

Just transition: initial analysis by industry group in London

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February 2021

Note: these slides use employment-based estimates of GHG emissions and energy consumption by industry group (SIC07). For the official source of GHG emissions and energy consumption in London see the [London Energy and Greenhouse Gas Inventory](#).

Aims

This research project aims to explore the impact that the transition to a net-zero carbon and circular economy will have on London's labour market in the short and medium-long term.

The following slides take an initial look at the impact across different industry groups by answering the following questions:

- Which industry groups are likely to account for the largest share of greenhouse gas emissions and energy consumption in London?
- What share of London's employment and economic output do these industry groups account for? How has this changed over time?
- What is the profile of London workers in these industry groups?
- What is the spatial distribution of these industry groups across London's boroughs?

Key definitions

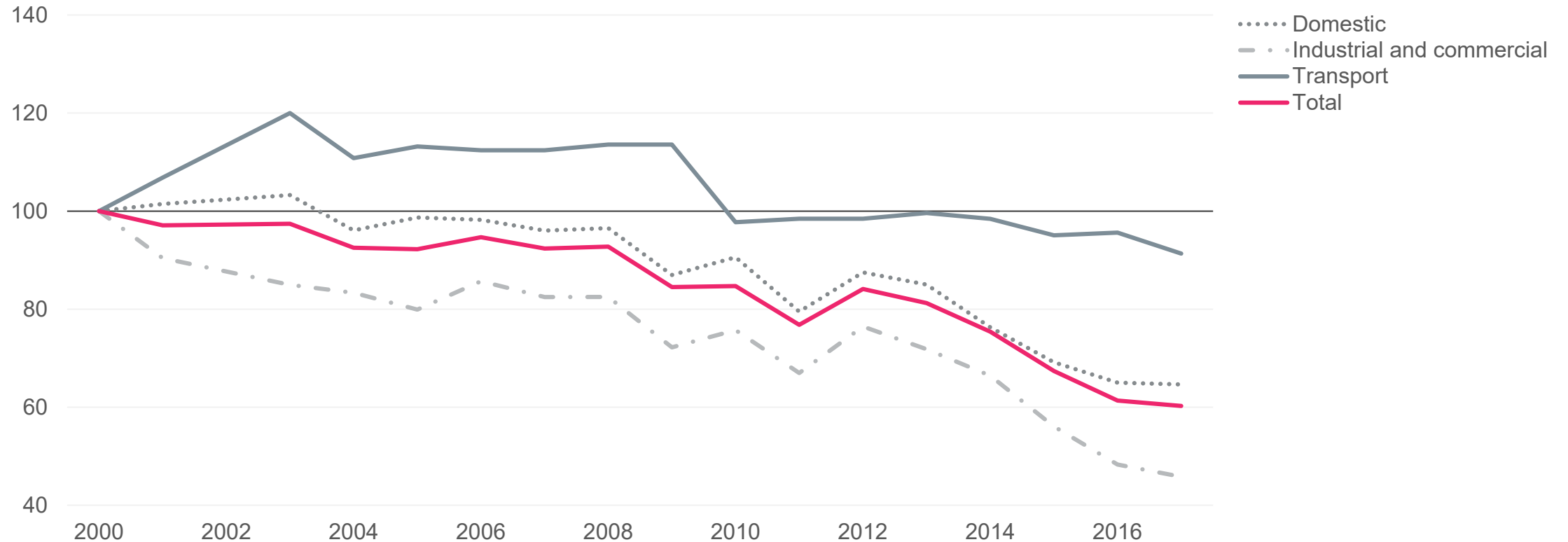
- **Greenhouse gases (GHG):** All greenhouse gases contribute to climate change and must be reduced substantially to meet the Paris temperature goal. Sometimes a net-zero target is expressed in terms of overall GHG emissions and sometimes in terms of CO2 only. The UK Government net-zero target refers to all GHG emissions.
- **Green economy:** The United Nations defines a green economy as a low carbon, resource efficient and socially inclusive economy. In a green economy, growth in employment and income are driven by public and private investment into such economic activities, infrastructure and assets that allow reduced carbon emissions and pollution, enhanced energy and resource efficiency, and prevention of the loss of biodiversity and ecosystem services.
- **Just transition:** According to the Paris Agreement, a just transition ensures environmental sustainability as well as decent work, social inclusion and poverty eradication.
- **Net-zero:** According to the Grantham Research Institute, 'net-zero' refers to achieving an overall balance between emissions produced and emissions taken out of the atmosphere. This takes into account that some emissions are produced by 'hard-to-treat' sectors, such as aviation and manufacturing, where reducing emissions is either too expensive, technologically too complex or simply not possible. In a net-zero scenario the residual emissions from these sectors are allowed as long as they are offset by removing emissions using natural or engineered carbon sinks.

Approach and comparison with LEGGI (1/2)

- **It should be noted that this analysis has not been based on London's emissions as reported through the London Energy and Greenhouse Gas Inventory (LEGGI). Instead we use UK level data on emissions and energy consumption by industry group and apportion to a London level using regional employment estimates.**
- We refer to these as London 'apportioned emissions'. They are not meant for use in understanding trends in GHG emissions and energy consumption in the capital.
- The London Energy and Greenhouse Gas Inventory (LEGGI) is the official source of GHG emissions and energy consumption from homes, workplaces and transport within the Greater London area. The LEGGI is updated on an annual basis and is used to measure progress against the Mayor's carbon reduction targets for London.
- The LEGGI uses sub-regional energy (electricity, gas and other fuels) and carbon dioxide equivalent (CO₂e) data published by the Department for Business Energy and Industrial Strategy (BEIS) for homes and workplaces, and data from the London Atmospheric Emissions Inventory (LAEI) for transport. For more information and data see [here](#).
- Slide 5 presents trends for selected sectors using LEGGI data. Note – these trends are not directly comparable with the employment-based emissions estimates by SIC07 industry group that are presented in the rest of these slides.
- Slides 10-14 present estimates of London apportioned greenhouse gas (GHG) emissions and energy consumption allocated by Standard Industrial Classification (SIC07) group and based on regional employment data. In the absence of sub-national data by industry, this approach is intended to support analysis to better understand the impacts of the transition to a net-zero carbon and circular economy on different industry groups and workers in London.

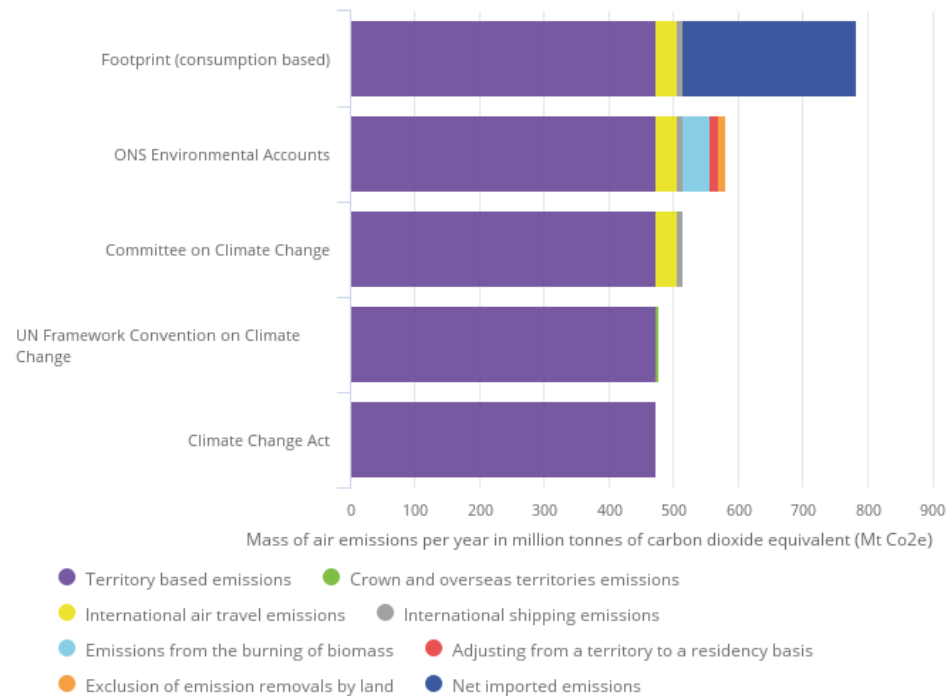
Approach and comparison with LEGGI (2/2)

London GHG emissions: total emissions and selected sectors based on LEGGI data
Index 2000 = 100MtCO₂ (pre 2010) and MtCO₂e (post 2010)



Source: GLA (2019) London Energy and Greenhouse Gas Inventory (LEGGI)

Measuring by industry group (SIC07)



Source: Office for National Statistics – UK Environmental Accounts, Department for Business, Energy and Industrial Strategy, Department for Environment, Food and Rural Affairs, University of Leeds, Committee on Climate Change, Ricardo Energy and Environment

The UK is required to report its estimated GHG emissions on a range of different bases in order to fulfil several international agreements.

Each measure differs in what is included and excluded in their totals. In 2016, estimates of the UK's GHG emissions ranged from a minimum of 473 million tonnes of carbon dioxide equivalent on a Climate Change Act basis to a maximum of 784 million tonnes of carbon dioxide equivalent on a footprint basis (see chart).

In this analysis we use data from the **ONS Environmental accounts**. We use this source as it includes estimates of emissions and energy consumption by UK Standard Industrial Classification group (SIC07). This approach is intended to support analysis of the potential impacts of the transition to a net-zero carbon and circular economy on different industry groups and workers in London.

To estimate energy consumption by industry group we use reallocated use of energy data that attributes consumption to the final consumer. Although the electricity generating industry is responsible for most direct use of energy, a switch to net-zero carbon sources will require adjustments on both the supply and demand sides.

The data presented in the ONS Environmental Accounts are measured on what is referred to as a UK 'residency' basis. This means that estimates include emissions relating to UK residents and UK registered businesses, regardless of whether they operate in the UK or overseas. By the same token the Environmental Accounts data excludes emissions from businesses registered elsewhere but operating in the UK. For example, they include all emissions from British Airways but not from Emirates.

One limitation of the ONS Environmental Accounts is that it only reports estimates by industry group at the UK level. To produce estimates for London we have used employment data from the Office for National Statistics' Annual Population Survey to apportion GHG emissions. This is an **established method** to calculate regional estimates using national data. We follow a similar approach for energy consumption.

Interpretations and limitations (1/2)

We have used a wide range of data sources to look at the potential impacts of the transition to a net-zero carbon and circular economy in London. This analysis is subject to several sources of uncertainty and our results should be treated with caution.

Interpretations

- In order to estimate the impact on London we have used ONS Annual Population Survey data on a residence basis to apportion UK GHG emissions and energy consumption data by industry group (SIC07). This means that the figures presented in the first part of the analysis (Slides 10-14) refer to the number or share of Londoners working in the industries that are most likely to be exposed to the transition to a net-zero carbon economy, regardless of their workplace location.
 - To give a concrete example, our estimates will include people living in London and working at any airport, even Stansted and Gatwick that are located outside London's administrative boundaries. However, they will exclude those people working in one of London's airports (Heathrow and London City Airport) but living outside the capital.
- When looking at the exposure of different boroughs to the transition to a net-zero carbon economy we use ONS BRES jobs data on a workplace basis (Slides 23-29). This means that our sub-regional estimates focuses on those jobs that are based in London but are held by people working outside the capital.
 - Using again the air transport sub-group as an example, our figures will include the jobs at Heathrow Airport even if held by people living outside the capital. In contrast, it will exclude the jobs at airports that are located outside the Greater London authority boundaries even if the people in those jobs live in the capital.

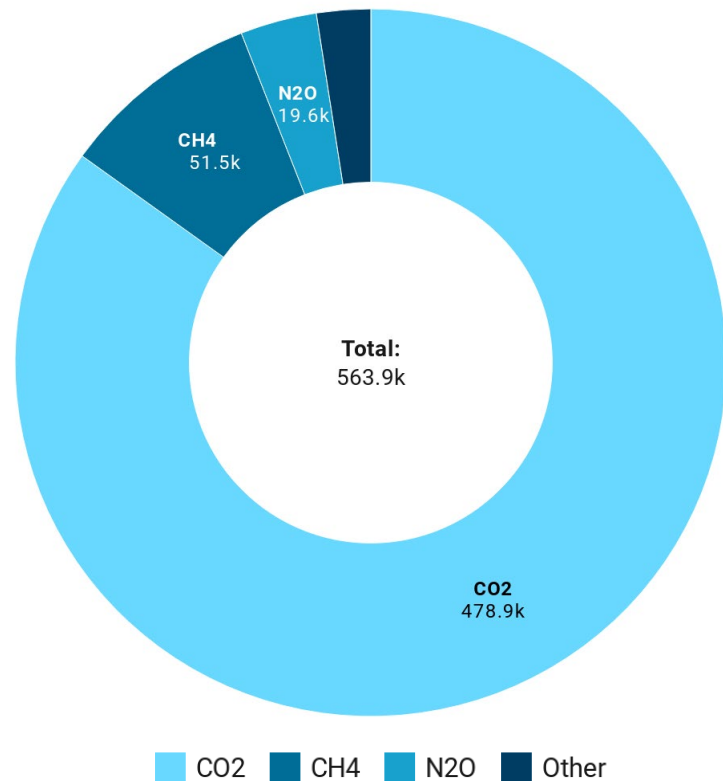
Interpretations and limitations (2/2)

Limitations

- As noted on the previous slide, we use employment data based on place of residence to apportion UK level data on greenhouse gas (GHG) emissions and energy consumption by industry group (SIC07) to the capital.
- In doing so, we assume that GHG emissions per worker and energy consumption per worker are the same within industries across the country. In reality, the occupational structure and carbon intensity of an industry is likely to vary across regions. While our approach provides a first approximation, the figures in the slides should be treated with a degree of caution.
- It should also be noted that our analysis only looks at direct emissions by industry group and does not take into consideration indirect emissions across supply chains; nor does this analysis look at emissions from consumer expenditure.
- London also plays an important economic role in the Greater South East, beyond its administrative boundaries. The transition to a net-zero carbon and circular economy is likely to affect workers who work in the capital but live outside London's boundaries. Most of this analysis relates to workers living in the capital.
- Our sub-London spatial analysis only allows us to look at where the jobs most likely to be affected by the transition are located (on a workplace basis). In order to devise the appropriate skills policy response, it will also be important to understand where people holding these jobs live. Unfortunately the available data did not allow a robust geographical breakdown.

The transition to a green economy will require a shift in approaches and employment

Total UK GHG emissions, 2018, excluding consumer expenditure



Source: ONS Environmental Accounts.

A key element of a just transition will be the reduction of GHG emissions and the impact this has on businesses, workers, communities and individuals. The UK is the first major economy to have committed to bring all greenhouse gas emissions to net-zero by 2050. London has also made this commitment and is looking at committing to net-zero by 2030.

In 2018, UK emissions of the basket of seven GHGs covered by the Kyoto Protocol were estimated to be 564 million tonnes carbon dioxide equivalent (MtCO₂e) (see chart).

The transition to a net-zero-carbon economy has the potential to create hundreds of thousands of jobs in the UK and support the emergence of new business models:

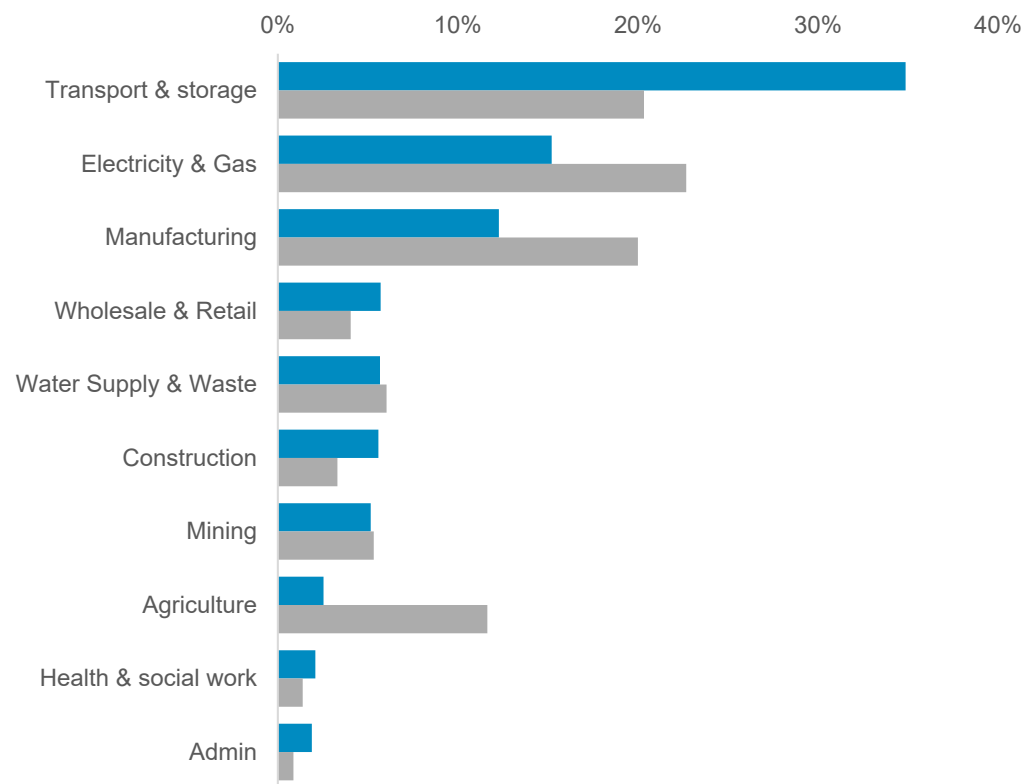
- According to research by **kMatrix**, the number of employees in London's Low Carbon and Environmental Goods and Services sector grew by 58% between 2007/08 and 2017/18. By 2017/18 there were over 246,000 employees in this sector in London.
- Analysis by **Ricardo Energy and Environment** suggests that low carbon industries could grow from around 2% of UK GDP in 2015 to 8% in 2030 and 13% by 2050.
- **Development Economics** found that to get the UK to net-zero, the energy sector must recruit for 400,000 jobs by 2050 – 260,000 new roles and 140,000 replacing those who left.
- The **Government estimates** that a £3 billion green investment package, announced as part of the Plan for Jobs, could help support 140,000 jobs.

But job creation in some areas may be offset by losses and adjustments in others:

- For example, research by the **Grantham Research Institute** suggests that 10% of UK workers would need reskilling to participate in the Green economy (this was also 10% of London workers). According to this analysis Construction (30%), Transport (26%) and Manufacturing (17%) are the industry groups in the UK that could require greatest reskilling.

This is particularly relevant for high-emitting industries...

% of GHG emissions in **London** (apportioned) and **UK** (actual), 2018
– ten highest emitting London industry groups



Source: ONS Environmental Accounts; ONS APS; GLAE calculations.
Note: GHG emissions have been apportioned to London using employment data. UK data is based on actual emissions.

According to analysis by **Nesta**, per capita emissions in Greater London are significantly lower than the average across England. This is related to the capital's extensive public transport system and largely service-based economy.

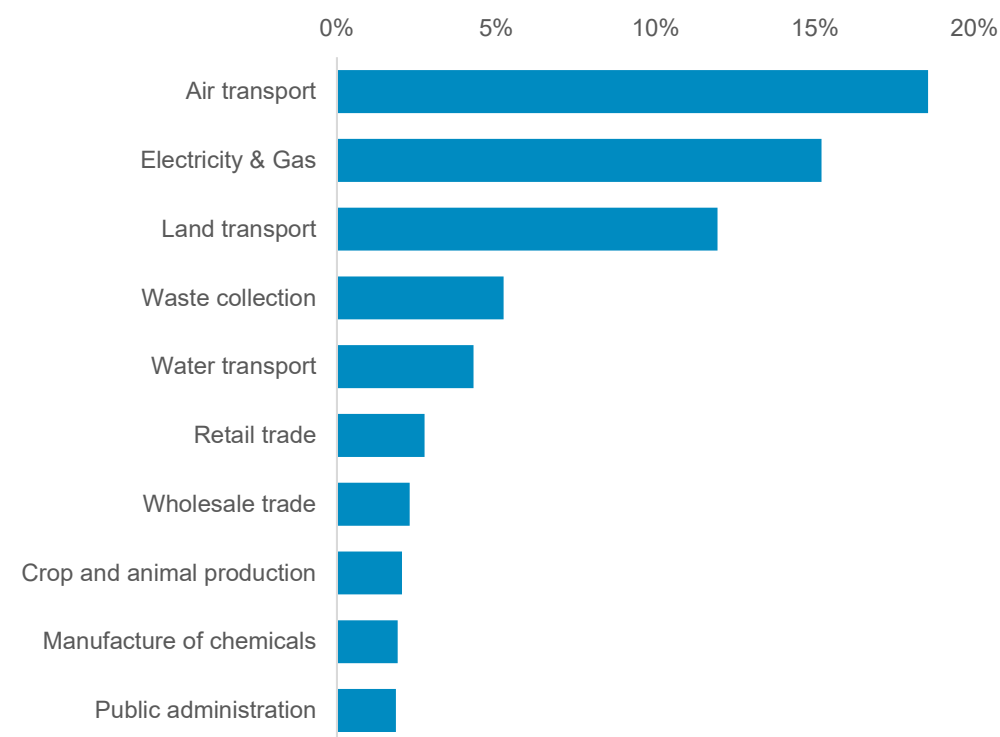
Our analysis uses resident employment data to apportion UK level GHG emissions to **London** by industry group. We find that in 2018:

- Electricity & Gas (23%) was the industry that accounted for the largest share of GHG emissions at the **UK** level, followed by Transport & Storage (20%) and Manufacturing (20%). Finance & Insurance, Real Estate Activities, Arts & Entertainment, and Information & Communication made up the smallest shares.
- After we apportion emissions to the **London** level, Transport & Storage was the industry that accounted for the largest share (35%) of emissions, followed by Electricity & Gas (15%) and Manufacturing (12%). We estimate these industry groups to account for around 62% of London apportioned GHG emissions.
- Finance & Insurance, Real Estate Activities, Arts & Entertainment and Information & Communications were also the industry groups responsible for the smallest shares of **London** apportioned emissions (each accounting for less than 1% of the London total).
- While all activities are expected to see a change in the way they operate with the move to a low carbon economy, these industries may be less affected than others.* Previous work by **GLA Economics** also identified these as industries in which London specialises or has established competitive strengths.

**Note: activities might be indirectly responsible for direct and indirect emissions in other parts of the UK and the world but which are not captured in our analysis.*

... and especially in certain sub-groups, such as Air Transport

% of GHG emissions in **London** (apportioned), 2018 – ten highest emitting London industry sub-groups



Source: ONS Environmental Accounts; ONS APS; GLAE calculations.
 Note: GHG emissions have been apportioned to London using employment data. UK data is based on actual emissions.

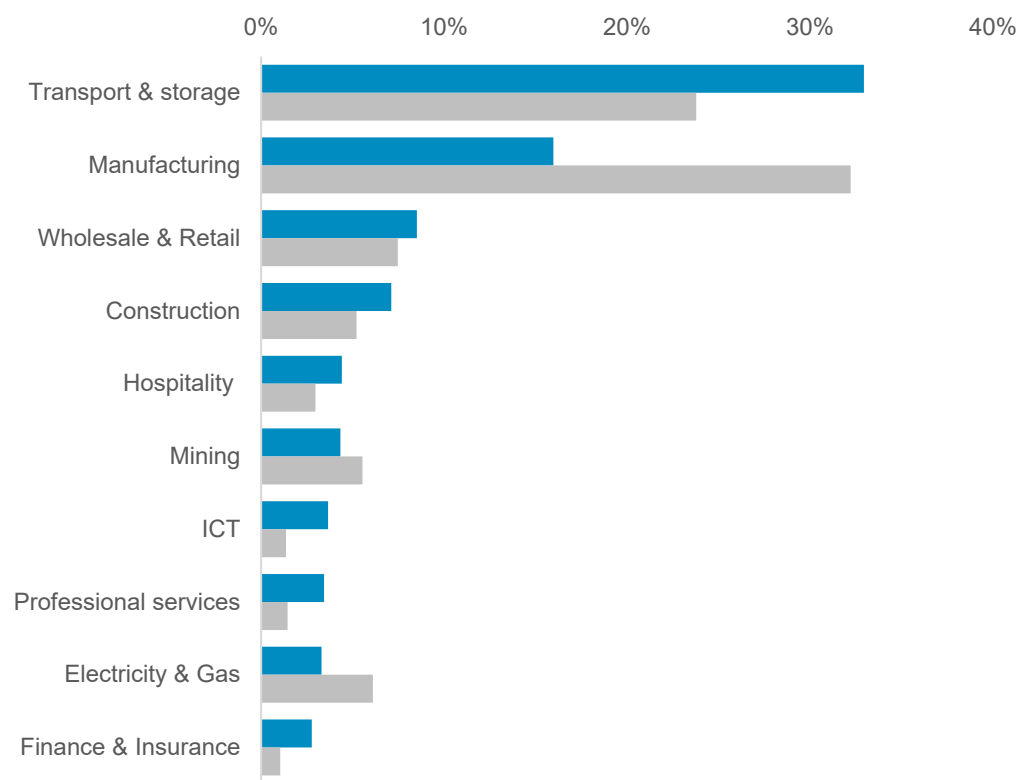
Our analysis on GHG emissions for London by sub-group shows that in 2018:

- Air transport – which accounts for half (53%) of Transport & Storage emissions – accounts for almost a fifth (19%) of all London apportioned GHG emissions.*
- This was followed by Electricity & Gas (15%) and Land transport (12%).
- Within Manufacturing, Manufacture of chemicals and chemical products accounted for the largest share (1.9%) of GHG emissions in the capital, followed by Manufacture of other non-Metallic mineral products (1.6%) and Manufacture of Food products (1.3%).
- Within Professional services, Activities of Head Office & Management consultancy activities account for the largest share of GHG emissions but this was only 0.7% of the total in the capital.

Note: our estimates only include GHG emissions (domestic and international) from airline companies registered in the UK. These are: British Airways, CargoLogicAir, DHL, easyJet, Flybe, Jet2.com, Jota Aviation, Norwegian UK, Ryanair, Tui Airways, Titan Airways, Virgin Atlantic and West Atlantic.

The transition to a green economy will also have an impact on energy-intensive industries

% of reallocated energy consumption in **London** (apportioned) and **UK** (actual), 2018 – ten most energy intensive London industry groups



Source: ONS Environmental Accounts; ONS APS; GLAE calculations. Energy consumption has been apportioned to London using employment data. UK data is based on actual emissions.

Similar to our approach to GHG emissions, we have used employment data to apportion UK level reallocated* energy consumption to London industry groups.

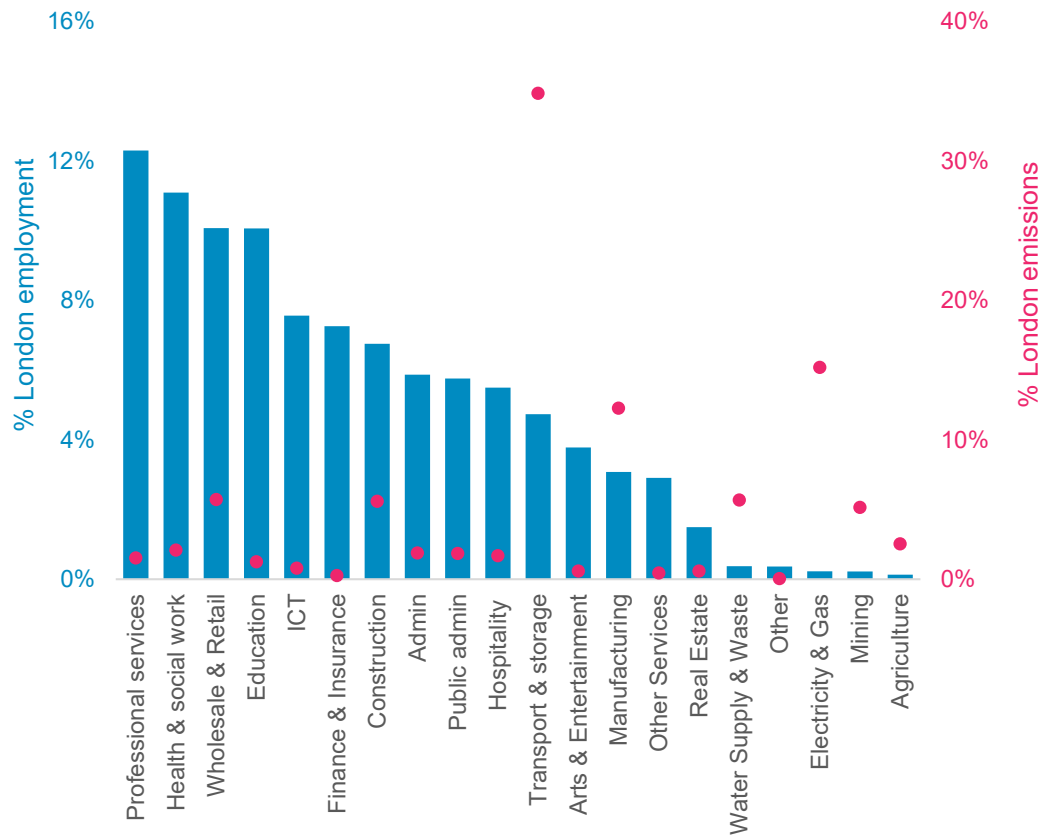
Our analysis on energy consumption in **London** shows that in 2018:

- Transport & Storage was the industry group that accounted for the largest share (33%) of energy consumption in London, followed by Manufacturing (16%) and Wholesale & Retail (9%).
- In contrast, Other service activities, Arts & Entertainment and Real Estate were the industry groups responsible for the smallest shares of energy consumption in the capital – each of them accounting for less than 2% of the total.
- Looking at the **UK**, Manufacturing (32%) was the industry that accounted for the largest share of energy consumption, followed by Transport & Storage (24%).

**Note: Reallocated energy consumption is where losses incurred during transformation and distribution are allocated to the final consumer of the energy rather than the electricity generation industry.*

However, high-emitting industries account for a small share of resident employment in London...

% London employment and London (apportioned) emissions, 2018



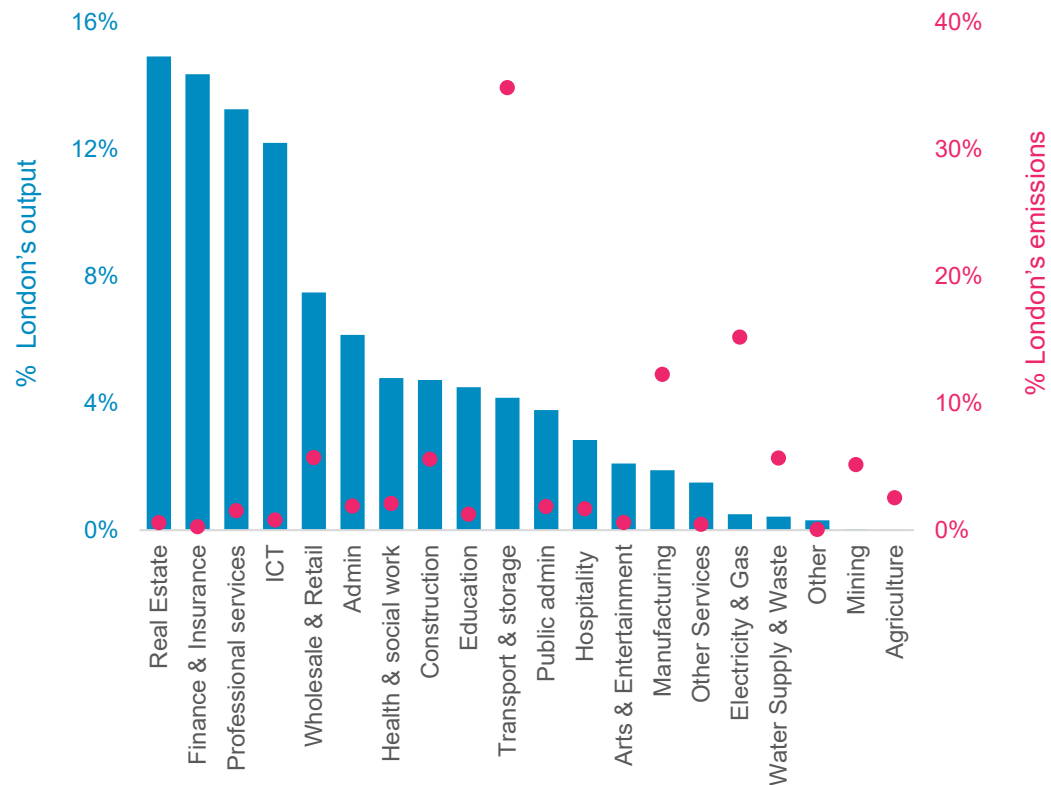
Source: ONS Environmental Accounts; ONS APS; GLAE calculations. GHG emissions have been apportioned to London using employment data.

London's economy specialises in services. The industry groups that are most responsible for the GHG emissions apportioned to London account for a relatively small share of employment among resident workers.

- For example, in 2018, Transport & Storage accounted for 35% of London's GHG emissions but only 4.7% of London's employment. A more detailed breakdown of this industry group shows that:
 - Land transport was the biggest employer: accounting for 60% of the employment in the Transport & Storage industry and 2.8% of resident employment in the capital.
 - Air transport accounted for only 0.2% of resident employment in London, although it might support more jobs through its supply chain (across a range of industry groups).
- Similarly, Electricity & Gas accounted for 15% of GHG emissions apportioned to London but only 0.2% of resident employment. This means that together the two highest emitting industry groups accounted for less than 5% of employment among London residents in 2018.
- In contrast, Professional services accounted for around 12% of resident employment but only 1.5% of London apportioned GHG emissions. And Health & Social Work, the industry with the second highest share of resident employment (11%), accounted for only 2.1% of London emissions.

... and a relatively small share of economic output generated in the capital

% **London output (GVA)** and **London (apportioned) emissions**, 2018



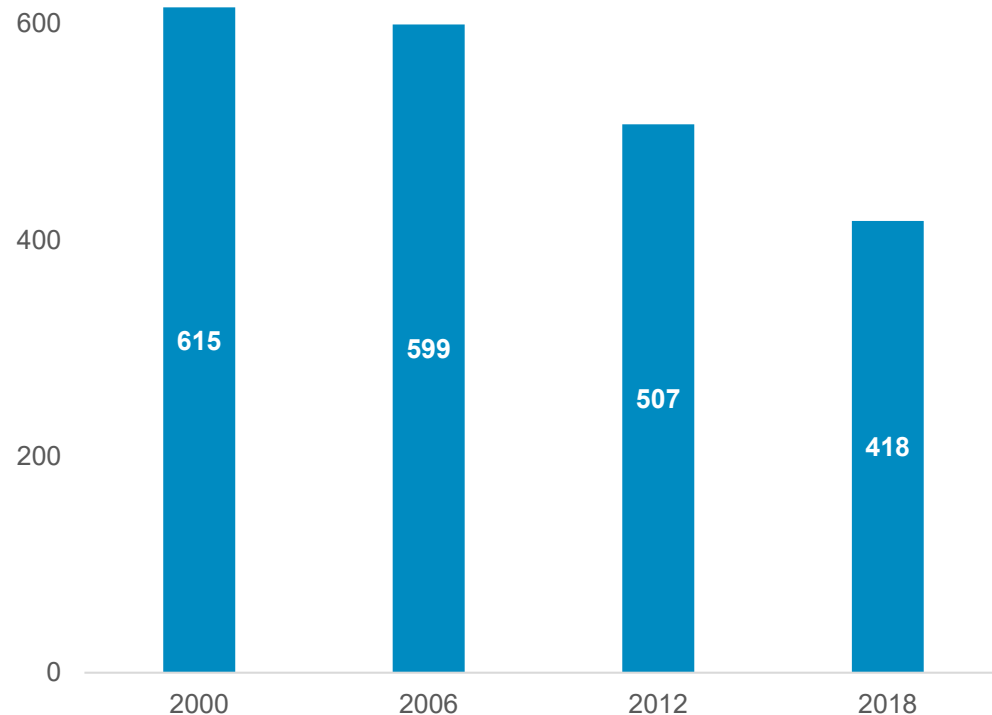
Source: ONS Environmental Accounts; ONS Regional GVA; ONS APS; GLAE calculations. GHG emissions have been apportioned to London using employment data.

London's economy is highly specialised in service-based activities. The industry groups that are most responsible for apportioned GHG emissions account for a relatively small share of London's output (GVA).

- For example, in 2018:
 - Transport & Storage accounted for 35% of London apportioned GHG emissions but only 4.2% of economic output in the capital.
 - Similarly, Electricity & Gas accounted for 15% of London apportioned GHG emissions but only 0.5% of the capital's economic output.
- Thus the two highest emitting industries in London (based on apportioned emissions) accounted for less than 5% of economic output in 2018.
- In contrast, Real Estate accounted for around 15% of London's economic output in 2018 but only 0.6% of London apportioned GHG emissions.

Total UK GHG emissions have fallen since 2000, led by a fall in Electricity & Gas emissions

UK GHG emissions excluding consumer expenditure, selected years, 2000-2018 (million tonnes of carbon dioxide equivalent)



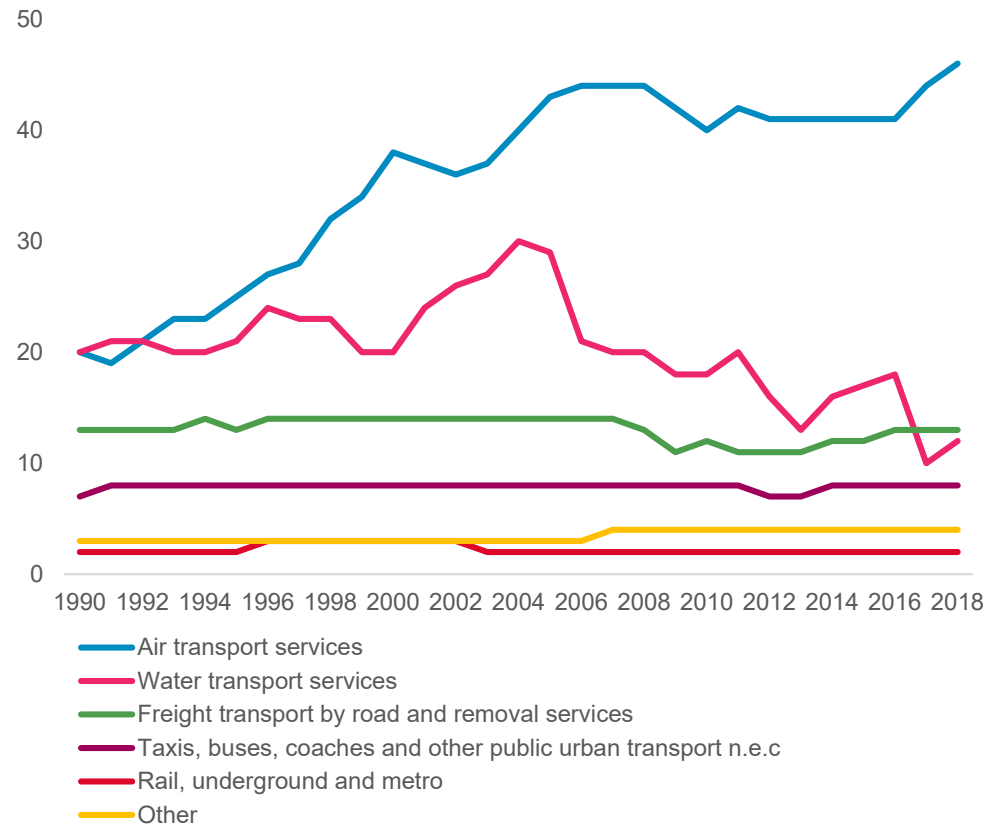
Source: ONS Environmental Accounts.

Total GHG emissions in the UK have gone down in the past 20 years:

- In 2018, GHG emissions in the UK were two thirds of 2000 levels. **ONS analysis** shows that the overall reductions in GHG emissions were driven largely by a switch from the use of coal and heavy-polluting fuels by the energy supply and manufacturing industries to other, more efficient fuels such as natural gas and renewable sources.
- In 2017, coal use by the energy supply industry was around a tenth of its use in 1990. In May 2020, the **UK National Grid Electricity System Operator** reported that the UK went 26 days without using coal for electricity generation. When used for electricity generation, coal produces more carbon dioxide (CO₂) than natural gas per unit of electricity produced, so the switch away from coal has led to a reduction in CO₂ emissions. As CO₂ is the most emitted greenhouse gas, changes in CO₂ tend to be reflected in overall GHG emissions.

Within Transport & Storage, aviation has been the main driver of an increase in UK emissions

UK GHG emissions for industries within the Transport & Storage industry group, 1990 to 2018 (million tonnes of carbon dioxide equivalent)



Source: ONS Environmental Accounts.

Between 1990 and 2018, aviation fuel use in the UK increased by 93%. Over the same period, emissions from the Air transport industry group have more than doubled (see chart).

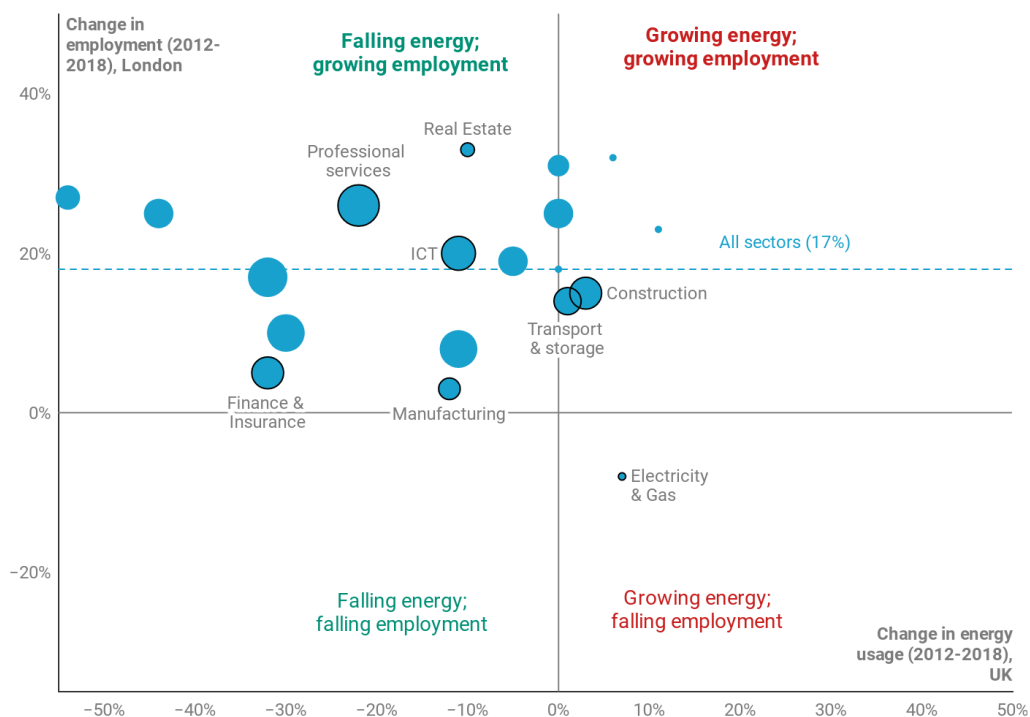
In 2018, Air transport was responsible for over half (54%) of all GHG emissions in the Transport & Storage industry group and accounted for around 8% of the UK's total GHG emissions. UK-registered airlines flew over 2.2 billion kilometres in 2018. This distance has been increasing since 2010, when UK-registered airlines flew around 1.7 billion kilometres.

The UK net-zero target does not currently include emissions from International Aviation and Shipping (IAS). However, the **Commission on Climate Change (CCC)** has recommended legislation to bring IAS emissions formally within UK carbon targets, noting that aviation is likely to be the largest emitting sector in the UK by 2050.

Friends of the Earth argue that, as well as technology and efficiency improvements, the government will need to constrain the growth in demand for air travel to reach the net-zero target. The **CCC** have suggested carbon pricing, reforms to Air Passenger Duty, and policies to manage the use of airport capacity as measures to constrain the increase in passenger numbers to 20-60% of 2005 levels.

Despite falling energy usage, many industry groups have seen an increase in employment...

% change in London employment and UK reallocated energy consumption, by industry group, 2012-2018



Looking at the relationship between employment among London residents and UK energy consumption between 2012 and 2018 shows that:

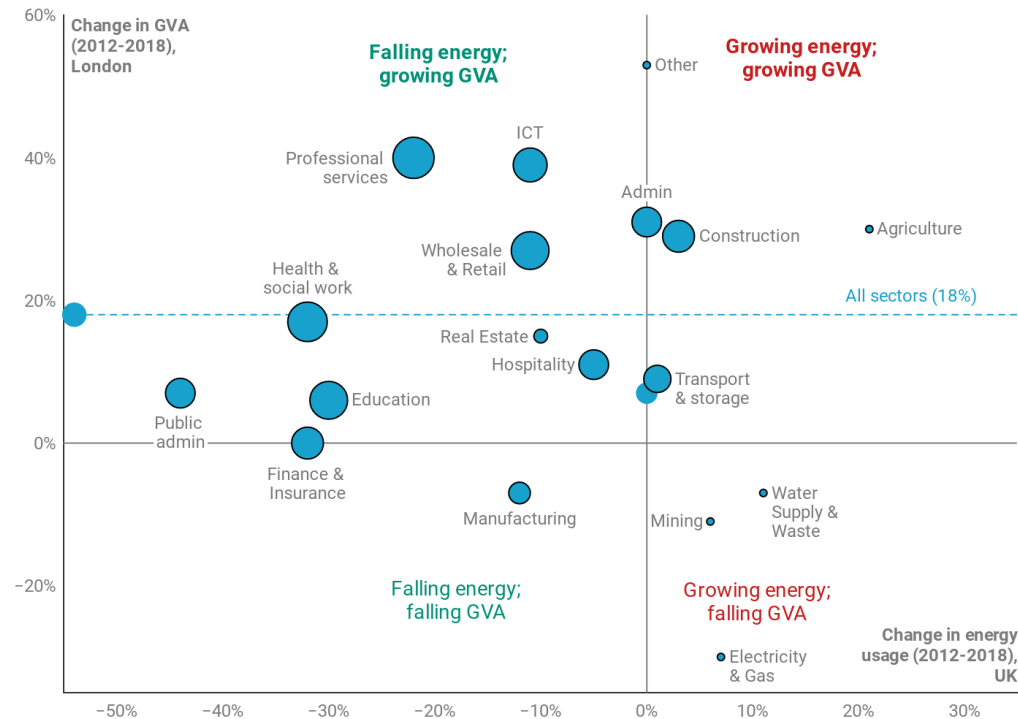
- Transport & Storage and Construction – two of the largest consumers of energy in London – have experienced modest increases in energy consumption at the UK level (1% and 3% respectively) and slightly below average increases in employment in the capital (14% and 15%).
- In contrast, Manufacturing, another high-energy consuming industry, has experienced a significant fall in energy consumption (-12%) at the UK level and a far lower rate of employment growth (3%) in London.
- Several industries in which London specialises have experienced a reduction in energy usage at the UK level. For example, Professional services has seen a fall in energy at the UK level (-22%) but an increase in employment (+26%). Similarly, Real Estate (-10%) and ICT (-11%) have seen a fall in energy consumption at the UK level and an increase in employment in London of 33% and 20% respectively.
- Finance & Insurance, another important industry for the capital's economy, has seen a notable fall in UK energy consumption (-32%) and a relatively small increase in employment in London (5%).

Note: the change in energy consumption (or usage) in this slide refers to the UK and differs from the London apportioned estimates reported in slide 12.

Source: ONS Environmental Accounts, ONS APS. GLAE calculations.
Note: circle size represents the share of London employment.

... and in output in the capital

% change in London GVA and UK reallocated energy consumption, by industry group, 2012-2018



Looking at the relationship between the change in output (GVA) in London and change in energy usage at the UK level between 2012 and 2018 shows that:

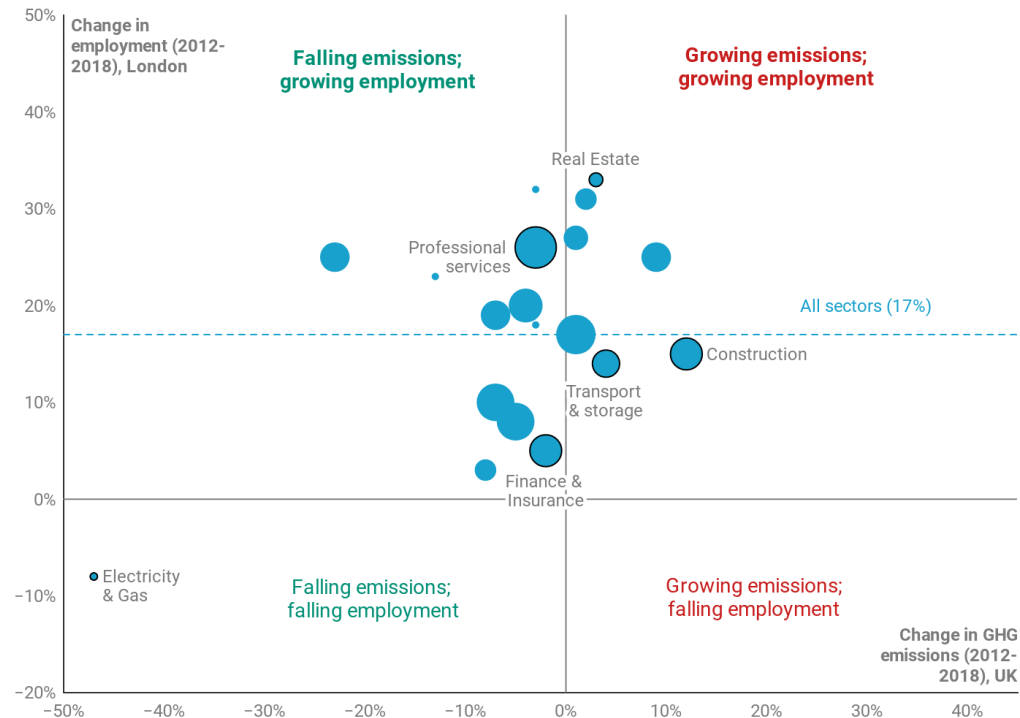
- Transport & Storage, the industry group that accounts for the largest share of London apportioned energy usage, has experienced a small increase in energy consumption (+1%) across the UK and an increase in output (+9%) in London.
- Wholesale & Retail has seen an increase in output (+26%) in London but a fall in energy consumption (-11%) at the UK level.
- Construction has seen both an increase in energy consumption (+3%) at the UK level and output (+29%) in London.
- Manufacturing, another high-energy industry group, has experienced a significant fall in energy consumption (-12%) at the UK level and fall in output in London (-7%).
- Some of the industries in which London specialises have experienced both a rise in output and a reduction in energy usage at the UK level. For example, Professional services has seen a fall in energy consumption at the UK level (-22%) but an increase in output in London (+40%). Real Estate, and ICT have also seen declines in energy consumption at the UK level (-10% and -11% respectively) alongside increases in output in the capital.
- Finance & Insurance, another significant industry, has seen a notable fall in UK energy consumption (-32%) and no growth in London output.

Note: the change in energy consumption (or usage) in this slide refers to the UK and differs from the London apportioned estimates reported in slide 12.

Source: ONS Environmental Accounts, ONS APS. GLAE calculations.
Note: circle size represents the share of London employment.

Employment in some high-emitting industry groups has increased...

% change in London employment and UK GHG emissions, by industry group, 2012-2018



Source: ONS Environmental Accounts, ONS APS. GLAE calculations.
Note: excludes Agriculture and Other services; circle size represents the share of London employment.

The relationship between economic growth and the environment is complex. In this and the next slide we look more closely at this relationship in London.

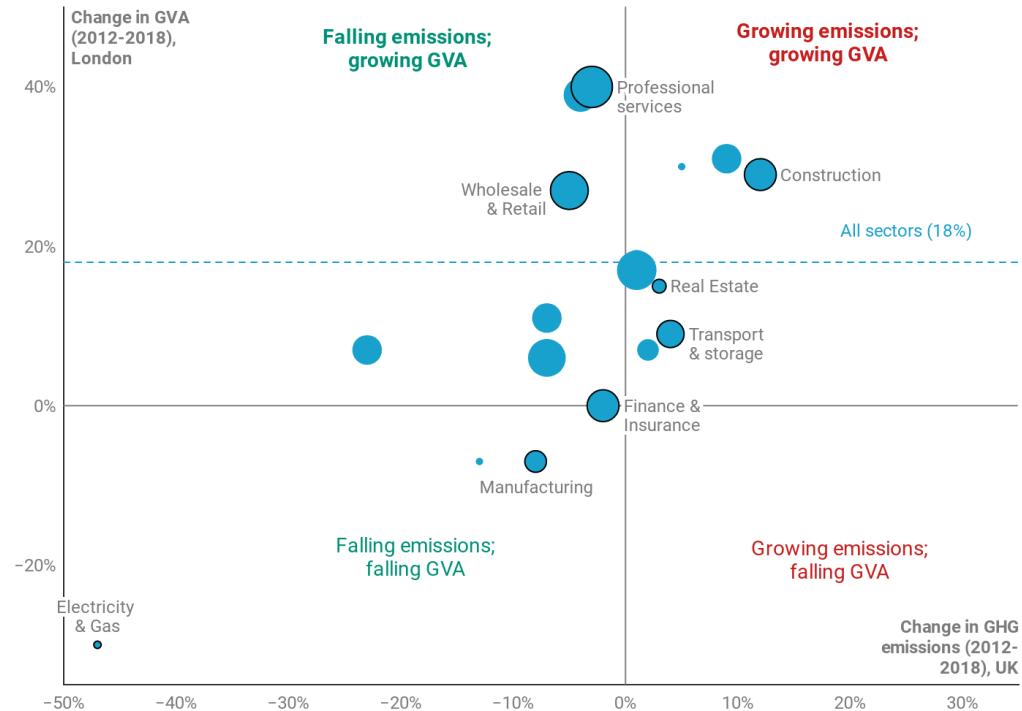
First, we look at the relationship between UK level GHG emissions and employment among London residents. As the chart illustrates, between 2012 and 2018:

- At the UK level the Electricity & Gas industry group has seen a fall in GHG emissions (-47%) and a fall in resident employment (-8%) in the capital.
- Professional services has also seen a fall in GHG emissions (-3%) but employment in the capital has gone up over the same period (+26%). This increase was higher than the increase for all London's industries (+17%).
- Some of the highest-emitting industry groups – Construction, Transport & Storage and Agriculture – have seen an increase in both GHG emissions at the UK level and employment among London residents over the same period.
 - Employment in Agriculture in the capital has gone up by 3,900 while GHG emissions at the UK level have gone up by 5% (excluded from the graph).
 - In Construction employment has gone up by 15%, slightly below the London average, while GHG emissions have increased by 12% in the UK. This growth was driven by the Construction of new buildings sub-group.
 - UK GHG emissions for Transport & Storage have gone up by 4% while employment in London for this industry group has increased by 12%.
 - Looking at a more detailed industry breakdown shows that employment growth in Transport & Storage was driven by the Land Transport and Warehousing sub-groups. Air Transport employment fell in London.
 - Employment in Manufacturing has also gone up (+3%) in the capital but this increase was considerably lower than the average for all industries.

Note: the change in GHG emissions in this slide refers to the UK and differs from the London apportioned estimates reported in slides 10-11.

... and so has output

% change in London GVA and UK GHG emissions, by industry group, 2012-2018



Similarly, the relationship between the change in UK GHG emissions and London economic output (GVA) is not clear-cut. Between 2012 and 2018:

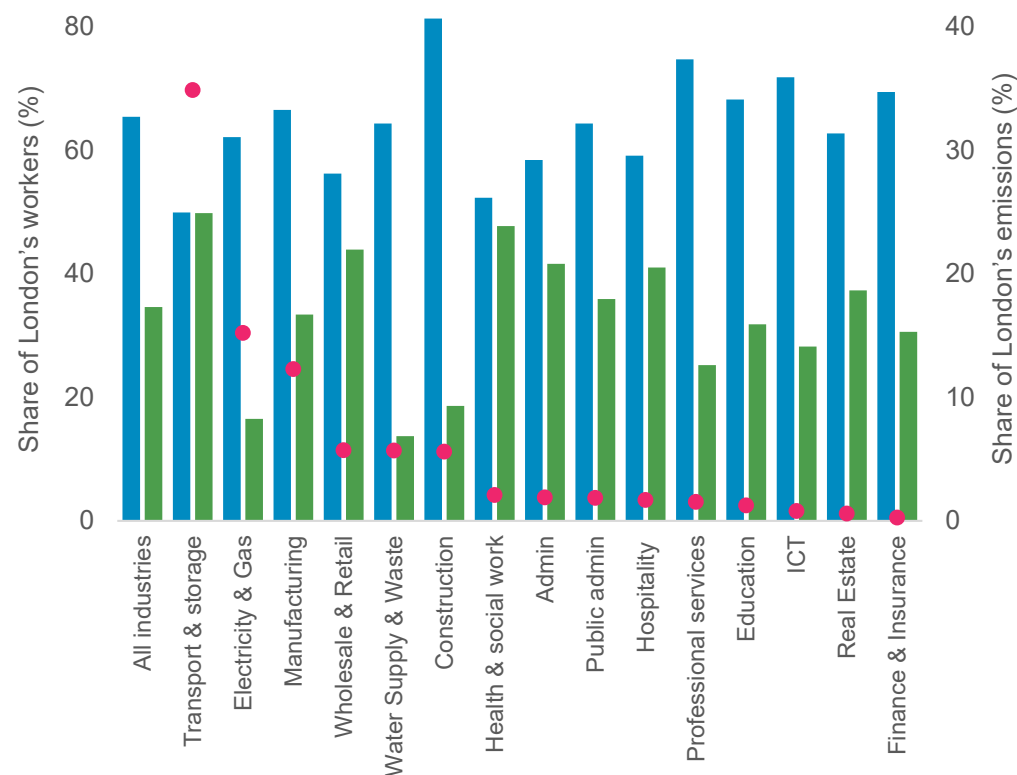
- At the UK level, the Electricity & Gas industry has seen a fall in GHG emissions (-47%) and in London it has seen a similar fall in GVA (-30%).
- Professional services has also seen a fall in UK level GHG emissions (-3%) but economic output in London increased over the same period (+40%). This increase in output was relatively high compared to the increase for all London industry groups (18%)
- Some of the highest-emitting industries – such as Construction, Transport & Storage and Agriculture – have seen an increase in both GHG emissions and economic output over the same period.
 - Output in Agriculture in London has gone up by 30% (from a low base) while GHG emissions at the UK level have gone up by 5%.
 - Construction output in the capital has increased at a relatively high rate (29%) while UK GHG emissions increased by 12%.
 - GHG emissions for Transport & Storage increased by 4% at the UK level while output in London increased by 9%. Looking at a more detailed industry breakdown shows that output growth in Transport & Storage was driven by Land Transport (+20%) and Air Transport (+41%) sub-groups. Water transport has seen a fall in output (-24%) in the capital over this period.
 - Output in Manufacturing has also gone down (-7%) in the capital, coinciding with a decline in GHG emissions at the UK level.

Note: the change in GHG emissions in this slide refers to the UK and differs from the London apportioned estimates reported in slides 10-11.

Source: ONS Environmental Accounts, ONS APS. GLAE calculations.
Note: circle size represents the share of London employment.

Half of the workforce in London's Transport & storage group is from an ethnic minority background

Employment by ethnic group (**White/Non-White**) (LHS) and **share** of London GHG emissions (apportioned), April 2019-March 2020



Source: ONS Environmental Accounts; ONS APS; GLAE calculations (excludes agriculture and mining due to lack of robust data). Note: Numbers may not sum due to rounding.

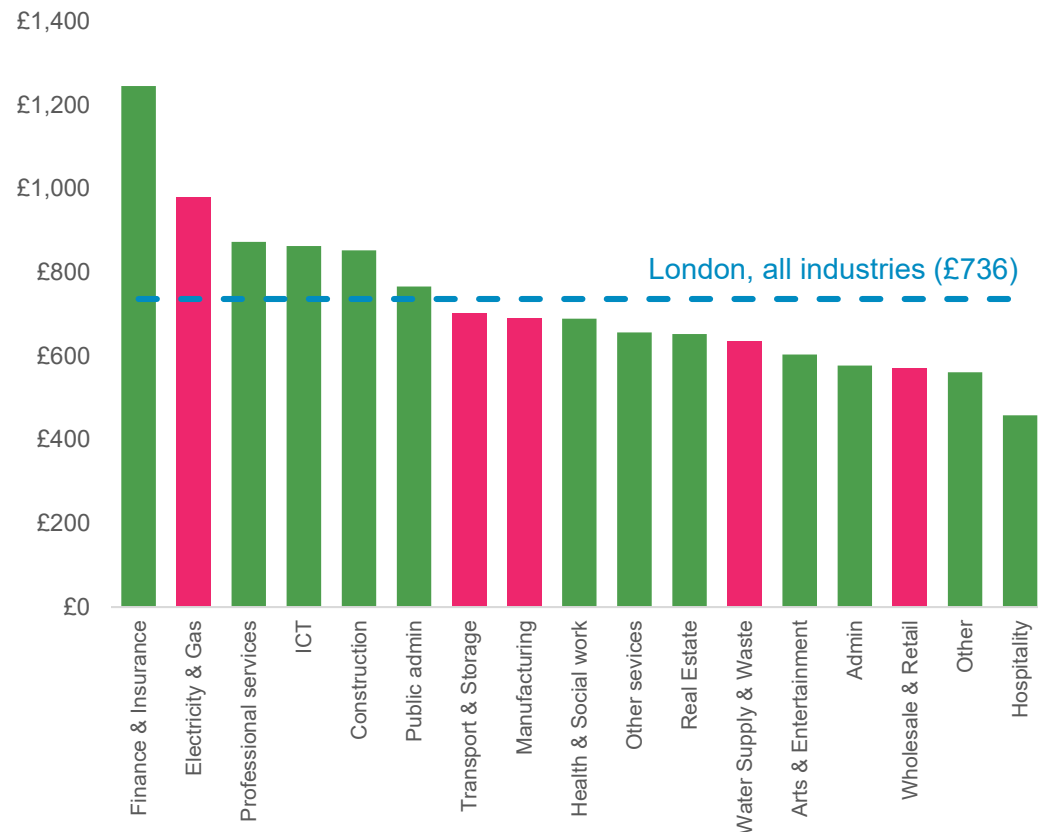
The adjustments required to meet the UK's net-zero target are likely to have different impacts for different people and places within London.

For example, looking at employment by ethnic group in some of the highest-emitting industry groups in the capital shows that:

- Half of the workforce in Transport & Storage are from a non-white ethnic group. This includes a large share of workers (15.8%) from the Black ethnic group.
- By comparison, Construction is a less ethnically diverse industry group: only 18.6% of workers are from a non-white ethnic group.
- 33.4% of workers were from a non-white group in the Manufacturing industry group – close to the average for all industries (34.6%).

Most high-emitting industries have lower than average rates of pay – except Electricity & Gas

Median gross weekly pay for full-time employees by industry group, London, 2019 – **top five highest emitting groups (apportioned)***

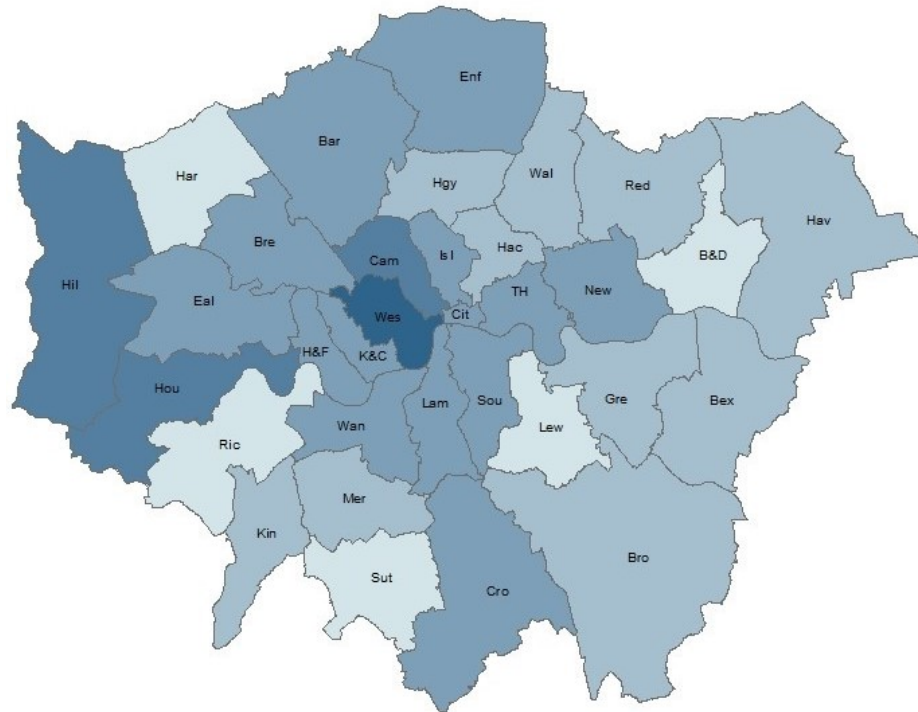


Source: ONS ASHE; GLAE calculations. Note: *based on GHG emissions apportioned to London using employment data.

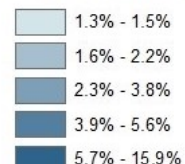
Looking at 2019 data on gross weekly pay for full-time employees by industry group shows that:

- Among the top five highest-emitting industry groups, Electricity & Gas was the only one where gross employee pay was above the London average (£981 per week compared to £736 per week for all industries).
- Median weekly pay for other high-emitting industry groups was lower than the London average:
 - Transport and Storage (£702)
 - Manufacturing (£690)
 - Water Supply & Waste (£636)
 - Wholesale & Retail (£570)

The highest emitting industries tend to be spatially concentrated



Jobs in high-emitting sectors as share of London's total



Source: ONS BRES (estimates for 2018), GLAE calculations.

London boroughs have adopted a variety of targets in respect of reducing council-generated emissions. Some boroughs have also adopted emissions reduction targets for their borough as a whole.

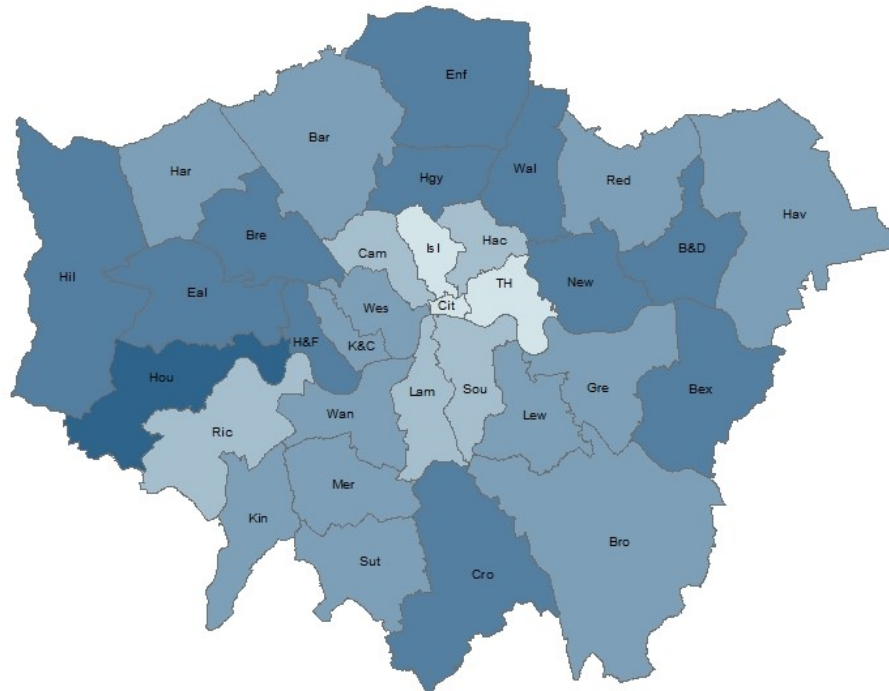
In economic terms, this may be more challenging for certain boroughs as high-emitting jobs tend to be spatially concentrated. Some boroughs could face additional challenges if the net-zero economy does not create (sufficient numbers of) jobs in the locations where jobs are lost in the high-emitting economy. Likewise, green job creation may not happen at the same time, or at the same pace, as conventional job losses occur.

Understanding the spatial distribution of high-emitting industry groups is therefore important. To give an initial indication, the remaining analysis examines workplace-based employment estimates from the ONS Business Register and Employment Survey (BRES) for 2018.

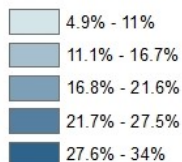
Looking at the jobs in the top ten highest-emitting sub-groups (see slide 11), BRES estimates for 2018 show that:

- Westminster accounted for the largest share of these jobs in the capital, with around 15.8% of the London total.
- Hounslow accounted for the second largest share (5.5%), reflecting the presence of Heathrow airport in the borough. Camden (5.0%) had the third largest share, followed by Hillingdon (4.6%).
- With 1.4%, Richmond upon Thames accounted for the lowest share of these jobs.

With certain boroughs relying heavily on these jobs – especially in Outer London



Share of jobs in high-emitting sectors, by borough

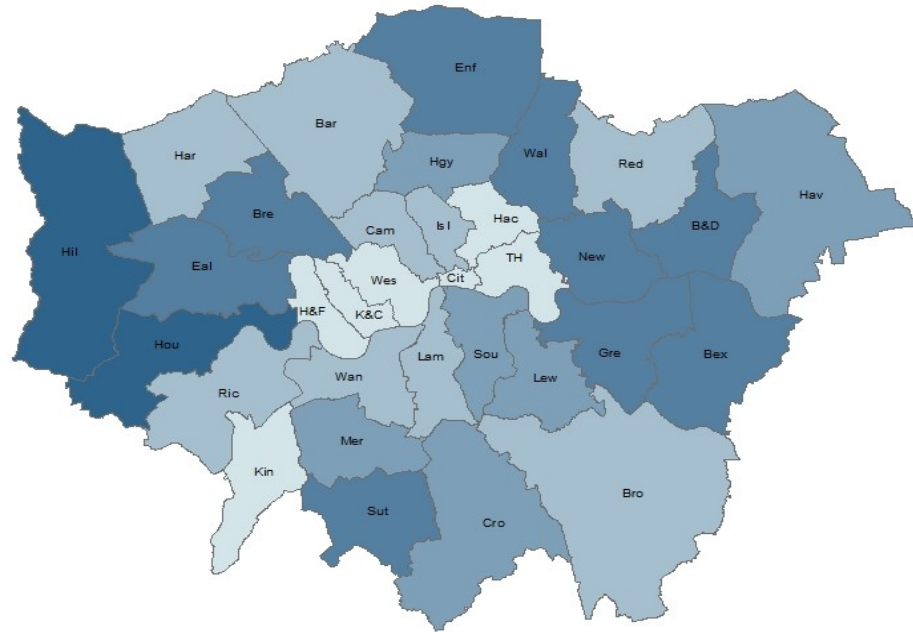


But it will be even more difficult for certain boroughs that rely heavily on these jobs as sources of employment.

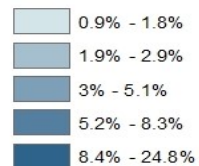
Looking again at jobs in the top ten highest emitting sub-groups (slide 10), this time as share of all jobs by London borough, shows that:

- With 34.0% of jobs in the borough, Hounslow was the most reliant on jobs in high-emitting industry groups, followed by Newham (27.4%), Croydon (27.3%) and Barking and Dagenham (26.3%). All these boroughs are in Outer London.
- In contrast, City of London (4.9%), Tower Hamlets (10.6%) and Islington (11.0%) were the least reliant on these type of jobs. This reflects the high number of Professional services and Finance & Insurance jobs in these boroughs.
- Note, while this tells us where these jobs are located, it will also be important to understand where workers in these industries live.

Transport & storage accounts for a quarter of all jobs in Hounslow



Share of jobs in Transport & Storage, by borough



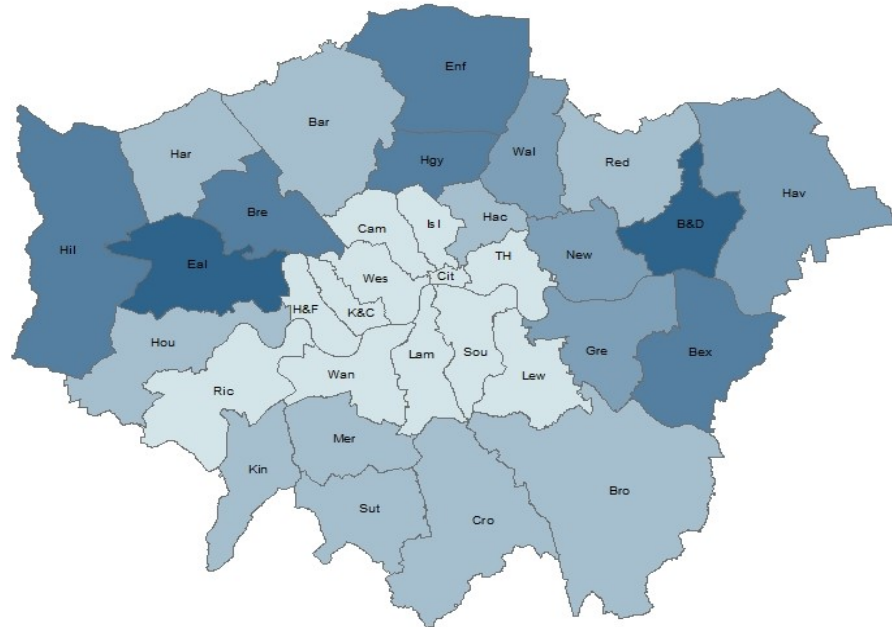
Source: ONS BRES (estimates for 2018), GLAE calculations.

Looking more closely at the distribution of Transport & Storage jobs across London's boroughs shows that:

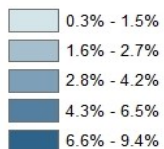
- In 2018, Hounslow and Hillingdon together accounted for a third of all jobs in Transport & Storage, the industry group responsible for the highest share of GHG emissions in the capital.
- Transport & Storage plays a vital role in the economy of these two boroughs, accounting for 25% of all jobs in Hounslow and 17% of all jobs in Hillingdon (see map).
- When we look at Air transport, these two boroughs accounted for 92% (or 34k) of London's jobs in this sub-group. This industry is likely to go through important changes in the transition to a low carbon economy.

Note: the data here only reflects employment at Airports located within London's administrative boundaries: Heathrow and City Airport. These figures do not include Gatwick, Luton and Stansted airports.

1 in 10 Manufacturing jobs in London are located in Ealing



Share of jobs in Manufacturing, by borough



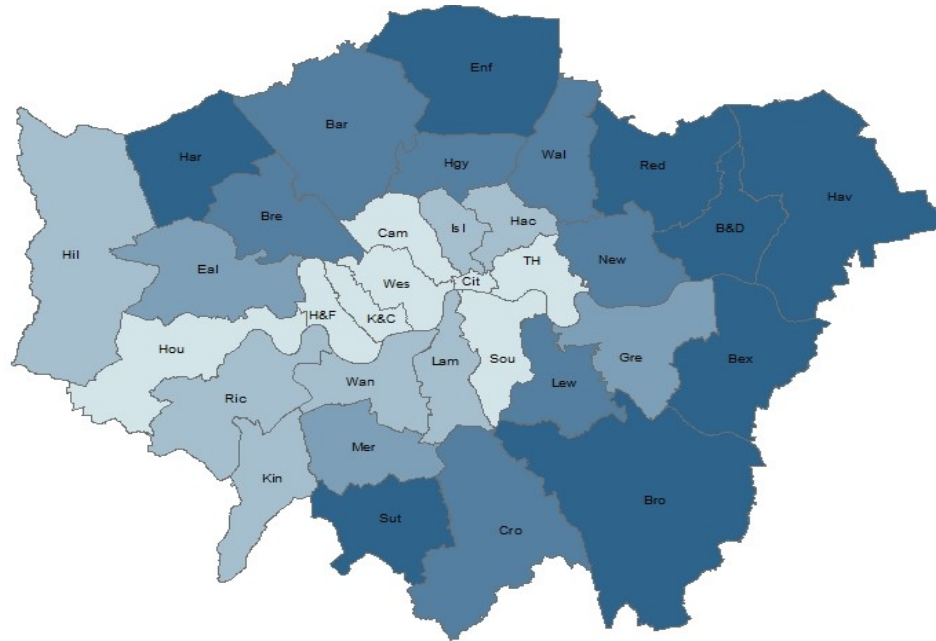
Looking at the distribution of London manufacturing jobs shows that:

- Around 10% of London Manufacturing jobs were based in Ealing. Hillingdon had the second highest concentration of jobs in this industry group (8%), followed by Brent (7%).

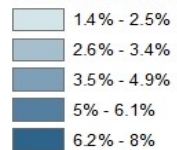
Looking at the importance of Manufacturing jobs for each borough shows that Outer London relies more on this industry group than Inner London:

- Ealing was also the borough most reliant on Manufacturing jobs: 9% of employment in this borough was in this industry group (see map). 58% of these jobs were in Manufacture of Food products.
- At 8% of employment, Barking and Dagenham was the second most reliant on Manufacturing. 67% of these Manufacturing jobs were in Manufacture of Motor Vehicles.
- In contrast, in the City of London, Manufacturing jobs accounted for only 0.3% of the jobs in the borough.

Construction jobs are more spread out across the capital



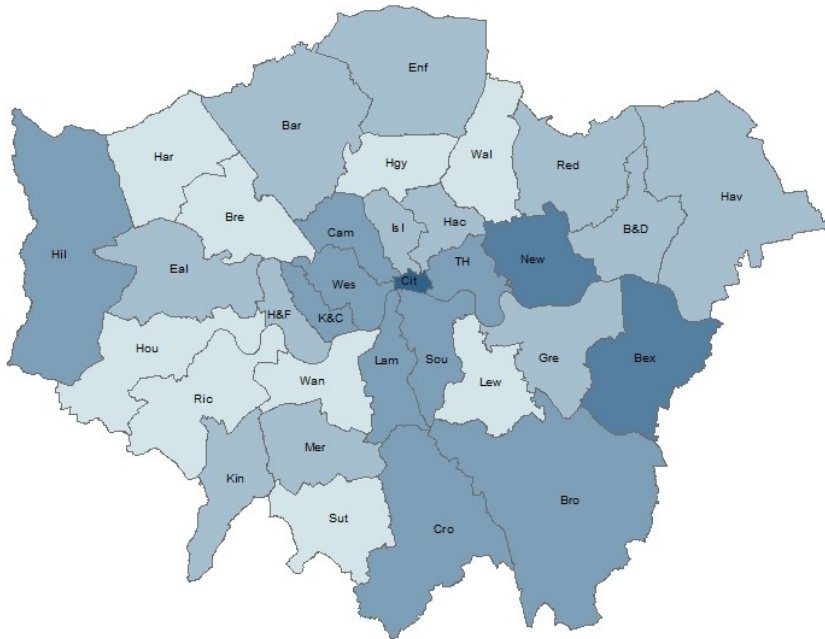
Share of jobs in Construction, by borough



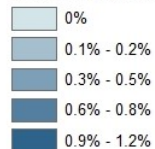
Construction jobs are more spread out across the capital:

- With 8%, Westminster accounted for the largest share of all jobs in construction, followed by the City of London (5%).
- Havering was the most reliant on Construction jobs – 8% of total (see map) – followed by Sutton (7% of total).
- In Kensington & Chelsea Construction jobs accounted for only 1.6% of the total jobs in the borough.

Electricity & Gas accounts for less than 2% of jobs in each borough



Share of jobs in Electricity & Gas, by borough



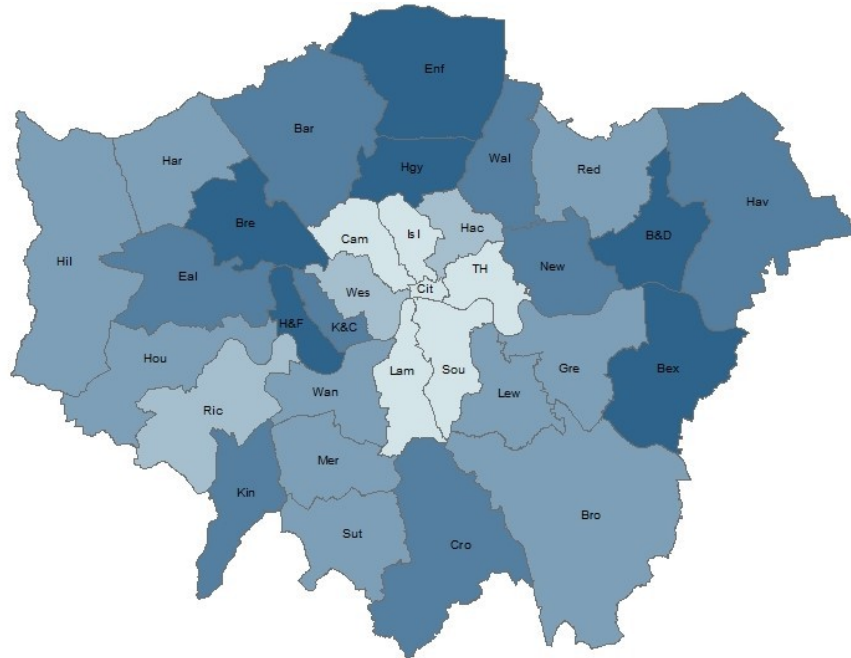
Looking at the distribution of Electricity & Gas jobs by borough shows that:

- City of London accounted for almost a third (32%) of all London's jobs in this industry group.
- With 16%, Westminster accounted for the second highest share of London's jobs in this industry.

Some of these jobs will be in professional occupations, which may be less exposed by the transition to a lower carbon economy.

City of London was the most reliant on jobs in this industry group but these accounted for only 1.1% of the total in the borough.

In four boroughs, Wholesale & Retail accounted for a fifth of all jobs



Share of jobs in Wholesale & Retail, by borough



- Westminster accounted for the largest share of jobs in Wholesale & Retail (12%), followed by Camden (5%).
- This industry group played an important role in Barking & Dagenham, Enfield, Hammersmith & Fulham and Haringey where it accounted for around a fifth of all jobs.
- In contrast, only 2.6% of jobs in the City of London were in this industry.

Labour market focused policy recommendations

Funding Green Jobs

In the current economic climate there have been calls for a 'green-led recovery' where the state plays an important role in generating green jobs. This would help meet the UK's net-zero target and stimulate job creation. This idea has received broad support, including from both the **CBI and TUC**.

Within this category of jobs, the activity that appears to most readily fit the criteria laid out above is home retrofitting.

A 2014 study by Cambridge Econometrics estimated that directly funding all low-income homes across the UK to be upgraded to Energy Performance Standard Band C by 2025, alongside providing zero-interest loans to other households to facilitate upgrading, would generate 108,000 jobs per year over the period 2020-2030, requiring £85 billion investment in that period.

Additional measures have also been proposed to support **upskilling and retraining**. This includes to:

- Create an **eco-jobs classification** to indicate 'leader' jobs that actively help to fight the climate crisis and a 'laggard' and 'follower' or 'brown jobs' classification, to help understand what employment may be negatively impacted by the climate crisis.
- Fund **training for people transitioning out of brown jobs** to those sectors less affected by environmental change.
- Create new, **industry-led credentials for non-traditional education programmes**. Non-traditional education, or non-formal education (education delivered by independent private or non-profit educators), can offer a quicker and cheaper route to upskilling. Employers use these routes four times more than further education colleges or higher education institutes to train their employees (Skills Commission, 2015).