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## Electrically-assisted bikes: Potential impacts on travel behaviour

S. Cairns<sup>a,\*</sup>, F. Behrendt<sup>b</sup>, D. Raffo<sup>c</sup>, C. Beaumont<sup>d</sup>, C. Kiefer<sup>e</sup><sup>a</sup>Transport Research Laboratory/University College London, United Kingdom<sup>b</sup>University of Brighton, United Kingdom<sup>c</sup>David Raffo Associates, United Kingdom<sup>d</sup>Transport Research Laboratory, United Kingdom<sup>e</sup>University of Sussex, United Kingdom

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### ABSTRACT

This paper reports on a review of the European literature about the impacts of having an electrically-assisted bike available to use, together with results from a trial in the UK city of Brighton, where 80 employees were loaned an electrically-assisted bike for a 6–8 week period. In the Brighton trial, three-quarters of those who were loaned an e-bike used them at least once a week. Across the sample as a whole, average usage was in the order of 15–20 miles per week, and was accompanied by an overall reduction in car mileage of 20%. At the end of the trial, 38% participants expected to cycle more in the future, and at least 70% said that they would like to have an e-bike available for use in the future, and would cycle more if this was the case. This is consistent with the results of the European literature which shows that when e-bikes are made available, they get used; that a proportion of e-bike trips typically substitutes for car use; and that many people who take part in trials become interested in future e-bike use, or cycling more generally.

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## 1. Introduction

Internationally, transport policy makers and urban planners are interested in encouraging cycling, given the potential to simultaneously achieve a number of goals – including addressing congestion; encouraging a switch from more polluting modes and thereby reducing local air pollution and greenhouse gas emissions; and increasing physical activity and thereby addressing obesity and a range of other health issues (see, for example, [OECD/ITF, 2013](#); [APPCG, 2013](#)). Electrically-assisted bikes are one tool that may help to achieve this goal.

Electrically-assisted bikes – or ‘pedelecs’ – are those where pedalling is required, but the rider can choose to switch on battery-powered assistance to reduce the effort required. This type of bike varies in design detail but, in all cases, assistance cuts out when the rider stops pedalling or when the bike exceeds specified speed thresholds, as set out by legislation (25 kmph across Europe). Although they are less environmentally friendly and require less physical activity than using conventional bikes for the same journeys, the differences are small when compared with using other forms of motorised transport such as the car, and the activity required is still sufficient to count as at least ‘moderate intensity’ physical activity

\* Corresponding author.

E-mail address: [scairns@trl.co.uk](mailto:scairns@trl.co.uk) (S. Cairns).

(Simons et al., 2009; Gojanovic et al., 2011). The term e-bikes is often used as short-hand in this paper, though it should be noted that this work does not consider other types of bike which are powered by electricity, but do not require the rider to pedal.

This paper reports on a review and analysis of EU e-bike literature, together with specific results from a series of trials in the UK city of Brighton involving electrically-assisted bikes. The aim of the paper is to draw together a range of relevant material to assess three key questions for the UK context:

- Can having the opportunity to use an electrically-assisted bike alter the amount that people cycle?
- Can having the opportunity to use an electrically-assisted bike affect the use of other transport modes?
- Can having the opportunity to use an electrically-assisted bike for a trial period have an effect on travel behaviour after the end of the trial period?

Given significant differences in the factors determining travel choices, material from the rest of the world, for example, from China and the USA (e.g. Cherry and Cervero, 2007; Dill and Rose, 2012; Popovich et al., 2014), is not considered.

## 2. Literature review

### 2.1. Literature sources used

To provide context for the results from the Brighton trial, we compiled and analysed a considerable body of European evidence (available by 2015) which provides some insights on whether the availability of electrically-assisted bikes affects travel behaviour. The evidence is largely outside the academic literature, comprising individual project summaries, European project reports, website articles, and other non-conventional material (some of which is not published in English). Drawing together this material was a substantial research task in itself. Moreover, although many studies were aimed at answering similar questions (i.e. often related to the main questions asked in this paper), the methodologies used meant that data were not available in readily comparable forms, with a range of different metrics and reporting conventions used. Consequently, in presenting this literature, we have used a combination of tabular summary (where studies are reported in their own terms), and our own summary, where we have drawn out comparable metrics where they existed.

Table 1 provides details of the main relevant material identified, together with appropriate references. Evidence is drawn from Norway, Sweden, Austria, France, Belgium, Italy, the Netherlands, Germany and the UK. In some cases, the only data source is website text – this is clearly specified in the references.

### 2.2. EU evidence on how much e-bikes get used

The first research question addressed in this paper relates to whether having the opportunity to use an e-bike actually alters the amount that people cycle (or whether, in fact, the other barriers to cycling still prevent use). Table 2 summarises the main findings about e-bike use available from the literature. The evidence reviewed seems to support the hypothesis that e-bike trials or ownership do result in e-bike use, with some further clarification about the nature of use, including:

- Evidence about average distance travelled – with estimates of weekly<sup>1</sup> travel by those owning or trialling an e-bike including 15 km (Wolf and Seebauer, 2014), 19 km (Drage and Pressl, 2012; Eddeger et al., 2012), 27 km (Kairos, 2010), 29 km (Cappelle et al., 2003), 38 km (Mercat, 2013), 68 km (Fyhri and Sundfør, 2014), 71 km (Hiselius and Svenssona, 2014) and a distribution centred around 50–100 km (VCD, 2013).
- Evidence about the speed of e-bike travel compared to use of other modes – with work from both Graz (Drage and Pressl, 2012; Eddeger et al., 2012) and Flanders (Mobiel 21, 2014) suggesting that e-bikes may be comparable to, or faster than, public transport.
- Evidence that e-bikes can encourage relatively long cycle trips, with Engelmoer (2012) suggesting that, on average, e-bike commuters make longer trips than conventional bike commuters (9.8 km versus 6.3 km), Helms et al. (2015) suggesting that average e-bike trips are 11.4 km (compared to 7.1 km for conventional bikes) and various other studies reporting on relatively long distances for the average e-bike trip - 14.5 km for pedelec commuters in Flanders (Mobiel 21, 2014); 18 miles for a community loan scheme in the Brecon Beacons (Kidd and Williams, 2009), and 30 km for tourism trips in the Cairngorms (Sustrans, 2013).

### 2.3. EU evidence on travel behaviour impacts

The second main research question addressed in this paper is whether having an e-bike available to use has any impact on use of other modes. Key findings from the literature are summarised in Table 3. From these studies (including work in Aus-

<sup>1</sup> As evident from Table 3, some studies have reported on daily or annual, rather than weekly, travel. These have been converted to a weekly travel figure by multiplying by 7, or dividing by 52.

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