



Empowering e-fleets for business and private purposes in cities

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Formative Evaluation Report- Summary

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1 Introduction

The overall objective of eBRIDGE is to demonstrate that fleet schemes can significantly facilitate the introduction of electric vehicles in urban areas and, as a result, improve market conditions of the electric mobility sector.

This report is the first deliverable of Work Package 4—*Evaluation and Scenarios*—of the pilot schemes. As part of the process of evaluating the schemes involved in eBRIDGE, this deliverable, is tasked with describing the development process of a method of evaluation of the schemes, as well as presenting the main findings of the early stages of project assessment, and describing the next steps for this Work Package.

Evaluation is an important part of every intervention, including trial schemes and policy and other measures: without evaluation it is not possible to judge the success and lessons learnt from the relevant intervention, and may therefore go on to continue with a scheme which is unsuccessful, or withdraw a measure which was actually effective, with any associated consequences.

In eBRIDGE, we developed a two-pronged evaluation approach, which follows current principles on relevant research, and includes formative summative parts. The formative part aims at feeding back to the pilot schemes; that is providing early knowledge emerging from the schemes, and what can be done to improve them; this way, the results feed directly back into the project. The summative part aims at understanding the potential for behaviour change which may emerge from the project after its completion. This Formative Evaluation Report thus aims:

- (a) To outline the evaluation framework and indicators to be used within eBRIDGE, and which will inform ongoing WP4 Tasks; and
- (b) To present initial, formative evaluation findings relating to barriers and motivators of Electric Vehicles (EV) use prior to or soon after pilot project launch, which will be used to inform the development of pilot projects (WP3) so that they address particular user needs and situational factors in each country.

The report is structured around these two aims, with the following pages describing the evaluation framework and indicators and the initial, formative evaluation findings. These aims will be pursued with respect to the particularities of each participating project, at each participating site, that is:

- Berlin (Germany)
- Bregenz (Austria)
- Carmarthen (Wales)
- Lisbon (Portugal)
- Milan (Italy)
- Valencia (Spain)
- Vigo (Spain)

2 Evaluation framework

Our framework draws on best practice in evaluation research, which highlights the need for *early*, *regular* and *embedded* evaluation, that is both *practical* and *robust* (e.g., Burgess & Chilvers, 2006; Rowe & Frewer, 2000; Pawson & Tilley, 1997). Accordingly, our evaluation framework comprises two strands:

- *Formative*, i.e. providing early feedback to demonstration projects on the barriers to and facilitators of EV uptake (in order that interventions can be designed and targeted appropriately), and emerging impacts and experiences of delivering the e-mobility schemes. This will be used to help modify delivery in order to exploit the projects' potential to deliver environmental, economic and social benefits.
- *Summative*, i.e. assessing behaviour change and short-term and long-term impacts from the demonstration projects. As this will require data which will accumulate during the life of our project, results from the summative evaluation will be presented in D4.3 Summative Evaluation Report (M25).

3 Formative evaluation

Formative data has been gathered through several methods:

- *Literature review*: This exposed EV experiences and perceptions identified in previous studies via searching bibliographic databases and related internet resources. This process guided the development of the user survey and site manager interview protocol (see Appendix B). Findings from previous studies helped scope the key parameters and themes to be examined in the survey and interviews.
- *User survey*: A survey was designed jointly with the site leaders, based on the literature review and the particularities of each project. It was then translated into the languages of those partners willing to implement them and distributed at the Carmarthen, Lisbon, Bregenz and Vigo sites. The survey was circulated by site managers to all EV pilot project users either as an online link, or as a paper version. The aim of the survey was to explore EV users' experiences of using the vehicles. The same survey will be conducted after the pilot project has been running for at least 12 months as part of the summative evaluation.
- *Interviews with site managers*: Finally, interviews with most site managers were conducted to elicit their perceptions of the barriers and drivers of EV use, and initial experiences of the pilot project.

4 Results

4.1 Literature review

Research on European public attitudes to EVs, suggests understanding about EVs is limited, but interest in low-emission vehicles is high (e.g., DEFRA, 2009) demonstrated by the recent rapid growth in sales of small, energy-efficient vehicles (Nykvist & Whitmarsh, 2008), but mainstream drivers perceived the current generation of EVs as a “work in progress” and too costly, despite offering environmental benefits. Range concerns have also been expressed (e.g. Xenias & Whitmarsh, 2013; Ernst & Young, 2010). In some cases, members of the public have some (limited) experience with EVs (Graham-Rowe et al., 2012), but commonly public perceptions are based on little knowledge of current EV technologies. Misconceptions are also widespread. This suggests a major barrier to EV uptake is familiarity and experience of EV use, both of which were core motivations for eBRIDGE and are being addressed in the project. At the same time, car-share schemes, and other fleet-schemes, are particularly likely to adopt EVs. Research highlights that fleet demonstration projects create initial infrastructure build-up necessary for mainstream adoption (see Nykvist & Whitmarsh, 2008) and spread the financial risk which cannot otherwise be borne by individual consumers.

4.2 User survey

The user survey took place online in November 2013 via a link which was circulated to each scheme’s respective customers; Vigo surveys started in summer 2013 due to the particularities of that project. Currently, only results from Bregenz, Carmarthen and Vigo are presented. The remaining pilot project sites are expected to provide data later into the project. From the sites where data were available, initial findings of the survey are outlined below.

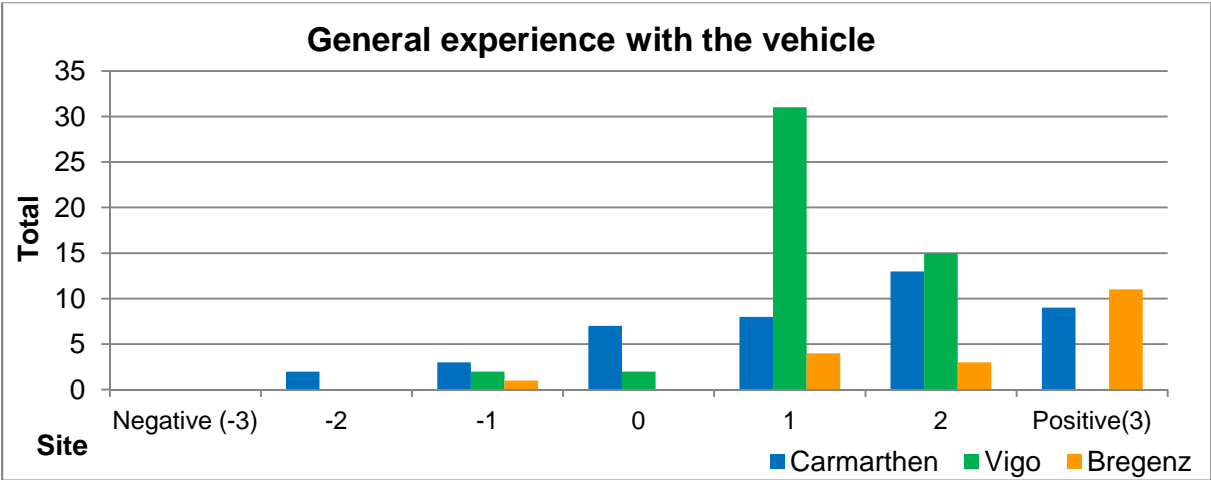


Figure 1 Users general experience. Source: eBRIDGE (2013)

One of the clearest findings came from the general user experience with EVs, although this was somewhat variable in the three sites we have acquired data from. Overall, participants' experience with the EVs has been positive or very positive in all three sites as can be seen in Figure 1.

Similarly, the possibility of drivers to use the EVs in their respective fleets again was clearly stated. As seen in Figure 2, the vast majority (91%) of responders in our survey, indicated that they would use the EVs again.

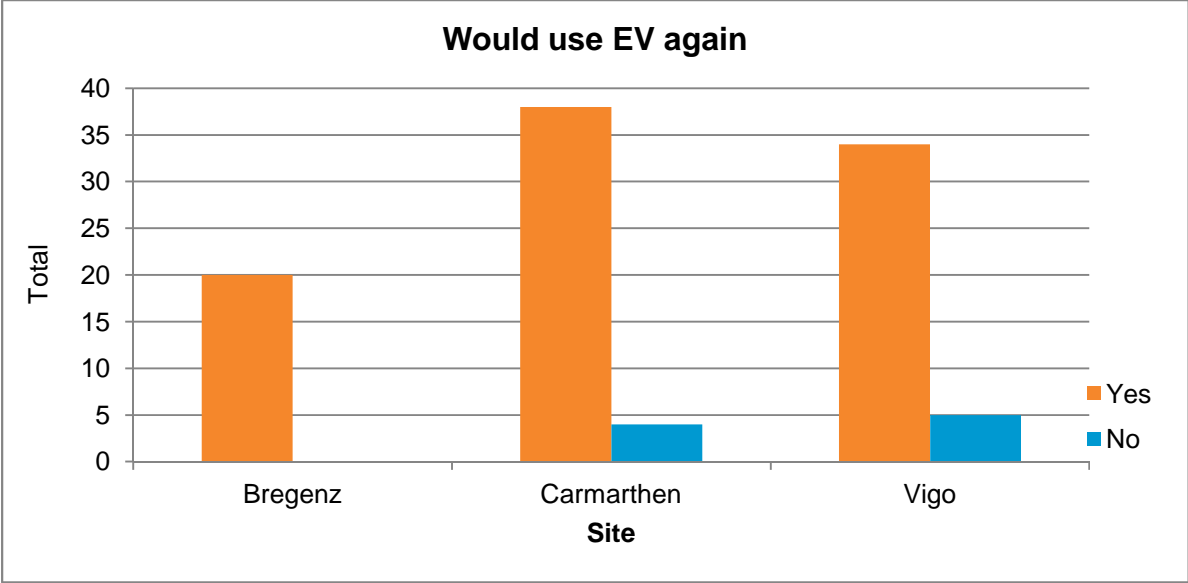


Figure 2 Willingness to use EV again. Source: eBRIDGE (2013)

On the other hand, drivers' consideration for buying their own EV presented the exact opposite image, with 76% *not* considering purchasing their own EV (Figure 3). Given the often cited high acquisition cost, this result is not a surprise; however the results from Bregenz were unexpected. This could be for several reasons, such as the small sample size, or some other factor relevant to the Bregenz sample, for instance responders may have included more EV users with positive attitudes to EVs, and fewer users with negative attitudes. A clear interpretation would require a larger sample.

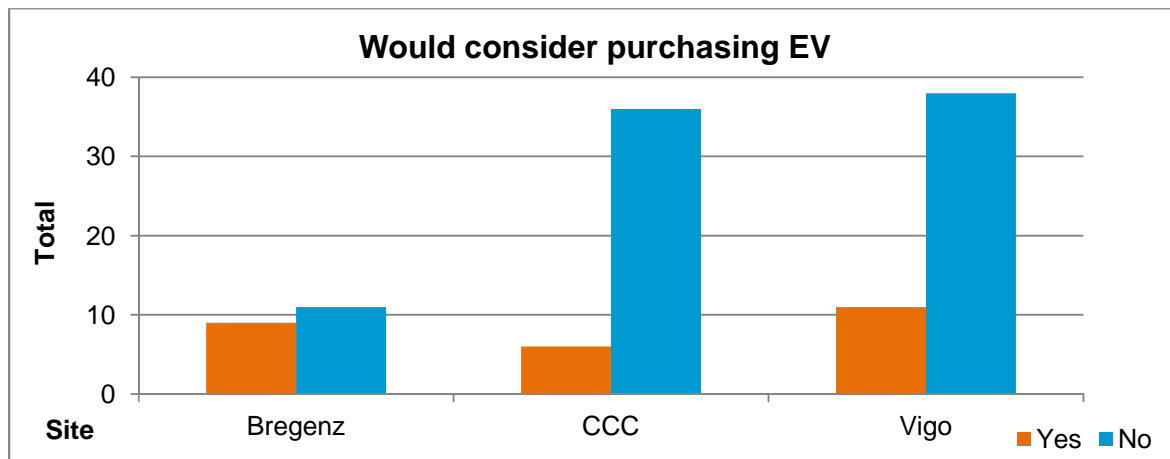


Figure 3 Consideration to purchase an EV. Source: eBRIDGE (2013)

Other results from this survey indicate that drivers' attitudes towards EVs were generally positive. There was some variability in attitudes, which may be due to the different sample size and composition across the three sites; alternatively, the different modes of ownership across the three samples may have influenced drivers' attitudes towards EVs. There was similar variability in users' comparisons of EVs with conventional vehicles on several dimensions, which again may be attributed to differences of fleet mode of ownership, or the particular context which the pilots took place in (e.g. private customers vs municipality employees).

INTERVIEWS WITH SITE MANAGERS

Site leaders, fleet managers and—where possible—users were interviewed, following a well defined interview protocol, and provided their personal perceptions of users' interaction with the EV fleets. The main themes that emerged from this work are outlined here.

- **Scheme overview:** pilot projects involved in eBRIDGE varied in terms of size (fleet sizes from two to several dozen EVs), purpose (public, private, peer to peer), management system (from fully automated booking and smart card vehicle access, to manual booking and accessing by key) and vehicle and trip data recording (from manually recording the vehicle mileage and battery status, to full satellite tracking of vehicle and trip data).
- **EV aspects drivers like:** Quiet operation and silent motor were among the few positive comments identified by fleet managers. Novelty was also mentioned as an attractive feature of EVs, as many customers reportedly drove EVs out of curiosity and in order to familiarise themselves with this technology. Reduced running costs appeared to be important from the fleet operator's perspective.

- **EV aspects drivers do not like:** The main issue here was range anxiety: drivers were often concerned with whether they could manage to make a return trip with one battery charge, and whether there would be any charging points on their way. Size of vehicles was also important for some drivers, depending on the particulars of each scheme, and main use of the vehicle.
- **Main barriers to EV adoption:** Cost of purchase was clearly the first preventing factor for private EV adoption. Other issues (e.g. limited charging network), appeared less important to drivers if EV prices could have been comparable to those of conventional cars.
- **Main motivators EV adoption:** Increased autonomy was the key factor to facilitate further use of existing EVs. This could be achieved by better batteries, lighter vehicles, more efficient ancillaries, or increased charging infrastructure. The latter would also help potential new adopters—as would measures relevant to parking privileges and taxation.

These interviews broadly confirm previous literature findings; combined with the user surveys and relevant literature, this exercise helped provide a more complete picture of EV perceptions than a single survey could have achieved, and they complement each other by providing different points of view for the same topic (triangulation).

5 Conclusions and next steps

This report outlined the evaluation framework and methods developed specifically for this project and in close collaboration with site managers. We also presented initial findings from the formative evaluation. These findings indicate that drivers overall had positive experiences with the EVs; and they would mostly repeat the experience of driving them. At the same time, the vast majority of drivers would not consider purchasing an EV for private use; the most frequently cited reasons for this was cost and range limitations. Industrial users also found the EVs unsuitable for goods travel, and as such their use in this sector may only be warranted if it does not involve heavy loads.

These findings may suggest that (a) overall potential for further use and expansion of EVs is positive; (b) mitigating cost could be a decisive factor for EV use and (c) EV use is more likely to remain in and around cities, due to limited battery range. Integrating (a), (b) and (c) favours solutions which involve:

- shared (as opposed to private) ownership of EVs
- in areas with dense recharging infrastructure (e.g. cities) and
- personal or light goods (as opposed to heavy goods) transport—within the vehicle's range.

In sum, it can be said that EVs are not 'one size fits all' vehicles, but operate better within targeted uses; and that car sharing schemes are necessary if EV use is to be broadened and increased.

It is important to remind at this point that these are early findings which will be complemented as other eBRIDGE participating schemes will provide data during the project. However, we do not have a priori reasons to expect significant deviations from the present results and it is likely that our main conclusions will remain unaltered.

The user survey that was part of the formative evaluation will become the baseline for later comparisons which will inform the Summative Evaluation Report (to be published in Month 25). This further step will endeavour to provide predictions for real world impacts of eBRIDGE related schemes in the short and medium term. In the coming months, we will continue liaising closely with all pilot schemes involved in eBRIDGE, and modify our current evaluation tools and materials as necessary. We will also acquire in two time points, and analyse the behavioural indicators dataset which will become part of the summative evaluation as well as feed into the scenarios.

We hope that this information will highlight a range of potential benefits and pitfalls involved in electric mobility, and help existing and new EV schemes to realise their full potential.



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