Home charging for all:
Ensuring cross-pavement products are accessible

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Motability Operations

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Motability Operations

Executive summary

1. Home charging:

Lack of access to on-street home electric vehicle (EV) charging is limiting EV adoption among disabled drivers.

- Restricted access to home EV charging for those without off-street parking creates significant disparity in both charging cost and convenience.
- Disabled EV drivers without access to a home chargepoint can have more challenges travelling to and using public chargepoints.
- Having no access to home charging is a barrier to EV adoption among disabled people leasing a vehicle through the Motability Scheme.

2. Making pavements accessible:

Electric vehicle cables that obstruct pavements are particularly inconvenient for disabled people.

- EV drivers without off-street parking may trail charging cables across the pavement to access the benefits of home charging creating hazards and inconveniencing pedestrians, particularly disabled people.

Executive summary

3. Inclusive cross-pavement products:

For an inclusive EV transition, accessible, unobstructive cross-pavement EV charging solutions must be made available.

- Motability Operations is committed to ensuring that its customers have fair access to home charging, so they can benefit from the convenience, cost savings and accessibility benefits it offers, while safeguarding the accessibility of pavements for disabled pedestrians.

- Research undertaken with Motability Scheme customers has identified a variety of accessibility challenges with existing cross-pavement products, and a range of considerations for more accessible future designs.

4. Ensuring no one is left behind in the EV transition:

Motability Operations is calling for stakeholders to make sure that its disabled customers without off-street parking are not excluded from the EV transition.

- Manufacturers of cross-pavement products should design products that are accessible for use by disabled people.

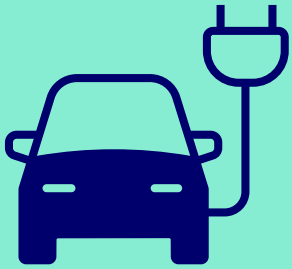
- Local authorities should ensure that, once available, accessible cross-pavement products are approved for use by disabled drivers.

Key figures

850,000+

Motability Operations runs the Motability Scheme, providing vehicles to over 850,000 disabled people.

Public charging can be up to 10x more costly than home charging.



90,000+

Over 90,000 Motability Scheme customers have already made the switch to electric vehicles (EVs).

Around 50% of Motability Scheme customers don't have access to off-street parking.

200,000+

We estimate that around 200,000 Motability Scheme customers live in housing that is suitable for a cross-pavement product.

The background

Introduction

For the 16 million disabled people living in the UK[1], mobility is key in supporting independence and allowing access to key social, economic, educational, and health-related activities. Most disabled people's journeys involve car use due to an absence of suitable public transport provision.[2]

Motability Operations runs the Motability Scheme, where people receiving a qualifying disability allowance can choose an affordable and accessible vehicle.

We know from our insight that some of our customers face barriers in making the transition to electric. Around 50% of Motability Scheme customers do not have off-street parking, and the cost and accessibility of the public charging network is an issue. We are committed to a range of innovation projects designed to address these challenges head-on and with a growing fleet of over 90,000 EVs, we need to address the unique barriers to EV use faced by disabled drivers. This will help ensure that no Scheme customer is left behind as the UK transitions to electric vehicles.

1 Department for Work and Pensions (DWP), 'Family Resources Survey: Financial Year 2022 to 2023.'
2 Department for Transport (DfT), 'National Travel Survey'.

The background

The need for EV charging equality

One common barrier to widespread EV adoption is the lack of access to the cost and convenience benefits offered by home charging. Currently, EV drivers with access to private off-street parking can have a home chargepoint installed, allowing them to charge at the unit cost of their home energy tariff.

EV cables create hazards on public footpaths. Those without off-street parking are generally prohibited from having a home EV charger installed, so they must rely on public chargepoints. These chargepoints may be far from users' homes and cost up to 10 times more than home charging.[3] Similarly, the cost of charging at home can be up to half the price of filling up with petrol.[4]

Motability Operations has identified this barrier as a major factor in limiting the uptake of EVs among customers without off-street parking. This barrier may affect disabled people more because of the physical effort needed to travel to and use public chargepoints.

On the other hand, disabled EV drivers with access to home charging may benefit from greater accessibility compared to drivers of internal combustion engine (ICE) vehicles, due to the relative ease of charging at home.

3 Which? February 2025: 'How much does it cost to charge an electric car?'
4 The AA's latest EV Recharge Report for March

Improving EV charging for those without off-street parking

Charging inequality may be partly addressed by improving or adding charging alternatives including:

- More on-street public chargers to reduce the distance needed to travel to a chargepoint.
- Fairer pricing for public chargepoints to reduce the gap between home and public charging costs.
- Allowing customers without access to their own charger to share the use of fellow EV drivers private home chargers.

Although these developments will close the gap between those with and without home chargers, they're unlikely to equal the cost of private home charging. For more widespread access to home charging, solutions must be found that allow a safe means of connecting to a home charger from an on-street parking space.

Cable mats and covers

Although most local authorities prohibit EV charging cables crossing the pavement, some are now allowing drivers to use cable mats and covers when they are charging their EV.

In principle cable mats and covers can help mitigate some of the trip hazards for pedestrians. However, even the most low-profile products could impact disabled people who already experience difficulties using obstructed pavements.[5] While these products may offer a viable stopgap solution, at scale they could create significant obstacles on pavements across the country.

Products should therefore be created that allow cross-pavement home charging for all and without creating obstructions or trip hazards for pedestrians.

5 Sustrans, Living Streets, and Arup, 'Walking for Everyone'.

Existing cross-pavement products

Several products have already been developed to reduce pavement obstructions while allowing EV drivers access to home charging. These “cross-pavement” products fit into 3 broad categories:

1. Overhead solutions carry the EV charging cable in a retractable arm above the footpath.

2. Cable channels are embedded into the pavement with a closure that allows the cable to remain safely beneath the pavement surface.

3. Other cross-pavement solutions, include a more integrated way of accessing a home energy supply through a permanently installed kerbside connection point.

None of these products are widely available due to the need for individual local authority approval. However, some products are gaining acceptance, with live trials underway in many local authorities, and some councils starting to implement standard installation processes.

The background

Cross-pavement products need to meet two objectives

Existing cross-pavement products appear to meet the needs of disabled pedestrians and tackle the issue of access to home charging for EV drivers. However, it's not clear whether these products can be used by Motability Scheme customers and the wider disabled population.

To understand how suitable the existing cross-pavement products are for Motability Scheme customers, Motability Operations' innovation team has conducted research with customers with a variety of accessibility needs to test a range of cross-pavement products.

This report summarises the outcomes from research workshops, describes Scheme customers' experiences using cross-pavement products, and concludes with a list of considerations for the design of more accessible cross-pavement products.

It is our hope that the content of this report may be used to help manufacturers create suitably accessible cross-pavement products, and to encourage local authorities to consider the needs of disabled people when approving such products. So, neither disability nor housing situation will result in people being left behind in the EV transition.

The research

Objectives:

- To determine the suitability of existing cross-pavement products for use by Motability Scheme customers and other disabled EV drivers.
- To identify barriers related to the use of cross-pavement products.
- To gain insights and guidance that can inform the design of more inclusive cross-pavement products.

Methods:

- A series of four interactive workshops were conducted with Motability Scheme customers.
- During the tests, participants were invited to use five different cross-pavement products installed in a mock-up pavement with a demo home charger and a standard type 2 EV cable.
- While the participants were testing the products, members of Motability Operations' electric team led discussions about their use of the product. Other participants were also invited to engage in the discussion.
- After testing each product, participants were invited to discuss their thoughts on the products and give a summary of the products that they found easiest and most difficult to use and why.
- Throughout the workshops, participants were encouraged to give feedback about their experience and suggest improvements of each of the products in a workshop booklet.

The research

Participants

- A total of 17 participants were recruited from Motability Operations' "Headlight" research community. Of these 17, 12 were Motability Scheme customers and 5 accompanied these customers as guests. Of the 12 Scheme customers, 10 were EV drivers and 2 drove an ICE vehicle.

- Participants reported a range of disabilities and accessibility requirements across the following categories: mobility (including 2 wheelchair users), mental health, stamina/ breathing/ fatigue, memory, vision, hearing, dexterity, social/ behavioural, chronic pain, learning/ understanding/ concentrating, and speech.

The research

Analysis

- Workshops were filmed, and footage was transcribed and coded according to participants' positive and negative user experiences, as well as strategies, techniques, and improvements to overcome accessibility barriers.
- Completed workshop booklets were scanned and similarly coded.
- An analysis workshop was then conducted with members of the innovation team at Motability Operations to determine general themes from the booklets and video data.

Limitations

- Although every aim was made to include a wide range of disabilities in the research workshops, some groups were underrepresented. Notably, more severe forms of visual impairment were absent, as participants were selected from a pool of Motability Scheme customers who drive their own vehicle.
- Anecdotally, some of the Motability Scheme's visually impaired EV customers who rely on others to drive their car, do assume responsibility for ensuring the vehicle is charged at home and should, therefore, be considered in further research.

Cross-pavement product challenges identified

Challenges with stretching, bending and kneeling

Disabled people who experience challenges with stretching, bending or kneeling, have difficulty using cross-pavement products that require a cable to be inserted at the ground level or require reaching above head height.

For several workshop participants, this made it impossible to use certain products successfully. To avoid bending, some participants sought to use their feet to kick and position cables and components into the correct place at ground level.

Recognising this challenge, some cable channel manufacturers are developing tools to aid inserting the cable. However, prototypes of some of these tools tested in the workshops did not provide sufficient assistance to significantly improve product accessibility. Further development of tools or other methods of inserting the cable from a standing height is required to ensure these products are accessible.

Beyond these accessibility issues, several workshop participants also expressed concerns about the cleanliness of products embedded in the pavement. These concerns demonstrate the potential that products which enable a cable to be inserted from a standing height might also improve their general user experience.

Cross-pavement product challenges identified

Challenges with strength and dexterity

Challenges relating to strength and dexterity needed to operate cross-pavement products may also be common among disabled EV users. Workshop participants experienced difficulties when carrying heavy items required for using the products, and when holding and managing the flex of the cable while charging.

Multiple products tested included stiffly sprung moving parts that proved difficult for those with dexterity-related challenges. The precision required to place tools and cables in the correct position when using some of the products, also proved difficult for some participants, particularly when trying to place the end of long-handled tools at specific, ground-level points. Where bending and reaching were required, these difficulties with strength and dexterity were increased.

For some cable channel products, the need for sprung or self-closing features to reduce trip hazards hampered accessibility for disabled users. Several participants suggested that, if channels remained open during the insertion of the cable, it would reduce the demands on their strength and dexterity.

Overhead products could significantly benefit disabled people experiencing strength and dexterity challenges, as they support the weight of the cable. However, the overhead product tested during the workshops had its own strength-related challenges caused by stiffly sprung moving parts.

Cross-pavement product challenges identified

Challenges with stamina and endurance

For some participants who were initially able to bend or operate the products, the extended periods of exertion required to use them proved challenging. Some opted to take a break during use of the product, while others were unable to complete the charging task. The length of time taken to use some products can exacerbate the effects of other impairments. One participant described how holding the cable for a long period of time resulted in pain related to their arthritis.

Challenges related to wheelchair use

For wheelchair users in the workshops, the positioning of the cross-pavement products was important to ensure access to the chargepoint. Wheelchair users had several concerns about products that require them to retrieve the cable from the road, as access to dropped kerbs, and sufficient space to move around the vehicle cannot be guaranteed in residential streets. Products that can be used from the pavement could allow some wheelchair users to charge and access their vehicle without the need to dismount kerbs. Such products may also be easier to use when road space is limited by cars parking close to the kerb and each other.

Cross-pavement product design recommendations

Reach

Parts of the product that require hands-on interaction should be at a height that can be reached by people with limited upper limb mobility, wheelchair users, and people with short stature. If reaching is required, a tool which extends the users reach should be provided. This is most likely to be relevant to overhead cross-pavement products.

One-handed use

Some Motability Scheme customers and other disabled drivers may rely solely on one-handed use of products. So, where possible, the product should be usable with one hand. If this is not possible with the standard product, additional tools or attachment should be considered.

Bending and kneeling

Products' touchpoints should also be at a height that allows users to interact with them comfortably, without needing to bend significantly—whether they are in a seated or standing position. Where this is not possible (as with cable channel products) a tool should be provided so that customers can use the product without bending. Alternatively, these products could be designed with methods of cable insertion that can be completed from seated or standing heights without a tool e.g. by enabling users to insert the cable by positioning it with their feet.

Reducing cable management

The product should aim to reduce the amount of manual manipulation of the cable and should also reduce the need for the user to carry the heavy charging cable.

Cross-pavement product design recommendations

Strength

The product should not require excessive strength to operate. Issues with strength may be exacerbated when combined with a need to bend down or reach high. So, where a degree of strength is required to operate a product, the force should be able to be applied at a height that is comfortable for disabled users.

Dexterity

The product should be designed to allow people with limited dexterity to use it. This is particularly applicable to products where a cable needs to be inserted for use (e.g. cable channels). To achieve this, the product should aim to be usable by someone interacting with it with broad or imprecise movements.

Efficiency of use

To reduce prolonged strain and stamina issues associated with managing and carrying charging cables, products should be efficient to use. If a longer process is required to use the product, it should be made possible for users to rest and then resume without having to completely restart the process.

Intuitive to use

The product should be easy to understand and operate from the first use. This could be achieved using contrasting colours to highlight areas of interaction, labelling of the product, or by supplying a simple user guide. This is particularly important if cross pavement products are to be used in peer-to-peer charging situations.

Cross-pavement product design recommendations

Wheelchair use

Where possible, the product should be useable by a powered or manual wheelchair user from a seated position. Where pulling the cable is necessary, accessories may be needed that attach the cable to the wheelchair, so both arms can be used to propel the chair. Consideration should be given for wheelchair users who may need to use a dropped kerb to access their vehicle's charging socket. As wheelchair users may have difficulty dismounting kerbs, cross-pavement products should be able to be used from pavement level.

Visibility

Key areas of interaction of the product should be highlighted in contrasting colours to improve use for visually impaired people. If trip hazards could be present during use (e.g. an open cable channel lid), these should also be highlighted. To avoid collision, any parts of the product that permanently protrude significantly above the level of the pavement should be visible at night. This is particularly relevant to kerbside column-type products.

Conclusion

Motability Operations supports the concept of cross-pavement products and their potential to provide more charging equality.

However, we're concerned that suitably accessible cross-pavement products are not yet available for Motability Scheme customers and other disabled drivers. And the challenges experienced by Scheme customers when testing existing products shows there's a need to create more accessible alternatives.

We recommend that manufacturers use the recommendations in this report as a starting point for developing new, inclusive products, and consult with disabled people throughout the design process. To ensure a fair EV transition for our 850,000+ Motability Scheme customers and many more disabled drivers, Motability Operations is urging manufacturers of cross pavement products, and local authorities to work with us to develop their products and make them available as soon as possible.

We would like to extend our thanks to the Motability Scheme customers who gave us their valuable time to make this research possible. We would also like to thank the cross-pavement manufacturers that have provided us with their products for testing and we are looking forward to collaborating further in the future.

Get in touch:

For further information email **innovation@mo.co.uk**

We are particularly interested in hearing from:

Manufacturers and designers

If you have an idea or design that you think could address the challenges presented in this report, we're keen to hear about it.

Local authorities

If you would like to work with Motability Operations to trial or implement more inclusive cross-pavement products, please get in touch for a discussion about how we could support you.

Motability Operations