The rise of micromobility

European urban areas are in the midst of a mobility revolution. The way people move around cities heralds a change as Europe transitions towards alternatively fuelled, shared, integrated and autonomous transport systems. Out of these macro trends we see the widespread emergence of micromobility devices, such as e-bikes and e-scooters.

This case study explains what micromobility is, looks at the rise in popularity of these vehicles, and explores why they are polarising opinion in cities around the world.
The urban problem

Cities face a constant array of challenges. Many of these are externalities of transport, for example, congestion, poor air quality, loss of public/green spaces, and a reduction in social mobility and accessibility. All are hardships that inhibit the functionality and comfort of urban areas. The economic cost of these challenges and the inconvenience that they bring has long been recognised by cities. An understanding of the associated impact on health has created a growing impetus for cities to tackle transport issues, backed by supporting legislation and standards. More recently, environmental concerns around climate change have provided another powerful driving force for change. Cities across Europe are declaring climate emergencies and setting ambitious net zero carbon emission targets. Therefore, with transport now accounting for nearly 30% of the EU’s total greenhouse gas emissions, cities are increasingly experiencing a mobility revolution whether they like it or not.

Air quality and congestion have also been a catalyst for new ways of thinking about urban design. Terms like ‘liveable’, ‘pedestrianisation’ and ‘green streets’ are symptomatic of the makeover that many European cities are undergoing. Investment in cycling infrastructure, more pedestrian zones, new green spaces and street furniture, and restrictions on private car use are some of the actions being taken. Many cities are formalising their plans for more sustainable urban transport systems - as evidenced by the number of cities across Europe that are implementing a Sustainable Urban Mobility Plan (SUMP). The Eltis city database now has details of over 1,000 cities involved in ongoing or completed urban mobility projects and initiatives.

Micromobility has emerged as a possible solution to some of the problems faced by cities and is primed to take advantage of emerging transport systems and regulations. It is a mode of transport that is championed by the younger generation who are showing different travel habits to the older generations. RethinkX is an independent think tank that looks at technology-driven disruption and its implications across society. One of its founders, James Arbib, said of the changes occurring in urban transport systems:

'We are currently operating a transport system in cities that is 100 years old. There is a role for micromobility in the current system, but it is capped and dangerous. However, we are on the brink of massive disruption to transportation where we expect to see on-demand autonomous electric vehicles at the heart of a new system. This will create room for micromobility in cities resulting in an explosion of micromobility vehicles and new use cases.'

In action

So, what exactly is micromobility?

Today, micromobility is a relatively ambiguous term that has no commonly agreed definition. Recently, SAE International created a set of terminology for describing micromobility vehicles in an attempt to address the lack of a common vocabulary. Its taxonomy includes three key criteria:

- fully or partially powered;
- curb weight up to and including 500 lb (227kg);
- top speed up to and including 30 mph (48km/hour).

A graphical summary of the SAE J3194 standard is presented below.
A new International Transport Forum (ITF) report on the safety aspects of micromobility has proposed another definition; 'Micro vehicles with a mass of no more than 350 kilograms (771 pounds) and a design speed no higher than 45 km/hour (28 mph).’ Their proposed micromobility definition and classification is presented in the figure below.

Source: SAE International from SAE J3194™ Standard - Taxonomy & Classification of Powered Micromobility Vehicles. [https://www.sae.org/standards/content/J3194_201911/](https://www.sae.org/standards/content/J3194_201911/)

A notable difference between the two definitions is the exclusion of human-powered vehicles in the
scope of the SAE standard. We tend to think of a bicycle as a micromobility solution. However, the recent and future growth of micromobility is largely thanks to electrically powered solutions and it is the impact of these newer vehicles that requires the most effort to understand and manage.

Another characteristic often associated with micromobility is ‘shared’ – fleets of bicycles and scooters that are docked or dockless and can be hired for short periods of time. While other micromobility solutions such as e-unicycles and e-skateboards are more portable, they are harder to monetise as a shared fleet. Therefore, they are largely privately owned and operated.

**Results**

How popular is it?

Over the last few years, micromobility solutions have seen incredible growth and are now a common sight on many city streets. Docked pedal bikes were followed by dockless fleets, then e-bikes emerged and, most recently, e-scooters burst onto the scene. Some consider that the electric revolution will be led by the e-bike rather than the electric vehicle.

In Europe, there are around 20 million users of e-scooters and it is estimated that the micromobility market could be valued at over €100 billion by 2030. By comparison, the car-share market across the whole of Europe was estimated at half a billion in 2017.

James Arbib sees technology at the heart of this trend: ‘The key driver for growth has been the technological improvements over the last few years. Even compared to a few years ago, range and reliability of these vehicles has improved massively.’

Facilitating this growth has been a surge of venture capital investment that has resulted in the emergence of many new companies enjoying incredible growth. However, with so many rival companies and investors starting to think about real profit, rather than aggressive growth, there are challenges as it the sector attempts to stand on its own two wheels. The severe impact of COVID19 of many micromobility companies has also underlined the financial instability of many companies. Beyond usage statistics and market valuations it is also important to consider the added value of micromobility and how it fits in to the long-term sustainable goals that cities set. This is considered in the next section.

**Challenges, opportunities and transferability**

**Environment**

As an electric and efficient form of transport, micromobility has the potential to reduce urban transport emissions. A recently published study, which is said to be the first ever Life Cycle Assessment (LCA) of an e-scooter in use in a major European city, finds that e-scooters with swappable batteries generate 34.7g CO2 equivalent emissions per person per kilometre across the full lifecycle. In contrast, a new petrol car will generate between 200-350g CO2e/km per person per kilometre[5]. Similarly, e-bikes can have a positive impact on the environment through a reduction in motorised transport modes. While replacement of fully non-motorised modes can have a net negative impact on the environment, e-bikes are typically very efficient - consuming about 10% of the energy of a small electric car.

Micromobility vehicles are also convenient for short trips and can present a solution to first and last-mile journeys, supporting a more integrated transport network that focuses on public transport and active mobility. With urban mobility accounting for 40% of CO2 emissions in Europe and the EU aiming to be climate-neutral by 2050, the potential environmental benefits of micromobility should
not be understated. However, careful planning and attention must be given to support a modal shift that focuses on replacing private car trips with journeys made using micromobility vehicles.

As highlighted above, the environmental benefits of using micromobility depends on the type of trip that is displaced. A further consideration is the total environmental footprint. Images of damaged and vandalised bikes and scooters have been circulated widely, raising questions about the overall sustainability of the vehicles and what happens at the end of their life. Some European micromobility operators are developing new generations of their vehicles that offer increased lifespans, and improved repairability through more modular design.

Urban logistics

The factors that make micromobility appealing to private users can also apply to businesses for urban deliveries and freight. Electric cargo bikes could replace polluting vans, which can be the cause of over 30% of oxides of nitrogen (NOx) and particulate emissions in cities. Trials conducted by DHL have estimated that CO2 emissions could be reduced by 16 tonnes per year by replacing two vans with four e-cargo bikes. These bikes can take faster routes using cycle lanes, are easy to park and enable quick deliveries. There is even the potential for private rental of e-cargo bikes for large shopping trips.

Accessibility
Compared with cars, micromobility vehicles have a far smaller physical footprint when used and parked. They are also highly utilised, often by up to 10 people per day – whereas cars usually have one occupant and will only be driven 4% of the time. This can also open up more urban space, allowing urban roads to be reallocated to public transport, pedestrian zones or green areas. An issue with dockless fleets has been the haphazard manner in which e-bikes and e-scooters are sometimes parked in the street, which creates obstacles for people with disabilities and for blind and partially sighted pedestrians. More than 100 bicycles a year are pulled out of canals in London and a provider of shared bicycles has closed down its operation in Manchester after losing 10% of its bike fleet to vandalism. Some companies have introduced no-park zones near waterways in an attempt to tackle the problem.

The low-cost characteristics of micromobility vehicles also mean they can support improved accessibility and increased social mobility. The vehicles themselves are relatively affordable and incur minimal additional costs, compared to the costs that are typically associated with car ownership – insurance, tax, maintenance, congestion charges and parking. As already highlighted, micromobility is typically a shared service with travellers accessing and paying for trips via a smartphone. This usage model eliminates many of the costs associated with the private ownership of vehicles. Rental costs can be as little as a few euros a day or €100 for an annual membership.

Safety
A major concern when it comes to micromobility is safety – particularly in relation to the speeds that e-scooters can reach. Since January 2018, at least 11 deaths have been linked to e-scooters in cities across Europe, while Paris is experiencing between 150 and 200 e-scooter-related injuries every month. Limited helmet use, poor road surface conditions, speed, inexperienced users and unclear road rules are largely blamed. However, analysing the relatively limited data available, ITF found that a road fatality is not significantly more probable with a shared standing e-scooter compared to a bicycle, although they noted that it does need further investigation. The ITF report also highlights 10 key safety recommendations, including awareness raising among road users, rethinking street layout, vehicle design and operation, and the enforcement of rules.

One of the most effective measures a city can implement to improve safety of micromobility and encourage a positive modal shift towards e-bikes and e-scooters is the availability of segregated infrastructure. Responses from a Bird Rider Survey showed that protected bike lanes would make riders feel most safe. The Commission’s ‘Guidance for Cycling Projects in the EU’ (link) contains information on a large number of cycling infrastructure with supporting city case study examples.

Regulation

The common thread across each of the issues highlighted above is a lack of regulation. As discussed in more detail in part 2 of Eltis’ Micromobility Series {insert hyperlink when available}, there is a lack of consistent regulation to manage micromobility across Europe – and often nothing at all. There must be clear rules on where micromobility can operate and how (e.g. speed limits and priority). Clear rules for road users must be supported by suitable infrastructure, including separate pathways, smooth road surfaces and informative signage. It is generally agreed that legislation is required for micromobility solutions to work in harmony with conventional transport.

In Depth

Conclusion

With each announcement of updated legislation (e.g. UK [16] and Romania) and a new city offering micromobility services, it seems more certain that micromobility is here to stay as a part of our transport mix, although the COVID 19 crisis will certainly pose challenges in the short term. In 5 years, we will be able to reflect on how quickly infrastructure was adapted and legislation updated, how effectively service providers and cities were able to work together, and how sustainable micromobility can become.

Evidently, there is an appetite for micromobility and the market is responding with solutions. There is an understanding that micromobility is not a panacea for sustainable transport, but with the right governance and legal framework, it can play an important role.

Additional relevant information can be found at:

- EEA: Greenhouse gas emissions from transport in Europe
- SAE International: SAE J3194™ Taxonomy and Classification of Powered Micromobility Vehicles
- ITF: Safe Micromobility
- The Verge: Forget electric cars — e-bikes will be the top selling EV in the next decade
- EY: Micromobility: moving cities into a sustainable future
- McKinsey & Company: Micromobility’s 15,000-mile checkup
• 360 Market Updates: Europe Car Sharing Market Size Analysis Report

• Investigating the impact of e-bikes on modal share and greenhouse emissions: a system dynamic approach

• IDC: What’s Happening with Micro-Mobility in European Cities

• Transport for Quality of Life: Potential for e-cargo bikes to reduce congestion and pollution from vans in cities

• RAC Foundation: Spaced Out Perspectives on parking policy

• The Guardian: Cycle hire firms urged to help clear dumped bikes from canals

• BBC: Electric scooters: Europe battles with regulations as vehicles take off

• iNews: E-scooter critics call for tighter regulations as injuries and even deaths increase — are they a dangerous nuisance?

• The Guardian: Electric scooters to get green light to go on Britain’s public roads

• Romania Insider: Romania's Govt. sets new rules for electric scooter use

• VOI Technology: Ride Safe

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