

Creating a world
fit for the future



Light Urban Mobility

Environmental Considerations



Introduction

The way that we live and move around in our towns and cities is profoundly changing, maybe faster than at any other point in our lifetimes

- Public and government actions have shifted due to the “Greta Thunberg effect”, Paris COP 21 obligations, increased awareness of the effects of local air pollution, and modern technology solutions, all of which have been suddenly supercharged by the effects of Covid-19
- Policy makers and businesses alike need to understand the implications of these sudden shifts and seize the new opportunities
- Light- and micro-mobility solutions, when utilised correctly, can be an enabler for an improved city environment
- However, the potential downsides to these solutions need to be understood

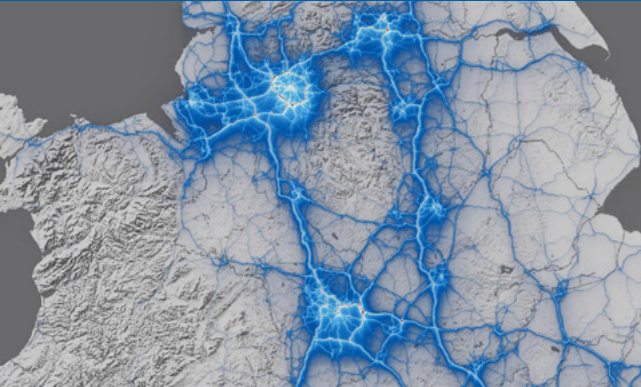
This document presents some of the issues facing modern urban environments which can be influenced by light- and micro-mobility solutions:

- The implications of post-Covid cities, where public transport may be shunned by large numbers of people
- The influence, both positive and negative, of light urban mobility solutions on sustainable urban mobility plans
- Lifecycle assessment of light transport modes and the challenges when comparing transport modes
- Planning of micro-delivery hubs serving light urban delivery services

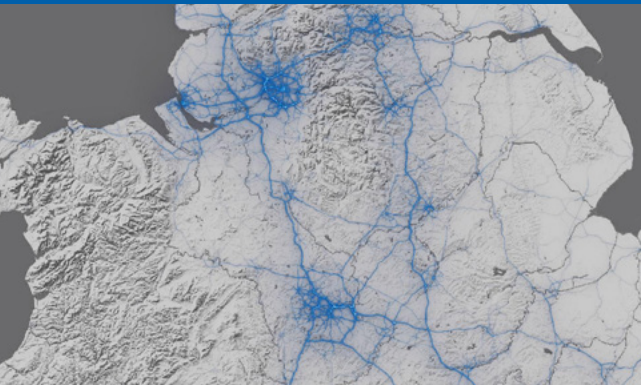


Implications of Post-Covid Cities

PRE-LOCKDOWN ROAD NO_x



IN-LOCKDOWN ROAD NO_x



During lockdown an improvement in air pollution due to reduced traffic, and most opinion polls show little desire to return to pre-Covid levels of congestion and associated pollution

- However, a survey found that only 54% of pre-Covid public transport users will return to use this mode even with hygiene measures in place, risking increased urban car usage and reduced revenue for public transport operators
- Sales of e-bikes (pedelecs) have increased by 230% year-on-year for one major UK retailer, and similarly e-scooters have seen a significant increase in sales
 - In response, the UK is trialling the legal use of rental e-scooters in 9 areas
- In response, many towns and cities implemented local policies of "pop-up" cycle lanes and car-free areas to encourage walking and cycling
 - Public response to these cycle lanes has been mixed. However many cities appear keen to retain this shift away from private car, and towards individual micro-transport, particularly active transport modes such as walking and cycling
- It remains to be seen how popular these active and light transport modes remain, as we head into the northern hemisphere autumn and winter
- We may see a return to the popularity of faster, warmer or drier transport options such as private cars
- Local authorities may need to incentivise transport options which have less environmental impact than cars in the colder months

Public authorities and public transport providers will need to carefully consider the most desirable mass transit methods in a pandemic-aware world



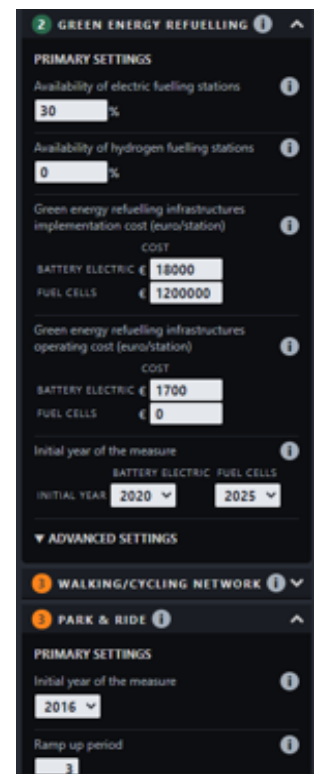
Light Urban Mobility Solutions and Sustainable Urban Mobility Plans

The EU has set objectives for urban transport by 2030, including halving the use of conventionally-fuelled cars and achieving essentially CO₂ free city logistics

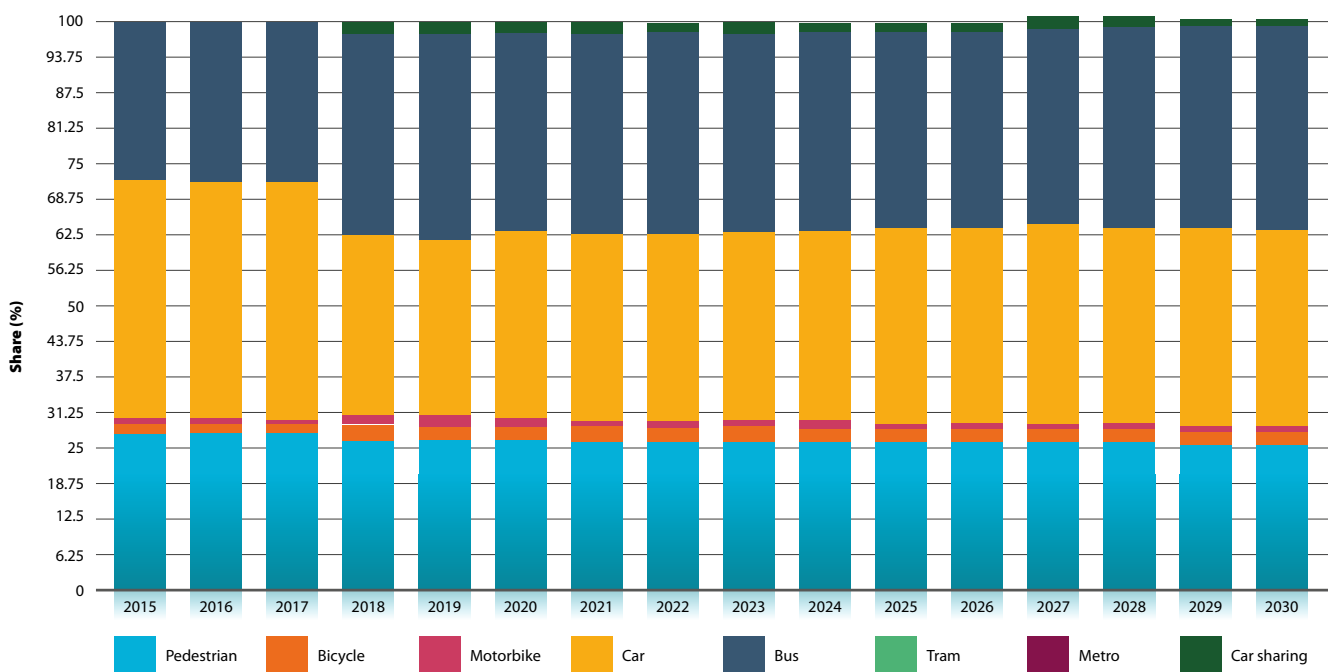
The European Commission strongly recommends that European towns and cities of all sizes should embrace its concept of Sustainable Urban Mobility Plans (SUMP)

Many cities have based their SUMP around increased uptake of public transport, through investments or restrictions on cars

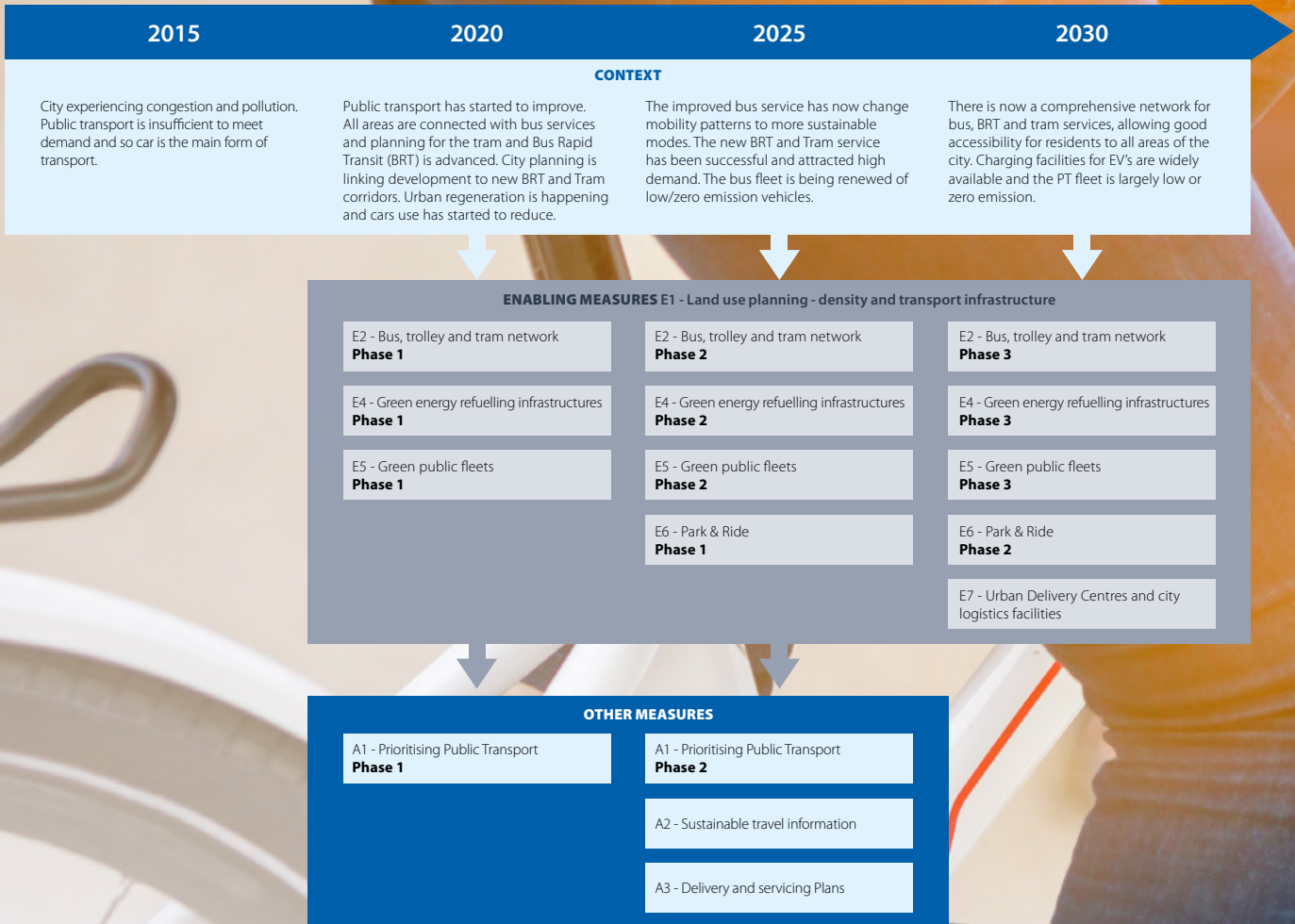
- However, COVID-19 has decreased the public's desire to use public transport, risking the gains made from existing policy measures
- Light- and micro-urban mobility solutions may be a means to avoid a return to cars, gridlock and poor air quality
- Policy makers and transport providers need to understand how these transport modes fit into existing networks, and what infrastructure, both physical and digital, is required to maximise the potential of these new transport modes
- Ricardo developed a web-based tool for the EU (<http://www.urban-transport-roadmaps.eu/>) to aid cities in exploring different transport policy scenarios and is adaptable to different city circumstances



Example Urban Mobility Plan showing reduced car use and increased low carbon transport



Example Road Map:



The EU also recognises that cities need Sustainable Urban Logistics Plans (SULPs), particularly in light of increased working from home rather than city centres potentially leading to a marked increase in congestion and pollution from home delivery

E-cargo bikes and other light delivery vehicles could be incentivised by councils, or exempted from restrictions applied to less environmentally friendly delivery vehicles

- Ricardo works closely with councils on air quality and is well placed both to help create new SUMP and SULPs and adapt them to the “new normal”, as well as advising businesses on how they can benefit from local authority plans

Lifecycle assessment of light transport modes

Light transport modes have the possibility of significantly lower emissions in construction and use when compared to private cars. They may also reduce the requirements for electricity grid investment for car charging and place less stress on the supply of materials such as lithium and cobalt

- This is in addition to the reduction in congestion if cars are displaced by 2 wheeled vehicles due to their smaller width and length
- Lifecycle impacts are shown to be only 20%-50% of a typical car
 - There are large variations in published estimates of lifecycle impact for 2 wheelers, mainly due to variation in lifetime distance and age
 - Estimates for human powered vehicles may include the environmental impact of additional food to account for energy use by the rider
 - Some studies have even shown e-bikes/pedelecs have the same carbon footprint as conventional bicycles due to the lower "fuel consumption" of the rider
- Several studies point to British buses averaging 9-10 passengers, leading to per passenger emissions of around 140g/km, with electric buses at around 50g/passenger km – this may be higher than the 2 wheeled vehicles

However, comparing lifecycle analysis of different transport modes is complicated by their usage pattern:

- If the 2 wheeler user would otherwise take a bus, that bus is still running, so the net impact of the 2 wheeler is an increase in emissions and traffic
- Equally, if the 2 wheeler user would otherwise walk, there may also be a net increase in emissions
- The issue is also compounded if the light vehicle is purchased in addition to existing vehicles, which still have embedded emissions

Where cities are updating urban mobility plans to mode-shift away from cars, it may be beneficial to consider the promotion of shared e-bikes and other private 2-wheelers rather than increase the number of buses or other public transport modes, which risk increasing CO₂ if not highly utilised, particularly considering reduced desire to use public transport post-pandemic

Nominal in-use and lifecycle emissions for light vehicles can be lower than other transport modes

Vehicle	Bus (12m single deck)	C - segment car	Scooter	Pedelec
Vehicle mass kg	12,000	1300(ICE) ¹ 1600(BEV) ²	115(ICE) ³ 130(BEV) ⁴	24 ⁵
Battery capacity	241 kWh	58 kWh	4.2 kWh	0.5 kWh
Estimated battery mass	1620kg	390kg	28kg	3.3kg
Estimated battery CO_{2e}	21,690kg	5,220kg	378kg	45kg
Fuel economy	35l/100km	6l/100km	3l/100km	
Electricity usage	1.4km/kWh	7.2km/kWh	31km/kWh	167km/kWh
In-use CO_{2e}	875(ICE) 175(BEV)	134(ICE) 35(BEV)	70(ICE) 8(BEV)	1.5
Lifecycle CO_{2e} g/km	1396(ICE) 475(BEV)	270(ICE) 120(BEV)	70-50(ICE) 20-50(BEV)	22+

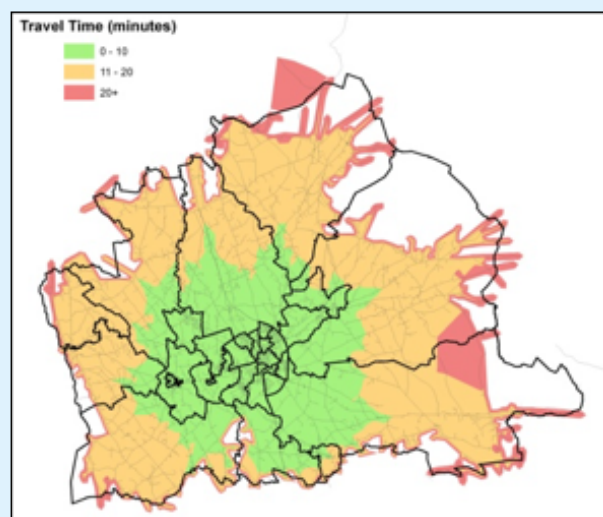
Planning of micro-delivery hubs serving light urban delivery services

Pre-Covid-19, the value of online sales had already doubled between 2013 and 2019

- With increased work from home, desire to avoid public places and acceptance of technology, the number of home deliveries is expanding rapidly – light vehicles may help meet this need
- Smaller, environmentally friendly light delivery vehicles may demonstrate a better brand image than large traditional delivery vehicles, especially when parked on a kerb or blocking the road

Light urban delivery vehicles tend to have smaller cargo volumes and masses than conventional delivery vehicles

- Therefore they will need to return to hubs and restock more often
- For battery powered vehicles, it may be necessary to swap or recharge batteries



In order to support light urban delivery vehicles, it is likely that micro-hubs or urban consolidation centres will be needed in areas of high population density, or in business districts, rather than edge-of-town

- These are often in areas of high property cost and are at risk of falling within low emissions zones

Therefore, the number and location of these hubs needs careful planning by:

- Councils, to understand the local impacts or provide incentives
- Operators looking to maximise efficiency

GIS (geographic information system) is a combination of mapping and other data, such as demographics, transportation, infrastructure and employment statistics

Ricardo has performed a large number of studies using GIS data for a variety of customers, particularly for councils and utilities

- These studies can consider demand based on demographics and calculate the most effective locations for hubs, or scenario planning to optimise delivery solutions



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