

## **Response to OLEV call for evidence on Government measures to support uptake of ultra low emission vehicles from 2015-2020**

### **Name and organisations:**

Research team:

Sally Cairns, TRL and UCL

Frauke Behrendt, University of Brighton

David Raffo, University of Ulster

with specialist advice from:

Andy Cope, Sustrans

Lynn Sloman, Transport for Quality of Life

**Email for correspondence:** scairns@trl.co.uk

**Telephone:** 01344 770078

### **A. Overall position**

This response stems from a research project funded by the Research Councils UK Energy Programme/EPSRC grant EP/J004855/1, led by Frauke Behrendt at the University of Brighton. The project is entitled 'Smart e-bikes: understanding how commuters and communities engage with electrically-assisted cycling.'

Our overall contention is that OLEV should make electrically-assisted bikes a priority component of their 2015-2020 programme, and support their uptake in a number of different ways.

As noted in a recent OECD discussion paper, globally, the overwhelming majority of electric vehicles are electric bikes and scooters<sup>1</sup>.

Electrically-assisted bikes offer considerable advantages over other types of electric vehicles in that:

- They are relatively cheap, thereby making them accessible to a wider range of people than electric cars/vans – and with potential social inclusion benefits (for example, they have been offered in some 'Wheels to Work' schemes, enabling jobseekers to take up new employment opportunities).
- Unlike other options, they offer potential health benefits through the physical activity generated, which has been shown to be sufficient to be of value, as discussed further below.
- They make relatively efficient use of road space, which may be particularly important in dense urban environments, where road space is constrained.

---

<sup>1</sup> Crist P (2012) *Electric vehicles revisited: costs, subsidies and prospects*. Discussion paper 2012-03. International Transport Forum at the OECD, Paris.

- They do not require the installation of dedicated charging infrastructure, as batteries can be charged via a conventional plug socket<sup>2</sup>.

In brief, then, support for electrically-assisted bikes could potentially deliver excellent value for money, reaching relatively large numbers of people, and achieving economic and health benefits, in addition to environmental benefits.

It should be noted that the number of electrically-assisted bikes sold in the UK already far outstrips the number of electric cars and vans sold. In 2009, the British Electric Bike Association reported that over 15,000 units were sold in the UK<sup>3</sup>. For 2011, a figure of 20,000 is quoted<sup>4</sup>, and the market is thought to have expanded since that time.

The remainder of our response comprises:

- A brief definition of electrically-assisted bikes, and a short summary of their environmental and health credentials.
- A summary of potential policy measures that could be considered.
- A summary of some of the results from our research work, suggesting the potential of this type of transport.

## **B. Definition and background case for electrically-assisted bikes**

Electrically-assisted bikes – or ‘pedelecs’ – are those where pedalling is required by the rider, but a battery-powered motor provides assistance, thereby reducing the effort required to pedal<sup>5</sup>. This type of bike varies in design detail (such as the location of the battery, and the method by which the power assistance is provided), but all share the common feature that assistance cuts out when the rider stops pedalling or when the bike exceeds specified speed thresholds, as set out by legislation (15mph in the UK; 25kmph in continental Europe). Most enable the rider to choose varying levels of assistance, or to switch off the assistance at will.

Although they are less eco-friendly and require less physical activity than using conventional bikes for the same journeys, the differences are small. Typically, the energy required to drive the bike is relatively low – requiring approximately 10 pence of electricity (at 2013 prices) for 25-40 miles of travel (depending on terrain and the degree of assistance selected), and there are no local emissions from use (given that the bikes are powered by batteries recharged by electricity).

---

<sup>2</sup> On most e-bikes, the battery is simply unlocked from the bike, and connected to a charger, which plugs into a conventional plug socket.

<sup>3</sup> PRESTO (2010) *PRESTO cycling policy guide*. Report funded by the EU’s Intelligent Energy – Europe programme.

<sup>4</sup> Association of the European Bicycle Industry (COLIBI) and Association of the European Two-Wheeler Parts and Accessories Industry (COLIPED) joint annual *European Bicycle Industry & Market Profile* (BIMP) 2012 report on the 2011 market, as quoted in: <http://www.bikebiz.com/index.php/news/read/britain-has-the-seventh-largest-e-bike-market-in-europe/013768>

<sup>5</sup> In the rest of this response, the term ‘e-bike’ will be used as shorthand for this type of bike, though our response is limited to the type of bike where the rider is required to pedal, and does not relate to other types of ‘e-bike’, where this is not the case.

There have also been several studies (Simons et al 2009<sup>6</sup>; Gojanovic et al 2011<sup>7</sup>) looking at the health impacts of electrically-assisted bikes, including impacts on heart rates and oxygen consumption, through controlled trials (involving participants travelling a fixed route in different ways). In both studies, even when the e-bike was being used on the highest power setting, the energy used by participants, and the heart rates generated, were sufficient for e-bike use to provide physical activity of at least 'moderate intensity'. Both studies also noted that, in real life, e-cycling may encourage people to cycle further, or more often, or faster, which may lead to greater health benefits than those suggested by their trials, and both studies also used a perceptual scale which showed that participants considered using the e-bikes to be considerably easier than conventional cycling, and therefore potentially more appealing or easier to sustain over time.

In particular, electrically-assisted bikes possess a number of advantages over conventional bikes, which could lead to them being used for a greater range of journeys, or encourage an increase in cycling by certain groups, with direct environmental and/or health gains. For example, they may appeal to those with heavy loads or children to transport; those with high blood pressure or other physical limitations; those who need to travel long distances, up hills or against the wind; those who are older or less fit; or those who need to arrive at their destination without breaking sweat, who dislike vigorous exercise or who are otherwise put off by the physical effort of a normal bicycle. They may also have psychological appeal over conventional bikes – as something innovative and hi-tech, and, separately, as something relatively safe (given the back-up of power in a difficult situation).

In other European countries with greater levels of cycling, this type of bike is rapidly becoming mainstream. For example, in The Netherlands, sales of e-bikes equal or exceed those of conventional bikes in value; in Germany, 1 in 10 bikes sold is an e-bike; and there are estimated to be over a million e-bikes in use across Europe, (Go Pedelec! 2013<sup>8</sup>). Various European cities (such as Vienna, Chambéry, Annecy, Nantes, Stuttgart, Zurich and Graz) have dedicated programmes for encouraging e-bike take-up. There are some small scale trials taking place in the UK, often as part of Local Sustainable Transport Fund activities. Transport for London and the Electric Bike Network are undertaking significant activities with e-bikes. However, overall, arguably, the UK is currently falling behind other countries in this area at present. For example, PRESTO (2010) report on Germany's 'Modellregionen Elektromobilität in Deutschland' programme, which launched in 2009 with support of €115 million, aimed at making Germany a leader in the electric mobility market. Of the eight regions selected for support, four had plans for measures to support electrically-assisted bikes<sup>9</sup>.

---

<sup>6</sup> Simons M, Van Es E & Hendriksen I (2009) Electrically assisted cycling: a new mode for meeting physical activity guidelines? *Medicine and Science in Sports and Exercise* 41 (11), pp2097-2102

<sup>7</sup> Gojanovic B, Welker J, Iglesias K, Daucourt C & Gremion G (2011) Electric bicycles as a new active transportation modality to promote health. *Medicine and Science in Sports and Exercise* 43 (11), pp2204-2210

<sup>8</sup> Go Pedelec! (2013) *The Go Pedelec! handbook*, [www.gopedelec.eu](http://www.gopedelec.eu)

<sup>9</sup> PRESTO (2010) *PRESTO cycling policy guide*. Report funded by the EU's Intelligent Energy – Europe programme.

## C. Potential policy measures for consideration

If OLEV is interested in promoting e-bikes, we can envisage a number of different ways in which they could be promoted. The following points represent a preliminary list of potential measures, which could merit further investigation:

1. **Convene a specialist working group** on e-bikes, in order to lead activities. For example, this might usefully involve those in Transport for London, the Electric Bike Network, and others who are already very active on this topic (for example those working on relevant research projects, or companies, such as Hertz, who have already trialled electric bike rental).
2. **Increase the recommended standard threshold used in the 'Cycle to Work' scheme**, (which facilitates the purchase of bikes for commuting through tax incentives), since most good quality e-bikes will cost more than the current £1000 threshold. (Specifically, our understanding is that this would require the Office of Fair Trading to increase the value of the group consumer credit licence that it has issued to cover employers implementing cycle to work schemes, and be accompanied by changes in the recommendations made by those promoting and implementing the 'Cycle to work' scheme for employers. We are aware that employers with their own 'Consumer Credit Licence Category B' can already allow employees to buy bikes of greater value.)
3. Consider **tax breaks for employers to provide charging equipment at work**. From our study, we do not think that stand-alone on-street charging points for e-bikes are likely to be the best use of grant money. However, facilities for charging batteries at workplaces, and/or facilities that combine charging opportunities with secure on-street parking may be advantageous (see point 5). We are unclear whether employers would currently be able to claim any tax relief on providing charging equipment – this would require further investigation.
4. Consider **direct grants to individuals** to reduce the costs of bike purchase, perhaps as part of a 'model city' approach (see point 5). For example, there are a number of European cities where this has taken place.
5. Consider working with a local authority to **develop an e-bike model city, town or region**. This might require funding for several related components. For example, from our work in Brighton, it is clear that in a densely populated, hilly environment, there is considerable interest in e-bikes. However, the nature of the urban environment (a lot of terraced housing and flats, no front gardens etc.) means that secure cycle parking is often a key issue. Hence, any grant to promote e-bikes might usefully include complementary funding for secure parking facilities (which could, at least in theory, incorporate charging points too). There are various other European cities which have adopted e-bike promotion policies<sup>10</sup>. If a model area approach is adopted, promotion of e-bikes might potentially work well in conjunction with the promotion of car clubs and/or new types of car rental (either based on electric or conventional vehicles).

---

<sup>10</sup> The information on Chambéry is taken from a presentation by Nicholas Mercat (2013) '2009-2012: four years of e-bike development policies in Chambéry', at Velo City, Vienna, 13<sup>th</sup> June 2013. We are currently unclear whether employers offered matched funding subsidies to employees or not.

### Case study - Chambéry

The French city of Chambéry (with 120,000 inhabitants) has had a €300,000 programme to promote e-bikes, which began in 2009. Key features include:

- Holding events (often through companies) to enable employees to trial e-bikes (50 per year),
- Enabling people to rent e-bikes for a 1-2 week period,
- Offering purchase subsidies of €250 (possibly with additional funding from employers).

More than 1,000 people have bought e-bikes using the subsidy. In a subsequent survey, 80% said they would not have bought the bike without the subsidy. 85% were former car drivers. Those evaluating the scheme estimate that the programme has resulted in 1.2 million kilometres transferring from car to e-bike per year, at a cost of only €0.05 per km.

Similar programmes have been developed in Nantes and Annecy.

6. **Support TABS (The Association of Bikeability Schemes CIC) in developing e-cycle training.** We have had some correspondence with TABS, as they are interested in the e-bike cycle training that we have developed as part of our research project. However, it might be valuable to explore whether further support would be helpful, in terms of developing e-cycle training as a standard bikeability training component. (Specialist e-bike cycle training is being developed in other countries – such as the 'Fit for e-bike' training developed in Austria<sup>11</sup>.)
7. Consider developing '**e-bike information and test ride centres**'. These could be run in cooperation with local bike shops and the local authority. These centres would work particularly well in combination with grants for e-bike purchase, since they could provide an accessible interface enabling the public to receive information and to try out e-bikes. Such centres could be of a 'pop-up' variety, touring the country, or of a more permanent nature (for example, using vacant retail space on the high street). Some or all of them could also offer e-cycle training, for those who wish to gain cycle confidence. 'E-cycling centres' have successfully been used in other European cities such as Stuttgart.
8. Convene a series of specialist seminars for those working on bike design and/or bike hire schemes to **establish and develop best practice on the design of e-bikes for use in public hire schemes**. We are aware that there are a number of developments in bike design taking place to make bikes more suited to hire schemes (e.g. integral locks, tracking devices etc.), and separately, that there is considerable development in e-bike design (although this is often more aesthetic than practical). Some integration of the two approaches might be valuable.
9. Consider whether **grants for cycle hire companies** that offer e-bikes would be appropriate. These might be particularly appropriate in rural tourism areas. There is already some evidence emerging from Local Sustainable Transport Fund work in the Lake District, and work by Sustrans in the Cairngorms, which suggests that e-bikes have a useful role to play in such areas – not least as they can encourage visitors to trial a new type of travel whilst on holiday, which may lead to changes in habits when they return home – and because they may provide a valuable

---

<sup>11</sup> Go Pedelec (2012) *Information on pedelecs for municipal decision makers*, [www.gopedelec.eu/informationSummaryMunicipalDecisionmakers](http://www.gopedelec.eu/informationSummaryMunicipalDecisionmakers) EN, p22.

transport option to the residents of such areas (which, being rural, are typically lacking in transport options).

10. Consider supporting the establishment of **e-bike leasing schemes**, which would enable people to rent their own e-bike for a longer period. These could be offered direct to individuals, or via employers, and could operate in a similar way to car leasing schemes. For example, they might include a monthly fee for usage, which includes all maintenance costs, and a replacement bike every few years. One benefit would be that potential users would therefore avoid the upfront costs required for bike purchase, and concerns about battery longevity. There might be particular groups that such schemes could initially focus on. For example, our discussions have suggested particular interest in e-bikes from the police; community health workers; and those responsible for delivering mail or parcels. E-bike leasing schemes are reported to exist in other countries, such as LeaseRad GmbH in Germany<sup>12</sup>.

## D. Initial results from our research study

As background information, the research project which is feeding this response involves an exploratory study of electrically-assisted bikes to examine:

- Whether they have the potential to appeal to a wider range of people than conventional cycling.
- Whether people who have the opportunity to use an e-bike start cycling, or cycling more than previously.

The project involves both trials with members of the public, and trials conducted through employers. Overall, we have been overwhelmed by the amount of interest we have received, both from people interested in borrowing e-bikes, and from the press.

Some of the formal research activity has involved working with two major employers in Brighton. In both cases, we have run full staff surveys, asking employees about a range of travel and activity characteristics, and interest in borrowing an e-bike. Those who express an interest are then asked to complete a second survey, which provides more detailed information about the trial, and asks for practical information. At the end of the second survey, respondents are asked to confirm that they are still interested. At both employers, about 40% of those answering the full staff survey were still interested in borrowing an e-bike at the end of the second survey, (87 of 226 respondents; and 156 of 386 respondents). This represents a very high level of interest when compared with existing levels of cycling by those answering. Only 54 of those interested in borrowing bikes described themselves as 'regular cyclists' and most were not cycling to work. We have had interest from a wide range of people, and, unlike the situation for conventional cycling, there does not appear to be a gender bias in terms of who is interested. For health purposes, it is interesting that 107 of those who wished to borrow e-bikes self-reported that they were doing less than the recommended amount of physical activity per week (i.e. at least 2.5 hours of at least moderate intensity physical activity per week).

In 2012, 40 employees from the first employer borrowed e-bikes for 6-8 week periods. In 2013, 40 employees from the second employer were also loaned e-bikes. Full data analysis is scheduled for the next few months. However, initial indications from the 2012

---

<sup>12</sup> Go Pedelec (2012) *Information on pedelecs for municipal decision makers*, [www.gopedelec.eu/informationSummaryMunicipalDecisionmakers](http://www.gopedelec.eu/informationSummaryMunicipalDecisionmakers) EN, p21.

trials are promising. 63% of the 2012 trial participants reported that they cycled more, during their trial period (with, for example, one trial participant going from not cycling, to cycling 450 miles in 10 weeks). There is some evidence that having an e-bike available would encourage more sustained behaviour change – 75% of those involved in the 2012 trials reported that they would cycle to work at least one day a week 'if they had an e-bike available'. Moreover, there is some suggestion that the trial could lead to longer term behaviour changes anyway – at the end of their bike loan, 25% participants said that they expected to cycle more after the trial compared with pre-trial, some described new plans for cycling to work, and some discussed purchase of an e-bike. All of the trial bikes are fitted with an automated monitoring system developed for the project (SEMS), which measures usage. This helps to corroborate survey data and provides objective data about patterns and volumes of cycling. Initial figures suggest that the 2012 trial participants made over 900 trips on the trial bikes, and travelled more than 3,000km (even though most participants were not regular cyclists before undertaking the trials).

Further information about the project is available via the project website:  
<http://www.smart-ebikes.co.uk>