

The Emergence & Growth of E-Scooters

Making Reliable Connections in Democratised, Vibrant and Eco-Efficient Cities

Connecting micro-mobility devices for operators and consumers; understanding the complex social interactions between a variety of stakeholders and the role of secure and resilient mobile communications in delivering an optimum service.



01

The Emergence of Electric Scooters

We have recently seen the emergence of e-scooters being used more widely in major UK cities, particularly through the implementation of shared-user public trials. The vision of commuters, day-trippers and tourists moving seemingly unencumbered through our urban spaces, brings a new and novel aesthetic to our cities; be it interest, delight, threat or consternation. Whatever your personal view towards these new and emerging forms of transport as a utility or leisure device, e-scooters and forms of micro-mobility seem like they may be here to stay; combining novelty and convenience for users while expanding their range, and potentially serving to reduce overall pollution.



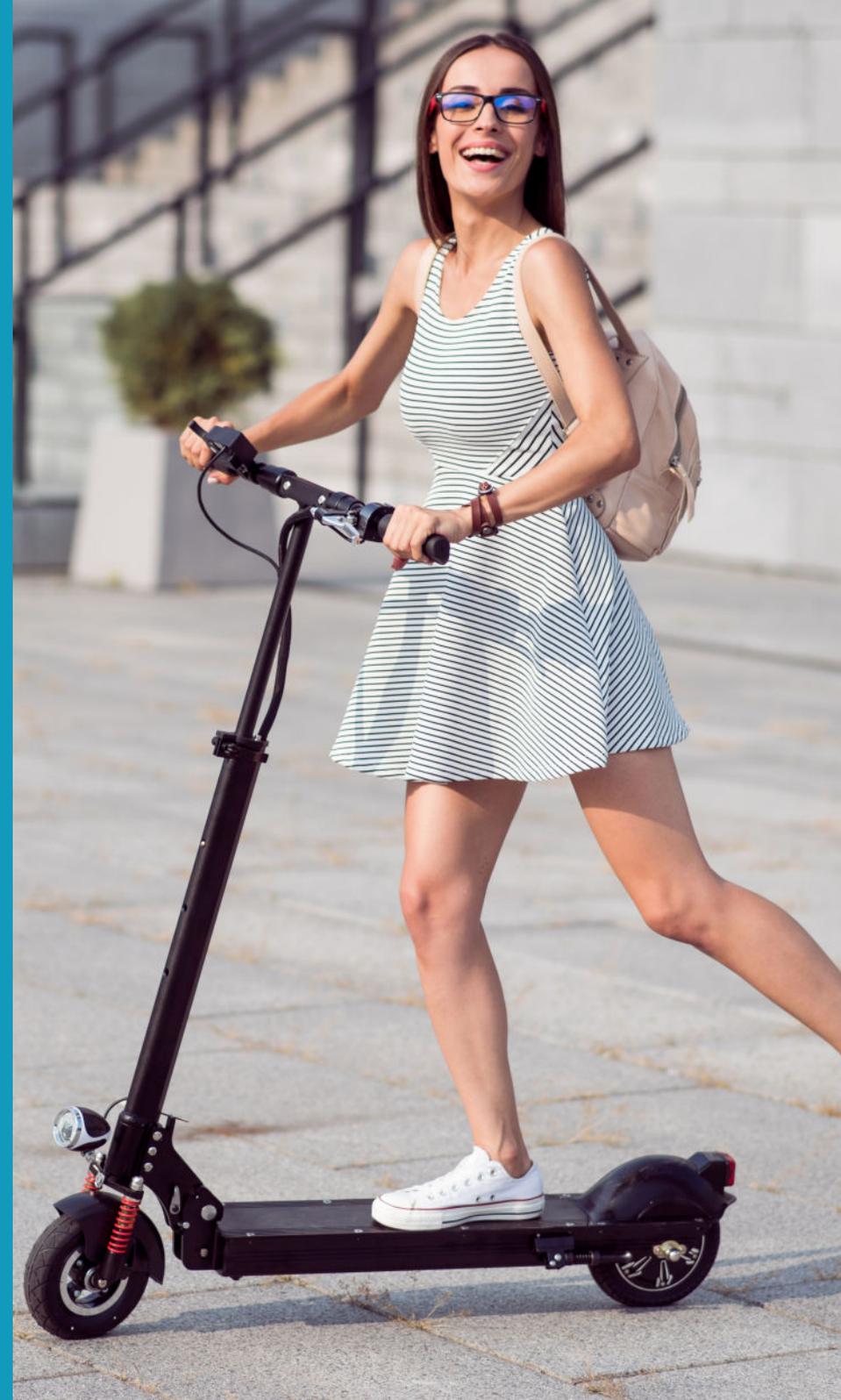
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How to use an E-Scooter

E-scooters in the UK typically cost £1 to unlock and 0.20p per minute of usage. The user must first register using a smartphone app. Users will need to have at least a provisional driving licence to hire an e-scooter. Public e-scooters can be used between 6am and 10pm every day. In the UK you can only ride an e-scooter on the road however each country has different rules and regulations set in place. If a rider is caught using a personally owned e-scooter in public, you can be fined up to £300 and gain six points on your licence.

To operate an e-scooter you need to activate the motor by pushing off with one foot until the wheels start spinning, then you turn the throttle which will allow you to gain speed. All electric scooters use a small battery located in the base of the e-scooter. this works the scooters brakes, controller, motor, lights, and display screen. An e-scooter battery can last anywhere between 1 to 3 years of recharging cycles and can travel between 15 to 40 miles before requiring charging. This will depend on the type of terrain, inclines, scooter model, weather, and speed. Location services are crucial to scooter operations, being used for real-time monitoring of their whereabouts and for transmitting motion telematics; used for allowing consumers and employees/freelancers to locate them, remotely check their charging status and range, and for the scooters to auto-detect entry into a prohibited or low-speed zone and therefore automatically stop or slow down.

Charging an e-scooter requires employees/freelancers to locate every e-scooter using an app, accumulating them, then taking them to a warehouse for an overnight charge and any maintenance as required. When the scooter is charging, a red light will turn on and will usually be flashing. When the scooter is sufficiently charged a green light appears.



03

The Market for Electric Scooters

Global e-scooter markets seem to be growing rapidly; currently estimated to be approximately around \$20 billion [1]. In the UK, 58% of car journeys are fewer than 5 miles, leaving the opportunity for e-scooters to replace some forms of short car journeys. Providing the hope of helping to reduce CO2 emissions and generating energy/cost savings when compared with other forms of private and mass urban transport systems. E-scooters, also, provide an appealing and enjoyable way of navigating around urban landscapes in different ways. Allowing users to explore new skills and fresh ways of experiencing urban environments.



[1] <https://www.grandviewresearch.com/industry-analysis/electric-scooters-market>

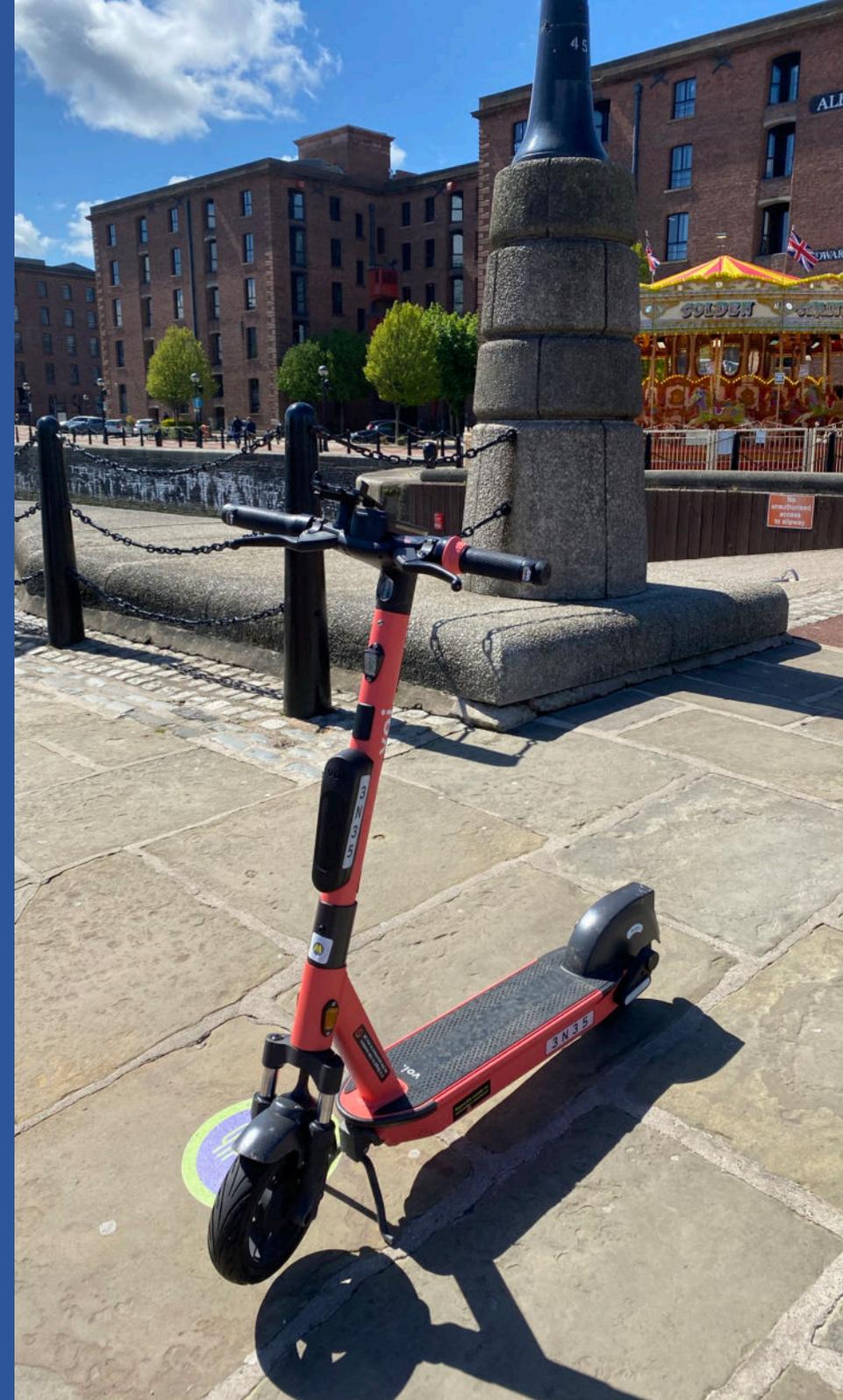
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Electric Scooters and Shared-User Rental Trials

E-scooters can be legally used on the road as part of a government rental scheme. Currently, the government is trialling the use of electric scooters in dense environments including London, Liverpool, Portsmouth, Southampton, Bristol, Bath, Derby and Nottingham. The objective is to consider how the public adjust to this different form of transport. UK trials will last around one year, which will enable authorities to monitor and review the impact of electric scooters in a public environment. The government will use the results and findings to consider future laws.

While shared-user e-scooter trials remain in their test stages, they are already creating interesting debates among the wider public. For instance; how they work? what are their rules of engagement? the relative safety and risks as well as the wider impacts towards other stakeholders and the urban and suburban fabric? Indeed, expecting tensions, electric scooter operators have put in place complex mechanisms to help control their devices to seek to minimise unhelpful interactions with pedestrians and their negative impact on other users of complex urban and suburban spaces.

One of the obvious concerns regarding e-scooters is their relative speed in comparison with pedestrians, small children, the elderly and traditional road users. While the maximum speed a public e-scooter can travel is 15.5mph, this can vary depending on the area and local restrictions. For example, some trials specify 10mph, reduced to 5mph in parks and are not allowed in main pedestrian shopping streets. Users must be over 18 years of age, wear a helmet and use only on roads. They can also only be used within certain areas and will come to a halt if they leave these zones.



05

Private Electric Scooters

In the UK, if you own a privately owned e-scooter, this mode of transport is classed as a motor vehicle. This implies you would have to be licensed, have insurance, tax, own number plates, and be registered with the DVLA. At the moment, however, it is unlawful in the UK to ride a privately owned e-scooter anywhere in public spaces, roads, paths, and pavements. It is however legal if you have permission from the owner of private land. Observations show that private scooters appear to be being used in public spaces, and it seems reasonable to assume that public trials might further legitimise private-type use as well for their owners. Indeed, the sight of shared scooters being used on pavements by users who perhaps rightly fear for their safety on busy roads, again potentially legitimises private users to use their vehicles on pavements, but perhaps without the same device restrictions provided by speed limitation and operator monitoring.

In some ways, private e-scooters may solve some of the more irritating aspects of shared user schemes for non-users. Scooters being looked after by their owners and held in secure private/home areas when not in use. This is in stark contrast to the common sight of discarded shared public scooters which are left in a variety of unhelpful places. In shop doorways, outside non-user houses and even on the side of roads or on traffic islands. This is clearly in breach of their terms of use, but tensions with the implicit need to provide immediate convenience for users for trials to be successful. While the smartphone app allows users to consider an e-scooter option by viewing their location and availability in real-time, to be a realistic choice for short journeys, scooters need to be liberally distributed nearby people's homes.

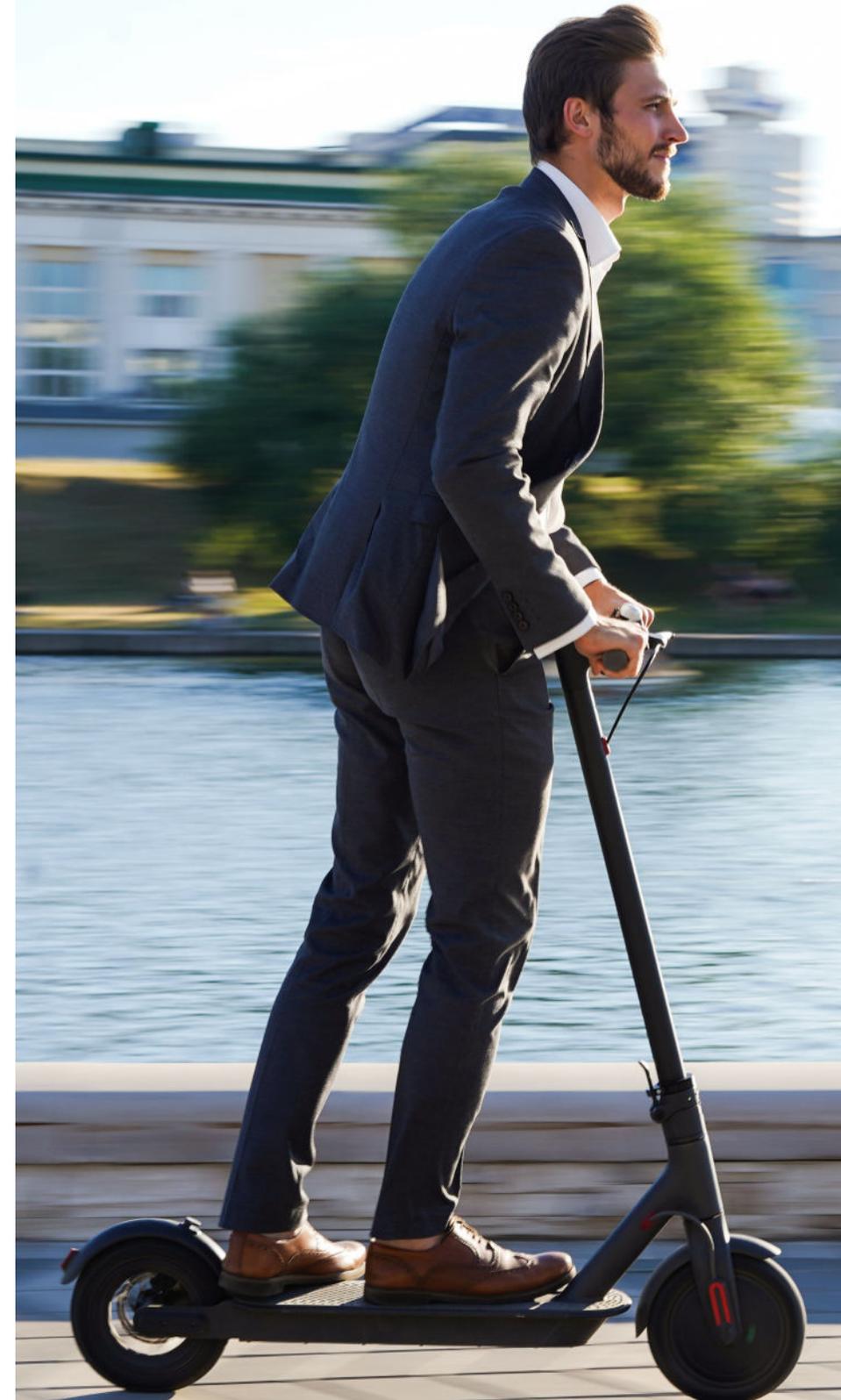


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Benefits of E-Scooters

The hoped-for benefits of e-scooters are to open up the entire city to new users. Meaning that areas become more accessible and some of the negative aspects and rigidity of private car ownership and mass transit systems are reduced; including pollution, high capital costs and inflexible routes. Specifically, e-scooters can help to:

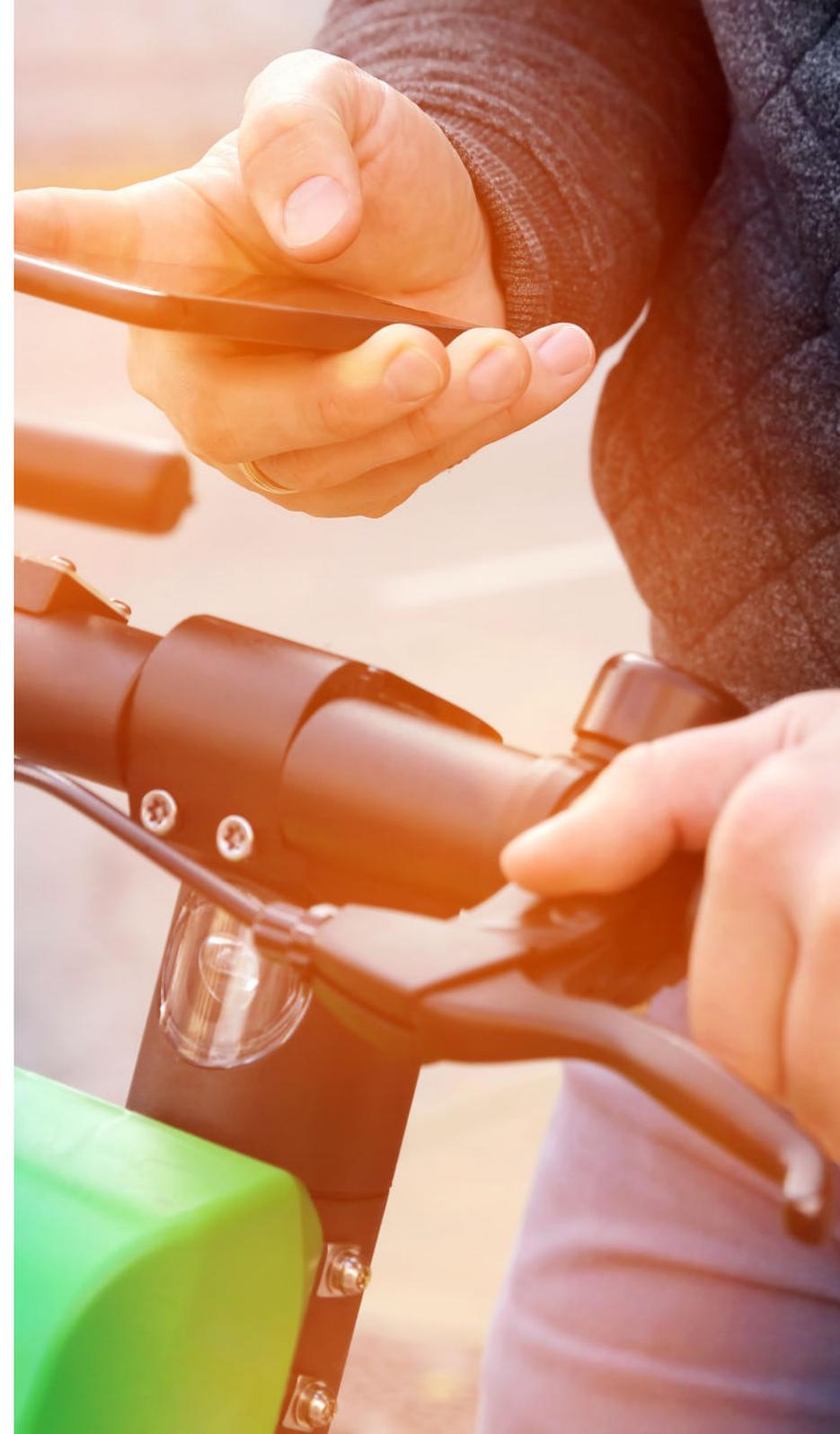
- Reduce overall CO2 emissions,
- Limit greenhouse gas emissions
- Provide a more eco-friendly form and choice of transport.
- Provide ubiquitous and convenient access: E-scooters can be unlocked through a mobile app and left locked anywhere within an allowed urban zone or circumference.
- Provide a more adaptive form of transport: as users can swap between riding and walking when using an e-scooter.
- Allow for less onerous parking needs on both users and infrastructure providers: i.e.; Travellers can easily park an e-scooter in a large city, which can be challenging in a motor vehicle, particularly when navigating where parking is difficult or limited.
- Provides a degree of autonomy for users, who are able to make more complex travel choices and makes interactions between alternative forms of private and mass transit systems possible (where there have previously been disconnections or voids between services).
- Enable democratic access to an affordable form of transportation due to their low use cost.



07

Concerns Towards E-Scooters

- E-scooters present new interactions between users and non-users. Conflicts emerge between e-scooter users particularly through routes where walking is a more accepted or prevalent form of movement, but also with cyclists on cycle lanes and motorists on roads.
- Due to the characteristics of the devices, e-scooter users might see themselves as occupying a different space to both pedestrians and motor vehicles. Upsetting the normal order of traffic and how public spaces look, feel and how users interact with them. This can mean a lack of respect or engagement with typical traffic rules, either for convenience or perceived safety. For example, pedestrians and drivers frequently struggle to foresee and predict where e-scooter riders will go and what they will do next as they seem less limited, and the law and its observation seems less defined and understood. Electric scooters, also, do not make any noise and therefore create a shock for unsuspecting pedestrians who did not see or hear their approach.
- Discarded e-scooters can cause a potential hazard for pedestrians via cluttering and obstructing public spaces; where users leaving them carelessly blocking pavements and driveways. Private landowners might find this disrespectful or unsightly.
- The unreliability or inaccurate location of an e-scooter on an interactive map could significantly disrupt users intended or scheduled travel plans if unavailable.
- Covid: Clearly, sharing vehicles between users and therefore surfaces creates concerns towards the transmission of viruses. To mitigate this risk, every vehicle is disinfected when they return to depots. Handlebars are also wrapped in Shieldex copper- tape, which kills 99.98% of coronavirus within contact.



08

E-Scooters Problems...

- Accidents: There have been several concerns regarding people with visual impairment being aware when an e-scooter is nearby due to how quiet e-scooters are when present. For example; there have been a range of incidents involving e-scooters; this has also involved fatal accidents for riders and serious injuries for non-riders involved in collisions.
- Riding Ability/Accreditation: There are not any tests individuals to take for riding an e-scooter in public spaces and especially roads. This results in individuals not having an awareness of road safety either in terms of driving regulations or how the scooter should be correctly handled to minimise risk or accidents.
- Lack of Regulations: Being a new form of transport, there remain limited regulations. For example, should the user turn their lights on when riding? Should they wear a protective helmet or is it simply a recommendation?
- Theft: It has been noted for individuals to hoard scooters to defraud scooter companies. Criminals have also previously been known to coax employees/freelancers into unsafe places to rob them.



09

Conclusions

E-scooters have gained recognition over the past few years and are currently increasing in popularity especially with commuters who regularly travel by bus or train. Nevertheless, they still have their fair share of problems in terms of safety issues this includes offences such as anti-social behaviour, assaults, burglaries and no legal requirement for a rider to wear a helmet. Research also appears to show that 60% of people believe electric scooter users should have a full driving licence before using them.

The negatives, however, appear to be overridden by the potential long term benefits of these schemes both for users and commuters and the city authorities themselves, but may require additional safety legislation and changes to the city infrastructure to accommodate them safely. For example, special priority lanes and approved/certified routes.

It is paramount that interactions between devices, operators and users remain 'always on'. The e-scooters need accurate information regarding their location, telematics, zonal requirements and status to operate effectively. This enables e-scooters to be located, checked, and operate according to their terms of use and the agreed rules of the trial or next stage deployment. It also helps to deter crime and reduce anti-social use/behaviour if users and devices can be monitored in real-time and audited against specific complaints or incidents.

Clearly, mobile communications are vital to these interactions and will require secure and resilient 'always on' Omni-network operation to work effectively.



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The Importance of Secure & Resilient Multi-Network Mobile Connectivity in Delivering a Successful E-Scooter Service

Caburn Telecom is a leading global provider of connectivity for the Internet-Of-Things (IoT). Our SIMs, chip-SIMs and e-SIMS provide multi-network capability for devices such as e-scooters and are used extensively in the vehicle security and telematics industry.

Some motivations for using multi-network connectivity include:

- Enlarging geographical coverage
- Increasing service up-time
- Ensuring resilient and cost-effective roaming
- Avoiding local, regional, national, or international service outages.
- Enabling centralised management of IoT connectivity for large scale deployments.

A managed SIM will, therefore, enable an e-scooter to connect to multiple networks, providing resilience, flexibility, and optimum service performance. This will allow an operator to always keep track of the whereabouts of each individual e-scooter and for them to receive operational data accordingly. Vital, for ensuring the safety of users and non-users and to help protect and safeguard these e-scooter assets for operators.



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