



lumo ARUP

Lumo

Economic impacts study



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# Executive Summary

Lumo is an open-access operator, launched in 2021 and operating train services between London and Edinburgh via Stevenage, Newcastle and Morpeth.

This report investigates the benefits associated with operating Lumo's services. This offers an insight into the ways in which this open-access operator has delivered benefits over and above those which would have been brought about through franchised services.

The quantified benefits of Lumo are estimated to amount to £470m-740m during the period from its launch up until 2033, in line with its current track access agreement. This includes faster journeys and fare savings for passengers, and reduced carbon emissions due to mode shift. Lumo also provides a range of other benefits, including supporting tourism.



## Passenger journeys

Lumo has demonstrated strong growth in passenger numbers since its launch in October 2021. Using data from the ORR, Lumo's passenger demand had increased by over 30% as of the year from Q4 2022 - Q3 2023, the most recent period for which data is available. Over the same period, National Rail journeys (excluding the Elizabeth line, which had not opened as of 2021) only increased by around 12% - thus, demonstrating the success of Lumo's launch.









## Economic benefits

Lumo is estimated to deliver economic benefits of £340m-375m from launch up to the end of its track access agreement in 2033, in the form of time savings, agglomeration, fare savings to Lumo passengers, mode shift and the direct jobs that it supports. These are different to the environmental benefits, which are shown as a separate figure.



## Environmental benefits

It is estimated that in the financial year 2022/23, Lumo helped customers to avoid emitting 60.6 ktCO<sub>2</sub>e by using their services. The greenhouse gas benefit from 2021 to 2033 is between £130m-365m. This benefit is at a substantial scale, reflecting that Lumo services have led to mode shift from private vehicles and air.

Benefit		Estimated total from 2021-33
		
Time savings		£9m-19m
		
Agglomeration		£1m-6m
		
Direct employment		£21m-43m
		
Mode shift benefits - environmental (carbon, air quality and noise)		£130m-365m
		
Mode shift benefits - other (highway congestion, accidents etc)		£125m+
		
Fare savings to Lumo		c.£185m
<b>TOTAL</b>		<b>£470m-740m</b>



**Tourism**

Tourism plays an important role in the economies of several of the locations served by Lumo. Tourism benefits are not usually monetised within a transport economic assessment. However, through increasing service frequency and improving connectivity between locations along its route, Lumo helps to support tourism by enabling people to have a convenient, sustainable way of visiting the places that it serves.



**Partnerships and initiatives**

As well as Lumo’s beneficial impact on the economy and sustainability, it has played an active role in the communities it serves by supporting many events and initiatives, including charity partnerships and sponsoring local organisations. Lumo advocates continuous learning and personal development, with 90% of their team undertaking a custom designed apprenticeship when they join.

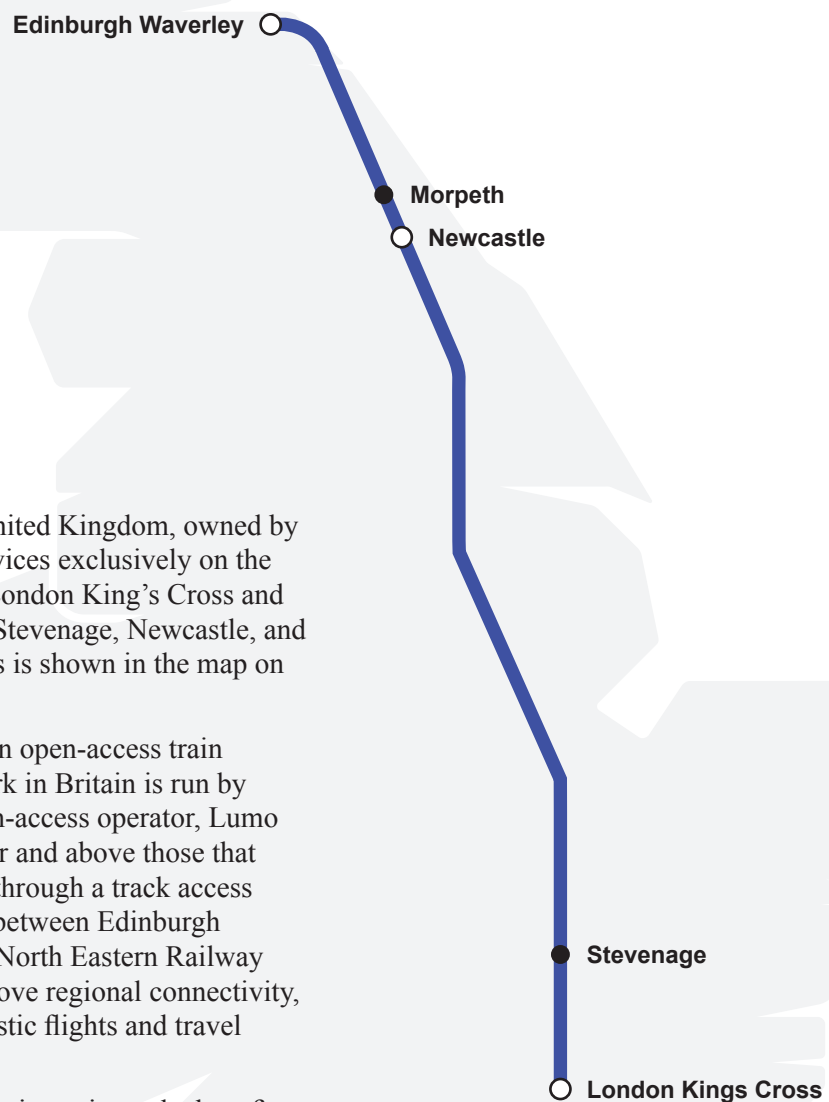


**Conclusions**

The total benefits delivered by Lumo from launch up to 2033 are estimated to be around £470m-740m. These benefits demonstrate just how much Lumo has added to the UK economy. The addition of Lumo services has increased people’s ability to travel sustainably along the corridor that it serves, while delivering environmental benefits.

A photograph of a blue high-speed train (TGV) stopped at a station platform. The train is sleek and aerodynamic, with a prominent nose. The platform is paved with grey bricks and has a yellow tactile strip along the edge. In the background, another blue train is visible on an adjacent track, and a large, arched glass and steel structure covers the station. The sky is overcast. The word "Introduction" is written in white serif font at the bottom of the image.

# Introduction



## Background to Lumo

Lumo is a rail operator in the United Kingdom, owned by FirstGroup. It operates train services exclusively on the East Coast of the UK between London King's Cross and Edinburgh Waverley, calling at Stevenage, Newcastle, and Morpeth. The route that it serves is shown in the map on this page.

Lumo launched in 2021 and is an open-access train operator. Most of the rail network in Britain is run by franchised operators. As an open-access operator, Lumo provides additional services over and above those that are run as part of the franchise, through a track access agreement (franchised services between Edinburgh and London are run by London North Eastern Railway (LNER)). Lumo's services improve regional connectivity, and offer an alternative to domestic flights and travel by road.

Lumo has commissioned Arup to investigate the benefits associated with operating its services. This offers an insight into the ways in which this open-access operator has delivered benefits over and above those which would have been brought about through franchised services.

The rest of this report sets out further background to Lumo services and provides a high-level valuation of economic and environmental benefits that have been delivered to date and are expected to be delivered in future.



### Impacts on the rail timetable

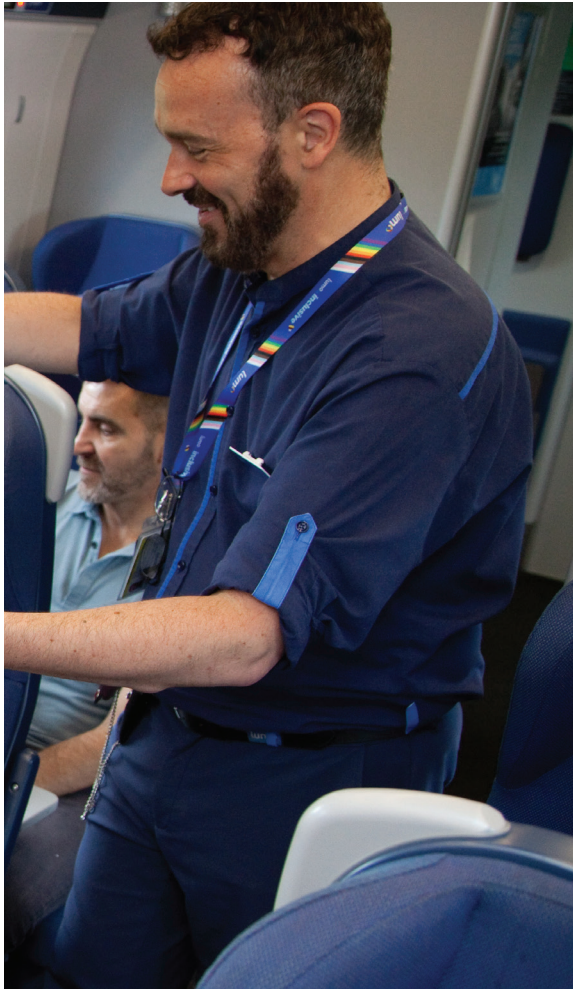
Lumo has added five direct train services per day in each direction between London King's Cross and Edinburgh. This brings about benefits to passengers on that route through increased service frequencies. Further to this, there are several features unique to Lumo's timetable:

- It offers the first rail service of the day from London to Newcastle and Edinburgh, departing before 6am, which enables passengers to arrive in Newcastle just after 8.30am and Edinburgh just after 10am. This makes it an attractive option for business trips that need to arrive in time for meetings during the working day. This service calls at Stevenage, offering an opportunity for passengers from the Home Counties to join the service and providing an alternative to flights from Luton Airport.
- It also offers the last rail service of the day from King's Cross to Edinburgh, departing King's Cross just before 8.30pm, whereas the last weekday service with other rail operators is at 7pm. Lumo also offers the last rail service of the day between Edinburgh and King's Cross.

- It generally has fewer stops than other providers' services from London to Newcastle. Three of Lumo's five daily services are direct to Newcastle with no stops, with the other two only stopping at Stevenage before arriving at Newcastle. By contrast, some services from other providers stop at as many as 10 intermediate stations before arriving at Newcastle.

Lumo provides five direct train services in each direction between London King's Cross and Morpeth per day. Although Morpeth services with other operators have increased since Lumo's launch, Lumo services still drive the total being more than double than it otherwise would be. This is illustrated in Figure 1. Lumo services are also faster because they have fewer stops on the way, including three services where there is only one stop (at Newcastle) prior to arrival at Morpeth.





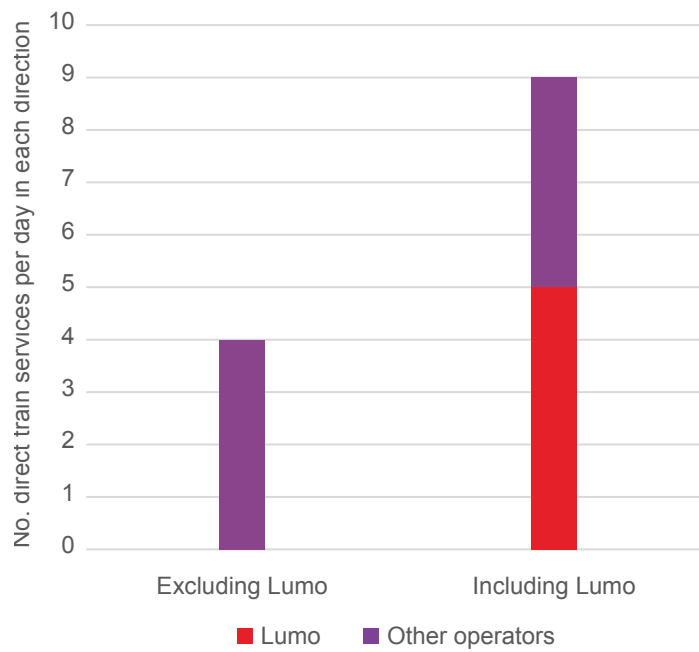
“Lumo has brought further improvements to transport accessibility and connectivity across the Transport North East area, helping more people travel more easily and sustainably. The growth in connections at Newcastle is especially important as the connecting rail and Metro networks grow in the future, and they have helped further improve connectivity to Morpeth and, in turn, into Northumberland.”

Tobyn Hughes, Managing Director, Transport North East

“Lumo offer a great service from Morpeth. They are a very reliable, cost effective, fast operator that other train companies on the East Coast could learn a lot from.”

CLlr Richard Wearmouth, Deputy Leader at Northumberland County Council

**Figure 1: Weekday direct rail services between London and Morpeth**



Source: National Rail timetable

### Journey time comparisons

There are important benefits associated with providing competition to air services between London airports and Edinburgh; these are explored further in this report.

One benefit comes in the form of time savings. Whilst the on-board time is much faster for a flight than a rail service, there are other elements of a total journey time that need to be accounted for, including:

- Access to the airport or station;
- Allowance of time to clear security and check in on time for a flight;
- Waiting at the airport once through security;
- Passing through the airport at the other end after landing; and
- Travelling to the final destination.

These are all accounted for within the concept of ‘generalised journey time’ (GJT), which adds all elements of a journey from A to B together. It is also recognised in the Department for Transport’s appraisal guidance that certain elements of a journey (such as waiting or interchanging) should have a higher weighting applied to them to reflect the inconvenience that they cause to passengers.

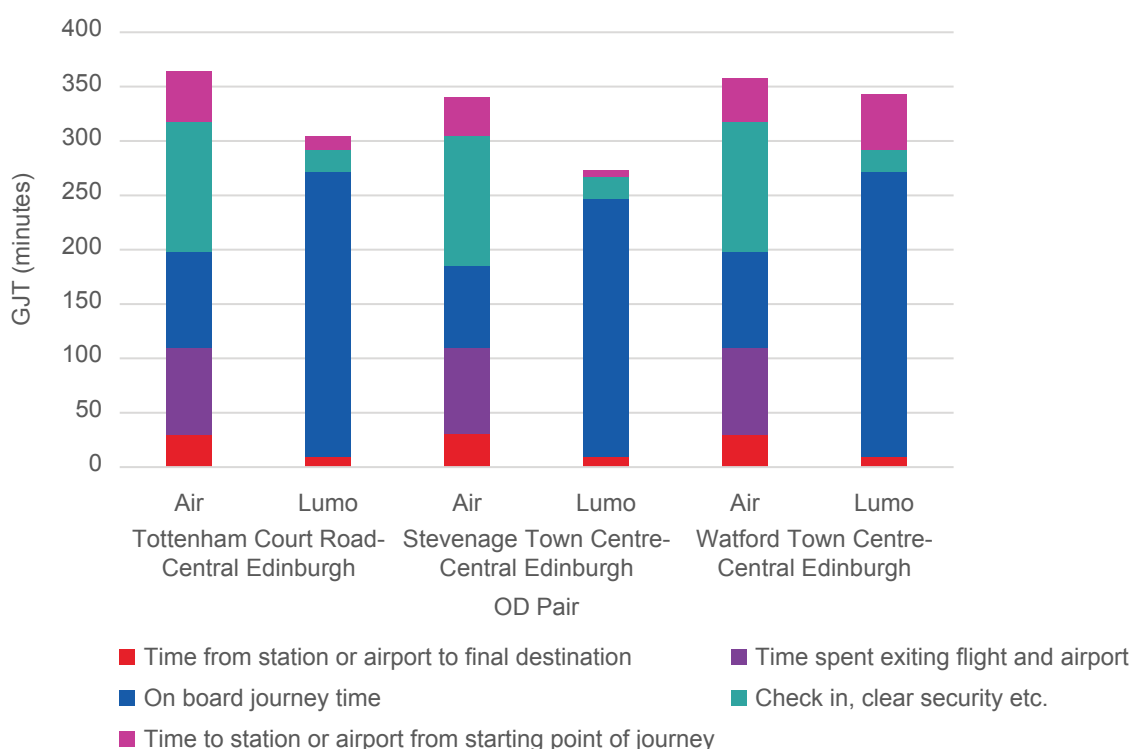
Whilst air travel will inevitably be faster depending on where the journey begins, taking all the journey elements into account means that there is not always a journey time benefit compared to rail. Figure 2 demonstrates a selection of origin-destination pairs where it would be faster in GJT terms to use a Lumo service compared with flying (NB this analysis does not include other factors such as fares). This is based on using assumptions about journey time to and from the airport, time spent going through security and waiting for the flight etc and how that would be valued in GJT terms.

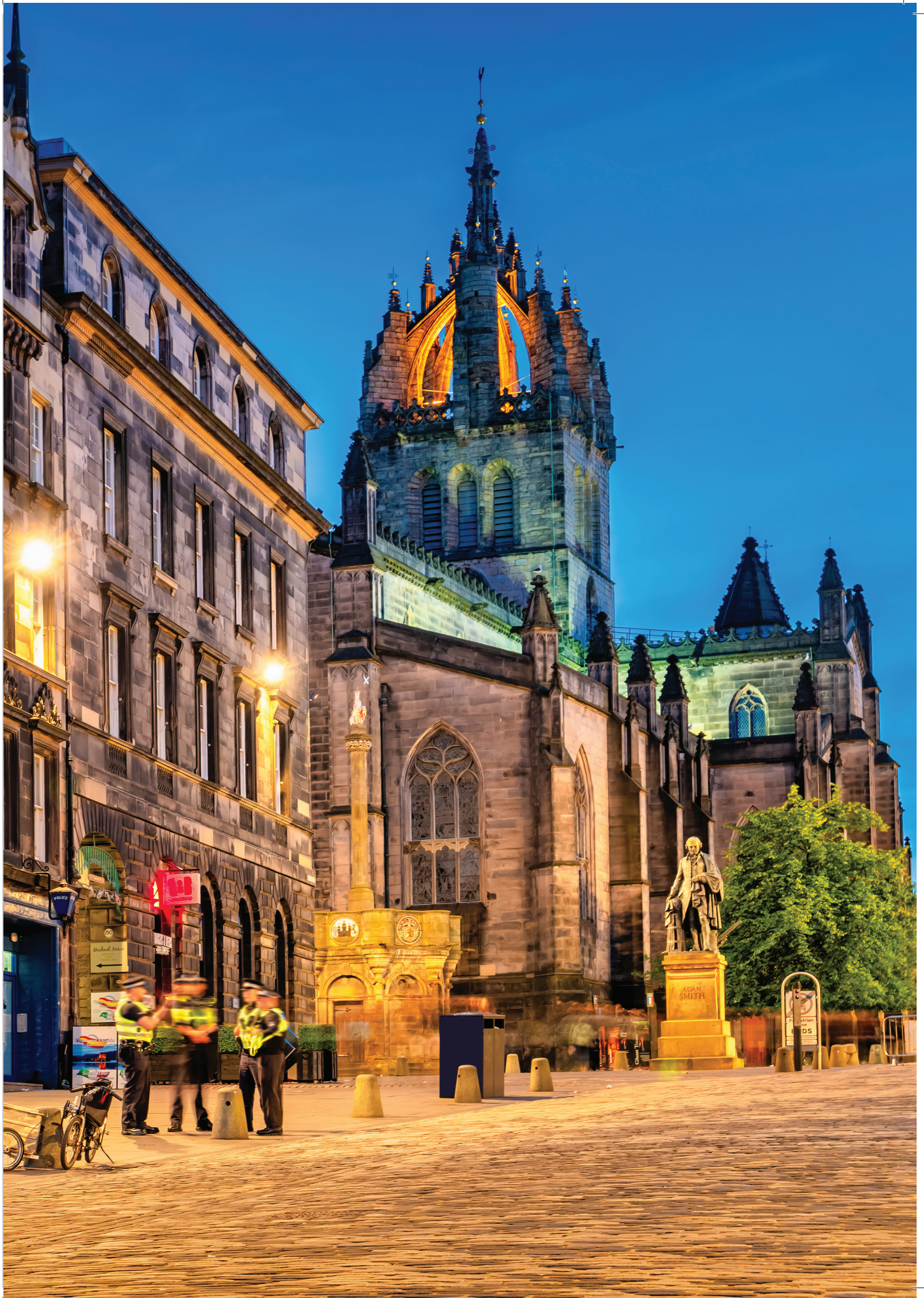
Another benefit that Lumo offers in this respect is for trips where the passenger wants to be able to work during their journey. A rail journey - where passengers can sit at a table, have access to Wi-Fi and be able to focus for a sustained period of time without interruption – is generally more conducive to this than air travel.

# 60 minutes

– estimated generalised journey time saving between central London and central Edinburgh from using Lumo instead of an air service

Figure 2: Examples of generalised journey time comparisons between air and Lumo







### Passenger journeys

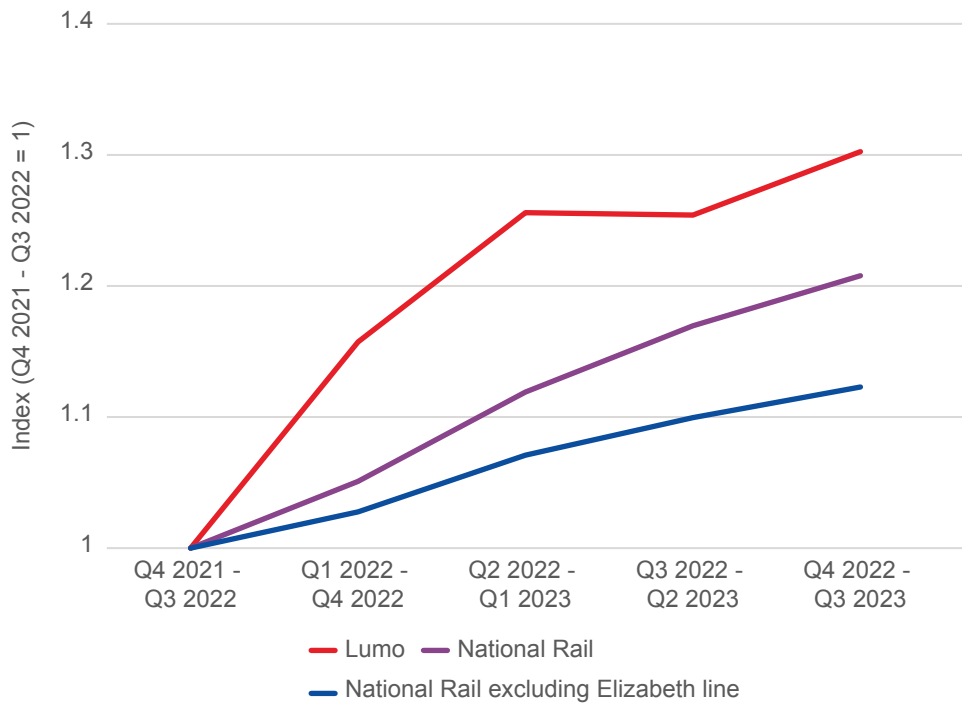
Lumo has demonstrated strong growth in passenger numbers since its launch in October 2021. Figure 3 shows passenger demand using a rolling sum of the past four quarters, indexed to the first data point (October-December 2021 to June-September 2022, labelled as Q4 2021 - Q3 2022). This uses data from the Office of Rail and Road (ORR). Figure 3 demonstrates that Lumo's passenger demand had increased by over 30% as of the year from Q4 2022 - Q3 2023, the most recent period for which the ORR data is available. It also shows that over the same time period, overall National Rail journeys (excluding the Elizabeth line, which had not opened as of 2021) only increased by around 12%. This demonstrates how strong Lumo's launch has been.

### Air capacity

Figure 4 shows average seat capacity for flights from London to Edinburgh, based on quarterly flight schedule data between 2018 and 2023. It highlights the dramatic decline in average seat capacity during the Covid-19 pandemic, and the rise in seat capacity beyond 2021. Nonetheless, the latest seat capacities in the 2023 data do not reach the same levels as pre-pandemic; the average seat capacities begin to plateau from the first quarter of 2023. This suggests that the introduction of Lumo trains post-pandemic, and the associated increase in train services since launch in 2021, could have driven reallocation of air capacity at Edinburgh towards destinations other than London.

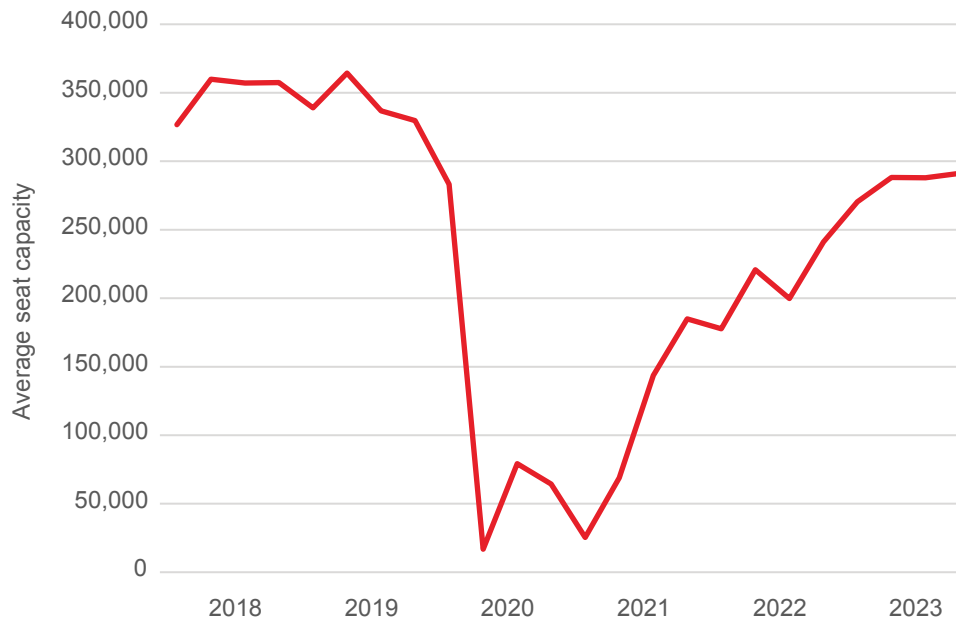
**Lumo demand increased by 30%, compared with 12% for overall National Rail excluding the Elizabeth line.**

**Figure 3: Rail passenger demand indexed to October 2021-September 2022**



Source: Office of Rail and Road

**Figure 4: Quarterly air capacity between London and Edinburgh**



# Economic impacts



## Benefits of rail

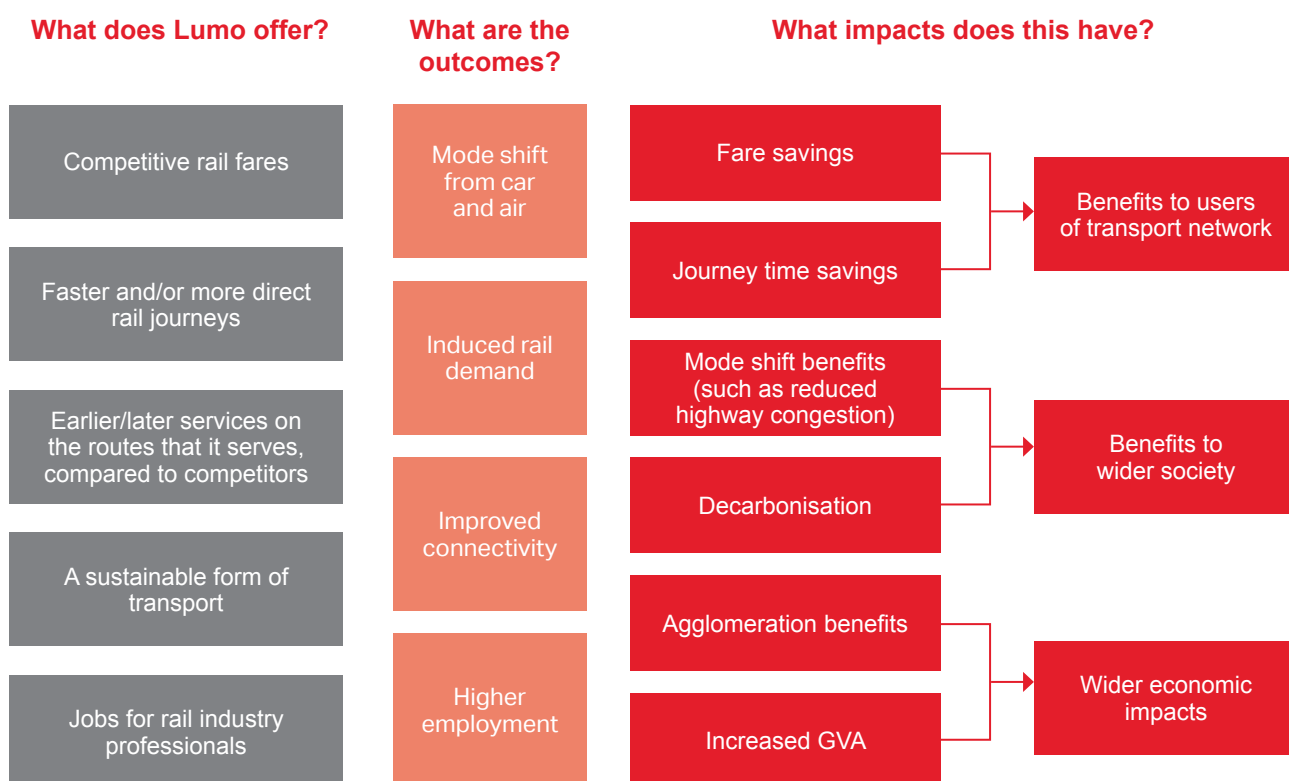
There are many reasons why rail can bring about benefits to individual users of the network and wider society; these include:

- **Transport benefits:** Rail schemes can bring about benefits such as time savings, crowding relief and improved reliability.
- **Wider economic benefits:** There is a positive relationship between productivity and density. Rail can support this by improving connectivity between key employment locations, thus boosting the productivity of workers - this is known as agglomeration. Rail also supports direct employment.
- **Environmental benefits:** Through encouraging mode shift from highway, rail can bring about reductions to emissions of carbon as well as other pollutants that affect local air quality.
- **Social and community benefits:** Rail can act as a means of enabling people to access key services, which is particularly important in areas of deprivation and low car ownership. In many areas, railways and stations can serve as key community hubs and assets, providing connectivity to important services, a point of pride for local people, and a 'gateway' to the area.

Figure 5 presents a 'logic model' that shows how the key features of Lumo services translate into a range of benefits across transport network users, wider society and in wider economic terms. This is not an exhaustive set of benefits, but it represents the focus of this report in terms of monetised impacts.

## Lumo services bring about benefits to passengers and wider society.

Figure 5: Logic model for Lumo





## Economic background

### London King's Cross

London King's Cross has become a hub for tech giants such as Google, Expedia Group, Samsung and Facebook, and startups alike. It is also identified as a 'new global knowledge hub'<sup>1</sup> considering that the area forms part of London's knowledge quarter - spanning from Bloomsbury and Euston Road, and includes the British Museum, UCL and the Wellcome Collection. The King's Cross area's recognition as a knowledge quarter means that it is becoming a popular choice for data-driven startups, particularly AI and machine learning. Some startups include Pavegen (focusing on the use of pedestrian kinetic energy for off-grid electricity on site) and ARK Coworking (providing coworking spaces for freelancers, startups, and social media entrepreneurs).

### Stevenage

Stevenage is a town with existing rail connections to London which have been strengthened further by the introduction of the Lumo services. Lumo has also developed Stevenage's connections to northern regions of the country and Scotland. The town is also located between Luton and Stansted airports, meaning that the enhanced rail connectivity helps to offer a sustainable alternative to flying.

Stevenage is home to a range of large companies including MBDA, GSK, Airbus and Stevenage Bioscience Catalyst. Together, these companies support over 5,000 jobs. The town also comprises other major organisations such as BMW, Fujitsu, Costco, and Tesco.

**Lumo serves destinations with a range of economic strengths.**





### Newcastle

Newcastle is where Lumo has its headquarters. The city offers major advantages as a UK base for global businesses including world-class universities, access to a labour market of over one million people, and a talent pool of 50,000 students<sup>2</sup>. The city is growing in the digital sector through boosting highly skilled software programmers and digital entrepreneurs. Moreover, Newcastle's strengths in creative and digital, science and healthcare, offshore and marine means that it is a fast-growing location for business investment<sup>3</sup>.

### Morpeth

Morpeth is a historic town in Northumberland, home to a range of independent businesses. It is also where Northumberland County Council is based. The town is easily accessible from Newcastle and the introduction of Lumo train services means that Morpeth is more accessible to people travelling to and from London.

### Edinburgh Waverley

Edinburgh is Scotland's second largest city in terms of population and employment. It is recognised as a centre for science and technology, but its key sectors also extend to software, financial services, tourism, higher education, film and television, food and drink, and contact centres<sup>4</sup>.

The Edinburgh city region is one of the most productive areas of the UK. Data from the Office for National Statistics for 2021 (the most recent year available) shows Gross Value Added (GVA) per filled job for 29 city regions in the UK. The 'Edinburgh and South East Scotland' City Region has the second highest productivity on this measure, second only to London and one of only three city regions above the UK average productivity on that measure.

<sup>2</sup> Newcastle City Council. (n.d.). *A place to grow your business and prosper*. Retrieved from Newcastle City Council: <https://www.newcastle.gov.uk/business>

<sup>3</sup> Newcastle City Council. (n.d.). *A city of investment and growth*. Retrieved from Newcastle City Council: <https://www.newcastle.gov.uk/our-city/growing-our-city>

<sup>4</sup> The City of Edinburgh Council. (n.d.). *Invest in Edinburgh - Key Sectors*. Retrieved from The City of Edinburgh Council: <https://www.investinedinburgh.com/key-sectors>



### **Lumo has delivered time savings for passengers**

Faster journey times represent a benefit to passengers. Being able to travel faster means that people can get to their destination quicker and spend more time productively.

Lumo has made journeys faster for its passengers through the following:

- Lumo services are typically faster between the destinations that it serves compared with rail services from other operators, since there are fewer intermediate stops.
- There is a benefit from adding extra frequency of service during the day, including enabling people to travel by rail earlier in the day.
- For Morpeth in particular, the launch of Lumo represented a significant addition to the number of direct rail services available.

When transport projects are being assessed within a business case, time savings are expressed as a monetised benefit by applying a value of time. The value of time is based on passenger research that has been commissioned over time by the Department for Transport and summarised in its Transport Analysis Guidance (TAG). It is different depending on the purpose of the journey – business trips typically have the highest value of time.

Time savings are estimated by using the change to GJT, which accounts for things like interchange and wait times rather than just on-board time. GJT changes have been sourced from MOIRA, a rail industry tool that shows the impact of timetable changes. Table 1 shows the average GJT saving from MOIRA for selected origin-destination pairs that are among those with the higher levels of demand along the route. Trips involving Morpeth have a particularly high time saving due to the step change in level of service that Lumo represents.

Generalised journey times can be monetised using values of time for rail passengers from DfT appraisal guidance. This indicates that the total generalised journey time savings, from launch in 2021 until the end of Lumo's track access agreement in 2033 are worth around £8-16m in current (2023) prices.



**Table 1: Generalised journey time savings resulting from Lumo services, for selected origin-destination pairs**

	Approx. baseline travel times (without Lumo services)	GJT saving per trip as result of Lumo (minutes)
Morpeth - Stevenage	5 1/2 to 6 hrs	30 to 63
Edinburgh - Stevenage	6 to 6 1/2 hrs	15 to 42
London - Morpeth	4 1/2 to 5 hrs	23 to 33
Newcastle - Stevenage	4 1/2 to 5 hrs	9 to 24
London - Newcastle	c. 2 hrs	2
London - Edinburgh	c. 40-50 mins	1 to 2

Source: Lumo

**£9-19m**

Estimated value of time savings from Lumo services, 2021-33

## Providing fare savings for passengers

### Lower fares on Lumo services

Lumo seeks to provide its customers with the best value fares. This section values the impact to Lumo customers with regards to the fare savings that they have benefited from as a result of the launch of Lumo.

For fares impacts, the key station pairs are Edinburgh-London and Newcastle-London, which account for the majority of Lumo journeys. Most of the post-Covid growth in rail passenger demand along this corridor has been in the unregulated fares market.

Regulated fares have to be offered on all routes, but their take-up tends to be highest on commuter routes, given the need to travel during peak periods and the lack of advanced booking options. For example, most season tickets and many Off-Peak and Anytime Day ticket fares are generally regulated, in particular where there are few or no equivalent alternatives.

Train operators can offer other types of tickets, for example based on commercial or promotional considerations. Referred to as regulated fares, which generally include ticket types such as Off-Peak Day, longer-distance and advance tickets, these fares generally cater to the leisure and other markets where rail passengers have more alternative options and where fares pricing is likely to be more competitive. For the two busiest routes for Lumo:

- Edinburgh-London: almost all the demand growth has been with unregulated fare travel.
- Newcastle-London: regulated fare volumes are still recovering to pre-Covid levels, while unregulated fare volumes are growing.

Comparing the levels of unregulated fares offered by Lumo against comparable unregulated fares on the same routes suggests Lumo's fares are around one third to one half lower than fares offered by other operators. This is summarised in Table 2.

Lumo passengers are therefore benefiting from lower fares. The fares averages on Lumo services, compared to the spreads of fares on the same routes by other train operators, imply that Lumo passengers could have collectively saved around £18m in the 2022/23 financial year.

If this scale of fare differentials continues, then projecting these savings over the period up to the end of Lumo's track access agreement in 2033 could amount to a total benefit of around £185m (in 2023 prices).

# £185m

Estimated fare saving benefit to Lumo passengers, 2021-33

**Table 2: Comparison of unregulated fares**

Lumo unregulated fares relative to other operators	2023
Edinburgh <-> London	63%-69%
London <-> Newcastle	44%-67%

Source: Lumo



### Effect on fares in general

Lower fares on Lumo services may have influenced other operators' fares. In order to value this, analysis has been undertaken to consider how regulated fares on key routes have changed compared against national fares policies and benchmarks. This analysis suggests that before Lumo began operating, regulated fares on the East Coast Main Line generally tracked, and in some cases exceeded, the national average levels of annual fare increases until 2020. There were reductions in yields from 2021 onwards which are likely to have been influenced by Covid-related demand and pricing effects, but may also have been influenced by Lumo's entry into the market.

Many non-Lumo fares were around 10%-15% lower than they might have been had those fares continued to track the national average levels of fare increases. For non-Lumo rail passengers on these routes, this level of 'fare rise restraint' may have amounted to around £2.0m to £3.5m in total benefit in the 2022/23 financial year.

Caution is required around the valuation of this impact given that Covid effects would have explained some of this restraint in fare rises, and it has not been included in the total benefits summarised at the end of this report. Nonetheless, it is estimated that this impact could range from £25m to £40m in benefits for the period up to 2033 (in 2023 prices).

**“Lumo is an important addition to not just Edinburgh's economy, but also the whole of Scotland as their services provide good inward and onward links. Their focus on low fares and sustainability is helping the connectivity into the Capital, critical for our economic growth. It also supports key sectors such as tourism, both leisure and business, which are now very much focussing on responsible and sustainable growth. Lumo is providing more journeys, delivering environmental benefits and helping bring more people to Edinburgh and beyond.”**

Liz McAreavey, Chief Executive, Edinburgh Chamber of Commerce



### Lumo has delivered significant mode shift benefits

Improving the rail offer for a given route can bring about a range of benefits associated with mode shift from car. Environmental benefits are addressed in a separate section later in this report, but other benefits brought about through reducing vehicle kilometres include:

- A reduction to highway congestion
- A reduction to highway accidents
- Some other smaller impacts such as reductions in highway maintenance costs

A separate report undertaken for Lumo by Arup estimated the scale of mode shift from car. For consistency, the estimated change to car kilometres from that report has also been used in the valuation of benefits for this study.

The benefits are monetised using values from TAG for the benefit per car kilometre removed. Those values differ by road type. A range is estimated by using values for motorways only (which has the lowest congestion benefits) and values for average roads which includes other routes such as A roads.

The benefits that are based on mode shift from motorway are likely to be the most appropriate. This results in an estimated benefit of £125m from the launch of Lumo services through to 2033 (excluding any environmental mode shift impacts, which are included later in this report). An estimate based on mode shift from A roads would result in a benefit of £765m, but this is likely to be an overestimate as the affected trips would mostly use motorways.

## £125m+

– estimated mode shift benefits of Lumo in relation to highway congestion, accidents and maintenance, 2021-33



“It’s great that the North East is home to Lumo, the UK’s newest and greenest passenger train operator. They are one of a number of businesses who have chosen the North East as the ideal place to establish and grow a business, attracting good quality employees as part of the jobs they have created, in addition to the transport boost they have brought to the region.”

John McCabe, Chief Executive, North East Chamber of Commerce

### Direct employment impacts have added to Newcastle’s GVA

Lumo employs a workforce of around 110 employees, and offers them custom designed apprenticeships. This contributes to the economy through the following:

- There is a direct impact on GVA via the output that those jobs produce.
- There are also indirect impacts through the expenditure that those employees make in the local economy and wider impacts on the supply chain.

The direct employment impact on GVA is estimated by using data from the Office for National Statistics on GVA per filled job, a measure of productivity. Average figures for Newcastle are applied. The latest data is available for 2021; for future years it is assumed that productivity grows by 1.5% a year.

This provides an estimate of the gross level of GVA produced between 2021 and 2033. An assessment is then required of how much of that would be additional to the economy since some of those jobs would have been created elsewhere or could represent displacement from existing activity<sup>5</sup>.

Accounting for this suggests that the economic impact associated with employment at Lumo is worth a total of £21m - £43m (in 2023 prices) from launch until 2033.

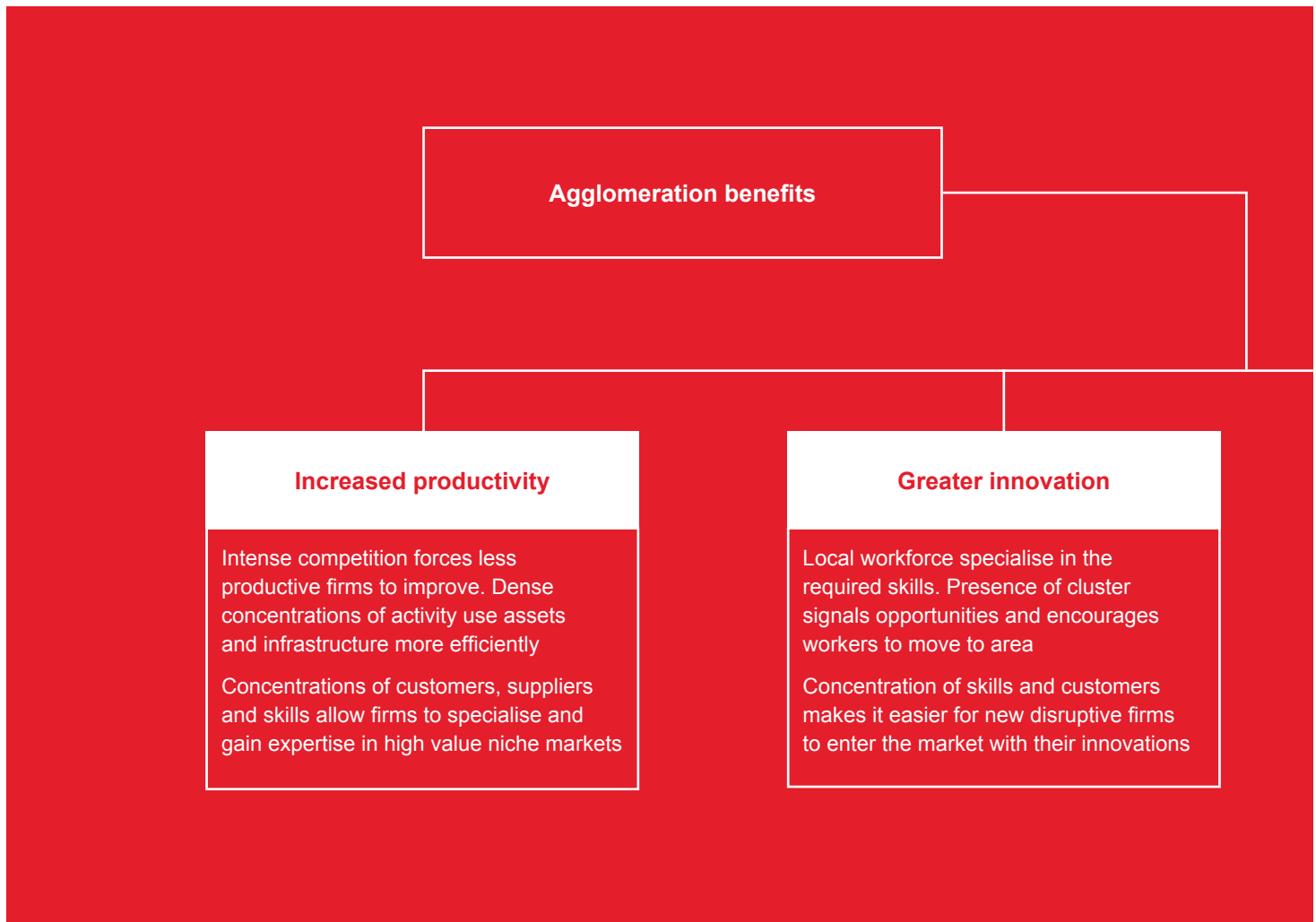
<sup>5</sup> There is uncertainty around the level of additionality and so a range has been used to calculate the impact. Based on additionality guidance from the Homes and Communities Agency (which is now Homes England), additionality between 20% and 40% has been applied. To account for further economic activity associated with additional local income, local supplier purchases and long-term development effects, a regional economic multiplier is also applied, sourced from the same guidance.

**Lumo has supported agglomeration**

Connectivity between centres of employment is important to deliver agglomeration benefits. Agglomeration represents the productivity benefit that arises from improved connectivity, which impacts on the effective density of a given location. Figure 6 shows ways in which these positive impacts can arise.

**Rail supports agglomeration through encouraging innovation and knowledge transfer.**

**Figure 6: Agglomeration benefits**





### **Knowledge transfer**

Physical proximity facilitates knowledge sharing through formal or informal channels

Clusters can bring together firms in different niches, academics and government institutions, sharing experiences and approaches

### **Economies of scale**

Large markets for both customers and suppliers encourage growth and better coordination of the supply chain

Large scale allows more products and services to be offered profitably, satisfying market needs and generating growth

In a transport context, agglomeration benefits are driven by improving connectivity between major centres of employment. The agglomeration benefits of Lumo should not be overstated as the major cities that it serves – London, Newcastle and Edinburgh – were already well served by the national transport network before the launch of Lumo.

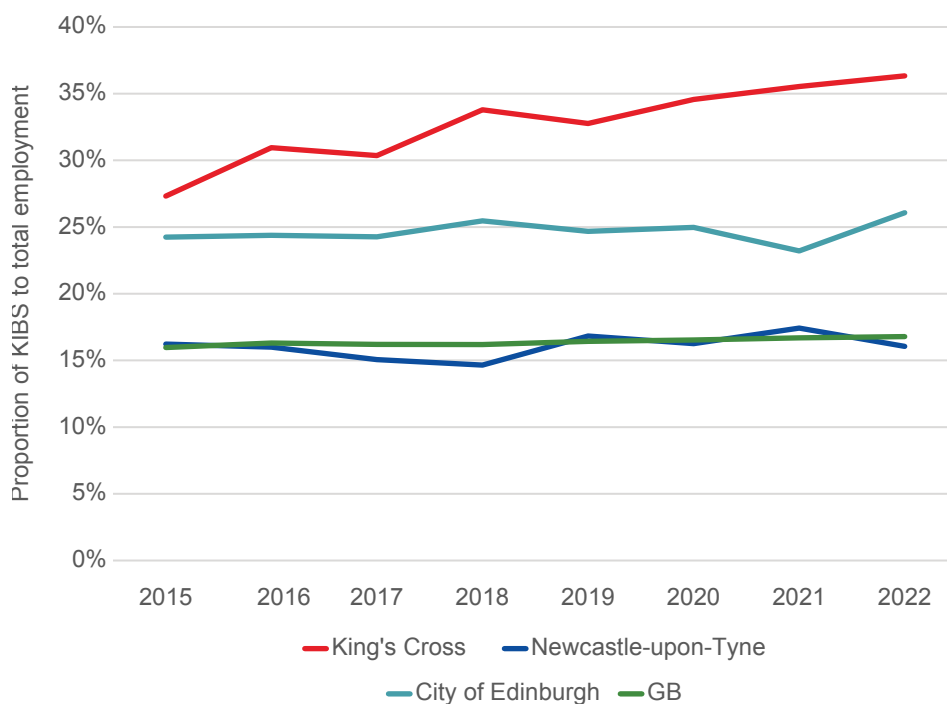
Nonetheless, there are clear benefits from better connecting these places. For instance, Figure 7 shows jobs in knowledge intensive business services (KIBS) as a proportion of total employment around King’s Cross, Newcastle-upon-Tyne, and City of Edinburgh<sup>6</sup>. Jobs in KIBS tend to be those that most benefit from agglomeration and have high levels of productivity. Figure 7 shows that King’s Cross and Edinburgh have a particularly high share of these jobs, with Newcastle at around the national average. Considering that jobs in knowledge intensive

industries are more likely to use rail than the overall average for all jobs, Lumo trains play a role in supporting the productivity gains that come from keeping these places well connected.

The valuation of agglomeration impacts in this report is based on a high-level assessment of the benefit that may be realised as a result of Lumo services, rather than being based on detailed economic modelling. The academic literature within transport appraisal suggests that impacts such as agglomeration are typically in the range of 10-30% of the value of the conventional user benefits (such as time savings) that are estimated in economic appraisals. This has been applied here.

This results in an estimated range of £1-6m for the agglomeration benefits of Lumo from 2021-33, expressed in 2023 prices.

**Figure 7: Knowledge intensive business services jobs as a share of total**



Source: ONS

<sup>6</sup> To produce a figure for King’s Cross, figures for four Mid Layer Super Output Areas (MSOAs) within the catchment of the station were used.



London and Edinburgh  
have a higher than  
average share of  
knowledge intensive  
jobs, which benefit  
from rail connectivity.

**£1-6m**

– estimated agglomeration  
benefits of Lumo, 2021-33



### Supporting tourism

Tourism plays an important role in the economies of several of the locations served by Lumo. Rail has a part to play in supporting that by enabling people to make visits using a sustainable mode of transport. According to the National Travel Survey, rail accounts for 8.9% of all trips over 10 miles. VisitBritain data indicates that rail’s mode share of domestic tourism trips is 14.4%. Rail is therefore used disproportionately for tourism.

Table 3 shows tourism spend for selected local authorities and where they rank nationally out of the 336 districts in England that are included in the data. Westminster in central London is ranked first, which is unsurprising given the number of tourists that visit central London. Newcastle and Northumberland (which is where Morpeth is located) also feature high on the list, ranked 16th and 25th respectively.

Table 4 also supports this by showing that there is a range of visitor attractions in Morpeth and Newcastle, as well as the numerous attractions on offer in London. Several of these locations are in the top 15% most visited attractions in England including Cragside and Wallington House in Morpeth, and Gibside and the Great North Museum in Newcastle. All of these fall within the ‘200k+’ category for annual visitor numbers, which is the highest category that VisitBritain uses for this data.

The VisitBritain data cited above only covers England, so it does not include information about Edinburgh. However, additional information from VisitScotland reflects the importance of tourism to Edinburgh, including:

- In 2019 there were 1.9m overnight visits to Edinburgh and Lothian from the rest of Great Britain (outside of Scotland);
- This represented £500m of tourism spend; and
- Many attractions in Edinburgh had over 200,000 visitors in 2019 including the National Museum of Scotland (2.21m), Edinburgh Castle (2.17m), the Scottish National Gallery (1.58m) and St Giles’ Cathedral (1.22m).

Tourism benefits are not usually monetised within a transport economic assessment. However, through increasing service frequency and improving connectivity between locations along its route, Lumo helps to support tourism by enabling people to have a convenient, sustainable way of visiting the places that it serves.



**8.9%**

Rail share of trips over 10 miles  
(National Travel Survey 2023)

**14.4%**

Rail mode share for domestic tourism  
(Visit Britain, average 2021-23)

**Table 3: Tourism spend, selected locations**

Location	Value of domestic tourism spend per year	Ranking out of 336 districts in England
Central London (Westminster)	£8.9bn	1
Newcastle	£1.2bn	16
Northumberland	£960m	25

Source: VisitBritain

**Table 4: Visitor numbers for selected tourist attractions**

Location	Visitor destination	Visitor numbers 2022	Ranking (out of 1,100 attractions in England)
Morpeth	Cragside, National Trust	200k+	153
Morpeth	Wallington House, Gardens and Estate	200k+	154
Morpeth	Brinkburn Priory	<10k	833
Newcastle	Gibside	200k+	144
Newcastle	Great North Museum	200k+	167
Newcastle	Discovery Museum	100k-200k	216
Newcastle	Laing Art Gallery	100k-200k	273
Newcastle	Belsay Hall, Castle and Gardens	50k-100k	374
Newcastle	Newcastle Castle	20k-50k	526
Newcastle	Hatton Gallery	10k-20k	613
London	Many attractions including 13 of the 20 most visited nationally		

Source: VisitBritain

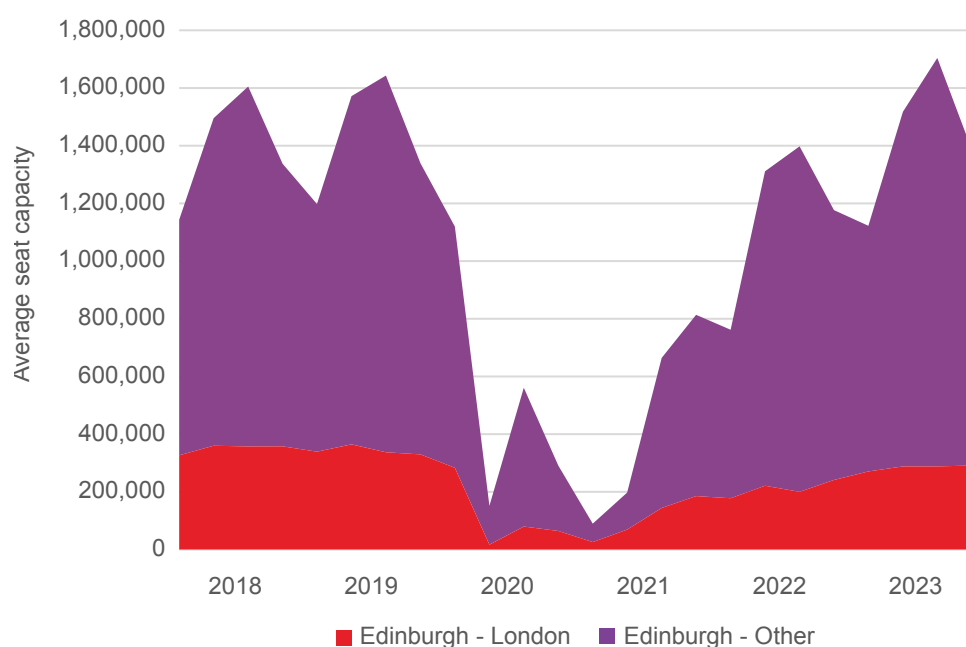


### Freeing up air capacity

Figure 8 shows average seat capacity for flights between Edinburgh and London, and between Edinburgh and elsewhere. This suggests that whilst total capacity is now at a slightly higher level than pre-pandemic, the share that is accounted for by flights between Edinburgh and London is lower. This ties in with the findings earlier in this report about Lumo enabling mode shift from air for the Edinburgh-London route.

Freeing up capacity to serve other routes can bring about economic benefits by supporting new opportunities for tourism and trade, particularly to the extent that it opens up routes that previously were not served at all.

Figure 8: Quarterly average seat capacity for Edinburgh flights



Source: OAG



# Environmental impacts



## Decarbonising travel

Lumo provides low-carbon regional and national connectivity as an alternative to car and air travel, such that a return trip from Edinburgh to London on Lumo trains saves the equivalent of up to 11 trees worth of annual carbon when compared to flying<sup>7</sup>. Additionally, a one-way Lumo trip between Edinburgh and London emits roughly 6.8 kgCO<sub>2</sub>e – this is approximately 22 times less than that emitted by air travel.

Table 5 compares CO<sub>2</sub>e emitted from one-way trips via car and planes to Lumo trains. On average across all routes, Lumo trains emits carbon dioxide equivalent emissions that are 25 times less than flying and 22 times less than travelling by petrol car. Thus, rail is by far the lowest emitting mode (when compared to petrol car and plane) for journeys between London King’s Cross and stations along the Lumo route.

Additionally, the introduction of Lumo train services brings the potential for modal shift from air to rail travel, such that if 15% of passengers that flew from Heathrow to Edinburgh had travelled via Lumo rail, 25,600 tonnes of CO<sub>2</sub>e could be saved annually. This is equivalent to one million trees, or 3,650 hectares of forested land needed to offset these emissions.

The operating emissions associated with Lumo trains are expected to further decrease in the future as the UK government aims to achieve net-zero by 2050, and investment in renewables, particularly wind and solar, continually increases. This investment is projected to decrease grid carbon intensity to 0.072 kgCO<sub>2</sub>e per kWh by 2027. This will directly reduce Lumo’s operating emissions and thus its overall footprint.

## Delivering further environmental benefits through mode shift

A separate report by Arup has examined the extent to which Lumo services have led to mode shift from car and air, and the impact on carbon emissions. It is estimated that in the financial year 2022/23, Lumo helped customers to avoid emitting a total of 60.6 ktCO<sub>2</sub>e by using their rail services.

Environmental benefits associated with mode shift from highway and air have been estimated using the price of carbon from TAG guidance. It is assumed that the emissions for a single year from the report cited above can be carried forward annually, although no further analysis has been undertaken for future years. This approach results in the following estimated environmental benefits from 2021 to 2033:

- Greenhouse gas benefit of £130m - 365m
- Local air quality benefit of c. £5m
- Noise reduction benefit of c. £5m

The greenhouse gas benefit is at a substantial scale, reflecting that Lumo services have led to mode shift not only from car but also from air. The large range for the valuation reflects that the low, central and high carbon values from TAG have been used to estimate the range.

**Table 5: Carbon dioxide equivalent (kg) emissions used on one-way petrol car and plane against Lumo journeys<sup>8</sup>**

Journey	Distance (km)	kgCO <sub>2</sub> e used vs rail	
		Petrol car	Air
London King’s Cross to Stevenage	44	x 23	
London King’s Cross to Newcastle	432	x 21	x 27
London King’s Cross to Morpeth	459	x 21	x 25
London King’s Cross to Edinburgh	632	x 21	x 22

<sup>7</sup> Arup. (n.d.). *The case for rail: Comparing the passenger emissions for Lumo Trains with alternative modes*. Retrieved from <https://www.lumo.co.uk/-/media/PDFs/Lumo-ARUP-Sustainability-Report-2023.pdf>

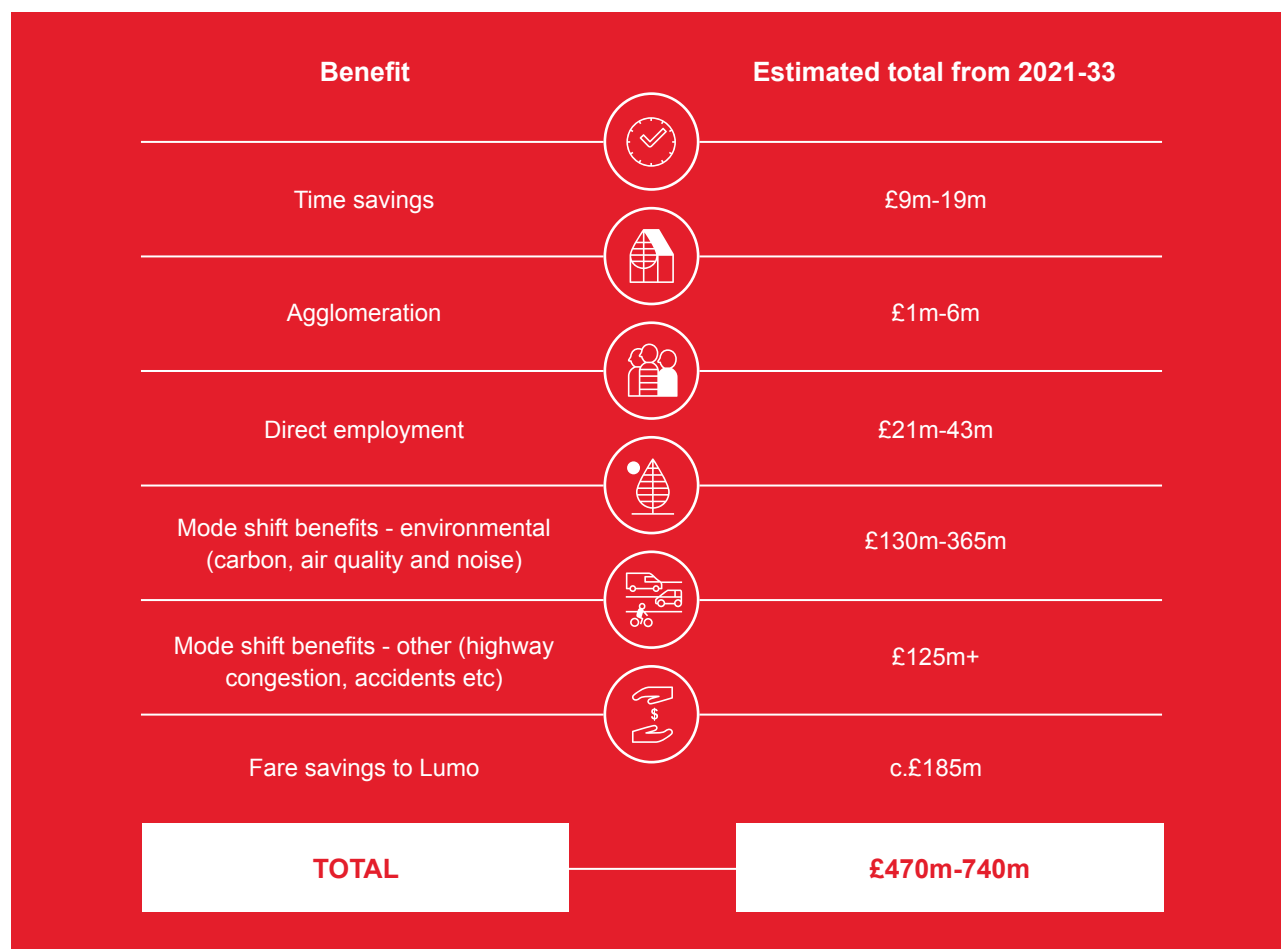
<sup>8</sup> Lumo. (n.d.). *Sustainability Matters*. Retrieved from Lumo: <https://www.lumo.co.uk/who-we-are/sustainability-matters>

# Summary of monetised benefits



Figure 9 brings together the various benefits that have been quantified as part of the assessment. This shows that Lumo is estimated to deliver benefits of around £470m - £740m from launch up to the end of its track access agreement in 2033 (expressed in 2023 prices).

**Figure 9: Summary of monetised benefits from launch to 2033**



# Partnerships and initiatives

As well as Lumo's beneficial impact on the economy and sustainability, it has played an active role in the communities it serves by supporting many events and initiatives including:

- A charity partnership with The People's Kitchen;
- Working with the Newcastle College Travel and Tourism course to provide real life work experience opportunities for students;
- Sponsoring Gateshead FC;
- Sponsoring Newcastle Falcons;
- Operating the 'Pride Partnerships' train (and sponsoring Northern Pride, Curious Arts and Pride Radio);
- Supporting and promoting the Edinburgh Fringe, including donating free travel as part of the Keep it Fringe Fund;
- Showcasing local arts and culture talent and promoting travel by train with a 'Culture Train' initiative;
- Sponsoring Edinburgh Science Festival and The Climate Co-Labs;
- Sponsorship of European Hyperloop Week when it was hosted by Edinburgh University in 2023;
- Acting as a business partner to Beamish Museum;
- Supporting local businesses, taking independent traders' products onboard their trains and helping expand their profile and reach- including Lumo x Donzoko 'Train Beer' and Ringtons Tea;

- Working to support wider rail industry events, including the Speaker Box Party and Pride in London activities at King's Cross, working with Network Rail;
- Custom designed apprenticeships for Lumo employees.

Lumo advocates continuous learning and personal development, with 90% of their team undertaking a custom designed apprenticeship when they join – ensuring that all employees can be the best that they can be. All staff are mentored throughout their careers with Lumo while championing their success. Beyond their employees, Lumo is committed to supporting communities it serves. In October 2021, Lumo announced a partnership with The People's Kitchen (Newcastle homeless support) – a charity run by unpaid volunteers, who prepare, cook, and serve up to 220 meals daily. Lumo has previously donated blankets as part of the charity's annual Advent and raised money for the charity in October 2023 while raising awareness of The People's Kitchen to its passengers. Lumo plans to deliver volunteering days to support the efforts in the kitchen as part of its continuous support to The People's Kitchen.





Lumo’s partnerships expanded as they partnered with locally based Donzoko Brewing Company to launch its first ‘train beer’ in May 2023. This offers a vegan friendly ale, served in an eco-friendly can, complementing Lumo’s environmental efforts and joining the 50% of plant-based food and drink available on its trains. Further to this partnership, in October 2023, Lumo announced its partnership with Newcastle Falcons, the Premiership Rugby team, for the 2023-24 season. This partnership establishes a promising relationship between two key industries: sport and rail. Lumo continues to develop its service and provide a greener link to the capital for Falcon fans in the future. This partnership celebrates the sustainability efforts and dedication to the North East brought by both businesses and the way in which they are committed to finding and developing local talent.

“Lumo is a great and much-valued addition to the North East community. They play an active role as a business in supporting and promoting the region, including recent sponsorship of the North East Tourism Awards and helping us support many visiting delegations. Their low fare train service has created a new offer attracting different and greater tourism opportunities to and from Newcastle and the surrounding area, and their environmental credentials are a good fit with the region’s stated low carbon ambitions.”

John Marshall, Chair, NewcastleGateshead Initiative (LVEP)



# Conclusions



This report demonstrates the range of economic and environmental benefits that Lumo delivers. These include:

- time savings through increasing services between London and Edinburgh via Stevenage, Newcastle and Morpeth;
- agglomeration benefits from increasing connectivity;
- mode shift benefits from reducing travel by highway and air;
- fare savings to passengers; and
- GVA impacts through direct employment.

The quantified element of these benefits, from launch in 2021 up until the end of Lumo's current track access agreement in 2033, is estimated to be in the range of £470m-740m, in 2023 prices.

That figure does not include potential further fare savings to non-Lumo rail passengers to the extent that fares with other operators are now lower as a result of Lumo's launch. The value of this benefit is less certain, but is estimated to be worth around £25m to £40m.

Lumo also delivers a range of benefits that have not been monetised. This includes supporting tourism and – through encouraging a shift to rail for trips between London and Edinburgh – freeing up air capacity that can support the economy through serving new routes.

These benefits demonstrate just how much Lumo, as an open-access operator, has added to the UK economy. The addition of Lumo services has increased people's ability to travel sustainably along the corridor that it serves, also delivering substantial environmental benefits.

# ARUP

**Contact:**

**Mark Havenhand**

Transport Policy, Strategy and  
Economics Business Area Lead

e: [mark.havenhand@arup.com](mailto:mark.havenhand@arup.com)

Arup  
8 Fitzroy Street  
London, W1T 4BJ

[arup.com](http://arup.com)