Expected environmental and safety impact of e-scooters in Bath

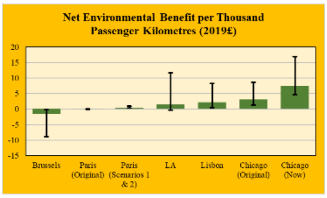
METHODOLOGY

Mode	Greenhouse Gas Emission (*gCO2e/pkm*)	Frequency of fatality (×10^{-9}) (*fatalities per billion pkm*)
Car	162	1.4
Taxi	427.7	
Bus	91.4	0.1
Train	43.4	0.1
Bicycle	16.9	11
Bikeshare	57.5	
Moped	73.1	45
Walk	0	14
E-scooter	37 (low)	39
	103.6 (central)	
	132.8 (high)	

Table 1: Total GHG emission and frequency of fatality for different transport modes, sourced from ITF (2020) and Hollingsworth et al (2019)

- GHG data is the estimation of the total CO_2 emission obtained from life cycle assessment (LCA).

- GHG data for e-scooter is categorized into 'low', 'central', 'high' values obtained from LCAs done by ITF (2020) and Hollingsworth et al (2019)



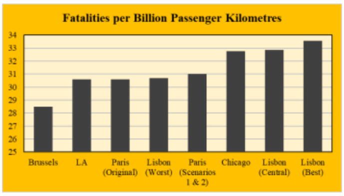


Figure 1: graphical display of net environmental benefit of using e-scooters, and fatalities per billion passenger kilometres

-Additional fatalities calculated from modal shift data, not including safety regulations

Figure 2: modal shifts in each case study

(Left-right: Paris, Brussels, Chicago, LA, Lisbon)

CASE STUDIES

	Relationship/finding	Paris	Brussels	Chicago	LA	Lisbon
Users	E-scooters are more desirable to Males					
	E-scooters are more desirable to individuals between 18 and 44 years old					
	There is an inverted U shape relationship between income and e-scooter usage					
	There is a positive relationship between ridership and bike lane infrastructure					
	Ridership positively related to dry weather and the summer season					
	Safety features (e.g. bigger wheels, and regular maintenance) are positively related to ridership					
	Safety regulations (e.g. helmet requirement) discourages e-scooter usage					
Usage	E-scooters are mostly used for commuting and fun					
	E-scooters relieve congestion, especially in the evening					
	High displacement of active travel (Walking and cycling)					
	Low emission e-scooters not necessarily enough to compensate for poor modal shift					
	Trade-off between safety and environmental benefit with regards to desired modal shift					
	E-scooters are often used illegally (e.g. on pavements or parked incorrectly)					
Other	Geofencing technology is inaccurate along specific roads/routes					
	E-scooters are divisive/polarizing, but complaints die down shortly after implementation					

Table 2: summary of case studies' findings

LITERATURE REVIEW

Factors affecting e-scooter ridership:

- Perceived financial cost of use
- Ability of transport mode to provide consistent and reliable transport
- Perceived integration of transport mode to the current transport network
- Perceived social safety of transport mode, regarding interactions with other individuals
- Perceived cleanliness of transport mode

POLICY PROPOSALS BASED ON THESE FACTORS

Policies to encourage ridership	Policies to encourage positive modal shift
Cleanliness- designated pick-up points to allow for individuals to use cleaning equipment if desired	Integrated ticket app scheme- system with current bus app
Social safety- CCTV at pick-up points and fines similar to cars' speeding fines for dangerous e-scooter use	Cost schemes- used in conjunction with integrated app
Consistency	
Bike Lanes- to be able to be used by e-scooters	
Sufficient e-scooters to match observed demand	

Importance of perceived safety + Chicago- lack of rule following → **CCTV and fines**

Importance of perceived cleanliness → **Cleaning equipment at pick-up points**

Integrating e-scooters to current transport systems + High ridership in bike lane areas- Paris, Chicago, LA and Lisbon → **Integrated app and more bike lanes**

Importance of consistent, reliable transport → **Accurate calculation of where to deploy e-scooters**

Perceived financial burden of e-scooter use + Use associated with income (Paris, LA) → **Cost schemes**

Figure 3: summary of policy proposals based on literature review and case study findings