Express Freight Market Analysis



Delivering London's Future Together



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Glossary

0.1

B2B	Business-to-Business
B2C	Business to Customer
BEV	Battery Electric Vehicle
BID	Business Improvement District
CAGR	Compound Annual Growth Rate
CAPEX	Capital Expenditure
CEP	Courier, Express and Parcel
CRP	Cross River Partnership
EBIT	Earnings Before Interest and Tax
FTL	Full Truck Load
FOC	Rail Freight Operating Companies
HGV	Heavy Goods Vehicle
ICE	Internal Combustion Engine
LGV	Large Goods Vehicle
LTL	Less Than (truck) Load
OPEX	Operational Expenditure
ROSCOs	Rolling Stock Leasing Companies



0.2

Executive Summary

A critical first step towards producing a strategic case for developing an express Rail Freight proposition to serve Central London is understanding the market this solution wishes to serve.

By 2030, the Courier, Express and Parcel (CEP) market could be delivering upwards of 7.6 billion parcels per annum if the market grows at an expected growth rate of 7% per annum between 2023 and 2030. In order to meet this growth, CEP sector players will need to find innovative, cost-effective and sustainable ways of meeting this growth whilst achieving carbon reduction objectives.

Evolving trends in the industry, such as changing market demands for same day delivery is causing businesses to innovate and seek new solutions, with over 60% of domestic parcels handled in the UK requiring next day delivery. Overnight rail freight solutions could be a key consideration in ensuring the rapid, reliable delivery of parcels to users.

Despite economic headwinds in the UK, most businesses across the CEP market are experiencing increasing volumes by remaining agile and responsive to market needs. DHL and UPS have more than doubled their CAPEX spend since 2016, with 40% of this on growth initiatives. This indicates appetite by the market to seek new solutions. A rail-based operation such as Midlands-London Waterloo could act as a blueprint for the reengineering of supply chains in pursuit of sustainability and more efficient logistics models to serve densely populated conurbations, which is a growing trend as a result of urbanisation.

Wider trends in the CEP industry, such as increased collaboration between large and small players, and a last-mile revolution in how businesses deliver parcels to end-users, all support increasing adoption of rail freight into city centers, without needing to significantly alter the ways they currently do business. It could signal that the inclusion of rail operations can be done in a way that does not degrade the overall service level commitments currently made available to customers.

Our case-study led analysis illustrates how rail freight solutions can integrate into existing roadbased hub and spoke models, which if adopted by the industry could reduce the reliance on the strategic road network between the Midlands and London, thus reducing emissions.

Rail based logistics solutions have the potential to address key challenges within the CEP sector, such as how to cater to market growth whilst also achieving emissions reductions associated with hard to decarbonise long distance road operations, as found within their linehaul and feeder networks. Even under the most optimistic trajectories, the technological uncertainty and scale of innovation required means it will take several years to fully decarbonise the HGV fleet and at significant cost. However, electricity from renewable sources direct from the grid is readily available to utilise from existing rail infrastructure (such as the high-speed West and East coast mainlines).

The proposed rail-served hub at London Waterloo has the potential to demonstrate and evidence clear benefits to a multitude of stakeholders, such as CEP operators, residents, local boroughs, the environment, the rail sector, businesses and the wider economy.

For the CEP sector, key trends such as the projected growth in volumes, the drive to achieve sustainability in logistics, and wider alignment with public policy demonstrate this initiative is deserving of continued support, further exploration and future investment from interested funders. It is recommended that this initiative is pursued further with road fed trials by logistics operators, and, subject to funding, rail fed solutions should be tested and trialled with a view to commercialisation.



1 - Introduction and Context

Introduction and Context

This market assessment report is a critical first step towards producing a strategic case for developing an express Rail Freight proposition to serve Central London.

The aim of this assessment is to make a compelling case to stakeholders to raise awareness of the opportunities created through a rail fed urban logistics operation underneath Waterloo, and to support discussions between funders, potential end users, infrastructure providers, operators and advisors.

To understand the value proposition from a new express rail freight product, it is necessary to first outline how existing express road and air freight models work, and the market dynamics which currently underpin the sector.

The report will focus on the Courier, express, and parcel (CEP) markets, which concentrate on the delivery of non-palletized parcels which are consolidated into larger volumes for transport, before being delivered to multiple end customers. We will focus on the Businessto-Business (B2B) and Business-to-Customer (B2C) market flows, and consider how increasing e-commerce activity and other trends are impacting the CEP sector. This analysis follows on from Steer's rail freight study 'On track for sustainable logistics -Integrating Rail Freight into London's deliveries', produced in collaboration with Cross River Partnership and Impact on Urban Health¹. The study explored how rail freight solutions can support CRP's objectives of reducing roadfreight emissions and achieving better air quality for residents of London. The study identified significant unoccupied floor space under Waterloo railway station which could be repurposed for Freight and Logistics Activity.

This assessment has been conducted parallel to other workstreams, which include undertaking an assessment of the space at Waterloo station and how CEP companies may use this space available, and developing a tool to help quantify the benefits of switching to rail freight and delivering a hub at Waterloo.

This report focuses on the express freight market and the commercial drivers underpinning it. The report has also taken insights from primary engagement with the CEP industry on how they would integrate rail and an urban logistics hub at Waterloo into their existing network. The rest of this report is structured is as follows:

- Section 2 will:
 - Provide an overview of the Courier, Express and Parcel (CEP) freight and logistics market, the market players, their primary business models and key interaction between industry actors, and;
 - Present the recent and forecast growth in this market, identifying the drivers behind this growth from both a demand and supply lens.
- Section 3 will:
 - Investigate the existing and future role of rail freight being adopted by the Courier, Express and Parcel (CEP) freight and logistics market,
 - Develop a case study example of how the CEP market can adopt rail freight solutions to complement and replace existing operations, and project the forecast growth in how rail freight can serve the CEP market in London.

1 - https://crossriverpartnership.org/wp-content/uploads/2023/03/On-track-for-sustainable-logistics-Integrating-Rail-Freight-into-Londons-deliveries-Full-Report.pdf



2 - Courier, Express and Parcel (CEP) Market Analysis

Market Overview

2.0

The Courier, Express and Parcel (CEP) Market is a developed and mature market in the UK, comprising of large and smaller players who have developed efficient, reliable, interconnected transport networks geared towards the expedited delivery of large and small packages, parcels, and documents to businesses and individuals across the country and internationally.

The industry has continued to evolve over the past several decades to cater to increasing demands of fast-paced global trade and improve efficiencies. This has given rise to the UK market being dominated by a few global providers.

These companies operate extensive road and air operations, connecting a comprehensive network of sorting hubs and depots; with smaller LGV vehicles deployed to fulfil the majority of last-mile deliveries to the end consumer or business.

The market is served by smaller players who compete with or partner with key players. In some cases, niche service offerings focusing on specific business sectors (such as time critical medical supplies) have emerged within specific geographies where it is economical to sustain such business models. With the rise of e-commerce and the increasing demand for online shopping, the Courier, Express and Parcel sector has experienced significant growth in recent years, adapting to the changing needs of customers and embracing innovative technologies to enhance delivery speed and convenience. Consumer habits have shifted from next day delivery expectations to same day delivery within some market sectors such as fast fashion or highvalue consumer products such as mobile phones.

The rest of this section will outline:

- The key current and future players in the CEP market, how these businesses are structured and operate, the types of parcels they move and where they are located;
- The historic and forecast the potential growth in the CEP market;
- The market drivers behind this growth, the opportunities and risks which may support or hinder new express rail freight market development, and the appetite for major players in serving the London Market via rail freight.

Throughout this section, we will also identify key considerations for how and why the CEP industry could accommodate rail freight solutions to respond to market needs, improve capacity and be more efficient.





Players in the CEP market

The CEP market is a collection of primarily road and air-based transportation services that move goods to time, or day-defined delivery schedules through a hub and spoke logistics network.

The CEP market is concentrated with several global players such as DPD, UPS, DHL, FedEx, Royal Mail, Evri and Amazon. Royal Mail holds the biggest market share (28%)¹.

There are a multitude of smaller players who compete against or partner with global players, focusing on niche sub-sectors such as time critical medical supplies, or same day courier solutions across central London.

The freight and logistics services offered by these companies encompass direct point-to-point Full Truck Load services (FTL). where one vehicle moves goods for one shipper, from one point to another, and Less Than (truck) Load consolidation services (LTL), where many small shipments from different shippers are transported on one truck.

The largest players are very established in the market, having operated for several decades with large scale sortation warehouses and infrastructure primarily based around the strategic road network. They have geared their networks so that HGVs (and aircraft, for express freight) operate their 'Middle Mile', or 'linehaul' services, which move goods around distribution hubs, warehouses and international gateways.

Sortation and linehaul activities within the CEP market are generally undertaken overnight (20:00-05:00), whereas final mile servicing operates during the day (05:00-20:00) and is targeted at operational business hours.

The next page highlights the historic and forecast growth of the CEP sector, and the demand drivers influencing the sector.



This gives impetus for rail freight solutions and a Waterloo freight hub to be designed to serve several larger and smaller players in the market to agglomerate the demands for rail freight, optimize resources, lower costs per unit and maximise efficiencies from economies of scale for last-mile delivery.

^{1 -} Market share of the leading courier service providers in the United Kingdom by volume in 2021, GBRTT Express Freight Commodity Study



Figure 2.1: Largest players in CEP market¹

The CEP Industry is often required to transport parcels overnight across the length of the country to meet demands for next day delivery. A rail solution could enable CEP businesses to more efficiently deliver longer-distance movements.



Figure 2.2: Types of mail and parcels moved in the UK in 2020/2021²

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Express Rail Freight Market Analysis



Market Drivers influencing growth

Over 14 million parcels were delivered every day in the UK in 2021, which equates to over 4.1 billion parcels per annum⁴.

The CEP market has grown at a compound annual growth rate (CAGR) of over 10% since 2014². Between 2019 and 2020, the market grew by over 35% due to COVID-19 and rapid reliance on home delivery⁴.

The CEP market is forecast to continue growing at a compound annual growth rate (CAGR) of over 7% to 2030, as revealed in a market study by Mordor Intelligence⁵. Figure 2.2 presents the historic and forecast growth with plausible scenarios of 6.4%, 7.6% and 9% annual growth up to 2030.

The next slides outline the strategic drivers which have influenced this recent growth, and how these may influence future trends for the sector, including the impacts of ecommerce adoption, economic headwinds, greater deployment of technology, improved customer offers and the desire for sustainable deliveries.



By 2030, the CEP market could be delivering upwards of 7.6 billion parcels per annum if the market grows at an expected growth rate of 7% per annum (CAGR). In order to meet this growth, CEP sector players will need to find innovative, cost-effective and sustainable ways of meeting this growth whilst meeting carbon reduction objectives. High-volume, sustainable transport solutions such as rail freight and efficient transfer points will be needed in the medium term.

4 - Courier, express and parcel (CEP) market volume in the UK (Statista, 2014-2021)

5 - UK CEP Market Size & Share Analysis (Mordor Intelligence, 2023)



Market Drivers influencing growth in Figure 2.5: Historical and forecast future growth in the number of parcels per annum delivered in London (2014-2030) London

Around 450 million parcels were delivered in London in 2021⁶, according to a study by the Centre for London. This means London accounts for over 10% of parcels handled by the UK CEP market.

2.0

The recent growth trend mirrors the rest of the UK, with deliveries increasing by 35%⁶ since the pandemic. This has resulted in 15,000 more delivery vehicles are now on London's road network, adding to the existing congestion and reducing the efficiency of deliveries in the capital.

The future growth in London is projected to be faster than the rest of the UK, with the number of parcels delivered in London is set to more than double to over 1 billion parcels per annum by 2030.

This means London could account for over 15% of the UK CEP market by 2030, with this increase due to a higher density of businesses in the capital and high growth in the B2B market, and a younger, more digitally savvy market with higher disposable incomes and shopping habits, which could sustain future growth for CEP services in the B2C markets.

5 - UK CEP Market Size & Share Analysis (Mordor Intelligence, 2023) 6 - Centre for London - Parcel Freight Delivery https://centreforlondon.org/blog/parcel-delivery-freight/



By 2030, the London CEP market is expected to deliver over 1 billion parcels per annum. The rate of growth in the CEP market is projected to be faster than the rest of the UK, with London making up over 15% of the CEP by 2030.

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The growth in e-commerce

Due to the rapid growth of e-commerce, the CEP market has seen increasing volumes over the last decade, driven by the increasing adoption, popularity and convenience of consumers using online platforms for shopping.

The UK is a world leader in e-commerce and British shoppers are well-versed in online shopping. Currently, the country's e-commerce industry is ranked third in the global online retail market, trailing only China and the United States.

By 2021, total e-commerce sales in the UK reached an estimated value of £693 billion⁸, which is greater than the combined value of the e-commerce markets of Germany and France.

Figure 2.3 aside shows the growth in the proportion of online retail sales as a share of the total retail sales in the UK between 2007 and 2023⁸.

Covid-19: A surge in deliveries

The unprecedented outbreak of coronavirus caused a surge in demand for CEP services, due to lockdown restrictions and contactless e-commerce, food and grocery deliveries.

Online shopping habits that opted out of necessity early in the pandemic persisted in 2021, due to a slow reopening of the retail high street and repeat lockdowns sustaining demand. COVID-19 drove rapid digitalisation and new business processes required by government, with CEP players and smaller SMEs accelerating capex investment in new technology, assets and resources to increase network capacity and enhance capabilities by several years to keep up with the pace of growth.

<u>7 - Internet sales as a percentage of online retail sales, Office for National Statistics, 2007-2023</u> 8 - UK domestic CEP market outlook, BusinessWire, 2022-2027

Post Covid-19 Economic downturn

The rapid growth in parcel volumes has slowed somewhat as a result of economic headwinds experienced in 2022-2023. In 2023, the UK economy unexpectedly shrank by 0.3% in March, with strikes and weak retail demand weighing on the economy. Persistently high inflation and reduced consumer purchasing power continues to impact consumer spending.

Despite this, the share of internet sales as a percentage of all retail sales is still significantly higher (6%) than pre-covid levels⁷ and this trend looks to continue as more people continue to purchase goods and services online.

Figure 2.6: Online retail sales as a proportion of all retail sales across all markets



A younger, more digitally savvy market with higher disposable incomes and shopping habits could sustain future growth for CEP services, namely next day and same day deliveries, with demand for these services in London outpacing other parts of the UK.



A shift from post to parcels

The adoption of e-mail since 1997, and growth in e-commerce over the last decade is reducing the need for traditional letter-based mail services. Letter deliveries, which peaked at 20bn annually around 2004, have fallen to 8bn, with volumes continuing to decline at about 8% annually^{8.1}. In 2022, Royal Mail requested permission to stop Saturday letter deliveries in a bid to cut costs, with Royal Mail's regulator Ofcom estimating that £125m-£225m could be saved per annum from this initiative¹⁰.

Mail only contributes to 28% of CEP industry revenue globally (See Figure 2.4), and this value is significantly lower in Europe where it is under 20% of revenue. Since 2011, aggregate mail volume has fallen by over 30% in advanced economies, with some large players almost exclusively now focusing on parcels. The historically strong positive relationship between mail volume and economic growth has all but disappeared, and mail items per capita have fallen steeply as populations have steadily increased.

Evolving to serve a business-to-consumer (B2C) market

Growth in e-commerce sales has also caused the largest players, DHL, FedEx and UPS, to invest in evolving their express networks traditionally used for Business-to-Business (B2B) delivery to meet growing Business-to-Consumer (B2C) demand. All three of these major players continue to invest in e-commerce logistics, aiming to win a greater share of the market. The Capex intensity for integrators is forecast to stabilise in the short term, as the companies seek increased efficiency in rapidly expanded networks, as well as improved shareholder returns. However, all three integrators continue to expand capacity, particularly in cross-border networks, acknowledging the B2C market will be lower yielding and need larger last-mile delivery networks to service homes.

<u>10 - Royal Mail requests permission to stop Saturday letter delivery, The Guardian, 2022</u> 14 | October 2023



Figure 2.7: Proportion of revenue from Parcels vs Mail vs other services in 2007, 2014 and 2021^{8.1}

Figure 2.8: Compound Annual Market Growth of Parcels vs Decline in Mail since 2000⁹



The evolution in the CEP market with a greater focus on delivering lighterweight parcels directly to consumers has ignited the need for change in how businesses operate. Major players are becoming more aware of needing to seek innovative solutions such as rail freight to meet changing market needs against a backdrop of lower margins and increased costs.



^{8.1 -} Post & Parcel industry trends (Accenture, 2023)

^{9 -} The endgame for Postal Networks (McKinsey, 2019)

Growth in Volumes, Revenues and Operating Margins

Despite wider economic uncertainties, the CEP industry benefitted from local and national lockdowns which caused temporary surges in demand in 2021, contributing to strong financial performance for most businesses in the CEP sector.

Parcels volume growth across the market averaged 7.7% annual growth between 2020 and 2021¹¹. However, the increased competition has also continued to drive down the unit costs companies can charge for delivering parcels. A focus on higher margin services, including delivering more premium, next-day delivery parcels and focussing on providing wider logistics and financial services activities to customers resulted in businesses experiencing revenue increases of 3.9% on average, up from 1.2% a year earlier¹¹.

This meant two thirds of CEP businesses reported a growth in revenues between 2020 and 2021¹¹. However, performance varied widely between companies, as indicated in figure 2.6 aside.

CEP companies with strong residential drop density and dense networks, combined with the most efficient last-mile proposition remain among the market leaders in parcel delivery. There has also been a growing number of bespoke last-mile providers who have become experts in partnering with larger companies to offer white label last mile micro-consolidation delivery solutions. Smaller players have performed strongly in the past decade, with aggregate volumes rising faster than those of integrators FedEx and UPS since 2011.

Businesses were able to offset rising staff and transport costs through network efficiency, with average EBIT margins improving in 2021. Note, these margins are still low, and companies are feeling the pressure of rising costs, particularly in last mile delivery where approximately 50% of the total cost of delivery is attributed.



Figure 2.10: Growth in parcel volumes, growth and operating margins between 2020 and 2021¹¹



Operating margins vary significantly, often between 5-15%. As transport costs continue to rise due to rising fuel prices and driver shortages, there is a growing need to seek innovative solutions, improve yields and implement cost control measures.

11 - Global Postal Industry Report (IPC, 2022)



Figure 2.9: Reported revenue and operating margins from sampled CEP Businesses in 2021¹¹

Capital Investment Spend of CEP businesses

With e-commerce growth accelerated by several years during the pandemic, businesses are investing in maintenance and growth.

Investments have focused on automating facilities, bolstering delivery fleets and improving digital capabilities. However, amid an uncertain outlook and rising costs, capital expenditure (CAPEX) has slowed by 10.3% in 2021, with CAPEX as a share of revenue dropping to 4.3% on average in 2021, down from 4.7% in previous years¹¹.

Capital Investment is a necessity for CEP businesses to:

- 1. Grow their capability, capacity and outreach
- 2. Meet changing market needs such as same-day delivery
- 3. Reduce unit costs, increase efficiency and operating margins
- 4. Remain ahead of the competition

Figure 2.11: Capital expenditure of CEP businesses (for maintenance and growth)¹¹ Capital expenditure index. 2016 = 100 160



The large players have proportionally invested more in expanding their capability for growth. In the past 5 years, Amazon has spent billions on operating, staffing and expanding its fulfilment. sorting and delivery facilities worldwide to enable same day delivery. Amazon has launched several services to offer third-party fulfilment and delivery to e-retailers selling beyond its own marketplace and rivalling traditional competitors such as UPS, FedEx and DHL.

Figure 2.9 illustrates the CAPEX investment of DHL. UPS and FedEx in reengineering their core operations to meet the requirements of the fastgrowing B2C parcel delivery market and to maintain a competitive position within the market.

Figure 2.12: Capital expenditure growth of DHL, UPS and FedEx¹¹





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Pursuing growth via acquisitions

The largest CEP players in the market have acquired controlling stakes in 390 smaller rivals since 2009. Two fifths of acquisitions were of firms from outside domestic markets as businesses continued to seek growth abroad. However, to focus on core growth areas such as domestic e-commerce, firms have also started to focus on niches. For example, DPD acquired final mile courier CitySprint in 2022, and more recently in 2023 acquired final mile courier Absolutely to further strengthen its same day delivery capabilities across the UK¹².

Logistics as a service

As trends towards sharing economies become greater, the logistics sector is considering similar approaches. DHL¹³ recently announced how they, and others in the industry are moving towards an ecosystem in which assets can be temporarily shared and rented, instead of buying and owning them.

CEP companies are working towards marketplace platforms which could include the marketing of surplus warehousing space, labour or last-mile delivery vehicles. Examples of this peer-to-peer system elsewhere include how Uber and Airbnb have delivered digital platforms that help connect supply and demand.

In Europe, 1 in 5 of all freight transportation vehicle-kilometers in 2020 were comprised of empty loads¹⁴. Although logistics marketplaces attempt to tackle empty runs by providing transparency of available vehicles and routes, they do not typically support collaborative bidding and price elasticity. The problem is that competing companies avoid collaborative transport solutions as they are reluctant to share sensitive data, such as transportation routes, rates, and volumes, with potential competitors. In the long term this may be outweighed by the advantage of shared transportation (better vehicle utilization) which leads to lower costs, improved efficiency and an overall reduction of emissions.



Closer collaboration between CEP businesses and a willingness to share assets supports the case for rail freight and a shared hub at Waterloo.

CEP operators may be able to reduce their cost base by:

- 1. Working together to aggregate volumes required for full train load rail freight reducing the cost per unit of transport
- 2. Sharing container movement and storage space during periods of variable demand
- 3. Sharing labour and last mile vehicles as and when required

13 - DHL - Sharing Economy - DHL - Global

14 - A fifth of road freight kilometres by empty vehicles - Products Eurostat News - Eurostat (europa.eu)



^{12 -} DPD UK announces acquisition of final mile courier company Absolutely, City Sprint, March 2023.

A revolution in last mile

Whilst a package may have travelled across counties, countries and even continents. last mile delivery consumes on average 53%¹⁵ of the total cost of delivery.

Transporting goods from a sortation hub to the final destination has become an increasingly expensive and inefficient operation for CEP companies.

Households are spread across larger residential areas, each with unique and specific parcel needs and requirements with a market push for next-day delivery meaning goods cannot be most efficiently consolidated and optimized for delivery. Furthermore, in cities such as London, the distribution centres are being pushed away from the city, which is significantly increasing the mileage of last-mile vehicles travelling from distribution hubs on the fringes of the city to serve hundreds of drop sites in one shift.

Figure 2.13: Last mile delivery costs as a proportion of the total cost of transporting freight¹⁵

CEP businesses may not be able to justify using rail freight when examining its impact on reducing linehaul costs alone.

However, by proposing a rail freight solution into Waterloo with a frictionless, complementary last-mile delivery network which can serve millions of Londoners using e-bikes may together provide a compelling opportunity to reduce their last-mile costs and remain competitive.







Achieving sustainable deliveries

Consumers are increasingly aware of the environmental impact of delivery, with over half of consumers willing to receive their parcel a few days later to reduce the environmental impact. About half of consumers want the delivery of their domestic or cross-border parcel to be carbon neutral. CEP companies are making investments needed to decarbonise their vehicle fleets, and switch to more sustainable fuels while still meeting their duties to shareholders and customers. There remains challenges in the decarbonisation of predominantly Internal Combustion Engine (ICE) fuelled long distance linehaul and express freight routes for CEP companies.

The UK Government's Transport Decarbonisation Plan¹⁶ features a headline commitment to ban the sale of new vehicles weighing between 7.5 and 26 tonnes by 2035, and vehicles weighing more than 26 tonnes from 2040 in support of reaching net zero.

For CEP operators, there are currently no 'like for like' carbon neutral alternatives available for ICE vehicles in terms of performance, range, or cost. Battery Electric Vehicles (BEV) are significantly more expensive, have limited range and require specific charging infrastructure that is not available in the UK without rapid deployment which, even then, will take years to roll out at scale and require significant capital expenditure.

Charge times drive a requirement for multiple tractor units to replace a single diesel-powered tractor unit in order to meet current service levels. With BEV's, payload weights are reduced by the need to carry heavy batteries, which in turn reduces the amount of parcel freight which can be hauled. A transition to BEVs requires a quantum leap in available charging infrastructure and significant developments in battery technology for this to be adopted at scale.

16 – Transport Decarbonisation Plan (Department for Transport, July 2021)

<u>17 – How hydrogen combustion engines can contribute to zero emissions (McKinsey, 2023)</u>

Hydrogen powered Large Goods Vehicles offer significant operational advantages with manufacturers promising 1000 km range vehicles with short refuel times and no impact on payload.

However, hydrogen as a fuel itself is problematic. Blue Hydrogen can be argued to be more polluting than fossil fuels as it is a product of a fossil fuelbased process, nominally from burning gas. Green Hydrogen is a very inefficient way to store energy from renewable energy production, converting electricity to hydrogen through electrolysis and then back again in a fuel cell. This inefficiency will drive a high cost at the pump once the current government subsidies are removed. Hydrogen has an overall efficiency rate of around 30% 'well to wheel' versus around 75% for a battery electric vehicle¹⁷.

Without subsidies, the use of hydrogen will be more than twice as expensive to fuel a vehicle per tonne kilometre than a battery electric vehicle, with the vehicles themselves likely to be significantly more expensive than their ICE counterparts. Furthermore, there is almost a complete absence of hydrogen fuelling infrastructure.

A period of disruption is imminent

Decarbonising logistics is critical to our net-zero ambitions. It is difficult to achieve and will require significant changes to how the industry currently operates today. There are plenty of opportunities for innovation and improvement. For example, Rail Freight solutions could be the answer to decarbonise long distance linehaul routes where there are limited alternative opportunities to decarbonise existing express road and air operations. CEP companies will need to re-engineer their networks to meet changing consumer demands, incorporate new modes, and achieve a reduction in emissions with minimal change to customer service commitments.

Rail freight could be a key solution to the decarbonisation of long distance linehaul routes. Section 3 examines the UK's Express Rail Freight market.





3 – Express Rail Freight Market Analysis

Market Overview

Between 2021 - 2022, 78 million tonnes of freight was carried on Britain's railway. This amounts to goods worth about $\pm 30 \text{ bn}^{16}$.

Rail freight holds a 9% market share of freight transportation, with road, air and maritime making up the remaining 91% of all freight transport in the UK.

The total economic and social benefits of rail freight are valued at £2.45bn every year¹⁷. Unlike many sectors that are concentrated in the southeast of the country, rail freight brings significant value for areas in the north of England, Scotland and Wales – where the railway has some of its busiest sections.

The leading rail freight operators are DB Cargo, GB Railfreight, Nuclear Transport Solutions, Colas Rail, Freightliner and Devon & Cornwall Railways. DB Cargo and Freightliner have the biggest market share at 31% each (based on freight train kms by operator) with GB Railfreight at 27%.

There are smaller operators such as Rail Operations Group, Loram, Varamis, Hanson & Hall, and RailAdventureUK, which primarily focus on niche parts of the rail market such as the movement of rolling stock on behalf of lessors or the operation of bespoke infrastructure monitoring and engineering services.



Express freight moved by rail accounts for less than 1% of freight moved on rail by commodity.

Royal Mail is the only CEP market player which uses the rail network to distribute letters and parcels at high speed to complement its extensive linehaul network.

Network Rail and Great British Railways have identified the express freight market as a key opportunity for rail freight growth and are proactively trying to attract CEP companies to rail.

18 – Rail Freight Operators (ORR Table 1333, April 2022 - March 2023) 19 - Freight moved by commodity (Office of Rail and Road, March 2022)



Figure 3.2: Freight moved by commodity¹⁹

Figure 3.1: Rail Freight Operators Market Share¹⁸

How Royal Mail utilises the UK Rail network

Royal Mail is currently the only CEP company to use high speed rail to distribute letters and parcels. It operates an express rail freight network across England and Scotland between their rail connected sortation and distribution hubs, complementing its road based linehaul network and in some cases, supporting domestic air freight operations.

High speed freight services run daily between London, Daventry, Warrington, Shieldmuir, and Low Fell using a fleet of Class 325 Electric Multiple Units maintained and operated by DB Cargo. Services commonly operate during early evening and overnight hours between 15:00 – 05:00. Some services do operate during the daytime depending on seasonal demand and capacity requirements.

Royal Mail's Rolling Stock and Infrastructure

Critical to the network design is the use of bespoke Class 325 Electric Multiple Units. The cl.325's are purpose-built trains, designed to accommodate the loading and unloading of York Roll cages, sometimes up to 235+ roll cages per 4-car unit train to convey letters and parcels.

Built in 1995 and 1996, the Royal Mail Cl.325's are similar to Class 319 passenger units, sharing the same traction equipment and body design, but are fitted with cabs of the same design as the ABB Network family.

Each set is made up of four cars, with roller doors in place of sliding ones and no windows. Each car has two roller shutter sliding doors on each side and is designed to hold a payload of up to 12 tonnes per vehicle and can operate in formations of 12-vehicles (or 3x 4 car units).

Royal Mail invested in dedicated road/rail connected warehousing and logistics hubs in the late 1990's, which enables the rapid cross docking of goods from road to rail. Similar infrastructure exists at Stafford, Doncaster and Tonbridge but these are not presently used to operate express freight services by Royal Mail.



Figure 3.3: Royal Mail services in 2023

Approximately 3-4 daily services are operated by Royal Mail in 2023.

Extra demand is catered for especially at busy periods, and additional trains operate during Christmas peak.





3.0 Royal Mail Express Rail Freight Operations - History





Illustrative evolution of service capacity and mail/parcel volumes moved by Royal Mail over time²⁰



1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023

<u>19 – Illustrative diagram based on Steer Case Study Research and Analysis</u>



New Daventry Hub

3.0

In the summer of 2023, Royal Mail opened a new 21.5-hectare facility in Daventry. Equivalent to 78,000m², or 30 football pitches, it will become Royal Mail's largest automated parcels facility, capable of processing 90,000 items an hour²⁰.

The site is also next to the warehouses and fulfillment centers of several major online retailers, which enables scope for increasing efficiency by working with partners to optimise loadings and consolidating volumes.

A doubling of rail freight services

In addition to the 1,600 vehicles forecasted to move freight in and out of the hub daily, the site features an integrated rail link which is connected to the West Coast Main line.

This will enable freight to be transported between the Daventry hub to and from facilities in Shieldmuir (Scotland), Warrington and London.

Royal Mail aims to double its daily rail logistic operation in the next few years, with an additional three daily services between Scotland and Daventry, and deliver up to 600,000 parcels a day by rail²¹.

Each royal mail train will take up to 16 Royal Mail trucks off the road every day, more than **3,000 trucks a year.** Royal Mail cites this as a key component of their Steps to Zero campaign – a drive to reduce the business's carbon emissions to net zero by 2040.



<u>20 – Parcel and Postal Technology International (2023)</u> 24 | October 2023



<u>21 – UK royal Mail to double its cross-border rail services (Rail Freight.com, 2022)</u> Express Rail Freight Market Analysis

Figure 3.4: Forecast Royal Mail services in 2025

Approximately 6-7 daily 12 car unit services could be operated by Royal Mail by 2025, subject to pathing and suitable rolling stock. With further services during busy periods.





The opportunity for Rail Freight in CEP logistics



Opportunities for Rail Freight

Current hub and spoke distribution models serve to inject consignments from manufacturers, businesses and sellers into their network for efficient and timely distribution.

Rail has the ability to fulfil the linehaul (trunk mileage), on key lanes where there is high volume between large sortation centres that are situated between long distances. This presents the first opportunity for rail.

The second opportunity for rail is to replace part of the linehaul into city centre delivery stations. Through the use of existing rail stations and infrastructure located in the heart of cities, rail could effectively offload volume straight into the heart of cities (where there is a greater drop density) for last mile delivery, complementing traditional spoke sites which are often located on the outskirts of cities, and where land values are high.

Rail can also serve return logistics, such as parcel returns or consolidation of inbound volumes into CEP networks for transit to other parts of the UK.

Whilst a key opportunity, rail must be able to demonstrate that it can offer fast, efficient rail freight products to meet existing service commitments currently offered by road to CEP customers.



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4 – Examining the Market Opportunity for Rail Freight to provide CEP sector solutions into London Waterloo

An exemplary operation for CEP companies between Midlands - London

4.0

Assessing the size of the rail-addressable part of the parcel market is a significant challenge, with limited information available to base any modelling assumptions on. In a fiercely competitive market, carriers are protective of the data they collate on volumes moved across their respective networks.

We have reviewed how major CEP and retail players serve the London Market, based on market feedback and understanding their network operations in relation to sortation, linehaul and last-mile delivery.

For the purposes of this exercise, an anonymous case study has been developed to illustrate how existing CEP operators' function on a key lane such as Midlands to London over a **24-hour weekday operating window,** where there is a high concentration of logistics sites and volumes flowing between the two.

By mapping the key logistics centres and freight flows between the two, we start to identify the opportunities where a shift to rail logistics using a London Waterloo freight hub could potentially replace existing road-based links and create new sustainable supply chain opportunities.

The four key steps of CEP operations are outlined in Case Study A aside and detailed in the next few pages.



Figure 4.1: Illustration of a road vs rail-based CEP operation between sortation centres in the Midlands and London



Step 1 and 2 – Aggregation and Sortation

4.0

CEP operators typically have a large ground sortation hub in the Midlands which can handle domestic and international packages. There is the opportunity for rail freight to support both inbound and outbound, however inbound is outside of scope for this study.

Our example Midlands hub is configured to sort up to 60,000 packages per hour and has 60 inbound and 140 outbound load doors for trailers.

The main 'sort' occurs between 18:00-02:30 and this is where inbound packages are sorted to outbound and grouped by shape, size and weight, commonly allocated as 'smalls', 'regular' or 'irregular' (i.e. irregular shaped and sized packages which otherwise require specialised handling).

Packages are loaded into outbound road trailers according to postal code. Once trailers reach capacity during the sort time, they are dispatched to the local delivery station immediately.

Engagement with CEP businesses indicate if they were to adopt a rail freight solution, this aspect of their supply chain would continue as current. The next two slides identify where a CEP rail freight solution into Waterloo would result in changes to their supply chain.







4.0 Exemplary Case Study 1 – Midlands to London CEP road and rail-based operation

Step 3 – Road vs Rail based linehaul

At the Midlands Sortation hub, packages are continually loaded into HGV trailers, which are dispatched as they hit capacity, bound for the delivery sites on the Western outskirts of London.

Typically, outbound road movements operate between 19:00-04:00 to reach the local delivery station in time for early morning deliveries. Dispatch time from the sortation hub can be influenced by the distance to the local delivery station and respective cut off time needed to meet service level obligations e.g., an 05:00 arrival at a Scottish hub may force an earlier departure from the Midlands hub, due to the distance which needs to be travelled.

For the amount of volume dispatched to London, a hub of this size would likely dispatch multiple large HGVs every hour throughout the night and into the next morning.

The next page assesses the number of movements that take place on this key flow between the Midlands and London, and assess the extent to which road-based linehaul operation can be shifted to rail freight.



Figure 4.3: Illustration of a road vs rail-based CEP operation - Step 3



Potential benefits quantification from shifting road-based operations to rail

Our analysis, derived from DfT statistics^x on road freight movements by commodity, origin, destination and assumptions from our engagement and previous work, indicate that approximately 500 HGV movements (with an average 10.5 tonne payload) make the 200km daily journey between the Midlands and London across multiple CEP operators, translating to over 100,000 HGV tonne kms per day.

The diagram aside demonstrates the extent to which introducing a converted electric locomotive hauled freight train with 12 intermodal wagons could help support the shift to rail freight. Each service can remove up to 23 HGVs.

Introducing up to 4[×] return rail freight services per day between the Midlands and London could move over 40 million parcels per annum by rail, shift over 50,000 HGV movements and reduce 9,500 tonnes of carbon emissions.

<u>https://www.gov.uk/government/collections/road-freight-domestic-and-international-statistics</u>
 Steer & CRP analysis and modelling - using model built to estimate potential impacts of rail freight services for CRP.

Figure 4.4: Potential benefits of shifting from a road to rail-based operation between the Midlands and London



Converted passenger train (Class 321) for rail freight use by Eversholt, Image Source: urb-it.com

*Note, our initial assessment of the space available at the Waterloo Freight hub, and considerations such as CEP linehaul operations predominantly needing to take place overnight, mean it is unlikely that the hub will be able to serve more than 8 services per day. Furthermore, it is expected to take several years to ramp up the demand to justify 8 services per day. However, given this is a market assessment report considering the wider London market, there could be potential to complement a Waterloo rail freight hub with other rail freight operations to other freight terminals elsewhere in London.



Step 4 – Last Mile Delivery

Road trailers arrive at the local delivery station and unload packages. These packages are then loaded on to vans and cargo bikes for last mile delivery by post code.

Parcels may go through a second sort at the smaller delivery station before being loaded onto last mile delivery vans and cargo bikes bound for homes across London. For densely populated areas within the city where vans cannot access, parcels may go through an additional micro-freight hub before final mile delivery commences.

Last mile delivery vans can carry anywhere between 100-130 parcels which need to be delivered as efficiently as possible during the day, with the average shift lasting 8-12 hours (Depending on traffic, number of parcels to be delivered and the geographical drop density).

A round trip from West London delivery station to Central London could take upwards of three hours before considering the time it takes to individually deliver to locations. With a rail freight solution into Waterloo, parcels will be directly transported within proximity to the final destination, significantly reducing the lastmile leg and increasing the speed of delivery.

Cargo bikes alone could serve up to a 10km radius of Waterloo station, whilst carrying fewer parcels, they can traverse Central London's streets faster than a van.



Epso

and faster deliveries.

Figure 4.5: Potential benefits of shifting from a road to rail-based operation between the Midlands and London

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An exemplary operation for CEP companies between Solent and London switching from road to rail-based operations (using existing passenger services)

We have developed a second anonymous case study to illustrate how CEP operators may utilise existing passenger services to move freight into Waterloo on the Southwestern Railway network, with focus on an operator moving medical supplies between Southampton and London.

The below example illustrate how a limited number of shipments, consolidated on early morning and mid-afternoon services, could use the Waterloo freight hub and the benefits of this.

Figure 4.6: Illustration of a rail based 'passengers as parcels' concept, using existing South Western railway services.





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Potential benefits quantification from shifting road-based operations to rail using existing passenger services

Southwestern Railway operate half-hourly passenger services throughout the day between Southampton Central and London Waterloo, using 10-carriage trains, taking just 80 minutes. Pre-pandemic, over 3 billion passengers used Southampton Central station, this has recovered to just 1.8 billion in the 2021-2022 period and may take several years to get back to pre-pandemic levels.

CEP operators may utilise this spare capacity on passenger services to move freight into Waterloo on the Southeastern Railway network. Our case study, which focusses on an operator moving medicinal supplies between Southampton and medical facilities in London, using spare space on services such as luggage compartments and bike storage areas. Alternatively, if there is sufficient demand, there may be scope to block out 1 carriage for freight on selected services which are best optimised with the requirements of the market (such as early morning or late evening services). The below example quantifies the benefits of how a limited number of shipments, consolidated on spare space early morning and mid-afternoon services, could be used to feed the Waterloo freight hub and deliver sustainable and efficient freight to the capital.

Figure 4.7: Illustration of how a rail-based CEP operation between Southampton and London may look using existing services on cl.159, cl.450 and cl.444 fleets



Opportunity for parcels to occupy underused bike storage space on services Source: Great Western Railway – IEP fleet

Opportunity for parcels to occupy lockers and space for passenger luggage on quieter services Source: Eurostar e320 fleet

Source: Steer analysis and modelling – using model built for complimenting commission (RfP2)



5 - Conclusions and Recommendations

Conclusion

There is a growing need for CEP businesses to continue to evolve their supply chain networks to meet the significant projected growth in volumes (7% per annum) between now and 2030, whilst also facing the challenge of decarbonising their supply chain.

As e-commerce sales have ramped up in recent years, integrators DHL, FedEx and UPS have adjusted express networks traditionally used for B2B delivery to meet the growing B2C demand. All three continue to invest in e-commerce logistics, aiming to win a greater share of the market.

As economic uncertainty replaces COVID-19 as the major challenge facing the CEP industry, ecommerce and emerging technologies will play a central role in continuing to shift the CEP sectors volume demands.

CEP companies will continue to innovate and optimize network efficiency in rapidly expanded networks, and evolve their existing models to manage increasing costs, changing consumer habits whilst delivering improved shareholder returns. An operation such as Midlands-London Waterloo could act as a blueprint for the reengineering of supply chains in pursuit of sustainability and more efficient logistics models to serve densely populated conurbations, which is a growing trend as a result of urbanisation.

The proposed rail-served hub has the potential to demonstrate and evidence clear benefits to a multitude of stakeholders, such as CEP operators, residents, local boroughs, the environment, the rail sector, businesses and the wider economy. For the CEP sector, it could signal that the inclusion of rail operations can be done in a way that does not degrade the overall service level commitments available to customers.

Rail based logistics solutions have the potential to solve both of the CEP sectors key challenges, catering to market growth whilst also achieving emissions reductions associated with hard to decarbonise long distance road operations, as found within their linehaul and feeder networks. Even under the most optimistic trajectories, the technological uncertainty and scale of innovation required means it will take several decades to fully decarbonise the HGV fleet. However, electricity from renewable sources direct from the grid is readily available to utilise from existing rail infrastructure (such as the high-speed West and East coast mainlines). The challenge of achieving net zero has been laid down, and rail should be included and explored as part of decarbonisation efforts to green the logistics sector. The pursuit of sustainable logistics models will play a central role in the years ahead, and inevitably require an element of disruption and change.

The boldest companies which adopt new modes of transport – regardless of size and capitalisation – may well win the race in the long term.

This market analysis reveals that projects such as the Waterloo freight hub concept are of strategic alignment with the UK's objective of achieving net zero by 2050 and to cut emissions by 68% by 2030, compared with 1990 levels; and reveals there is the market volume and appetite to make such solutions commercially viable.

It is clear that the trends impacting this project such as the projected growth of CEP sector volumes, the drive to achieve sustainability in logistics, and wider alignment with public policy demonstrate this initiative is deserving of continued support, further exploration and future investment from interested funders. It is recommended that this initiative is pursued further with road fed trials by logistics operators, and, subject to funding, rail fed solutions should be tested and trialled.



Recommended next steps

There are a series of recommended next steps which Steer has developed, to support the development of a Waterloo freight hub into a mature proposition.

A key factor within any new initiative is to determine how the solution will be commercialised and marketed for target customers, and the finances which will underpin this.

Choosing the right rolling stock solution

Sourcing rolling stock will be one of the main drivers of cost and deliverability, and there are multiple options available on the market but not all will be a competitive solution to meet the needs of the CEP sector. Once a solution is identified for use, gauging assessments will need to be undertaken to ensure the rolling stock is compatible with operating into Waterloo.

Understanding the commercials

Further work is needed to understand the commercials which will underpin the solution. This is so that during commercial discussions with interested customers, the project team can clearly articulate a unit price ('the offer'). For example, the project team needs to understand the operational expenditure (OPEX) to provide the necessary logistics capacity to the market, what utilisation is needed for the service to be viable, and what capital expenditure (CAPEX) is required before the service can start. This can be developed through a financial model and would also support conversations with interested funders and the raising of capital to implement the solution.

Explore funding sources

Once CRP has a clear understanding of Opex and Capex requirements, CRP should begin to explore potential funding sources which could support the project team with the procurement and mobilisation of the solution, providing ongoing financial support until the service can break even (through high levels of utilisation by customers in the CEP market).

Procurement and implementation considerations

For the procurement and implementation of the solution, it is likely that CRP would need a small project team with rail-based expertise to procure the solution, project manage the implementation and provide operational/contractual management during any trial stages. Only at the point of procurement (or when there is a mature commercial proposition for the CEP sector) should the rail freight operators and rolling stock providers be consulted. Until CRP is ready to procure a solution, any discussions with FOCs and ROSCOs at this stage would be premature.

Summary of next steps to be explored:

- The project team should explore and shortlist potential rolling stock solutions to be used and do this through a separate working group, including familiarisation with the gauging assessment requirements at Waterloo for the short-listed solution;
- Explore the commercials in more detail, with the development of a financial model demonstrating OPEX and CAPEX requirements for the rail solution and wider Waterloo hub project, to develop a unit cost which will inform commercial discussions with interested customers from the CEP market; and
- Explore potential funding sources to support the procurement and mobilisation of the short-listed rail solution (Noting the point above, only once the commercials have been developed in more detail).

An outline step by step plan has been developed for consideration by CRP on the next page.

This plan is indicative and includes key project stages, outputs, time frames, budgets and stakeholders at each stage, based on Steer's previous expertise in mobilising new rail business models. **A Go / No Go decision point** is included subject to conclusion of the feasibility work.



Conclusion and Recommendations (3/3)



5.0

6 – Appendices

Location of CEP and retail sortation, warehousing and distribution centres in the UK





6.0

6.0 Location of CEP distribution centres dedicated to serving London





Location of retail warehousing and distribution centres dedicated to serving London





6.0

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