



Lowering your emissions through innovation in transport and energy infrastructure

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An Introduction to Sustainable and Shared Mobility

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Shared Mobility

Shared mobility refers to modes of transport where It is therefore imperative that cities and operators the public can rent vehicles owned by an operator work together to identify deployment sites that over a period of time for their own personal use. promote shared mobility travel over more carbon intensive modes, rather than compete against low There are a growing number of shared mobility emission transport services such as public transport or active travel.

services as this market develops. The three leading shared mobility modes are:

- > Car clubs
- E-scooters
- > E-bikes

Shared mobility removes the need for the user to purchase a vehicle outright; instead, users will share the cost associated with owning the vehicle on a subscription or pay-as-you-go basis, enabling access to sustainable travel regardless of socio-

economic status. Shared mobility also reduces the number of vehicles on the road, as well as congestion and journey times Providing a sustainable mobility service, that for all road users, however they often require specific infrastructure such as docking stations, parking deploys electric vehicles, and promotes a shift away from private car use, can reduce greenhouse gas bays, and cycle lanes, which can make shared mobility difficult to integrate within cities. emissions and improve air quality.



Car Clubs

company that allows its users to access a hire car at any time, either online or via an app.

They offer flexible payments (hourly, daily, or an annual subscription) which removes many of the costs associated with owning a car - such as insurance, maintenance, and initial outlays - and makes them an accessible low emission mode of transport.

The two main operating models used are:

- > Station-based: A vehicle will have a single designated location from which it can be rented and then returned.
- > Free-floating: These vehicles are available within a designated area, offering flexibility to collect and leave at the users' convenience.

Vehicles should be located in areas of higher population densities with the availability of car parking spaces, and strategically placed with good

A car club is a car sharing scheme run by a rental connecting transport links, chargepoints, and within close proximity to target users.

> High-density, low-income areas can have limited dedicated parking spaces and such a scheme relies on users having compatible smart phones; similarly operators may be hesitant to deploy vehicles in areas with a high crime rate.

> The provision of car clubs, though, can ease the pressure on parking and congestion within a city as one shared vehicle can replace 8-12 privately owned vehicles, which means fewer cars taking up space on the roads and in car parking spaces.

> Fairness and equality are additional benefits of car clubs, with lower income individuals gaining greater access to employment, education, healthcare, shops, and services where car sharing schemes have been implemented.

Car Clubs: Future Roadmap

-	De	Ti	Transition Phase			
	2020	2021	2022	2023	2024	
Technology		Limited deployment	nt of autonomous	vehicles. Continue	d growth of EVs.	
Operations	Small urban c	ars typical. Across El	J a mixture of free-	floating, P2P and s	tation-based.	Full
Environment	CO2e im	provements driven	by less individual v	vehicle ownership,	improves as users	s inc
Coverage	30 mi	llion users globally.		50 m	illion users globally	y
Economics	Cheaper	per mile for annua	I mileages below a	verage, ideal for u	rban	

Low emission and congestion zones, and incentives However, by the middle of the decade it is likely that for low emission vehicles, will encourage the an average user (travelling 10,000 miles) may also deployment, and uptake, of electric car club vehicles see savings as operator costs reduce. in urban environments.

The level of vehicle autonomy is expected to remain low until the end of the decade, when early adopters could take advantage of self-driving technology to boost the business case.

Until 2024, it is expected that car clubs will only be cheaper or comparable to private ownership when an individual travels less than 2000 miles per year.

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E-scooters

By moving people from cars to micromobility (such as e-bikes and e-scooters), congestion can be eased, and journey emissions and times reduced. For these reasons, micromobility is becoming increasingly attractive to individuals and policy makers alike.

Pioneered in the US in 2018, e-scooters, powered by a small electric motor, can be spread around a city for the general public to use and have seen dramatic market growth in recent years.

The common operating model for operators is to scatter dockless e-scooters in central locations close to city amenities, transportation hubs, or in high footfall areas.

Throughout the day their charge will decrease with use, before third party gig-workers collect e-scooters that are low on charge in the evening and transport them to a facility where they can be recharged then redistributed overnight, however an increasing number of operators now use swappable batteries

and sustainable cargo bikes for collection.

Dockless systems give e-scooter users the convenience and freedom to start and end journeys at any location, within a designated zone, effectively allowing door to door travel.

In the UK 58% of car trips are fewer than 5 miles (in urban environments 69% are fewer than 3 miles) therefore could be replaced by e-scooters, which have a typical range of 40 miles, especially in congested environments.





E-scooters: Future Roadmap



Improving the environmental performance of the vehicles can help maximise carbon emission benefits, and even small innovations, such as route optimisation to recharge vehicles or replace batteries, and making the vehicles more recyclable, can be effective.

At present, few e-scooter operators are profitable, due to the need to replace vehicles every 6-12 months. As critical components develop, it is likely that the majority of operators will have a profitable business case by 2023.

E-bikes

One of the first shared bike programmes was colloquially known as Boris Bikes in London, introduced in 2010, with shared electric bike schemes introduced in Europe and America from around 2016.

Most e-bike schemes rely on an app for payment and access at docking stations, which require the vehicles to be parked and locked in specific locations, limiting their ability to provide a door-to-door service.

Due to battery-assistance, e-bikes are able to attract a wider range of users and cover a range of terrains, while still providing health benefits as well as a low cost, environmentally friendly form of travel.

Utilising a docked system removes the trip hazard to the general public or a potential eye-sore when not in use often associated with e-scooters. A docked system also allows for integrated charging which removes the need for staff to travel around and collect vehicles for recharging or battery swapping.

Similar to e-scooters, when e-bikes replace other forms of active travel over car use, this will increase overall CO2 emissions rather than subtract from the overall transport carbon footprint. Appropriate measures should encourage the modal shift from cars, to ensure that e-bikes do not become a less sustainable option than the current status quo.



E-bikes: Future Roadmap

	De	evelopment a		Transition Phase		
	2020	2021	2022	2023	2024	
Technology	Cargo e-bikes	developed further	and deployed for s	haring Furth	er development of jour	
Operations	Pay-as-you-ric	de dominates mix of	docked & dockless s	ystems Sub	scription services popula	
Environment	CO ₂ footprin	t reductions prima	arily from battery p	production	More control over end	
Coverage	Major cities	and densely popu	lated areas continu	ue to be focus	Small cities wi	
Economics	Profitable in la	arge cities >300,000	citizens & tourist de	stinations	Profitability in most c	

Towards the end of the decade e-bike providers may look at larger battery capacities, either through advances in energy density of li-ion batteries or moving over to solid-state batteries. This could allow users to hire e-bikes for a full weekend without the need to recharge and improve carbon footprints. Major cities and densely populated areas will continue to be the focus for e-bike schemes as they are already profitable propositions. This will continue through to the middle of the decade when e-bike operators will likely look to deploy additional schemes in smaller cities within riding distance of popular rural attractions.

The environmental impact of e-bikes will improve as operators increase their life-span and control their end-of-life more closely, by recycling and reusing parts of the e-bikes more sustainably.

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City Planning

Integrating shared mobility schemes into a city Local authorities and private operators should requires careful consideration for users and cooperate to strategically integrate these services non-users alike, and implementation should be into the city's transport system in a way that: planned appropriately between operators and local authorities.

Safety is a major concern with micromobility, where schemes have arrived in cities before the infrastructure, policy, and awareness needed to support them.

Actions such as reducing the speed of traffic, creating micromobility lanes, and assigning designated parking spaces can have a high impact. A safe environment encourages uptake and reduces the risk from road users and the risk to pedestrians.

Appropriate infrastructure is required in order to > deploy any successful shared mobility scheme whether this be e-bike docking stations, chargepoints for electric car club vehicles, or clear signage.

Further Reading





Sustainable Transport and Shared Mobility -FutureLearn course www.futurelearn.com/ courses/sustainabletransport-and-shared-mobility

in the UK www.cenex.co.uk/app/ uploads/2021/12/WMG-MicroMobility-Vision-

Document-wide-cover.pdf

∰ SuSMo internet 😥 Private sect engagement & delivery Platterms, roote Municipal polic procurement & resultation

Sustainable Urban Shared Mobility project www.cenex.co.uk/?s=susmo



Plymouth Mobility Hub Network case study www.cenex.co.uk/casestudies/plymouth-mobilityhub-network/

*Roadmaps produced by Cenex for the SuSMo project, funded by Climate-KIC

Authorities should share knowledge and data with operators so schemes can be implemented where the business case and the benefits to the city are optimised, by filling gaps in the transport network and ensuring the majority of trips replace private car journeys.

There are some sites suitable for shared mobility hubs that are common to most cities:

- > Train and bus stations
- Technology Industrial Parks and universities

supports public transport and active travel

> targets key user groups and locations

> meets sustainability objectives.

- Popular tourist and recreational sites
- Residential areas with no off-street parking
- > Residential areas with low uptake of private vehicles

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