



Whitepaper:

## Micromobility:

Navigating new technologies and the safety and business risks.





## Foreword

As the world looks to decarbonise, new and interesting mobility solutions are grabbing the attention of many. Already, we have seen an explosion in the popularity of electric bicycles and scooters around the world – particularly in cities. Far more accessible than an electric car and far easier to store, these ‘micromobility’ platforms are offering an all-new alternative to conventional private and public transportation.

For many of us, the pandemic has provided an opportunity for reflection and re-evaluation. This, in turn, has spurred motivation to find new solutions to the challenges in our lives, both big and small. In micromobility, we find the intersection of zero ‘tailpipe’ emission transportation with practicality and economic accessibility.

In the UK, we have seen a sharp rise in the popularity of micromobility platforms. From last-mile delivery vehicles to commuters and the more than 40 cities launching or planning public rental e-scooter schemes, micromobility is proving to be an attractive solution for many journeys. Expected to be a \$300-500 billion market by 2030, this new type of vehicle also introduces new risks for businesses, organisations and legislators.

This whitepaper is intended to provide guidance on these revolutionary new platforms and their implications for safety. It has been designed to help inform organisations and businesses about their obligations as well as some of the challenges and risks around micromobility. For example, if your employees use micromobility for their commute or visiting clients, the employee and your business or organisation are exposed to that risk.

“Recent articles in the press\*, indicate that there are over 1 million e-scooters in use in the UK with the vast majority privately owned. Private scooters remain illegal to use on anything other than private land with the permission of the landowner. This situation seems to create an even greater risk right now with little control, no mandatory training, challenges around policing and a lack of clarity around insurance liabilities.”

As everyone from governments to small businesses looks to decarbonise, it is important that new, cleaner technologies and innovations are embraced with a safety-first mindset. I hope this whitepaper provides you with useful insight and starts a conversation at your workplace about micromobility, its benefits and risks.



**Charlie Norman**  
Managing Director

\*The Sunday Times, 13 Feb 2022



## Micromobility – What is it?

Coined in 2017, micromobility is a relatively new word that is used to describe small and lightweight vehicles that are, typically, slower than conventional traffic and used over short distances. The term covers things like electric bicycles, electric scooters, electric skateboards and similar small, open-air, single-person vehicles.

With 25% of journeys in England under one mile and 68% under five miles, the requirement for a short-range, low-emission alternative to passenger cars is clear. While automobility, particularly electric vehicles (EVs), offers situational and capacity advantages, it is ill-suited to efficiently transport people on such short journeys.

While traditional micromobility solutions, like conventional bicycles, have been used by the likes of commuters and couriers extensively over the past decades, the primary factor behind the current micromobility trend is electrification. In many ways mirroring the transition of automotive manufacturers to EVs, the electrification of things like bicycles, scooters and skateboards has made them a far more viable alternative to other modes of powered transport, like cars and motorcycles.

Thanks to advances in lithium-ion battery technology, control systems and electric motors, complete electric powertrains are light and efficient. This allows them to be easily integrated into the aforementioned small platforms while still providing practical range and performance.

### Micromobility tech at a glance

**Common types:**  
e-scooter, e-bicycle,  
e-skateboard, e-unicycle

**Range:**  
5 – 15 miles

**Top speed:**  
15 – 28mph  
(London e-scooter trial -  
12.5mph)

**Propulsion:**  
Lithium-ion battery and  
1–2 electric motors





## The Rise of E-mobility

While the pandemic has had a significant impact on the number and distance of personal mobility journeys, especially automobility, it is predicted that micromobility as a share of miles travelled will increase 5 – 10% in the medium-to-long term.<sup>1</sup>

Another important factor to consider is changes in post-pandemic behaviour, with a shift away from public transportation due to perceived virus transmission risk. The vast majority of micromobility platforms are designed for single users and offer an open-air alternative. While, globally, micromobility startups struggled with profitability through the height of the pandemic, the sector is now looking at a significant rebound. By 2030, the micromobility market is expected to reach \$300 – 500 billion.<sup>1</sup>

Another primary driver is the inconvenience of widespread congestion in cities in the UK, and indeed worldwide. Large-scale congestion is turning motorists away from automobility towards alternatives including public transport and, of course, micromobility. Worldwide data highlights that a shift to e-scooter use comes primarily from private vehicles (36%) and walking (37%).<sup>2</sup> The de-carbonisation agenda of course is also impacting urban travel.

Closer to home, the Department for Transport (DfT) has lagged behind other nations in studying and allowing widespread micromobility use. Significant progress was made in 2020 when the UK Government announced a £2 billion package to create cycling and walking solutions, including bike lanes and funding to reduce crowding on public transport. The package also included funding for public e-scooter rental trials.<sup>3</sup>

Later in the year, DfT opened up e-scooter trials to any city that applied before the August deadline. As of December 2021, there were 32 regional public rental e-scooter trials across the UK, from London to Sunderland, South Somerset to Norwich. Supported by the DfT, these trials are intended to inform future legislation around micromobility and its integration with existing infrastructure and mobility solutions, particularly automobility.

### London Trial

Transport for London (TfL) and London Councils began their trial of rental e-scooters in June 2021 with a select number of boroughs and expanded further in August the same year.

In the first month of the trial, there were 35,000 e-scooter trips, with the average rental lasting 24 minutes and covering 2.9km. The fleet of public rental e-scooters used in the London trial met a number of stringent safety requirements including permanent lighting front and rear, GPS controlled parking and usage zones, and unique identification numbers.<sup>4</sup>

# Safety

Safety and regulation are two of the primary discussion points and concerns around the widespread adoption of micromobility platforms. There is currently no overarching legislation for the use of micromobility platforms on public roads, with each vehicle type at different stages of legislation. Electric bicycles, for example, have a far longer history of use and legislation within the UK, whereas electric scooters and other more modern concepts are still in trials with legislation pending.

## DfT 2020 Privately Owned E-scooter Safety Review

- 460 accidents involving e-scooters resulting in 484 casualties
- Breakdown: one death, 128 seriously injured and 355 slightly injured
- Accidents more frequent between 2pm and 8pm
- Aside from the riders, other users most in danger were pedestrians, pedal cyclists and motorcyclists <sup>5</sup>

Officially termed electrically assisted pedal cycles (EAPCs), electric bicycles do not require a license, road tax or insurance to operate. An EAPC must have pedals that can be used to propel it and visibly display the power output (maximum permitted is 250 watts) and manufacturer of the motor. They must also display the battery's voltage and the bike's maximum speed, with the electric propulsion system disengaging above speeds higher than 15.5mph. Those that can be propelled without pedalling or working outside the guidelines above require type approval to be considered legal.<sup>6</sup>

Unlike EAPCs and 'twist and go' e-bicycles, the only way to legally ride an e-scooter on UK roads is through a government trial rental programme. Riders must possess a category Q license, which is also encapsulated within full or provisional licenses with AM, A and B categories. Depending on the trial location, rules may vary.

Nationally e-scooters available for rent, as part of DfT trials, are permitted on the road (except motorways) and cycle lanes but not on the pavement and must remain within the trial's geographical boundary. E-scooters within the trials are limited to a top speed of 15.5mph with a maximum weight of 55kg and a 500-watt power limit. Helmets are currently recommended but not mandatory for e-scooter riders. For now, privately-owned e-scooters remain illegal for use publicly.

According to independent research commissioned by Drivetechnology and the AA, 89% of respondents believe that safety training should be mandatory before operating an e-scooter and 84% believe they should be classified as a vehicle and therefore must be properly registered and insured, and riders qualified in order to ride them legally.

## TfL ban

While privately-owned e-scooters remain illegal in use in public spaces, they are widely available for purchase. Currently unregulated, these platforms do not meet any standardised minimum requirements for safety or operation. Following a number of fire incidents, TfL banned privately-owned e-scooters and e-unicycles on its transport network in December 2021. E-bikes remain allowed on some parts of the network at certain times, as these are already regulated via manufacturing standards.<sup>7</sup>

## Singapore trials

Singapore, one of the world's great metropolises, was first introduced to e-scooters back in 2013. A recent study by Future Urban Mobility (FM), an interdisciplinary research group at the Singapore-MIT Alliance for Research and Technology (SMART), found that e-scooters have become an important transport option but their introduction posed risks to pedestrians. Following a number of serious and fatal accidents between riders and pedestrians, the government banned their use on public footpaths in November 2019. E-scooters remain legal on 440 kilometres of cycle paths across the island and are in widespread use – including numerous sharing services.<sup>8</sup>

Just as we have seen the rise of advanced driver assistance systems (ADAS) in cars, advanced rider assistance systems (ARAS) are on the rise too. While most commonly restricted by GPS geofencing – shutting down functionality if taken within 'restricted' areas – by those operating share and rental fleets, ARAS offer additional options. On-board cameras, accelerometers and location data can be used to verify appropriate riding behaviour and automatically regulate the top speed of shared micromobility platforms when around pedestrians and other vehicles.

1 <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/the-future-of-micromobility-ridership-and-revenue-after-a-crisis>

2 <https://www.london.gov.uk/about-us/londonassembly/meetings/documents/s82223/Appendix%202%20-%20Micromobility%20and%20Active%20Travel%20in%20the%20UK.pdf>

3 <https://www.gov.uk/government/news/2-billion-package-to-create-new-era-for-cycling-and-walking>

4 <https://www.intelligenttransport.com/transport-news/127377/london-rental-e-scooter-trial/>

5 <https://www.gov.uk/government/statistics/reported-road-casualties-great-britain-e-scooter-factsheet-2020/reported-road-casualties-great-britain-e-scooter-factsheet-2020>



## Sustainability

Many are hailing micromobility as the solution to decarbonise our cities. With an estimated 2.5 billion additional people residing in urban areas by 2050, affordable, low-emission personal transport will be undoubtedly crucial to meeting national emission targets. Typically, micromobility vehicles use 5% of the energy that an EV requires

to make an equivalent trip, with their manufacture also less emission-intensive. That is to say, for 1-kilowatt-hour, an EV can travel 4.1 miles while an e-scooter can travel 82.8 miles.<sup>9</sup>

When reviewing the carbon footprint of micromobility platforms, it is also important to consider the service life and carbon neutrality of the hardware and batteries required. Post-manufacture, the vast majority of emissions associated with micromobility travel involves the recharging of batteries, with one study highlighting that 43% of the lifetime carbon emissions of a fleet e-scooter revolves around daily collection and charging.<sup>2</sup>

The use of micromobility platforms as viable short-range delivery vehicles is an area of key interest. While heavy goods vehicles account for just 5% of miles travelled, they emit 17% of transport-related greenhouse gas (GHG) emissions<sup>10</sup>. Termed 'last mile delivery' vehicles, the use of micromobility platforms is a compelling alternative to diesel-powered delivery vans, particularly in urban areas.

6 <https://www.gov.uk/electric-bike-rules>

7 <https://www.fleetnews.co.uk/news/car-industry-news/2021/12/09/tfl-announces-ban-of-e-scooters-on-transport-network>

8 <https://news.mit.edu/2021/e-scooters-new-micro-mobility-service-0622>

9 <https://www.cbinsights.com/research/report/micromobility-revolution/>

10 [https://www.gov.uk/government/publications/freight-carbon-review-2017#:~:text=Heavy%20goods%20vehicles%20\(%20HGVs%20\)%20are,just%205%25%20of%20vehicle%20miles.&text=The%20government%20is%20also%20committed%20to%20improving%20UK%20air%20quality](https://www.gov.uk/government/publications/freight-carbon-review-2017#:~:text=Heavy%20goods%20vehicles%20(%20HGVs%20)%20are,just%205%25%20of%20vehicle%20miles.&text=The%20government%20is%20also%20committed%20to%20improving%20UK%20air%20quality)





## In the spotlight...

“From my in-depth research on the subject of micromobility, there is a probable future scenario, which needs careful consideration. It’s highly likely that rental and private e-scooters will be legalised in the next year or so. Undoubtedly there will be restrictions on these vehicles for both speed and weight, with a speed limit of at least 15.5 mph but no higher than 28 mph. Rental e-scooters will be relatively easy to maintain control of and from what I have witnessed, the trials have been broadly successful.

“However, the legalisation of private e-scooters is where issues will arise and will quickly become a big social and safety problem if certain things aren’t considered. The most important of which is people will modify e-scooters to make them go faster. Speeds of over 50 mph are completely possible and could only be prevented if there was a low enough cap on the motor size, although this would also reduce torque, which is important if we want to expand vehicle types.

“Consequently, we need to introduce rules similar to car and motorbike ownership, which makes people more aware that they are responsible for what they do with the vehicle and importantly there is a link between them, the vehicle and law enforcement. Psychologically this is very important and is one of the reasons the e-scooter rental trial has made it a requirement that riders must have at least a provisional driving license.

“Therefore, I believe we need several legal rules imposed with the legalisation of private e-scooters. Firstly, all private e-scooters (also rental), should require a registration plate. Secondly, e-scooters should be taxed and insured in the same way as motorbikes. I think whether riders will need a provisional or full driving licence is not clear. This requirement greatly reduces the number of people who can own and operate an e-scooter and I expect this will be dropped for both rental and privately owned e-scooters. However, there will be greater emphasis put on training, which will include safe riding and the Highway Code.”



**Dr. Roger Woodman**

Head of Human Factors for Future Mobility at WMG, University of Warwick

# Training

As the popularity of micromobility increases, businesses and organisations must remain aware of their exposure to the risks posed by this new form of transport. Whether operating last-mile delivery vehicles or allowing employees to use micromobility rental services in the course of work, understanding the risks and staying informed is critical. With more than 40 cities across the UK launching – or planning to launch – public rental schemes for e-scooters, now is the time to put policies in place and invest in training.

All leading players within the UK micromobility rental market – including TIER, Lime, Voi, Dott, Spin and more – recognise the important role that safety and training will play in the safe integration of micromobility into the modern road user network. As it stands, inexperienced riders participating in the regional trials present a road safety hazard. Training is essential to minimise user risk.

Drivetech has produced safety solutions for a number of e-scooter companies and is a pioneer in the micromobility training space. From educational videos to specific online training modules, Drivetech has developed its packages specifically for businesses and organisations that understand the risks posed by the rapid adoption of new transport solutions.

As the UK Government develops legislation through consultations, incorporating both public and private use, Drivetech will continue to update its micromobility training programmes. Emphasising its ‘share the road’ approach to improve safety for all road users, Drivetech is a national leader in fleet risk, safety management and driver training.



## **Duncan Robertson, General Manager at Dott UK**

“Safety is non-negotiable for riders and non-riders alike and Dott has been dedicated to a responsible transport approach from the very beginning. Micromobility and sustainable travel are now part of London’s rich mix of transport options, and part of the revolution to create people-focused streets - in busy cities with crowded public transport, e-scooters are a natural fit, providing meaningful and sustainable change. However, to achieve this: safety must come first. Through our partnership with Drivetech, we have created an extensive rider training module, educating new riders on the rules of the road to further reduce the opportunity for accidents. Riders are incentivised with discounted rides, earned by completing our online and in-person ‘rules of the road’ courses. By actively encouraging

our riders to take responsibility for the safe use of our vehicles, we’re creating an environment of shared initiative and promoting responsible behaviour whenever riding with Dott.”



## **Alice Friedman, senior manager at Spin**

“Scooter safety – for both riders and pedestrians – is central to everything we do at Spin. Spin takes a Safe Systems approach to injury prevention, starting with safe vehicles using cutting edge technology to ensure smart self-enforcement of riding rules, investing in multifaceted rider education, and building partnerships to ensure safe places to ride across the globe.

“Vehicles equipped with Spin Insight Level 2 can intelligently detect pavement riding, and slow down and even stop the vehicle – automatically. Spin Insight Level 2 can also detect incorrect parking placement, and let riders know when they have parked their vehicles safely and correctly. This game-changing technology addresses some of the most common concerns regarding safe operation of electric vehicles. Spin’s vehicles additionally limit the top speed to no more than 12.5 mph in the UK, and even less in restricted slow zones. These technologies represent a crucial difference from privately-owned electric scooters, which are not currently permitted on UK roads, and do not have automatic speed, pavement-riding, or parking enforcement capabilities.

“Rider education is baked into for-hire scooter schemes – another critical distinction from privately operated vehicles. Our rider education system emphasizes riding alert, sober, and off of the pavement, and reminds riders to be mindful of those with vision or mobility impairments. Our training module specifically focused on low vision, developed in partnership with London Vision, helps Spin riders know how to interact with blind and partially sighted people to support and respect their independence in the urban environment. In 2022, Spin will be able to earn rewards for participating in a new online module developed by the UK’s leading road safety entity, Drivetech, as well as at in-person safety events focusing on safe operation of our vehicles.”





**Matthew Penchars, Head of Public Policy at Voi UK, Ireland and Benelux**

“Safety is our number one priority at Voi and has never been a tick-box exercise. Without collaboration and commitment from all parties involved in the introduction of this new transport mode, and an overall feeling of safety and reassurance, we will continue to live in polluted cities and the shift to greener transport alternatives won’t happen. Indeed, our detailed Safety Pledge, Vision Zero strategy, industry-first RideLikeVoila e-scooter driving school and our Annual Safety Report are all part of our commitment towards safety and these are all supported by ongoing concrete proactive actions.

“Such actions include our successful collaboration with Driveteck, from the AA, to introduce an innovative online learning module, and also endorse the first-ever online e-scooter traffic school, RideLikeVoila, which has trained over half a million users to date.

“Knowing that safety can be an issue for those who are new to e-scooters, in particular, we acted accordingly by creating a Beginner’s Mode, which reduces the scooter speed to 10mph instead of Voi’s maximum speed of 12.5mph, well below the speed limit recommended by the Department for Transport (15.5mph).

“We also proactively communicate safety messages via in-app messaging, we organise regular online and in-person safety events where we have distributed thousands of free helmets to our riders since the beginning of the trials.

“Another UK industry first safety initiative was putting number plates on all of Voi’s UK e-scooters. They not only help us spot rogue riders, but also support our Report a Voi page, where any person can report a scooter. This initiative acts in parallel with our other monitoring and enforcement activities such as police collaboration, having staff on the ground, our three strike policy to tackle misuse and our ‘Parking Photo’ initiative to promote safe parking.

“Our design developments also have safety at their core, such as the latest e-scooter model, with turn indicators to clearly show the rider’s direction of travel. We are also piloting e-scooter sounds in Birmingham, Bristol and Liverpool to help protect visually-impaired or blind pedestrians.

“In addition, our technology has assisted safe parking with the use of sensors, including accelerometers and dynamic GPS technology, which determine the position of each scooter and automatically issue an alert to our staff. At the most cutting-edge end of the technological spectrum, we are piloting AI and computer vision in our scooters technology to detect pavement riding.

“Our strategies and actions must also be supported at a local and government level, which is why we work closely with our regulatory stakeholders. For example, we actively push for better and safer infrastructure, sustainable urban design and a new vehicle classification for e-scooters. At Voi, we believe that safety can only be fully achieved by putting it at the centre of everything we do, with cooperation from local authorities, national government and operators to develop innovative solutions. From our technology to philosophy, grassroots to government, safety is key to our Voilage.”



**Hal Stevenson, public affairs manager for UK and Ireland at Lime**

“Safety is at the heart of Lime’s shared e-scooter and e-bike services. Our riders, transport partners and cities, rely on us to provide a safe and well maintained service wherever we operate.

“Lime has invested in years of independent design and development to create an industry leading e-scooter, our Gen4 vehicle, which has unrivalled braking and GPS reaction speeds, helping to keep riders and other road users safe. Our vehicles are also designed with larger wheels and a lower base board to improve stability, with mountain bike style suspension added to deal with uneven terrain.

“Safety is about more than vehicle hardware and software. Lime has also set new standards for rider education, requiring users to take mandatory training in-app before they can start their journeys. Users also have the opportunity to attend in-person training, led by Lime team members, helping them learn the rules of the road in a safe and controlled environment. We have also partnered with industry-leader, Driveteck, to offer longer format virtual training via our online Driving School.

“As usage of shared e-scooters continues to increase, safe operations are critical to demonstrating the positive impact these vehicles can have on our towns and cities, helping to deliver long term regulation that supports the growth of this exciting transport mode.”



Georgia Heathman, Public Policy Manager, UK and Ireland, TIER

E-scooters and bikes bring better air quality, lower congestion and enhanced health and wellbeing, ultimately making our towns and cities more liveable. Yet this must not come at the expense of anyone's safety.

Indeed that is TIER's top priority. First, a deep-rooted safety culture underpins our e-scooter vehicle design: integrated helmet, indicator lights and shock absorbers, alongside the triple brakes and double kickstand which sees TIER lead the sector in stopping-distance and wind-topple tests.

That safety culture also guides our broader approach, scrutinised by the TIER UK Safety Board of leading charities who meet with us to scrutinise our approach to safety and responsible operations, and advocate for new, sector-wide safety measures to ensure that e-scooters are incorporated into the transport mix smoothly and safely.

Our industry-first commitments - from sound emitters co-developed with a visual impairment charity, to a theory test in our AA Ride Safe School built with disability groups - speak to our belief that no accident is inevitable. We also use technology enabling TIER to detect incidents remotely, have introduced the world's most accurate e-scooter parking system, and allow people to trade in their illegal-use private e-scooters for TIER ride credit instead.

Meanwhile, access to training in various formats online and in-person is vital. As well as our online training module with Drivetechnology, our in-person training safety courses for e-scooters are regularly attended by people who are older and for whom standard cycling may no longer be suitable. Electrically-assisted vehicles therefore mean more people can enjoy the health benefits associated with micro-mobility. So as we view people riding push bikes, and the

care that is taken to protect and improve their safety on the road, so too should we view the users of other micro-mobility modes such as e-scooters and e-bikes.

We must therefore ensure we update the training we expect for all road users. Awareness training for drivers of cars, buses, HGVs and other vehicles should include recognition of a multitude of micro-mobility vehicle types being used on the road.

Alongside training and awareness raising, better infrastructure that caters for a multitude of vehicles and encourages safer use and adoption will also be vital to ensuring benefits from expanded micro-mobility use can be more fully enjoyed in the UK.

Bringing these elements together to ensure safer outcomes for all, everyone can play their part in making our cities greener, and supporting the move to net zero.





## Conclusion

Micromobility can present a significant risk to UK businesses because so many fail to fulfil the basic training to ensure employee safety. With the number of e-scooters in public areas rapidly increasing, it's important that businesses implement effective procedures to minimise risk to employees and the public.

Driver and rider training is an important way for organisations to fulfil their obligations while helping employees to minimise risk when conducting work-related travel. Not only will it improve micromobility use and awareness, but it will employees will understand their responsibilities while out and about.

It's more important than ever for organisations to plan ahead for the rise in micromobility use going forward. The introduction of micromobility platforms must be considered when health and safety departments assess risks within organisations. Maintaining awareness of work journeys and the vehicles and technology involved will be critical to fulfilling duty of care – particularly over the next decade during a period of significant transition.

Micromobility can be an excellent tool for organisations, particularly with the introduction of clean air zones in a number of major UK cities. It's critical that businesses and organisations understand their responsibilities to employees who use micromobility solutions and are prepared to adapt policies to meet the evolving needs of transport.

A lot of employees (whilst not conducting work-related travel) will commute using micro-mobility, and employers should extend training to these employees as part of being a good employer with a strong duty of care





## About Drivetech.

Drivetech is the world leader in fleet risk and safety management, and driver training. It is also the UK's largest provider of driver offender retraining courses. With a track record built over the last 30 years, Drivetech now delivers fleet consultancy, driver assessment and training services in over 95 countries, in 35 languages through over 40 partners. Our fleet solutions improve driver safety, reduce fleet running costs and ensure compliance with legal and duty of care responsibilities. Our customers range from companies with small fleets through to large corporate customers where driver training is a core activity, an understanding of their sector required and a clear return on investment is demanded.

Drivetech is part of the **AA**.

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