WITHOUT LIMITS

AECOM

FREIGHT MATTERS

INSIGHT INTO THE UK FREIGHT INDUSTRY'S KEY DATA, TRENDS AND ISSUES 2020

THOUGHT LEADERSHIP THAT ADDRESSES
THE BIG ISSUES OF TODAY AND TOMORROW

FREIGHT MATTERS

FOREWORD

Amidst all the devastation and heartache caused by the coronavirus crisis a silver-lining has emerged across a number of societal behaviours, and legacies are forming that will have lasting impacts. Freight and logistics sector shares part of this silver-lining in that the profile of the sector has been elevated closer to its rightful place, and its importance as an integral and indispensable part of a healthy economy is now being better recognised. In operational terms, the sector benefited from quieter roads and lower congestion and drivers have been able to maintain the most economical speeds, reducing fuel use and associated pollutants — minor blessings on this front!

Aside from the daily challenges of running a busy transport operation and coping with the pandemic, many freight businesses involved in international movements have been gearing up for major change once the Brexit transition period finishes at the end of this year. Given the timing of this report — and the fact that advice on procedures, documentation, licences and permits is constantly being updated — we want to wait until the dust has settled before further analysing the impacts. As a result, the focus of this report falls elsewhere.

On a personal level, one aspect from 2020 truly stands out.

Our sector's success in keeping the country moving depended on those individuals who turned up for work despite difficult circumstances — and the entire AECOM Freight and Logistics team feel that those efforts should be recognised. So, to those in ports and shipping who move 95 per cent of our imports/exports; to those in the air industry flying essential pharmaceuticals, medical supplies, perishable goods and vital parcels around the world; to those in the rail freight sector moving consumer goods across the country; to those in road freight delivering supermarket goods, medical supplies and home deliveries; and finally to those working in warehousing, freight terminals and transport office support functions, we want to say a heartfelt thank you. In the face of immense challenges, you showed the country that Freight Matters. WL

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CORONAVIRUS:
HOW FREIGHT HAS RISEN TO THE CHALLENGE

The global effects of the coronavirus pandemic have been momentous and devastating, so much so that in decades to come future generations and historians may look back on this period in the same way that we think of the bubonic plague or the Great Fire of London. Many people have been forced to stop, take stock and review their priorities.

The same can be said of attitudes towards the freight and logistics sector. After the onset of widespread lockdowns, the general public (and hopefully strategic planners as well) have become more aware that the movement of goods is essential for modern life as we know it. After all, if the freight industry and the wider supply chain had ceased working during the lockdowns, supermarket shelves would have been unstocked, hospitals would have run short of resources and tonnes of goods would have remained undelivered.

The effects of the pandemic on road freight have been mixed — some sectors are suffering while some are thriving. Over 84 per cent of respondents to the Freight Transport Association's Coronavirus Logistics Impact survey reported 'lack of work' as a barrier to getting back to normal when restrictions lift. Interestingly, the survey also found that operations are unable to provide work for all drivers, with firms reporting 14 per cent of HGV drivers and seven per cent of van drivers being furloughed.

> THE EFFECTS OF THE PANDEMIC ON ROAD FREIGHT HAVE BEEN MIXED – SOME SECTORS ARE SUFFERING WHILE SOME ARE THRIVING.

Conversely, rise in demand for supermarket home deliveries and online shopping has created thousands of new jobs in this sector, although a lack of delivery drivers both in the UK and overseas may prove a barrier if demand increases much more in the future. On a positive note however the lack of cars on the roads during lockdown meant that more truck deliveries were made on-time each day[1]. This poses questions as to how road policy can be configured and what steps can be taken to allow these benefits for freight to remain as car traffic levels increase again, both at the national strategic level and at the last-mile stage of deliveries.

According to industry publication International Airport Review, global air cargo capacity fell by 35 per cent due to the withdrawal of passenger services on some routes as a result of the pandemic[2]. The reduction in passenger services also reduced overall belly hold capacity by 75 per cent in April 2020 compared to the previous year[3]. Some airlines, with ticket sales significantly down, have converted passenger aircraft to freighters, with Emirates alone using 70 passenger Boeing 777s in this manner[4].

Some of these aircraft have been used on trips to and from locations such as China to ferry Personal Protective Equipment (PPE) back to the UK. This shift has thrown the freight and logistics industry into the public eye in a way not often seen before and acts as a positive example of the global freight sector coming together to meet the most pressing of needs.

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Regional Director,
Freight and Logistics,
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Rail freight operations have continued during the pandemic, with freight trains proving a cost-effective and time-efficient way for supermarkets to keep the shelves stocked as much as possible, especially with the onset of panic buying back in March. Specially-commissioned express services delivering critical medical supplies have also played a vital part[5]. Interestingly, due to the decrease of passenger traffic and associated services, the punctuality of international freight trains has improved from around 60 per cent to 80-90 per cent[6]. This, in a similar way to road traffic, provides a glimpse into how passenger and freight trains can potentially interact more effectively going forward, in particular with opening up new freight paths to allow greater amounts of transportation by rail and prioritising freight to a greater extent to enable faster journeys.

The maritime sector moves around 95 per cent of world cargo by volume[7] and has continued to do so throughout the pandemic. There were short-term space issues at docks and in warehouses as freight forwarders tried to find space for the goods already in transit where orders had been cancelled by struggling industries. A key issue has been ships stuck at sea mid-voyage, often unable to dock because of bans on entry at borders especially in hard-hit areas such as the USA and South America[8]. However, it was noteworthy how the UK government classified cross-border freight workers as essential, and therefore free from quarantine, thus exemplifying the importance of freight and the high esteem in which the industry has been held.

The coronavirus pandemic has opened the eyes of many people to the importance of freight and logistics at all scales, whether it be the multi-national organisations transporting PPE to the local 'last mile' deliveries ensuring people have been able to get food and other necessities when they have really needed them. It is now important that the freight and logistics industry uses this new-found exposure to its advantage, ensuring that the importance of the industry is reflected in future policy. Furthermore, it is important that freight remains a priority for development and investment and does not get forgotten by both the public and the planners when passenger numbers return to pre-pandemic levels again.

However, the biggest challenge for the freight industry for all modes may be yet to come. The effective distribution of the vaccine against coronavirus has been described as being "one of the biggest logistical challenges in modern history"[9]. A single Boeing 777 Freighter can carry around one million individual doses of a vaccine, meaning delivering double-doses to half the world's population will require space in around 8,000 cargo planes[10]. This is not to mention the need for end-to-end cold chain distribution, as well as the on-ground transport and the challenge of getting a vaccine in such numbers to the world's poorest and hardest-to-reach areas, which is a great challenge for conventional freight, let alone potentially life-saving immunisations. However, it is clear that the freight industry has met the challenges of the pandemic so far, and it remains to see how it is able to meet the further challenges going forward. As we move into this next phase, the global spotlight will be firmly fixed on freight to ensure that the vaccine is delivered successfully. We must not disappoint. WL

> INTERESTINGLY, DUE TO THE DECREASE OF PASSENGER TRAFFIC AND ASSOCIATED SERVICES, THE PUNCTUALITY OF INTERNATIONAL FREIGHT TRAINS HAS IMPROVED FROM AROUND 60 PER CENT TO 80-90 PER CENT.

1 www.bbc.co.uk/news/business-52020648
2 www.internationalairportreview.com/article/115426/air-cargo-industry-reacting-responding-covid-19
3 www.cargofacts.com/allposts/logistics/carriers/absent-the-bellyhold-freighter-fleet-cant-handle-cargo-demand/
4 www.bloomberg.com/news/articles/2020-07-25/the-supply-chain-to-save-the-world-is-unprepared-for-a-vaccine
5 www.railpage.com.au/news/s/leading-businesses-praise-role-of-uk-s-rail-freight-during-covid19-crisis
6 www.railjournal.com/policy/erfa-calls-for-new-rights-for-freight-post-covid-19/
7 assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/826446/port-freight-statistics-2018.pdf
8 www.businessinsider.com/cargo-ship-workers-trapped-sea-predict-anarchy-not-sent-home-2020-7?r=US&IR=T
9 novamedica.com/media/theme_news/p/10848-covid-19-vaccine-delivery-will-be-one-of-the-biggest-logistical-challenges-in-modern-history
10 www.bloomberg.com/news/articles/2020-07-25/the-supply-chain-to-save-the-world-is-unprepared-for-a-vaccine

Image credit: © Matt Webb, AECOM

FREIGHT IN THE UK

The freight sector supports a wide range of industries and is integral to the UK economy. Most goods and services bought and sold in the UK rely on the logistics supply chain at some point. The performance of freight in the UK is measured on the amount of goods moved and lifted, alongside the value of freight to the UK economy, and the number of workers in the industry. In 2018, 193 billion tonne-kilometres of domestic freight were lifted throughout the UK freight system[1], up two per cent on the previous year.

Fast forward to 2020 and the unprecedented impact of coronavirus and we see just how critical the smooth functioning of freight across all the modes has been in keeping the economy moving. Crucially, the huge increase in online shopping has changed the demand for goods and services — and the freight sector is expected to adapt[2]. Most of this demand will be met by road freight transport, which moves the majority of domestic goods throughout the UK, followed by water and then rail[3].

Despite freight's strategic importance in the national picture, it is often overshadowed by passenger transport. Freight is often called the 'Cinderella industry' as it operates in the background without recognition. Coronavirus has brought freight to the forefront as goods continue to be moved and the industry continues to grow with changing consumer behaviour such as online shopping.

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1 assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/870647/tsgb-2019.pdf
2 www.bigcommerce.co.uk/blog/covid-19-ecommerce/#changes-in-revenue-across-ecommerce
3 assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/870647/tsgb-2019.pdf

FREIGHT IN THE UK

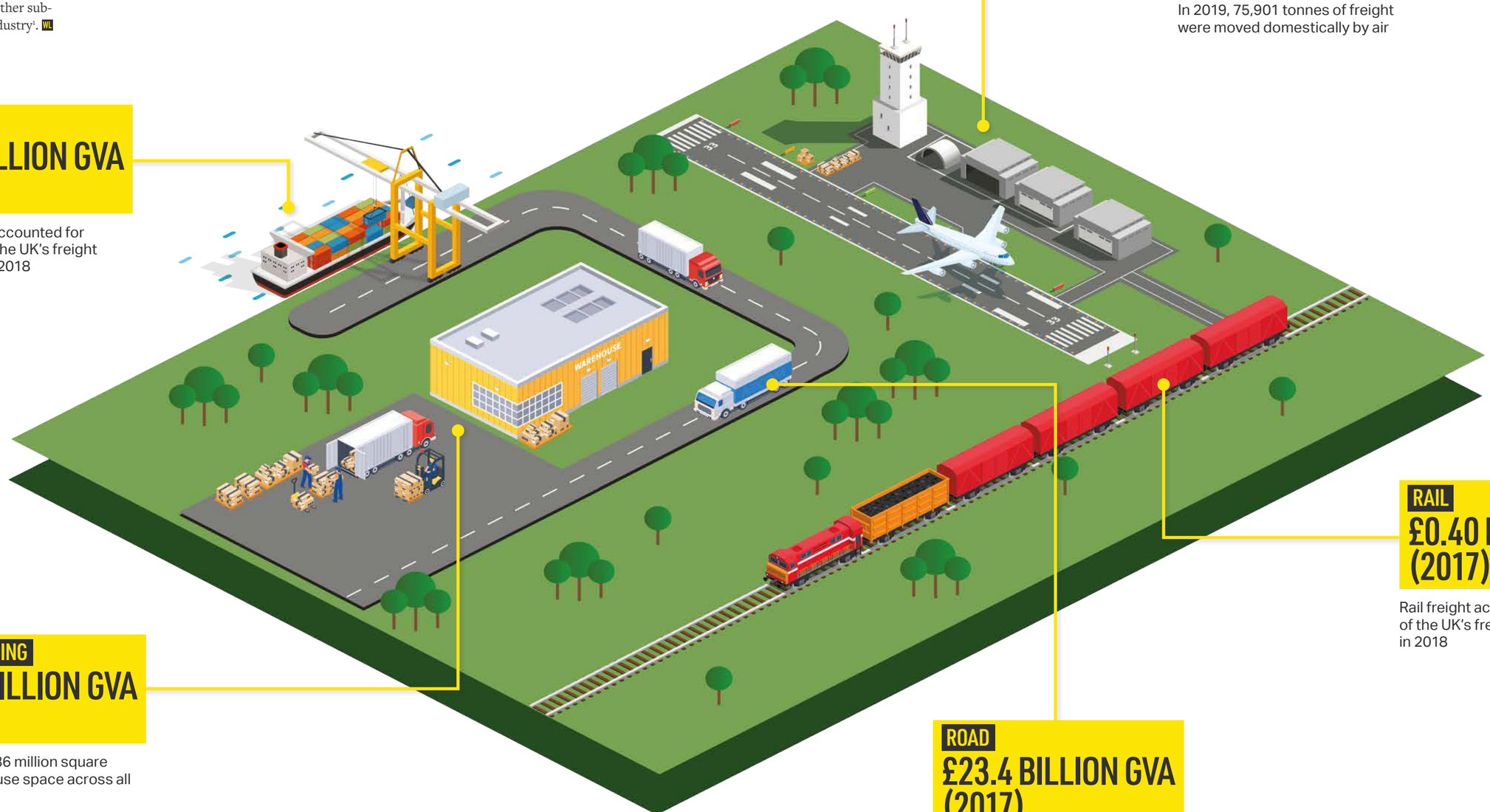
In 2017 the UK freight industry comprised around 192,525 enterprises, employed 2.7 million people and contributed an estimated £124 billion Gross Value Added (GVA) to the UK economy. This figure includes £83 million GVA from wholesale and contributions from several other sub-sectors within the freight industry[1]. WL

AIR
£0.19 BILLION GVA (2017)

In 2019, 75,901 tonnes of freight were moved domestically by air

WATER
£3.9 BILLION GVA (2017)

Water freight accounted for 13 per cent of the UK's freight movements in 2018



RAIL
£0.40 BILLION GVA (2017)

Rail freight accounted for 9 per cent of the UK's freight movements in 2018

WAREHOUSING
£12.9 BILLION GVA (2017)

England had 486 million square feet of warehouse space across all regions in 2019

ROAD
£23.4 BILLION GVA (2017)

Road freight accounted for 78 per cent of the UK's freight movements in 2018

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The linked sources for these figures are listed in Sources, page 46

WAREHOUSING MATTERS

Warehousing is a practical and cost-effective method of storing and managing goods. It is a vital part of the overall freight and logistics industry both here and across the globe. The square footage of available warehousing space varies across the UK, as does the variable costs of warehousing goods. One of the metrics for measuring warehousing is based on the amount of goods that can be stored.

Currently, there are several challenges facing the warehousing sector in the UK. There is an estimated 486 million square feet of warehousing space in the UK[1], however significant regional imbalances exist. For example, warehousing capacity in London and the South East is 1.4 times larger than the warehousing capacity of the West Midlands and is significantly more expensive when compared to the national average[2]. Unless addressed, there is a danger that these imbalances may persist in the long term.

Furthermore, there is a growing need for greater investment in effective warehouse management systems, both to increase operational efficiencies in a highly-competitive market and to meet demands set by increasingly-automated and faster-paced delivery trends.

Addressing these issues will ensure that warehousing remains an economically viable part of the freight and logistics industry as the sector adapts to the changes and challenges arising from both coronavirus and Britain's departure from the European Union.

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1 www.savills.co.uk/research_articles/229130/284236-0/big-shed-briefing---july-2019.pdf (calculated based on vacancy space and vacancy rate)

2 See warehousing domestic stats

JARGON BUSTER

DYNAMIC CAPACITY

The amount of throughput a facility can handle, relating to commonly-demanded products. As these items are consistently picked, high selectivity is vital to maintain dynamic capacity levels.

CROSS-DOCKING

The action of unloading materials from an incoming trailer or rail car and immediately loading these materials in outbound trailers or rail cars, thus eliminating the need for warehousing (storage).

REPLENISHMENT CYCLE

This refers to the time between orders of a specific item. It is most easily calculated by dividing the order quantity by the annual demand and multiplying by the number of days in the year.

WAREHOUSING:
MORE THAN JUST STORAGE

Ask someone to describe a warehouse and they'll probably mention row upon row of shelving packed full of packages, and forklift trucks trundling about amongst men and women in hi-vis jackets. By and large, it's an accurate image. However, warehousing is evolving — and fast. In this article we describe some of the trends shaping warehouse design and industry processes, as well as challenges facing the industry.

ADDRESSING THE SKILLS SHORTAGE

There is a critical skills shortage in the warehousing industry. Applicants with the required technical skills are not gravitating towards warehousing as a career as the industry invests more in technologies to improve efficiency[1].

The running of a warehouse is dependent on a team of employees with the computer literacy and problem-solving skills needed to manage the goods flowing in and out. When vacancies arise however, employers tend to hire applicants that have both the necessary skill sets, as well as prior experience. For example, knowledge of automated warehousing systems is often a requirement, but that experience is difficult to come by for someone who has not already worked in the industry. As an industry, we need to find ways of bridging that skills gap by offering apprenticeships or better training.

Crucially, negative perceptions around working in warehousing are also hugely problematic as they deter potential employees with the required skills from applying. There are several reasons for this. A role in warehousing is hard work and includes a lot of repeat processes, which can be off-putting especially for applicants looking for variety in their work to keep them challenged and engaged. The sector needs to focus on developing and supporting the career development of existing employees, along with improved salary incentives, while also promoting these career paths to potential new applicants.

THE IMPORTANCE OF DATA

Data continues to be a hot topic in the freight and logistics industry as it gives us a better understanding of industry trends and can inform business decisions based on customer needs — and warehousing is no exception. Questions such as how data can be gathered, how it can it be analysed and how can it be used to improve efficiencies are at the forefront of the debate as technology evolves.

Technology moves quickly to meet demand. Forty years ago, the widespread roll-out of barcode technology was a key enabler — products could be found easily and inventory records became far more accurate[2]. Nowadays, that technology has now evolved into Radio Frequency Identification (RFID) where products fitted with RFID tags are identified wirelessly, accurately and — crucially — quickly, resulting in significantly faster flow.

> **IN TODAY'S MARKET, THE FOCUS IS ON LEVERAGING DATA TO PROVIDE AS MUCH INFORMATION AS POSSIBLE.**

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Senior Consultant,
Freight and Logistics,
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In today's market, the focus is on leveraging data to provide as much information as possible. As an example, consumers expect next-day delivery as well as accurate data regarding product availability. The challenge for traditional warehouses is how they enable data gathering to improve the customer experience and the requirements to do so. It can be expensive to invest in necessary technology and automation. Staff also need to possess the necessary data collection skills.

Warehousing management systems provide real-time data to both the warehouse and to the customer about the availability of products, and the movement of goods within the system. A typical example is the ability to track (through an app and email notifications) the location of a parcel from purchase to delivery.

1 ciltuk.org.uk/News/Latest-News/ArtMID/6887/ArticleID/22813/Logistics-sector-facing-severe-skills-shortage-in-next-five-years-CILT-finds
2 www.dbk.com/resources/barcode-scanner-history.html

THE RISE OF AUTOMATION

Automation is revolutionising the way warehouses operate. Many of the repetitive tasks involved in warehousing can be automated, plugging the gap in the labour market. Automated vehicles can load and unload goods from vehicles and then stack them on to the shelves. In a process known as automated picking, a machine can grab several products and pack goods onto a pallet which can then be automatically labelled and scanned by another robot.

Amazon uses a lot of automation in their warehouses — autonomous vehicles transport goods to picking stations in a determined sequence (to allow for maximum efficiency) which are then labelled and transported to their destinations[3].

The use of automation has positive implications for warehouse design as space, such as the full height of a building, can be fully optimised. Ocado's hive/grid fulfilment system, which uses autonomous vehicles, is a modular system that can be adapted to the specific dimensions of a warehouse to maximise the use of space[4].

LOCATION MATTERS

Changes to consumer behaviour are influencing the location of warehouses. As demand comes primarily from urban areas, goods need to be close to city centres so that operators and retailers can fulfil next day delivery expectations. For example, warehouse specialists SEGRO recently acquired an urban warehouse in Perivale Park, West London which benefits from excellent main road and public transport connections[5] for the movement of goods and staff. The challenge is getting the balance right between the additional rental cost of buildings in urban areas and the flow of goods to customers. In these cases, automation may offset additional rental costs by reducing outgoings. WL

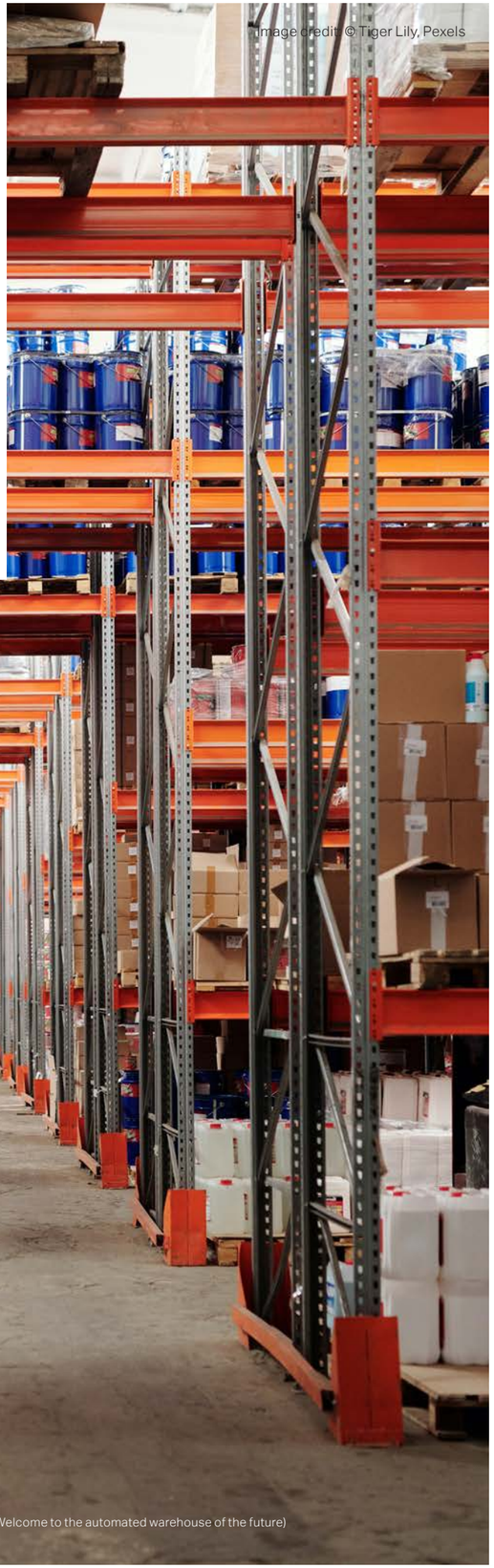


Image credit: © Tiger Lily, Pexels

3 www.chargedretail.co.uk/2019/10/18/behind-the-scenes-at-amazons-robotic-fulfilment-centre/
4 www.theverge.com/2018/5/8/17331250/automated-warehouses-jobs-ocado-andover-amazon (2018 — Welcome to the automated warehouse of the future)
5 www.segro.com/media/press-releases/2020/08-06-2020?sc_lang=en

WAREHOUSING BY REGION 2019

Warehousing space (square footage per capita)

WEST MIDLANDS

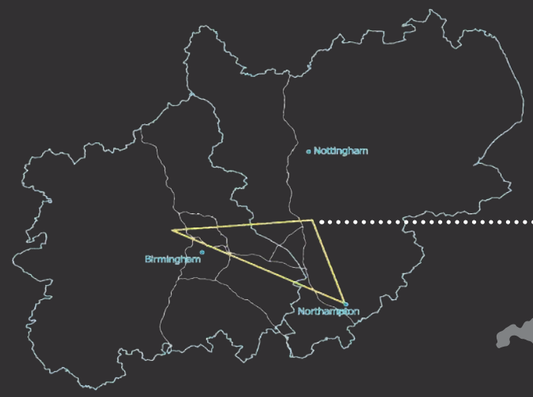
5.9 MILLION
people

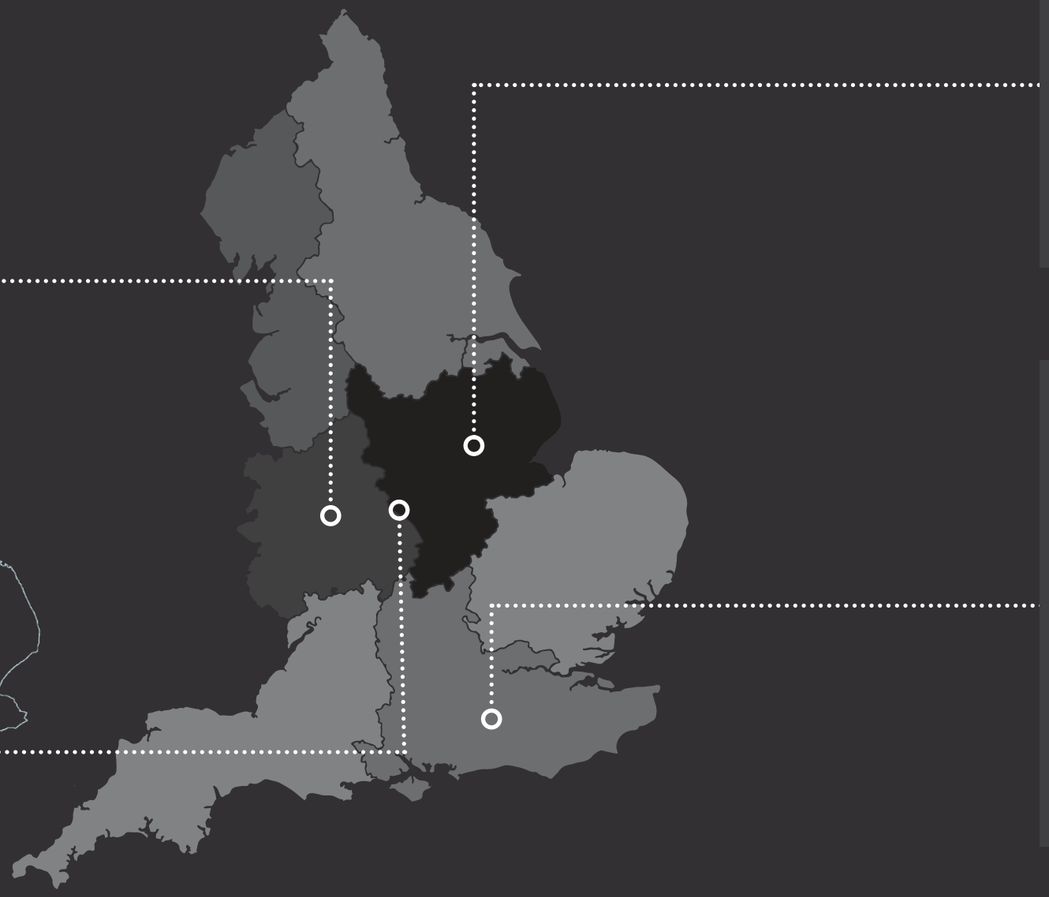
81 MILLION
square feet of warehouse space

OVER 10%
vacancy rate, the highest of all regions

THE GOLDEN TRIANGLE

A key warehousing area with high accessibility





Square feet per capita

- Less than 5
- 5–10
- 10–12
- 12–15
- More than 15

EAST MIDLANDS

The least populated region, with **4.8 MILLION** people

99 MILLION square feet of warehouse space, second only to London and the South East

LONDON AND THE SOUTH EAST

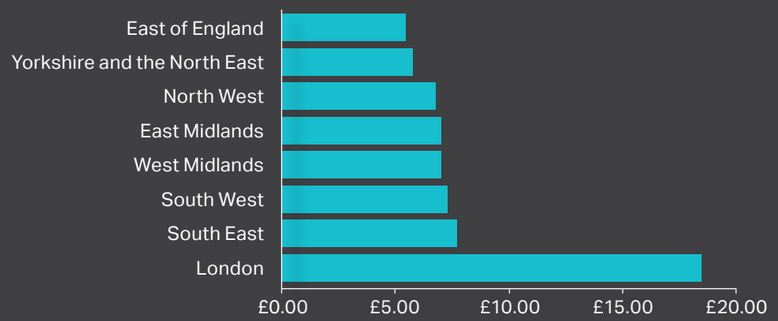
18 MILLION
people

111 MILLION
square feet of warehouse space

The national average costs are up to **2.3 TIMES**

WAREHOUSING COST

Grade A warehousing rent (£ per square foot)



DEVELOPMENT PIPELINE

H1 2019 compared to H1 2018

▲ East Midlands, West Midlands, London and the South East

Total development:
5.11 MILLION sq ft

▽ North West, South West, East of England, Yorkshire and the North East

Total development:
1.13 MILLION sq ft

The linked sources for these figures are listed in Sources, page 46

THE ENVIRONMENT MATTERS

The freight sector has an acknowledged impact on the environment, most obvious of which is the greenhouse gas emissions produced from the use of fossil fuels to move goods. The wider impacts are measured by the type and amount of fuel being used, which includes the use of renewable energy sources, alongside the amount of the greenhouse gases produced. In 2019 transport in the UK accounted for a third (34 per cent) of all carbon dioxide emissions, with the large majority coming from road transport[1].

To reduce emissions and mitigate against the effects of climate change, the entire sector is actively looking at new technologies, greener fuels and industry best practice including emission targets.

1 assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/875485/2019_UK_greenhouse_gas_emissions_provisional_figures_statistical_release.pdf

JARGON BUSTER

ALTERNATIVE FUELS

Low-polluting fuels which are used to propel a vehicle instead of high-sulphur diesel or gasoline. They include methanol, ethanol, propane or compressed natural gas, liquid natural gas, low-sulphur or 'clean' diesel and electricity.

CARBON FOOTPRINT

The amount of carbon dioxide released into the atmosphere as a result of the activities of a particular individual, organisation, or community.

ENVIRONMENTAL MANAGEMENT LEADING SYSTEM

A set of procedures and techniques enabling an organisation to reduce environmental impacts and help increase its operating efficiency.

DECARBONISATION:
HOW FREIGHT IS LEADING THE WAY

The transport sector is a major contributor to climate change — in 2018 it accounted for over 24 per cent of global CO_2 emissions from fuel combustion[1]. While individual freight modes — rail, air, road and water — have committed to decarbonisation, the sector as a whole is playing catch up with others such as the UK energy sector, which has reduced its reliance on fossil fuels through the adoption of solar, hydro and wind power technologies leading to a 68 per cent reduction in CO_2 emissions since 1990[2]. So, what action is the freight industry taking to accelerate progress towards decarbonisation?

RAIL FREIGHT

Rail freight is a low-carbon form of transporting goods, producing 76 per cent less CO_2 emissions than HGVs for the equivalent journey[3]. Nevertheless, in 2019, independent advisory body the National Infrastructure Commission recommended that the UK government should publish within the next two years a full strategy for rail freight to reach zero emissions by 2050[4].

Numerous initiatives exist to develop ways of lowering emissions. An example is the Rail Safety and Standards Board (RSSB) Intelligent Power Solutions to Decarbonise Rail competition in which six winners were awarded a share of £1 million to develop decarbonisation projects.

One of the winning projects — a collaboration between low-carbon technology company G-volution and GB Railfreight, Network Rail, Loram UK, Colas Rail Freight, Europhoenix and Deutsche Bahn — demonstrated to rail freight operators the benefits and the feasibility of adopting dual fuel engines as a way to decarbonise their operations, with a particular focus on Type 3 locomotives which comprise 10 per cent of the UK's fleet and Type 5 locomotives which comprise 72 per cent of the UK's fleet.

ROAD FREIGHT

In the context of decarbonisation, most people outside the industry usually consider the impacts of road freight to be the greatest (alongside air freight) — and they would be correct. According to the Organisation for Economic Co-operation and Development's (OECD) International Transport Forum, HGVs are the fastest growing source of global oil demand, accounting for 40 per cent of oil demand growth by 2050 and 15 per cent of the projected increase in global CO_2 emissions[5].
This is largely due to increased demand and usage from countries such as India and China.

In the UK, the government is reducing the emissions impact of road freight in urban areas through policies such as Low Emission Zones and Clean Air Zones. In addition, the road freight industry is taking steps to explore the use of alternative fuels such as hydrogen and biodiesel, and is investing in the development of electric HGVs and vans.

10%
Type 3 locomotives of UK's fleet.

72%
Type 5 locomotives of UK's fleet.

Raj Sharma
Principal Consultant, Freight and Logistics, AECOM, UK and Ireland

In Europe, the US and Japan, the development of electric fleet vehicles progresses steadily. However, manufacturers in China (such as FAW, Geely, Dongfeng Motors, Foton Motors and Jiangling Motors Corporation) as well as ones in India (Eicher Motors, Ashok Leyland, Tata Motors and Mahindra) are leading the way.

AIR FREIGHT

Air freight is an essential component of any international logistics network. Although it represents just two per cent of global carbon emissions, air freight has a higher negative impact on the environment than other modes of transport as it produces more CO_2 per tonne-kilometre than rail or water.

Furthermore, the planes used to transport freight are generally older and more polluting.

The International Transport Forum (ITF) predicts that more emissions will be produced from air freight cargo than passengers by 2050[6]. The air industry has set goals of achieving carbon-neutral growth by 2020 meaning that CO_2 levels will remain the same level post-2020 and aims to reduce air freight's net emissions by 50 per cent by 2050.

As ways of measuring air cargo's carbon footprint become more accurate, processes are being put in place to meet reduction targets. For example, reducing weight on board can reduce fuel consumption. In addition, operators are developing strategies to modernise fleets and use biofuels[7].

WATER FREIGHT

International shipping accounts for approximately 3.1 per cent of annual global CO_2 emissions[8]. The International Maritime Organization (IMO) expects this to rise to 10 per cent by 2050 based on current practice.

In 2018 the IMO agreed on an initial greenhouse gas strategy which signalled a shift for the shipping industry. This landmark strategy sets out a timeline alongside key goals to tackle decarbonisation — a 50 per cent reduction of total annual greenhouse gas emissions from international shipping by 2050 (compared to 2008), and an additional call to further efforts to phase them out entirely by as soon as possible.

50%
Reduction of total annual greenhouse gas emissions from international shipping by 2050.

Notably, the IMO is the only organisation to have adopted energy-efficiency measures that are legally binding across an entire global industry, applying to all countries.

Shipping and cargo companies are stepping up to the challenge. In 2018, Maersk set a target of achieving net zero operational carbon emissions by 2050 and has committed to introducing zero carbon emission vessels by 2030. To achieve this, the company is developing new carbon-neutral fuels, as well as new technologies such as harnessing wind power to propel their vessels.

Image credit: © Matt Webb, AECOM

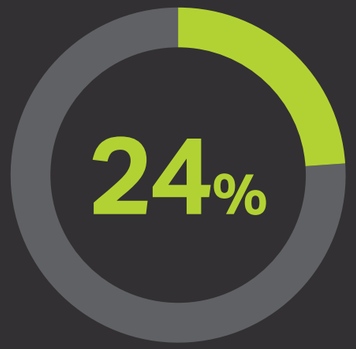
> NOTABLY, THE INTERNATIONAL MARITIME ORGANIZATION IS THE ONLY ORGANISATION TO HAVE ADOPTED ENERGY-EFFICIENCY MEASURES THAT ARE LEGALLY BINDING ACROSS AN ENTIRE GLOBAL INDUSTRY, APPLYING TO ALL COUNTRIES.

THE NEED FOR A UNIFIED APPROACH

Each mode has set its own decarbonisation targets and an individual approach is needed to achieve them. In this way, freight can decarbonise. However, better progress could be made if there was a unified approach at a national or international level to help achieve these goals more efficiently. WL

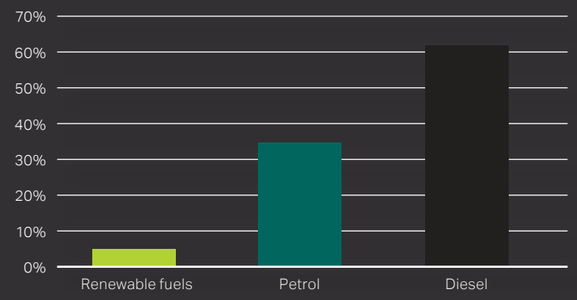
1 www.iea.org/reports/tracking-transport-2020# (excludes emissions from agriculture and land use)
2 www.energy-uk.org.uk/energy-industry/energy-in-the-uk.html
3 assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/590922/freight-carbon-review-2017.pdf
4 www.nic.org.uk/wp-content/uploads/Better-Delivery-April-2019.pdf
5 www.itf-oecd.org/sites/default/files/docs/towards-road-freight-decarbonisation_0.pdf
6 ITF Transport Outlook, 2019
7 www.iata.org/en/programs/cargo/sustainability/carbon-footprint/
8 Greenhouse gas emissions from global shipping, ICCT, 2017

THE ENVIRONMENT MATTERS



Percentage of total greenhouse gas emissions caused by transport in the UK

Volume of fuels by fuel type in the UK



In 2019: 2,680 million litres eq. of renewable fuel was supplied, constituting 5.1 per cent of total road and non-road mobile machinery fuel. This is an increase from 4 per cent in the previous year. This renewable fuel delivered an average greenhouse gas (GHG) saving of 83 per cent compared to fossil fuels (not accounting for indirect land use change).

WHAT IS A RENEWABLE FUEL?

Renewable fuels are typically made from a form of biomass known as feedstocks. These are either grown specifically to process into fuel or are waste products such as food waste.

These feedstocks are then processed by renewable fuel manufacturers, producing fuels which behave similarly to conventional propulsion fuel such as petrol and diesel.

These renewable fuels are then mixed with petrol, diesel and other fuels by fuel suppliers, who are required to have a set proportion of renewable fuels in their fuel stock.

These mixed fuels are then sold at the pumps at petrol stations and on the market.

Renewable fuels deliver greenhouse gas savings as they are sourced from feedstocks which extract CO_2 from the atmosphere.

DOMESTIC GREENHOUSE GASES 2017

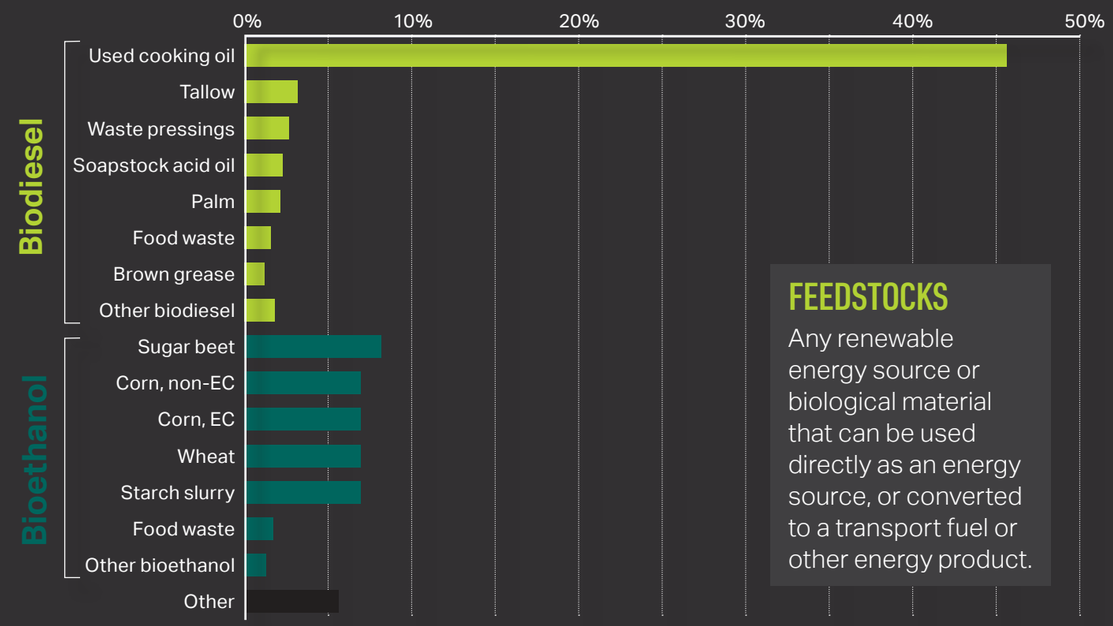
HGV
20.8 MILLION TONNES
▲ UP 1%

SHIPPING
5.9 MILLION TONNES
▽ DOWN 2%

RAIL
2.0 MILLION TONNES
▽ DOWN 1%

AIR
1.5 MILLION TONNES
▲ UP 3%

SUPPLY OF RENEWABLE FUEL TO THE UK BY FEEDSTOCK AND FUEL TYPE



FEEDSTOCKS

Any renewable energy source or biological material that can be used directly as an energy source, or converted to a transport fuel or other energy product.

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The linked sources for these figures are listed in Sources, page 46

Image credit: © Matt Webb: AECOM

ROAD FREIGHT MATTERS

The road freight transport industry is fast, reliable and has the added convenience of offering door-to-door haulage. The performance of the road freight transport industry is measured on the tonnage of goods lifted (weight of goods in tonnes) and moved (measure of activity in tonne-kilometres), alongside the value of the industry to the national economy and the number of individuals it employs. In 2019, 1.44 billion tonnes of goods were lifted in the UK[1], an increase of one per cent compared to the previous year.

For some sectors, the road freight transport industry is critical to their business. For example, 98 per cent of food and agriculture products are transported by road[2]. Without road haulage, the UK food industry could not survive because even though ports and rail freight play an important part, goods must be transported those last few miles by road.

Currently, the road freight transport industry is under pressure to operate more efficiently and to reduce GHG emissions in order to help the UK meet a reduction target of 80 per cent by 2050[3]. In 2016, road transport by heavy goods vehicle (HGV) accounted for only around one quarter of global freight activity (in tonne-kilometres) but was responsible for nearly three quarters of freight transport energy use[4]. Pressure to meet emissions reduction targets, coupled with rising customer demand and shrinking margins, is creating a need for innovation around new technologies and cleaner fuels.

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1 assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/898747/domestic-road-freight-statistics-2019.pdf
2 www.dafblog.co.uk/blog/features/world-food-day-top-10-facts/
3 www.bbc.co.uk/news/science-environment-48596775
4 core.ac.uk/download/pdf/157864989.pdf

JARGON BUSTER

AVERAGE LENGTH OF HAUL

Total tonne-kilometres divided by total tonnes lifted.

GROSS VEHICLE WEIGHT

The total weight of the vehicle plus carrying capacity.

POWERED VEHICLES

Comprises rigid vehicles, lorries with semi-trailers (articulated units) and lorries with drawbar trailer (some vehicles under 3.5 tonnes gross vehicle weight are also included).

ROAD SAFETY:
HOW TRAINING AND AWARENESS IS SAVING LIVES

The UK's strategic road network (SRN) has a very good safety record with major incidents involving heavy goods vehicles (HGVs) continuing to decrease. In 2019, the number of fatalities and serious injuries from incidents involving HGVs decreased by two per cent and seven per cent respectively from the previous year[1]. However, figures are still disproportionately high compared to other vehicle types — 23 per cent of vehicles involved with fatal incidents on motorways are HGVs[2], while they make up just 12 per cent of the vehicle miles on the motorway network[3].

ADDRESSING DIESEL SPILLS AND TYRE-RELATED INCIDENTS

Incidents are caused by several different factors. Diesel spills are a major hazard and usually occur by accident or as a result of poor maintenance. Research from Highways England found that 78 per cent of fuel spillages on the SRN were diesel, and 67 per cent came from HGVs over 7.5 tonnes[4]. As diesel is still the most dominant fuel source in the UK's 37 million vehicles[5], these incidents are unlikely to go away.

Tyre issues are also prevalent — 20 per cent of all breakdowns are tyre-related, and 13 per cent are HGVs[6].

A defective tyre can significantly reduce the effectiveness of a vehicle's steering and braking systems, and can deflate suddenly — with dangerous consequences. Tyre manufacturer Continental Tyres suggests that around 30 per cent of tractor units and 40 per cent of trailers are running on tyres that are incorrectly inflated[7]. Furthermore, incorrect load distribution and overloading can cause overheating as well as abnormal wear patterns to develop, which reduce tyre life and can cause catastrophic failure.

As many of these incidents are preventable, organisations are publishing advice and guidelines. In April 2019, Highways England published two documents 'Diesel spillage: Best practice guide' and 'What is the impact and cost of a diesel spillage?' to "improve understanding of the impact and cost of diesel spillages amongst commercial vehicle drivers and fleet operators" and to ultimately reduce the amount of fatalities and serious injuries on the UK's roads. Similarly, many organisations such as Logistics UK and the Fleet Operator Recognition Scheme (FORS) have released tyre management guides for drivers. These are useful documents; however, it is important that they are properly read on a regular basis, and the contents understood, to ensure that drivers fully benefit.

> "INCIDENTS ARE CAUSED BY SEVERAL DIFFERENT FACTORS. DIESEL SPILLS ARE A MAJOR HAZARD AND USUALLY OCCUR BY ACCIDENT OR AS A RESULT OF POOR MAINTENANCE.

Matthew Lott
Senior Consultant,
Freight and Logistics,
AECOM, UK and Ireland

1 assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/833941/ras41001.ods
2 assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/921839/ras20004.ods
3 assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/916291/tra4105.ods
4 s3.eu-west-2.amazonaws.com/assets.highwaysengland.co.uk/specialist-information/knowledge-compendium/2016-17/Highways+England+Incident+Prevention+-+Diesel+Spillages.pdf
5 s3.eu-west-2.amazonaws.com/assets.highwaysengland.co.uk/specialist-information/knowledge-compendium/2016-17/Highways+England+Incident+Prevention+-+Diesel+Spillages.pdf
6 assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/840015/DUKES_2019_MASTER_COPY.pdf
7 s3.eu-west-2.amazonaws.com/assets.highwaysengland.co.uk/specialist-information/knowledge-compendium/2016-17/HGV+Incident+Prevention+Project+-+Interim+Tyres+Report.pdf

> "TO TACKLE EFFECTIVELY THE MANY CAUSES OF ROAD INCIDENTS ON TEH SRN, COMPREHENSIVE AND SPECIALIST ENFORCEMENT IS NEEDED.

8 www.gov.uk/government/consultations/banning-tyres-aged-10-years-and-older

FURTHER MEASURES TO INCREASE ROAD SAFETY

The 2014 introduction of the Driver Certificate of Professional Competence, more commonly known as DCPC, was a significant step in ensuring that HGV drivers comply with road health and safety rules. Every HGV driver wishing to drive professionally must complete additional training on subjects such as health and safety, regulatory rest and driving periods (EU Drivers Hours 2006) and "ECO-safe" driving techniques to obtain the certificate. Many freight operators mandate extensive driver training, both practical and theoretical, including compulsory annual refresher courses.

New legislation also has the potential to increase safety, if implemented in the right way. The Department for Transport (DfT) recently consulted and decided on banning commercial vehicle tyres over 10 years old[8]. The ban will apply to tyres fitted to the front axle of HGVs, buses and coaches, in addition to the tyres on all axles of minibuses when fitted in single configuration. This policy has the potential to increase safety but will in no way solve all problems — drivers will still need to ensure that tyres are kept to a good standard.

Ultimately, to tackle effectively the many causes of road incidents on the SRN, comprehensive and specialist enforcement is needed. This can include checking HGVs maintenance standard and checking the number of hours that drivers have worked. Electronic and other advanced enforcement methods such as Weight in Motion systems, cameras and drug testing kits also have their part to play in helping make the UK's roads safer for all. WL

ROAD FREIGHT – DOMESTIC

GOODS MOVED

154 BILLION
tonne-kilometres
2019

▲ **UP 1%**
(on 2018)

Contribution to UK economy:
£23.4 BILLION GVA (2017)

▽ **DOWN 1%**
(on 2016)

GOODS LIFTED

1.44 BILLION TONNES

▲ **UP 2%**
(on 2018)

Licensed HGVs:
501,500
HGVs were licensed in Great Britain at the end of 2019, of which around 405,400 were taxed as goods vehicles

Employment:
276,000
Individuals in 2018
(up 6 per cent on 2017)

COMMODITIES

In 2019, the five most common divisions (representing 68 per cent of all goods) lifted by GB registered HGVs in the UK were:

18%
261 million tonnes of food products lifted

16%
230 million tonnes of groupage lifted

13%
183 million tonnes of waste-related products lifted

11%
155 million tonnes of metal ore, mining and quarrying goods lifted

10%
143 million tonnes of non-metallic mineral products lifted

DEFINITIONS

Commodity: goods are classified into commodity divisions and grouped by the 'standard goods classification for transport statistics 2007'.

Groupage: when no single commodity makes up up 75% or more of the consignment weight on mixed consignments.

ROAD FREIGHT – INTERNATIONAL

GOODS MOVED (2019)

2.5 BILLION
tonne-kilometres
to the UK

5 BILLION
tonne-kilometres

▽ **DOWN 12%**
(on 2018)

2.5 BILLION
tonne-kilometres
from the UK

GOODS LIFTED

8.2 MILLION TONNES

▽ **DOWN 6%**
(on 2018)

—
The linked sources for these figures are listed in Sources, page 46

Image credit: © Matt Webb, AECOM

RAIL FREIGHT MATTERS

The rail freight industry transports large quantities of goods over long distances, offering an alternative to transport by road.

The performance of the rail freight industry is measured on the tonnage of goods transported. This can be translated to the number of heavy goods vehicle (HGV) kilometres removed thanks to rail freight as a benefit to the freight industry. During 2019 and 2020, the rail freight industry lifted 68.1 million tonnes of goods[1] — a ten per cent increase on the previous year.

There has been a wider decline in the amount of freight moved by rail over the last five years due to the reduced demand for coal at UK power stations[2]. This decline is likely to continue as a result of the coronavirus pandemic.

The UK government is looking at ways of reducing greenhouse gas emissions by championing rail haulage over road freight. Rail freight has a significant role to play in reducing the number of lorries and congestion on the nation's roads — each freight train typically replaces between 43 to 76 HGVs[3].

Recently the UK's rail freight sector has focused on enhancing capacity and improving performance, which has led to freight operators running longer trains, improving efficiency and business productivity, freeing up additional capacity for more freight and passenger trains.

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1 dataportal.orr.gov.uk/media/1738/freight-rail-usage-performance-2019-20-q4.pdf?#:~:text=Annual%202019%2D20,freight%20moved%20in%2023%20years.
2 dataportal.orr.gov.uk/media/1738/freight-rail-usage-performance-2019-20-q4.pdf?#:~:text=Annual%202019%2D20,freight%20moved%20in%2023%20years.
3 www.citytransport.info/Trains01.htm

JARGON BUSTER

ERTMS (EUROPEAN RAILWAY TRAFFIC MANAGEMENT SYSTEM)

A dynamic signalling system which provides in-cab instructions to train drivers, allowing more trains to run on the network with even greater levels of safety and cost efficiencies.

FREIGHT DELAY PER 100 TRAIN KILOMETRES

Normalised measure of delay experienced by freight operating companies. The measure is calculated from the total delay experienced by all GB freight operators divided by their train mileage.

DEPOT

A complex of sidings, buildings, platforms, etc. where transhipment, stabling, servicing, repairs and other such activities are undertaken.

THE MODERN-DAY SILK ROAD:
A NEW CHAPTER FOR INTERCONTINENTAL RAIL FREIGHT

The movement of goods using long-distance rail freight routes is nothing new in many parts of the world. Cross-country freight connections are a staple in countries such as the US, where railroads move over two billion tonnes per year across nearly 140,000 miles of track. They are also important in other large countries such as Australia. Now Europe and Asia are catching up. Over the last decade, intercontinental rail freight transport has developed quickly in a comparatively short space of time, marking a key trend in the sector. New rail freight lines now connect China with European markets and are known colloquially as the 'New Silk Road', in reference to the historic Silk Road overland trade routes that prevailed for centuries.

So, as the freight sector looks to decarbonise, we examine whether these new rail freight corridors will provide a viable alternative to road, sea and air in the future.

THE 'NEW SILK ROAD' RAIL NETWORK

On January 1, 2017 the first freight train to link London with Eastern China pulled into Barking freight depot, amid much fanfare. The train, whose 34 containers were filled with clothes and high street goods, had crossed seven countries on its 7,500-mile journey — the second longest rail freight route in the world. The journey took just 18 days — two weeks faster than it would have done by sea.

That day, London became the 15th European city to benefit from direct rail freight links with China. Known colloquially as the New Silk Road, the new connections are part of China's Belt and Road Initiative, a policy designed to further expand rail and sea trade routes across the globe. While China has been a driving force behind the new Europe/China routes, the expansion has also been supported by European investment and facilitated through the Eurasian Customs Union, which launched in 2011 to allow goods to travel freely between the founding states of Russia, Kazakhstan and Belarus.

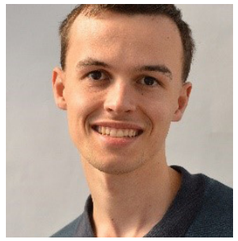
AN INTERCONTINENTAL SUCCESS STORY

Demand for these new services has been strong. In 2018, 6,300 trains made the journey to Europe from China, an increase of 72 per cent on the previous year[1], contributing to an overall bilateral trade volume between Europe and China of almost €600 billion in 2017[2].

Even taking coronavirus into account, services appear to be doing well — 1,033 trains ran between China and Europe during May 2020, a 47 per cent increase on the same month in 2019[3]. A total of 65 routes now operate from China to over 40 European cities[4], and the network continues to grow. As a result of increasing congestion on the primary Trans-Siberian route, different lines between China and Europe are being used such as the 'middle corridor' route, which runs from China via Azerbaijan and Kaliningrad.

6,300

trains made the journey to Europe from China in 2018, an increase of 72 per cent on the previous year.



Adam Bardsley
Consultant,
Freight and Logistics,
AECOM, UK and Ireland

This success is easy to explain. Cheaper than air and quicker than sea, intercontinental rail freight is well-positioned as a middle option — a viable alternative for less time-sensitive and less valuable goods. Container transportation by rail is around a quarter of the cost of air freight (£6,000 by train and £24,000 by plane[5]).

The New Silk Road is by no means a one-way route. European markets are taking advantage of direct links with China, with goods such as Spanish olive oil and whisky from Scotland travelling east. These connections are also seen as a way for the UK to increase its trade outside Europe, especially within the context of uncertainties surrounding the UK's departure from the European Union.

LIMITATIONS TO CROSS-CONTINENTAL RAIL FREIGHT

It's not all plain sailing, however. Freight undertakings of this scale come with challenges — and the China/Europe rail routes are no exception. Varying rail gauges mean bogie exchange is necessary upon entry to Russia and Europe, and containers sometimes need to be lifted onto different wagons to continue their journey.

In addition, the price advantage offered by sea transport means that typically only those goods that justify the additional cost are transported by rail.

Rail freight is limited in terms of geographical reach, so goods usually need to be transported by road for the final few kilometres. Even if lines were extended, there are significant costs involved in building new infrastructure to support rail freight operations.

Rail also uses more carbon than shipping — the Suzhou to Warsaw route uses five tonnes of CO_2, double the 2.1 tonnes used by shipping[6].

A SOLUTION THAT'S ON TRACK

As we have seen, there are limitations to long-distance rail freight but the new routes have certainly proved their worth over the last few years. Even though we can't answer questions about future capacity and capabilities, on balance intercontinental rail routes between Europe and China are well-positioned to take an even greater share of the market, especially when we consider the continuing global shortage of truck drivers.

Furthermore, the demand for air freight is unlikely to go away but the New Silk Road can certainly play its part in providing an environmentally-friendly alternative that still meets market needs. WL

> DEMAND FOR THESE SERVICES HAS BEEN STRONG. IN 2018, 6,300 TRAINS MADE THE JOURNEY TO EUROPE FROM CHINA, AN INCREASE OF 72 PER CENT ON THE PREVIOUS YEAR, CONTRIBUTING TO AN OVERALL BILATERAL TRADE VOLUME OF ALMOST €600 BILLION IN 2017.

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1 www.beltandroad.news/2019/01/05/china-sends-a-record-6300-cargo-trains-to-europe-in-2018/
2 www.uk.dsv.com/services-and-downloads/White-papers-about-the-transport-and-logistics-industry/rail-freight-between-europe-and-china#:~:text=In%202017%2C%20the%20bilateral%20trade,just%20a%20few%20short%20years.
3 www.railjournal.com/freight/china-europe-rail-freight-up-48-in-may/
4 www.railfreight.com/beltandroad/2019/07/11/china-launches-new-container-train-to-belarus/
5 www.uk.dsv.com/services-and-downloads/White-papers-about-the-transport-and-logistics-industry/rail-freight-between-europe-and-china#:~:text=In%202017%2C%20the%20bilateral%20trade,just%20a%20few%20short%20years.
6 freightservices.greencarrier.com/eco-friendly-container-train-solution-between-china-and-europe/

RAIL FREIGHT – DOMESTIC

GOODS LIFTED

68.1 MILLION TONNES 2019–20

DOWN 10% on previous year

£30 BILLION of goods delivered across Britain

91.1% arrived within 15 minutes of scheduled time 2019–20

CO_2 Moving goods by rail rather than road reduces carbon emissions by **76%**

LORRY JOURNEYS AVOIDED

2018–19

7 MILLION Lorry journeys avoided

DOWN 3% on previous year

1.6 BILLION Fewer HGV kilometers

£0.4 BILLION GVA
Conribution to the UK economy in 2017

33.2 MILLION
freight train kilometres in 2019–20

DOWN 1% on previous year

6.77 BILLION domestic intermodal
Net tonne-kilometers 2019–20

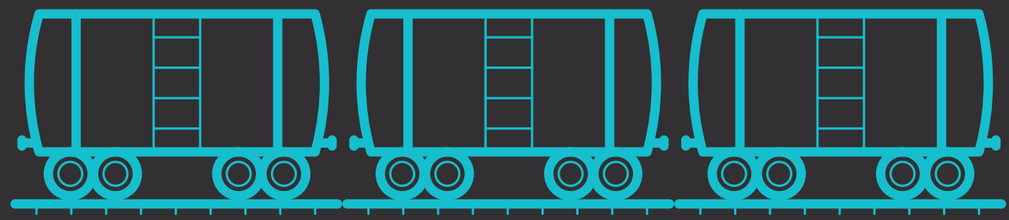
COAL
Over the last five years, freight moved by rail has declined as a result of the reduced demand for coal at UK power stations

RAIL – INTERNATIONAL

1.3 MILLION TONNES
rail freight through the Channel Tunnel 2018

0.49 BILLION NET TONNE-KILOMETRES OF INTERNATIONAL FREIGHT MOVED

2019–20



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The linked sources for these figures are listed in Sources, page 46

Image credit: © jcomp, freepik.com

WATER FREIGHT MATTERS

The shipping industry in the UK encompasses the inland waterway network through to the megaships delivering thousands of containers to major ports around the country. As an island nation, shipping has always been hugely important to the UK, having played a key role in the country's early industrialisation.

The performance of water freight is determined by a number of metrics: the tonnage of goods moved; the major exporter and importer countries to and from the UK; the value of the industry to the national economy; and the number of individuals it employs. In 2019, the international tonnage handled by UK's major ports totalled 383 million tonnes[1].

The UK is heavily reliant on the shipping industry — currently 95 per cent of the UK's tangible international trade is moved by sea[2]. Over the past decade, the industry has been shifting towards container shipping and away from liquid-bulk and dry-bulk products that have long been the staple heavy products shipped on large vessels.

For goods moved within the UK by water, the River Thames is the busiest inland waterway in the UK, carrying 53 per cent of all goods lifted on the UK's inland waterway network[3]. There is scope for more domestic freight to be moved by inland waterways with effective government support needed to promote modal shift, and policy frameworks that protect and expand inland waterway infrastructure. An increased uptake in moving domestic freight by water could reduce pressure on congested roads and improve the country's environmental footprint as freight moved by water produces less CO_2 than road, rail and air[4].

1 assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/908558/port-freight-statistics-2019.pdf
2 assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/908558/port-freight-statistics-2019.pdf
3 assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/908558/port-freight-statistics-2019.pdf
4 www.itf-oecd.org/sites/default/files/docs/cop-pdf-06.pdf

JARGON BUSTER

INLAND WATERS TRAFFIC

Movement of freight on a ship or barge along inland waterways such as rivers or canals. Also includes coastwise or one-port traffic handled by a port.

COASTWISE TRAFFIC

Traffic carried around the coast from one UK port to another, including domestic ferry services.

SHORT SEA

Maritime traffic that moves cargo along a coast without having to cross an ocean. This consists of European Union (EU) and 'Other Europe and Mediterranean' (Extra-EU) countries.

PORTS AND SEA FREIGHT:
RESHAPING DISTRIBUTION MODELS TO FIGHT CLIMATE CHANGE

The UK's supply chains are heavily reliant on road freight. At the same time however, the UK has set ambitious greenhouse gas emissions reduction targets that require a rethink of current distribution models. In this article, we examine the need for change and the greater role that ports and sea freight could play in helping the UK's supply chains reduce their carbon emissions.

SUPPLY CHAINS IN THE UK

While supply chains in the UK started primarily as domestic distribution networks, they have now evolved into global supply chains that offer shippers competitive unit costs, just-in-time delivery, constant availability and minimal inventory. The UK's supply chain model — which includes the location of warehouses, distribution of freight among its ports, and modes of inland distribution — has been built around these objectives and now comprises a mixture of distribution facilities, primarily in the 'Golden Triangle' in the Midlands[1], and port-centric distribution facilities.

Almost without exception consumer goods brought into the UK or transported between the UK and Ireland are shipped as unitised cargo, i.e. in containers or trailers. The great majority travel by road. Some imports from continental Europe cover significant distances by road as shippers find this option more attractive even where lower cost alternatives (by rail or sea) are available. 54 per cent of unitised freight imported to the UK comes in trucks, a proportion that has remained constant for over a decade but increased 29 per cent in absolute terms over the same period[2].

While this distribution model has functioned well over the last 20–30 years, there are questions about its long-term sustainability, particularly in relation to the UK government's ambitious target to reduce greenhouse gas emissions to net zero by 2050. Today's trucks remain almost entirely reliant on fossil fuels and, as consumer attitudes on environmental issues are shifting, retailers' sourcing and supply chain methods now attract greater scrutiny. In addition, the pool of human labour willing to drive HGVs is steadily shrinking[3].

WAYS TO RE-SHAPE TRANSPORT AND DISTRIBUTION MODELS

Sustainable supply chains need to offer lower emissions per tonne-kilometre to reduce their impact on the planet. Sea freight and rail offer the lowest emissions by this measure[4] and can substitute for trucks on many long point-to-point movements. Pressure to reduce supply chain emissions could re-shape transport and distribution models in two different ways:

SOLUTION A:

A more distributed model with shorter inland transport links. In this scenario, a greater number of regional ports would be used for imports, each serving modest hinterlands. Medium-sized ports, particularly those close to centres of population, would play a greater role. While this scenario represents an opportunity for medium-sized ports, a critical mass of imports would be needed to make direct (or even feeder) services from other ports viable.

Steve Roberts
Associate Director,
Ports & Marine,
AECOM, UK and Ireland

> DISTRIBUTION MODELS HAVE FUNCTIONED WELL OVER THE PAST 20-30 YEARS, BUT THERE ARE QUESTIONS ABOUT THEIR LONG-TERM SUSTAINABILITY. TODAY'S TRUCKS REMAIN ALMOST ENTIRELY RELIANT ON FOSSIL FUELS AND CONSUMER ATTITUDES ON ENVIRONMENTAL ISSUES ARE SHIFTING SO SUPPLY CHAIN METHODS ATTRACT GREATER SCRUTINY.

SOLUTION B:

Large hubs linked by low-emission corridors. Larger ports — which would still be serving distant centres of population — would have to find ways to reduce emissions from the inland transport leg of their throughput, as well as offering low emission container handling.

However, reducing emissions from inland transport legs isn't easily done. Rail offers the shortest transit time and lowest emissions of all the truck alternatives, but new rail facilities take a long time to develop and there are capacity constraints on the rail network.

Inland waterways offer an easier-to-implement alternative, however the UK's four most significant ports for unitised cargo imports — Dover, London, Felixstowe and Southampton, which together account for 51 per cent of the national total — are not located on or near rivers or canals that can offer high-volume cargo transport far inland.

Therefore, developing low-emissions corridors using either low or zero-emission trucks, truck convoys or road-trains between these ports and major centres of population could be a more pragmatic approach, one that has the potential for conversion to driverless operation or transfer to rail in the long-term.

A COMBINED APPROACH

In truth, it is likely that both trends will emerge but to varying degrees depending on local circumstances. A more distributed model with shorter inland transport links may be easier to implement and offer a shorter development timescale than setting up low-emission corridors, but this model may not be able to match the low unit costs that established import hubs would be able to offer.

In terms of the best way forward, the combination of lower emissions and low unit cost will be key as logistics operators will be influenced by both when proposing supply chain solutions to clients. WL

> DEVELOPING LOW EMISSIONS CORRIDORS USING EITHER LOW OR ZERO-EMISSION TRUCKS, TRUCK CONVOYS OR ROAD-TRAINS BETWEEN THE UK'S MAIN PORTS AND THE MAJOR CENTRES OF POPULATION WOULD BE A MORE PRAGMATIC APPROACH... THE COMBINATION OF LOWER EMISSIONS AND LOW UNIT COST WILL BE KEY.

1 The 'golden triangle' encompasses parts of the West and East Midlands, from the triangle approximately 85% of the UK's population can be reached within four and a half hour's drive
2 AECOM analysis of UK Department of Transport statistics
3 There is a reported shortage of 59,000 drivers in the UK according to the Freight Transport Association (FTA, HGV driver shortage climbs to 59,000, 14 October 2019. https://fta.co.uk/media/press-releases/2019/october-2019/hgv-driver-shortage-climbs-to-59-000), and across Europe a shortage of 150,000 drivers (British International Freight Associations, Truck Driver Shortage Crisis Now Spreading Across The Whole Of Europe, December 2018. https://www.bifa.org/news/articles/2018/dec/truck-driver-shortage-crisis-now-spreading-across-the-whole-of-europe)
4 Coastal shipping and inland waterways emit approximately 30 grams of CO_2 per tonne-km, rail 15 grams. Source: CO_2 Emissions from Freight Transport: An Analysis of UK Data, Alan McKinnon Logistics Research Centre, Heriot-Watt University. http://www.greenlogistics.org/SiteResources/d82cc048-4b92-4c2a-a014-af1eea7d76d0_CO_2%20Emissions%20from%20Freight%20Transport%20-%20An%20Analysis%20of%20UK%20Data.pdf

WATER FREIGHT – DOMESTIC

2019

£3.9 BILLION GVA (2017)
contribution to the UK economy

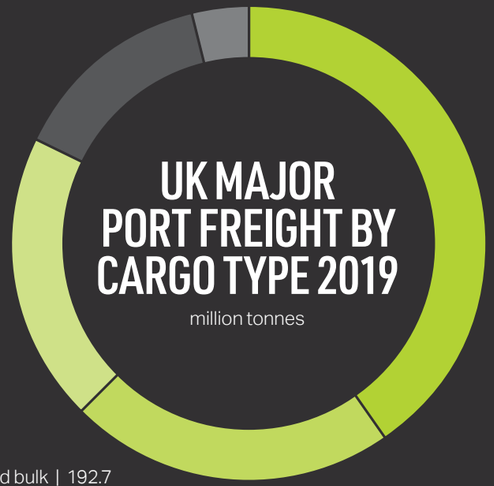
475.4 MILLION TONNES
handled by major UK ports in 2019

167.7 MILLION TONNES
Exports

307.7 MILLION TONNES
Imports

UK MAJOR PORT FREIGHT BY CARGO TYPE 2019

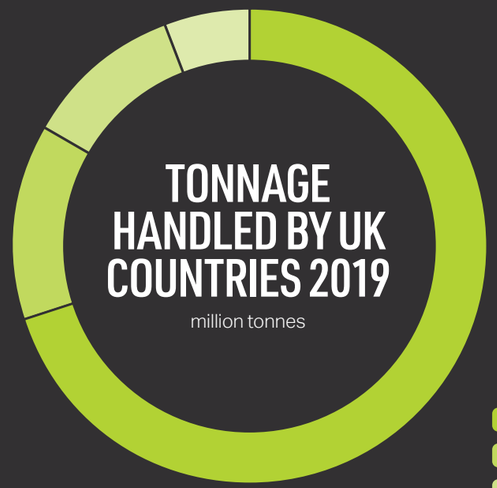
million tonnes



- Liquid bulk | 192.7
- Ro-Ro | 104.9
- Dry bulk | 93.5
- Lo-Lo | 67
- Other cargo | 17.2

TONNAGE HANDLED BY UK COUNTRIES 2019

million tonnes



- England | 332.9
- Scotland | 63.2
- Wales | 52.2
- Northern Ireland | 27

185,700
directly employed

486.1 MILLION TONNES
handled by all UK ports in 2019

WATER FREIGHT – INTERNATIONAL

2019

196.9 MILLION TONNES
accounting for major port traffic from EU trade with UK

TOP 5 IMPORT AND EXPORT DESTINATIONS BY PERCENTAGE SHARE

- Netherlands | 21%
- France | 10%
- Belgium | 9%
- China | 9%
- Irish Republic | 8%
- Rest of World | 43%

EXPORTS
72.8 million tonnes

- Netherlands | 13%
- Norway | 10%
- USA | 10%
- France | 7%
- Belgium | 6%
- Rest of World | 54%

IMPORTS
119.1 million tonnes

Tonnage carried on domestic routes made up 19 per cent of all traffic handled by UK major ports in 2019, totalling

92 MILLION TONNES

121.6 MILLION TONNES
deep sea international freight traffic 2019

UP 7%
on 2018

The linked sources for these figures are listed in Sources, page 46

Image credit: © jcomp, freepix.com

AIR FREIGHT MATTERS

The air freight industry is predominately used to transport small high-value goods. The performance of the air freight industry is measured by volume of goods handled at UK airports and the value of these goods. In 2019, UK airports that received commercial air traffic handled 2.54 million tonnes of freight[1].

In the UK, international air freight is dominated by three London airports (Heathrow, Gatwick and Stansted) equating to 76-80 per cent of all international goods imported by air[2]. In comparison, the movement of domestic goods is dominated by East Midlands International airport in Leicestershire, which leads the way in terms of total volumes lifted.

One notable feature of the UK air freight market is the huge importance of Heathrow and its surrounding freight facilities — most forwarders have major consolidation centres in the vicinity of the airport. Significant volumes of air freight are trucked to the facilities near Heathrow, processed and then trucked to another airport, either in the UK or in continental Europe, without ever flying in or out of Heathrow itself.

The key factor holding back other UK airports is the quality of infrastructure. Freight facilities at UK airports outside of Heathrow are often outdated and simply unable to cope with the widebody airplanes widely used by today's air freight operators.

1 www.caa.co.uk/uploadedFiles/CAA/Content/Standard_Content/Data_and_analysis/Datasets/Airport_stats/Airport_data_2019_annual/Table_14_International_and_Domestic_Freight.pdf

2 airlinesuk.org/wp-content/uploads/2018/10/Assessment-of-the-value-of-air-freight-services-to-the-UK-economy-Final-Report-v22-Oct-2018-b-SENT.pdf

JARGON BUSTER

AIR WAYBILL

A 'ticket' for air freight, this is a legal document that accompanies the freight and demonstrates evidence of the contract of carriage.

INTEGRATOR

An airline that operates door-to-door, comprising all elements of the logistical operation of moving freight e.g. FedEx, UPS.

INTERNATIONAL CIVIL AVIATION ORGANISATION (ICAO)

A specialised agency of the United Nations that governs the principles of air navigation and the development of air transport.

TURBULENT TIMES:
AVIATION'S RESPONSE TO GLOBAL CHALLENGES

Air transport provides a service that other modes cannot provide: the ability to deliver goods to the other side of the world in a matter of hours. It plays an important role in delivering high value goods to market such as pharmaceuticals, fashion items and new technology products. However, these are turbulent times for aviation. In this article we discuss some of global and national issues that have affected the sector over the last twelve months, and the impacts on air cargo.

ABOUT AIR FREIGHT

Goods transported by air freight travel in several ways:

- In the belly hold on passenger services.
- On dedicated freight aircraft. For example, the use of dedicated freight aircraft was necessary to handle the large volumes of Apple iPhones needed on the product's launch day.
- Consignments are usually then transported from the airport by road to their end destination if it is economical to do so. Or, they are transported by road to another European airport — such as Amsterdam, Frankfurt and Paris, where there may be better connectivity to different parts of the world — under what's known as an air waybill.

THE IMPACT OF CORONAVIRUS

Few industries have been affected as significantly as aviation by the global coronavirus pandemic, as governments moved to halt non-essential travel and implemented national lockdowns. This led to a drastic reduction in air travel — a 97 per cent decrease in passenger flights compared to the previous year, with estimates that the industry in the UK could lose over £20 billion in revenue in 2020[1].

The reduction in passenger services and the global economic downturn has meant that daily international cargo capacity has been impacted considerably. Industry-wide cargo tonne-kilometres (CTKs) have decreased by 14.5 per cent in the January-June period compared to 2019[2], and whilst air cargo volumes have recovered slightly since the "demand trough" in March, there has been slow growth as buyers switch to cheaper means of transport, such as rail and shipping.

However, there have been one or two positive outcomes for the air freight industry. The International Air Transport Association (IATA) expects cargo revenues to grow by eight per cent in 2020[3], as dedicated freighter airlines step in to bridge the supply gap caused by the fall in passenger traffic. Industry-wide load factors are close to record high levels, leading to a sharp rise in air freight rates as demand for PPE and masks peaked. These increased yields have led some passenger airlines to utilise their aircraft for cargo, either by filling empty seats or undertaking retrofits to remove passenger equipment and maximise space for freight.

> "THE BENEFITS TO ECONOMIC GROWTH FROM AVIATION CANNOT BE UNDERSTATED."

Kieran Knowles
Consultant,
Freight and Logistics,
AECOM, UK and Ireland

ENVIRONMENTAL CONSIDERATIONS

The benefits to economic growth from aviation cannot be understated. However, an increased consumer awareness of the industry's environmental impact (particularly during the "clear skies" of the lockdown period), combined with increasingly strict regulation regarding emissions, has meant that the industry is being forced to take difficult decisions on carbon reduction and to seek more sustainable solutions.

Whilst technological advances have reduced the carbon output of some aviation operations, the continuous growth of e-commerce and demand for next-day delivery is making it challenging for airlines to meet targets set by the ICAO and national governments.

1 committees.parliament.uk/publications/1452/documents/13275/default/
2 www.iata.org/en/iata-repository/publications/economic-reports/air-freight-monthly-analysis-june-202022/
3 centreforaviation.com/analysis/reports/air-cargo-revenue-to-grow-in-2020-as-total-airline-revenue-halves-528170

Image credit: © Iain Knox @photoknoxy

Frameworks exist to help. The introduction of carbon mitigation schemes, such as the European Union's Emission Trading Scheme, has placed a price on the production of carbon emissions from aviation within the European Economic Area (EEA). In addition, IATA's Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) provides a basis for carbon neutral growth by encouraging airlines to invest in carbon offset schemes and alternative fuels.

There is an expectation within the aviation industry that the transition to the next generation of 'greener' aircraft, such as the Boeing 787 Dreamliner and Airbus A350 XWB, as well as series updates of established models such as the Boeing 777X, will see reductions in fuel consumption due to the combined use of lighter composite materials, more efficient engines and design modifications to the airframe. While these changes will reduce the environmental impact of freight carried within the holds of passenger aircraft, the majority of dedicated air freight operators use older aircraft such as the Boeing 747-400F, which produce a greater amount of emissions and noise.

A major barrier for competition in the UK air freight industry is the limitations that noise restrictions place on operations, especially in the express parcels market which facilitates next-day delivery by retailers. However, it is unlikely that the government will compromise on these restrictions due to the concerns of residents and the impact on their health. Therefore, investment in 'greener' aircraft is key to achieving sustainable growth.

POLITICS AND AIRPORT EXPANSION

Aviation policy in the UK has been dominated in recent decades by the capacity issues at airports in the South East of England. London Heathrow and London Gatwick are among the top ten busiest airports in Europe, with both airports having extremely high capacity utilisation and therefore limited capability for future growth.

One of the primary reasons behind the 2015 Airport Commission's decision to approve the construction of a third runway at London Heathrow, was to ensure its dominance as one of Europe's major hubs, as it serves the vast majority of intercontinental traffic to and from the UK and retains strong brand strength with passengers and airlines. This access to a wide variety of routes to non-EU destinations, and the opening up of more markets following expansion would have provided the UK with greater market access to developing economies. This would have been important for growing trade relationships with other nations following the UK's departure from the European Union.

However, the Committee on Climate Change[4] stepped in and stated that the plans for London Heathrow's expansion breached the Government's climate change laws, because the increased activity would push aviation emissions up by 15 per cent (above 2005 levels) by 2050. This assertion was supported by a Court of Appeal ruling in February 2020, which ruled that the Government's policy in favour of a third runway at Heathrow was produced unlawfully, as it failed to account for the UK's commitments to the Paris Agreement, an international agreement which aims to limit global temperature rise to 1.5C.

Following this ruling, it is uncertain what next steps the Government will take to boost airport capacity in the South East of England, particularly given the slowdown in aviation activity caused by coronavirus. The air freight sector eagerly awaits the Department for Transport's Aviation White Paper which will set out how future economic growth within the industry will be balanced with the environmental, political and social factors at play. Certainly, there will be difficult decisions ahead for policy makers to balance the post-pandemic need for economic growth against long term sustainability. WL

> "WHILST TECHNOLOGICAL ADVANCES HAVE REDUCED THE CARBON OUTPUT OF SOME AVIATION OPERATIONS, THE CONTINUOUS GROWTH OF E-COMMERCE AND DEMAND FOR NEXT-DAY DELIVERY IS MAKING IT CHALLENGING FOR AIRLINES TO MEET TARGETS SET BY THE ICAO AND NATIONAL GOVERNMENTS."

4 www.theccc.org.uk/publication/letter-department-for-transports-assessment-of-the-case-for-a-third-runway-at-heathrow/

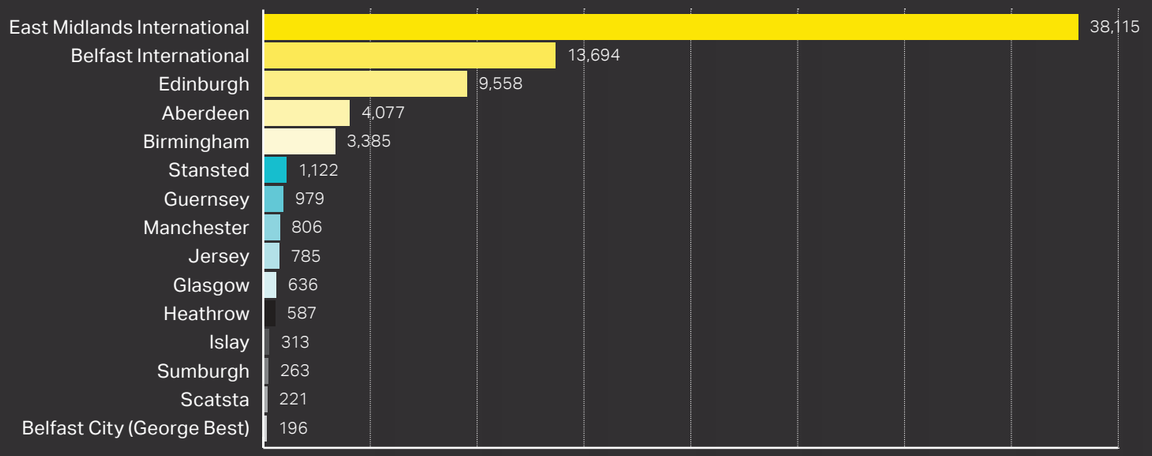
AIR FREIGHT – DOMESTIC

£0.19 BILLION GVA (2017)
contribution to the UK economy

75,901 TONNES
domestic air freight handled by UK 2019

2.54 MILLION TONNES
freight handled 2019
DOWN 3%
on 2018

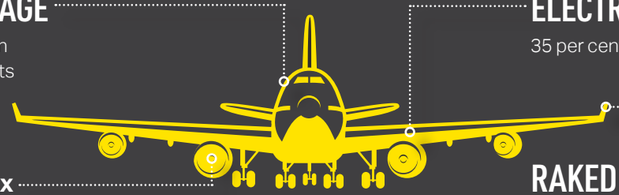
THE TOP 15 UK AIRPORTS FOR DOMESTIC GOODS HANDLED 2019



NEXT GENERATION IMPROVEMENTS

COMPOSITE FUSELAGE
20 per cent weight reduction compared to equivalent parts

ELECTRICAL ACTUATORS
35 per cent power draw from engines

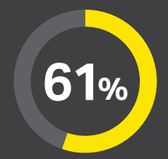


ENGINES: CF6>GEnx
15 per cent improvement in fuel efficiency

RAKED WINGTIPS
5.5 per cent drag reduction

AIR FREIGHT – INTERNATIONAL

AIR FREIGHT HANDLED 2019



HEATHROW
handled the most with 61 per cent

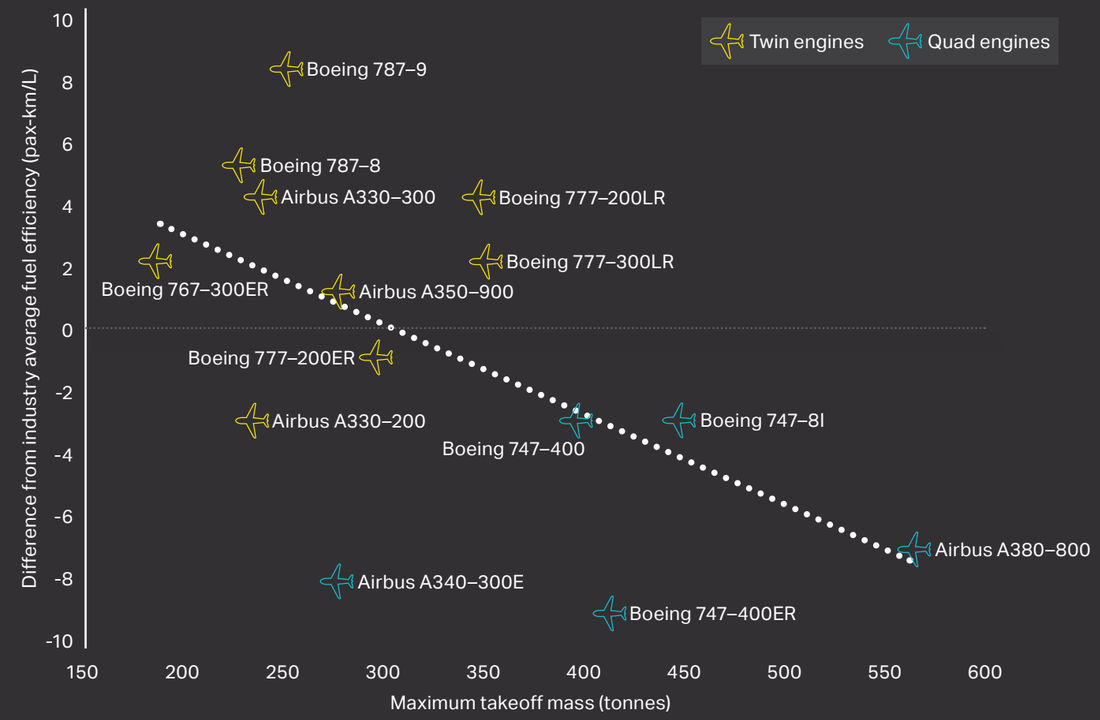
EAST MIDLANDS
followed with 14 per cent

Of all air freight at UK airports over the last decade, Heathrow and East Midlands airports have consistently handled over **70%**

UK AIR FREIGHT TONNES 2019

* Change from 2018

AVERAGE FUEL EFFICIENCIES OF INDIVIDUAL AIRCRAFT WHEN HOLDING MAXIMUM CARGO WEIGHT



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The linked sources for these figures are listed in Sources, page 46

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WATER FREIGHT | DOMESTIC | PAGE 38

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AIR FREIGHT | INTERNATIONAL | PAGE 44 & 45

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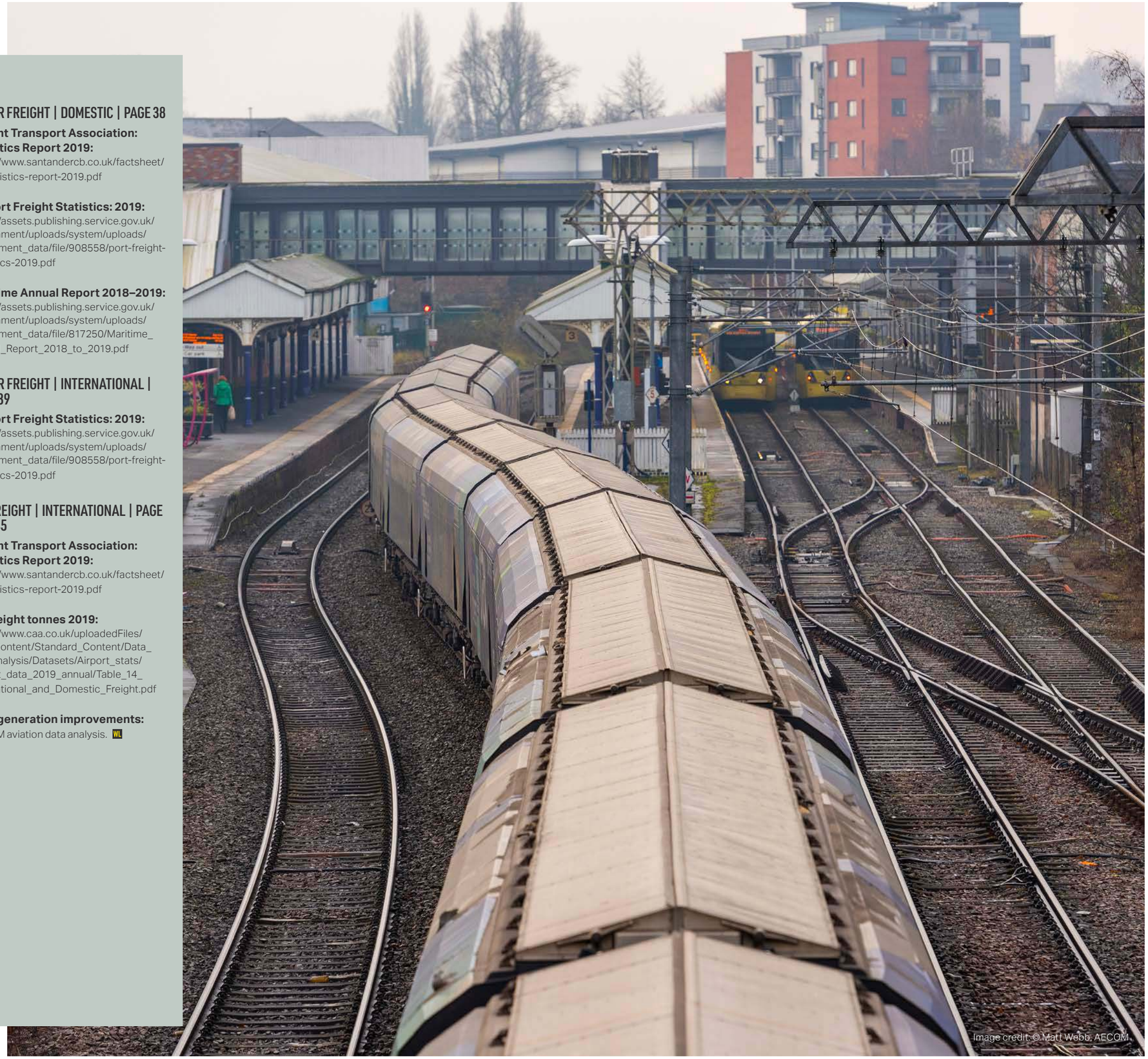
Next generation improvements:
AECOM aviation data analysis. WL



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AECOM FREIGHT AND LOGISTICS

AECOM is a global network of experts working with clients, communities and colleagues to develop and implement innovative solutions to the world's most complex challenges. As a specialist offer within AECOM's overall service portfolio, the Freight and Logistics team provides specific expertise across all aspects of freight transport. We work for a wide range of public and private sector clients, offering balanced and tailored solutions to local, regional, national and international issues. Our people are our greatest asset, combining industry-leading knowledge and experience in transport, logistics and economics to help our clients succeed.

Understanding the bigger picture, we can offer informed solutions to help tackle the industry's biggest challenges, as well as enable clients to leverage future opportunities. Our work extends across road, rail, air and water modes, with specific emphasis on measures that drive social value, economic growth and environmental sustainability. We provide robust and cutting-edge advice on freight activity, current and future transport trends, the important determinants of freight demand, evidence-based policy making and technological advances. WL

> **WE PROVIDE ROBUST AND CUTTING-EDGE ADVICE ON FREIGHT ACTIVITY, CURRENT AND FUTURE TRANSPORT TRENDS, THE IMPORTANT DETERMINANTS OF FREIGHT DEMAND, EVIDENCE-BASED POLICY MAKING AND TECHNOLOGICAL ADVANCES.**

OUR CORE OFFER INCLUDES:

- Freight and logistics research
- Freight and logistics master planning
- Freight demand forecasting for road, rail and water
- Supporting transportation by non-road modes
- Freight and logistics infrastructure feasibility and design
- Truck parking solutions
- Freight safety, quality and efficiency programmes
- Effective planning for safe and efficient deliveries to sites, premises and developments
- Carbon emission reduction

WITHOUT LIMITS

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