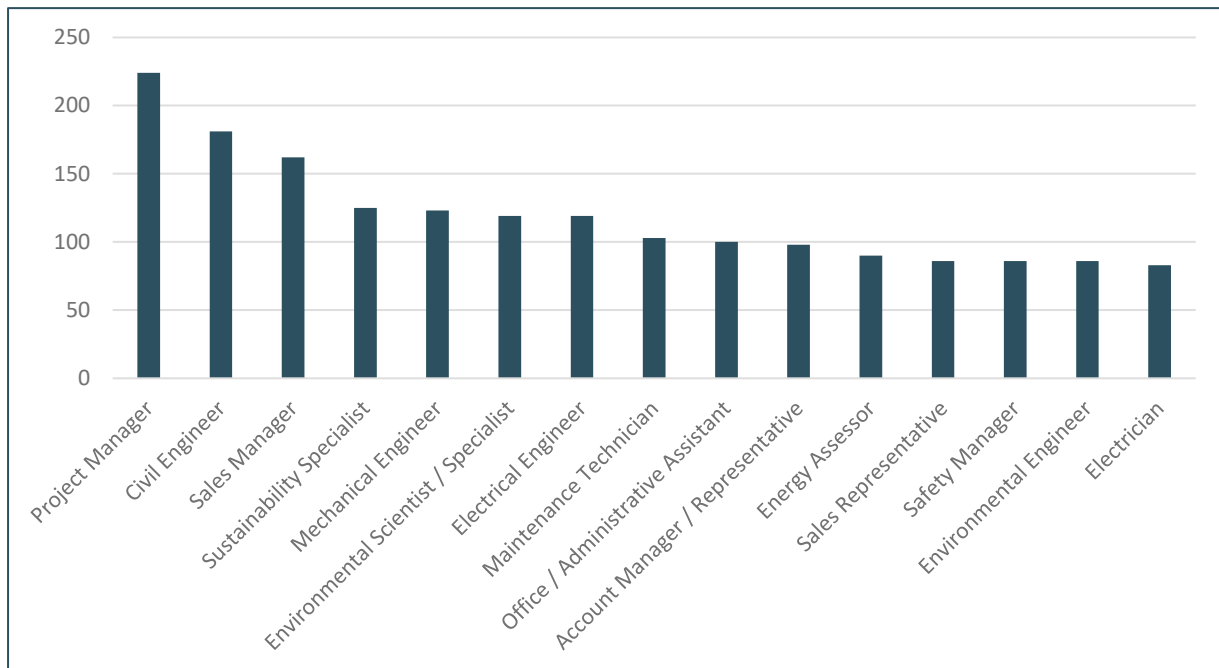


Figure 5 – Labour Insights Extract – GM “Green Job” vacancies

(4.7) While the filters applied to produce this list are restrictive and don’t include many affiliated professions in construction, utilities, or transport, it does give a sense of the growth and opportunity in the sector. The number of “Green Job” vacancies as classified is up 58% from 2016. Similarly, this data demonstrates the opportunity for residents to start, or progress into high-paying jobs. The mean salary of the 6,198 “Green Jobs” was £40,100pa, well above the GM average. Close monitoring of the type and volume of green jobs advertised in GM will ensure that stakeholders can support the sector to grow.

5. Skills Demand

- (5.1) In the past, jobs in the Green Economy were largely thought of as relating directly to the environment – tropes around natural capital jobs like marine biologists or park rangers were commonly thought of as Green Jobs. While they are important, they only constitute a very small part of the occupations and skills that will be required as part of the transition to Net-Zero.
- (5.2) Before considering skills demand in further detail, it is important to understand the difference between a skills gap and a labour gap. While they are interlinked and often conflated, there are elements of the Green Economy which exhibit signs of a skills gap, and other elements that face a labour gap. Some areas face both. Skills gaps (“proportion of the workforce that were considered to be lacking in full proficiency”⁴¹) often manifest as an under-qualified workforce, with outdated or inappropriate skillsets, resulting in a hard-to-fill vacancies in skilled positions and low productivity. It can be caused by a lack of provision, lack of incentive to upskill or retrain, or an unclear qualification picture. In short – a mismatch between existing skills and required skills. Labour gaps often manifest as poor application rates for even entry level positions as a result of a lack of interest in the sector among jobseekers. It can be caused by a poor image of an occupation or sector, low wages/poor conditions, or a long or complex training cycle which can’t meet employer demand. In short – not enough people to do the job.
- (5.3) The 5 areas of GM’s Green Economy exhibit skills and labour gaps to varying degrees. Employers reported a tight labour market, with difficult and expensive recruitment, as well as a confusion over current and future skills requirements. In late 2021, Greater Manchester followed the UK in a tightening of the labour market as consumer demand drove the recovery from the COVID19 pandemic. As of October 2021 there were around 61,000 vacancies available across all sectors in GM, with 112,000 individuals

⁴¹ [DfE – Employer Skills Survey](#) – Nov 2020

claiming universal credit – a ratio of less than 2:1. For skilled professions, the balance is in favour of the worker – some professions are able to “name their price” because the demand for the skillset is so high.

- (5.4) Given the prevalence of STEM skills within all 5 pillars of the Green Economy, much of the labour gap is explained by increased competition for a limited supply of young people, FE leavers, and graduates with STEM skills. Increasing wages in digital professions, engineering, and the construction sector are attracting large proportions of these workers. In fact, previous GMCA work on the Manufacturing and Construction sectors revealed employers reporting that they were unable to compete with digital and tech firms for STEM talent.
- (5.5) Employers also reported a lack of basic skills and understanding of sustainability and Net Zero in other sectors. Understanding the drive towards Net Zero is not restricted to businesses who will operate among the loosely defined Green Economy – every type of business will be impacted by climate change, so needs an understanding of basic green skills. Areas which need additional awareness and understanding include basic sustainability, carbon pricing, and energy efficiency. With such high targets in GM, all businesses need to do everything they can to work towards Net Zero.
- (5.6) Vacancy data also shows the skills requested in many advertised Green roles, shown below in Figure 6. Alongside the direct green skillsets are a number of wider business and back-office skillsets. Project Management, Customer Service, and Digital skills all feature in the top 10 skills required by the employers who advertised a Green Job in GM in the last 12 months. These cross-cutting skills are important in many sectors, so it is not surprising to see them listed by employers here.

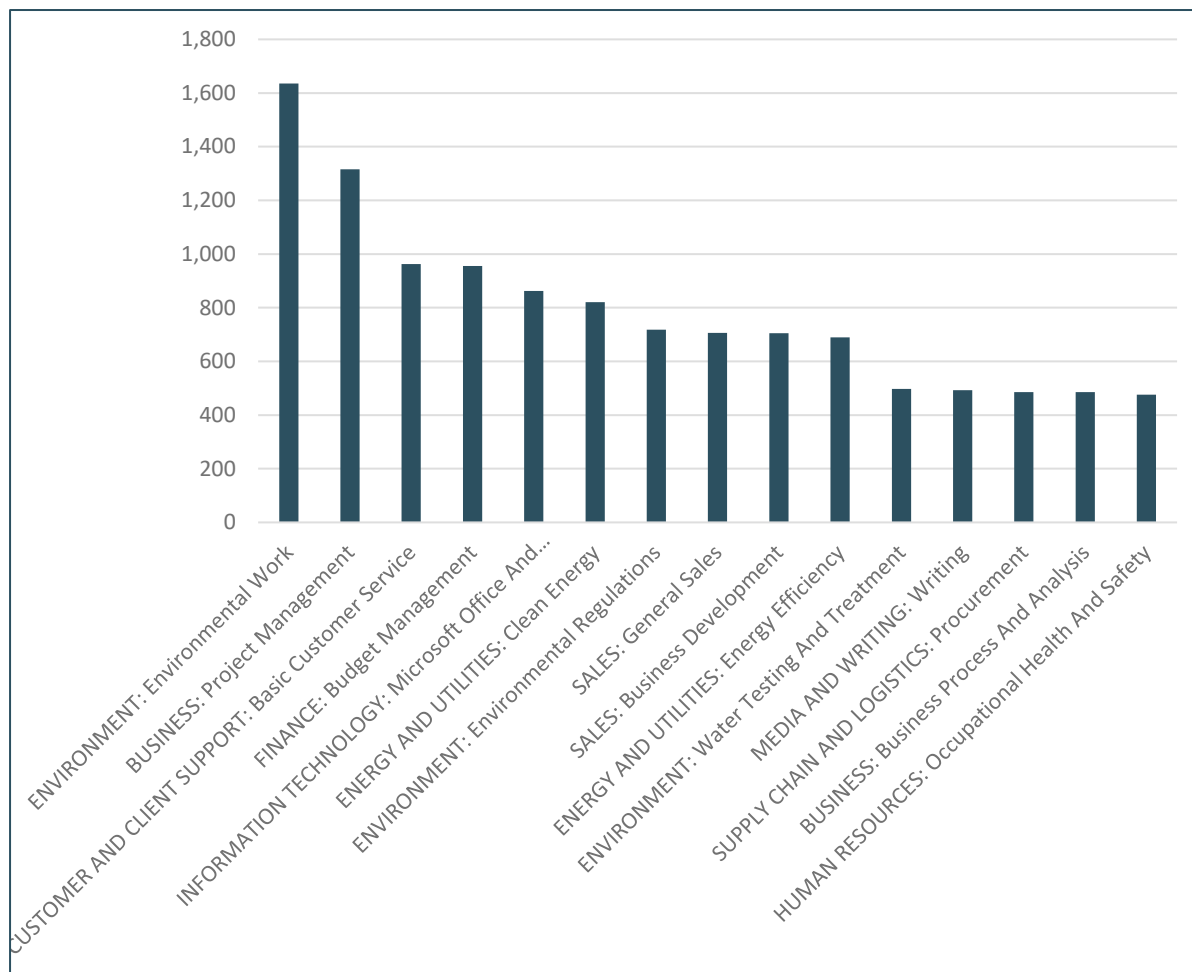


Figure 6 – Labour Insights Extract – GM “Green Job” in-demand skills

- (5.7) In addition to these cross-cutting skills, there is a need among many smaller businesses in the Green Economy for commercialisation skills. This is seen particularly at the very cutting edge of technology, often where academia meets entrepreneurship. Ideas, new processes or technologies can be spun out of university research. Historically, much of this innovation has been seen in the “golden triangle” (Oxford/Cambridge/London), with the universities there attracting the most research funding. With recent intentions outlined in the Levelling Up Whitepaper, GM has an opportunity to build a similar ecosystem of start-up businesses in the Green Economy, building on the work of the regional Universities. Building the skills to take technologies and innovations from academia to commercially viable models is a specialist skillset.

Low-Carbon Buildings

- (5.8) The low-carbon buildings sub-sector acts as one of the biggest opportunities for carbon reduction in Greater Manchester. This was recognised in the mayor's manifesto⁴², which contained a promise to form a Retrofit Taskforce to address the delivery, financing, and skills challenges in the sector. The Taskforce built on some of the findings in the Skills Intelligence Report⁴³ for Low Carbon Buildings to feed into the wider retrofitGM action plan. There is ongoing work around public sector decarbonisation, and the market for domestic retrofit is growing. Improving the energy efficiency and carbon output (of heating in particular) in every home in Greater Manchester would have a massive impact on overall emissions.
- (5.9) Homes and other buildings will need various measures to ensure that the city region can reach Net Zero. Of particular importance are the decarbonisation of heat, improvements to energy efficiency, and electrification. Much of this work in the past has been driven by government subsidies like the ECO scheme and the Green Homes Grant. With growing public and private investment in retrofit, ensuring a skilled workforce to conduct the work is crucial. Employers reported that the existing workforce would need additional skills. Low-Carbon heating systems like heat pumps often need larger radiators, more efficient plumbing set-ups, and underfloor heating to be efficient. However, due to the prevalence of gas-based systems, the existing engineers that do this work don't need to consider these factors. Much of the work of a gas engineer is maintenance and replacement of like-for-like systems – Low-Carbon heating systems require additional varied skills.
- (5.10) There are two key skills and labour challenges within the retrofit market – a shortage of general and skilled labour in the wider construction sector, and a shortage of skills and accreditation among the existing workforce. GMCA has already allocated approximately £1.5m from the Skills for Growth and DfE

⁴² [Andy Burnham's Manifesto](#) – May 2021

⁴³ [GMCA Skills Intelligence Reports](#) – August 2020

Bootcamp funding to address both of these issues. Skills required include an understanding of basic retrofitting measures like insulation and fenestration, and more advanced skillsets to install heat-pump, solar panel, and battery technology.

- (5.11) Employers reported that skilled workers in the more advanced skillsets are often hard to find. This is largely due to uncertainty generated by the historic low volume of retrofits, a distrust generated by previous grant/subsidy withdrawals, and an already short-staffed construction workforce. Skills programmes commissioned to date attempt to overcome these challenges. Employers in the sector should engage with these skills programmes to upskill their staff so they can take advantage of the future opportunities within retrofit.
- (5.12) One of the other skills needs reported heavily in the low-carbon buildings sector is a requirement for electricians and electrical engineers. With the world moving away from direct and indirect use of fossil fuels in the home, there will be a greater burden on electrical equipment to heat homes, cook food, and provide power. Training and recruiting more skilled electricians is an important part of this, as is the upskilling of existing electricians to understand the workings of new technology.

Transport

- (5.13) One consideration of future roles in the Green Economy, and in particular, the shift to Electric Vehicles (EVs), was well expressed in a recent article in *The Economist*⁴⁴. As consumer and business habits shift in favour of EVs and away from cars with internal combustion engines (ICEs), many roles, and in particular the role of the car mechanic, will change significantly. While this is not imminent, and many elements of both EV and ICE cars are the same

⁴⁴ [The Economist](#) – October 2021

(wheels, brakes, body, etc.), it will cause a substantial shift in the way the automotive manufacturing and repair industry works.

(5.14) Some parts of the GM transport ecosystem have begun to shift towards Net Zero. 2021 saw the launch of electric waste collection trucks⁴⁵ operated by Biffa in Manchester, after an investment by the city council. Stagecoach already operates a fleet of 32 electric buses⁴⁶ across Greater Manchester, with dozens more in the pipeline for the next few years. The International Energy Agency (IEA)⁴⁷ documents the increase of electric vehicles around the world. 2020/21 saw a huge uptick in adoption across the UK. TfGM are working with the taxi and private hire industry to increase coverage of EV charging. The electrification of rail is an ongoing project in GM, with September 2021 seeing the announcement of another line upgrade between Wigan and Bolton⁴⁸. Skills requirements within the rail sector will be addressed in a future report by GMCA.

(5.15) Data on EV adoption is patchy. Much of it relies on car registrations, which are skewed by leasing companies and company fleet headquarters. What is clear is that the take-up in EVs in the past 2 years has grown. This will create some impacts for the skills system to deal with. Because of the importance of the battery in an electric vehicle, much of the current skillset for maintenance and repair sits within original equipment manufacturers (OEMs). In many cases, unauthorised repair or maintenance of EVs breaches warranties and can be a danger to the mechanic. As a result, many existing mechanics in the commercial vehicle maintenance and repair sector are not yet seeing the rising demand for EV services.

(5.16) Figure 7 shows a breakdown produced by Europe On to show the prevalence of roles within the Passenger EV sector. While this is an imperfect measure, it

⁴⁵ [CommercialFleet.org](https://commercialfleet.org) – March 2021

⁴⁶ [Stagecoach](https://stagecoach.co.uk) – March 2020

⁴⁷ [IEA](https://www.iea.org) – November 2021

⁴⁸ [DfT](https://www.dft.gov.uk) – September 2021

shows a weighting towards maintenance of vehicles (at 39% of the total) being a large proportion of the roles created/supported. Given this estimate is along the lifetime of the transition to EVs, it is clear that some sections will be more prevalent than others at different stages. For example, there will be a surge in manufacturing and installation in the earlier stages, where maintenance won't become a large proportion until later.

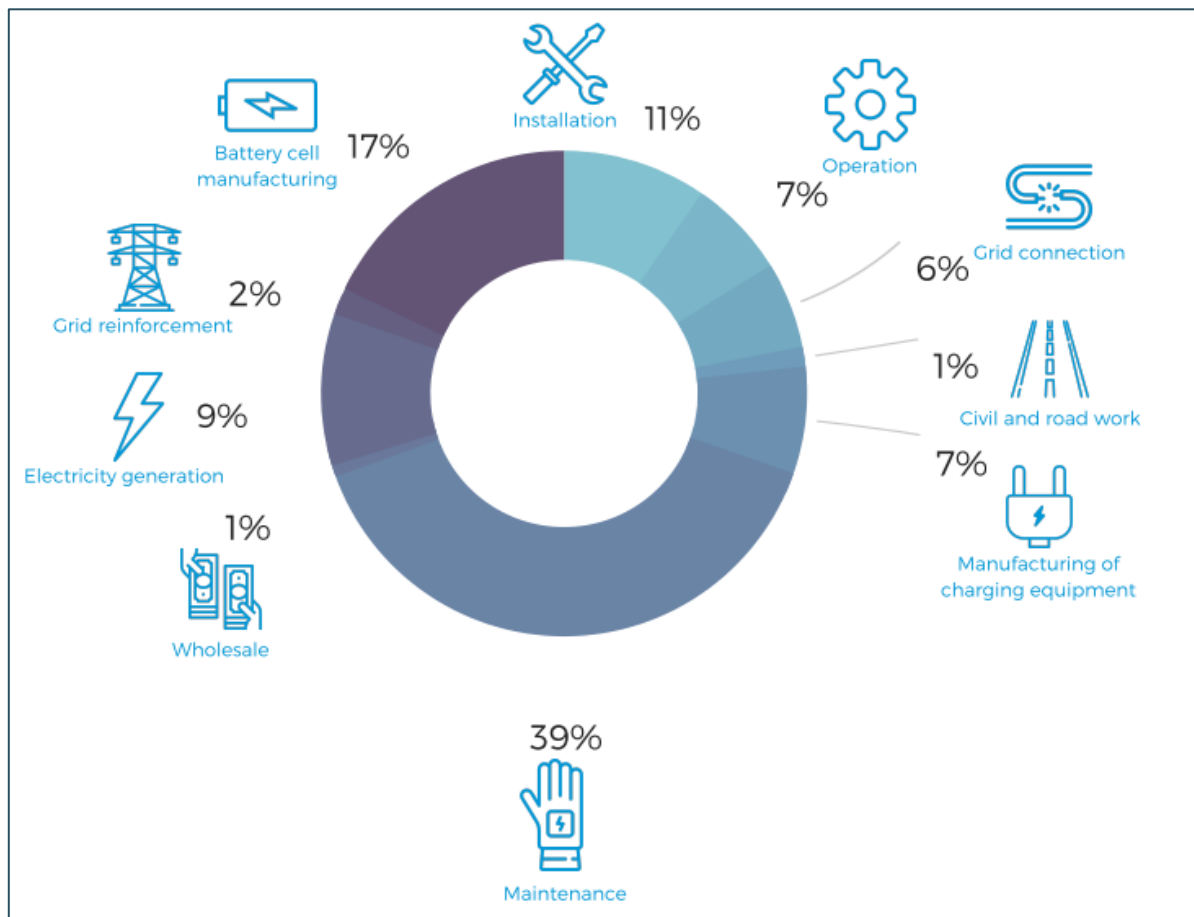


Figure 7 – Share of jobs per role in EV Market⁴⁹

(5.17) As adoption of EVs increases and the market adjusts in terms of jobs and common occupations as above, the skills picture will change. GM doesn't feature any major automotive manufacturer, but there are hundreds of smaller businesses in the automotive supply chain in the city region. As a result, GM is unlikely to see any major benefits with the shift to battery manufacturing, as

⁴⁹ [EuropeOn](#) – February 2020

these sites will likely be kept close to the assembly sites. Instead, GM's opportunity lies in upgrading EV charging infrastructure – given the city's geography and connection to the motorway networks, there will be a growing need for rapid and high-capacity charging sites. Data⁵⁰ in early 2022 indicated that the growth of EV sales was far outstripping charging infrastructure (600% increase in EV sales between 2019 and 2021 vs. 82% increase in public charging points). Similarly, there are regional differences – GM has only 17 chargers per 100,000 people, compared with 102 per 100,000 in London.

(5.18) There are a number of skills that employers reported being in demand as transport infrastructure shifts to being zero carbon:

- **Mechanic & Repair** – While many parts of cars will be the same on EVs as ICE cars (windows, doors, brakes, wheels, etc.), repairing battery cells and advanced electric motors is not usually part of a car mechanic's skillset. While much of the current maintenance and repair is done by OEMs, as the second-hand market grows, other mechanics will need additional skills to work on these EVs.
- **Battery Specialists** – One of the specific areas of additional training required is in dealing with high-voltage batteries. It may be that in future mechanics will leave battery repair to specialists. While some electrician and electrical engineers are skilled enough to do this work, there are too few of them at the moment.
- **Electrician** – As consumer choice shifts towards EVs, more people will need charging points fitted in their homes. This work is largely done by car manufacturers and retailers when a new EV is purchased, but as the second-hand market grows more will need to be done by the existing workforce. Upskilling these workers will be important.

⁵⁰ [Guardian](#) – February 2022

- Electrical Engineering – As fleets and railways become electrified, additional connections and upgrades to the infrastructure of the power grid and the transport infrastructure will be needed. More electrical engineering skills both among the existing workforce and among designers/architects would be helpful for this aim.
- Design and Data Analytics – With more charging sites needed, the assessment, selection, and evaluation of sites for development is needed. At the moment transport authorities and councils are doing most of this work, but there is a burgeoning private market for selecting and designing EV charging sites.

(5.19) The weight, capacity, and charging times of conventional batteries make them a poor replacement for ICEs particularly for large vehicles like HGVs, where carry capacity and uptime are vital. Instead, there is some discussion in the sector around the use of Hydrogen as an alternative fuel for these vehicles. A truck engine can be converted for around £10,000 - £15,000 to run on hydrogen. This compares well with the cost of a new battery powered HGV, which costs upwards of £60,000. From a skills perspective, the biggest need will come in Hydrogen production and fuelling facilities. Hydrogen production is currently expensive and energy intensive, and as a fuel it proves difficult to transport. However, there is continuous and rapid innovation going on with the uses of Hydrogen, much of it led by MMU's Hydrogen Fuel Cell Innovation Centre⁵¹ and Hynet⁵² at Ellesmere Port. As its uses become better understood, there is a great opportunity for GM and the North West to be a hub for Hydrogen fuel. The Department for Transport are currently assessing skills needs across the sector through a consultation⁵³ - while Green Skills is not included as one of the themes, it is expected to be a core thread throughout.

⁵¹ [MMU](#) – December 2021

⁵² [Hynet](#) – December 2021

⁵³ [DfT](#) – February 2022

Energy

- (5.20) Electrifying heating, transport, and industrial systems will put additional pressure on the wider power grid. In addition to this, over the past 25 years or so, the traditional model of power generation taking place in specialised plants has given way to a more decentralised system, where power is generated in hundreds of different places through smaller systems like wind turbines and solar panels. Ensuring that the grid adapts to the additional demands is a huge part of the shift to Net Zero. This is the responsibility of the National Grid and the District Network Operators (DNOs), so skills gaps within the relevant companies and occupations must be addressed.
- (5.21) Greater Manchester has very few large-scale energy generation sites – these sites tend to be built in less urbanised areas. As a result, there are very few skills needs in this area. Many suggest that shifting to Net Zero will require an increase in more smaller power generation equipment like solar panels and wind turbines. This will create additional skills needs. Most electricians are qualified to work on modern solar photovoltaic (PV) equipment, but with an increase in battery and alternative power systems, more niche skills will be more common. Fitting these power systems requires a specific skillset, requiring additional modules or qualifications over and above the usual electrician pathways. This is because of the complexity of the systems, the need for inverters, two-way connections to the main grid, and metering/control systems.
- (5.22) The District Network Operator (DNO) for the region is Electricity North West. Their 2023-2038 plan⁵⁴ details their involvement in the shift to Net Zero. The plan includes a section on workforce resilience, which explains the need for skills relating to the grid upgrade and development of a “resilient and reliable smart network”. ENWL highlight the “need to recruit additional resource at either entry level via adult trainees or via apprenticeships to allow the

⁵⁴ [ENWL](#) – December 2021

development of our existing workforce”. Workers in the ENWL workforce will need engineering and maintenance skills – these are delivered currently through the L3 Power Network Craftsperson apprenticeship.

- (5.23) Employers reported that there are reasonably clear progression pathways for both domestic electricians and network/grid engineers. This is as a result of long-standing respect and use of the apprenticeship system, with a range of well-served apprenticeships from Levels 2 – 7. Within their existing workforce, additional skills needs include customer service, project management, and digital (smart systems) skills and knowledge.
- (5.24) As the power network becomes higher capacity and more complex, there will be a growing need for “smart” systems to manage electricity flow. With more distributed power generation sites (domestic PV, wind turbines, etc.), the need for users to be able to both receive and send power has grown. DNOs like ENWL manage these systems, which sit on advanced software. Data management, analytics, and software development are therefore key elements of the rollout of a modern “smart” power grid. Increasing the skills of both the existing workforce and bringing specialist skillsets into the sub-sector is vital.

Waste and Circular Economy

- (5.25) Another pillar of the Green Economy includes the wide range of businesses in the waste, recycling, and circular economy. Many materials and products are currently recycled through council waste authorities, much of which is used to generate power or melted down to be reformed and reused. Some materials and products are starting to move closer to a lower waste solution referred to as the circular economy. This is where products are used in exactly the form they were recycled in – milk bottles being washed and re-filled are a good example of this. The shift to Net Zero combines with the ongoing need to reduce waste and production of non-recyclable materials will demand greater use of both recycling and circular economy solutions.

- (5.26) GM has set targets⁵⁵ as a city region for reduction of plastic use, household recycling, and diverting waste away from landfills. Waste generally goes to one of three places – landfill, incineration, or recycling. Landfill rates have fallen in the past 30 years, but the UK still incinerates more waste than is recycled⁵⁶. While historically the city region had several landfill sites in each borough, the city region and councils have mostly decommissioned or converted these into recycling sites. Much of the city region's waste still goes to landfill sites, which are now mostly outside the region's borders.
- (5.27) Waste that is not taken to landfill either goes back to manufacturers to be melted down and reused as a (usually lower grade) raw material, or goes to incineration plants. Both Bolton and Oldham have major waste incineration plants which burn waste to generate power. Before this recycling, landfill or incineration, the waste has to be sorted. Employers reported that much of the process of sorting waste is now automated, so there are very few direct skills requirements. Understanding what waste is recyclable, non-recyclable, and usable for energy plants comes with experience, and is largely left to specialised machinery.
- (5.28) Employers reported some fleet management skills requirements, given many large employers in the sector collect waste in large vehicles. There is some crossover with transport skills, which would involve the repair and maintenance of EV and alternative fuel vehicles. Other skills required included specialist technical skills involved in the decommissioning of landfills, but not at high volume. Methane and other hazardous gases and materials are often exposed when old landfills are dug up, so developing and maintaining the equipment which mitigates and neutralises these is a niche skillset.

⁵⁵ [GMCA](#) – December 2021

⁵⁶ [Waste Management World](#) – December 2021

Natural Environment

- (5.29) Certain boroughs of GM have extensive “green space” – this features as a key element of the “Places for Everyone” Strategy (and the Stockport Local Plan). The importance of these green spaces to wellbeing has crystallised over the course of the pandemic. There are many rural areas in North-east Rochdale/Oldham, South-east Stockport, and North-west Wigan. Compared to many other regions though, GM is very urbanised. The management of both of these rural and urban environments for the benefit of residents and the purposes of Net Zero falls under Natural Environment. Solutions for this area of the Green Economy are often referred to as “Nature-based Solutions” (NbS)⁵⁷. There are a range of skills needs in the sub sector, but jobs in Natural Environment benefit from perception and the feeling of making a direct impact on the environment (i.e. tree-planting, landscaping).
- (5.30) Behind the philosophy of NbS lies the idea that although technological solutions to climate and environmental problems are useful, some of the best solutions are already available through clever deployment of natural assets. A good example of a project in GM is the recently completed West Gorton Park⁵⁸. The park is designed to act as a rain ‘sponge’ and absorb excess water from the surrounding streets through layers of carefully constructed swales and vegetation. This is a cheaper and more attractive solution to flood mitigation and brings carbon reduction and biodiversity benefits.
- (5.31) Natural environment employers reported that the skills gaps will be in several places. The first set of skills needed will be in the building of NbS like green roofs, green walls, and Sustainable Urban Drainage Systems (SUDS) like West Gorton Park. This requires civil engineers, landscape architects, and urban designers to understand and implement the solutions in the design and planning phase. These consulting organisations, housebuilders, and landowners will need to consider NbS as part of future projects.

⁵⁷ [University of Oxford](#) – December 2021

⁵⁸ [Green Cities Europe](#) – November 2020

- (5.32) A technical skills need for Natural Environment involves the maintenance of NbS after they have been constructed. Some systems are designed to be self-sustaining, but certain designs of green walls and roofs have hydroponic and nutrient delivery systems which need maintenance. Jobs in this area involve a combination of technical skills to maintain the equipment, understanding of the plant's needs, and evaluation and monitoring skills to measure impact and maintenance schedules.
- (5.33) There are some additional skills needs with other solutions. Rewilding (allowing nature to take back over previously used land) involves some planning, project management, and evaluation skills. There are some infrastructure and construction skills needs required in other projects like adaptation and flood defence work in areas of uplands where the digging of ditches and damming of streams is important. Employers reported a skills loss in many Natural Environment linked roles since the loss of many council ranger roles over the past 30 years or so. Rebuilding this skills base for GM will be an important part of the shift to Net Zero.

Summarising Green Skills Demand in GM

- (5.34) Summarising the Skills Demand from Green Economy employers in GM requires recognising that there is a wide range of sub-sectors, which differ in their requirements. Given the volume and range of skills demands the sub-sectors should be prioritised as given in Figure 8 below:

<div> <div>Largest Skills Impact</div> <div>Smallest Skills Impact</div> </div>				
Low Carbon Buildings	Transport and Infrastructure	Energy	Waste	Natural Environment
Energy efficiency of old and new	Rail and Light-Rail in GM – Metrolink	Upgrade of entire electrical grid – demand increasing as	Management of waste, LA led activity	Management of green spaces – both urban and rural

buildings – EPC measures	already fully renewable	more things electrify	Movement towards so-called “Circular Economy”	Emphasis on the deployment on “nature-based solutions”
Heating – (1.2m homes in GM, of which 264,000 Social Housing)	Introduction of electric buses	Local generation of increasing importance (solar, wind, etc.)	Reuse and repair	Perceptions of wider Green Economy generally sit here – marine biologists, park rangers, etc.
Public Sector decarbonisation scheme – schools, council property	EVs and EV infrastructure rollout	Storage and batteries installation	Responsible disposal of household, commercial and industrial goods	
Retrofitting & construction skills in very short supply	Additional cycling options	Electrical engineering skillsets in v. high demand	Skills in repair, management of recycling sites, awareness, etc.	Small volume, but important roles
	Skills of Mechanics, construction workers to change			

Figure 8 – Green Economy Skills Prioritisation for Greater Manchester

(5.35) Across the challenge area sectors, there is a heavy tilt towards sectors where STEM (Science, Technology, Engineering, and Maths) careers are important. As is made clear in the Green Jobs Taskforce Report⁵⁹, much of the transition to Net-Zero will be fuelled by innovation – the scientific research into new technology, which will then be adopted by manufacturers and engineers. Just as science has developed our understanding of carbon emissions, there is hope that it will provide the solution to the effects of them. As a result, STEM skills are of the utmost importance to the transition. GM has a good track record of STEM skills development, with varied provision and a strong heritage of science and technology inspiration activity.

(5.36) Given a certain level of temperature rise is already “baked in” to the climate, an increasing area of importance will be around Resilience and Adaptation. The effects of climate change are becoming increasingly common, so ensuring that urbanised areas like Greater Manchester can cope with flooding

⁵⁹ [BEIS Green Jobs Taskforce Report](#) – July 2021

and freak weather events. This resilience will look different in many of the 5 key challenge areas, so pinning down any particular skills requirements is difficult. The skills system itself needs to be resilient in order to support the pace and depth of change.

Greater Manchester is home to organisations already making significant progress in promoting sustainability and green skills among their staff. In recent years academics at Manchester Metropolitan University have developed two short courses around Carbon Literacy and Carbon Management, which are based on standards defined by the [Carbon Literacy Project](#). Material is delivered both as part of the existing curriculum, and for organisations wanting to improve understanding of climate change and mitigation.

With toolkits developed for some sectors and individual employers, the Carbon Literacy Project's materials are helping organisations explore and develop their Net Zero strategies. Examples of employers include TfGM, NHS Trusts, Electricity North West, and a range of housing associations, all of which have a role to play in the transition to Net Zero. The programmes can be adapted and applied to job roles, occupations, and organisations.

Great Places Housing Group have developed their own programme which is based on the standards set by the Carbon Literacy Project. This training is offered to all new staff, and over the past few years, every member of existing staff has participated in several days of training to understand the importance of emissions reductions. This understanding and motivation has seen staff start to change their behaviour and decision-making by factoring in their learning around emissions and mitigation. Employers in GM should explore the deployment of this type of action-linked training among their own CPD activity.

Future Skills Gaps

(5.37) Gauging skills needs further into the future is difficult with jobs in the Green Economy, as it is with many fringe sectors. With the rate of innovation and technological development, it is inevitable that new skills gaps will emerge as the sector grows. In addition to the shift around favoured technology (and as a

result, skillsets), there is already a shift in cultural attitudes. Perception change around what a “green” job is, and why they are valuable, will be important to drive a lot of future talent pipelines.

(5.38) With a wide range of potential future technology, the skills needs are even less clear. Developments in areas like Carbon Capture, Use & Storage (CCUS), Nuclear power (fission/fusion), Hydrogen fuel, and electrification in sectors like aerospace will create a new set of skills requirements. Ensuring a skilled workforce to work in these areas should be a top priority for the wider skills system. This may take the form of ensuring agile and adaptable workers who can pick up new technologies easily.

6. Skills Provision

- (6.1) There is a wide and vibrant market of existing skills provision in GM, which includes hundreds of schools and sixth-form colleges, 9 General Further Education Colleges, 5 Universities, and dozens of private commercial training providers. Many of these providers are starting to shift their existing (non-“green”) provision to support skills for the Green Economy. This includes curriculum adaptations, such as construction provision adapting to include retrofit and renewable energy installation elements. In addition to this, there is a growing list of dedicated “green” courses, serving both the specific sectors listed above, and the wider economy.

Schools and Further Education

- (6.2) Consensus from employers, teachers, and the influencers of young people is that most young people approaching their leaving date of school, college, or university have a desire to pick a career path that doesn’t harm the environment. They realise that the fight against Climate Change is the biggest challenge of their generation, so want their career to be one that helps with the shift to Net Zero. Professions where there are existing labour shortages could position these jobs as critical for the Green Economy, harnessing the interest from young people.
- (6.3) The Greater Manchester Apprenticeships and Careers Service (GMACS⁶⁰) website lists Green Industries as one of the key sectors for employment within GM. GMACS gives summaries of some key professions, including Electrical Engineering, Architecture, and Roofing. With tens of thousands of schoolchildren and other young people using the resources, the promotion of these key “green” jobs will help the wider Green Economy. YP might be interested in these careers but articulation of the roles and opportunities is still quite immature – careers services will need support from industry on this.

⁶⁰ [GMACS](#) – December 2021

- (6.4) With STEM and Construction pathways critical to many roles in the Green Economy, it's important to review GM's credentials in these areas. Across the 9 GFEs in GM, 2019-20 saw 23,686 students start a qualification on Engineering, Digital, or Science/Maths pathways. Of these, just under 6,000 were Level 3 or above. The same year saw 5,643 starts on Construction related pathways, of which 1,331 were level 3 or above. With good numbers of young people studying STEM and Construction pathways at FE level, it's important that these individuals go on to valuable apprenticeships and entry level positions.
- (6.5) September 2021 brought the announcement⁶¹ that GM would receive £78m to retrofit public buildings. While the fund will be used across a variety of buildings in the public estate, many of the sites to be retrofitted under this scheme are schools. There is a good opportunity to use these projects to teach young people about the jobs and work involved in Retrofit on a live environment as new technology and fabric is installed in the schools. Bolton College⁶² already have good sustainability credentials, with solar panels, rainwater collection, and ground source heat pumps. On-site, some of these technologies are accessible to the students, with information boards next to the systems, detailing their working for students who are interested. This sort of inspiration and awareness building will drive more young people into choosing careers in the Green Economy.

Apprenticeships and Technical Education

- (6.6) Early 2021 saw the Institute for Apprenticeships and Technical Education (IfATE) create the Green Apprenticeships Advisory Panel (GAAP⁶³). This panel named a range of pathways⁶⁴ relevant to the Green Economy, which will be monitored and updated as the technology progresses, ensuring that

⁶¹ [GMCA](#) – September 2021

⁶² [Bolton College](#) – December 2021

⁶³ [IfATE](#) – May 2021

⁶⁴ [IfATE](#) – May 2021

the provision stays up to date. The panel will also explore the possibility of new apprenticeship pathways for specific occupations important to the Green Economy.

- (6.7) There are a number of apprenticeship standards in development which will directly serve Green Economy sectors. Upcoming and recently approved standards include the Domestic Electrician Level 3, Low Carbon Heating Technician Level 3, Landscaping Technical Manager L5, and Professional Arboculturist L6. These standards will contain content highly relevant to roles within the Green Economy – ensuring that employers and providers engage with these is critical to their success.
- (6.8) One apprenticeship still being developed will have a big impact for Green Economy employers and Retrofit in particular – the Low Carbon Heating Technician Level 3⁶⁵. Employers reported that at the moment, they have to train new starters on plumbing or other trade apprenticeships. However, these apprenticeship pathways aren't entirely appropriate – an installer of low carbon heating systems needs a wider range of skills than any particular trade. MCS⁶⁶ gathered an employer group (including GM employers like Groundtherm) to inform the content of this apprenticeship. Once released, it will be critical to ensure that GM providers and employers adopt this.
- (6.9) Many mechanics and vehicle technicians will take apprenticeship routes into their careers, usually specialising on either light or heavy vehicle repair and maintenance. There are no apprenticeships dedicated to hybrid or electric vehicle repair, but one of the common pathways⁶⁷ was updated over the past 2 years to include knowledge and skills around “Alternative fuels and hybrid and electric systems”. Employers reported that this will need to be continually reviewed as the vehicle market changes and impacts the way repair and maintenance is performed.

⁶⁵ [IfATE](#) – December 2021

⁶⁶ [InstallerOnline.co.uk](#) – May 2021

⁶⁷ [IfATE](#) – December 2021

Higher Education

(6.10) Given how new many Green technologies and processes are, the Green Economy has a strong link to universities. Researchers in Greater Manchester universities are leading the way in some areas. MMU's Fuel Cell Innovation Centre⁶⁸ focuses on the development of Hydrogen as a fuel, "exploring the pure science of the fuel cell itself", and "developing the technology talent of tomorrow". The University of Manchester's Sustainable Consumption Institute works to assess systems of consumption and production to "create more sustainable societies". The University of Salford will complete the Energy House 2.0⁶⁹ in 2022 – the "largest test and research facility of its type" to "play a leading role in the development of new low carbon homes and retrofit technologies". The University of Bolton ran its first Environment Sustainability week in November 2021⁷⁰, focusing on "The University's mission to be Green and Clean". University Academy 92 is consulting on course content, to ensure that the business professionals they produce can work in the Green Economy.

(6.11) Universities in the region already deliver a number of degree and post-graduate courses that are relevant for jobs in the Green Economy. These include the BSc Environmental Management (UoM/UoS), BSc Environmental Science (MMU), MSc Electric Vehicle Technology (UoB), and BSc Environmental Geography (UoS). While the student volumes on most of these courses are relatively small, there are a large number of students on degree programmes that indirectly support the Green Economy. These include the likes of Electrical Engineering, Construction Project Management, Civil Engineering, and Architecture.

(6.12) Employers reported a good level of skills among graduates from GM universities, particularly on the directly relevant environmental courses. Graduates have a strong awareness of climate change and the challenges

⁶⁸ [MMU](#) – December 2021

⁶⁹ [University of Salford](#) – December 2021

⁷⁰ [University of Bolton](#) – November 2021

with reaching Net Zero. Coupled with this, they generally have a desire to work in a role that has a positive impact on the environment (or at least in a role that doesn't have a strong negative impact).

- (6.13) The Universities of GM update and revise their curriculum and course content on a regular basis, and there is a desire within the departments to ensure that skills for the green economy are included. Degree programmes like electrical engineering are being updated to include references to battery technology, EV charging infrastructure, and local energy generation. Graduates will need these skills to work in the subsectors of the Green Economy in the future. Universities should continue to review their content, and link course content to the advanced research that is happening within the institutions.

Adult Education

- (6.14) GM's devolved Adult Education Budget covers a number of pathways that would be relevant for employers in the Green Economy. In 2021, as part of the work towards the Mayor's Retrofit Taskforce, AEB funding was made available for providers delivering relevant qualifications. Using the flexibility around Level 3 qualifications made possible by devolution, key qualifications like the Level 3 Diploma in Fenestration Installation, L3 Award in Solar Thermal Hot Water Systems, and L3 Certificate/Diploma in Environmental Sustainability are now funded through the Adult Education Budget. This further widens the options for relevant Green Skills provision in GM.
- (6.15) Programme data from GM's Adult Education provision reveal that 2,537 residents of GM completed a Construction related qualification between August 2020 – July 2021. These qualifications include BTECs, Certificates, Diplomas, and Awards, many of which are relevant to occupations within the Green Economy. For example, there were 122 Diplomas in Electrical Installation, 47 Diplomas in Insulation, and 64 Technical Certificates in Plumbing. With the push to Net Zero, flexibility in AEB provision, and encouragement of providers and residents to take advantage of the devolved funding GM will be increasingly important.

(6.16) The National Skills Fund includes funding towards various bootcamp style courses⁷¹ across a number of sectors – the Green Economy is one of these. While most bootcamps are indirectly relevant, there are a few bootcamp courses that are directly linked to jobs in the Green Economy. In GM, North West Skills Academy have been delivering an NSF funded Retrofit Bootcamp⁷² since the summer of 2021, training new entrants, young people, and career switchers to work on Retrofit projects. Other bootcamps touch other areas – Midlands-based Remit Training run a Heavy Vehicle Conversion Course⁷³ (decarbonising petrol/diesel vehicles to run on batteries) which is under the National Skills Fund. With the extension of the National Skills Fund in 2022-23, DfE intend to fund a wider variety of appropriate Green Skills programmes.

Commercial Provision

(6.17) There is a wide range of commercially available provision around the Green Economy and Environmental aims. Some of the wider skills needs involve speaking to organisations who sit outside the Green Economy about their carbon emissions and business processes. Many are starting to move towards renewable power, sustainable supply chains, and reducing waste. At corporate level, the rise of “ESG” (Environmental, Social, and Governance) principles guiding business investment has driven larger businesses to invest heavily in ensuring that their businesses processes and overall carbon footprint are moving towards Net Zero

(6.18) One recent successful programme has been the Carbon Literacy Project – an organisation which aims to educate industries around the importance of Net Zero, and some practical tools to achieve this. Successful programmes have been run with Manchester Metropolitan University, cultural centre HOME, and Great Places Housing Group. Skills for businesses to understand their own

⁷¹ [DfE](#) – January 2022

⁷² [NWSA](#) – December 2021

⁷³ [Remit Training](#) – December 2021

carbon footprint, and in particular, be able to calculate their footprint, are crucial for the transition to Net Zero. These skills are often best suited to short courses, which can be delivered on commercial grounds.

- (6.19) The Manchester Innovation Activities Hub, is the UK's first net zero industrialisation and electrification skills training centre for the transport, manufacturing and energy sectors. Recently funded under the "Getting Building Fund", it will form a critical part of the Green Skills landscape in GM and the wider region. Currently under construction, the £4 million centre will de-risk green tech innovations to accelerate clean growth through the upskilling, reskilling and retraining of people to fast-track them into hard-to-fill roles that require specialist technical skills. MIAH will also provide access to industrial grade equipment and Industry 4.0 technologies to help SMEs repivot, prototype and manufacture clean growth products, and scale up to achieve sustainable growth. With commercial courses under development, MIAH will deliver skills to a wide range of residents, focusing on key areas of demand like EV maintenance and repair, battery and energy storage, and automation.

In late 2021, a number of Community Renewal Fund projects were launched in GM. A project run by One Manchester, a social housing provider, aims to pilot a different model of employment and skills development in Green Economy sectors. The programme will see supported placements of 15 hours per week for around 3-4 months with Green Economy employers, or in roles linked to Green projects. With around a dozen employers already signed up to use the scheme and recruit staff, the programme intends to support 125 people into new roles within the Green Economy.

Participants are supported with a job coach, pre-employment support, and job-specific training. Sectors include Low-Carbon Buildings, Energy, Transport, and Natural Environment. Targeting hard to reach groups ensures that the opportunities will be accessible to a wider range of participants than other programmes.

While the programme is restricted to Manchester residents, if successful it will form a model of supported training and work-based placements leading to valuable employment outcomes in the Green Economy. One of the key benefits is that it allows employers to test new roles with very little risk – providing a funded position for a few months while the new starter upskills and gets real workplace experience. In addition, the programme will form a Green Employment and Skills Partnership for Manchester, bringing together some of the key employers and training providers to share best practice.

7. Summary

- (7.1) This section aims to collate the learnings and challenges for meeting the skills needs in the Green Economy. Given at the Executive Summary at the start of this report, the recommendations are for a range of stakeholders, including employers in the Green Economy, training providers, local government, and central government.
- (7.2) GM will see a number of environmental initiatives rolled out over the next few years – including the GM Local Energy Market, the Retrofit Accelerator, the IGNITION project, and the expansion of the Bee Travel Network. All of these will support the city region on the journey to Net Zero, with a target date of 2038. In 2015, the Tyndall Centre at the University of Manchester calculated that GM's total emissions to 2038 must total no more than 67Mt – the city is already 8.3Mt behind the trajectory for this target. Deep and rapid reductions in emissions are still required, particularly across buildings and transport emissions.
- (7.3) Ensuring that the skills support for the Green Economy is precise and sufficient is critical. Two skills elements are critical to the city region's path to Net Zero – the upskilling and expansion of the Green Economy workforce. Deployment of GM's devolved skills functions will be critical to this. The city region will need an increasing focus on key occupations in Net Zero transport solutions (EV rollout, rail electrification), Net Zero building and nature-based solutions (low carbon heating, urban drainage), and the adaptation of existing sectors (electrification of industrial processes, building resilience into waste, power, and water systems). Thousands of new roles will become available in some of these sectors, and many more will see significant changes in their day-to-day job roles.
- (7.4) The key challenges reported by employers to address the skills issues in the Green Economy are:

- **Current vs. future demand** – Employers generally want to be able to recruit skilled staff at exactly the point they need them (i.e. to have a ready pool of heat pump engineers to deploy at the start of a retrofit project). However, the skills system needs time to respond and train these workers, and is cautious about skills development for “future jobs”. This link needs strengthening, so that workers are trained up to the skill level needed at the moment demand increases. Employers need to be looking ahead to invest in new processes/operations and skills pipeline that will be needed.
- **Technical skills need** – The skills needed are generally STEM or technical skills. These roles are already in high demand from other sectors – over recent years the growth of financial, tech, and digital companies has increased competition for STEM skills. The number of young people opting to study these subjects has not increased in proportion.
- **Uncertainty around future** – While the importance of carbon reduction is becoming more accepted, this is yet to feed through to a cohesive government policy. Previous initiatives, subsidies, and funding have been piecemeal, which has damaged confidence in both the Green Economy, and training providers designing courses to meet the skills needs.
- **Slow accreditation** – Designing new accreditations, qualifications, and courses to meet skills needs has been too slow to meet employers’ needs. Development of new green tech areas like EVs, Low Carbon Heating, or nature-based solutions often outpaces the skills system. Employer involvement in the process is critical – requirements need turning into industry accepted accreditations, embedding within qualifications, then developed and delivered as courses. There are perhaps lessons to be learned from the digital sector, which shares similar problems.
- **Perceptions of “Green”** – To the general public, “Green” still means “Environmental”. “Green Careers” are ones which link directly to the environment. This is starting to shift, but needs accelerating so that young people and job seekers fully understand their options.

- **Poor or incomplete data** – Measurement of the size and shape of the “Green Economy” is difficult using current tools. SIC/SOC classifications are unsuitable for gauging the Green Economy. As a result, understanding the in demand roles and future growth of sub-sectors is difficult.

(7.5) Meeting the skills need for the Green Economy in Greater Manchester will be difficult and must address some of these challenges. Not all of these challenges can be solved at a city region level – some require national and systemic shifts. Deployment of devolved skills funding allows for some flexibility around the needs that local employers report. Focus in Greater Manchester should be given to meeting the skills needs for employers working towards the decarbonisation of buildings and transport – these are the areas of biggest change.

(7.6) In addition to the growth of roles in the Green Economy, the journey to Net Zero will result in a range of changes across existing sectors. Figure 9 below shows the changes expected in occupations across 9 key sectors, ordered by the amount of change Net Zero will have on occupations and operations in the sector.

Limited Change	Medium Change	High Change
Health & Social Care <ul style="list-style-type: none"> Ageing population increasing demand in most roles Nurses, social workers & care workers in high demand Little direct impact 	Public Sector / VCSE <ul style="list-style-type: none"> Waste and council services will see some impact Policing, fire services unlikely to see much change Growth of community groups 	Construction / Infrastructure <ul style="list-style-type: none"> Large shifts for engineers, architects, designers New roles and different skills needs for most tradespeople Energy infrastructure skills
Hospitality / Leisure / Culture <ul style="list-style-type: none"> Sector short staffed in most roles, particularly kitchen staff Automation in some areas Chefs & front of house staff roles unlikely to change 	Finance & Professional Services <ul style="list-style-type: none"> Supporting “green” professional services – financing options, law Accountants & Insurance may see change in content of work Environmental consultancy 	Logistics / Transport <ul style="list-style-type: none"> Vehicle maintenance with shift from ICEs to EVs for logistics fleets and warehousing Electrification and maintenance of train/tram networks
Education <ul style="list-style-type: none"> Teaching staff unlikely to see any material change School facilities staff may have new duties Careers guidance in GE 	Digital / Tech <ul style="list-style-type: none"> Rapid pace of change in sector Innovation and digital solutions likely to be common Importance of software, cybersec, data analysis 	Manufacturing <ul style="list-style-type: none"> Some changes in automation and low-carbon manufacturing Skills gaps in certain technical roles e.g. advanced materials. Trend towards industry 4.0

Figure 9 – Decarbonisation impact on other sectors

- (7.7) Generally speaking, human-based service sectors like Health and Social Care, Hospitality, and Education will see little change. There will be some additional awareness and skills needed among maintenance teams, but the majority of roles in these sectors, like Nurses, Doctors, Social Care Assistants, Chefs, Bartenders, Waiters, Teachers, Tutors, etc. will see few changes in their job roles as a result of Net Zero.
- (7.8) The three sectors in the middle which will see medium levels of change are Public Sector / VCSE, Finance and Professional Services, and Digital/Tech. On the journey to Net Zero, many public and third sector workers will be involved at all levels of government, and particularly in research departments at universities. Shifts in financing and other professional services like insurance and legal will be necessary as legislation, subsidies, and investment habits change. In addition, much of the move to Net Zero will involve the digitalisation and automation of existing infrastructure and systems to make them “smart” and more efficient. Skilled software developers, data analysts, and cybersecurity experts will see shifts in their roles as more parts of the economy start to move towards Net Zero.
- (7.9) Sectors which will see significant change have been covered in more detail earlier in this report – they include Construction/Infrastructure, Logistics/Transport, and Digital/Tech. Much of the changes needed to reach Net Zero are in Infrastructure (upgrading of homes, upgrading of the grid, installation of additional energy generation and storage), and in Transport (electrification of rail and road transport). Manufacturing is generally categorised as a “High Carbon” section of the economy – there is already a lot of work ongoing in many organisations to decarbonise and streamline production processes, such as using hydrogen fuel cells instead of furnaces, or installing local energy storage to power production.
- (7.10) To conclude, with a growing Green Economy, a strong base of research and innovation, and some leading Green companies, Greater Manchester is in a fairly good position to work towards Net Zero. GMCA will continue work to ensure that policy and funding supports the aims of this critical sector.

8. Next Report

- (8.1) Intelligence gathering will be an ongoing activity for GMCA and partner stakeholders. The data and intelligence gathered as part of this report will be enhanced and added to as the sector, policy landscape, and economic situation develops. With the unique importance of the Green Economy, this work will form the basis for many future projects, as GMCA aims to ensure that businesses and residents in the city region can contribute to reaching Net Zero and take advantage of the opportunities it brings.
- (8.2) Areas which may require deeper research and intelligence gathering include:
- *Sub-Sector Differences* – Earlier sections of this report have shown the Green Economy is made up of sub-sectors. Given the differences in the level of decarbonisation efforts, technologies involved, and skills needed, a deeper look at sub-sectors may be worthwhile.
 - *Policy Impact* – Given that policy and subsidies are central to driving demand for the shift towards Net Zero, it may be worthwhile revisiting the sector as these shift.
 - *Fluctuating Demand* – With demand for Green Economy services fluctuating but generally trending upwards, this may have an impact on the skills picture. How this smooths out over the next few years will have a big impact on the 2038 GM and 2050 National Net Zero targets.
 - *Technological Developments* – As a sector driven by new and frontier technology, it is expected that further developments will shift skills and labour demands. As businesses explore the utility of both near- and long-term alternative green tech (e.g. sustainable aviation, carbon capture techniques, fusion or other renewable energy generation, land management developments), the skills requirements will change.