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Micromobility in London

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"We believe that integrating shared micromobility into London's transport system will lead to a more pleasant, less polluted and less congested city. Powered by renewable energy, Dott's e-scooters offer Londoners the choice to travel in an environmentally friendly, fun and efficient way. For e-scooters and e-bikes to be a truly compelling alternative to cars, cities need to set standards that ensure riders, pedestrians and other road users can travel safely. We work closely with the communities in which we operate to help introduce our services safely, and collaborating with the Centre for London on this research highlights the importance of a consistent approach across the city which would offer riders the best experience and encourage the switch to a greener way to travel."

Duncan Robertson, General Manager
Dott UK/Ireland

"At Voi safety and accessibility have always been at the heart of everything we do to ensure our e-scooter and e-bike riders and all other road users can benefit from the introduction of these sustainable modes of transport. While our experience tells us that one size doesn't fit all, cities such as London can benefit from insights and learnings from other UK cities where e-scooter and e-bike trials are taking place, be that on safety, technology or operations. The collaboration between Centre for London and Voi on this research will play a key role in helping policymakers set the framework to create better and healthier places to live."

Nathan Ashley, Senior Public Policy Manager
Voi UK, Ireland & Benelux

Summary

Transport contributes a quarter[1] of London's CO_2 emissions so will play a vital role in achieving the Mayor of London's target for the city to reach net-zero carbon emissions by 2030.[2] In 2019, 36 per cent of trips were made by car, another 37 per cent by public transport, 25 per cent by walking, and 2 per cent by cycling (including e-bikes). Following the economic ramifications of the COVID-19 pandemic, improving Londoners' access to modes of travelling around their local area and the city more broadly could play an important role in the recovery of London's high streets. There is an opportunity to reduce the use of privately owned cars by enabling more people to cycle and use other forms of 'micromobility', such as e-bikes and e-scooters. Not only would this support the city to become carbon neutral, but it could also lead to cleaner air, less congested roads, safer streets, and increased mobility for Londoners.

It is important to consider who stands to benefit and who risks losing out from any changes to how people travel in London. At present, those who cycle in London do not accurately represent the city's population – they are more likely to be relatively young, affluent, male, and white. Policy must ensure that all Londoners, including those currently less likely to cycle or use other forms of micromobility, are supported to make more use of micromobility. This is crucial not only because being attentive to existing inequality in the city and seeking to redress it is a worthy goal, but it will also be essential to realising the wider opportunities presented by micromobility, such as reducing London's carbon footprint.

This report seeks to synthesise existing evidence about the opportunities and risks posed by increased access to micromobility and to provide evidence-based recommendations for how to support their use in London.

Our aim is to inform policy with new thinking and evidence and develop a pathway to building a 'gold standard' low carbon micromobility ecosystem in London.

Key findings

Opportunities presented by micromobility

Use of micromobility could lead to reduced use of private cars.

- Two thirds of car trips in London could be made by bike, e-bike, and likely by e-scooter in 20 minutes or less, with most of these trips occurring in outer London.[3]

- Studies in France suggest that between 8 and 10 per cent of those using a shared e-scooter would have used a car or hailed a taxi, had an e-scooter not been available.[4]

- Survey data from France suggests that shared e-scooter riders have not significantly reduced how much they walk or use public transport.[5]

- Survey data from Salford suggest that micromobility is commonly used as part of a trip involving public transport, with 27 per cent of people who had ridden an e-scooter in the city saying that they had at some point combined riding an e-scooter with riding a bus or a tram, and 12 per cent with taking a train.[6]

Conventional bikes, e-bikes, and e-scooters are more environmentally friendly modes of travel than private car use, taxi or ride-hailing.

- For the same distance travelled by the same number of people, privately owned micromobility modes emit up to 90 per cent less CO_2 than a conventional privately owned car, depending on the vehicle type.[7]

- Shared micromobility vehicles, used for short term hire, emit more CO_2 than privately owned micromobility vehicles, but up to 64 per cent less than a conventional privately owned car.[8]

As well as reducing London's carbon footprint, increased micromobility use could result in a reduction in air pollution from combustion engines which are dangerous to Londoners' health.

- The equivalent of between 3,600 to 4,100 deaths in London were estimated to be attributable to air pollution from all sources in 2019.[9]

- Depending on the type of vehicle, micromobility produces very little if any harmful pollutants at the point of use compared to privately owned cars, though some are emitted in the production and charging of e-bikes and e-scooters, and the operational services of shared schemes, which vary between operators.

Congestion in London could be substantially reduced if more people used micromobility, in combination with public transport, instead of driving private cars.

- London drivers spend, on average, 149 hours a year in traffic, costing the economy an estimated £4.9 billion annually.[10]

- Where cycle lanes have been introduced in London, congestion has not increased.[11]

- If more people switched from driving a privately owned car to cycling, riding an e-bike or e-scooter, in combination with public transport, the city's roads would be less congested.

Millions of Londoners who currently have limited choice about how to travel could be supported to travel around their area if they had access to micromobility, and this could help them to access public transport for part of their journey.

- The proportion of trips made by bike has doubled since 2000, though growth has been slower since 2010, growing by 20 per cent between 2010-2019.[12]

- However, the proportion of trips made by cycling varies considerably across London, from 8.9 per cent in Hackney to 0.5 per cent in Hillingdon.[13] People living in inner London are more likely to cycle than those in outer London.[14]

Risks associated with micromobility

Increased use of micromobility could pose a risk to the safety of riders and non-riders if vehicles are ridden unsafely or in unsafe environments. The evidence suggests that encouraging more people to travel by micromobility instead of private car or motorcycle is likely to lead to safer streets.

- A trip by walking or cycling is less likely than a trip by car or motorcycle to result in someone dying in a road accident.[15, 16]

- Two per cent of people injured or killed in road traffic accidents in London in 2019 were in a collision involving a pedal cycle.[17]

- Collisions involving cyclists are much more likely to injure the rider than pedestrians. [18]

- Cars and larger vehicles are involved in over 80 per cent of conventional bike crashes which result in the death of a rider, internationally.[19]

- Evidence about the safety of newer modes of micromobility is limited but appears to be similar to that for conventional bikes.[20]

Some Londoners have better access to micromobility than others.

- Those in outer London have less access than other Londoners to cycle lanes which are separated to some extent from car traffic and to on-street parking to park their bikes when they arrive at their destination, as well as cycle hangars on their street to park their bike if they can't fit it in their house.[21]

- Shared micromobility schemes that have existed in London in recent years have overwhelmingly operated in inner London.[22]

- Existing evidence suggests that the people who use micromobility tend not to accurately represent the population of the city they live in. For instance, cyclists in London are more likely than the average Londoner to be young, male, white, employed, and to have a relatively high income. [23]

- Emerging evidence about the users of shared micromobility internationally finds that riders tend to be young, male, and to have a higher income.[24]

- There is less evidence available about people who ride e-bikes and e-scooters, but some international studies suggest that they appeal to a different, and in some ways more representative, group of riders.[25]

Key principles for micromobility in London

Increased use of micromobility in London has the potential to bring about a range of benefits, including to the city's carbon footprint, its air quality, the level of congestion in the city, and Londoners' ability to move around cheaply, easily, and enjoyably. On the other hand, micromobility carries some risks to the safety of riders and pedestrians, and the benefits may not be accessible to all Londoners; these risks appear smaller for micromobility than for many other forms of transport but are worth considering.

Below, we set out the key principles that we believe should guide any investment or policy seeking to increase the use of micromobility in London. These principles seek to enable policymakers to navigate a path that makes the most of the opportunities of micromobility while safeguarding the interests of Londoners, including those who do not use micromobility.

Policy seeking to increase the use of micromobility in London should:

- **Put pedestrians' interests first**, including their safety and convenience.

- **Consider the experiences of current and potential users of micromobility** to ensure that policies meaningfully contribute to making micromobility more accessible to all people across London.

- **Contribute to net zero carbon emissions**, reducing the carbon footprint of travel in the city.

- **Make it possible for all Londoners to use micromobility modes**, focusing on groups who are currently less like to use it, including disabled people.

Recommendations

To make the most of the opportunities presented by micromobility at this critical moment, we recommend the following. Our recommendations are set out in full in Part 3.

To provide a consistent approach across London and the UK:

- National government should give Transport for London (TfL) the power to make arrangements for shared schemes for micromobility on behalf of the whole city. TfL should collaborate with local authorities and operators in a way that delivers city-wide provision of shared schemes for micromobility.

- National government should legalise private ownership and riding, as well as shared schemes, of micromobility vehicles, such as e-scooters, that can be ridden safely alongside conventional bicycles. This should include vehicles which meet minimum standards, such as a maximum permitted speed and the presence of lights, both at the point of sale and while being ridden.

- The Mayor of London should update the Transport Strategy to reflect the potential to extend the role of micromobility for travel in London.

To enable sustainable and active travel:

- TfL should develop a single, distance based road user charging scheme for users of cars and larger vehicles to encourage use of more sustainable modes of transport, including micromobility, and discourage use of private cars.

- TfL should seek to work with operators to integrate payment mechanisms for shared micromobility with payments for public transport in London.

To provide enough space to ride and park micromobility vehicles:

- The Greater London Authority (GLA) and local authorities should work together to ensure there is enough parking for current and projected demand for micromobility vehicles of all types, so that more Londoners have access to parking where they live, at transport hubs, and at their destination.

- TfL should review the characteristics of micromobility parking design via the London Cycling Design Standards to ensure it suits the needs of Londoners and the requirements of all types of micromobility vehicle. This should include a focus on safety for users, including well-lit parking; security of storage; and safety and convenience for pedestrians.

- TfL, the GLA and the boroughs should require Equality Impact Assessments for larger parking and infrastructure projects, to ensure that they systematically take equality into account.

- TfL and London boroughs should regularly review the current and projected demand for road space for micromobility (currently cycle lanes) and expand them as needed.

To ensure that micromobility is safe for riders and pedestrians:

- Operators of shared vehicle schemes should use penalties and rewards, including price incentives, to encourage safe riding and parking, such as reducing the incentive to rush through traffic and increasing the incentive to park appropriately.

- TfL and local authorities should invest in the expansion of delivery of 'micromobility training' and publicity.

- Where pavement riding of vehicles travelling significantly faster than walking pace persists, and where electric micromobility vehicles travel above legal limits, police should enforce bans on unsafe riding.

To make micromobility accessible to all Londoners:

- National government should offer tax incentives and loans to all citizens wanting to buy a micromobility vehicle.

- TfL, providers, the GLA and boroughs should continue to develop and deliver public messaging about micromobility to encourage take up by those least likely to think of micromobility as for them.

↓ Operators of shared vehicle schemes should use penalties and rewards to encourage safe riding and parking.

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↗ National government should offer tax incentives and loans to all citizens wanting to buy a micromobility vehicle.

Introduction

What is micromobility?

The word 'micromobility' can be used to mean a wide range of vehicles. In this report, we use it to describe small vehicles used by people to get themselves around a city and that can be safely ridden alongside conventional bicycles in cycle lanes. In practice, this currently covers mainly conventional bicycles, and certain electric bikes (e-bikes) and electric scooters (e-scooters).

Technological advances in batteries, small motors, satellite navigation and smartphones have enabled these vehicles, and an associate layer of services, from sharing to security, around them. Advocates believe they are broadly compatible with slower, more active, lower carbon streetscapes, and generally they use pre-existing street infrastructure. Cities and transport authorities around the globe have adopted a wide range of approaches to their regulation and management.

Before the COVID-19 pandemic, the UK and London authorities took a cautious approach to newer forms of micromobility, such as e-scooters. Since the onset of the pandemic, as people began to avoid using public transport due to fears about the virus, a rise in car use and the associated environmental harm this might cause may have played a role in the government accelerating e-scooter trials (see Box 2).

In this section we discuss the importance of a consistent approach to defining micromobility, and some of the difficulties that have accompanied this challenge.

Micromobility, electrification, and the Highway Code

Researching and regulating micromobility is made harder because it is not clearly defined in law. The Highway Code recognises a number of different vehicle types related to micromobility, and these do not neatly map to the actual types of vehicles available today. It does not recognise e-scooters outside of the current trials, which is why they are illegal to drive on the public highway.

The Highway Code recognises:

- Non-powered bicycles
- E-bikes, which must have the speed at which they assist the rider capped at 15.5mph and require the rider to pedal rather than just using the engine – otherwise they need a licence
- Lower-powered wheelchairs and mobility scooters, restricted to the pavement and capped at 4mph
- Higher-powered wheelchairs and mobility scooters, which can travel at 4mph on the pavement or 8mph on the road
- Motorcycles

All human-powered and electric vehicles can contribute to London meeting its net-zero goal where they replace petrol and diesel car journeys, and smaller vehicles reduce congestion by taking up less space on the road and when parking. Like conventional bicycles, there are reasons to regulate the use of e-bikes and e-scooters, such as the potential for a crash to result in the injury of a pedestrian. However, regulation should be proportionate to the impact of the use of micromobility on others in the city; for instance, the risk of a crash harming a pedestrian is considerably less for micromobility than for conventional cars and larger vehicles. We need to welcome this innovation, while making sure that it does not disadvantage pedestrians and vulnerable road users, especially people with disabilities.

For this project, we have defined micromobility as small vehicles which can safely be ridden alongside bicycles in cycle lanes. We focus on the case of conventional bikes, e-bikes, and e-scooters, as the main examples of micromobility vehicles. The definition we use is based on the outcome of using micromobility, rather than on specific features of the vehicles in question, per se. Nonetheless, our definition is likely to overlap considerably with the low speed, low mass sub-category of micromobility vehicles defined by the International Transport Forum – vehicles weighing less than 35 kilograms and a design speed no higher than 25 km/h (see Box 1).[26]

Box 1: Classification of micromobility

The International Transport Forum (2020) proposes that micromobility vehicles are classified according to their speed, their mass, and the combination of these two. They propose four categories, described in the table below.

Lightweight mopeds limited to 45km/h fall outside of the definition used in this report because although they offer some of the benefits of micromobility, such as emitting less carbon than conventional cars, they cannot safely be ridden alongside bicycles in cycle lanes.

There are benefits to thinking about this range of vehicles – bikes, e-bikes, e-scooters, and similar vehicles – as a set, which we call 'micromobility'. While each type of vehicle is unique, they share important characteristics that mean they complement one another. For instance, building more cycle lanes would benefit all forms of micromobility, as would increasing the provision of safe, secure parking for smaller vehicles. A greater proportion of trips being made by cycling, e-biking and e-scooting will likely lead to a reduction in the risk of serious injury from riding any micromobility vehicle if fewer trips are made by car (see Chapter 2). These and other features of micromobility vehicles give us reason to consider all micromobility vehicles – those already popular, those on the rise, and those not yet invented – together.

As technology continues to adapt, policy makers and the legislators responsible for the Highway Code will need to adapt with it: in particular, policy makers will need to decide which vehicles need a licence (like cars or motorbikes), which can be used on pavements, and which can be used on cycle lanes.

Table 1: Categories of micromobility vehicle proposed by the International Transport Forum

Title	Unpowered or powered up to 25km/h	Powered with top speed between 25-45 km/h
Less than 35kg	Bikes, e-bikes, e-scooters, some types of self-balancing or one-wheel vehicles	Faster e-bikes, lightweight mopeds and e-mopeds, some types of self-balancing or one-wheel vehicles
Between 35kg and 350kg	Mobility scooters, electric cargo bikes	Mopeds and e-mopeds

Policy context

Greenhouse gas emissions from transport on the roads in London remain stubbornly high. The UK has a legal commitment to reach net-zero emissions nationally by 2050. In London, the Mayor has committed to achieving net-zero by 2030. Yet, surface transport continues to produce over a quarter of greenhouse gas (GHG) emissions across London, and the UK. In contrast, the UK's energy sector has made significant inroads into greening London's electricity supply. This has provided an opportunity to rethink mobility in the capital.

London's transport system overall is in urgent need of decarbonization, through electrification, active travel, and other yet-to-be-established means.

The COVID-19 pandemic has led to a significant shift in how people move around the city, with fewer trips being taken by public transport, and more by private transport and active travel.[27] Reducing carbon emissions in the city will involve encouraging Londoners back onto public transport while making use of the recent increase in active travel by supporting Londoners to make more trips via cycling, and other small vehicles such as e-bikes and e-scooters.

The use of cycling as a convenient, healthy, and sustainable mode of travel has been on the rise in London over at least the past two decades (see 'Where we are now' below). In recent years, emerging technologies have allowed other modes of transport to be developed – small vehicles which use lightweight electric motors to support or substitute for human pedalling. These vehicles – such as electric bikes (e-bikes) and electric scooters (e-scooters) – provide an opportunity to enable more people to travel in convenient, and sustainable ways.

A rise in the use of micromobility could pose a risk to the finances of Transport for London (TfL) if trips taken by bike, e-bike, or e-scooter displace those taken on public transport. Future funding settlements between the national government and TfL must ensure that TfL has the budget required to enable Londoners to travel in a sustainable way. To realise the benefits of micromobility for the environment and for congestion in the city, it is important that trips taken on micromobility, as far as is possible, displace trips in privately owned cars.

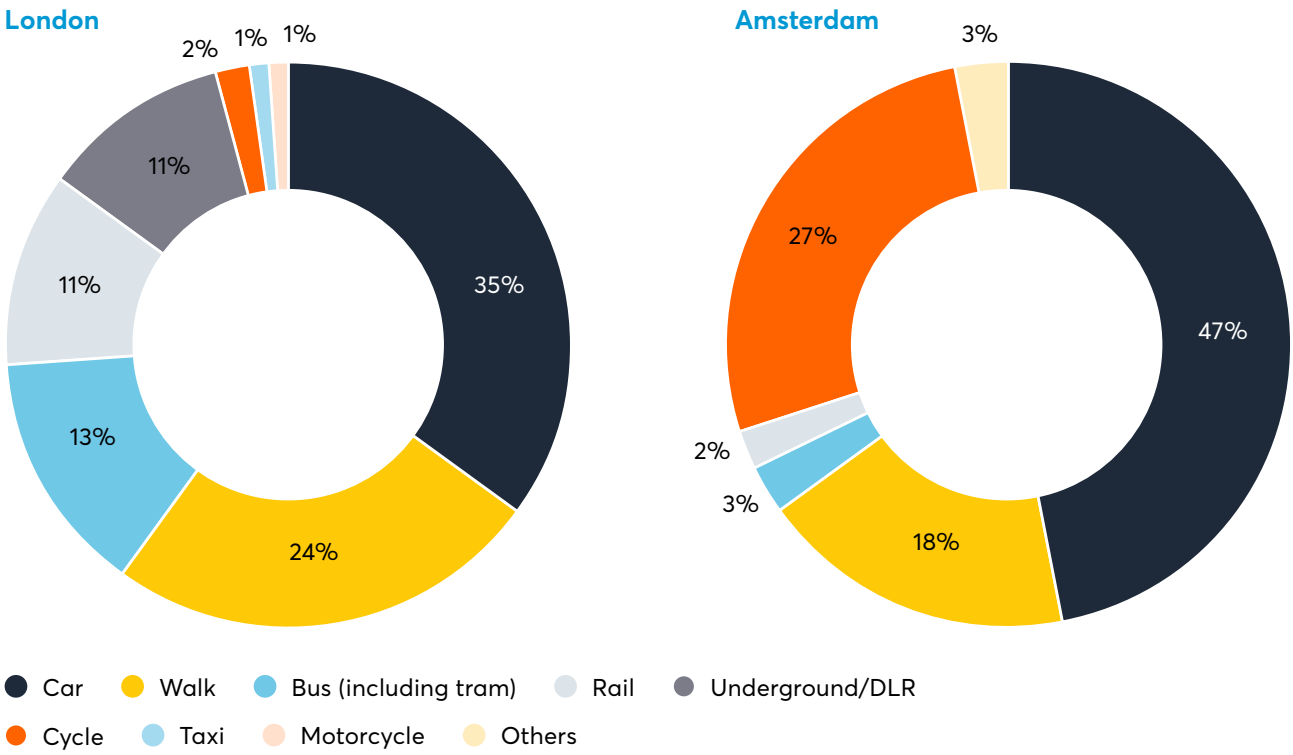
Micromobility vehicles present a significant opportunity to the city. Making micromobility available to more Londoners in a safe and affordable way could increase the proportion of trips in London taken by small vehicle, walking, or public transport – bringing about a host of benefits from cleaner air and reduced congestion to better access to local services and to public transport.

Where we are now

According to the most recent data available (for 2019), people in London most commonly travel by public transport (36 per cent), followed closely by travel by car (36 per cent) by walking (35 per cent) and by cycling (two per cent, including e-bikes). The proportion of trips made by bike has doubled since 2000, though growth has been slower since 2010, growing by 20 per cent between 2010-2019.[28] However, the proportion of trips made by cycling varies considerably across London, from 8.9 per cent in Hackney to 0.5 per cent in Hillingdon.[29]

For comparison, in Amsterdam, where cycling is famously common, 27 per cent of trips are by bicycle, with 47 per cent made by car (see Figure 1).[30]

Figure 1: Proportion of trips made by different modes, London (left) and Amsterdam (right)[31]



However, some Londoners are much more likely to cycle than others. In Chapter 2 we describe the factors that influence who cycles in London and how this could influence who stands to benefit from policy in this area.

Each mode of transport has its own perks and drawbacks. One study using data from seven European cities found that cyclists travel for an average of approximately 4.8 kilometres per trip, lasting an average of 26 minutes.[32] People who used e-bikes tended to use them for longer trips, both in terms of the distance they travelled and how long it took.

Data from some cities internationally suggests that e-scooters have tended to be used for shorter trips, though this may be due to where e-scooters have been offered so far, with many shared schemes operating in relatively small areas. Evidence from schemes operating in the UK shows that in larger trial areas, such as Bournemouth (stretching 16 kilometres from end to end), trips cover distances more similar to those usually covered by bike. Up to April 2021, there were at least five areas in the UK where the average trip covered 5 kilometres or more.[33]

Car journeys in London tend to cover bigger distances than trips by other modes (average of 13.8 kilometres per trip).[34] Some car trips, especially longer ones, will be more difficult to replace with micromobility alone, but some could be replaced with multi-mode trips, such as cycling to a train or bus station to catch public transport to near your destination.

People might use micromobility for trips with a variety of purposes, from leisure to commuting. Evidence from Paris suggests that demand for rental e-scooter trips was driven by people using them for commuting (19 per cent) and those using e-scooters to ride around with no specific purpose (10 per cent).[35] The same study found that the median time spent on a trip on a rental e-scooter was 11 minutes. Nearly four in ten trips were taken on the weekend. A separate survey of people who use e-scooters in Paris in 2019 found that the reasons most commonly cited for using an e-scooter included saving time on their trip, the playfulness of e-scooters, and saving money.[36] Interim results from a study of users of the e-scooter trial in Salford found that the most commonly cited reasons for riding were for fun or curiosity (80 per cent), followed by leisure and recreation (26 per cent); 17 per cent of e-scooter riders had used them to travel to work or study.[37] The authors note that the fact that the trial was in early stages and social distancing was in place in response to COVID-19 at the time of their research may have influenced these findings. A survey conducted in London in 2016 found that cyclists reported making journeys by bike for a variety of reasons: the most common type of journey reported was for pleasure or exercise (54 per cent), to visit friends or relatives (40 per cent), for social or recreational purposes (40 per cent), followed by personal business (e.g. visiting the doctor) and commuting to work (33 per cent for each).[38]

The proportion of people in London who have cycled at least once in the past year has not changed much in the past decade, and has actually fallen slightly from 22.6 per cent of Londoners in 2010/11 to 20.7 per cent in 2018/19.[39] However, the number of cycle trips made in London over the same period has grown substantially, by about 36 per cent.[40] This may partly be explained by the growth in the average distance travelled per cycle trip in London, which grew by approximately 15.1 per cent between 2010/11 and 2016/17.[41] Overall, the number of cycle trips recorded per day in London increased between 2000 and 2016 at nearly twice the rate that London's population has grown.[42] Growth in the number of cycle trips per day over this period has been particularly high in inner London.[43]

Some 17.7 per cent of Londoners cycle at least once a month. Of these, 12.9 per cent cycle at least once a week. A slightly higher proportion of people cycle in London than in England as a whole, where 16.1 per cent of people cycle at least one a month, with 11.2 per cent cycling at least once a week (this difference is statistically significant at the 95 per cent level).

People in inner London are much more likely than those in outer London to cycle once per month (23.3 per cent vs 13.8 per cent) and to cycle at least once per week 17.6 per cent vs 9.5 per cent).[44]

Between 2015/16 and 2018/19, according to a survey conducted annually for the Department for Transport, there was no statistically significant change in the proportion of Londoners who cycle at least some of the time.[45] In England as a whole, however, there was a statistically significant fall in the proportion of people who cycle at least some of the time.

There is some evidence that use of cycling in London increased in the first year of the COVID-19 pandemic, with data from Transport for London suggesting that cycling increased by seven per cent in inner London and 22 per cent in outer London between 2019 and autumn 2020.[46] However, it remains to be seen to what extent any increase brought about in the early months of the pandemic will last as the number of COVID-19 cases in the city falls and social distancing rules are relaxed.

Prior to the COVID-19 pandemic, use of cycling typically peaked during the busiest hours for commuting, as people used cycling to get to and from their place of work. Nearly half of all hires of the Transport for London operated Santander Cycle scheme were used by commuters in October 2019.[47] During 2020, as Londoners tended to make fewer and shorter trips as social distancing measures ebbed and flowed, use of most forms of transport decreased, while people continued to walk and cycle. Use of Santander Cycles, however, rose slightly, while membership increased by 57 per cent in the year to December 2020.[48] However, the proportion of cycling trips that were used for commuting fell substantially to 36 per cent.[49] It is worth noting that Santander Cycles are in inner London; while all Londoners may use them as part of a trip to work (e.g., from the train station to reach their office), this data is likely to reflect use by those living closer to the centre of the city.

E-bikes and e-scooters are newer on the scene, and there is less robust data about their use. Sales of e-bikes are one indicator. The number of e-bikes sold in the UK appears to be on the rise, increasing by 70 per cent between 2019 and 2020, representing one in twenty bikes bought in the UK.[50] A survey of people in a number of European countries found that a quarter of people intended to use an e-bike in 2020.[51] Meanwhile, more than four million trips were made on shared e-scooters as part of UK trials in the first eleven months of their operation.[52] Due to the implementation of e-scooter trials, one in ten people in the UK live in an area where they can rent an e-scooter and millions of trips have been taken since the trials began in July 2020 (see Box 2).

These suggest that e-bikes and e-scooters will continue to become more common on London's streets. For e-scooters, this is especially true if they are legalized following the ongoing trials in London (see Box 2). It is likely that new modes of micromobility that we have not yet anticipated will come about in recent years.

It will be important for London to develop a gold standard micromobility ecosystem which meaningfully enables Londoners to access and use micromobility of all kinds, including those that do not yet exist.

Box 2: E-scooter trials in London and the UK

In recent years, technology has improved to enable electric motors to become smaller and more efficient. This has resulted in a proliferation of new small vehicles, that we refer to in this report as micromobility. E-scooters, represent one category of these vehicles. Riders stand on a platform and use a button pressed by their finger or with their heel to engage an electric motor. Like other forms of electric micromobility, e-scooters can be designed to travel at a variety of speeds.

England currently has several shared e-scooter trials, including one in London – in these, e-scooters run by participating companies are legal, subject to restrictions on speed, geographical area and parking. By July 2021, one estimate suggests that 10 per cent of people in the UK live in an area with access to a trial.[53] Private scooters remain illegal. Riders must have a driving licence or learners permit, and transgressions can be punished with points on the licence. Local authorities are responsible for the trials under a central government-run scheme.[54] The aim is to learn from the trials for future regulation approaches.

In London, the trial is being run in a group of areas, each of which has opted in to participating, rather than being determined at a city level by the GLA or TfL.[55] More boroughs have joined the trial since it began in June 2021: in August, the scheme operated in City of London, Ealing, Hammersmith & Fulham, Kensington & Chelsea, Lambeth, Richmond upon Thames, Southwark, and Tower Hamlets (incl. Canary Wharf Estate). Proponents of this arrangement say that it gives boroughs choice and control over what happens in their area, particularly given that local authorities are responsible for most of London's roads (TfL is responsible for major roads, which carry a substantial minority of the city's traffic).[56] Opponents say that this arrangement is confusing and impractical for riders and leaves Londoners with unequal access to transport options in their city.

Public opinion about the trials is somewhat divided, with one survey, commissioned by operator Voi in June 2021, finding that 48 per cent of respondents in England and Wales supported the use of shared e-scooters, while 24 per cent opposed it.[57] Another survey in early 2021 found that 41 per cent of respondents in England thought that using an e-scooter should be made legal, with 44 per cent saying they didn't know enough to make a decision and the remaining 14 per cent against legalization.[58]

A survey conducted by YouGov in June 2021 found that a minority of people in Britain say they are interested in using an e-scooter, with younger people and those who already cycle significantly more likely to be than others. People in London were more likely than those in other parts of Britain to say they were interested in using one. The survey found that most people do not think that e-scooters should be used on the pavement or on the road, but the survey did not ask people how they felt about e-scooters being used in cycle lanes.[59] People in London were more likely than others to say that they thought e-scooters should be allowed on the road.

How travel in London could change

Changes to infrastructure in London, to financial costs of different modes of transport, and to attitudes to those modes, could change how people travel in the city. For use of micromobility to lead to substantial reductions in carbon emissions, air pollution, and congestion, a considerable proportion of travel via micromobility should displace use of privately owned cars. This is because privately owned cars are among the biggest causes of these issues in London. But it is not guaranteed that people will switch from driving a privately owned car or getting a taxi to riding a bike, e-bike or e-scooter. Below we describe the existing evidence on this topic.

Two thirds of car trips in London could be cycled in 20 minutes or less.[60] Most (55 per cent) of car journeys in London that could be cycled in 20 minutes or less take place entirely in outer London. But what proportion of trips taken via micromobility would otherwise have been taken by car? The most recent evidence on this comes from e-scooters and is summarized below.

- Researchers in France asked users of shared e-scooters how they would have travelled if e-scooters hadn't been available. Nearly half (44 per cent) would have walked, a third (30 per cent) would have used public transport, 12 per cent would have cycled, and 10 per cent would have used a car or taxi, a ride hailing service or a shared car.[61] Although 30 per cent of riders said they used an e-scooter instead of public transport, just six per cent said that they had taken public transport less often since they started using an e-scooter.

- Interim findings from a study of the ongoing e-scooter trial in Salford found that of those people who had used an e-scooter in the trial, most said that they would have made all or some of the trips they had made on an e-scooter by another mode had an e-scooter not been available, with 28 per cent of men and 42 per cent of women saying they would have made none.[62] Two thirds (64 per cent) of people who had used an e-scooter had at some point done so in place of walking, 31 per cent had done so instead of a bus or a tram, 19 per cent instead of cycling, 16 per cent instead of a taxi, and 14 per cent instead of a private car. The study found that users of e-scooters in the trial commonly combined multiple modes, with the biggest group (51 per cent) combining an e-scooter trip with walking, while a substantial minority combined it with public transport: 27 per cent combined riding an e-scooter with riding a bus or a tram, and 12 per cent with taking a train. [63]

- A survey in 2018 by e-scooter operator Lime found that one in five (21 per cent) of its riders in Lisbon reported that they would have used a car or taxi had an e-scooter not been available. [64]

- In a survey of e-scooter riders in Essex by mobility company Spin, 31 per cent said that they would have used a car for their most recent journey instead of an e-scooter had the hire scheme not been available in their area. [65]

- An evaluation of a shared e-scooter scheme in Chicago found that most e-scooter riders (53 per cent) said they would have walked or cycled instead, had an e-scooter not been available for their most recent trip.[66] Nearly a third (30 per cent) said that they would have chosen to drive or use ride-hail instead, with 12 per cent saying they would have used public transport and 5 per cent saying they would not have made a trip at all. The proportion of people saying that they would have chosen to drive, or ride-hail instead fits with evidence from Portland where 34 per cent of e-scooter riders said they would have driven a car or hailed a taxi had e-scooters not been available.[67] Cities in the USA tend to have fewer public transport options than London, meaning that the availability of e-scooters is likely to have less of an impact on road use in London than in these cities.

- Nearly half of cycle trips in Chinese cities take place at the beginning or end of a trip on the metro, as part of an intermodal journey. City planners specifically locate shared bike docking stations using data on gaps in public transport provision.[68]

One way that people who would otherwise not use micromobility might do so is if they are given the chance to rent a vehicle for a short period at a low price. There is some evidence that shared schemes influence the likelihood that people go on to use micromobility. In response to a survey of people in the UK who currently used a bike sharing scheme, 30 per cent of respondents said that using bike share had led them to start cycling after a break of at least five years.[69] A study in Paris found that 40 per cent of bike share users in the city had never used a bicycle (either one that they owned or rented) before.[70]

An important factor in whether people are willing or able to use public transport or other means of getting around is how far they have to walk to reach a transport hub or parking space. According to data from Transport for London (TfL), in 2017/18 people in London who walked at least once a day walked more than three times per day as part of a longer trip (e.g., from their house to a bus stop). The average distance they walked in was 0.32 kilometres, for a total of 1.07 kilometres walked per day.[71] Using this as an indicator of how far people are willing and able to walk between different stages in their trip, this suggests that infrastructure such as micromobility parking needs to be distributed widely to ensure it's close to residents' place of work and their home.

There are variety of factors that influence whether people use micromobility and what mode of transport they would be likely to use in its absence. In Part 3 we discuss the potential barriers to micromobility for Londoners and how policy could seek to address them.

1. The opportunity presented by micromobility

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What does London stand to gain from more people travelling on bikes, e-bikes and e-scooters? In this section, we look at the potential benefits for Londoners of an increase in the use of micromobility to get around.

Carbon emissions

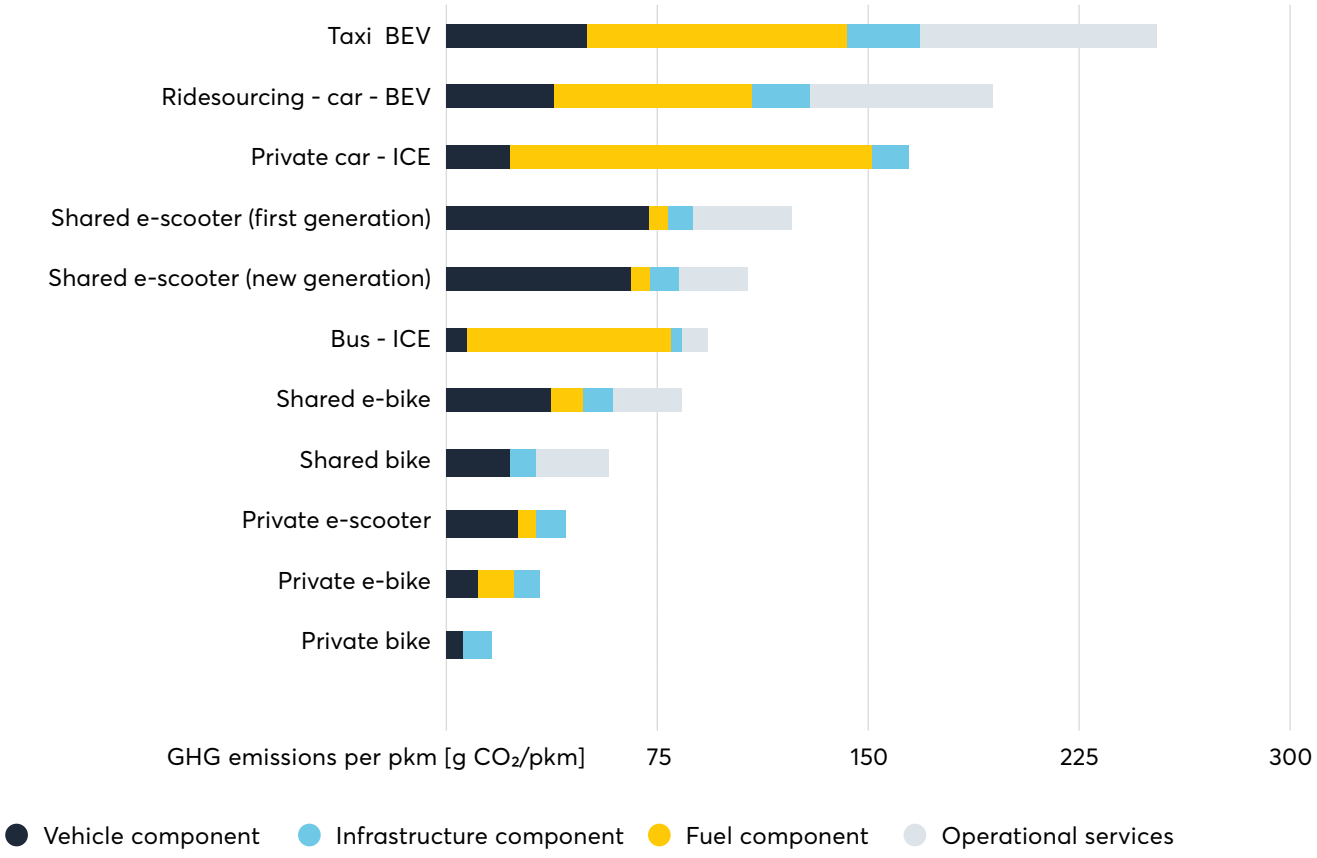
The Mayor of London has set a target for London to be carbon neutral by 2030. Transport in London contributes a significant share of the city's carbon emissions, with all transport (including for industrial uses) making up 25.2 per cent of all of the city's emissions.[72]

Evidence about carbon emitted by different types of vehicle continues to grow, and this is a quickly moving field. In this report, we seek to provide a summary of the evidence as it stands. The emissions of vehicles will vary depending on a range of factors, including the source of energy used to produce and (if applicable) fuel them, how long a vehicle lasts before it has to be replaced, and even the level of congestion in a city. Interestingly, shipping micromobility vehicles from one country to another does not significantly affect the emissions of that vehicle over its lifetime unless it is shipped by aircraft.

Different types of transport are associated with different levels of carbon emissions for the same distance travelled. For instance, one study suggests that a privately owned car with a conventional (combustion) engine will emit 162.0g of CO_2 per passenger per km (pkm) travelled over that vehicle's lifetime (see figure 2). This compares with 91.4g CO_2/pkm for a bus with a battery electric engine, and 248.8g CO_2/pkm for a taxi with a battery electric engine.

Most modes of micromobility emit considerably less than a privately owned car, with a privately owned bike emitting the least (90 per cent less than a private car) and a shared e-scooter emitting the most (34 per cent less). The relative emissions of different modes varies between contexts of different cities and as technology improves. For instance, one recent study by EY, sponsored by e-scooter operator Voi, found that their e-scooters in Paris emit the equivalent of 35g CO_2/pkm – considerably lower than the estimate described by the graph above. This may be due to differences in methodology, context of operations, the improvement of technology, or some mix of the three.

Figure 2: Estimate of life cycle CO_2 emissions from selected transport modes, per passenger kilometre[73]



BEV: battery electric vehicle. ICE: internal combustion engine

Variation in the emissions of different types of micromobility vehicle are mainly due to the emissions associated with producing each vehicle and the distance it travels before it needs to be replaced, any operational services associated with using the vehicle, and the fuel required to operate the vehicle (if any). In general, electric micromobility vehicles tend to have higher emissions than human-powered vehicles because of the production process and the requirement of fuel, much of which is generated using fossil fuels. It is worth noting that the extraction of raw materials required for the batteries of electric micromobility vehicles is also associated with both environmental and social costs.

Shared micromobility vehicles tend to have higher emissions than privately owned vehicles.[74] This difference is due mainly to two factors. One is that some shared vehicles have relatively short life spans due to a range of factors including improper use and vandalism, meaning that each vehicle travels a shorter distance than a private vehicle before it has to be replaced, generating carbon in doing so. At the same time, shared vehicles are often built to be more robust than many private vehicles. The other factor is that shared vehicle schemes require vehicles to be regularly transported to a different part of the city to keep up with where demand for vehicles is likely to be. For instance, if someone rides a shared bike from a densely populated area where their office is based to a less densely populated area where they live, then the operator of that scheme may need to transport that vehicle back to where they picked it up so that someone else can access it easily. This generates carbon emissions. On the other hand, shared micromobility schemes can enable more people to access public transport (see 'How travel in London could change', above), which could support wider mode shift from driving private cars.

The emissions profile of shared micromobility vehicles could improve over time if a higher proportion of electricity is produced using renewable means[75], if more robust vehicles are developed which have a longer lifespan, or if other efficiencies due to better technology are realised.
Work is currently ongoing on these fronts, for instance to increase the lifespan of e-scooters from the current average of between two and five months to up to three years.[76] Evidence suggests that new iterations of shared e-scooters have a considerably smaller carbon footprint than the previous generation.[77] Increasingly, operators are using electric vehicles to transport the e-bikes or e-scooters that they are responsible for, further reducing their emissions. Continuing technological development, in combination with the growing proportion of electricity in the UK that is generated via renewable energy sources, could mean that the gap between the carbon emissions of a privately owned car and e-micromobility, including shared vehicles, will continue to grow.

Evidence from a study covering a selection of cities in Europe suggests that people who cycle on a daily basis emit much less (84 per cent less) carbon from their daily travel than those who don't, with those who cycle or walk more often emitting less still than those who do so less often.[78] According to this study, those who cycled more often were most likely to emit less carbon in their travel to or from work or education and for social or recreational trips, though there was a smaller difference for their shopping and personal business trips and business travel. Taking into account the carbon generated by making the vehicle, charging it, and disposing of it, this study found that carbon emissions from cycling can be more than 30 times lower for each trip than driving a fossil fuel car, and 10 times lower than driving an electric one. People who live in cities who switch from driving to cycling for just one trip per day reduced their carbon footprint substantially; by what the authors claim to be the equivalent of a one-way flight from London to New York each year.

Encouraging people to use privately owned cars less often and micromobility and public transport more often would therefore reduce carbon emissions from transport in London

Air pollution

In 2021, the UK made history by recording its first ever case of air pollution as a cause of death.[79] The coroner ruled that poor air quality had made a 'material contribution' to nine year old Ella Adoo-Kissi-Debrah's death. Air pollution is estimated to have caused 3,600 to 4,100 deaths in London in 2019.[80] The effects of air pollution on human health are varied, with longer term health effects ranging from severe coughing and exacerbating existing respiratory issues, all the way up to asthma, pulmonary disease and lung cancer.[81] Studies also suggest that air pollution can stunt the growth of children's lungs.[82] Over the pandemic, it has been found that living in an area of poor air quality was correlated with higher COVID-19 mortality rates.[83]

The key forms of dangerous pollutants emitted by road transport are Nitrogen Dioxide, Carbon Monoxide, Lead, Polycyclic Aromatic Hydrocarbons and Polychlorinated Biphenyls.[84] These all primarily come from the exhausts of petrol and diesel road vehicles.[85] If more people opt for different modes of transport, or switch to electric and low emission vehicles, there would be better air quality in London.

The second factor that effects air quality is congestion, many combustion engine-based vehicles are less efficient when operating in a stop-start fashion. This is because stop start driving with lots of acceleration and deceleration, and stops and starts forces the engine to operate at its lowest efficiency, as it forces the engine to work harder.[86] If there were

fewer cars and other large road vehicles on the roads, there would be less congestion for the remainder – thus increasing air quality.

The London environment strategy states the Mayor aims for London to have the best air quality of any major city by 2050, with the plan being to reduce car use and move to a zero emission transport system by 2050.[87] This includes measures like supporting the use of zero emission-capable taxis, electric buses, supporting low emission freight and an expansion in electric vehicle charging points. Micromobility solutions like bikes, e-bikes and e-scooters could also play a major role, as being electric they do not themselves at the point of use emit any of the harmful chemicals that are harmful to human health. Micromobility vehicles go further than electric cars to achieving reduced pollution in London by requiring less energy to power the same number of passengers over the same distance.[88]

Although emissions and air pollution from road transport have been declining in recent years, in London, privately owned cars currently emit 8,133 tonnes of NOx a year, 1,245 tonnes of PM10, and 661 tonnes of PM2.5.[89] These are the three most dangerous emissions caused by road transport. As described earlier in this report, two thirds of car trips in London could be cycled in 20 minutes or less. To get a sense of the order of magnitude of how much of an impact could be had if people switched from driving these trips to using micromobility, consider the following calculation. The calculation assumes that (1) the car trips that could be cycled in 20 minutes or less tend to emit approximately half as much as the average car trip, (2) that with a shift to micromobility in the future, 20 per cent of these trips were made via micromobility instead of by car, and (3) that travel by micromobility results in a two thirds reduction in emission of harmful pollutants. A rough calculation tells us that this could result in a reduction of harmful pollutants of about 361 tonnes of NOx, 55 tonnes of PM10 and 29 tonnes of PM2.5.

Congestion

The use of road vehicles in London, measured by the total distance travelled, has been steadily increasing over the last decade. Total road kilometres travelled increased from 30.1 million in 2009 to 36.4 million in 2019,[90] with London drivers on average spending 149 hours of 2019 in traffic, costing the economy an estimated £4.9 billion.[91] High volumes of traffic are correlated with reduced quality of life and economic productivity, as studies have shown that being stuck in congestion on the way to and from work makes people less happy and productive.[92] Where cycle ways have been implemented in London, one study found that they did not have a negative impact on congestion.

It remains to be seen to what extent Londoners who have been able to work from home during the pandemic will return to their usual place of work as case numbers fall. Whatever transpires on the city's streets congestion is likely to continue to be significant in the medium term. It is clear that cycling, and other modes of micromobility, can play a significant role in supporting those Londoners to travel to and from their place of work, helping to reduce car journeys and so reducing congestion.[93]

Improved access to sustainable and active modes of travel

Getting around London is easier for some Londoners than others, based on where in the city they live. A range of factors, including higher population density in the centre than in outer London, tend to make it a quicker area to travel around without a car, with services more likely to be within walking or cycling distance and public transport hubs close by for trips further afield. About one third of Londoners live in areas with the lowest public transport accessibility levels, a measure used by Transport for London to gauge access to public transport, combining how long it takes to walk to the network (e.g., bus stop) and typical wait times for a service.[94]

Access to micromobility is also unevenly distributed in London at present, with residents of inner London more likely to cycle than those in outer London (see Part 3 below). Improving access to micromobility could help all Londoners, and especially those in outer London, to travel around their local area more easily or to use public transport to travel to other parts of the city or elsewhere.

Currently, cycling is the most used form of micromobility in London. The most common purpose of a cycling journey is for commuting to work.[95] Over 10 per cent of cycle trips in London are made in a social capacity, 13 per cent are made for shopping, while eight per cent are made to travel to a place of education.[96]

Newer forms of micromobility, such as e-bikes can enable people to travel farther for the same amount of physical exertion than they would be able to on a conventional bike. Meanwhile, e-scooters, which do not require the rider to pedal, could appeal to a wide portion of the population, including those for whom the physical exercise required to cycle doesn't appeal. In addition, providing short term rental for micromobility is one way to reduce the financial barrier to using a bike, e-bike, or e-scooter.

Cycling tends to be used for shorter distance trips than private cars (see the section 'Where we are now,' above). Inner London is better suited to shorter trips than outer London because of its higher density of people, shops, services, and offices. Much cycling infrastructure has historically been built to suit the needs of commuters who travel in and out of inner London, with a radial pattern of cycle lanes surrounding the centre of the city. The needs of people seeking to travel locally, especially in outer London, for instance to school, to the doctor, or to visit neighbours, has been paid less attention (see the section 'Distribution of the benefits of micromobility').

Approximately 61 per cent of the trips made by the average Londoner are either for education (e.g., the school run), shopping and personal business, or leisure.[97] Many of these trips are likely to be relatively short, to local schools or businesses. A minority of these trips are taken via micromobility. If better infrastructure, such as cycle lanes and safe, secure parking for micromobility were provided locally, more of these journeys might be possible on micromobility for more people. There is evidence that recent investment in cycling infrastructure in European cities in response to the COVID-19 pandemic led to an increase in cycling in those areas that it was introduced.[98] In response to a survey in 2016, 17 per cent of cyclists in London cited improved cycling infrastructure in the city as a reason that they had started cycling.[99] The introduction of well-planned Low Traffic Neighbourhoods which join up with each other and existing cycle networks is one way of improving cycling infrastructure in London; Centre for London will consider this topic in a forthcoming report.

Across London, improving access to micromobility could make a significant difference, providing people with more choice about how they travel in their area.

Many journeys involve the use of two or more types of transport, such as cycling to a train station and catching a train to within walking distance of your destination. Increasing access to micromobility could open opportunities to take these kinds of trips to more Londoners. Areas with a combination of relatively poor access to public transport and relatively high population density are concentrated in outer London.[100] Here, improvements to cycling infrastructure in areas surrounding transport hubs such as train stations could enable considerably more Londoners to access public transport, increasing the travel choices available to them.

There are reasons to think that the availability of shared vehicles can help to improve access to micromobility as a mode of transport in areas where space for parking infrastructure tends to be scarcer, such as in inner London. For instance, Santander Cycles, a subsidized shared bike scheme in London, has a staffed hub at Waterloo station where, before the COVID-19 pandemic, it facilitated an estimated 1,300 cycle trips each day.[101] Where parking space is more constrained, TfL argue that shared schemes such as this can provide a 'space-efficient alternative to complement standard cycle parking facilities'.[102] At Waterloo Station, TfL estimate that providing equivalent levels of cycle parking for private cycles would require over two square kilometres of additional space. Additionally, many existing homes do not have space to comfortably fit a bike, e-bike or e-scooter. Increasing the availability of shared vehicles is one way to improve access to micromobility for people who live in such homes, alongside providing cycle hangars for private micromobility vehicles on residential streets. Shared micromobility schemes can be delivered in a variety of ways, including docked and dockless models – one potential delivery mode is mobility hubs (see Box 3).

Box 3: Mobility hubs

One way to improve the availability of shared vehicles, including bikes, e-bikes, and e-scooters, is the provision of mobility hubs, located within walking distance of a substantial number of people.

Mobility hubs are public spaces where shared vehicles, such as bikes, e-bikes, e-scooters, and shared cars are parked together to be picked up and dropped off. By connecting people with shared modes of micromobility, they can also connect people to public transport – for instance, someone who lives a long walk from a public transport hub may be able to pick up a shared bike at their local mobility hub and shorten their journey.

CoMoUK, who provide accreditation of mobility hubs, describe their three key characteristics:

- Co-location of public and shared mobility modes
- The redesign of space to reduce private car space and improve the surrounding public realm
- A place or sign which identifies the space as a mobility hub which is part of a wider network and ideally provides digital travel information.[103]

Mobility hubs could play a role in improving micromobility infrastructure in London which could help to reduce the barriers that some people in London face to accessing shared micromobility.

Improving access to local services and to public transport will benefit Londoners. It will also benefit businesses, who stand to gain from increased footfall if people are able to travel more easily in their area. While there is little robust evidence on the impact of investment on active travel infrastructure on businesses in the UK, the growing body of case study evidence suggests that they deliver significant benefits to consumers and businesses.[104] To illustrate one way in which better infrastructure could improve business in an area, one study found that tourists in Australia who used e-scooters were able to visit more destinations in a day and spend more money on the local economy.[105]

There is evidence that access to good public transport is associated with better health and physical activity in a population, as well as higher levels of social participation and wellbeing. [106, 107]

Good public transport has also been found to be associated with better access to services and a higher chance of being employed.[108]

Further, increasing access to micromobility can itself have benefits for the health of Londoners by enabling more people to travel in a way that involves physical activity. Riding bikes and e-bikes is associated with improved physical health.[109] E-scooters don't require riders to pedal, so if e-scooter journeys replace to a substantial degree those that would have been taken by riding a bike or e-bike could have negative consequences for the amount of active travel people do.[110] However, riders are likely to walk more by riding an e-scooter than driving a private car, especially if they use it in conjunction with public transport. Generally, enabling more people to switch from driving a privately owned car to riding micromobility is likely to come with health benefits for Londoners.

Case study: Utrecht Stationspleinstalling (Station bicycle parking garage)

In August 2019, the Dutch city of Utrecht opened and completed its station bicycle parking garage. With space for 12,500 cycles, the Stationspleinstalling is the largest bike parking garage in the world, and is designed specifically as a part of the station to fully integrate cycling with the wider transport network.[111] This is important as 40 per cent of visitors to the station arrive via bike.[112] The project was jointly financed by the state-owned railway infrastructure company, the City of Utrecht, the Dutch Ministry of Transport and the European Union.[113] Construction of the site had to take place in stages to allow the station to remain fully operational during the building phase.

Built on three floors, the building is designed with ramps and cycleways to allow the entire site to be traversed via bike. An automated signage system directs cyclists to the most convenient available parking spot.[114] The underground level has integrated access to the platforms, making it easy to cycle into the garage and take an onward train.[115]

The Stationspleinstalling offers a vision of how cycling and other forms of micromobility can be more integrated with public transport infrastructure. By providing an easy way to securely store bikes at the station, it is easier to use a bike to get to the station, or to go from the station to another destination. While some stations in London have bike storage, it is often limited or located a distance from the station itself. The difference the Stationspleinstalling offers is how tightly integrated it is with the station, since it is possible to ride a bike directly into the garage, which is attached to the station, simply and securely store it for the day, and walk down a set of stairs directly to the platforms.

While a parking facility on this scale will not be possible at some London stations, especially those in inner London, the Stationspleinstalling offers lessons for the kinds of features that are likely to encourage more people to use micromobility and public transport together.

↗ Cycle parking at a strain station in Utrecht allows cyclists to ride to and from their parking space

2. The risks presented by micromobility

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Increased use of micromobility could risk some negative consequences, both for those who and those who do not opt to make use of it directly. In the recent past, a number of concerns about micromobility have made headlines, ranging from the perceived threat of thieves making use of new types of vehicles, to the injuries caused by collisions involving micromobility.

In this section, we focus on the risks that appear most likely to be linked directly to increased use of micromobility and that carry the greatest costs to Londoners. We explore risks to the safety of riders and non-riders of more people using micromobility more often (both from collisions and from improper parking of shared vehicles), and the risk that the benefits of micromobility might be unevenly distributed across Londoners.

Safety of pedestrians and riders

In common with other types of vehicles, riding on bicycles, e-bikes, and e-scooters entails risks to the person riding it and to those around them, such as pedestrians or those in other vehicles. In this section we describe the evidence about the relative risk of different types of micromobility, and how the risk associated with travel on these vehicles compares to other modes of transport such as privately owned cars. Data about injuries resulting from crashes, particularly where injuries are slight rather than severe, are likely to be underreported as casualties may not attend a hospital or speak to the police.

There is not much evidence on the relative safety associated with privately owned micromobility vehicles and rented ones. Because rented vehicles have to be unlocked before use, usually via an app, operators of shared schemes can use tools such as brief training videos or quizzes to nudge riders to ride safely – there have been examples of this in the ongoing e-scooter trials in the UK. Further, rented vehicles are less vulnerable to being 'hacked' to override the maximum speed limit imposed by the vehicle; a feature of privately owned vehicles which can lead to vehicles which are speed limited at the point of purchase having their maximum speed dialled up. These features of shared schemes could mean that they are safer to riders and pedestrians, at least in the case of riders who are less familiar with riding a bike, e-bike, or e-scooter.

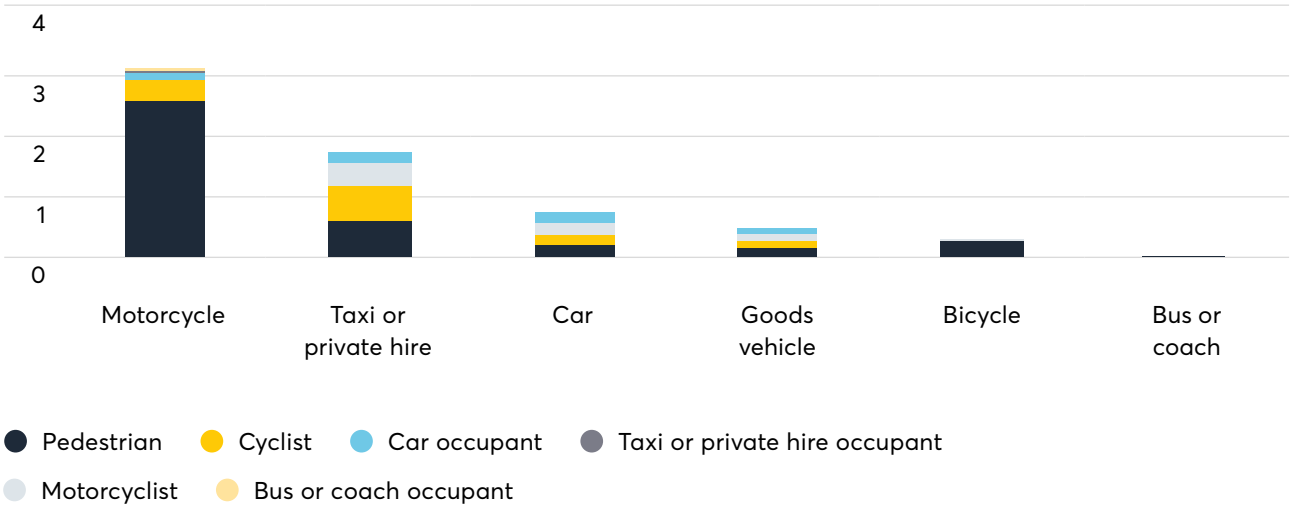
Risks to pedestrians from micromobility and other modes

Approximately two per cent of all traffic injuries and deaths in London in 2019 that resulted from a collision involved conventional cycles; the majority (62 per cent) involved a car.[116] This has been consistent in recent years.

Those who are injured as a result of a crash involving an e-scooter are overwhelmingly likely to be the rider, with studies estimating that between 1 and 14 per cent of those injured are pedestrians. [117]

In data collated from a range of cities globally, one study finds that a trip by car or motorcycle is more likely to result in someone dying than a trip by walking, using a conventional bike, or taking the bus. Data from London confirms that this pattern holds true in London as well as elsewhere (see Figure 3).

Figure 3: Risk of fatal or serious injury to another road user by vehicle involved in a collision (per million journeys travelled by that vehicle), 2018[118]



The vast majority of fatalities resulting from crashes involving conventional bikes are riders, with people who aren't riders (e.g., pedestrians) making up around 10 per cent deaths in such crashes in data from a range of cities internationally, and 16 per cent in inner London.[119] This contrasts with data for crashes involving passenger cars and motorcycles, which are much more likely to result in the death of someone not using the vehicle.

Most deaths caused by crashes involving passenger cars are people who were not in the car.

There is good evidence about the risks associated with riding a conventional pedal bike, since they have been popular for a long time in cities around the world. Newer modes, such as e-bikes and e-scooters, have less robust evidence available about the risks to safety associated with riding them. However, emerging data suggests that e-scooters and e-bikes are similar to pedal bikes in terms of the risk they present to riders and non-riders. For instance, one study finds that where people have died in crashes involving e-scooters, riders are much more likely to do so than non-riders (i.e., pedestrians), similar to conventional bikes.[120] One study in the Netherlands, where cycling is generally safer than in other cities, found that e-bikes that are limited to approximately 15.5 miles per hour are no likely to result in a rider visiting an emergency department or being admitted to hospital than conventional bikes once riders' age and the distance travelled per trip is accounted for.[121]

Risks to riders of micromobility

The number of cyclists who are injured or killed on London's roads has increased in recent years, from an average of approximately 3,400 per year in 2005-09 to approximately 4,630 in 2019 (an increase of 36 per cent).[122] The rate of growth in cycling injuries appears to have been slower than the growth in the number of journey stages made by bicycle in this period.[123] Indeed, the risk of being killed or seriously injured while cycling in London fell by more than 60 per cent between 2000 and 2017.[124]

There is limited evidence about the risk of injury from riding an e-scooter or e-bike compared to other modes. What little evidence exists suggests that the risk of riding an e-scooter is similar (within an order of magnitude) to the risk of riding a conventional bike.[125] In the first two months of the e-scooter trial in London, three serious injuries were reported by operators, out of 85,000 trips.[126]

Cars and larger vehicles are involved in over 80 per cent of conventional bike crashes which result in the death of a rider.[127] Figures from one study suggest that fatalities of e-scooter riders are similarly likely to be in crashes involving cars and larger vehicles, though data is limited.

Case study: Guided tours of London on an e-scooter

There are many factors that contribute to safe riding of micromobility, including the availability of good information about how to ride safely. One example of this information being provided to riders of e-scooters in the UK is ScooTours, which, in July 2021, launched e-scooter tours of London. The firm introduce e-scooters to their customers and teach them how to ride them responsibly and safely by taking them on a tour around London.[128]

Designed in a way that encourages new riders to get comfortable with e-scooters, the tours have had positive responses even from those previously ambivalent to the vehicles.[129] All tours start with training on safe riding on a quiet street and the tours themselves take place entirely on quiet roads and cycle lanes. Users are guided through traffic in convoy style to encourage safe traffic traversal.

One of the owners of ScooTours explains that in his view the rental model as opposed to privately owned e-scooters encourages more responsible riding through measures that hold users accountable if they misuse them.[130] Introducing people to e-scooters in a safe, controlled, and enjoyable environment could encourage more people to take up riding an e-scooter while raising awareness of principles of safe and considerate riding. However, it remains to be seen to what extent the tours increase the uptake of e-scooters amongst the previously sceptical.

Parking shared vehicles in unsafe places

As described above (in 'How people travel in London'), there has been a rise in people using shared micromobility vehicles to travel around London, in part driven by the recent e-scooter trials. There is a risk that increased use of shared, dockless vehicles, could lead to vehicles being left in places which threaten the safety of pedestrians and other road users.

In this section, we briefly describe the factors that influence where people park their vehicles and present two case studies of operators seeking to encourage appropriate parking among their users.

Micromobility vehicles must be parked when they are not in use. Private vehicles need to be parked close to where the rider needs to go, in a safe and secure location to reduce the risk of theft. These locations also need to be safe for riders to use, which means they need to be well-lit and, as far as possible, in busy places: leaning over to lock a bike is a vulnerable moment for female riders at night. As micromobility modes evolve, we will need parking for different types of vehicles like cargo bikes and bikes or scooters adapted for people with disabilities, perhaps including electric charging capability for private e-bikes and e-scooters.

Londoners who live in flats or terraced houses may also need secure parking adjacent to their home – some London boroughs provide cycle hangars, but demand for these outstrips supply.[131] Secure bike parking is especially important for blocks of flats, as otherwise residents might be tempted to leave their bikes in shared areas – a potential hazard if residents need to flee a fire.

Parking of shared micromobility vehicles is a newer policy challenge, and a more contentious one in recent years. Transport for London's own shared cycle scheme uses physical docks - users stop paying for their bike only when it is returned to one of these docking stations. This does not entirely remove the risk of bikes being abandoned away from the docking stations, but it significantly reduces it. As London's transport authority, it is relatively straightforward for TfL to install docking stations in public places: it is much harder for private companies to do so.

Sponsor case study: Dott's approach to supporting parking compliance

Dott's clear commitment to providing the safest possible service for all includes non-riders, especially people, such as those with visual impairments, who rely the most on clear pavements to safely navigate the city. Through a mixture of software, hardware, and physical infrastructure, Dott can maximise parking compliance and minimise conflict between vehicles and pedestrians.

On 7 June 2021, London's rental e-scooter trial launched in a core group of boroughs. Following a competitive tendering process, operators Dott, Lime and Tier were selected to take part.

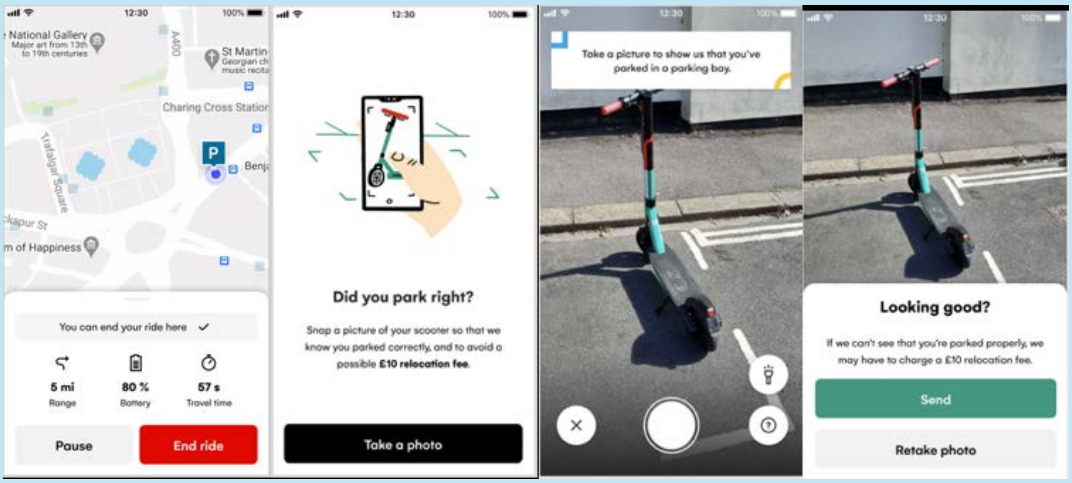
Dott believes that a critical factor to a successful trial is strong collaboration between all stakeholders to deliver a safe and accessible parking network. Dott has supported this process by sharing its operational experience in Paris, contextualised for London.[132] When the trial started, 119 parking locations were allocated for shared e-scooters. To maximise compliance, Dott requires riders to share a photo at the end of each trip to ensure they have parked inside one of these allocated bays.

↗ E-scooter hire parking location at St James' Avenue, South London

↗ Selection of user photos received and reviewed by Dott operations team

Data and images collected by Dott in the first three weeks of the trial indicated that 94 per cent of all trips ended in or adjacent to parking bays. In the vast majority of these cases, scooters were parked correctly inside a bay; otherwise they were parked directly next to it, an indication that some boxes might be too small. The remaining six per cent were abandoned far from parking spots, mostly at the outer boundaries of the service area. This was primarily due to a combination of riders not understanding the parking requirement and not having access to parking that aligned with their journeys. These abandoned scooters may have been parked properly had there been suitable parking available, suggesting that at this stage there were too few parking options.

↗ Dott's parking user flow with photo verification



While Dott appreciates the reasons for the temporary provision of dedicated parking on footpaths at the start of the trial, Dott are urging the boroughs and Transport for London to allocate most parking spots on the carriageway to reduce the potential for conflict between motorised vehicles and pedestrians. Only in exceptional cases, where no suitable location for parking on the carriageway can be found, should footpath locations be used. In these instances, physical infrastructure can be installed to provide additional safeguards for pedestrians. This includes design elements such as barriers, signs, and plants, as illustrated in the image below.

The parking compliance data collected by Dott shows that a combination of dedicated parking boxes and photo enforcement technology works extremely well. With more dedicated spots, compliance could increase close to 98 or 99 per cent, similar to levels seen in Paris.

↗ E scooter parking with barriers, signs and plants

E-bike shared schemes in London so far have been mostly dockless: users simply leave the bike when they are finished with it. They are given guidance on how to park the bike responsibly, but these are hard to enforce in real time. Recent e-scooter trials in London require users to park in a defined area, but this does not have a physical dock. Operators are experimenting with GIS systems to check that an e-scooter has been parking correctly, but current technology makes it hard to tell if it is in or very close to the parking space. Others require users to upload a photo via the app they booked the ride with, to show where they have parked.

Evidence on how frequently or otherwise bikes, e-bikes, and e-scooters that are parked obstruct others is fairly thin, and highly context dependent. However, there are some indicators that parking in shared spaces is less of a problem for micromobility than for other types of transport. For instance, a study which observed the parking of thousands of bikes, scooters and cars in five US cities found that motor vehicles impede access far more (24.7 per cent) than bikes (0.3 per cent) and e-scooters (1.7 per cent).[133]

Badly parked bikes, e-bikes and e-scooters can make an area look rather messy and neglected. More importantly they can cause hazards, particularly for people with disabilities - blind and partially sighted people may walk into or trip over them, and they can block the pavement to people who use wheelchairs. Badly placed parking spaces can cause problems as well, by taking space away from pedestrians on narrow or congested pavements. Getting parking for shared micromobility vehicles right is a key issue for the London e-scooter trials and beyond - with new ideas and evidence emerging frequently, the challenge for policy makers is deciding which models to implement and where.

Sponsor case study: Voi's approach to co-creation in the UK to deliver inclusive transport

Making micro-mobility as inclusive and accessible as possible for all is at the heart of what Voi does. Ensuring everyone's needs are taken into account in the design and development of our products and services is a key part of our service.

Together with 6-t, a mobility-research oriented firm, we sought to find out what is needed to make our service more inclusive. The roadmap toward a more inclusive micromobility offering identified **three key steps:**

- **Step 1:** Ensuring **'Access To All'** through spatial accessibility, economic accessibility and improved access to opportunities.

- **Step 2:** Offering a **'Tailored Service'**, by understanding users' specific needs, developing users' capabilities and adapting commercial offers.

- **Step 3:** Implementing **'Meaningful Involvement'**, by empowering grassroots organisations, setting up inclusive advisory and performance monitoring committees.

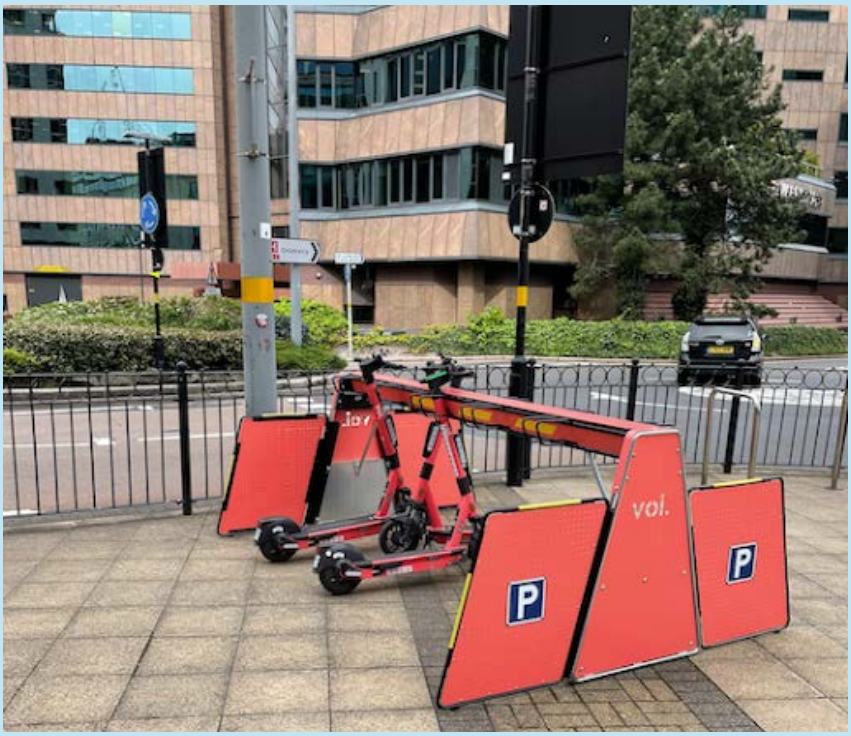
As the largest micro-mobility operator in the UK, Voi regularly and proactively engages with vulnerable road user groups. This has come in the form of pan-disability training for its staff, an inclusive design hackathon, roundtables, surveys and regular equality meetings held across a number of cities - collaborating with the Royal National Institute of Blind People (RNIB), Women In Transport, Love Language and many local equality groups to support us in co-creating an inclusive transport offering for all.

Over the past few months, we have been working with Open Inclusion to establish a pan-disability and age-inclusive approach into our operations to make micro-mobility more convenient and safer for everyone.

The starting point was to engage with and listen to the perspective of underrepresented groups and people often left out of the discussion around micro-mobility. Led by Open Inclusion, Voi held a number of roundtable discussions covering London and other cities across the UK. This involved local groups as well as, experts from TfL's Independent Disability Advisory Group (IDAG), RNIB, Transport for All, and Campaign for Better Transport. Alongside the roundtables, Voi also conducted a survey of 120 people. In total, over 150 people were consulted which included people with disabilities, older people and parents with toddlers or babies. This level of engagement has allowed Voi to better understand diverse community perspectives. It has enabled Voi to take a co-creation leadership role when introducing and testing solutions as part of the e-scooter trials.

© Voi

↗ Voi v4 e-scooter and helmet



© Voi/RNIB

↗ Voi and RNIB co-created parking rack.

Inclusive Design Hackathon: As part of Voi's commitment to inclusive design Voi held two sessions during their quarterly Hackathon, to hear the challenges and hurdles women and people with physical disabilities face when it comes to transport. Voi staff then tested their hackathon ideas with participants by dropping in to open workshop sessions. These sessions were moderated by Open Inclusion. This was the first ever inclusive design hackathon held at Voi. Both the hackathon and inclusive design training for Voi staff has improved the organisations understanding, recognising how physical, sensory or cognitive differences can impact how you consider and design for these differences.

Testing Scooter Noise: Voi engineers have designed a bespoke noise (a 'low hum') which has been added to a sample of our e-scooters to alert other road users and pedestrians that an e-scooter is approaching. The noise replicates the types of artificial engine noise introduced on electric cars in recent years and can be adapted and improved by Voi, based on feedback from users and the visual impairment community. Voi is working with the University of Warwick, RNIB and Thomas Pocklington Trust to manage engagement sessions with people with visual impairment and other disabilities.

Co-creation of Parking Racks: Voi in collaboration with the RNIB redesigned its parking racks to improve the visibility and address mobility issues faced by blind and partially sighted people. This resulted in the development of modified and detachable side plates, enabling visually impaired road users who utilise walking canes to detect parked e-scooters more easily. These racks have helped to reduce street clutter and improve e-scooter parking habits.

The **three-step approach** will help deliver a service that is inclusive and accessible for all. That means a transport service that contributes to the public transport system, with a geographical distribution making it available further out from the city centres and in different kinds of neighbourhoods. As the service evolves, we at Voi will ensure that it does so in consideration of all citizens' needs and in partnership with local communities.

This will contribute to building healthier and sustainable cities made for living.

Distribution of the benefits of micromobility

The range of benefits associated with micromobility might not benefit all Londoners equally. In this section, we describe who uses micromobility in London, and the factors that might influence this.

As well as the distribution of infrastructure such as parking spaces and cycle lanes, discussed above, a range of factors are likely to influence whether someone uses micromobility. These include whether they perceive micromobility as something that is 'for them', which might be informed to some extent by whether their peers, friends, and family use micromobility; how much micromobility costs compared to other modes of transport; and how accessible the technology, software, and vehicles are, and how safe they feel when they are riding, parking, or getting from their parking place to their destination.

Use of micromobility by people with different characteristics

Different groups of Londoners currently have different levels of micromobility use – broadly, cyclists are more likely than other Londoners to be male, white, and relatively affluent.[134] London's first Cycling Commissioner, Will Norman, addressed this in 2018, calling diversity a 'real challenge for London cycling'.[135]

In the absence of evidence about the users of other types of micromobility in London, we present in Box 4 a summary of existing evidence from other cities, not just in the UK but globally. The results of these studies will be influenced by a range of local contextual factors, so it cannot be inferred from these exactly what micromobility use in London looks like. In summary, international evidence suggests that users of bikes, e-bikes, and e-scooters overrepresent young people and men; in addition, users of bike sharing schemes tend to have a higher income. These associations appear to vary by mode; though evidence is limited, some studies suggest that e-bikes and e-scooters are ridden by a more representative group.

Box 4: Characteristics of people who ride bikes, e-bikes, and e-scooters

Cyclists in London are more likely than other Londoners to be male, white and relatively affluent.[136]
A review of the literature on the characteristics of people who use shared micromobility finds that studies tend to agree that users of bike sharing schemes tend to be young, male, and to have a higher income.[137] Not all studies agree.[138]

Fewer studies have investigated the characteristics of other types of shared micromobility, such as dockless schemes or e-scooter schemes. One study in Utah found that as well as younger age groups, a substantial proportion of middle aged people used an e-bike sharing scheme in the area, perhaps because e-bikes provide assistance to the rider.[139]

Studies which consider the characteristics of e-scooter riders find that riders tend to be young and male,[140] but that e-scooters appeal to men and women of a variety of ages and ethnicities. Early evidence from the e-scooter trial in Salford suggests that women were slightly more likely than men to have used an e-scooter.[141] One study in Zurich found that e-scooter riders tended to be more representative than bike-share users in terms of educational attainment, full-time employment, and household income – though this may have been because of the prevalence of e-scooter use among students.[142] In the French cities of Paris, Lyon, and Marseille, two thirds (66 per cent) of shared e-scooter riders were men, a quarter were aged 25-34, and riders were 'significantly more well off' than the general population.[143]

We will not see the full benefits of micromobility for decarbonisation, traffic reduction or personal health and convenience unless inequalities in both micromobility and wider society are addressed.

Some inequalities in micromobility use are specifically related to London's cycling and scooting infrastructure. Historically, the policy focus of encouraging cycling has largely been on commuter cyclists travelling on radial routes in and out of central London.[144] Central London commuters are more likely to be wealthier, male and white,[145] and this is reflected in statistics about London's cyclists. Shared schemes - both the established Santander bikes and newer e-scooter trials - are also focused on inner and central London because this is where most customers are, reinforcing this bias towards commuters. Women are more likely than men to fear harassment or assault while using micromobility, especially at the vulnerable moment of parking/docking - this is made worse when parking or docking facilities are in dark or unsafe places.[146,147] Some 37 per cent of people in London say that they would feel fairly or very unsafe walking on their own after dark on a quiet street near their home, compared to 32 per cent of people in England as a whole, with women considerably more likely to feel unsafe than men.[148] Older people are more likely to say they are worried about cycling in traffic and that they would start to cycle if safer routes were available.[149, 150]

Other differences are driven by wider societal inequalities. Research from Transport for London in 2011 found that while the barriers to cycling vary from person to person, a range of factors are likely to impact some groups more than others. These included affordability, with over half of ethnic minority groups excluded from participation by poverty in 2011; a lack of culturally accessible facilities or provision; and a lack of services targeted at people from Black, Asian, or Minority Ethnic (BAME) backgrounds.[151] Black people in the UK are much more likely than White people to have no outdoor space at home, and this makes it harder to store a bike.[152] They are more likely to experience certain health problems, such as diabetes, and these might make cycling more difficult.[153] Income levels in London are closely tied to ethnicity; paying for a bike or e-scooter is much easier if you have a reliable income, especially if you are not sure at first how much it will replace other forms of transport.[154]

Finally, all micromobility modes are public and visible - perhaps even more than car or public transport use. If people don't see micromobility users who look like them, it's less likely that they will try them out themselves, and this reinforces existing inequalities.[155] Schemes which encourage and promote micromobility use among under-represented groups are likely to have a dual benefit, both for participants themselves and for others in the community.

Any policy to support increased use of micromobility needs to consider these factors if it is to provide meaningful benefits to all Londoners.

Box 5:
Disabled people and cycling

Everyone should be able to use micromobility. For some disabled people, cycling infrastructure does not suit their needs or those of the vehicle they used. While most disabled cyclists use a two-wheeled cycle, one poll found that a third had been unable to park or store a non-standard cycle because of inadequate facilities and this lack of infrastructure was viewed as the biggest barrier to cycling.[156]

Non-standard cycles include a wide range of vehicles including tricycles, tandem cycles, and hand cycles. Many non-disabled cyclists use non-standard cycles, such as family cycles, tandem cycles, and cargo bikes. They are often different shapes and sizes to standard cycles, which can mean that infrastructure for cyclists, such as parking spaces, are incompatible with the cycles that disabled people use. Non-standard cycles are typically more expensive than standard cycles, which can pose a barrier to disabled people taking up cycling.

Some disabled cyclists use their cycle as a mobility aid, finding cycling easier than walking. One poll found that nearly half of such cyclists had been asked to dismount their cycle and to walk with it in areas where cycling is not permitted. Wheels for Wellbeing has called for disabled cyclists to be given permission to cycle considerately in non-cycling areas when using their cycle as a mobility aid.

E-scooters, which do not require pedalling, may appeal to some people with disabilities, which could be accentuated as new forms emerge such as seated e-scooters or light mopeds.

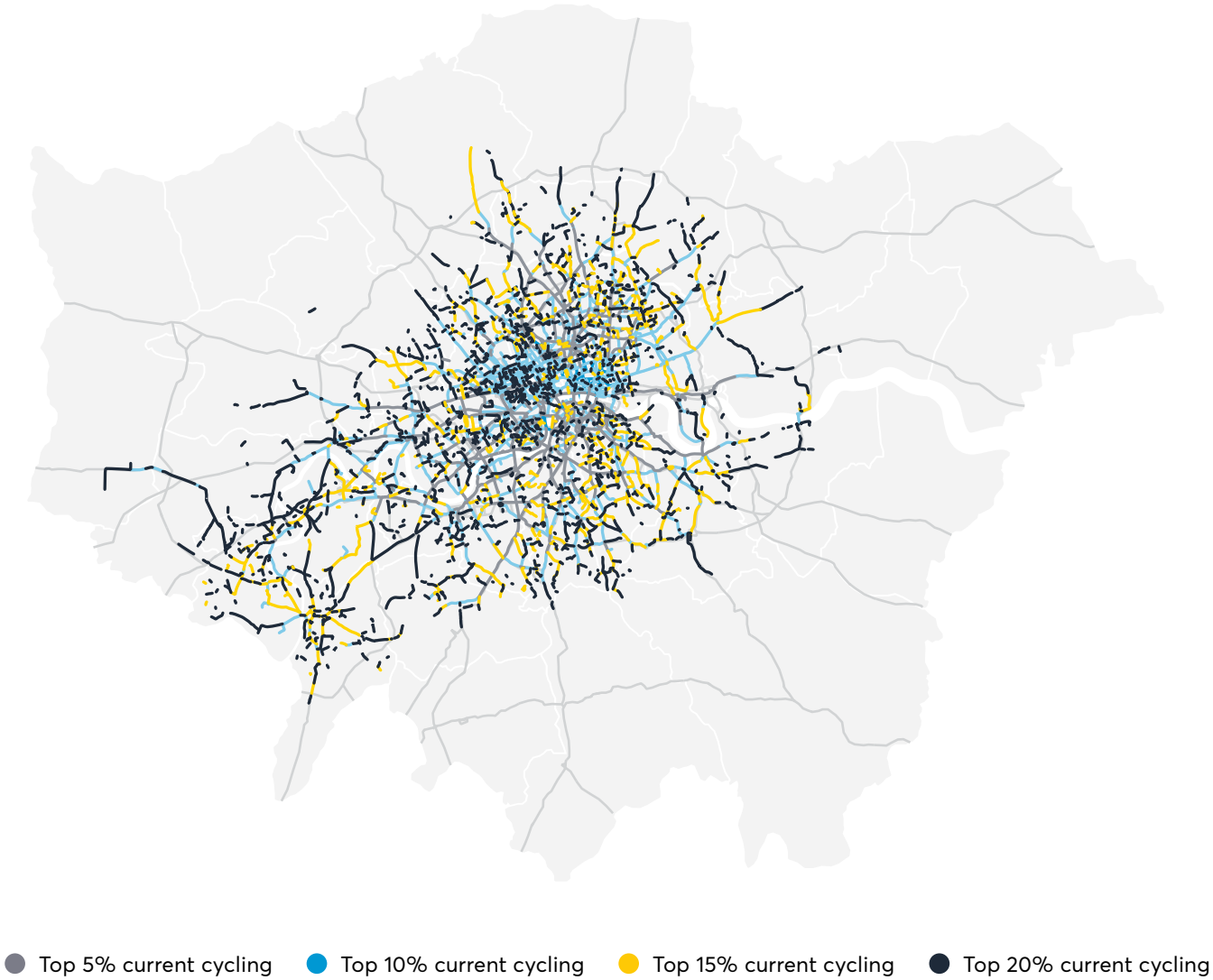
© Kai Bossom, Bexhill-on-Sea

↗ Everyone should be able to use micromobility.

Use of micromobility in different parts of London

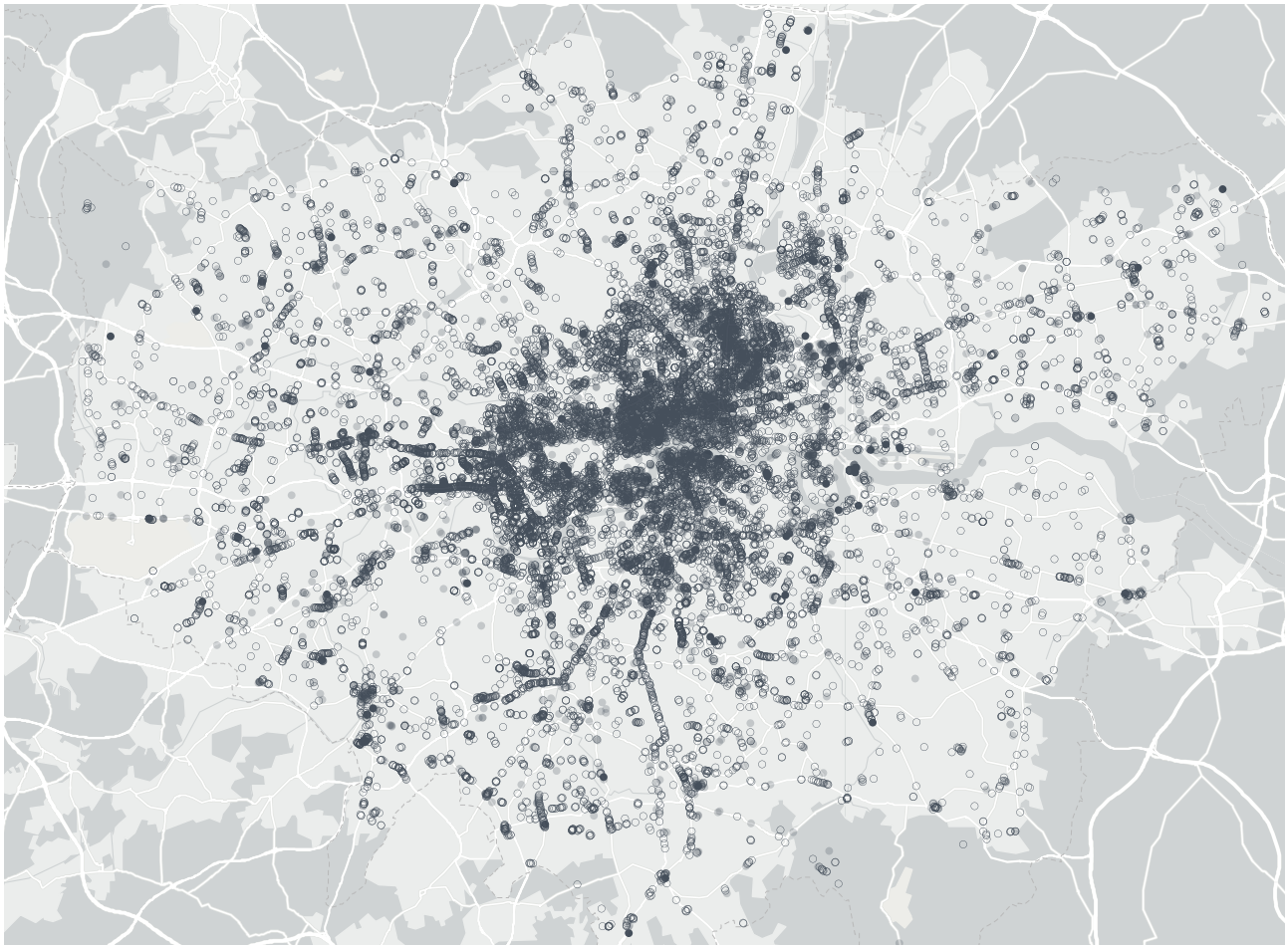
People who live in some parts of London are much more likely to use micromobility than other Londoners. A higher proportion of people cycle in inner London (17 per cent) than in outer London (10 per cent).[157] The difference in where people cycle is illustrated by Figure 4 below, which shows the routes where people currently cycle the most in London.

Figure 4: Areas in London with the highest levels of current cycling[158]



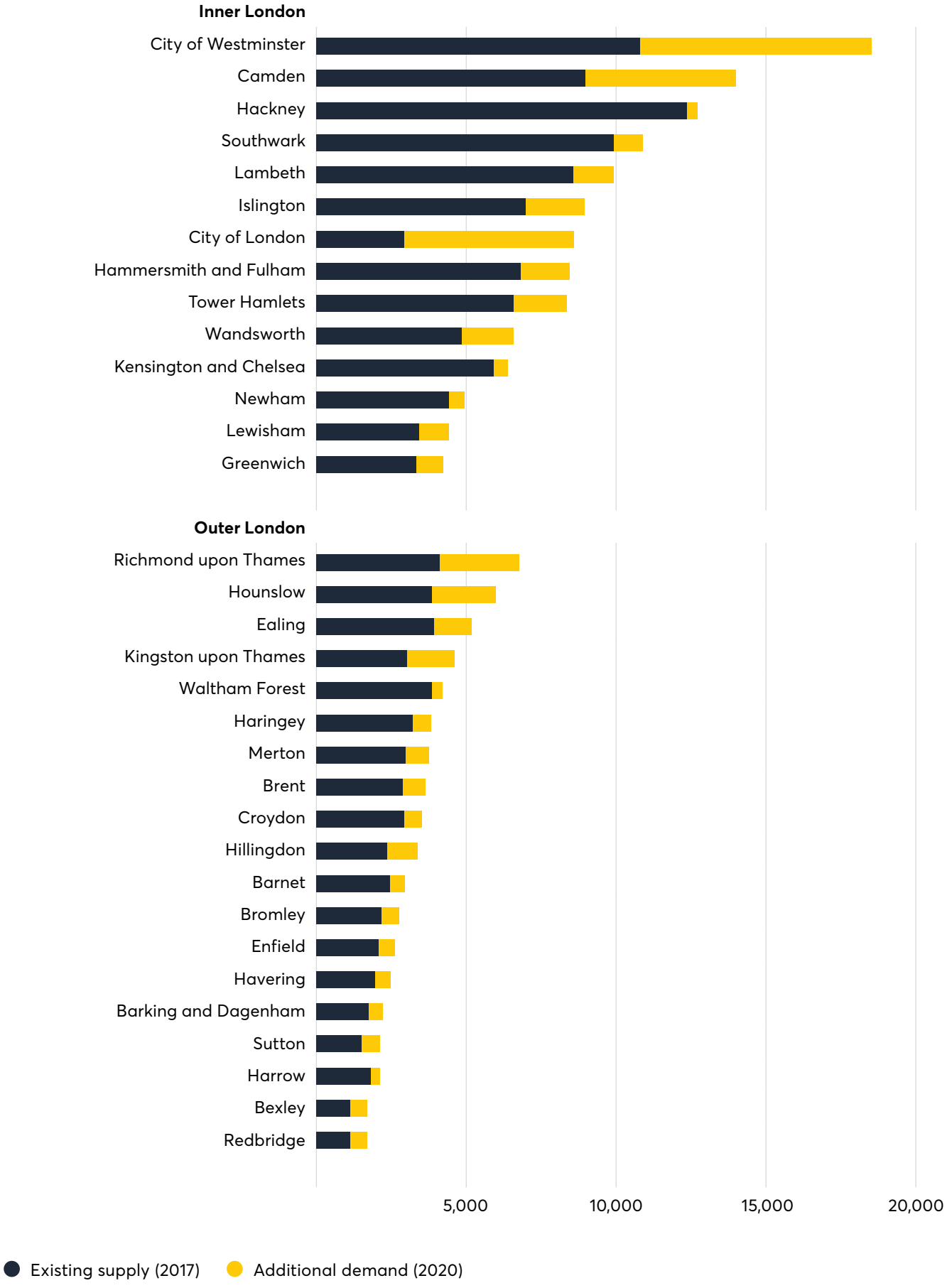
Where in London people are most likely to cycle is likely to be influenced by the kind of cycling infrastructure in their area. Those in inner London have greater access than other Londoners to cycle lanes which are separated to some extent from car traffic and to on-street parking for their bikes when they arrive at their destination (see Figure 5, below), as well as cycle hangars on their street to park their bike if they can't fit it in their house.

Figure 5: Existing on-street cycle parking in London[159]



Demand for cycle parking in London exceeds supply substantially, with Transport for London estimating that the city needs 46,661 on-street cycle parking spaces added to the existing stock of 145,449 spaces to meet current demand – this estimate has increased by around 10,000 spaces since the onset of the pandemic.[160] TfL estimate that an additional 13,948 spaces would be required on top of this to meet demand by 2025, and a further 5,217 spaces to meet demand by 2030. As illustrated by Figure 6, demand for on-street cycle parking is greater than supply in all London boroughs. In some boroughs, demand for on-street parking outstrips supply more than in others, with excess demand highest in Westminster, City of London, and Camden in inner London and in Richmond upon Thames, Hounslow, and Kingston upon Thames in outer London.[161]

Figure 6: Supply and excess demand for on-street parking spaces in London[162]



In addition to infrastructure for private micromobility vehicles, the availability of shared modes in London has historically been concentrated in inner London.
For instance, Transport for London's cycle docked shared bike scheme, Santander Cycles, has 19,791 docks across 782 locations, all of which are in inner London. A glance at where other shared bikes are located when using their app or a partner app such as Google Maps or Citymapper suggests that a similar trend holds true for privately run shared bike schemes in London too.

Case study: Engaging with residents for better services

The Northwest Side Housing Centre (NWSHC) has been running community led cycle infrastructure planning and public engagement programs in Chicago since 2018. The organisation's involvement in transport infrastructure organising started in 2018 when the youth of the area identified that a lack of public transportation in Belmont Cragin was negatively affecting their lives.[163] 64 per cent of the residents in Belmont Cragin drive alone to work, compared with a citywide average of 52 per cent.[164] This may be because of a lack of cycling infrastructure – while approximately 3 per cent of Chicago's population lives in Belmont Cragin, the area only has 0.5 per cent of Chicago's cycleways.[165] There were also no docking stations in the area for the city's bike sharing scheme.

The area Youth Leadership Council[166] lobbied the Chicago authorities to install cycling infrastructure, such as a bike lane on the busy main highway into the area, and docks for the city's bike sharing scheme, in their neighbourhood.[167] The NWSHC continues to organise in the community to reassess the city's transportation provision and identify improvements that can be made for cycling,[168] like by drawing attention to the lack of cycleways in target areas with community bike rides.[169] The NWSHC also spread awareness of cycling and bike sharing, and fund free bike passes for those on qualifying government assistance programs. Their partners run free courses teaching residents bike maintenance.[170]

The experience of NWSHC in Chicago is a reminder that infrastructure for micromobility is too often provided in a way that benefits some residents of a city more than others and offers lessons for how planning authorities can engage effectively with citizens to ensure that their experiences are reflected in planning decisions.

3. The decisions we need to make

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In this report we have set out the opportunities presented by micromobility to London's commitment to net zero carbon emissions, its air quality, congestion on its streets, and to Londoners' ability to move around the city. We also set out some of the risks presented by more people using micromobility to the safety of riders and pedestrians, as well as the risk that the benefits of micromobility might not reach all Londoners. In this section, we set out the tools available to policymakers to enable the city to benefit from the opportunities while mitigating these risks and set out recommendations for a pathway to a 'gold standard' micromobility ecosystem in London.

Policy levers available to influence micromobility

In broad terms, there are three ways for government at different levels to influence how much, where and by whom micromobility methods are used: legislation around privately owned vehicles, regulation of shared schemes, and actions to encourage people to use micromobility more – either through changes to infrastructure or through making vehicles more affordable.

Legislation: The Highway Code for bikes and e-scooters

Bikes are legal to ride in the UK subject to the restrictions in the Highway Code – which for example prevent them from being ridden on pavements and require lights at night.[171] E-bikes, which can be ridden only by riders aged at least 14, can be used in the same way as bikes if they have a maximum power output of 250 watts and a maximum assisted speed of 15.5 miles per hour, otherwise they are considered to be a motorbike or moped, and taxed.[172] Outside of the e-scooter trials, e-scooters are not legal to ride on public roads or pavements – they may only be used on private land with the landowner's permission.

E-scooters are easy to buy from mainstream retailers in the UK, and the ban on riding them is often flouted. But it still causes a problem: because all use of private e-scooters is illegal, it is harder to encourage safe and appropriate riding – on the road or in a cycle lane, with lights – over dangerous riding on a pavement, without lights, or at an unsafe speed.

Changes to the Highway Code proposed in 2021 would give road users who can do the greatest harm more responsibility for others' safety. These changes, which include ensuring the cyclists have priority when travelling straight ahead at junctions, are welcome, but alone are unlikely to result in sufficient change to protect pedestrians, cyclists, and riders of other micromobility.

Regulation of shared schemes: trials and beyond

England currently has a small number of shared e-scooter trials, including one in London – in these, e-scooters run by participating companies are legal, subject to restrictions on speed, geographical area and parking. Private scooters remain illegal. Riders must have a driving licence, and transgressions can be punished with points on the licence. Local authorities are responsible for the trials under a central government-run scheme.[173] The aim is to learn from the trials for future regulation.

The way that shared vehicle schemes are operated can have a significant influence on the experiences of riders of those vehicles and others. To take one example, if someone renting a bike or a scooter is paying for their rental by the minute, then they may be encouraged to finish their journey in as little time as possible to reduce the cost of their journey – this could lead them to take risks when riding, endangering themselves or others. Policy levers can be used to address issues such as this, for example by awarding contracts to operators which use pricing mechanisms to encourage safe riding, for instance by pricing giving riders time before they begin paying to put on a helmet.

Subsidised hire and purchase for private micromobility

National and local government can encourage people to take up new forms of transport by offering subsidies to try them out, or to buy one's own. For purchases, the Cycle to Work scheme, which allows people to purchase a conventional bike or e-bike through their employer, saving the tax and spreading the cost, is available to some employees.[174] This could be expanded to include private e-scooters, or it could be rolled out to people who do not work for a participating employer. There is precedent for this type of change to employment-based incentive: in the late 2010s, the government replaced the previously employer-run but government funded childcare vouchers system with a centralised tax-free childcare system.[175]

For people who do not yet want, or cannot afford, their own private vehicle, government can make them available for hire cheaply or for free.[176] Some councils already offer this for conventional bikes over periods of weeks or months. National government is said to be considering day-trip leisure hires of e-bikes, some in tourist spots, to build interest in the technology.[177]

One way to make micromobility more affordable and to enable people to make the switch from travelling in a privately owned car to travelling via bike, e-bike, or e-scooter is via a scrappage scheme which gives people credits that can be spent on various modes of transport when they trade in their car. A version of this has been trialled in Coventry, where motorists who trade in an older, polluting car are given up to £3,000 that can be spent on public transport, car clubs, bikeshare, taxis and on-demand bus services.[178]

Infrastructure for micromobility: riding, parking, and charging

In broad terms, bikes, e-bikes and e-scooters use the same infrastructure when they are moving – they can be used on roads, but riders tend to prefer quieter ones, or safely segregated bike lanes.[179] Policies which make cycling easier and safer are likely to be useful for all modes. There may be emerging issues around shared cycle/pedestrian routes, for example across London's parks or on the banks of rivers and canals, as use of e-bikes and e-scooters increases, either because they move and accelerate faster than non-powered vehicles or because there are more of them. Since each situation will be different, it is likely that these will need to be resolved locally rather than through blanket rules.

Parking for bikes in London is already insufficient in some areas (see 'Distribution of the benefits of micromobility'), and cycle theft is common.[180] This may be more of a concern for e-bike owners since these tend to be more expensive. As well as providing more, and more secure, cycle parking, it may be possible in future for e-bikes and e-scooters to be charged at combined public parking/charging points.

Whereas regulation of both private micromobility and the management of shared schemes needs to be led by government (at different levels), infrastructure and incentives to support it can be highly local. For example, a Friends of Parks group might decide to provide more bike and scooter parking by the playground, or a business improvement district might decide to offer a small discount for people who have ridden or scooted to the shops.

Infrastructure, such as micromobility parking, must systematically take equality into account, to ensure that nobody's interests are harmed because of characteristics such as their gender or disability. One way to ensure that equality is considered is to require Equality Impact Assessments for larger parking and infrastructure projects. There are examples of EIAs being conducted in Southwark and in Barking and Dagenham.[181]

Barriers to accessing micromobility

The existence of technologies such as bikes, e-bikes, and e-scooters cannot alone enable people to make use of them. There are a wide range of reasons that people might not have meaningful access to these means of getting around, from the cost of purchasing and maintaining a vehicle to the lack of proper infrastructure such as cycle ways and secure parking. These are discussed in Table 2 below, alongside potential policy solutions. One way of framing barriers to access, proposed by research agency 6t and e-micromobility operator Voi, is providing equal access to affordable services, ensuring everyone can use the service (considering a range of possible constraints), and involving under-represented users in the design of services.[182]

Table 2: Micromobility – barriers to use, and policy solutions

Barrier	Why it's a problem	Which groups are most affected	How we can address it
Inconsistent access to shared schemes in different parts of London, in particular stopping e-scooters at borough boundaries.	Prevents people from using schemes to their full extent. It's a particular problem if they don't realise their route crosses a borough boundary until they get there.	People who rely on shared schemes: particularly new micromobility users or on low incomes.	Manage shared schemes at a London level.
Requirements for hiring a shared vehicle: smartphone access, use of English, age and driving licence requirements (for e-scooter trials).	Prevents people from using schemes to their full extent. May push people towards use of private (currently illegal) e-scooters rather than shared.	Younger people, people on lower incomes, people who do not have English as a first language, visitors and recent arrivals to the UK.	Consider whether driving/ provisional licence and 18+ requirements remain appropriate following e-scooter trials, consider providing apps in alternative languages.
Not enough safe, segregated cycle lanes, especially in outer London and for non-commuter routes.	Prevents people from using micromobility, or makes them use it less. Increases accidents.	Everyone, but especially groups which are less likely to commute into central London – women, people younger or older than working age, people with caring responsibilities.	Review current provision and deliver more cycle lanes, focussing on routes within and between parts of outer London.
Not enough safe, secure parking for private micromobility vehicles – both at destination and near the home.	Prevents people from using micromobility.	Parking near home: most likely to affect lower income Londoners, Black and Ethnic Minority Londoners. Dark or unsafe public parking: women and girls. Lack of parking for adapted vehicles: people with disabilities.	Require micromobility parking in all new developments and encourage both public parking and cycle hangars for existing developments, including transport hubs.
High upfront cost of private micromobility vehicles.	Prevents people from benefiting from the cost savings of using micromobility instead of a car or public transport.	People living on low incomes (disproportionately Black and Asian Londoners, women, and young Londoners). People who cannot access the tax-free Cycle to Work scheme.	Offer tax incentives, similar to the Cycle to Work Scheme, to all buyers regardless of employment status. Offer medium to long term loan of a vehicle. Improve access to shared micromobility.
Perception that micromobility is unsafe.	Prevents people from using micromobility.	Many Londoners, but in particular women and older people.	Safer infrastructure, and also access to micromobility training and support.
Perception that micromobility is 'not for me'.	Prevents people from using micromobility.	Many Londoners, but in particular people living in outer boroughs, women, older people.	Promotion and active outreach to these groups. Emphasis on benefits of e-vehicles for those who cannot or do not want to use a pedal bike.
Encumbered journeys, for instance those made with children, are difficult on conventional bikes.	A significant proportion of trips made in London are made by people travelling with their children or otherwise encumbered, for instance returning with the weekly shop.	Many Londoners, but in particular women, who are more likely than men to be the primary caregiver in their family.	Improved availability of cargo bikes, which are designed to carry heavy loads, for families in London. Interventions which reduced the high cost of these to London's poorest families would have the biggest impact.

Building a gold standard micromobility ecosystem in London

In this section, we set out recommendations for governments at the local, regional, and national level, as well as for operators of shared micromobility schemes. These recommendations seek to capitalise on the opportunities presented by micromobility while mitigating the associated risks. They are guided by the key principles set out in the executive summary.

To provide a consistent approach across London and the UK:

- **National government should give Transport for London (TfL) the power to make arrangements for shared schemes for micromobility on behalf of the whole city.** TfL should collaborate with local authorities and operators in a way that delivers city-wide provision of shared schemes for micromobility. TfL's power should be adaptable to innovations in technology, applying to new types of micromobility vehicle as they arise. Any arrangement should provide consistency across London in aspects of riding and parking that are most important to users' experiences (e.g., shared parking spots which can be accessed by riders, regardless of which operator they rent from, and operate similarly in different boroughs) while allowing for sufficient flexibility to account for variety in geography and demographic characteristics of the population in different areas. Dynamic markets for services should be fostered, with healthy competition between multiple operators. Operators of shared schemes should be required to provide access in less densely populated areas, particularly outer London, as well as central and inner London.

- **National government should legalise private ownership and riding, as well as shared schemes, of micromobility vehicles, such as e-scooters, that can be ridden safely alongside conventional bicycles.** This should include vehicles which meet minimum standards (such as a maximum permitted speed and the presence of lights, both at the point of sale and while being ridden) which maximise safety for riders and non-riders alike and should be informed by the ongoing e-scooter trials. Riding of such vehicles, if legalised, should be governed by an updated version of the Highway Code, which may require riders of vehicles to be of a certain age (such as age 14 and over, in line with e-bikes) where allowing younger riders leads to costs which outweigh the benefits.

- **The Mayor of London should update the Transport Strategy to reflect the potential to extend the role of micromobility for travel in London.** It should set out plans to improve access to micromobility for all Londoners, especially those who currently use it least.

To enable sustainable and active travel:

- **TfL should develop a single, distance-based road user charging scheme to encourage use of more sustainable modes of transport, including micromobility, and discourage use of private cars,** to replace all existing schemes including the Congestion Charge and ULEZ. This should charge users of cars and larger vehicles and exclude users of micromobility modes.

- **TfL should seek to work with operators to integrate payment mechanisms for shared micromobility with payments for public transport in London,** to make it possible to offer discounts for those who use multiple modes of transport in a trip. This could be achieved via the TfL Go app.

To provide enough space to ride and park micromobility vehicles:

- **The GLA and local authorities should work together to ensure there is enough parking for current and projected demand for micromobility of all types.** This includes making it part of every new housing development and public realm project, ensuring there is enough at stations, and increasing the availability of private parking for existing homes where it's hard to fit in a bike or scooter. The Mayor should provide for this in future iterations of the London Plan, considering where need for micromobility parking is greatest.

- **TfL should review the characteristics of micromobility parking design (via the London Cycling Design Standards), in consultation with relevant stakeholders such as the Independent Disability Advisory Group.** Design standards should have a particular focus on safety and lighting, suitability for different types of micromobility vehicle, and ensuring safety and convenience for pedestrians. TfL should explore whether electric charging points would be useful to riders. Parking should be delivered in a way that allows for flexibility – for example if bike use at a parking facility is lower than expected but scooter use is higher, changing the kind of parking offered should be achievable with minimal amounts of cost and waste.

- **TfL, the GLA and the boroughs should require Equality Impact Assessments for larger parking and infrastructure projects,** to ensure that they systematically take equality into account.

- **TfL and London boroughs should regularly review the current and projected demand for road space for micromobility (currently cycle lanes) and expand them as needed.** New road space for these forms of micromobility should be provided where transport options are currently poor, and should enable trips for various reasons, not just commuting. Space for such micromobility modes should be taken from cars and not from pedestrians.

To ensure that micromobility is safe for riders and pedestrians:

- **Operators of shared vehicle schemes should use penalties and rewards, including price incentives,** to encourage safe riding and parking, such as reducing the incentive to rush through traffic and increasing the incentive to park appropriately. Any interventions to improve safety, such as geofencing and pricing mechanisms, should be tested to ensure that it maximises the safety of riders and pedestrians.

- **TfL and local authorities should invest in the expansion of delivery of 'micromobility training' and publicity based on best practice in cycling proficiency lessons** currently provided in London, offering training to all children and adults. Some training could be delivered by or in conjunction with operators of shared vehicle schemes.

- **Where pavement riding of vehicles travelling significantly faster than walking pace persists, and where electric micromobility vehicles travel above legal limits, police should enforce bans on unsafe riding.** This will be easier to achieve if e-scooters are legalised and there is a clear distinction between what is and is not allowed, along the same lines as what is allowed for cyclists. Enforcement should not be used as a substitute for investment in infrastructure and education to enable safe riding and should only be used in instances where pavement riding leads to more danger to pedestrians and/or riders. Enforcement should be closely monitored to ensure that all riders are treated equally.

To make micromobility accessible to all Londoners:

- **National government should offer tax incentives and loans to all citizens wanting to buy a micromobility vehicle.** This could be based on the current cycle to work scheme but available to more people, particularly those who currently face the biggest barriers to access – caps on support should not exclude anyone from accessing a suitable micromobility vehicle. This could be administered through Credit Unions.

- **TfL, providers, the GLA and boroughs should continue to develop and deliver public messaging about micromobility** to encourage take up by those least likely to think of micromobility as for them. This has worked well for cycling and could be extended to e-bikes and (when appropriate) e-scooters.

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