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THE IMPACT OF LOGISTICS SITES IN THE UK

A report prepared for Amazon and supported by Logistics UK

07 JUNE 2022

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FOREWORD

The smooth delivery of goods across the country is something that those in the UK logistics industry know is a huge accomplishment every day. For those outside the sector, the pandemic may have been the first time they'd given it much thought. I'm hugely proud of the work that everyone at Amazon, and the whole sector, did to support local communities during the pandemic, and we wanted to commission this report in order to capture and share the importance of that contribution to the UK as we look toward the sector's future.

The growth of the UK logistics industry over the last decade is astonishing: adding over 600,000 jobs across the UK, which is equal to the population of Manchester. These jobs are distributed right across the country, and not focused in London or other urban centres. The smooth running of this sector is central to every aspect of modern life, and the workers in logistics should be recognised and respected for that contribution.

As the report finds, the UK logistics industry not only creates jobs nationwide, but it creates more jobs than other sectors in the parts of the country that have been identified by the Government as 'Levelling Up' priorities. And the impact on opportunity continues beyond the industry itself: every 1,500 logistics workers in an area supports a further 1,000 jobs in the supply chain, service providers, and other businesses in the local community.

Our industry offers high quality careers, not just jobs, and the opportunities that are created in logistics are also a driver of social mobility. Qualifications are not a barrier to entry, and the sector has more managers without degrees than the rest of the economy. At Amazon, we work hard to attract new talent to the industry and create opportunities to allow our existing employees to advance their own careers. From our 1,500 new apprentices this year, through to our Career Choice skills programme (which funds 95% of the cost of training for in-demand skills), there are many ways into logistics roles at Amazon, and many ways up once you're here. In fact, opportunities for career development were the top reason that people chose to join Amazon in a recent survey of our new hires.

When I travel to our sites across the UK I get to meet many people who work in this thriving and vibrant sector, and who love what they do. From those at the beginning of their career, like Fionnula from Belfast, who joined us from university and is now a Change Manager, to people like Terry, who'd worked in an accounting for 30 years, but when that ended found a new role with us with us as an Area Manager, and is now pursuing his Chartered Management Degree Apprenticeship.

It's our hope that this report will improve the understanding of what the UK's logistics sector already contributes to the country, increase appreciation for the hard work and dedication of the industry's employees, and build excitement and awareness for the many opportunities it offers people and local communities right across the country.

John Boumphrey
UK Country Manager, Amazon

EXECUTIVE SUMMARY

This report, commissioned by Amazon and supported by Logistics UK, provides an independent analysis of the economic, social and environmental impact of the logistics industry in the UK. Over the last two years, the Covid-19 pandemic has highlighted the role of the industry in ensuring that goods are available to consumers through brick-and-mortar stores and online delivery, and supporting the continuity of supply chains including the distribution of Covid-19 tests, vaccines, and personal protective equipment (PPE). In this report, we look at the current state of the industry and its evolution over the last ten years. We assess its influence on the economic and social outcomes of local areas of the UK, and its contribution to the UK Government's ambitions to deliver growth that creates high-quality jobs across the UK ("levelling up") and support the economy's transition to net zero.

FIGURE 1 SUMMARY OF FINDINGS

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OUR APPROACH

We define logistics as "activities required for the storage and transportation of goods by road and rail". We focus in particular on the local impact of logistics sites such as distribution centres. This excludes other forms of transport, such as air and sea freight, which are also important but less frequently used for moving goods within the UK.

Our findings are based on a combination of quantitative and qualitative analysis, including:

- Analysis of data on employment from the Office for National Statistics' (ONS) Business Register and Employment Survey (BRES) and Annual Population Survey, and data on online job postings, provided by Emsi Burning Glass ("EBG data");
- A new independent survey of workers in logistics, undertaken by YouGov;
- In-depth interviews with industry stakeholders; and
- A review of the social and environmental commitments of major logistics operators.

LOGISTICS IS A LARGE AND GROWING INDUSTRY ACROSS THE UK

Logistics is one of the largest industries in the UK, employing **1.25m people,** 4.1% of all UK jobs.[1] This includes around 690,000 people employed in the "core" industry (e.g. third-party logistics companies), and a further 550,000 employed by other companies (e.g. retailers or manufacturing companies with their own distribution operations). To put this into context, **employment in the logistics industry is likely to surpass the English NHS (which currently employs around 1.4m people) by 2023**.[2] The industry generated around £48bn in Gross Value Added in 2021.

Employment in logistics **has nearly doubled since 2012**, outpacing the rest of the UK economy. Logistics has added the most jobs in the UK among industries of comparable size between 2012 and 2021, and comes second among all industries in terms of jobs added in this period.[3] Logistics growth pre-dates the COVID-19 pandemic, but the last two years have seen a particular acceleration in logistics employment: latest figures show that between 2019 and 2021, the number of people employed in logistics has grown by 190,000, an 18% increase.[4]

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[1] This figure focuses conservatively on the definition of logistics set out above, which excludes related activity such as, for example, air transport. As a result, this figure is smaller than other estimates that adopt a broader definition, such as Logistics UK's Logistics Report 2021, which puts logistics employment at 2.56m in 2021.

[2] Assuming that growth of logistics continues at the same average rate of the last 10 years – a conservative assumption given the acceleration observed in the last two years. The NHS employs 1,366,205 people according to the latest NHS workforce statistics, which cover the period up to November 30th, 2021, and were published on March 3rd, 2022.

[3] This compares logistics as defined in our study with the highest level Standard Industrial Classification (SIC) codes. This comparison is not perfect because for logistics we include some jobs outside the "core" SIC codes. However, the finding that logistics ranks very high in terms of percentage employment increase holds regardless of the specific definition of the industry. If we look at two-digit SIC codes (the second-highest level codes), the percentage increase in logistics would be second-highest.

[4] When looking at the growth of logistics over time, we generally use 2012 as the starting point as this is the first year for which detailed data on online job postings was collected. Note: recent ONS analysis reports growth in transport and storage employment at 20% between December 2011 and December 2021. This is slower growth than the logistics growth identified by our analysis. The

Logistics activity is more geographically balanced across the UK than other industries. As a result, the industry contributes to reducing regional inequality in employment and pay, recently highlighted by the government's Levelling Up White Paper:[5][6]

- All regions in Great Britain include local authorities with a significant logistics presence. **Three in four local authorities in Great Britain host at least 1,000 logistics jobs**.[7]
- Moreover, logistics jobs are **less likely than other jobs to be based in London** (which accounts for 17% of all non-logistics jobs and 8% of logistics jobs).
- Although there is a high density of logistics jobs in the Midlands, this region accounts for only 21% of all logistics jobs in the UK. The **North West of England, Yorkshire and the Humber, the East of England and the South East of England each account for around 10% of logistics employment** in the UK.
- In many local areas, logistics is an essential source of employment: **the industry accounts for at least 10% of total jobs in 38 local authorities** (around one in ten Great Britain local authorities).
- In the last 10 years, logistics employment has broadened its geographical reach. **There are now 124 local authorities where logistics accounts for at least 5% of jobs, up from 58 areas in 2012**, as shown in the map overleaf.

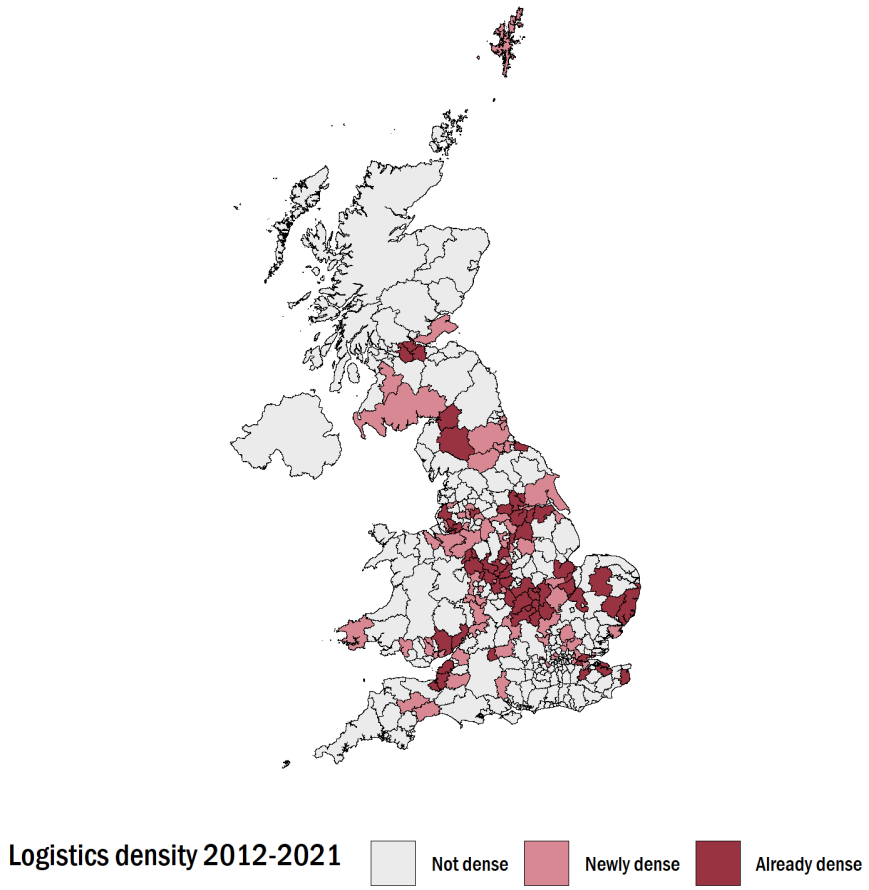
reason for this is that the ONS analysis looks at transport and storage as a whole, including sub-sectors that are excluded from our analysis, for example air transport and passenger transport, which have grown at slower rates than freight by road and rail and warehousing, which are included in our definition of logistics.

[5] Source: Frontier analysis of BRES and EBG data.

[6] HM Government, Levelling Up White Paper 2022

[7] Data constraints mean that local authority-level analysis is for Great Britain only: for Northern Ireland, statistics are calculated at a regional level.

FIGURE 2 EVOLUTION OF LOGISTICS DENSITY OVER TIME, 2012-21

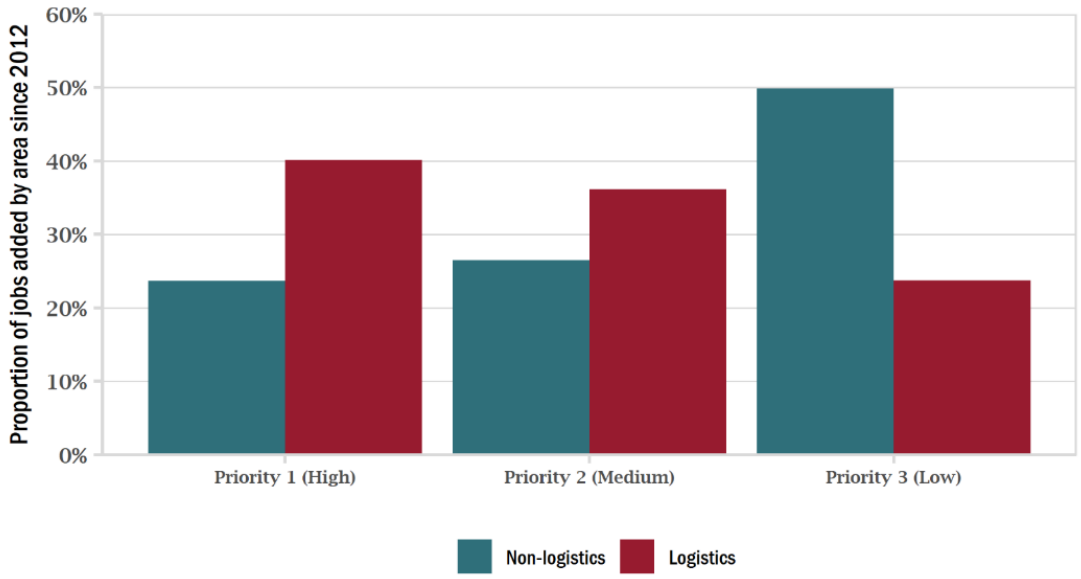


Source Frontier analysis of: BRES 2012-2020; LFS 2020-2021; EBG data

Much of the growth of the industry is in high priority areas for the government's levelling up agenda. As shown in the figure overleaf, since 2012 the logistics industry has added more jobs in priority-1 areas than in any other areas of the UK, in contrast to non-logistics industries.[8] Around four in 10 new logistics jobs since 2012 have been added in high priority areas, compared to only one in four in other industries.

[8] Source for levelling up prioritisation: Levelling Up Fund, Prioritisation of places methodology note. Priority-1 areas that have added over 2,000 logistics jobs in this period include, for example, Kettering, Newport, Sunderland and Wakefield.

FIGURE 3 EMPLOYMENT GROWTH BY LEVELLING UP PRIORITY CATEGORY



Source: Frontier analysis of: BRES 2012-2020; LFS 2020-2021; EBG data; Levelling Up Fund Index
Note: Each Local Authority is assigned a category number according to their priority for receiving Levelling Up Funds

LOGISTICS JOBS PROVIDE GROWTH OPPORTUNITIES FOR PEOPLE WITH LOW FORMAL QUALIFICATIONS

The current context of the UK labour market is one of stagnating earnings over time for most workers, and in particular for those with relatively low pay, whose earnings are still at or below their 2008 level.[9] Pairing this with the increases in cost of living experienced in early 2022[10], it is particularly important to assess whether logistics jobs provide opportunities for social mobility, enabling access to high-quality jobs and enabling progression within the job.

We find that the employment created by logistics sites includes a variety of job roles, from entry-level (e.g. warehouse operatives and warehouse associates) to administrative (e.g. logistics coordinators) and managerial roles (e.g. warehouse manager). These jobs pay as much as, or more than, other jobs in the same occupational categories (as defined by the ONS). **Entry-level jobs, in particular, are relatively well paid**: median annual pay is around £22,000, compared with £15,000 across all jobs in the same occupational category.[11] There is initial evidence, from online job ads, that pay in logistics further increased in 2021 relative to other jobs, driven by changes in pay for drivers of heavy goods vehicles

[9] Source: ONS (2022). Labour market overview, UK: April 2022; Cribb, J. & Johnson, P. (2019). Employees' earnings since the Great Recession: the latest picture. Institute for Fiscal Studies Briefing Note BN256.

[10] The Consumer Prices Index has increased by 6.2% in the 12 months to March 2022. Source: ONS (2022). Consumer price inflation, UK: March 2022.

[11] This is calculated by finding the median pay for Standard Occupational Code 9: Elementary Occupations. This includes among others warehouse operative, warehouse associate roles and equivalent which are considered as entry-level jobs in logistics. Source: Frontier analysis of Office for National Statistics' data from the Annual Survey of Hours and Earnings.

(HGVs) and operators of fork-lift trucks, at the same time as total logistics employment expanded significantly.[12]

Logistics provides opportunities for people who may not otherwise be in work. Our independent survey undertaken by YouGov indicates that 20% of people currently in logistics were previously unemployed.[13] In this group, one in four was long-term unemployed.[14]

Workers in entry-level jobs, and more broadly workers with low levels of formal qualifications, can create careers in logistics:

- We estimate that **around 35,000 people in 2021 progressed to a managerial role in logistics** (from a previous non-managerial role in the industry)[15]; and
- **Almost two-thirds (63%) of logistics managers do not have a university degree**.[16]

Moreover, logistics **jobs provide workers with valuable skills.** Almost all logistics workers have received training (87%), and 59% of them think this training would be useful if they started a new job with a different employer.[17]

Skills provision often takes place through **apprenticeships**, an important pathway for both upskilling workers and providing job opportunities in the logistics industry: Logistics UK data in the Skills and Employment report 2021 shows that there were almost 6,000 logistics apprenticeship starts in England in 2020/21.

Our survey shows that logistics workers are net satisfied across all aspects of their job.[18] This applies not only to pay but to other facets of their jobs, such as their **ability to use initiative**, **job variety and job security**. For example, 56% of workers are either fairly or very satisfied with their ability to use initiative. Our survey also showed that logistics workers are **more satisfied with their current job than with their previous job.**

[12] Source: Frontier analysis of EBG data.

[13] Sample size: 319 logistics workers.

[14] Defined as unemployed for more than six months.

[15] Source: Frontier analysis of EBG, BRES and YouGov survey data. The survey shows that 50% of people in a managerial logistics job were promoted from a non-managerial role in logistics; combining BRES and EBG data indicates that around 70,000 new logistics managerial roles opened up in 2021.

[16] Source: Frontier analysis of YouGov survey data. This statistic is calculated based on current logistics managers and workers who had been a logistics manager in the past five years, and based on 62 survey responses. The sample size for current logistics managers is relatively small (44) and using only this group we find that 65% do not have a university degree.

[17] Source: Frontier analysis of YouGov survey data.

[18] Net satisfaction is defined as the difference between workers who are “fairly” or “very” satisfied and those who are “fairly” or “very” dissatisfied. We found that across all aspects of logistics jobs we asked about, there are more satisfied than dissatisfied workers.

LOGISTICS SITES GENERATE WIDER BENEFITS FOR THEIR LOCAL COMMUNITIES

Looking beyond the size, distribution and characteristics of logistics jobs, we investigated the role of logistics in driving economic growth and positive social outcomes more broadly in the local communities that host logistics sites.

Logistics sites vary in size and location. They include large distribution centres, which typically employ over 1,000 people, as well as smaller local distribution hubs, which typically employ 100 to 400 people and are often closer to the end point of the goods' journey. For all types of sites, opening and operating a new logistics site is linked with additional economic activity beyond the site. For example, we estimate that **a new site employing around 1,500 people would generate an additional 1,000 jobs in the local area**.[19] Additional jobs can result from indirect and induced effects:

- Indirect effects come from supply chain links: a new site requires a range of inputs from the manufacture, servicing and repair of machinery and motor vehicles to catering, cleaning and security services. Our in-depth interviews indicate that many of these services are provided by local workers.
- Induced effects stem from the purchasing power of people employed at the logistics site, many of whom, as described above, may have previously earned less or may not have been working at all.

More broadly, our analysis shows that logistics employment has grown substantially in areas that recorded poor economic performance in the 10 years prior to the 2008-10 recession. Since then, areas with high logistics density have grown faster than other areas of the UK in both GDP per capita and overall employment, despite **starting conditions that were not especially favourable.** Logistics-dense areas are relatively sparsely populated, located outside city centres, and residents tend to have lower formal qualifications – all characteristics that are linked with slower economic growth.

We estimate that high logistics density is linked with **1.3 percentage points additional GDP per capita growth** over the 2012-19 period, relative to areas with lower logistics density and comparable starting conditions.[20] To put this into context, this is equivalent to adding an extra year of GDP per capita growth to logistics-dense areas or an additional £300 per year per person per year in the local area.

The logistics industry also **engages with the local community** beyond those who work in the sector. This includes **upskilling initiatives** that extend beyond the logistics workforce, **distributing essential goods**, **donations to and partnerships with local charities**. Examples of broad upskilling initiatives include the academy at the iPort Logistics Park in Doncaster, which links employers and residents through training and recruitment.[21] This is seen as a valuable service for local people.[22] Logistics companies of all sizes support hundreds of local charities and communities across the UK each year. This includes logistics companies

[19] This is based on econometric analysis conducted as part of this study to estimate how total employment in a local area is related to the presence of logistics sites. This is a conservative approach compared to the use of available indirect and induced multipliers from the economic literature, and the focus is on the long-term impact of logistics sites (1-7 years from opening) rather than the short-term impact (e.g. construction jobs created when the site is being built).

[20] This analysis uses 2019 as the end point as this is the latest year for which ONS data on GDP per capita is available at the local authority level.

[21] https://www.iportacademy.co.uk/

[22] Finding from case study interviews with Doncaster District Council and Doncaster Chamber of Commerce.

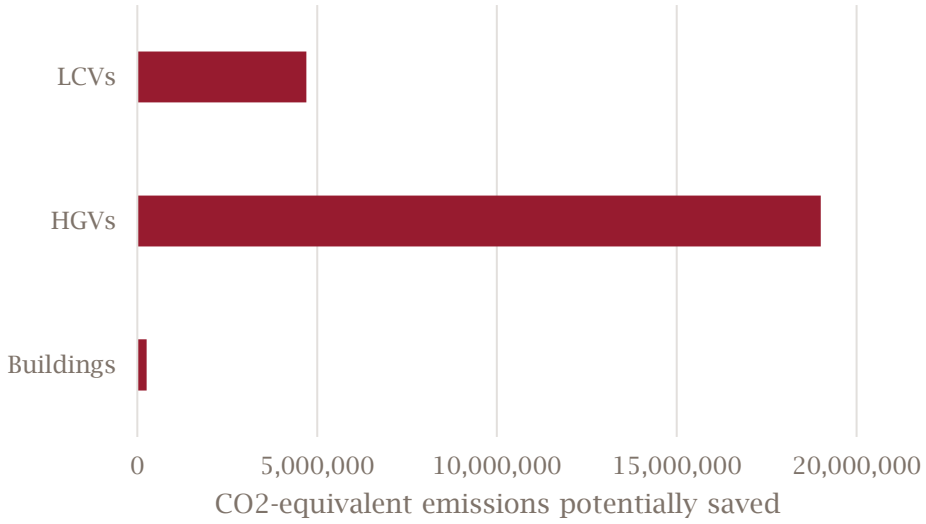
using their expertise to support local communities. For example, Amazon is working with local charities and businesses in Fife, Scotland to deliver essential goods to vulnerable households by providing a £150,000 grant and supporting the creation of a new warehouse site to process deliveries.[23]

THE LOGISTICS INDUSTRY HAS STARTED ITS TRANSITION TOWARDS NET ZERO EMISSIONS

The logistics industry is rising to the challenge of getting to net zero, **with multiple operators committing to do so by 2040**, earlier than the nationwide 2050 target set by the UK government. In this report, we estimate that the logistics industry's transition to net zero should generate large CO2 savings and contribute significantly to the decarbonisation of the UK economy as a whole.

We focus on three key source of emissions: Light Commercial Vehicles (LCVs); Heavy Goods Vehicles (HGVs); and logistics buildings. We also focus on scope 1 and 2 emissions, which are more directly within the control of logistics companies.[24]

FIGURE 4 POTENTIAL CO2 SAVINGS FROM DECARBONISING LOGISTICS



Source: Frontier analysis of Department for Transport data on vehicle emissions (2019), Savills data on warehouse space by sector (2021) and Department for Business, Energy and Industrial Strategy data on energy efficiency (2021) National Energy Efficiency Data-Framework

Around 20% of vehicle emissions in logistics originate from LCVs. Logistics companies have started to reduce their reliance on petrol and diesel LCVs, adopting electric LCVs and exploring alternative last-mile delivery models that involve bicycles, electric scooters and consolidated collection points:

[23] https://www.aboutamazon.co.uk/news/community/amazon-to-help-more-than-13-000-families-across-fife-in-scotland-with-product-donations

[24] Scope 1 emissions are direct GHG emissions that occur from sources controlled by an organisation. The most common sources are natural gas for heating, refrigerants and vehicle fuel. Scope 2 emissions are indirect GHG emissions from the purchase of electricity, steam, heat, or cooling that occur at the site of generation rather than the site of use. Scope 3 emissions are indirect GHG emissions that are the result of activities from assets not controlled by the reporting organisation, but that the organisation indirectly impacts in its value chain. A comprehensive analysis of emissions along the entire logistics supply chain is beyond the scope of this report.

- From the public commitments of three major operators alone, 20,000 electric LCVs would be operational in the UK by 2030; and
- The public pledges of logistics companies suggest that it may be possible for all LCVs used by major logistics operators to be electric LCVs by 2040.

If **all LCVs in the logistics industry were converted to zero-emission vehicles (electric LCVs or lighter vehicles such as bicycles), this would reduce emissions by 4.7MtCO2e per year**, which is 19% of all annual logistics vehicle emissions and 4% of all annual UK transport emissions.[25]

Around 80% of vehicle emissions in logistics originate from HGVs. Decarbonisation of HGVs is more challenging than for LCVs, as the supply of zero-emission HGVs is relatively limited.[26] Current actions to reduce reliance on petrol and diesel HGVs include:

- Two major logistics operators piloting electric HGVs, and Amazon using five electric HGVs to directly replace diesel lorries in their UK operations; and
- Commitments made by eight of the top 12 logistics operators to increase the proportion of their fuel that comes from alternative sources such as bio-Compressed Natural Gas (bio-CNG).

Using alternative fuels can bring significant benefits in the short term. For example, **using bio-CNG for half of the HGV fleet would cut tank-to-wheel emissions by around 9 MtCO2e per year**, which would represent 40% of all logistics vehicle emissions and 8% of all UK transport emissions. In the long-term, zero-emissions logistics fleets are more likely to include electric and hydrogen-fuelled HGVs. **Converting all HGVs to electric vehicles would reduce UK carbon emissions by about 19 MtCO2e, around 16% of all annual UK transport emissions**.[27]

After vehicles, the largest sources of emissions for the logistics industry are electricity consumption and heating for buildings. Efforts are being made to decarbonise in these areas by purchasing renewable electricity and sustainable gas, as well as by installing renewable electricity generation technologies such as solar panels and wind turbines. Fully decarbonising electricity and heating in buildings would lead to **a reduction of at least 260,000tCO2e in carbon emissions each year**, which is equivalent to **decarbonising heating in 70,000 homes and decarbonising the electricity that is used by 90,000 offices**.[28]

Significant challenges to the industry's transition to net zero remain. For example:

- The scale of change required: for example, phasing out all petrol and diesel LCVs by 2030 would involve removing 50,000 vans a year across the industry, 20,000 of which would be taken off the

[25] Source: Frontier analysis of Department for Transport data on 2019 vehicle emissions.

[26] For example, the Department for Transport's Consultation on when to phase out the sale of new, non-zero emission heavy goods vehicles stated that "The very first zero emission HGVs above 26 tonnes are arriving on the UK market, designed for specific, short range use cases."

[27] Source: Frontier analysis of Department for Transport data on 2019 vehicle emissions.

[28] Source: Frontier analysis of Savills data on warehouse space by sector and BEIS (2021) Non-domestic National Energy Efficiency Data-Framework (ND-NEED). Further detail on our calculations is available in Annex A.

road before the end of their useful lifetime.[29] Moreover, logistics operators would need to install up to 120,000 chargepoints at their depots to power these vehicles.[30]

- The readiness and scalability of clean technologies, particularly for HGVs. Electric HGVs lag significantly behind LCVs in their development: their autonomy range is relatively limited compared to the distances that have to be covered.

Given this context, achieving and accelerating the industry's transition is likely to involve significant investment and actions from the industry, government and broader stakeholders.

THERE ARE ACTIONS THAT COULD INCREASE THE BENEFITS OF LOGISTICS SITES TO THE UK

The analysis described in this report shows that the logistics industry creates a very large number of jobs that provide opportunities for upward social mobility across the UK and makes a positive contribution to the economic and social outcomes of its local communities. We also described the potential impact of current and future planned efforts to improve the environmental sustainability of the industry. This is clearly relevant to two key ambitions set out by the UK government: to reduce inequality across the UK (level up) and to cut the UK's carbon emissions to zero by 2050.

Our analysis has shown that the industry is making a positive contribution to these ambitions, and that this contribution could be further enhanced through actions taken by the industry, local and central government, and broader stakeholders.

To **further enhance the logistics industry's contribution to levelling up, all stakeholders (industry and government) could**:

- Provide skills and inclusion initiatives to ensure that local communities can benefit from the jobs created through logistics investment, including both entry-level roles and higher-paying roles that require higher levels of qualifications and experience.

- Work to maximise the efficiency and effectiveness of logistics hubs, including setting up shared facilities and coordinating to ensure effective utilisation of these facilities, while minimising any unintended effects on those outside the industry (e.g. road congestion). This would boost productivity in the sector and in the local area.

For **local and central government in particular**, promoting the growth of logistics activity and related employment creation could include:

- Ensuring availability of physical space with planning permission for logistics sites;

[29] This is a conservative figure as it assumes an average 13-year lifespan of an LCV, which is likely an overestimate of the useful life of LCVs for logistics operations. According to our conversations with industry sources, the useful life is closer to five than to 10 years. Detailed methodology outlined in Annex A.

[30] Methodology outlined in Annex A.

- Supporting the accessibility of logistics sites through public transport. This would enable people in the area who do not live nearby and do not have private means of transportation can easily take up the jobs being created by the industry. Reducing reliance on cars is also good for sustainability.

- Maintaining and expanding supporting transport infrastructure (road, rail and air).

To maximise the economic and social impact of the industry, these actions could usefully focus on increasing logistics activity in areas that have recently struggled to generate employment, in particular jobs that pay above the national minimum wage. These areas are especially likely to benefit from new logistics sites. Existing conditions of local areas could be taken into account by logistics employers seeking to maximise the impact of new sites on local communities, and by policymakers and planners in their decisions around skills, transport, and development.

To further enhance the logistics industry's contribution to achieving net zero, the logistics industry could:

- Continue to work with vehicle manufacturers to test and adopt low- and zero-emission vehicles; and

- Continue to experiment to understand what works best in decarbonising distribution journeys, including not only adoption of electric vehicles but broader re-design of distribution models, including for example increased use of consolidated collection points;

Central government and broader stakeholders could:

- Support investment in the development and deployment of low-emission vehicle technologies; and

- Work with industry to deliver significant investment in charging infrastructure at distribution centres and in public spaces, required to achieve electrification.

GLOSSARY

Key terms used in this report include the following:

- **Distribution centre**. A relatively large warehouse or other specialised building that stores goods temporarily, before they are transported to a brick-and-mortar store, to customers' homes, collection points, or other logistics sites.
- **Heavy Goods Vehicle (HGV)**. A commercial vehicle that weighs over 3.5 tonnes.
- **Last-mile**. The last leg of a good's distribution journey, typically starting from a distribution centre or local distribution hub.
- **Light Commercial Vehicle (LCV)**. A commercial vehicle that weighs up to 3.5 tonnes.
- **Local distribution hub**. A smaller (compared to the case of a distribution centre as defined above) warehouse or other specialised building that stores goods temporarily before they are transported to a brick-and-mortar store, to customers' homes, or collection points. Local distribution hubs are typically located closer to urban centres than distribution centres.
- **Logistics and logistics industry**. In this report, we define "activities required for the storage and transportation of goods by road and rail". We focus in particular on the local impact of logistics sites such as distribution centres. The logistics industry as defined in this report includes third-party logistics companies, distribution centres and the transportation of goods to bricks-and-mortar retail stores and to fulfil online orders. This excludes other forms of transport, such as air and sea freight, which are also important but less frequently used for moving goods within the UK. We also exclude the delivery of mail and takeout food.
- **Middle-mile**. The earlier leg of a good's distribution journey within the UK, which may start from a manufacturing facility, port, airport, rail terminal, distribution centre.

1 INTRODUCTION

This report, commissioned by Amazon and supported by Logistics UK, provides an independent analysis of the economic, social and environmental impact of the logistics industry in the UK.

We define logistics as "activities required for the storage and transportation of goods by road and rail". We focus in particular on the local impact of logistics sites such as distribution centres. The logistics industry as defined in this report includes third-party logistics companies, distribution centres and the transportation of goods to bricks-and-mortar retail stores and to fulfil online orders. This excludes other forms of transport, such as air and sea freight, which are also important but less frequently used for moving goods within the UK. We also exclude the delivery of mail and takeout food.

When referring to jobs in the logistics industry, we include both:

- **Employment in the core logistics industry**: workers at firms predominantly engaged in logistics activities, for example a purchasing manager employed by a warehousing and distribution firm.[31]
- **Related logistics jobs**: workers carrying out logistics-related occupations who are not necessarily employed by a logistics-oriented firm. For example, an HGV driver employed by a retailer would be included in this category.[32]

- This definition focuses on the jobs predominantly at or around logistics sites, ranging from larger warehouses to smaller distribution hubs. This reflects our particular interest in the local social and economic impact of these sites. Our approach complements existing evidence on the footprint of the logistics industry, which, as is the case with reports published by Logistics UK[33], typically uses a broader definition (including, for example, postal activities and transport by sea).

1.1 OUR APPROACH

The study is based on a combination of quantitative data analysis and desk research. The sources of evidence used for our analysis include:

[31] In UK public data sources, firms are typically categorised according to the Standard Industrial Classification (SIC). Firms are assigned one SIC code based on their primary activity. SIC codes divide activity into sectors such as manufacturing, construction, etc. Employment figures based on SIC codes will include total employment of the firms operating within that industrial sector. We define the core logistics industry as the following three-digit SIC codes: '49.2: Freight rail transport'; '49.4 Freight transport by road and removal services'; and '52.1 Warehousing and storage'. These SIC codes make up part of the higher level 'Transportation and Storage' SIC code.

[32] The Standard Occupational Classification (SOC) categorises jobs according to activity (as opposed to the SIC, which is based on the activity of the employing firm). We define relevant SOC codes following those identified by Logistics UK, although we exclude postal workers and couriers. This includes the following nine SOC codes: '8211: Large goods vehicle drivers'; '1133: Purchasing managers and directors'; '1161: Managers and directors in transport and distribution'; '1162: Managers and directors in storage and warehousing'; '3536: Importers and exporters'; '4134: Transport and distribution clerks and assistants'; '8212: Van drivers'; '8222: Fork-lift truck drivers'; '9260: Elementary storage occupations'.

[33] The broader definition of logistics used by Logistics UK includes postal delivery and couriers for road, wholesale, warehousing and cargo, rail, sea and inland waterways and air logistics.

- Analysis of data on employment in the industry from the ONS's Business Register and Employment Survey (BRES) and Annual Population Survey;
- Analysis of data on online job postings for vacancies in logistics and other industries, provided by Emsi Burning Glass (EBG data);[34]
- A new independent survey of 319 workers in logistics, commissioned as part of this study and undertaken by YouGov;
- In-depth interviews with industry stakeholders; and
- An extensive review of publicly available documents on the social and environmental commitments of major logistics operators.

1.2 STRUCTURE OF THIS REPORT

This report is structured as follows:

- Section 2 discusses the economic footprint of the logistics industry, including the number, geographical distribution and key characteristics of logistics employment in the UK, and how this has changed in the last 10 years.
- Section 3 describes the contribution of logistics jobs to social mobility, and reports on logistics workers' perceptions of their jobs.
- Section 4 looks at the wider contribution of logistics sites to their local area, in terms of economic outcomes, including employment and output, as well as community engagement and skills provision;
- Section 5 describes the industry's planned transition towards net zero carbon emissions and the opportunities and challenges this presents; and
- Section 6 concludes and summarises the implications of this report for the logistics industry and for policymakers.

[34] Please see Annex A for a detailed description of EBG data.

2 THE ECONOMIC FOOTPRINT OF LOGISTICS

This section describes the economic footprint of the logistics industry in the UK.

2.1 DISTRIBUTION AND GROWTH OF LOGISTICS EMPLOYMENT IN THE UK

2.1.1 OUR APPROACH

As described in the introduction, throughout this report we define the logistics industry as "activities required for the storage and transportation of goods by road and rail".

We estimate the level of logistics employment by local authority area from 2012 to 2021 based on a combination of data sources: the Business Register and Employment Survey (BRES), the Labour Force Survey and online job postings from Emsi Burning Glass (EBG data). Combining these sources gives us a level of granularity not available from public data sources only:

- Industry: The BRES data on logistics employment is based on Standard Industrial Classification (SIC) codes, which classify firms according to their primary activity. We use EBG data to estimate the additional employment in logistics-related occupations outside logistics SIC codes. This allows us, for example, to capture van drivers engaged in logistics-related activities for a retail firm who would not otherwise be recorded in the data.
- Time: The BRES data is available only up to 2020. We extend estimates to 2021 using EBG and Labour Force Survey data.
- Geography: Detailed data across both industries and occupations is typically available only at national level. We use EBG and BRES data to produce estimates at local authority level.

In EBG data we identify all logistics job ads relevant to our definition by combining a search for the words in the job title of the ad with information on the occupational category of the ad.[35] We then calculate how many of these ads are pertinent to the core logistics industry, versus the wider industry,[36] and apply this proportional split to the BRES jobs data to estimate total logistics employment.[37]

2.1.2 THE NATIONAL PICTURE

Logistics employment in 2021

We estimate that the logistics industry employed 1.25m people in 2021 (4.1% of the UK total workforce), including 690,000 within the core industry and a further 550,000 in logistics-related occupations.[38] We

[35] This follows the list of logistics-related occupations used by Logistics UK.

[36] The core logistics industry is defined as 3 Standard Industrial Classification codes: 492: Freight rail transport; 494: Freight transport by road and removal services; and 521: Warehousing and storage.

[37] Annex A provides further detail on our methodology.

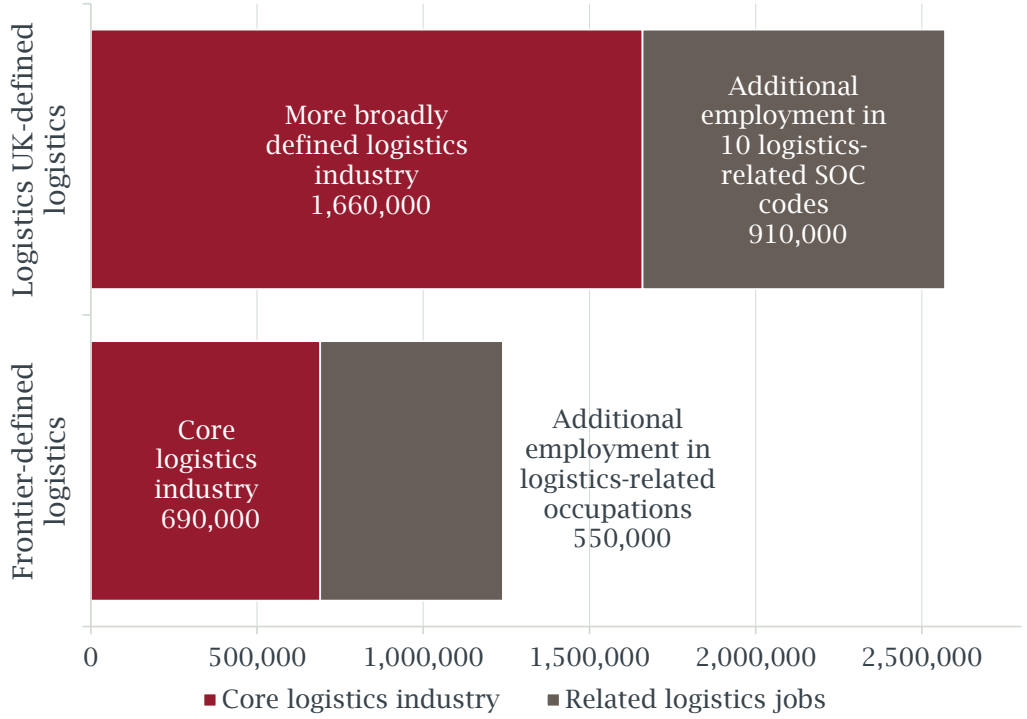
[38] Following the employment definition of the Business Register and Employment survey, the number of jobs is the number of people employed (both full-time and part-time) as of September of the relevant calendar year.

estimate that the logistics industry contributed £48bn in Gross Value Added in 2021, doubling from £24bn in 2012.[39]

This makes logistics one of the largest industries in the UK. It is bigger than the finance and insurance industries, which employ collectively around 1m people, and the utilities sector, which employs around 340,000 people.[40] By way of comparison to other key sectors, manufacturing accounts for 8.7% of all UK jobs and construction for 6.6%, showing the importance of the logistics industry as a major employer.[41]

As described earlier, our definition of logistics focuses on employment at and around distribution sites. Consequently, as shown in Figure 5 below, our job estimates are smaller than those published by the industry body Logistics UK, whose figures include, for example, postal workers. These occupations are not included in the definition used in this study.

FIGURE 5 LOGISTICS EMPLOYMENT IN THE UK ACCORDING TO DIFFERENT DEFINITIONS



Sources: Frontier Economics analysis, Logistics UK Skills and Employment Report 2021

[39] This is estimated by multiplying our estimate of the number of logistics jobs in 2021 by the average GVA per worker in the "core" logistics industry based on the ONS Annual Business Survey (ABS). We conservatively use an average for the 2012-19 period. 2019 is the latest year of data available from the ABS.

[40] Business Register and Employment Survey 2020, ONS 2021. https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/datasets/industry235digitsicbusinessregisterandemploymentsurveybrestable2

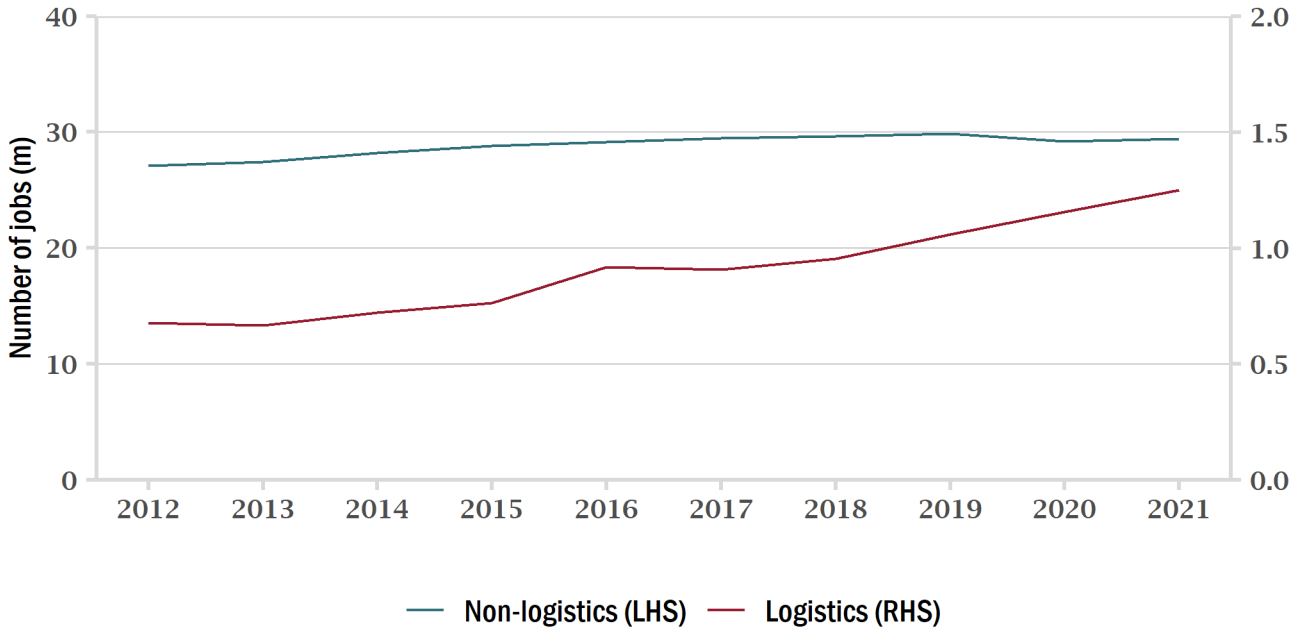
[41] Annual Population Survey, 2020.

Logistics employment growth since 2012

Logistics employment in the UK has nearly doubled since 2012, from 680,000 to 1.25m, and it has grown at a faster rate than non-logistics employment.[42] This has increased the proportion of people who work in logistics in the UK from 2.4% in 2012 to 4.1% in 2021, an increase of 70%. Based on this pace of growth, **employment in the logistics industry is likely to surpass the English NHS (which currently employs around 1.4m people) by 2023**.[43]

Growth in logistics has accelerated during the COVID-19 pandemic: between 2019 and 2021 the industry added 190,000 workers across the UK, which is around a quarter of the total increase since 2019. This is likely linked to the growth of online retail, which has accelerated significantly during the COVID-19 pandemic, as documented for example by the ONS.[44]

FIGURE 6 NUMBER OF LOGISTICS AND NON-LOGISTICS JOBS 2012-2021



Sources: Frontier analysis of: BRES 2012-2020; LFS 2020-2021; EBG data

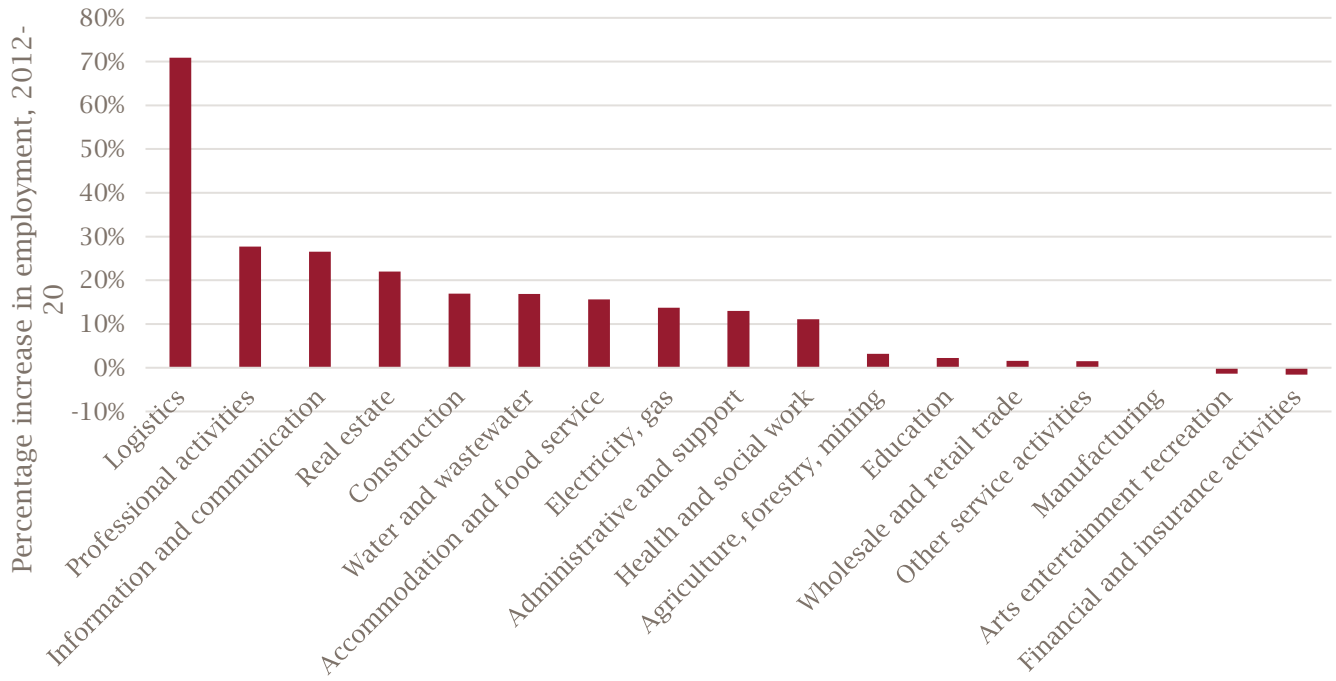
[42] Note: recent ONS analysis reports growth in transport and storage employment at 20% between December 2011 and December 2021. This is slower growth than the logistics growth identified by our analysis. The reason for this is that the ONS analysis looks at transport and storage as a whole, including sub-sectors that are excluded from our analysis, for example air transport and passenger transport, which have grown at slower rates than freight by road and rail and warehousing, which are included in our definition of logistics.

[43] Assuming that the growth of logistics continues at its average rate of the last 10 years – a conservative assumption given the acceleration observed in the last two years. The NHS employs 1,366,205 people, according to the latest NHS workforce statistics, which cover the period up to November 30th, 2021, and were published on March 3rd, 2022.

[44] ONS analysis on the link between online retail growth and demand for warehousing in ONS (2022). "The rise of the UK warehouse and the "golden logistics triangle".

No other industry of comparable size has added more jobs during this period. Focusing on 2012 to 2020 so we can make a clean comparison with other industries, employment in logistics increased by nearly 500,000 in the period. This was second only to the professional, technical and scientific industry group as a whole – a much larger category that includes legal services, advertising, architectural activities and others. Relative to its size in 2012, logistics added more jobs than any other industry during that time, as shown in the figure below.[45]

FIGURE 7 PERCENTAGE INCREASE IN EMPLOYMENT BY INDUSTRY, 2012-20



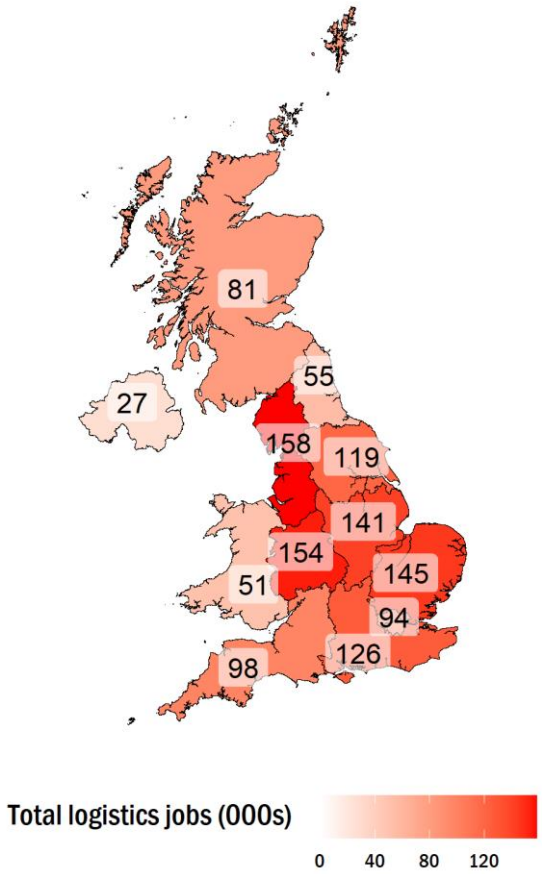
Source: Frontier analysis of BRES and EBG data

2.1.3 DISTRIBUTION OF EMPLOYMENT ACROSS THE UK

The figure overleaf shows logistics employment in each nation of the UK and English region. The North West of England is the region with most logistics jobs, 158,000, followed by the West and East Midlands with 154,000 and 119,000 respectively. Although the Midlands is a logistics-dense region, the West and East Midlands combined account for only 21% of all logistics jobs in the UK.

[45] This chart compares logistics as defined in our study with the highest level Standard Industrial Classification codes. This comparison is not perfect because we include in logistics some jobs outside the "core" SIC codes, as described earlier in this report. However, the finding that logistics ranks very high in terms of percentage employment increase holds regardless of the specific definition of the industry. If we look at two-digit SIC codes (the second-highest level codes), the percentage increase in logistics would be second-highest.

FIGURE 8 LOGISTICS JOBS ACROSS THE UK, 2021



Source: Frontier analysis of: BRES 2012-2020; LFS 2020-2021; EBG data

While geographic inequality is a striking feature of the UK economy, as highlighted by the recent Levelling Up White Paper[46], logistics is more geographically balanced across the country than other sectors, as shown in the table below. Six regions have similar levels of logistics activity: the North West, Yorkshire, the East and West Midlands, East of England, and the South East each accounts for 10-15% of all logistics jobs in the UK. Compared with other industries, logistics is much less concentrated in London: the capital accounts for 8% of logistics jobs, compared with 17% of all other jobs.

TABLE 2 DISTRIBUTION OF LOGISTICS AND NON-LOGISTICS JOBS ACROSS UK NATIONS AND REGIONS, 2021

EACH REGION...	... ACCOUNTS FOR X% OF TOTAL UK JOBS	
	LOGISTICS	NON-LOGISTICS
North East England	4%	3%
North West England	13%	11%

[46] Department for Levelling Up, Housing and Communities (2022). Levelling Up the United Kingdom.

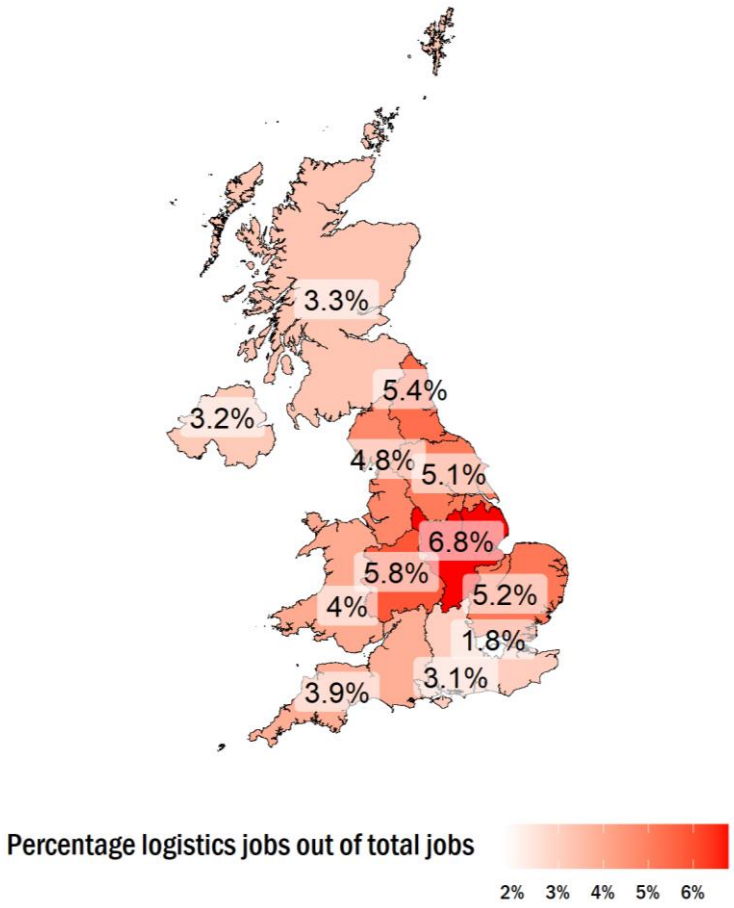
Yorkshire and the Humber	10%	8%
East Midlands	11%	7%
West Midlands	12%	8%
East of England	12%	9%
London	8%	17%
South East England	10%	14%
South West England	8%	8%
Scotland	6%	8%
Wales	4%	4%
Northern Ireland	2%	3%

Note: in this and following figures, "nations and regions" are defined as UK Government Office Regions in line with ONS data.
Source: Frontier analysis of: BRES 2012-2020; LFS 2020-2021; EBG data

Logistics density

The figure below shows the proportion of all jobs in each area that are in the logistics industry. The East Midlands is the most logistics-dense region, followed by West Midlands, the North East, the North West and Yorkshire and the Humber all close to 5% logistics density.

FIGURE 9 REGIONAL DENSITY OF LOGISTICS JOBS IN 2021



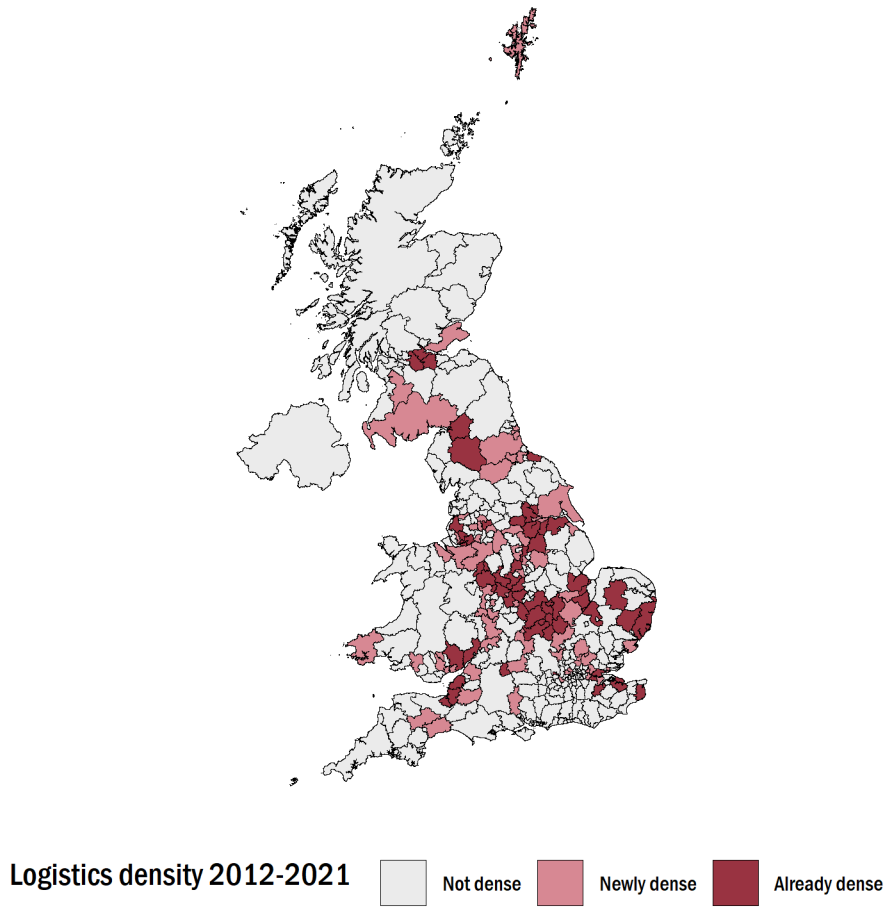
Source: Frontier analysis of: BRES 2012-2020; LFS 2020-2021; EBG data

We have estimated the prevalence of logistics jobs across the UK at local authority (LA) level.[47] There are many areas where the logistics industry is a particularly key employer:

- As of 2021, there were 124 LAs where logistics accounts for at least 5% of jobs, up from 58 areas in 2012 (shown in Figure 10 below); and
- There are 38 LAs where logistics accounts for 10% or more of all jobs.

These 38 areas are spread over every region of Great Britain except for London,[48] with the largest number (12) in the East Midlands. Low logistics density tends to be a characteristic of densely populated urban areas, including London and other large cities.

FIGURE 10 LOGISTICS-DENSE LOCAL AUTHORITIES IN THE UK, 2012-21



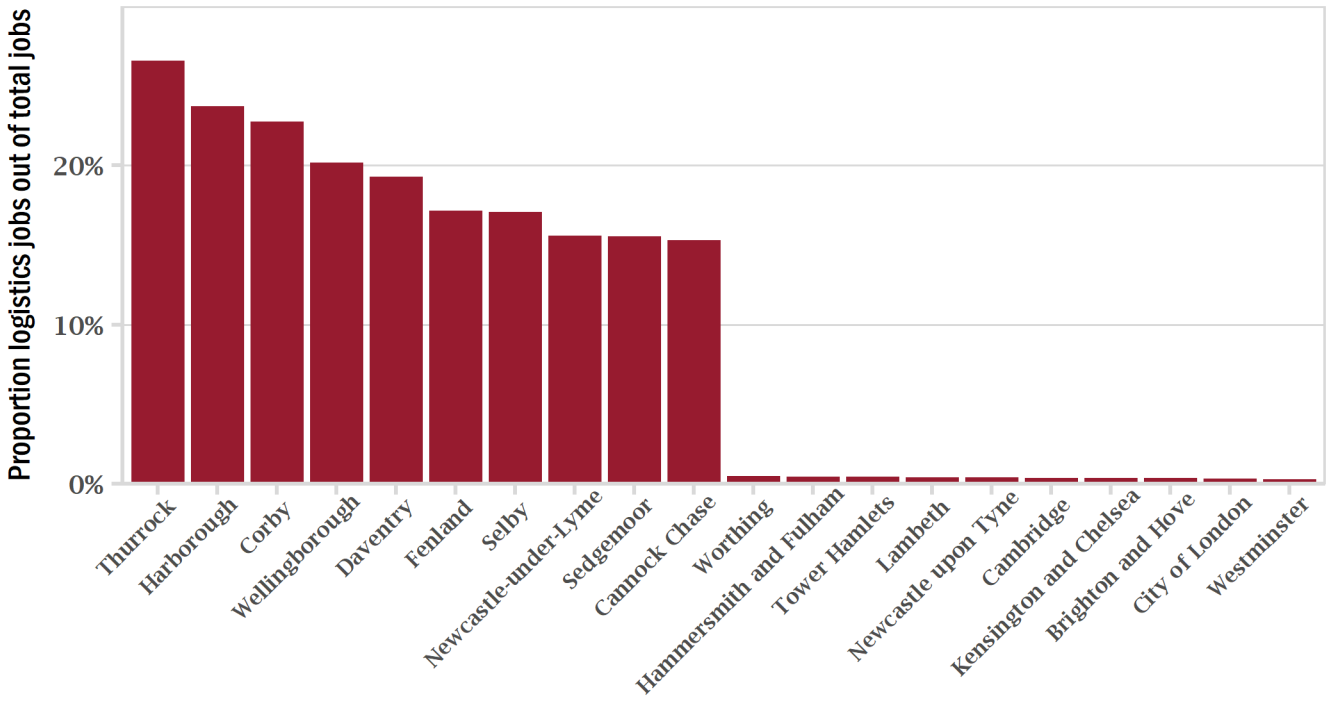
Source: Frontier analysis of: BRES 2012-2020; LFS 2020-2021; EBG data

[47] The exception is Northern Ireland, where jobs are estimated at a regional level. This is due to a lack of public data on employment by detailed industry SIC code at LA-level for Northern Ireland. The Business Register and Employment Survey reports employment for Great Britain LAs only.

[48] As above, note that Local Authority-level analysis excludes Northern Ireland.

Although there are logistics-dense areas throughout the UK, a number of the densest areas (Harborough, Wellingborough, Corby and Daventry) are clustered in an area of the East Midlands, with Leicester, Coventry and Birmingham as the closest cities. The area with the highest logistics density, Thurrock, is located near a major port in the East of England. Although we do not include ports specifically in our logistics definition, the area has a high volume of associated warehousing activity, as measured by warehousing floor space (12th highest out of LAs in Great Britain).[49]

FIGURE 11 TOP AND BOTTOM 10 LOGISTICS-DENSE LOCAL AREAS IN 2021



Source: Frontier analysis of: BRES 2012-2020; LFS 2020-2021; EBG data

Growth in logistics employment

Logistics employment has grown faster than non-logistics employment in every region of the UK since 2012. The greatest proportional increase in logistics employment has occurred in London (although starting from a relatively small number of logistics jobs in 2012), North East of England, Wales, and East of England. Wales and the North East of England have also experienced lower-than-average growth in non-logistics jobs over this time period, demonstrating that the logistics industry has the potential to offer employment opportunities in areas where these might otherwise be relatively scarce.

[49] Source: CBRE group.

TABLE 3 LOGISTICS JOBS HAVE OUTPACED OTHER JOBS IN EVERY UK REGION SINCE 2012

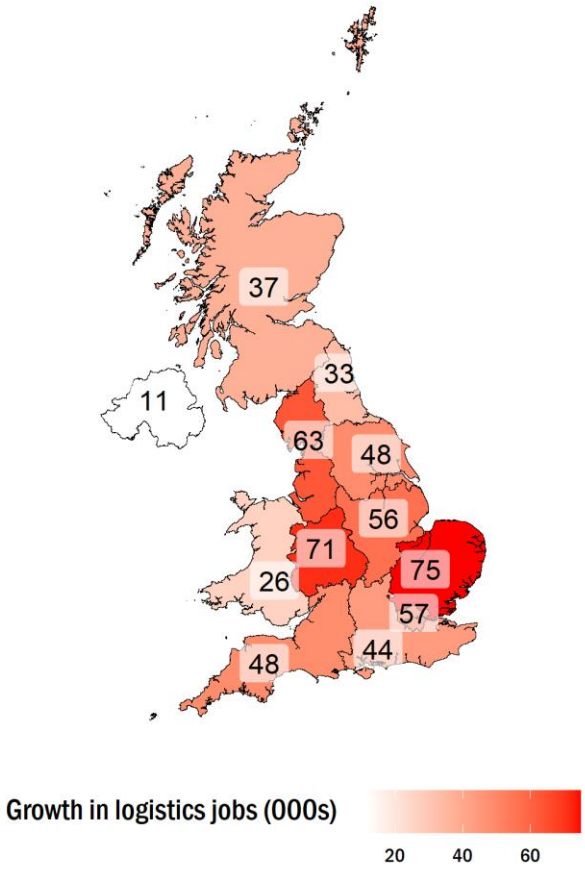
REGION	GROWTH FROM 2012/4 TO 2019/21	
	LOGISTICS JOBS (%)	NON-LOGISTICS JOBS (%)
North East England	97%	0%
North West England	62%	8%
Yorkshire and the Humber	42%	5%
East Midlands	60%	5%
West Midlands	74%	7%
East of England	93%	10%
London	125%	12%
South East England	37%	6%
South West England	77%	7%
Scotland	67%	3%
Wales	87%	4%
Northern Ireland	74%	7%

Source: Source: Frontier analysis of: BRES 2012-2020; LFS 2020-2021; EBG data

The greatest number of new logistics jobs in absolute terms has been added in the East of England (75,000 jobs), West Midlands (71,000 jobs) and North West (63,000 jobs), as shown in the map overleaf.[50]

[50] Recent analysis by the ONS also shows the East of England and Midlands as areas of fastest growth in logistics. However, compared to our analysis, the ONS data highlights Yorkshire as an area of growth more than the North West of England. The difference likely stems from the fact that our analysis and the ONS analysis use different metrics: while we focus on growth in number of jobs, the ONS analysis uses growth in the percentage of business units used by the transportation and storage industry.

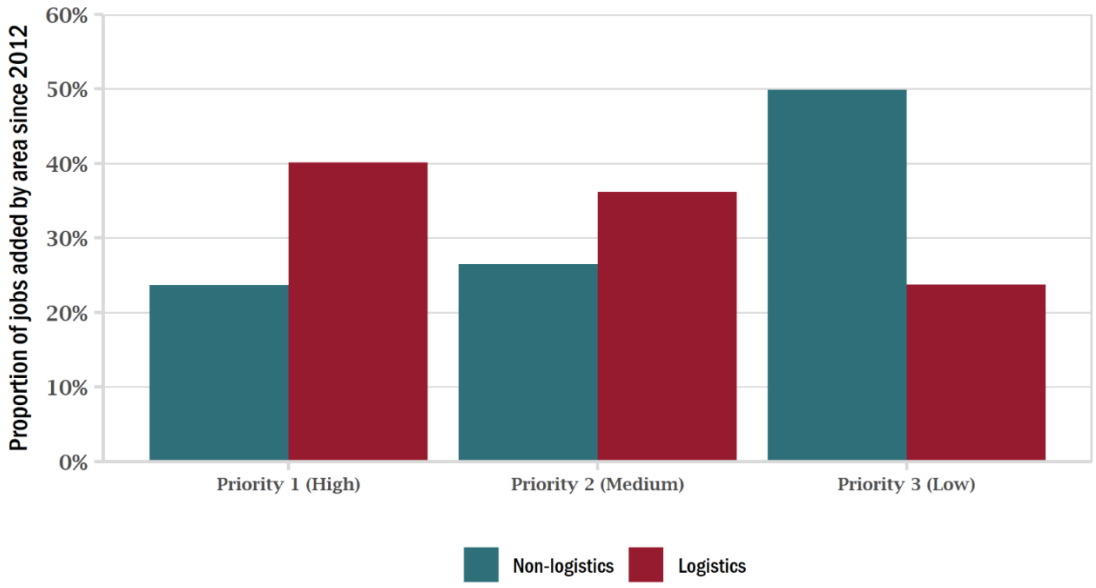
FIGURE 12 GROWTH IN LOGISTICS JOBS BY REGION, 2012 TO 2021



Source: Frontier analysis of: BRES 2012-2020; LFS 2020-2021; EBG data
Note: Growth is presented as change in jobs from 2012/4 to 2019/21

Many of the logistics industry's growth areas are a high priority for the government's levelling up agenda. As shown in the figure below, since 2012 logistics has added more jobs in priority-1 areas than any in other area of the UK. This stands in contrast to non-logistics industries. Around four in 10 new logistics jobs since 2012 have been created in high priority areas, compared with only one in four in other sectors. Our analysis of the wider economic impact of logistics, shown in section 4, indicates that jobs added by the logistics industry are associated with broader employment gains and faster economic growth in logistics-dense areas.

FIGURE 13 JOBS ADDED BY LEVELLING UP PRIORITY AREA, 2012-2021



Source: Frontier analysis of: BRES 2012-2020; LFS 2020-2021; EBG data; Levelling Up Fund Index[51]
Note: Each Local Authority is assigned a category number according to its priority for receiving Levelling Up Funds

Growth in local logistics density

Logistics has increased its geographical reach across the UK in the last 10 years, spreading around and at times away from areas that were logistics-dense in 2012. Among the areas with below-average logistics density in 2012, logistics employment grew by 109% from 2012-2021, compared with 71% growth in the areas with above-average logistics density in 2012.[52]

Of the new logistics jobs created between 2012 and 2021, 42% were in areas with below-average logistics density in 2012. These new jobs were not concentrated in only one geographic region or nation, but distributed across the UK.

2.2 CHARACTERISTICS OF LOGISTICS JOBS

In this section we consider the characteristics of logistics jobs compared to non-logistics jobs, including occupational type, pay and the prevalence of permanent versus temporary jobs.

2.2.1 OUR APPROACH

The source for this analysis is the Emsi Burning Glass database of job advertisements posted in the UK from 2012 to 2021 (EBG data). This large database, comprising around 80m job ads, allows for richer

[51] Source for levelling up prioritisation: Levelling Up Fund, Prioritisation of places methodology note. Priority-1 areas that have added over 2,000 logistics jobs in this period include, for example, Kettering, Newport, Sunderland and Wakefield.

[52] Excluding outlier areas with very low logistics employment in 2012 (including these areas would lead to misleadingly high estimates of percentage growth in non-dense areas, due to the low starting number of jobs).

observation than is possible from using public data sources only, as it contains data at a higher level of granularity in terms of geography, industry, occupation and characteristics.[53] However, it should be noted that the figures represent the number of ads, and not total employment as was examined in sections 2.1.2 and 2.1.3.[54]

We identify the ads related to logistics using a definition consistent with that used in the previous section. For more methodology detail, please see Annex A.

Occupational type

Using EBG data, we can investigate what types of jobs are offered by logistics employers. This can be done using the Standard Occupational Classification (SOC) system, which categorises jobs according to their skill content.[55] As shown in the table below, logistics jobs include primarily:

- Roles such as warehouse associate, warehouse operative and similar (classified under SOC code 9, "Elementary Occupations");
- Drivers of large vehicles and forklift trucks (classified under SOC code 8);
- Managerial and supervisory roles such as procurement managers, warehouse supervisors and transport managers (classified under SOC code 1); and
- Administrative roles such as transport planners, logistics coordinators and supply chain analysts (classified under SOC code 4).

There are fewer logistics jobs in SOC codes 2-3 and 5-7. This is to be expected, as these represent professional occupations (e.g. lawyers, teachers), services and or skilled trades.[56]

TABLE 4 OCCUPATIONAL TYPES OF LOGISTICS AND NON-LOGISTICS JOB ADS, 2021

SOC CODE	% OF ADS FALLING WITHIN EACH SOC CODE	
	LOGISTICS	NON-LOGISTICS
1. Managers, Directors And Senior Officials	19%	10%
2. Professional Occupations	1%	34%

[53] For example, publicly available data sources commonly report the statistics we are interested in only at the higher level 'Transportation and Storage' SIC code, and/or not at more detailed geographic levels such as Local Authority.

[54] Job ads in a particular year reflect characteristics of both the existing level of employment (related to replacing workers leaving the industry) and 'new' jobs related to the net growth of the industry from year to year.

[55] Specifically, we use the 2010 version of the SOC classification, which is available throughout the period of interest (2012-21). The SOC classification is routinely used by national statistics authorities in data on the labour market.

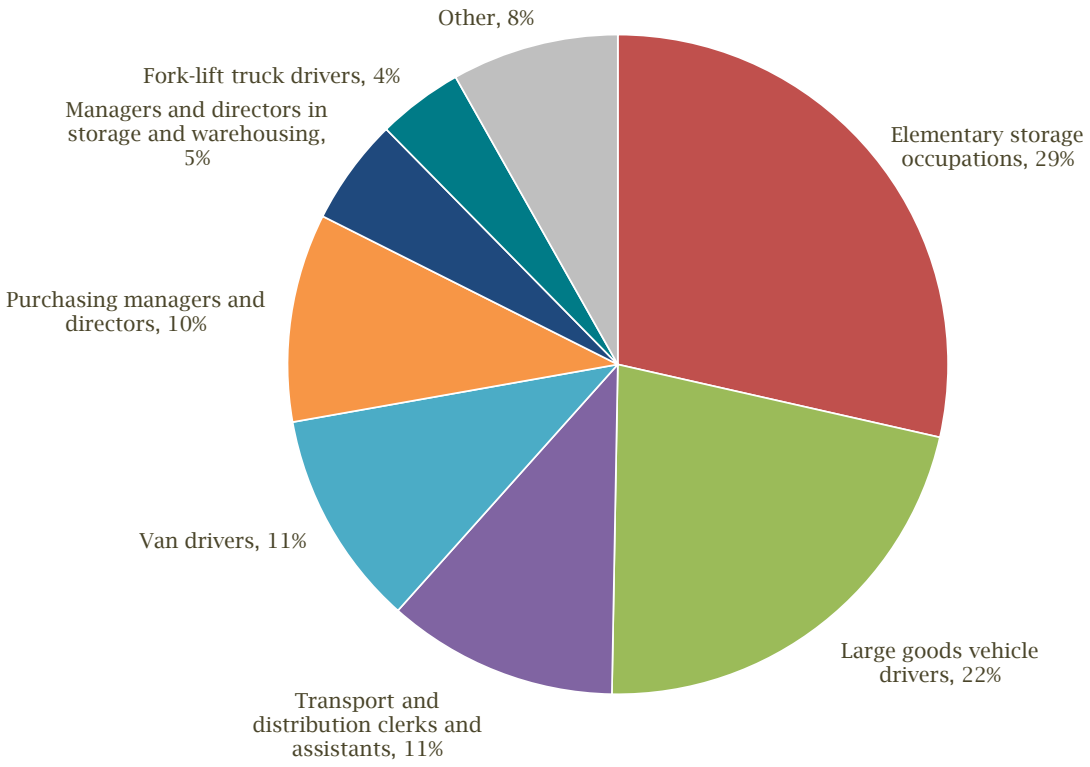
[56] We find a similar distribution of occupational types within the industry to Logistics UK's Skills and Employment report, with some discrepancies stemming from our different definitions of the industry. For example, as our definition does not include smaller-scale courier and messenger activity, and last-mile restaurant delivery, related occupations are excluded from our findings.

3. Associate Professional And Technical Occupations	2%	18%
4. Administrative And Secretarial Occupations	12%	9%
5. Skilled Trades Occupations	0%	7%
6. Caring, Leisure And Other Service Occupations	0%	8%
7. Sales And Customer Service Occupations	0%	8%
8. Process, Plant And Machine Operatives	37%	2%
9. Elementary Occupations	29%	5%

Source: Frontier analysis of EBG data

Within the logistics industry, the most common job ads - comprising 51% of the total - are for elementary storage occupations and large goods vehicle drivers.

FIGURE 14 MOST COMMON LOGISTICS OCCUPATIONS, 2021



Source: Frontier analysis of EBG data

According to EBG data, around 19% of job postings in logistics are for temporary jobs. This is somewhat higher than the average across all other sectors (15%). The table overleaf shows how this differs by occupational category.

TABLE 5 PROPORTION OF TEMPORARY JOB ADS IN LOGISTICS AND NON-LOGISTICS INDUSTRIES, AVERAGE 2013-2021

SOC CODE	PROPORTION TEMPORARY JOB ADS	
	LOGISTICS	NON-LOGISTICS
1. Managers, Directors And Senior Officials	15%	11%
4. Administrative And Secretarial Occupations	14%	17%
8. Process, Plant And Machine Operatives	21%	17%
9. Elementary Occupations	22%	14%
All occupational categories	19%	15%

Source: Frontier analysis of EBG data

Note: The proportion of temporary jobs is considerably higher in 2012. This year has been excluded as an outlier for these figures after discussion with the data provider.

Hourly pay

Looking at the four occupational types (SOC section) that together make up 97% of logistics job ads, the advertised average pay in logistics is approximately as much as, or more than, the pay offered for the same occupational type in other industries, as shown in the table below. This is likely linked to differences across industries in and local areas in the supply and demand for labour – in particular, the strong demand for logistics jobs, described in the previous section.

The Process, Plant and Machine Operatives category, where hourly pay is on average £0.20 lower in the logistics industry, is an exception. However, on average across the logistics industry, advertised hourly in 2021 was £14.50 per hour, £0.44 higher than in other industries when controlling for occupational type.[57]For each job type the average advertised pay per hour is greater than the National Living Wage.[58]

TABLE 6 AVERAGE HOURLY PAY IN LOGISTICS AND NON-LOGISTICS INDUSTRIES, 2021

SOC CODE	AVERAGE HOURLY PAY		
	LOGISTICS	NON-LOGISTICS	DIFFERENCE
1. Managers, Directors And Senior Officials	£22.35	£21.82	£0.53
4. Administrative And Secretarial Occupations	£15.11	£12.33	£2.79
8. Process, Plant And Machine Operatives	£13.67	£13.87	-£0.20
9. Elementary Occupations	£11.21	£10.84	£0.37
Logistics average occupation	**£14.49**	**£14.05**	**£0.44**

Source: Frontier analysis of EBG data

Note: Differences in average pay are all statistically significant to <0.01% confidence level. 'Logistics average occupation' pay is calculated as the weighted average of pay rates in each occupational type based on the distribution of occupational types within the logistics industry.

[57] For context, non-logistics jobs in SOC category 4 include, among others, medical secretaries, bank clerks and receptionists; jobs in SOC 8 include train and tram drivers, energy plant operatives and scaffolders; jobs in SOC 9 include waiters and waitresses, security guards and mail sorters. A full list of the occupations included within each SOC code is available here.

[58] https://www.gov.uk/government/publications/the-national-minimum-wage-in-2021

This pattern is not the result of differences in any particular region. Advertised pay is, on average, slightly higher in logistics than in non-logistics industries (for similar occupation types) across the UK. The exception is Northern Ireland, where advertised pay is slightly lower (by £0.06 per hour). The differential of logistics pay over non-logistics pay is highest in the East Midlands (just over an extra £1 per hour).

These findings are confirmed by analysis of data on median annual wages from the ONS's Annual Survey of Hours and Earnings (ASHE), where we can compare data on logistics occupations with other occupations in SOC codes 8 and 9. These logistics occupations are considered to be entry-level. The ASHE data shows that:

- Median annual pay in 2021 for elementary storage occupations (which include, for example, warehouse operative roles) was £22,074, compared with £15,814 across all SOC 9 occupations;
- Median annual pay for fork-lift truck drivers and large goods vehicle drivers was £25,072 and £30,620 respectively, compared with £24,537 across all SOC 8 occupations.

Since 2020, there is some evidence of increases in advertised salaries for drivers and fork-lift truck operators in logistics, relative to the same jobs in non-logistics industries. But it is too early to confirm from job advertisement data only if the increases will persist.

3 CAREER SATISFACTION AND PROGRESSION IN LOGISTICS JOBS

3.1 OUR APPROACH

As shown in the previous section, the logistics industry employs a large number of people across the UK, and logistics jobs are relatively well paid compared with jobs in similar occupational categories. In this section, we look at the social impact of these jobs, by examining whether they provide good quality employment and opportunities for progression, with a particular focus on those with low levels of formal qualifications. Our survey indicates that 80% of logistics workers do not have a bachelor's or advanced further education degree.[59]

To investigate the social impact of logistics jobs, we draw on a new independent survey of 319 logistics workers undertaken by YouGov ("the YouGov survey")[60], case study interviews with public and private sector stakeholders in Doncaster and North West Leicestershire, information from publicly available sources on logistics employers' skills provision, and other evidence including Logistics UK's Skills and Employment reports. More details on the sources and analysis are provided in Annex A.

Overall, we find that logistics workers are satisfied with their jobs, which provide valuable skills and opportunities for career progression within the industry.

3.2 SOCIAL MOBILITY AND CAREERS

Logistics provides opportunities for people who may not otherwise be in work: the YouGov survey indicates that **20% of people in logistics were previously unemployed,** including one in four (24%) long-term unemployed.[61] This shows that logistics can be an employment pathway for those who had previously struggled to find a job.

While logistics workers in entry-level jobs tend to have broadly low levels of formal qualifications, they can create careers in the industry. YouGov survey data shows that 51% of workers in managerial roles have been promoted from a non-managerial job. This implies that **around 35,000 logistics workers in 2021 were promoted to managerial jobs**. These include team managers, warehouse managers and other such managerial roles. Analysis of the YouGov data shows that of the 62 logistics managers who responded to the survey, almost two-thirds (63%) do not have a university degree or equivalent qualifications.[62] [63] This is

[59] Analysis by Logistics UK, using a wider definition of logistics compared to ours, found that over 40% of logistics jobs are low to middle skilled (level 2) and around 25% are low skilled, and that these proportions are greater than the national average. Source: Logistics UK 2021 Skills and Employment Report

[60] Note: for some of the questions in the survey, the total number of responses is lower than 319.

[61] Long-term unemployed defined as unemployed for more than 6 months

[62] This is considerably higher than among all managers, directors and senior officials, 53% of which have a higher education, degree or equivalent qualification according to ONS data. Source: ONS (2020).

[63] This statistic is calculated based on current logistics managers and workers who had been a logistics manager in the past five years. The sample size for current logistics managers is relatively small (44) and using only this group we find that 65% do not have a university degree.

particularly important in logistics-dense areas as these areas have relatively few people with such qualifications – further discussed in section 4.2.

These findings are supported by interviews with stakeholders. The chambers of commerce and district councils in Doncaster and North West Leicestershire indicated that logistics companies provide career opportunities to local workers and that the perception of the industry as being entirely low-skilled is incorrect. They also noted that career opportunities within logistics are not always apparent to the public.

3.3 TRAINING AND SKILLS PROVISION

In addition to being relatively well paid and opening up career options for entry-level workers, logistics jobs provide employees with valuable skills. **Almost all logistics workers in the YouGov sample have received training (87%), and 59% of them think this training would be useful if they switched employer**.[64] This is consistent across different logistics occupations, although those not in managerial roles are slightly less likely than logistics workers as a whole to consider their training useful (55% compared to 59%).[65]

Training in the industry includes a wide range of forms and topics, from modules on driving transport vehicles and handling machinery[66], to training on customer interaction and using digital tools as part of last-mile delivery[67], to apprenticeships. Our review of publicly available information on major employers in the sector shows that many have specific initiatives to enhance workforce skills. Yodel, for example, provides training up to master's level in a range of subjects. The Yodel Academy offers apprenticeship schemes, health & wellbeing courses and vocational learning. Another example is Amazon, which provides more than 40 different apprenticeship schemes across its operations and corporate teams, covering engineering, warehouse team leadership and safety technicians.[68] Amazon recently announced 1,500 new apprenticeships with more than 200 of them at degree level; 500 of the places are open to existing employees. These opportunities are available across Amazon's operational sites throughout the UK, as well as in head offices and development centres in Manchester, Edinburgh, Cambridge and London.

Our review of skills provision also identified examples of resources provided to support workers' wellbeing. This includes, for example: DHL's training for managers to promote good mental health among employees[69]; Tesco providing online mental wellbeing tools for its employees and awareness training for managers through Mind; Wincanton's partnership with the charity Mates in Mind to provide all its employees support and guidance on mental health.[70]

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[64] Frontier analysis of YouGov survey data.

[65] The net rating for the usefulness of training (those who see it is useful minus those who do not think it is useful) is lower for non-managerial roles (33%) compared to all jobs (40%).

[66] There are legal requirements around training for a number of tasks in logistics, including for example operating fork-lift trucks and driving Heavy Goods Vehicles. Also see for example the range of courses offered by Logistics UK at this link.

[67] For example, Yodel invested £0.5m in 2019 in an extensive training programme for final-mile workers. Source: Yodel Corporate Social Responsibility Report 2020.

[68] https://www.aboutamazon.co.uk/news/working-at-amazon/what-do-our-apprentices-do-at-amazon

[69] DHL, 2019 Sustainability report.

[70] https://www.wincanton.co.uk/news-and-media/press-releases/wincanton-partners-mates-mind-improve-mental-wellbeing-across-uks-transport-and-logistics-industry/

We discuss the impact of education and training on the wider communities around logistics sites in section 4.6.1.

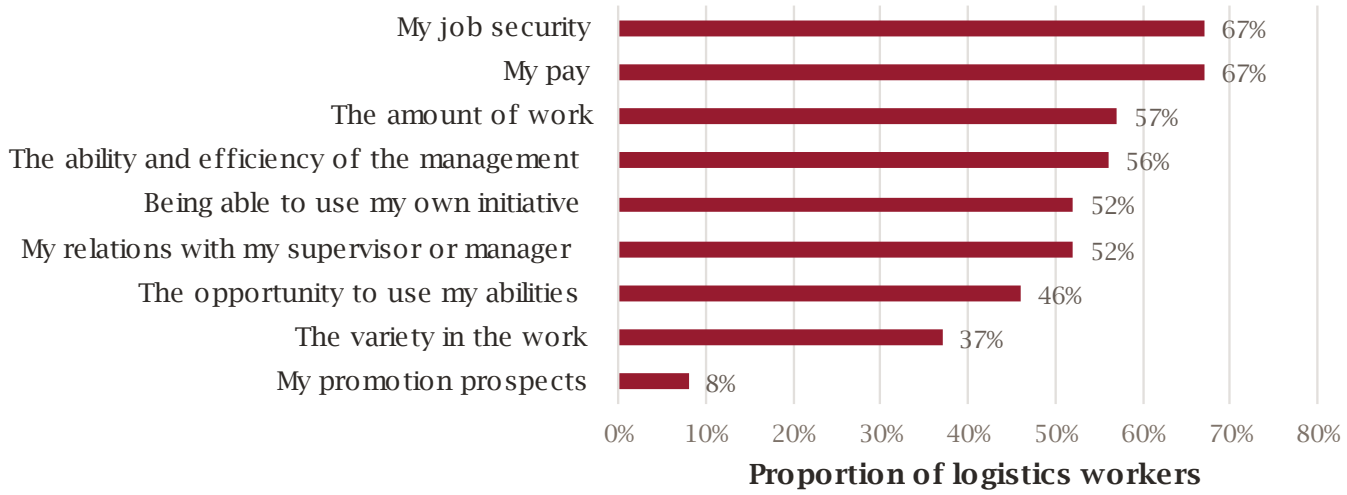
3.4 JOB SATISFACTION

The survey we commissioned from YouGov asked respondents about nine different aspects of their jobs to understand if these are important, if workers are satisfied with them and if they prefer them to their previous jobs. The nine questions were chosen to be consistent with the UK Skills and Employment Survey.[71]

The following chart sets out the net importance for logistics workers of each aspect of their job. This is calculated by summing responses rating it as fairly or very important and subtracting those rating it as not that important or not important at all. It does not take into account those respondents who did not know.

Pay and job security are the most important aspects of the job for logistics workers. They also attach importance to the amount of work they need to do in their jobs and the ability and efficiency of management. On the other hand, there is significant variation when it comes to the importance of promotion prospects: 50% of logistics workers consider this to be a fairly or very important issue, but 42% say it is not that important or not important at all. Taken together, that produces a relatively low net importance rating (9%).

NET IMPORTANCE OF DIFFERENT ASPECTS OF WORK FOR LOGISTICS WORKERS



Source: Frontier Economics analysis of YouGov data. Sample size: 160 people working in logistics at the time of the survey (February 2022)

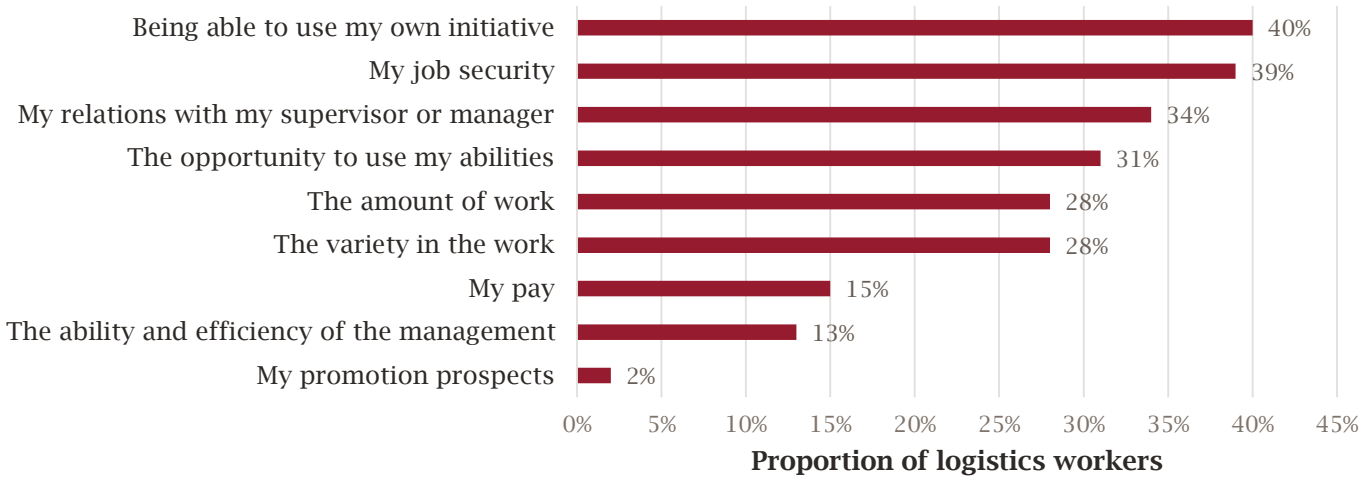
[71] The Skills and Employment Survey has been conducted regularly since 1986 and currently led by researchers at the University of Cardiff. The survey design reflects academic research in the measurement of job quality. Source: https://www.cardiff.ac.uk/research/explore/find-a-project/view/626669-skills-and-employment-survey-2017

We also asked how satisfied workers were with these aspects of their jobs. Net satisfaction is calculated as responses saying very or fairly satisfied minus responses saying fairly or very dissatisfied. It does not take into account those who were neither satisfied nor dissatisfied, or those who didn't know.

Logistics workers are net satisfied across all aspects of their job, as set out in the following chart. This includes not only pay but also other facets such as their ability to use initiative, variety in the work they do and job security. For example, **56% of workers are fairly or very satisfied with their ability to use initiative**. Additionally, logistics workers are more satisfied with their current job than with their previous job in every aspect of their work.

However, there is a difference between those in managerial roles and non-managerial roles with regard to promotion prospects. Among non-management logistics workers, such as warehouse operatives, drivers and logistics coordinators, 24% are satisfied versus 28% not satisfied, for a net satisfaction rating of -4%. For managers, there was a net satisfaction of 19%.

FIGURE 16 NET SATISFACTION OF DIFFERENT ASPECTS OF WORK FOR LOGISTICS WORKERS



Source: Frontier Economics analysis of YouGov data. Sample size: 319 people working in logistics at the time of the survey (February 2022).

We examine the detailed findings in the following sections.

3.4.1 PAY

Pay is one of the most important aspects of work for logistics workers and they are net satisfied with their pay. Moreover, they are more net satisfied with the pay in their current job than in their previous job.

- Looking at different roles, those in management are materially more net satisfied about their pay than non-management workers (22% vs 12%).
- Digging deeper, HGV and other transport vehicle drivers seem to be more satisfied on balance (35% net satisfaction) than other non-managerial workers. Their reported satisfaction is comparable to that of management. The two groups come top of the net satisfaction rankings on pay, an outcome

that is consistent with actual wages for the roles: Logistics UK's 2021 Skills and Employment report finds that the hourly median pay of drivers is now similar to that of managers and directors in storage and warehousing.[72]

3.4.2 JOB SECURITY

Job security vies with pay as the most important aspect of the job for logistics workers, and 55% of them say they are either very or fairly satisfied on this count. Job security comes second only to the ability to take the initiative in the satisfaction rankings of various aspects of work. Logistics workers are also net more satisfied with their job security than in their previous job, and this is also the case in particular for those who were previously employed in a different industry.[73]

- Looking at different roles within logistics, non-managerial workers are more net satisfied with the security of their job than employees in managerial roles (41% compared to 32%).

- Job security satisfaction can be a facet of "full" and stable employment. Our analysis of the EBG data identified most logistics posts to be full-time jobs. This finding is consistent with the NOMIS data for local authorities showing that logistics-dense areas have proportionately fewer people working under 10 hours a week. That data also shows that proportionately fewer people in those local authorities have second jobs.[74]

3.4.3 PROMOTION PROSPECTS

Even though promotion prospects are judged to be the least important aspect of work, logistics workers overall are satisfied with prospects in their current job; 29% of them are fairly or very satisfied, and the net figure is marginally positive. Logistics workers are net more satisfied with their promotion prospects in their current job than they were in their previous jobs.

- Satisfaction levels with job promotion prospects vary among logistics occupations. Those in non-managerial roles are net dissatisfied (-4%) with their promotion aspects, whereas all logistics workers on average are net satisfied (2%) with this aspect of their work.

- While promotion prospects are not net important for non-managerial logistics workers in general, those who said promotion is important for them are net satisfied with their prospects. Net satisfaction is lower in non-management roles, albeit with substantial variation as just over one third of non-management roles are satisfied, just under one third are dissatisfied and the remaining third of workers are neither satisfied nor dissatisfied with their job promotion prospects.[75]

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[72] Source: Logistics UK 2021 Skills and Employment Report. It is possible that the higher level of satisfaction of HGV drivers is linked to recent increases in their pay (see section 2.2) as well as the level of their pay. Our data does not allow us to investigate specifically the role of recent changes in pay on reported satisfaction.

[73] Sample size: 68 logistics workers who were previously working in a different industry immediately prior to starting their current role in logistics.

[74] Frontier analysis using ONS data provided through NOMIS, snapshot of 2019, https://www.nomisweb.co.uk/

[75] About 5% are unsure of their satisfaction levels.

3.4.4 BROADER JOB SATISFACTION

With regards to all other aspects of their work, logistics workers are net satisfied. For example, 50% of them are very or fairly satisfied with the opportunity to use their abilities at work and 49% of them are fairly or very satisfied with the amount and variety of the work they do.

4 THE ECONOMIC AND SOCIAL IMPACT OF LOGISTICS SITES

4.1 OUR APPROACH

In this section we analyse the extent to which the logistics industry generates wider local economic and social benefits beyond the direct employment opportunities it affords. Broader or indirect benefits may result, for example, from the impact that logistics sites have on local businesses that provide goods or services to those sites, or from the purchasing power of people employed at the sites. The broader impact of logistics sites also includes engagement with the local community, for example through donations to and partnerships with local charities. For our analysis of economic effects, we draw on statistical analysis of data at local authority level on logistics employment, economic outcomes such as Gross Domestic Product (GDP) and total employment, and other characteristics such as the formal qualifications held by local residents. For our analysis of broader social impacts, we draw on interviews with stakeholders and desk research on the activities of the largest logistics employers.

4.2 HOW DO LOGISTICS-DENSE AREAS COMPARE TO OTHER PLACES?

To understand the local impact of the logistics industry, we categorise local authority districts (LAs) based on their **logistic density** (i.e. the share of logistics jobs in total employment in the area).

We consider **logistics density**, rather than total logistics employment, to be **the most relevant measure** for quantifying the broader impacts of the industry. This measure allows us to focus on areas where logistics accounts for a significant proportion of employment, and where we can therefore expect it to have a stronger economic and social impact.

As a starting point for this analysis, we focus on the 35 most logistics-dense areas in Great Britain as of 2021: LAs where the logistics industry accounted for at least 3.5% of total employment in 2012. In sections 4.3 and 4.4 we zoom out to a broader analysis of the economic impact of logistics including less-dense areas. We focus on density in 2012 as this is the starting point of our analysis as described in section 2, allowing us to observe what happened to these areas in the following years. Areas with high logistics density have not only maintained a high share of logistics employment, but have also added the most new logistics jobs relative to their population: between 2012 and 2020, 27% of all new logistics jobs were generated in logistics-dense areas, even though they account for only 9% of the total population.[76]

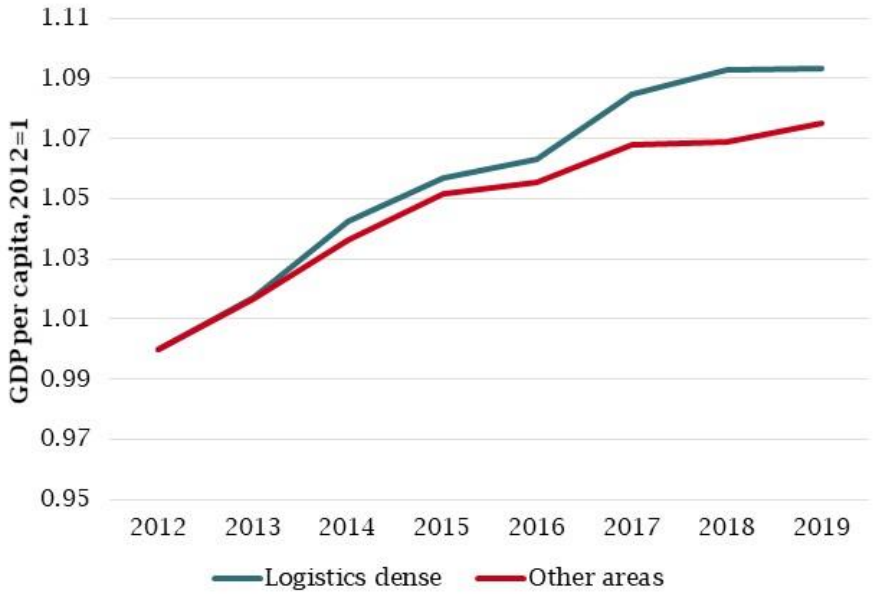
A preliminary approach to considering the impact of logistics density is to **compare how logistics-dense areas performed** over time relative to the average local authority in the UK. For this comparison, we focus on two metrics: GDP per capita and employment. We also look at what happened to the unemployment rate and earnings in logistics-dense areas, but we find no clear differences with other areas.

Figure 17 analyses the evolution of average GDP per capita in local authorities with high logistics density in 2012, compared to the UK as a whole. **Logistics-dense areas performed slightly better than the UK average**: GDP per capita in 2019 was 9.3% higher than in 2012 for logistics-dense areas, compared with 7.5% in other local authorities.[77]

[76] Source: Business Register and Employment Survey (logistics employment) and ONS (total population).

[77] We use 2019 as the end point as this is the latest year for which ONS data on GDP per capita is available at local authority level.

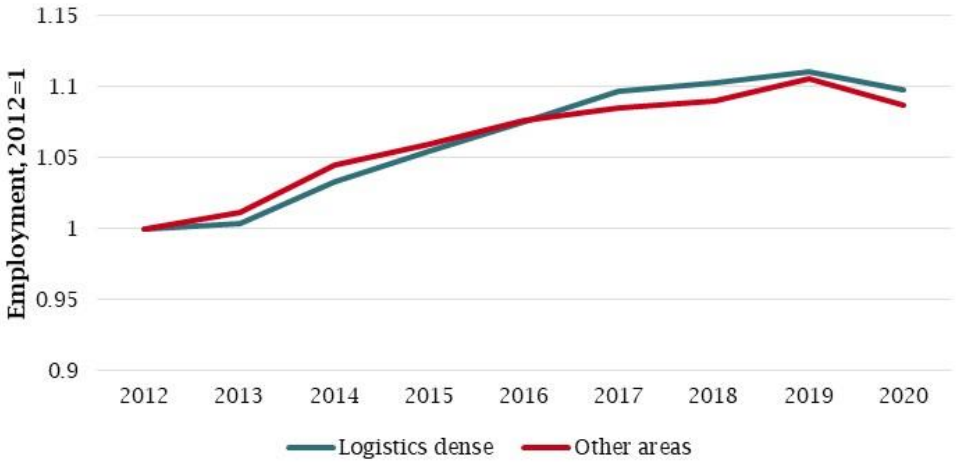
FIGURE 17 GDP PER CAPITA IN LOGISTICS-DENSE AREAS COMPARED TO UK AVERAGE, 2012-19



Source: Frontier Economics based on BRES (grouping of logistics density), ONS (GDP per capita figures for dense and high dense areas)

Looking at employment, in the figure below we can see **that since 2012 employment in logistics-dense areas has grown at a similar pace to the UK average**: employment in 2019 was 9.7% higher than in 2012 for logistics-dense areas, compared with 8.7% in other local authorities.

FIGURE 18 EMPLOYMENT IN LOGISTICS-DENSE AREAS COMPARED TO UK AVERAGE, 2012-20

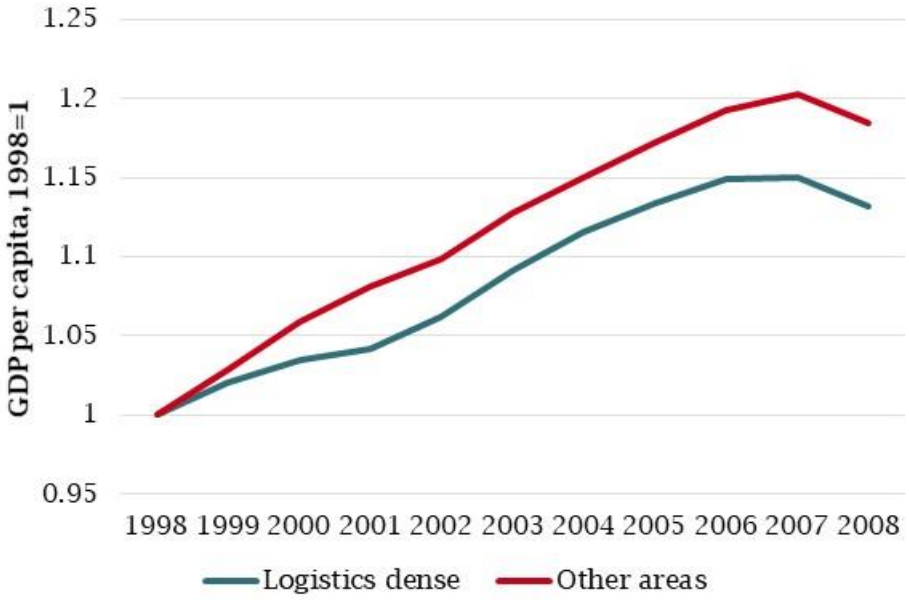


Source: Frontier Economics based on BRES (grouping of logistics density) and ONS Annual Population Survey

In interpreting these figures it is important to note that **logistics-dense areas may not always be comparable to areas with lower levels of logistics density** in terms of their past economic performance or other characteristics that may influence their economic outcomes.

Indeed, we find that logistics-dense areas **have either outperformed or kept pace with the rest of the UK since 2012 despite underperforming in the 10 years preceding the 2009-2010 financial crisis**. As shown in **Error! Reference source not found.** below, GDP per capita between 1998 and 2008 grew by 13% in logistics-dense areas, compared with 18% in other local authorities.[78]

FIGURE 19 GDP PER CAPITA IN LOGISTICS-DENSE AREAS COMPARED TO UK AVERAGE, 1998-2008



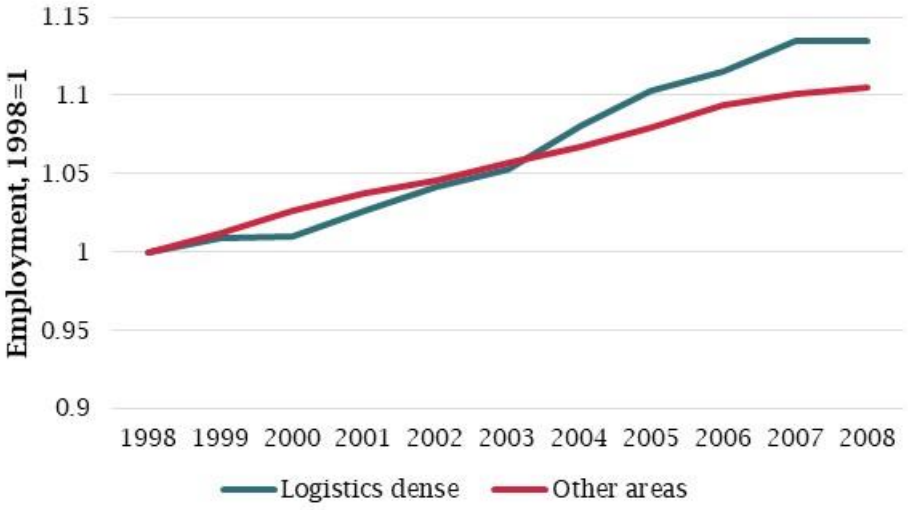
Source: Frontier Economics based on ONS (GDP figures for dense and high dense), BRES (grouping of logistics density)

Following the same approach, Figure 20 below sets out the historical evolution of average employment in local authorities across the UK[79], broken down according to their logistics density. Logistics-dense areas enjoyed higher employment growth than the UK average: total employment increased by 13.5% in high-density areas compared with 10.4% in other local authorities.

[78] The historical growth performance does not include the period 2008-2012 as it was heavily affected by the financial crisis.

[79] Northern Ireland is excluded from the "logistics dense" group as the Business Register and Employment Survey does not include data for Northern Ireland.

FIGURE 20 EMPLOYMENT IN LOGISTICS-DENSE AREAS COMPARED TO UK AVERAGE, 1998-2008



Source: Frontier Economics based on BRES (high logistics dense) and Oxford Economics (overall employment in the UK)

Our analysis also reveals other differences between logistics-dense LAs and other LAs that should be taken into account when comparing their economic outcomes. Drawing on existing literature on the drivers of local economic growth[80], we compare the two groups of LAs with regard to their:

- Human capital: e.g. the proportion of people with different levels of formal qualifications;
- Physical capital and infrastructure: e.g. local broadband speed and transport infrastructure;
- Economic conditions: e.g. historical differences in GDP per capita and industrial composition of the economy (e.g. share of local employment in manufacturing versus services); and
- Social capital: e.g. local prevalence of crime and other factors reflected in the Indices of Multiple Deprivation.

For this analysis, we focus on Great Britain as comparable data on several of the relevant characteristics is not available for Northern Ireland.

Table 7 below compares logistics-dense areas with the average local authority in Great Britain along key indicators for each of the categories described above. Taking a snapshot of logistics-dense areas in 2012, the beginning of the period we're considering, we find that:

- residents of logistics-dense areas were less likely to have a high level of formal qualifications;
- logistics-dense areas are relatively sparsely populated (high proportion of rural residents) but with good connections to major roads;

[80] Including, for example, existing reviews and frameworks in BIS (2010), Frontier Economics (2019), McCann (2018) and the "Levelling Up the United Kingdom" white paper published in 2022 by the Department for Levelling Up, Housing and Communities.

- their economic structure leant slightly towards manufacturing (rather than services) and jobs in "elementary" occupations as classified by the ONS; and
- they were somewhat less well-off in terms of GDP per capita, but logistics-dense areas did not rank any differently from other areas on the Index of Multiple Deprivation.

TABLE 7 INITIAL CONDITIONS OF LOGISTICS-DENSE AREAS

driver of growth	variable	high logistics dense	average local authority
Human capital	Proportion with higher education (NVQ4+, 2012)[81] *	27.7%	45.3%
Human/physical capital	Proportion of rural population (2011) **	45.3%	28.8%
Physical capital	Average travel time to nearest major road junction (minutes, 2013)	10.0	11.8
Economic conditions/human capital	Share of employment from manufacturing (2012) *	13.5%	9.4%
Economics conditions/human capital	Share of employment from elementary occupations (2012) *	11.8%	10.8%
Economic conditions	GDP per capita (£, 2012) *	26,005	27,551
Social capital	Index of Multiple Deprivation (average rank across all domains, 2010) **	14,848	14,868

Source: Frontier Economics based on data from EBG, ONS, DEFRA, DfT.

Note: High logistics dense is defined as areas with at least 3.5% share of employment in logistics as of 2012.

A higher rank in the Index of Multiple Deprivation indicates higher levels of deprivation. The average rank in the Index of Multiple Deprivation in logistics-dense areas remained mostly unchanged from 2010 to 2019.

** Figures relate to Great Britain;*

*** Figures relate to England.*

The picture shown in the table above is very similar when fast forwarding to 2021 – with one exception: the gap between the average local authority and logistics-dense areas has narrowed, as we describe in further detail in the next section.[82]

The differences with other local areas in the UK indicate that logistics-dense areas may have had relatively limited *potential* for economic growth. Therefore in the next section of the report we use appropriate

[81] National Vocational Qualification Level 4 or higher and equivalent qualifications. These include higher apprenticeships, undergraduate degrees and postgraduate degrees.

[82] In 2012, the GDP-per-capita ratio between logistics-dense and other areas was 94.3%; in 2019, the latest year for which LA-level GDP is available, it was 96%.

statistical techniques to strip out, as best as possible, the role of these differences in assessing the impact of logistics density on the growth of employment and GDP per capita.

4.3 MODELLING THE IMPACT OF LOGISTICS DENSITY

4.3.1 METHODOLOGY

To disentangle the impact of logistics density on economic outcomes from other drivers of local growth (such as skills), we use an **econometrics approach**. This effectively amounts to constructing an appropriate comparator group for logistics-dense areas. Focusing on human capital for simplicity, in the previous section we saw that logistics-dense areas on average have a lower proportion of people with high qualifications than other LAs in Great Britain. Because workers' skills and human capital more broadly are conducive to economic growth, comparing logistics-dense LAs with all other LAs may not be a like-for-like comparison. Applying econometrics, we can in effect compare logistics-dense areas with other areas that have a similar skills profile. The exercise can be repeated for other characteristics, such as population sparsity or past economic conditions, which are included in our econometric model as "control variables". This means that remaining differences between logistics-dense and other areas can be more confidently attributed to the impact of logistics density.

In our modelling, we consider how changes in **GDP per capita** and the level of **employment** between 2012 and 2019 are associated with logistics density. We have opted to consider the period from 2012 onwards to avoid distortions caused by the 2008-2010 financial crisis. We use 2019 as the end point as this is the latest year for which ONS data on GDP per capita is available at local authority level. This can be seen as a conservative choice as it does not take into account the acceleration of the logistics industry in the aftermath of the COVID-19 pandemic.

This cross-section approach means we are using variations between LAs to identify the effect of logistics. As we use a sample of up to 360 observations[83], we can only include a relatively limited number of control variables in the econometric model while still providing reliable estimates.[84] For this reason, while we have considered a wider set of characteristics than those included in the report, we have narrowed down the list of controls to those that were generally statistically significant and showed marked differences between logistics-dense and other areas. The results shown in the next sections are generally not sensitive to the specific choice of control variables used in the model.

Table 8 summarises the variables we have considered. It shows whether they are included in our preferred model ("yes") or whether they have been used in initial testing but ruled out of the preferred model. Definitions and sources for each variable are provided in Annex B.

[83] Our dataset contains a total of 360 local authority districts across England, Scotland and Wales.

[84] In econometrics terms this relates to overfitting the model. In this situation, the resulting coefficients and standard errors might be misleading.

TABLE 8 LOCAL CHARACTERISTICS CONTROLLED FOR IN ECONOMETRIC MODELLING

Variable	Description	Included in model?
Logistics density	"Treatment variable", defined as the share of employment from economic activities related to logistics (SIC 49.2, 49.4 and 52.1) out of total employment as of 2012.	Yes
Control variables for economic outcome in starting year	GDP per capita and total employment in the local area in 2012.	Yes
Control variables for historical economic performance	Previous trend in GDP per capita from 1998 to 2008; previous trend in employment from 1998 to 2008	Yes
Control variables for other drivers of local growth	Proportion of population with National Vocational Qualifications level 4 or above in 2012; Proportion of rural population; Dummy variable identifying local authorities corresponding to the 10 largest cities in Great Britain.	Yes
Other control variables	Dummies for each Government Office Region / NUTS1 areas; Average local broadband speed; Travel time to nearest airport and to nearest major road junction; Index of Multiple Deprivation; Proportion of workers in elementary occupations and other Standard Occupational Codes (as of 2012); Proportion of workers in manufacturing and other Standard Industry Classification codes (as of 2012); Population and population density as of 2012.	No

Source: Frontier Economics

4.3.2 ECONOMETRIC RESULTS

Table 9 sets out results from the econometric regressions for GDP per capita. We estimate **that a 1 percentage point increase in logistics density is associated with a 0.75 percentage point increase in GDP per capita over the 2012-2019 period**. This effect is statistically significant at a 95% confidence level.

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TABLE 9 REGRESSION RESULTS FOR THE OUTCOME: GROWTH IN GDP PER CAPITA FROM 2012 TO 2019

local characteristic	Effect on gdp per capita (percentage points)	statistical significance (p-value)
Logistics density	**0.75****	**0.016 (highly significant)**
Higher education (2012)	0.13**	0.045 (highly significant)
Rural population (2011)	-0.03*	0.066 (significant)
Major city	0.02	0.422 (not significant)
GDP per capita (2012)	3.32e-07	0.561 (not significant)
Trend in GDP per capita (1998-2008)	-0.02	0.798 (not significant)

Source: Frontier Economics

Note: Sample size 309 local authorities in England. The coefficient for logistics density remains statistically significant when using robust standard errors. As shown in Annex B, alternative models using all local authorities in Great Britain provide similar results.

Translating this result into more tangible terms, our modelling suggests that going from a low to a high level of logistics density is linked with additional growth of 1.3 percentage points in GDP per capita over the 2012-19 period. This is equivalent to adding an extra year of GDP per capita growth to logistics-dense areas, or an additional £300 per year per person per year in the local area.

Table 10 sets out results from the econometric regressions for employment. We estimate that **a 1 percentage point increase in logistics density is associated with a 0.65 percentage point increase in employment over the 2012-2019 period**. In other words, high logistics density is linked with 1.2 percentage points of additional employment growth in that period, relative to comparable areas with lower logistics density. This amounts to around 1,000 extra jobs.

TABLE 10 REGRESSION RESULTS FOR THE OUTCOME: GROWTH IN EMPLOYMENT FROM 2012 TO 2019

local characteristic	Effect on employment growth (percentage points)	statistical significance (p-value)
Logistics density	**0.65*****	**0.006 (significant)**
Higher education (2012)	0.16***	0.000 (highly significant)
Rural population (2011)	0.04	0.731 (not significant)
Major city	-0.0001	0.995 (not significant)
Employment (thousands, 2012)	0 .0002***	0.003 (highly significant)

local characteristic	Effect on employment growth (percentage points)	statistical significance (p-value)
Trend in employment (1998-2008)	0.89***	0.013 (highly significant)

Source: Frontier Economics

Note: Sample size 309 local authorities in England. The coefficient for logistics density remains statistically significant when using robust standard errors. As shown in Annex B, alternative models using all local authorities in Great Britain provide similar results.

Tables in Annex B also show evidence from econometric models that **high logistics density is associated with a faster decrease in economic inactivity**: the proportion of people in the local area that are not in work, looking for work or in full-time training or education. These findings indicate that the increase in employment estimated above is linked to more local residents finding jobs – rather than being due, for example, to more workers commuting to the area. This is also consistent with data on the number of residents by local authority, which does not show any discernible difference in population growth between areas with low and high logistics density.

Annex B also includes findings from alternative econometric regressions controlling for other proxies of local characteristics, including the average rank in the Index of Multiple Deprivation or the proportion of employment related to manufacturing. It also includes an alternative definition of logistics density. Overall, the results for logistics density are robust to the various alternative specifications.

As a caveat, we note that the logistics industry is typically concentrated in **well-connected areas.** In order to reduce transport times and costs, distribution centres tend to be located on the outskirts of cities and large industrial areas that benefit from good links to major roads, railways, ports and/or airports. We are not able to confirm that our findings are not at least partly driven by the effect of location on economic growth.

In other words, while we find a positive and statistically significant relationship between logistics density and increasing levels of GDP per capita and employment, it is challenging to separate any potential growth associated with being well-connected as an area from growth driven by the logistics industry itself. The two are highly correlated. However, because we take account in our modelling of the initial value and trend of the outcome variable, the impact of location is at least partly controlled for.[85]

4.4 WHAT IS THE EXPECTED ECONOMIC IMPACT OF A NEW LOGISTICS SITE?

Logistics sites vary in size and location. They include large different types of distribution centres, which typically employ over 1,000 people, and smaller local distribution hubs, which typically employ 100 to 400 people that are closer to the end point of the goods' journey.

The previous sub-section shows that opening and operating a new logistics site is linked with additional economic activity beyond the site itself. Putting the results from the econometrics exercise above in more concrete terms, we estimate that **a new site employing around 1,500 people would generate an extra**

[85] For example, when estimating the impact of logistics on employment growth, we take into consideration 1) the initial value of employment in the area as well as 2) previous job growth in the area. Any potential impact of connectedness on employment growth should be reflected in these two variables (e.g. well-connected areas would have already been growing as a result of their location).

1,000 jobs in the local area, and a site employing around 250 people would generate around 160 additional jobs in the area.

Additional jobs can be created as a result of indirect and induced effects:

- Indirect effects flow from supply chain links: a new site requires a range of inputs from the manufacture, servicing and repair of machinery and motor vehicles to catering, cleaning and security services. Our in-depth interviews indicate that many of these services are provided by local workers.
- Induced effects stem from the purchasing power of people employed at the logistics site, many of whom, as described earlier, may have been earning less or may not have been working at all.

FIGURE 21 DIRECT, INDIRECT AND INDUCED EMPLOYMENT EFFECTS FROM THE LOGISTICS INDUSTRY

Source: Frontier Economics
Note: The size of the boxes is not to scale.

Our findings are consistent with available indirect multipliers from the economic literature, which suggest an effect in the order of 650 to 1,330 additional jobs linked to a new logistics site employing 1,500 people.

Table 11 sets out the ONS's Blue Book estimates of Type I employment multipliers[86] for logistics-related activities. Type 1 multipliers are a conservative measure as they do not take into consideration the induced effects mentioned above.

[86] Type I employment multipliers include direct employment effects resulting from an increase in production in a given industry, as well as the indirect employment effects resulting from supply chain links (i.e. the additional demand for goods or services from suppliers to the logistics industry).

TABLE 11 BLUE BOOK TYPE 1 MULTIPLIERS BY INDUSTRY

Source	industry	full time EQUIVALENT (fte) multiplier	additional FTE employment from 1,500 employees in the industry
ONS Blue Book[87]	SIC 49 - Land transport services and transport services via pipelines, excluding rail transport	1.45	675
	SIC 52 - Warehousing And Support Activities For Transportation	1.89	1,335
	SIC 53 - Postal And Courier Activities	1.45	675

Source: Frontier Economics based on ONS Blue Book 2018 consistent estimates of Type I UK employment multipliers by SU114 industry group and sector, reference year 2015.

Note: The SIC 53 was not included in our definition of logistics, and therefore excluded from the calculation of logistics density. We still include it in this table for completeness.

4.5 THE ROLE OF SMALL AND MEDIUM ENTERPRISES

While the logistics industry includes several large companies, 99% of businesses in the industry are small or medium-sized enterprises (SMEs) [88], as shown in recent analysis from the ONS.[89] Moreover, the wider impact of logistics also includes enabling SMEs outside of the industry to order goods from suppliers and send them to customers – in particular, enabling them to fulfil online orders from customers outside their local area.

SME participation in e-commerce has grown substantially since official statistics started tracking it, and is now very significant:

- In 2019, the latest year for which data from the ONS E-commerce and ICT survey[90] is available, e-commerce sales made by UK SMEs were worth nearly £170bn, having nearly tripled since 2009. By contrast, e-commerce sales by large businesses grew 1.6 times over the same period.[91] [92]

[87] https://www.ons.gov.uk/economy/nationalaccounts/supplyandusetables/adhocs/009746typeiukemploymentmultipliersandeffectsreferenceyear2015

[88] SMEs are business with 249 and fewer employees. Generally SMEs are subdivided into micro (0-9 employees), small (10-49 employees) and medium (40-249 employees).

[89] ONS (2022). "The rise of the UK warehouse and the "golden logistics triangle".

[90] https://www.ons.gov.uk/businessindustryandtrade/itandinternetindustry/bulletins/ecommerceandictactivity/2019

[91] The latest data available dates back to 2019, so these figures are likely to significantly underestimate the current volume of e-commerce sales.

[92] Analysis of SMEs between 2016 and 2018 also identified that SMEs with 50-249 employees recorded increases in the percentage of turnover from e-commerce from their own website/app and through an e-commerce market place website/app of 4% and 3.5% respectively. Larger companies, particularly those with over 1,000 employees, saw substantially lower growth in the share of e-commerce turnover. Source: https://www.oxfordeconomics.com/recent-releases/The-Economic-Impact-of-an-Online-Retail-Sales-Tax-in-the-UK

- The proportion of SMEs with 10-49 employees engaging in e-commerce almost doubled from 2009 to 2019, going from 14% to 27%. The participation of SMEs with 50-249 employees also increased, from 27% to 33%.[93] [94]

E-commerce benefits SMEs across the UK, in particular those outside London and the South East. The ONS does not provide data on participation in e-commerce by region. However, its data shows that manufacturing, retail and wholesale are the industries with by far the highest proportion of e-commerce sales. These three sectors, and by extension the SMEs active in e-commerce, are relatively spread out across the UK, as shown in the table below: 86% of jobs in these three industries are outside London and the South East, compared with 70% of employment across all industries. ONS analysis also indicates that businesses which sell their goods online are more productive than comparable businesses.[95] That means increasing participation in e-commerce throughout the UK may contribute to reducing regional inequalities in productivity.

TABLE 12 EMPLOYMENT BY REGION FOR TOP E-COMMERCE INDUSTRIES AND ALL INDUSTRIES, 2020

Region	Proportion of employment (Top 3 E-commerce industries combined)	Proportion of employment (all industries)
North East	4%	3%
North West	13%	11%
Yorkshire & Humber	9%	8%
East Midlands	9%	7%
West Midlands	10%	8%
East of England	9%	9%
London	11%	17%
South East	13%	13%
South West	8%	8%
Wales	4%	4%
Northern Ireland	3%	3%
Scotland	7%	8%

Source: : Frontier Analysis using ONS BRES data: annual employment estimates for the UK split by region and broad industry group Standard Industrial Classification

Note: Top 3 e-commerce sectors are Retail, Wholesale and Manufacturing

[93] Data is not available for micro firms (employing 1-9 people) for this period.

[94] A study by FedEx in 2017 put the percentage of SMEs generating revenue from e-commerce at just over 80% http://www.fedex.com/images/emea/learn/sme-export-report/FedEx_Export_Report_Document_UK.pdf

[95] https://www.ons.gov.uk/economy/economicoutputandproductivity/productivitymeasures/articles/informationandcommunicationtechnologyintensityandproductivity/2018-10-05

The benefits to SMEs from digitalisation in general have been recognised by the UK government, which launched the 'Help To Grow: Digital' initiative[96] in 2022. The scheme is part of a wider effort to boost SMEs' productivity and innovation capabilities by helping them adopt digital technology, including e-commerce software. [97]

4.6 WIDER SOCIAL BENEFITS FOR LOCAL COMMUNITIES

Logistics companies also contribute to their local communities through activities beyond their core business and the direct and indirect effects of their employment. Our review of publicly available information from the largest logistics employers, coupled with conversations with stakeholders, has identified three key themes, described in this section of the report:

- Provision of training and education to local communities;
- Enabling responses to the COVID-19 pandemic; and
- Support to charities through local and national initiatives.

It is worth noting that the availability of information on community initiatives varies substantially across logistics companies and local areas. Moreover, for vertically integrated companies, such as retailers that employ a large logistics workforce, it can be challenging to define whether a particular initiative is linked to the logistics arm of the business. Consequently, it was not possible to generate aggregate figures on the wider social impact of the logistics industry, and the facts reported in this section may not fully capture the activities undertaken by logistics companies.

4.6.1 TRAINING AND EDUCATION FOR LOCAL COMMUNITIES

One of the main ways the logistics industry supports local areas is through education and training for non-employees. For example, the iPort Logistics Park in Doncaster includes an academy which links employers and local residents through training and recruitment[98] and is seen locally as a valuable opportunity. [99] Another example is the Centre for Logistics, Education and Research (CLEAR) at the Magna Park in Harborough. CLEAR will create training pathways for new entrants and existing workers alike, and conduct research into the application of advanced technologies to benefit the distribution and logistics industry.[100]

Several training and inclusion programmes provided by logistics employers are targeted at specific groups including marginalised individuals. An example of this is Clipper Logistics' "Fresh Start" programme, which offers ex-offenders among others the chance of a job they may not have had before. Over 1,200 people have been employed through this scheme, including more than 250 ex-offenders. [101] Many logistics

[96] This is part of the wider government initiative 'Help To Grow' aimed at helping recover and build back better from the COVID-19 pandemic by adopting digital technology and management training to increase innovation, productivity and future growth.

[97] https://www.learn-to-grow-your-business.service.gov.uk/

[98] https://www.iportacademy.co.uk/

[99] Finding from case study interviews with Doncaster District Council and Doncaster Chamber of Commerce.

[100] https://www.thebusinessdesk.com/eastmidlands/news/2046826-logistics-training-facility-planned-with-space-for-1000-students

[101] https://www.yorkshirepost.co.uk/business/clipper-works-with-local-prison-to-help-ex-offenders-gain-employment-3472670

employers have signed the Armed Forces Covenant[102], including Kuehne+Nagel, who use a dedicated recruitment specialist who engages with the British Forces Resettlement Services and the Career Transition Partnership (CTP) in the recruitment of service leavers. [103]

Examples of education programmes for children include the Amazon Future Engineer scheme to inspire and enable students from low-income backgrounds to pursue careers in computer science. Through a bursary scheme Amazon gives financial support of £3,500-£5,000 a year for up to four years, as well as mentoring, careers advice and networking opportunities.[104] Amazon has also teamed up with education bodies to launch Maths4All, an online storefront providing free curriculum-linked maths resources. It also provides additional free STEM (science, technology, engineering and maths) resources to students through Amazon Future Engineer, virtual tours and online Class Chats.

Apprenticeships are also important pathways to skills and jobs for local people as well as providing existing logistics workers with training opportunities. Logistics UK data in the Skills and Employment report 2021 shows that there were almost 6,000 logistics apprenticeship starts in England in 2020/21. At Amazon, 80% of its apprentices are in the operations team, which means they are spread throughout the UK. Amazon has announced 1,500 new apprenticeships in 2022, with 1,000 of them for new employees. Most previous apprentices have gone on to sign to permanent contracts. Those on Amazon's largest programme for apprentices, level 2 Supply Chain Operatives for Business Improvement Techniques, are guaranteed a permanent contract on completion of their apprenticeship (subject to meeting Amazon's general criteria).[105]

Some logistics companies are supporting apprenticeships in other industries. For instance:

- Royal Mail has used over £4.1m of its Apprenticeship Levy allowance to fund apprenticeships for its charity partners and SMEs via the London Progression Collaboration. The company has supported 282 apprenticeship starts with its charity partners to date.[106]
- Amazon has used £2.5m of its Apprenticeship Levy funding to support small businesses, creative industry partners and Amazon Web Services through 200 apprenticeships.[107]

Local councils value the career opportunities that logistics offers and can provide training to develop the necessary skills. An example is the training programme at the Port of Tilbury, called "Routes to Logistics", which is being run over 21 months starting in 2021. The aim is to help unemployed residents get local

[102] https://www.armedforcescovenant.gov.uk/

[103] Armed Forces Covenant | Kuehne+Nagel (kuehne-nagel.com)

[104] https://www.aboutamazon.co.uk/news/community/funding-students-through-the-amazon-future-engineer-bursary

[105] Information provided by the Amazon apprenticeship team.

[106] Royal mail Corporate Responsibility Report 2020-21, https://www.responsibilityreports.com/HostedData/ResponsibilityReports/PDF/LSE_RMG_2021.pdf

[107] https://www.aboutamazon.co.uk/news/small-businesses/amazon-announces-2-5-million-apprenticeship-fund-to-help-small-businesses-across-england-upskill-their-workforces .

logistics jobs. The scheme is funded by the Tilbury Community-led Local Development programme and administered by Thurrock Council in partnership with Tilbury on the Thames Trust.[108]

4.6.2 SUPPORT FROM THE LOGISTICS INDUSTRY DURING THE COVID-19 PANDEMIC

The COVID-19 pandemic has demonstrated the importance of a strong logistics industry – including the role played by the sector in the distribution of vaccines and tests. DHL, which estimates that it has delivered over 1bn COVID-19 vaccine doses[109], says its locally adapted last-mile delivery and distribution models will continue to be important beyond 2021.[110] In 2020, the government launched a partnership with Amazon, Royal Mail, research institutes, pharmacies and laboratories to meet the demand for COVID-19 testing, starting with frontline NHS staff.[111]

Beyond this, operators have donated money, time and logistics resources to support local communities and the NHS during the pandemic:

- ASOS has provided additional storage and inventory management services for NHS facilities close to its Great Houghton and West Moor Park logistics centres. This ensured that more than 1m units of medical supplies could be distributed across South Yorkshire to where they were needed as swiftly as possible[112];
- Yodel was a partner for the Salute the NHS campaign, ensuring – at no cost – the delivery of 1m free meals in three months to NHS frontline workers[113]; and
- Amazon delivered over 7m COVID-19 test kits across the country in 2020, with all fees and charges waived.[114] Amazon has also supported COVID-19 relief internationally through providing logistical support to governments including Germany, Italy, Spain and France, and personal protective equipment and hospital donations in Nepal[115].

4.6.3 SUPPORT FOR LOCAL CHARITIES

The YouGov survey shows that 35% of logistics workers think their employer has a positive impact on the local community. This is more than those who disagreed (15%), and so the net positive result is 20%. However, many respondents neither agreed nor disagreed with this statement (37%). For non-managerial

[108] https://www.yourthurrock.com/2021/03/18/new-logistics-training-programme-launches-at-the-port-of-tilbury-for-unemployed-local-residents/

[109] https://www.lloydsloadinglist.com/freight-directory/news/DHL-delivers-1-billion-COVID-19-vaccine-doses/79931.htm#.YinjlOjP2Uk

[110] https://www.dpdhl.com/en/media-relations/press-releases/2021/the-race-against-the-virus-dhl-white-paper-covid-19.html

[111] https://www.gov.uk/government/news/government-launches-new-drive-on-coronavirus-tests-for-frontline-nhs-staff

[112] https://www.asosplc.com/news/supporting-national-effort-during-covid-19/

[113] https://www.salutethenhs.org/our-partners

[114] https://committees.parliament.uk/writtenevidence/23097/html/

[115] https://www.aboutamazon.com/news/community/how-amazon-is-helping-fight-covid-19-in-nepal

logistics workers, the net positive score was 11% with a slightly higher proportion of respondents neither agreeing nor disagreeing (43%).

Logistics companies support hundreds of local charities, and our analysis points to logistics-dense areas likely receiving at least several thousand pounds each year. A vast range of charities and communities receive backing, but two causes stand out: support for food banks and for health and wellbeing, including local hospices. Examples include:

- Food banks:
  - Yodel has donated to many food banks, including those in Middlesbrough, South Sefton and Sunderland[116];
  - Oakland international has donated to the Coalville food bank[117]; and
  - XPO donated almost 10,000 meals to Doncaster food bank in 2020[118];
- Domestic abuse charities:
  - Amazon has donated to local domestic abuse charities, including £1,000 to Changing Pathways in Thurrock in 2020[119]; and
  - PassLogistics is joining with Phoenix Women's Aid in Doncaster to raise money in 2022[120];
- Children's hospices:
  - Armstrong Logistics supports the Rainbow Children's Hospice in North West Leicestershire[121]; and
  - XPO has donated to Bluebell Wood Children's Hospice in Doncaster, raising over £20,000 and 24,000 bags of donations.[122]

Logistics companies can also use their logistics expertise to support local communities. For example, Amazon is working with local charities and businesses in Fife, Scotland to deliver essential goods to

[116] https://www.yodel.co.uk/news/2020/january/yodel-colleagues-show-support-for-middlesbrough-foodbank-with-generous-donation and https://www.inyourarea.co.uk/news/parcel-carrier-colleagues-show-support-for-south-sefton-foodbank-with-donation/

[117] https://oakland-international.com/2020/11/19/oakland-international-to-support-coalville-charities/

[118] https://www.thegrocer.co.uk/community/xpo-logistics-reports-record-food-bank-donations-over-christmas-period/601219.article

[119] https://thurrock.nub.news/n/amazon-cash-helps-out-local-good-causes

[120] https://passlogistics.co.uk/news-article/pass-x-phoenix-supporting-local-charities/

[121] https://armstrong-logistics.co.uk/news/2020/1/rainbows_charity_partnership

[122] https://www.bluebellwood.org/news/xpo-logistics-turns-delicious-donation-into-cash-to-help-local-families-at-bluebell-wood

vulnerable households through a £150,000 grant and supporting the creation of a new warehouse site to process deliveries.[123]

National charity partnerships

Large logistics companies also have multiple national charity partnerships. Our review of publicly available information suggests that each large company lends continuous support to between one and 10 such initiatives. The list includes Royal Mail's partnerships with Action for Children, Missing People and National Literacy Trust; Travis Perkins with Macmillan Cancer Support and Volunteer It Yourself; XPO Logistics with the Down Syndrome Association; and Amazon with NHS Charities Together, British Red Cross, Magic Breakfast, Barnardo's[124] and In Kind[125].

[123] https://www.aboutamazon.co.uk/news/community/amazon-to-help-more-than-13-000-families-across-fife-in-scotland-with-product-donations

[124] Company public CSR reports available on company websites.

[125] https://www.aboutamazon.co.uk/news/community/donate-a-toy-with-amazon-and-charity-in-kind-direct

5 ENVIRONMENTAL SUSTAINABILITY

5.1 OUR APPROACH

The logistics industry is rising to the challenge of achieving net zero carbon emissions, **with multiple operators committing to net zero by 2040**, earlier than the government's 2050 target for the UK as a whole. As explained earlier in this report, logistics is a large industry that has a significant impact on economic and social outcomes in the UK. Transport (of people as well as goods) is responsible for 27% of the UK's greenhouse gas (GHG) emissions[126], more than any other sector, so the logistics industry has a big part to play in achieving the UK's environmental ambitions.

The Department for Transport (DfT) has forecast that carbon emissions from transport will need to decrease by 200-220 MtCO22 from 2020 to 2050[127] for the UK to reach its net zero target. In this section, we assess the potential effect of actions that the logistics industry is taking or planning on the UK's transition to net zero.

We consider the impact of actions to reduce emissions from three main sources:

- Emissions from transport vehicles, which account for 20% of all UK transport emissions,[128] including:
  - "Middle-mile": Heavy Goods Vehicles (HGVs) used to transport goods to and from large distribution centres; and
  - "Last-mile": Light Commercial Vehicles (LCVs) used to transport goods from distribution centres or local distribution hubs to their final destination (e.g. a retail store, a customer's house or a collection point).
- Logistics buildings, primarily warehouses used as distribution centres or local distribution hubs.

For each source of emissions, we provide an overview of the status quo, the scale and potential impact of steps to reduce those emissions, and some of the challenges facing industry and policymakers. We also consider cross-cutting operational changes that may affect the industry's emissions.

We find that the logistics industry's transition to net zero should generate large CO2 savings and so contribute significantly to the decarbonisation of the UK economy as a whole. Achieving these objectives is likely to involve actions by businesses, policymakers and other stakeholders, given the scale of change required to decarbonise the industry.

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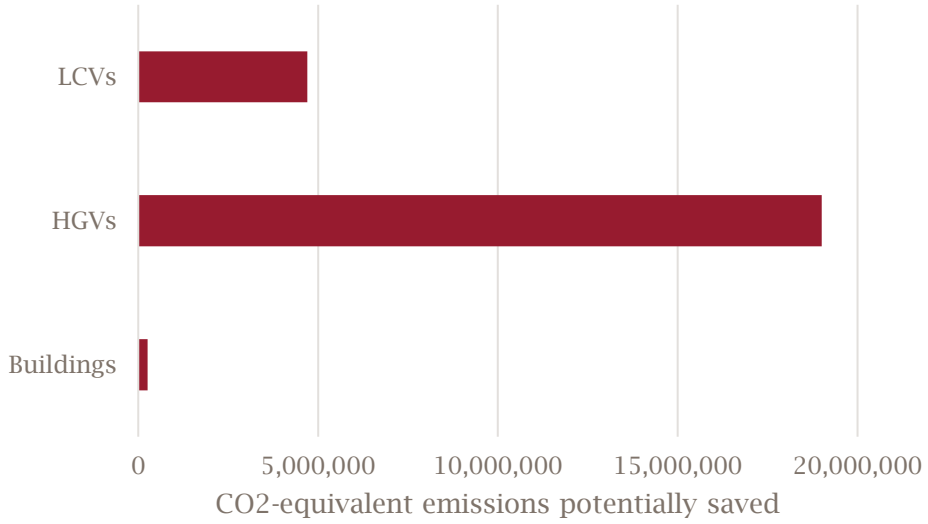
[126] Department for Business, Energy and Industrial Strategy (2021). 2019 UK Greenhouse Gas Emissions, Final Figures.

[127] DfT (2021) Decarbonising Transport: A Better, Greener Britain.

[128] Of which 16% from HGVs and 4% from LCVs. This estimate is based on attributing 100% of HGV emissions and 24% of LCV emissions to the logistics industry. We use 24% as this is the proportion of LCV miles travelled in the delivery and transport of goods (source: DfT van statistics Table VAN0211). Source for emissions statistics: Department for Transport data on 2019 vehicle emissions.

FIGURE 22 POTENTIAL CO2 SAVINGS FROM DECARBONISING LOGISTICS



Source: Frontier analysis of Department for Transport data on vehicle emissions (2019), Savills data on warehouse space by sector (2021) and Department for Business, Energy and Industrial Strategy data on energy efficiency (2021) National Energy Efficiency Data-Framework

There are many important determinants of an industry's environmental impact, including waste, biodiversity and use of land and water. Here we focus on carbon (and equivalent) emissions, as they are the most widely discussed measure in the literature on the industry.

We also focus on emissions from direct logistics operations (scope 1) and from the purchase of electricity, steam, heat or cooling in logistics (scope 2).[129][130] This excludes emissions from indirect sources (scope 3)[131], such as those generated in the manufacture of transport vehicles or in the construction of distribution centres. Scope 3 emissions are significant[132] and logistics companies are working to minimise them, for example by designing buildings to reduce embedded carbon, or by encouraging employees to replace their internal combustion engine (ICE) vehicles with EVs. It is certainly important to address these types of emissions, and doing so will involve substantial collaboration between logistics operators and other parts of the value chain. However, a comprehensive analysis of emissions along the entire logistics supply chain is beyond the scope of this report.

5.1.1 TAKING INTO ACCOUNT THE POTENTIAL FUTURE GROWTH OF LOGISTICS

This section, which mainly explores how emissions from the logistics industry can be reduced, implicitly discusses per unit emissions. For total emissions from the industry to fall over time, the expected growth

[129] Scope 1 emissions are direct GHG emissions that occur from sources controlled by an organisation. The most common sources are natural gas for heating, refrigerants and vehicle fuel.

[130] Scope 2 emissions are indirect GHG emissions from the purchase of electricity, steam, heat, or cooling that occur at the site of generation rather than the site of use.

[131] Scope 3 emissions are indirect GHG emissions that are the result of activities from assets not controlled by the reporting organisation, but that the organisation indirectly impacts in its value chain.

[132] According to the IPCC, many organisation report that 80% of their emissions fall into the Scope 3 category. Available here: https://www.logisticsbusiness.com/transport-distribution/scope-emissions-need-know/

of the logistics industry must also be taken into account. Measured by the weight of goods lifted,[133] the National Infrastructure Commission (NIC) expects freight to increase by 27-45% in the next 30 years. This growth is broken down further in the last-mile and middle-mile sections of this report.

As for emissions, projections for the future of logistics differ. Vivid Economics estimates that freight emissions will increase by 20% from 27MtCO2e in 2016 to 32-33MtCO2e in 2050 if left unabated.[134] However, using the National Transport Model, DfT finds that without abatement there is little change in HGV emissions from today's levels out to 2050.

The projected growth in logistics means that it is even more important to overcome the hurdles to decarbonising last-mile delivery, middle-mile delivery and buildings. These challenges are outlined in the following sections. As the carbon emission reductions are calculated for each of these industries based on today's levels, an expanding logistics industry would mean that the same technological or behavioural changes would yield an even greater cut in emissions.

It should also be noted that some of the growth in logistics may replace activity elsewhere; in some cases logistics acts as a substitute. This means that logistics emissions may grow, but emissions from other sectors decline. It may even be the case that the reduction by other sectors outweighs the increase in logistics emissions, resulting in a net reduction.

Evidence suggests this may be the case for e-commerce, which is a subsector of logistics. A report by Oliver Wyman (2020) finds that e-commerce is 2.3 times cleaner than physical retail[135] thanks to lower transport and buildings emissions. The estimate takes into account the return of items ordered online, modes of transport and number of items per trip. Based on this estimate, without further abatement growth in e-commerce would increase the sector's emissions. However, overall UK emissions would still drop because e-commerce would be displacing physical retail, which is a bigger emitter. While e-commerce is just a subset of logistics, the same principle could apply to other logistics activities.

5.2 LAST-MILE

5.2.1 THE STATUS QUO

On this last leg of the logistics journey, goods are transported almost entirely in LCVs - commercial vehicles that weigh up to 3.5 tonnes. Vans are the most common example.[136][137] Other last-mile options include cycling, walking and autonomous vehicles. However, LCVs account for the vast majority of trips and emissions in last-mile delivery and therefore are the focus of this section.

[133] NIC (2019) Better Delivery: The Challenge for Freight.

[134] Vivid Economics (2019) The value of freight.

[135] Oliver Wyman (2020) Is E-Commerce Good for Europe?.

[136] 'Vans' and LCVs will be used interchangeably throughout the rest of this section. LCVs include other types of small commercial vehicles, such as cars when used for delivery, but - as previously stated – vans are the most common LCV used by the logistics sector.

[137] Logistics UK (2021) The Road to Net Zero: A Manifesto for Logistics.

In 2019-20, there were 4m vans registered with the UK Driver and Vehicle Licensing Agency, and these vehicles drove a collective total of 50.5bn miles.[138] Vans are used for a variety of purposes. Sixty percent of van miles are for providing services, while about a quarter is for delivery and collection.[139] We define the vans in this latter category as "logistics vans". They are responsible for 4% of all UK transport emissions[140] and account for around one-fifth of total logistics vehicle emissions.

Increasing numbers of vans are coming onto UK roads: LCVs have experienced 70% growth in the last 20 years.[141] Statistics from the DfT suggest that van traffic could increase by another 50% in the lead up to 2050.[142] This could be due to several factors, including rising demand for same-day or next-day delivery, growth in self-employed sectors with high van use and continued growth in e-commerce.[143][144]

5.2.2 COMMITMENTS BY LOGISTICS OPERATORS AND POTENTIAL IMPACT OF DECARBONISATION

The last-mile is where logistics companies have made the most concrete changes and commitments so far. This is partly explained by the greater technological readiness of low-carbon LCVs compared with low-carbon HGVs:[145] LCV technology, although still developing, is more mature. Policy choices are also contributing to the adoption of electric LCVs, including £582m of plug-in grants to reduce the upfront cost of low-emission vans and cars, and the mandate that sales of new petrol and diesel cars and vans end by 2030.[146]

We have analysed the environmental sustainability commitments made by the top 12 employers[147] in the logistics industry. Eight of the 12 have made firm pledges that relate to increasing the proportion of EVs in their LCV fleet. A further three have a goal to electrify their fleet but, to the best of our knowledge, have not publicly set out concrete actions or objectives. Based on targets for the total number of vans operated by three companies,[148] we would expect the logistics industry to have more than 5,000 electric LCVs on the road in the UK by the end of this year, and **more than 20,000 by the end of 2030**.

Many operators are already making progress towards their commitments and have introduced EVs into their fleet. Royal Mail currently has 1,137 vehicles powered by electricity or alternative fuels[149] and plans to

[138] Logistics UK (2021) The Road to Net Zero: A Manifesto for Logistics.

[139] Data source: DfT (2021) Van Statistics (Table VAN0211).

[140] Source: Frontier analysis of Department for Transport data on 2019 vehicle emissions.

[141] Government Office for Science (2019) Understanding the UK Freight Transport System.

[142] Vivid Economics (2019) The value of freight.

[143] CCC (2018) Chapter 5 Annex – Progress Report to Parliament.

[144] Government Office for Science (2019) Last mile urban freight in the UK: how and why is it changing?

[145] As defined in terms of Technology Readiness Levels (TRL) - a measure to estimate the maturity of a technology, on a 9-point scale from 1 = basic principles observed to 9 = actual system proven in an operational environment.

[146] Sales of some categories of hybrid cars and vans will be allowed until 2035. Source: DfT (2021) Green Paper on a New Road Vehicle CO2 Emissions Regulatory Framework for the United Kingdom.

[147] The methodology is explained in Annex A.

[148] These are Amazon, Royal Mail, and Tesco.

[149] Available here: https://www.royalmailgroup.com/en/responsibility/our-environment/

add 3,300 EVs to its fleet in 2021-22.[150] Amazon has more than 1,000 EV LCVs on the road which were used to deliver more than 45m packages in 2021[151]. If the industry as a whole were either to convert all LCVs to EVs today or to switch to carbon-free ultra-light modes of delivery (e.g. e-cargo bikes), our estimates show **this would reduce tank-to-wheel emissions[152] by 4.7MtCO2e per year**. This represents **19% of all annual logistics vehicle emissions and 4% of total annual UK transport emissions**.[153] The public pledges of logistics companies suggest that it may be possible for all LCVs used by major logistics operators to be replaced with EVs by 2040.

As well as replacing diesel LCVs with electric equivalents, efforts are being made to shift last-mile journeys from LCVs to less polluting modes of transport such as bicycles or electric scooters. Amazon now has over 500 vehicles in its European ultra-light delivery fleet (e-cargo bikes, electric scooters and walkers),[154] while DHL uses 28,500 bicycles to deliver parcels and mail in Germany.[155][156]

5.2.3 CHALLENGES TO DECARBONISATION

However, there are challenges involved in decarbonising last-mile logistics:

1 **Cost**

The last-mile already tends to be much more expensive than other legs of the delivery journey, accounting for 20% of operating costs but only 6% of distance.[157] This is because there are more vehicles moving fewer packages than in other legs, raising overheads.

The upfront vehicle cost of an electric LCV is greater than a diesel equivalent and the total cost of ownership (TCO)[158] can also be greater depending on vehicle usage. The expected savings in fuel cost do not currently outweigh the upfront vehicle cost over the lifetime that logistics operators tend to use

[150] Available here: https://www.royalmailgroup.com/en/press-centre/press-releases/royal-mail/royal-mail-charges-up-its-fleet-with-ten-fold-increase-in-electric-vehicles/

[151] https://www.aboutamazon.co.uk/news/sustainability/amazon-delivered-45-million-packages-in-the-uk-with-zero-emission-vehicles-last-year

[152] Tank-to-wheel emissions represents any emissions (CO2e) that are released into the atmosphere at the point of use. The definition does not consider emissions that were produced as part of the extraction process, or from transporting the fuel to consumers: these are well-to-tank emissions. Well-to-wheel emissions consider the entire lifecycle of the fuel from production to end-use. The exception is that tank-to-wheel emissions for bioenergy include the negative carbon emissions of the feedstock, meaning that carbon emissions from bioenergy are zero.

[153] Data source: Frontier analysis of Department for Transport data on 2019 vehicle emissions, explained in Annex A.

[154] Available here: https://sustainability.aboutamazon.com/environment/sustainable-operations/transportation

[155] Available here: https://www.dhl.com/de-en/home/logistics-solutions/green-logistics.html

[156] It is worth noting, however, that many of these bicycles are likely used to deliver post, which is not included in our definition of logistics. We would therefore expect that DHL uses a smaller number of bicycles for logistics purposes in Germany, but it is not possible to separate these out.

[157] NIC (2019) Better Delivery: The Challenge for Freight.

[158] Total cost of ownership is the purchase price of an asset (in this case a vehicle) plus the costs of operating it. For vehicles operating costs include fuel, insurance, parking, and other necessary infrastructure.

vans,[159] especially when the cost of installation of chargepoints at depots and other connectivity costs for infrastructure are taken into account.

Replacing all logistics vans now on the road with EVs by 2030 would involve swapping out 50,000 vans a year, 20,000 of which would be replaced early (i.e. before the end of their useful lifetime).[160] Moreover, logistics operators **would need to install up to 120,000 chargepoints** at their depots.[161] The necessary investments would be above and beyond business as usual. Indeed, the costs entailed could significantly impact the commercial sustainability of logistics operators.

2 **Technology and Infrastructure**

While the in-vehicle technology for electric LCVs is ahead of that for electric HGVs (e-HGVs), we understand from conversations with industry stakeholders that it is still not fully developed. The range of electric LCVs is insufficient for logistics operators to use them on the majority of their routes. Therefore, in-vehicle technology improvements that allow electric LCVs to travel longer distances would boost the size of electric vehicle fleets. A network of rapid chargepoints at logistics sites and in public spaces along LCV routes would also help operators can further expand LCV journey lengths and cut down on space required to charge vehicles on-site. In turn, installing chargepoints requires investment to connect to the grid and, particularly for rapid chargepoints, investment by distribution network operators (DNOs) in additional grid capacity. Information on local capacity is needed for logistics operators to plan their own investments in chargepoint infrastructure and complex, lengthy planning processes should be simplified to deploy the infrastructure in conjunction with procurement timelines for vehicles.

3 **Ownership**

To maintain the flexibility required to operate their services efficiently, many logistics operators rely on third-party providers to provide the bulk of their vehicle fleet. This is because the logistics industry is seasonal, so owning the full fleet required during peak times would lead to vehicles being underutilised for long stretches of the year. This ownership structure means that logistics operators do not have full control over the make-up of the fleets they use, which makes it more challenging to quickly increase the proportion of electric LCVs.

5.3 MIDDLE-MILE

5.3.1 THE STATUS QUO

For the middle-mile, goods are generally transported over long distances, predominantly in HGVs, which are commercial vehicles over 3.5 tonnes.[162] Lighter HGVs (3.5-26 tonnes) travel about 150km per day, while

[160] This is a conservative figure as it assumes an average 13-year lifespan. This is likely an overestimate. According to our conversations with industry sources, the useful life of an LCV for logistics operations is closer to five than to ten years. Detailed methodology outlined in Annex A.

[161] Methodology outlined in Annex A.

[162] Middle-mile also includes goods transported by rail, short-sea and inland water shipping. However, in this section of the report we focus on transport on road, and exclude short-sea and inland water shipping in line with the definition of logistics provided in section 1.

heavier ones (over 26 tonnes) average 400km per day.[163] While rail freight is increasing in response to decarbonisation efforts – as it has lower carbon intensities (gCO2e/tonne-km) than road freight[164] – it represents only 8% of middle-mile freight and therefore is not a focus of this section.[165]

There are about half a million HGVs on the road in the UK,[166] travelling 16.4bn miles a year.[167] The HGV fleet is growing more slowly than other vehicle types. The number of HGVs has increased by 5.5% in the last 20 years, compared to 12% for cars and 70% for LCVs.[168] The DfT forecasts that the number of HGVs could increase by 8% up to 2050.[169]

HGVs represent about 80% of the logistics industry's vehicle emissions. They also represent 16% of UK transport emissions.[170] Of the 27MtCO2e emitted by freight in 2016, 20MtCO2e was from HGVs.[171] According to DfT statistics, after falling since 1990, emissions from HGVs increased by 8% from 2012-2019 due to increased traffic and decreased fleet efficiency.[172]

The UK government realises the importance of decarbonising HGVs, and has introduced regulation mandating a reduction in CO2 emission levels (gCO2/km) for new HGVs of 15% by 2025 and 30% by 2030.[173] Government has also committed to phase out non-zero emission HGVs by 2035 for smaller HGVs and 2040 for larger HGVs.[174] Given the 7 to 14-year lifespan of HGVs,[175] this could mean that a small number of non-zero emission HGVs will still be in use in 2050.

The discussion about decarbonising HGVs centres principally on two options:

1 Alternative technologies; and

2 Alternative fuels.

Hydrogen and electrification are seen as the two possible ways of fully decarbonising HGVs. However, these are a mid- to long-term solution due to the nascency of technology available. The UK government understands the importance of investing in these technologies and has established a £20m fund for Zero Emission Road Freight Trials (ZERFT) to look into hydrogen fuel cell technology, electric road systems and

[163] DfT (2021) Consultation on when to phase out the sale of new, non-zero emissions heavy goods vehicles.

[164] The German government calculated that in 2018 the average rail freight train emitted around 18gCO2/tonne-km, compared with 112gCO2/tonne-km for trucks. Available here: https://www.railfreight.com/policy/2020/01/08/rail-freight-produces-6-times-less-co2-than-truck/?gdpr=accept

[165] Logistics UK (2021) The Road to Net Zero: A Manifesto for Logistics.

[166] Government Office for Science (2019) Understanding the UK Freight Transport System.

[167] Logistics UK (2021) The Road to Net Zero: A Manifesto for Logistics.

[168] Government Office for Science (2019) Understanding the UK Freight Transport System.

[169] DfT (2021) Consultation on when to phase out the sale of new, non-zero emissions heavy goods vehicles.

[170] Ibid.

[171] Vivid Economics (2019). The value of freight. Report prepared for the National Infrastructure Commission.

[172] DfT (2021) Consultation on when to phase out the sale of new, non-zero emissions heavy goods vehicles.

[173] Ibid.

[174] Ibid.

[175] Ibid.

battery electric HGVs.[176] This work will help inform decisions on the most appropriate decarbonisation technology.[177]

It is possible to use alternative fuels – such as Compressed Natural Gas (CNG), biomethane and Hydrotreated Vegetable Oil (HVO) - in HGVs rather than diesel, which would reduce the emissions at point of use. But the challenges involved in using such alternatives, discussed in Section 5.3.3, mean they are likely to be an interim measure before zero emission technologies are available at scale, and while diesel vehicles are being phased out.

5.3.2 COMMITMENTS BY LOGISTICS OPERATORS AND POTENTIAL IMPACT OF DECARBONISATION

ALTERNATIVE TECHNOLOGIES

Logistics operators are working with vehicle manufacturers to become early adopters of zero emission technologies – electrification and hydrogen - and to learn how they can be improved to support middle-mile operating models. DfT estimates that the logistics industry alone could generate £700m in Gross Value Added in zero emission vehicle manufacturing, supporting 5,000 jobs.[178]

Converting all logistics HGVs to electric vehicles would reduce emissions by around 19 MtCO2e, roughly 16% of all annual UK transport emissions.[179] There are a few examples of businesses that are early adopters of these technologies or are trialling them. Amazon used e-HGVs in its operations for the first time in 2022[180], Travis Perkins trialled an e-HGV in 2021[181] and Tesco is trialling two from 2022[182]. In 2021 Amazon also began testing hydrogen-powered trucks in the United States. A case study on Amazon's e-HGVs is highlighted below.

[176] Ibid.

[177] DfT (2021) Decarbonising Transport: A Better, Greener Britain.

[178] DfT (2021) Decarbonising Transport: A Better, Greener Britain.

[179] Data source: Frontier analysis of Department for Transport data on 2019 vehicle emissions.

[180] Available here: https://www.aboutamazon.co.uk/news/sustainability/amazon-unveils-first-ever-fully-electric-heavy-goods-vehicles-in-its-uk-fleet

[181] Available here: https://www.travisperkinsplc.co.uk/responsibility/environment/ournetzerocarboncommitments

[182] Available here: https://www.tescoplc.com/news/2021/tesco-powers-into-the-new-year-with-the-uk-s-first-commercial-electric-articulated-hgvs/

CASE STUDY – AMAZON E-HGV ADOPTION

- Amazon has added five e-HGVs to its middle-mile fleet as part of Shipment Zero – the company's goal to deliver 50% of shipments with net zero carbon by 2030. These are 37-tonne trucks, at the heavier end of the market (where many logistics companies operate), and where it is hardest to achieve zero emissions with existing technology.
- The roll-out of e-HGVs allows Amazon to collect information on performance, drive improvements in battery technology and better understand the need for charging infrastructure. At present the vehicles are charged at Amazon's own locations in Milton Keynes and Tilbury.
-

Source: Amazon unveils first-ever fully electric heavy goods vehicles in its UK fleet.

As vehicle range improves, the e-HGVs will be used on a wider range of Amazon's routes. E-HGVs have significantly higher upfront costs than internal combustion engine (ICE) vehicles, but lower operating costs. Extending the range of an e-HGV means more on-road miles, which helps to achieve cost parity with ICE equivalents.

High-speed charging could greatly spur the adoption of e-HGVs. The availability of 250kW+ chargers rather than 40kW chargers would allow e-HGVs to be charged during driver breaks – as is the case with diesel vehicles – rather than overnight.

ALTERNATIVE FUELS

Eight of the top 12 logistics operators have made commitments to increase the proportion of their fuel that comes from alternative sources. Amazon has pledged to have 2,700 CNG trucks in North America and Europe by the end of 2021.[183] Travis Perkins has said 10% of its fleet will be converted to alternative fuels each year between 2025 and 2035.[184]

If the industry as a whole were to **convert 50% of its HGV fleet to bio-CNG today, current tank-to-wheel emissions would fall by almost 9 MtCO2e per year**, which would represent 40% of all logistics vehicle emissions and 8% of all UK transport emissions.[185][186]

[183] Available here: https://sustainability.aboutamazon.com/environment/sustainable-operations/transportation

[184] Available here: https://www.travisperkinsplc.co.uk/responsibility/environment/ournetzerocarboncommitments

[185] Data source: Frontier analysis of Department for Transport data on 2019 vehicle emissions, explained in Annex A.

[186] These are tank-to-wheel emissions rather than lifecycle well-to-wheel emissions. This is discussed further in Section 5.3.3, but it should be noted that the reductions in tank-to-wheel emissions may overestimate the cuts in total emissions.

5.3.3 CHALLENGES TO DECARBONISATION

ALTERNATIVE TECHNOLOGIES

There are two main inter-related challenges to decarbonising HGVs:

1 The in-vehicle technology; and

2 The level of charging infrastructure.

The Technology Readiness Level (TRL) and scalability of technology for e-HGVs lags behind that for LCVs. One of the main hurdles is range; neither hydrogen nor electric comes close in range to diesel. While this makes the UK a good place to trial these technologies – the country is dense and has relatively shorter middle-mile journeys than mainland Europe[187] - range limits are impeding the widespread adoption of e-HGVs.

Charging infrastructure is another significant challenge. The Climate Change Committee (CCC) estimates that were HGVs to switch to electrification, 90,000 depot-based overnight chargers would be needed in the UK by 2050. Were HGVs to switch to hydrogen, the UK would need 800 refuelling stations by 2050 - though it should be noted that hydrogen trucks have a lower TRL than electrification so are currently still at the trial stage.

This infrastructure is expensive and complex to deploy. Estimates for the Midlands alone put the cost of installing recharging and refuelling infrastructure at £800m by 2040.[188] The complexity of deployment, including required planning processes, creates a risk that the operation of e-HGVs may be held back by delays in the deployment of charging infrastructure on site and around relevant routes. Moreover, public policy intervention is required to co-ordinate the parties involved and ensure that the positive externalities of establishing public recharging and refuelling networks are taken into account. By aligning land owners, local authorities, distribution network operators (DNOs) and other stakeholders, co-ordination will prevent duplication of infrastructure.

ALTERNATIVE FUELS

Alternative fuels can be produced from a wide range of resources, with varying sustainability profiles. Compressed Natural Gas emits less carbon than petrol fuels, but still generates around 75-80% of the CO2-equivalent emissions produced by using diesel.[189] Biofuels, such as biomethane or biodiesel, generate close to zero carbon emissions at the point of use (tank-to-wheel emissions). But producing biofuels can involve changes in land use, which may have a negative impact on greenhouse gases, for example via deforestation, or on feedstock availability.[190] Research also shows other potential impacts of biofuels that may need to be

[187] In 2020 the average length of haul in the UK was 107km (DfT RFS0108) compared with 139km across the EU. The average was more than 107km in 19 countries (and less in 10). Available here: Eurostat - https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Average_distance_on_which_goods_are_carried_for_total_road_freight_transport,_2015-2020_(kilometres).png

[188] Logistics UK (2021) The Road to Net Zero: A Manifesto for Logistics.

[189] Source: Department for Business, Energy and Industrial Strategy (2021). Greenhouse gas reporting: conversion factors 2021

[190] Department for Transport (2022). Low carbon fuels strategy: call for ideas

traded off against carbon emission reductions.[191] Moreover, a large majority of the biofuels used in the UK are imported, so the emissions generated in their transport should be taken into account when comparing them to the use of electricity from renewable sources. All these factors contribute to alternative fuels being seen as an essential tool to reduce carbon emissions in transport[192], but one which requires a specific strategy to maximise its benefits.[193]

5.4 BUILDINGS

Buildings are the second-largest source of emissions by the logistics industry after transport vehicles. They are predominantly made up of heating and cooling emissions (scope 1), and emissions from electricity use (scope 2). Operational measures to reduce buildings emissions (for example by switching to LED lights) are under discussion, but the savings they are expected to produce are marginal because operators already have the price incentive to reduce their electricity and heating costs. These operational measures are therefore not discussed further.

5.4.1 THE STATUS QUO

Warehouse floorspace increased by 32% between 2015 and 2021, the latest year for which data is available. [194] Warehouse space occupied by third-party logistics operators and online retailers rose at a particularly fast pace (increases of 42% and 614% respectively).[195]

According to data from the Department for Business Energy and Industrial Strategy (BEIS) on non-domestic buildings, the electricity and gas intensity[196] of warehouses is relatively low compared to other non-domestic buildings, such as restaurants, offices, and shops.[197][198] The data also shows that these intensities have been slowly declining for warehouses over the last decade.[199] However, this decline is unlikely to outweigh the increase in building space outlined above.

5.4.2 COMMITMENTS BY LOGISTICS OPERATORS AND POTENTIAL IMPACT OF DECARBONISATION

Logistics operators are working to decarbonise their buildings. Six of the top 12 operators have made commitments to reduce the emissions from their buildings by increasing the amount of renewable electricity or switching to net zero heat. Some, including Iceland, have pledged to do this by 2035,[200] while

[191] Jeswani, H. K., Chilvers, A., & Azapagic, A. (2020). Environmental sustainability of biofuels: a review. Proceedings of the Royal Society A, 476(2243), 20200351.

[192] Department for Transport (2022). Low carbon fuels strategy: call for ideas

[193] DfT (2021). Decarbonising Transport: a better, greener Britain.

[194] Savills (2021) The size and make-up of the UK warehousing sector – 2021. A report for the UK Logistics Agency.

[195] Savills (2021) The size and make-up of the UK warehousing sector – 2021. A report for the UK Logistics Agency.

[196] The electricity intensity is the electricity in kWh that are used per m2 of floorspace. The gas intensity is the equivalent for natural gas.

[197] Data source: BEIS (2021) Non-domestic National Energy Efficiency Data-Framework (ND-NEED) 2021.

[198] This is the data for warehouses on average. There are likely to be specific logistics warehouses – such as refrigerated warehouses or ones with heavy automation – that use significantly more energy than the average.

[199] Data source: BEIS (2021) Non-domestic National Energy Efficiency Data-Framework (ND-NEED) 2021.

[200] Available here: https://sustainability.iceland.co.uk/our-planet/carbon-footprint/

Travis Perkins has moved all its UK sites to a 100% renewable energy tariff.[201] At Amazon, on-site solar systems can generate up to 80% of a single fulfilment facility's demand[202], depending on factors including temperature, length of day, levels of solar shading and maintenance.

If all logistics operators switched their buildings to run on renewable electricity and net zero gas, this would save over 0.3MtCO2e per year.[203] The impact of the industry using renewable electricity is equivalent to more than **55,000 shops, 90,000 offices or 110,000 factories** making the switch. The impact of **decarbonising heat in these buildings is equivalent to more than 70,000 homes** making the switch.

5.4.3 CHALLENGES TO DECARBONISATION

It is easier for operators to make the above changes to new buildings, but we understand from conversations with industry stakeholders that it can be challenging – and sometimes not economically viable – to retrofit old buildings. For example, some roofs are too weak to support solar panels, and reinforcing them would be extremely costly. Operators can design new buildings so they can be heated by more energy-efficient heat pumps rather than gas boilers. However, replacing gas heating in an older building is prohibitively expensive unless the heating system is at the end of its useful life. Using biogases in gas heating systems is an alternative but, as discussed in section 4.3, biofuels are better seen as an interim measure rather than a permanent solution.

5.4.4 OPERATIONAL CHANGES

Other operational measures such as increasing load efficiency and reducing packaging are expected to have a smaller impact on the logistics industry's emissions than decarbonising vehicles through alternative fuels and technologies. However, changes in these areas are already being made and companies have pledged to make further progress. These are discussed briefly below.

Operational measures tend to focus on cutting emissions by reducing fuel use. Given that operators already have the incentive to keep fuel costs low, the opportunities to reduce emissions by such measures are likely to be marginal, not substantial. But they all help. Steps include offering best practice training to drivers, installing telematics to monitor real time driving for fuel efficiency, route optimisation, raising backfill and load efficiency, and increasing load through double-deck or duo trailers.

Reducing packaging has a direct impact on the environment by cutting waste, but is beyond the scope of this report. Indirectly, reducing packaging lowers fuel emissions, because less weight needs to be transported and load efficiency is increased, meaning fewer vehicles are needed for the same number of packages.

[201] Available here: https://www.travisperkinsplc.co.uk/media/hbelakvx/nzc-buildings-roadmap.pdf

[202] Available here: https://sustainability.aboutamazon.co.uk/environment/sustainable-operations/renewable-energy?energyType=true

[203] Source: Frontier analysis of Savills data on warehouse space by sector and BEIS (2021) Non-domestic National Energy Efficiency Data-Framework (ND-NEED). Further detail on our calculations is available in Annex A.

6 IMPLICATIONS FOR THE LOGISTICS INDUSTRY AND FOR POLICYMAKERS

In March 2021, HM Treasury published "Build Back Better", a policy paper setting out the UK Government's plan to help the economy recover from the Covid-19 pandemic. The paper outlines an ambition to deliver growth that creates high-quality jobs across the UK ("levelling up"), supports the economy's transition to net zero, and supports the UK's integration into the global economic and financial system.

The analysis described in this report shows that the economic and social impact of the logistics industry has increased through the pandemic, and that the industry can play a key role in building back better in the future.

Logistics is a large, growing industry, that generates opportunities for upward social mobility through employment at logistics sites, contributes to economic growth and supports additional jobs in the local areas around logistics sites, and engages with its local communities including skills provision and partnerships with charitable organisations. Participation in e-commerce, enabled by logistics, benefits SMEs across the UK, in particular those outside London and the South East.

To further enhance the logistics industry's contribution to levelling up, all stakeholders (industry and government) could:

- Maintain and expand training and upskilling initiatives to support local residents in accessing the better-paying logistics jobs that require higher levels of formal qualifications or experience.
- Maintain and expand training and inclusion initiatives to support local residents in accessing entry-level jobs, with a particular focus on those from the most deprived backgrounds. Public sector provision here would be particularly helpful as private companies are unlikely to be able to engage with all those who have been out of work for a long time and may need intensive support to re-join the labour market.
- Work to maximise the efficiency and effectiveness of logistics hubs, including setting up shared facilities and coordinating to ensure effective utilisation of these facilities, while minimising any unintended effects on those outside the industry (e.g. road congestion). This would boost productivity in the sector and in the local area.

For local and central government in particular, promoting the growth of logistics activity and related employment creation could include:

- Ensuring availability of physical space with planning permission for logistics sites;
- Supporting the accessibility of logistics sites through public transport. This would enable people in the area who do not live nearby and do not have private means of transportation can easily take up the jobs being created by the industry. Reducing reliance on cars is also good for sustainability.
- Maintaining and expanding supporting transport infrastructure (road, rail and air).

The transportation of goods accounts for a significant proportion of the UK's carbon emissions, and therefore the logistics industry is also a key player in the government's aim to achieve net zero by 2050. Indeed, a large majority of the largest logistics companies have set targets to improve the sustainability of their operations. Achieving and accelerating progress towards these targets will be crucial to the UK's overall environmental ambitions and to ensuring that seizing the economic and social opportunities provided by the growth of logistics does not come at the expense of our environment.

To further enhance the logistics industry's contribution to achieving net zero, logistics operators could:

- Continue to work with vehicle manufacturers to test and adopt low- and zero-emission vehicles; and
- Continue to experiment to understand what works best in decarbonising distribution journeys, including not only adoption of electric vehicles but broader re-design of distribution models, including for example increased use of consolidated collection points;

Actions that could be taken by central government and broader stakeholders include:

- Supporting investment in the development and deployment of low-emission vehicle technologies; and
- Working with industry to deliver significant investment in charging infrastructure at distribution centres and in public spaces, required to achieve electrification.


frontier
economics

ANNEX A - DETAIL ON METHODOLOGY

A.1 - ECONOMIC FOOTPRINT ANALYSIS

A.1.1 - ESTIMATING LOCAL PREVALENCE OF LOGISTICS JOBS

To estimate the prevalence of logistics jobs at local authority level we start from the ONS's Business Register and Employment Survey, which includes data up to 2020 for the following three "core" SIC codes: 492: Freight rail transport; 494: Freight transport by road and removal services; and 521: Warehousing and storage. We expand and improve on this data by using information on online job postings to estimate the number of logistics jobs outside the core SIC codes:

- Taking the ads from the Emsi Burning Glass data ("EBG" data") that correspond to our definition of logistics (see next section), we calculate the proportional split between ads that fall into the three core SIC codes (i.e. ads targeted at the core logistics industry) and those that do not (i.e. ads aimed at wider logistics-related occupations).
- The proportion of 'wider logistics occupations' job ads out of the total has been growing over time, from 38% in 2012 to 44% in 2021.
- We calculate the above for each region of the UK (smoothed over time to account for some jumps in the data for smaller regions), in order to take account of the potential for different trends across the UK. We estimate the proportion of wider logistic occupations out of the total to be highest in the North East and lowest in the East Midlands.
- We apply our estimated proportion of additional wider logistics jobs, for each year and each region, to our LA-level employment estimates from BRES to arrive at estimates of total employment.

We also expand on BRES by estimating logistics employment in 2021:

- BRES employment data is available only up to 2020.
- We estimate total employment in 2021 for each local authority based on regional total employment growth rates for 2020-2021, taken from the Labour Force Survey.
- We estimate logistics employment in 2021 from the change in the proportion of logistics job ads out of total job ads from EBG data from 2020-2021, at local authority level. We use a smoothed time series, as the proportion of logistics job ads can be jumpy in smaller local authorities from year to year.

Northern Ireland

- BRES data at local authority level excludes Northern Ireland.
- Lacking LA-level information, we instead estimate employment for Northern Ireland as a whole.

- Total employment in Northern Ireland from 2012-2021 is taken from the Annual Population Survey.

- We use EBG data on job ads, and our employment estimates as described above, to calculate a Great Britain average of the number of ads per job, for logistics and for non-logistics employment.

- We apply these ratios to the number of logistics and non-logistics job ads in Northern Ireland (smoothed over time), to estimate the number of jobs in both categories, adjusted so that logistics plus non-logistics employment equals the total as recorded in the Labour Force Survey.

Validating our estimates

We validated our estimates of logistics employment through a number of cross-checks. These included comparing our estimates to: i) data from other reports on the logistics industry, chiefly annual reports by Logistics UK; and ii) data on warehouse square footage by local authority provided by CBRE.

A.1.2 - ESTIMATING THE CHARACTERISTICS OF LOGISTICS JOB ADS

Emsi Burning Glass logistics definition

- We have identified logistics-dense areas through data on online job ads where we have been able to pick out the logistics jobs which match our definition. We rely on job ads data because it is more granular than publicly available official statistics in terms of geography, industry and occupation (e.g. ONS data considers Transport and storage as a whole, including passenger transport).

- We define "logistics" as activities required for the domestic transportation of goods. This excludes international freight and includes warehousing. We are particularly interested in the role of sites such as distribution centres and local distribution hubs, and the activities that directly revolve around them.

- We identify the jobs ads of interest accordingly:

    - Primary filter: We include any job ads for job titles containing the words 'logistics' or 'warehouse'.[204] This identifies 900,000 ads from 2012-2021 (1.2% of the total number of ads over the period).

    - Secondary filter: Logistics UK identifies 10 SOC codes for logistics-related occupations,[205] and we include jobs ads that fall within these categories. The SOC codes also have EBG-defined job titles that we have identified as being closely related to the warehousing, distribution and fulfilment activities relevant to our logistics definition,[206] which is

[204] Including closely related words, such as 'warehousing' or 'logistician'.

[205] These are: 8,211 Large goods vehicle drivers; 1,133 Purchasing managers and directors; 1,161 Managers and directors in transport and distribution; 1,162 Managers and directors in storage and warehousing; 3,536 Importers and exporters; 4,134 Transport and distribution clerks and assistants; 8,212 Van drivers; 8,222 Fork-lift truck drivers; 9,211 Postal workers, mail sorters, messengers and couriers; and 9,260 Elementary storage occupations.

[206] The additional Burning-Glass-defined job titles that we have identified as relevant, based on analysis of the job titles falling within the Logistics UK SOC codes, are: "delivery driver", "hgv / LCV class 2 driver", "hgv / LCV class 1 driver", "procurement manager", "labourer / material handler", "storage / distribution manager", "forklift / pallet jack operator", "transportation planner / analyst",

somewhat narrower than that used by Logistics UK. This filter captures some additional jobs of interest not included in the primary filter, such as HGV drivers, fork-lift operators and some managerial occupations. This identifies an additional 1.9m ads, on top of those from the primary filter (2.6% of the total).

- Exclusions: We explicitly leave out delivery and courier services in the restaurant services SIC code (56). We do that to exclude last-mile food delivery service operations such as JustEat and Deliveroo, which we do not consider to be relevant to our main logistics focus of warehousing and storage operations. This cuts out an additional 18,500 ads.

- Our choice of data and definition allows us to capture the jobs of interest accurately. Sorting data by Standard Industrial Classification and Standard Occupational Classification codes would not have enabled us to focus on our targeted definition of logistics. For example, the SIC 'Transportation & Storage' group includes jobs beyond our description, such as bus drivers and other jobs in passenger transport, while the SOC code 'Elementary Storage Occupations' includes non-logistics jobs such as farm and forestry workers.

Characteristics of job ads

- Our analysis of characteristics such as occupational type, salary, etc. focuses on the number of job ads, not the number of jobs. This is estimated separately (see Annex B.1) and not sub-divided by characteristics.

- For example, occupational analysis is based on the proportion of managerial job ads, and not the proportion of managerial jobs. To the extent that churn rates, i.e. turnover, might vary from one group to another, analysis based on job ads could over- or under-state the share of a particular occupational category in total employment.

A.2 - ENVIRONMENTAL ANALYSIS

A.2.1 - ENVIRONMENTAL COMMITMENTS BY INDIVIDUAL OPERATORS

Throughout the environmental section of this report, we discuss the commitments made by the top 12 logistics operators. We settled on that list by using EBG data and by looking at logistics job adverts and the companies that post them. Not every company that advertises a logistics job is a logistics company. Some are recruitment agencies, while others are larger organisations that stretch beyond logistics and are so do not fall within our definition of logistics. The NHS is a good example.

Having determined the logistics job adverts that are posted by logistics operators, we gathered the top 10 companies by adverts from 2012-2021 and the top 10 in 2021 only. Unsurprisingly, there was a lot of overlap. Combining the two produced a final list of 12 operators:

- Amazon

- Asda

"transportation manager", "cargo / freight coordinator", "courier / messenger", "shipping / receiving clerk", "project manager" and "supply chain manager".

- DHL
- Dixons Carphone
- FedEx
- Iceland
- Royal Mail
- Tesco
- Travis Perkins
- Wincanton
- XPO Logistics
- Yodel

A.2.1.1 - ESTIMATING REDUCTION IN LAST-MILE EMISSIONS

Estimating reduction in LCV emissions

We estimate the emissions that could be saved if all logistics LCVs were electric vehicles (EVs). The total of LCV emissions comes from DfT statistics. These are tank-to-wheel emissions and do not take account of the emissions used in production of the fuel. Table ENV0201 looks at the total amount of GHGs produced by each vehicle type from 1990 to 2019. We take the 2019 value – 19.7 MtCO2e - and recognise that, considering the trend in van growth, this is likely to be an underestimate.

DfT van statistics (Table VAN0211) has data on the proportion of all LCV miles, broken down by primary usage, for 2019-20. This finds that 24% of LCV miles over that period were for the purpose of delivery or collection of goods. This is our definition of logistics vans in this dataset. Accordingly, we assume that 24% of all LCV emissions came from the logistics industry. This is 4.7 MtCO2e.

As described above, we are measuring tank-to-wheel emissions. There are no tank-to-wheel emissions from an EV, because all of the emissions occur in production and not when the vehicle is being used. Therefore the savings from converting logistics LCVs to EVs is the total amount of emissions previously produced by logistics LCVs, i.e. 4.7 MtCO2e.

Estimating LCV replacement

In section 5.2, we estimate the number of LCVs that would need replacing if the logistics industry were to switch to an all-EV fleet. The SMMT Sustainability Report (2019),[207] which was cited in a House of Commons paper,[208] puts the average lifetime of a van at 12.9 years. This means that about 8% of vans are being replaced every year. DfT van statistics (Table VAN0201) show more than 400,000 vans are used for

[207] https://www.smmt.co.uk/wp-content/uploads/sites/2/SMMT-Sustainability-Report-2019.pdf

[208] https://researchbriefings.files.parliament.uk/documents/CBP-7480/CBP-7480.pdf

logistics purposes (same definition as above). Assuming an 8% replacement rate, that implies the replacement of over 30,000 vans a year. But if the goal is to withdraw all non-EV logistics vans by 2030, including those that have not yet reached the end of their useful life, the figure rises to 50,000 a year – a replacement rate of roughly 13% a year.

Estimating chargepoints required

A 2021 paper by the Electric Vehicle Fleet Accelerator (EVFA) group says 500,000 chargepoints will be needed at workplaces and depots to support a national fleet of EVs. These chargepoints are likely to be used by both commercial vans and cars. Based on its 24% share of van miles (DfT's Table VAN0211), the logistics industry would logically be responsible for a similar share of the chargepoints EVFA projects to be necessary – 120,000.

Given that logistics is likely to have a higher proportion of all vans than it has of all cars and vans, 24% is probably an overestimate of the proportion of chargepoints used by the industry. However, without further data we could not arrive at a more credible estimate.

A.2.2 - ESTIMATING REDUCTION IN MIDDLE-MILE EMISSIONS

BEIS publishes the emissions factors for various fuels. These are either reported in kgCO2e/kWh or kgCO2e/GJ. Biogas was found to have 0.1% of the tank-to-wheel emissions of diesel, so the tank-to-wheel saving from switching from diesel to biogas is 99.9% of the emissions released by using diesel – i.e. 19.5 MtCO2e.

A.2.3 - ESTIMATING REDUCTION IN BUILDINGS EMISSIONS

We draw on Savills data on warehouse space by sector.[209] A conservative definition of logistics is used, comprising 3PL / Transport, Retail (online), and Parcel / Mail, which gives a total of 181m sq. ft of warehouse space occupied by the logistics industry in 2021.

BEIS 2021 data on the Non-domestic National Energy Efficiency Database Framework (ND-NEED) provides the median energy intensity in terms of kWh/m^2 of floorspace broken down by building use, for both electricity and gas. For our purposes we use electricity and gas emissions intensities in 2019.

We combined these two datasets to calculate the electricity and gas used by the logistics industry as a whole. Switching to renewable electricity and net zero heat would eliminate all of the emissions currently involved in this electricity and gas use. To provide helpful benchmarks for the emissions that could be saved, we converted the values into shop, office and factory equivalents. These benchmarks were derived from ND-NEED data on median electricity and gas use for these types of buildings.

A.3 - SOCIAL FOOTPRINT AND IMPACT ANALYSIS

YouGov survey

[209] https://www.savills.co.uk/research_articles/229130/315446-0#Warehousing

As part of this report we commissioned a new independent survey undertaken by YouGov with a panel of respondents across the UK. We identified relevant logistics workers through their jobs[210] and from the SOC 8 and 9 occupation groups in which most logistics workers are categorised (see 2.1.4). The YouGov Omnibus survey included questions about job mobility, training, which job aspects are important, and how satisfied people are with these aspects. The survey also included a question on the community impact of their employer. YouGov captured demographic information such as gender and age.

The survey was run in two waves to ensure a sufficiently large sample. Not everyone answered every question, but there were responses from over 319 current logistics workers. The distribution across different types of logistics jobs, and the geographical spread of the jobs, broadly match the job adverts data from EBG.

All figures on the social footprint and impact, unless otherwise stated, are from YouGov Plc. Total sample size was 4,168 adults, including 319 who currently work within logistics. Fieldwork was undertaken between 9th - 16th February 2022. The survey was carried out online. The figures have been weighted and are representative of all UK adults (aged 18+).

Case study interviews with stakeholders

As part of this work, we included two case studies with stakeholder interviews in Doncaster and North West Leicestershire. The aim was to identify what makes a successful logistics hub and to provide additional qualitative evidence on its local economic and social impact, beyond what we find in the data analysis. We looked at the impact of logistics jobs on the workers themselves as well as on the wider community.

These semi-structured interviews were with the district authorities and chambers of commerce in both locations, as well as with local Amazon representatives.

Corporate Social Responsibility reports

We reviewed the latest Corporate Social Responsibility (CSR) reports of the top logistics companies by number of employees. Almost all the firms reviewed provide CSR information on, among other things, training, charitable donations and charitable partnerships. However, publicly available information is relatively limited and inconsistent across companies, which makes it difficult to get a sector-wide view. This is particularly true for the impact on local communities as the public information tends to be aggregated to a national level with few local details.

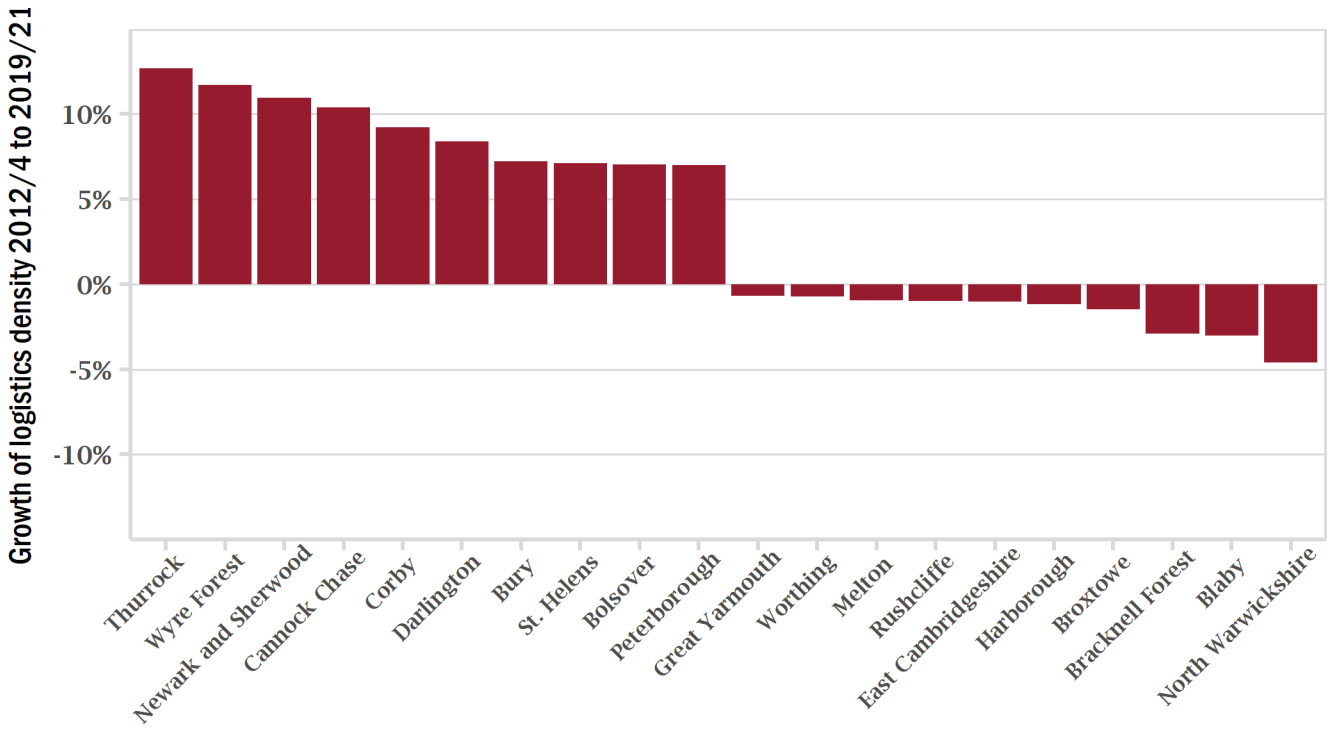
We also note that some logistics companies, e.g. grocers, are vertically integrated, which can make it difficult to understand the impact that their logistics arms have on local communities.

[210] This survey was across the logistics industry as we have defined it for this work. We did not filter based on employer.

ANNEX B - ADDITIONAL CHARTS AND TABLES

B.1 - ECONOMIC FOOTPRINT ANALYSIS

TOP AND BOTTOM 10 LOCAL AREAS FOR GROWTH IN LOGISTICS DENSITY SINCE 2012



Source: Frontier analysis of: BRES 2012-2020; LFS 2020-2021; EBG data
Note: Growth is presented as change in percentage points from 2012/4 to 2019/21

B.2 - ECONOMIC IMPACT ANALYSIS

For the econometric modelling in the economic impact analysis, it is important to note that we have applied a simple data-cleaning process to prevent outliers in our estimates from having a disproportionate impact. The methodology employed to clean the dataset was as follows:

- Two local authority districts, City of London and Westminster, were removed from the sample. These local authorities have distinctively high levels of GDP per capita and jobs taken by people who live outside the area; and
- For each outcome variable (change in GDP per capita, employment, inactivity), we have dropped from the sample local authorities corresponding to the 1st and 99th percentile in the outcome variable. In other words, we do not include local authorities which have experienced extremely high or low variation in the outcome variable during the period of the analysis.

The results described in Section 4.3.2 of this report are based on our preferred specifications of our econometric models. Table 13 to 16 below report results from alternative specifications. The magnitude of the estimated effect of logistics density is robust to the choice of specification.

We note that the last two columns of each table (related to specifications 5 and 6) use data at the Great Britain level, instead of focusing on England. There is a compromise between sample size and the use of certain control variables which are not available for the whole of Great Britain. [211]

At the end of this annex, Table 17 includes the definitions and sources for each variable considered as part of the econometric modelling.

TABLE 13 ALTERNATIVE SPECIFICATIONS FOR REGRESSIONS ON GDP PER CAPITA

Variable	Coefficient (effect on GDP per capita growth 2012-19 in percentage points)					
	S1	**S2**	**S3**	**S4**	**S5**	**S6**
Logistics density (2012)	0.594** (0.283)	0.763** (0.307)	0.609** (0.303)	0.646** (0.320)	0.614** (0.275)	0.666** (0.282)
GDP per capita (2012)	-2.85e-08 (5.30e-07)	2.75e-07 (5.25e-07)				
Trend in GDP per capita (1999-2008)	-0.0155 (0.0620)		0.0368 (0.0655)			
Higher education (2012)	0.109* (0.0570)	0.127** (0.0617)	0.0912 (0.0661)	0.111* (0.0578)	0.152** (0.0640)	0.0815 (0.0574)
Dummy for London	0.0643* (0.0341)		0.0685* (0.0369)	0.0607* (0.0342)	0.0519 (0.0329)	0.0605* (0.0321)
Dummy for major cities		0.0198 (0.0251)				
Rural population (2011)		-0.0288* (0.0157)		-0.0254 (0.0159)		
Index of Multiple Deprivation (2010)			-6.40e-07 (1.10e-06)			
Travel time to nearest major road junction by car				-0.000542 (0.000434)		
No qualifications (2012)					0.00106 (0.00150)	
Employment in manufacturing (2012)						-0.00106 (0.000969)

[211] Some control variables (e.g. the proportion of rural population) are available only for England. The alternative specifications at the Great Britain level do not include such control variables, but only those which are available for the whole of Great Britain.

Variable	Coefficient (effect on GDP per capita growth 2012-19 in percentage points)					
Constant	0.0267 (0.0213)	0.0162 (0.0218)	0.0334 (0.0349)	0.0374 (0.0238)	0.000103 (0.0329)	0.0423 (0.0258)
Number of observations	354	301	301	300	353	354

Source: Frontier Economics

*Note: Figures not in parentheses relate to the estimated coefficient. Figures in parentheses indicate the standard error of the estimated coefficient. * indicates a statistically significant effect at 99% confidence; ** significant at 95% confidence; *significant at 90% confidence*

TABLE 14 ALTERNATIVE SPECIFICATIONS FOR REGRESSIONS ON EMPLOYMENT (2012-2019)

Variable	Coefficient (effect on employment growth 2012-19 in percentage points)					
	S1	**S2**	**S3**	**S4**	**S5**	**S6**
Logistics density (2012)	0.653*** (0.236)	0.651*** (0.236)	0.672*** (0.232)	0.382 (0.237)	0.740*** (0.225)	0.784*** (0.231)
Employment (thousands, 2012)	0.000227*** (6.60e-05)	0.000235*** (7.76e-05)	0.000221*** (6.76e-05)			
Trend in employment (1999-2008)	0.0849** (0.0358)	0.0889** (0.0356)	0.0868** (0.0356)	0.0917** (0.0355)	0.0566* (0.0335)	0.0536 (0.0334)
Higher education (2012)	0.152*** (0.0441)	0.162*** (0.0423)	0.152*** (0.0510)	0.142*** (0.0442)	0.174*** (0.0521)	0.152*** (0.0464)
Dummy for London	0.0198 (0.0283)		0.0195 (0.0301)	0.0514* (0.0278)	0.0477* (0.0287)	0.0485* (0.0278)
Dummy for major cities		-0.00014 (0.0230)				
Rural population (2011)	0.00513 (0.0124)	0.00426 (0.0124)				
Index of Multiple Deprivation (2010)			-7.09e-08 (8.71e-07)			
Travel time to nearest major road junction by car				-.0011*** (.000325)		
No qualifications (2012)					0.000101 (0.00122)	
Employment in manufacturing (2012)						-.000686 (0.00079)
Constant	0.00602	0.00248	0.00866	0.0503***	0.0136	0.0283

Variable	Coefficient (effect on employment growth 2012-19 in percentage points)					
	(0.0176)	(0.0174)	(0.0268)	(0.0184)	(0.0270)	(0.0211)
Number of observations	301	301	301	300	352	353

Source: Frontier Economics

*Note: Figures not in parentheses relate to the estimated coefficient. Figures in parentheses indicate the standard error of the estimated coefficient. * indicates a statistically significant effect at 99% confidence; ** significant at 95% confidence; *significant at 90% confidence*

TABLE 15 ALTERNATIVE SPECIFICATIONS FOR REGRESSIONS ON EMPLOYMENT (2012-2020)

Variable	Coefficient (effect on employment growth **2012-20** in percentage points)	
	S1	**S2**
Logistics density (2012)	0.700***	0.808***
	(0.242)	(0.233)
Employment (thousands, 2012)	0.000272***	0.000223***
	(6.77e-05)	(5.93e-05)
Trend in employment (1999-2008)	0.109***	0.0823**
	(0.0367)	(0.0337)
Higher education (2012)	0.140***	0.146***
	(0.0452)	(0.0468)
Dummy for London	0.0128	0.0244
	(0.0290)	(0.0284)
Rural population (2011)	0.00687	
	(0.0127)	
Employment in manufacturing (2012)		0.000162
		(0.000805)
Constant	-0.0177	-0.0187
	(0.0180)	(0.0221)
Number of observations	301	353

Source: Frontier Economics

*Note: Figures not in parenthesis relate to the estimated coefficient. Figures in parentheses indicate the standard error of the estimated coefficient. * indicates a statistically significant effect at 99% confidence; ** significant at 95% confidence; *significant at 90% confidence*

TABLE 16 IMPACT OF LOGISTICS DENSITY ON PROPORTION OF ECONOMICALLY INACTIVE POPULATION

Variable	Coefficient (effect on inactivity growth 2012-19 in percentage points)					
	S1	**S2**	**S3**	**S4**	**S5**	**S6**
Logistics density (2012)	-1.383** (0.613)	-1.422** (0.612)	-1.230** (0.617)	-1.277** (0.559)	-1.240** (0.583)	-1.225** (0.550)
Inactivity rate (2012)	-0.0179*** (0.00261)	-0.0171*** (0.00254)	-0.0145*** (0.00249)	-0.0121*** (0.00217)	-0.0230*** (0.00284)	-0.0149*** (0.00246)
Trend in inactivity rate (2004-2008)	-0.00630 (0.0651)	-0.00865 (0.0654)				-0.00191 (0.0614)
Higher education (2012)	-0.284** (0.114)	-0.259** (0.119)	-0.300** (0.122)	-0.0851 (0.122)	-0.0851 (0.122)	
Dummy for London		0.0181 (0.0680)	0.0586 (0.0695)	-0.0606 (0.0683)	-0.0606 (0.0683)	-0.000212 (0.0646)
Government office regions (South)	-0.0789*** (0.0223)	-0.0812*** (0.0223)			-0.0650*** (0.0220)	
Rural population (2011)	-0.0380 (0.0306)	-0.0398 (0.0306)				
Dummy for major cities	0.0520 (0.0501)					
Travel time to nearest major road junction by car			-0.000349 (0.000834)			
Index of Multiple Deprivation (2010				1.05e-05** (2.41e-06)		
Employment in manufacturing (2012)					0.00207 (0.00189)	
No qualifications (2012)						0.00708*** (0.00328)
Constant	0.454*** (0.0837)	0.434*** (0.0842)	0.354*** (0.0851)	0.330*** (0.0819)	0.245*** (0.0837)	0.332*** (0.0876)

Variable	Coefficient (effect on inactivity growth 2012-19 in percentage points)					
Number of observations	300	300	299	300	354	353

Source: Frontier Economics

*Note: Figures not in parentheses relate to the estimated coefficient. Figures in parentheses indicate the standard error of the estimated coefficient. * indicates a statistically significant effect at 99% confidence; ** significant at 95% confidence; *significant at 90% confidence*

The trend in inactivity rate was calculated from the period 2004 to 2008 (and not from 1999 as with the remaining trend variables) due to data availability.

Table 17 includes the definitions and sources for each variable considered as part of the econometric modelling. In the modelling we calculate logistics density based on publicly available data from the Business Register and Employment Survey, rather than using our own estimate of logistics employment. This is to ensure that our specific approach to estimating employment does not influence our estimates of the wider effects of logistics. We have therefore decided to focus on this narrower definition of logistics density, explained below.

TABLE 17 DEFINITIONS AND SOURCES OF VARIABLES IN ECONOMETRICS MODELLING

variable	definition	source
Logistics density (2012)	"Treatment variable", defined as the share of employment from economic activities related to logistics (SIC 49.2, 49.4 and 51.1) out of total employment.	Business Register and Employment Survey (BRES)
Higher education (2012)	Proportion of population with National Vocational Qualifications level 4 or above, which primarily represents higher education.	Annual Population Survey (APS)
No qualifications (2012)	Proportion of population without any National Vocational Qualifications level 1 or above (level 1 NVQs include for example GCSEs with grades 3, 2, 1 or grades D, E, F, G).	Annual Population Survey (APS)
Rural population (2011)	Percentage of population living in rural areas in England.	2011 Census
Index of Multiple Deprivation (2010)	Average rank across all domains of the index of multiple deprivation, England.	Department for Levelling Up, Housing and Communities (DLUHC)
London	Dummy variable (0/1) identifying local authorities in London	Frontier Economics
Major city	Dummy variable (0/1) identifying local authorities corresponding to the 10 largest cities in Great Britain according to their population. These are defined as London, Manchester, Birmingham, Leeds, Glasgow City,	Frontier Economics

variable	definition	source
	Liverpool, Newcastle upon Tyne, Sheffield, Brighton and Leicester.	
Government office regions (South)	Dummy (0/1) variable identifying local authorities in the South East and South West Government Office Regions	Frontier Economics
Travel time to nearest major road junction by car	Average travel time by car to nearest major road. We use the lowest travel time across all Lower-layer Super Output Areas (LSOAs) within the local authority	Department for Transport (DfT)
Employment in manufacturing (2012)	Proportion of employment in manufacturing industry, defined as the 2007 UK Standard Industry Classification (SIC) section C : Manufacturing.	Business Register and Employment Survey (BRES)
Trend in GDP per capita (1999-2008)	Percentage change in GDP per capita between 1998 and 2008.	ONS
Trend in employment (1999-2008)	Percentage change in the level of total employment between 1998 and 2008.	Business Register and Employment Survey (BRES)
Trend in inactivity (2004-2008)	Percentage change in the inactivity rate between 2004 and 2008. Inactivity rate is defined as 0 to 100. Data is not available prior to 2004.	Annual population survey (APS)

Source: Frontier Economics

WWW.FRONTIER-ECONOMICS.COM