TRANSPORT SCOTLAND
CÒMHDHAIL ALBA

SRP10: The potential for E-bikes in Scotland

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Executive Summary

The Scottish government has ambitious goals to reach Net Zero by 2045. While improvements have been made in many areas, emissions from road transport remain largely unchanged since 1990 and transport is now the largest contributor to Scotland's greenhouse gas emissions. Plans to reduce emissions and decrease the number of kilometres driven by cars are currently off-track, meaning more substantive and impactful work is needed if we are to achieve these targets.

Electric bikes (e-bikes) represent an opportunity to make a meaningful difference in how we travel. This research project looks to better understand how Scotland can leverage e-bikes to curb transport emissions. Our findings come from a combination of qualitative analysis from interviews with four e-bike industry professionals and a literature review. This work has been funded by Transport Scotland and carried out by Sustrans' Research and Monitoring Unit as part of the Scottish Research Programme.

In recent years (particularly since the Covid-19 pandemic) e-bikes have undergone a noticeable shift in public perception, with significant growth and changes in perceptions. What was once seen as a high-end luxury item is now becoming a legitimate form of transportation, in part due to lower prices, improved capabilities and variety of models, greater environmental consciousness, and increased visibility. Stigmas around e-bikes, such as being seen as "cheating", have also declined.

E-bikes reduce several of the traditional barriers to cycling, such as physical fitness and hilly terrain, while also being more accessible and attractive to a wider range of users; they are more appealing to older people, women, and people with disabilities than traditional bikes. Furthermore, e-bikes are used more frequently, and for a greater variety of trips (especially more functional trips such as commuting and shopping). Users also tend to replace more car journeys with e-bike trips compared to conventional cyclists. Although it is clear that e-

bikes have the potential to significantly reduce emissions and car kilometres in Scotland, it is far from clear whether this potential will be realised. Currently, there are a variety of policies to promote the growth of battery electric vehicles (BEV), and there is a risk that this will help maintain a car-centric culture, rather than shifting towards more sustainable and beneficial ways of travel such as public transport and active travel . Interest in, and use of, e-bikes has grown rapidly in recent years- particularly since the Covid-19 pandemic. However, a corresponding increase in supportive policies has not followed. Instead, the E-bike Grant Scheme which provided interest free loans to individuals and businesses was discontinued in 2024. As a result, e-bikes make up only 9% of all bike sales in the UK, with 4% of the Scottish population having access to one. By contrast across Europe e-bikes account for 27% of bike sales.

While e-bike prices have fallen, cost remains the most significant barrier to ownership. Other challenges highlighted by our interviewees include a lack of public awareness causing concerns about battery lifespan, and misconceptions about fire risks. Furthermore, the increasing availability of low-quality, speed limit removed e-bikes has fuelled concerns about safety and led to negative perceptions of e-bike riders and their interaction with other path users. Other barriers include heavier weight, risk of theft and potential stigma from conventional cyclists.

The most commonly suggested strategies to boost e-bike adoption as identified by our interviewees include re-introducing interest free e-bike loans, alongside targeted behaviour change programmes. A strategic long-term approach was consistently recommended. Our full list of recommendations to increase the uptake of e-bikes falls into five categories: financial incentives, awareness, infrastructure, safety and e-bike/battery electric vehicle hierarchy.

Financial Incentives

- Expand financial support beyond purchase costs to include necessary accessories, insurance, and maintenance, particularly for low-income households.
- Ensure financial incentives for e-bikes are proportionate to those for electric vehicles, to encourage a more balanced transition.

Awareness

- Introduce e-bike hire/loan schemes in towns/cities to allow people to travel by e-bike without needing to purchase & store one. For example, see the 'E-Move' project run by Sustrans in Wales (discussed under "Increased Awareness" section).
- Ensure e-bike retailers allow a 'try before you buy' approach to e-bikes, to assuage any preconceived assumptions/concerns (about safety etc.).
- Improve data collection on e-bike adoption to inform future policy and infrastructure planning.

Infrastructure

- Increase secure parking and charging facilities, especially at transport hubs and residential areas, to support everyday e-bike use.

Safety

- Encourage workplaces and public transport to have more permissive policies related to e-bike storage due to battery safety concerns. This ensures regulated e-bikes can be used as part of the network of daily travel patterns.
- Introduce clearer standards and regulations to address unregulated e-bikes and batteries, reducing safety risks.
- Public campaigns should focus on safety- in particular pointing out safety standards and how to identify potentially unsafe and unregulated options.

E-bike and electric vehicle hierarchy

- Include e-bikes in all future transport strategies/plans; consider them to be strategically important within decarbonisation of transport.

- Establish e-bikes as a distinct category in Scotland's transport hierarchy, ensuring their role is properly recognized in policy planning.

- While electric vehicles may go some way to reducing the CO2/km driven in comparison to petrol and diesel vehicles, they should not be considered the only solution especially when shorter trips can be completed by e-bikes instead. The promotion of e-bike usage would be aided by encouraging a shift away from all types of car use including EVs.

There are a number of issues with the growth of e-bikes. Cheap and unregulated e-bikes fuel perceptions about e-bikes being unsafe- in particular perceptions around fire risks from batteries. Regulations around e-bikes need to be enforced. Similarly, fully regulated and safe e-bikes and components need to be made as attainable as unregulated options; online and less safe e-bikes will continue to be sold as long as they are substantially cheaper.

Overall, however, e-bikes represent an opportunity to substantially change how we travel. They remove many of the traditional barriers to active travel, and replace a significant amount of car journeys, particularly for short to medium distances. As a result, if the growth of e-bikes is supported and continues, not only will it result in decreases in carbon emissions, but improvements for our health, homes, and neighbourhoods.

Introduction

Climate Change is the greatest crisis facing humanity today, with its impacts already evident both globally and in Scotland[1]. As part of efforts to limit the impact of climate change, the Scottish Government has committed to reaching Net Zero carbon emissions by 2045.

While progress has been made in many areas, transport emissions remain persistently high- largely due to an overreliance on cars as the primary mode of transport. Scottish greenhouse gas emissions have halved (-49%) between 1990 and 2021, but transport emissions over the same period have only reduced by 22%, with road transport falling even less (-5%)[2,3,*]. Transport is now the largest contributor to Scotland's greenhouse gas emissions, accounting for 29% of total emissions- 38% of which comes from cars[2,4].

Reducing car usage and prioritising sustainable transport options are key components of the Scottish government's commitment to achieving net zero emissions. In 2018, the Scottish Government set out an ambitious commitment in their Climate Change Plan to reduce car kilometres by 20% by 2030[5]. However, a concrete delivery plan has yet to be published, and progress has been minimal. A recent Audit Scotland report highlights that, rather than car kilometres falling, they are rebounding to near pre-pandemic levels[6]. On

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* *Notably, the latest figures are only for 2021, when transport emissions from Covid-19 lockdowns on transport were still being felt. Transport emissions have likely risen since then.*

[1] (Met Office, 2024)
[2] (Scottish Government 2023)
[3] (Transport Scotland, 2024)
[4] (Scottish Government, 2022)
[5] (Scottish Government, 2020)
[6] (Audit Scotland, 2025)

current trends Scotland is unlikely to reach its goal of reducing road traffic by 20%[7,8].

E-bikes have the potential to change this and play a pivotal role in reducing car kilometres and emissions. As discussed later, e-bike users travel significantly further per trip than conventional cyclists, use their e-bikes for more practical purposes (such as commuting and shopping rather than just leisure), and replace a greater proportion of car journeys with e-bike trips. Additionally, e-bikes help overcome traditional barriers to cycling and appeal to a broader demographic. As such, they present an opportunity to increase the share of trips completed by active travel while reducing reliance on cars.

This research project looks to better understand how Scotland can leverage e-bikes to curb transport emissions. It has been funded by Transport Scotland and carried out by Sustrans' Research and Monitoring Unit as part of the Scottish Research Programme. Our findings come from a combination of a literature review as well as qualitative analysis from interviews with four e-bike industry professionals based in Scotland (three working in an e-bike advocacy/support-provider capacity and one retailer). Interviewees were selected through identifying relevant companies and organisations and reaching out to them. A full overview of our methodology is given in Appendix 1: Methodology.

Our report first provides an overview of the benefits of e-bikes, with a focus on modal shift. We then look at the available evidence and views on several topics, including:

- Current demand for e-bikes in Scotland
- Barriers to e-bike growth
- Support strategies for e-bike adoption

Each topic is explored from both an industry perspective and a review of existing literature. Finally, we present recommendations to promote the adoption and continued growth of e-bikes in Scotland. It is important to note that the

[7] (Energy and Climate Change Directorate, 2024)
[8] (Climate Change Committee, 2024)

findings from an industry perspective are based on a small sample size; future work would benefit from a broader range of voices from a variety of perspectives. However, much of what was reported by interviewees aligns with finding from the broader literature, which gives us more confidence in our results.

For the purpose of this study, ‘e-bikes’ are defined as electrically assisted pedal cycles with an integrated electric battery. Traditional non-electric bikes are referred to as ‘conventional bikes’ throughout.

Findings

The benefits of e-bikes

E-bikes have a range of benefits that align with Scotland's goals of reducing emissions and car kilometres travelled while improving public health and wellbeing. They address many of the traditional barriers to cycling and expand the appeal of cycling beyond conventional bike users[9].

> "E-biking could play an increasingly significant role in policies to promote low carbon transport and healthy cities"[10]

Some of the key benefits of e-bikes that can help Scotland reduce its emissions include:

- Replacing car journeys (E-bike users substitute a significantly higher proportion of car trips than conventional cyclists, who often cycle in addition to driving[11]).
- **Encouraging functional cycling:** E-bikes enable more people to use cycling for commuting, shopping, and other daily tasks, rather than just for leisure.
- **Extending travel distances:** The average e-bike trip is 1.5 times longer than a conventional bike trip, making cycling a viable alternative for more journeys[12].
- **Supporting active lifestyles:** E-bikes enable users to maintain or increase their cycling activity levels, even if they would otherwise struggle with conventional cycling.
- **Broadening access to cycling:** E-bikes make cycling more accessible for individuals who may be deterred by

[9] (Sundfør, et al., 2020)
[10] (Jones & Harms, 2016)
[11] (Melia & Bartle, 2022)
[12] (Young & Whyte, 2020)

distance, inclines, or perceived physical fitness limitations[13].

> "[The benefits of E-bikes include] diminishing the physical effort required, improving the carrying capacity and increasing the potential distance travelled, empowers more people to cycle. It expands the practice of cycling across social groups (gender, age and life course position, physical condition) and spaces (suburban and rural contexts, distances)"[14]

Reducing barriers to cycling

E-bikes remove many of the obstacles that traditionally discourage cycling[15,16,17]. Research on UK e-bike users has found that e-bikes allow people to travel further, manage difficult road conditions, and cycle in poor weather more easily. The ability to exert less effort while riding means that users can arrive at destinations without excessive exertion, making cycling a more practical option for commuting and errands.

E-bikes are particularly beneficial in hilly regions, as they reduce the physical strain of climbing inclines. This is especially relevant for Scotland's varied terrain. A study in Brighton found that e-bike users were more willing to cycle uphill, significantly increasing the likelihood of choosing cycling over other transport modes. Additionally, e-bike users reported feeling safer in traffic, as they could keep pace with vehicles and accelerate out of hazardous situations when needed.

Modal shift and carbon emissions

[13] (Young & Whyte, 2020)
[14] (Rérat, 2021)
[15] (Melia & Bartle, 2022)
[16] (Behrendt, Cairns, Raffo, & Philips, 2021)
[17] (Bourne, et al., 2020)

Replacing car journeys with e-bike journeys has a significant impact on emissions. A single e-bike can save up to 225kg CO2 per year[18]. If people in the UK rode e-bikes to the same extent that the Dutch do for commuting, then a little under one million tonnes of CO2 emissions a year could be saved[19].

Most car trips in the UK are short distances, which have a higher impact on CO2 emissions per mile than longer car journeys. In England, 61% of daily journeys are by private car and of these, 68% are under 8km (5 miles) - a distance well within the capability of an e-bike**Error! Bookmark not defined.**[20,21]. Studies show that new e-bike owners increase their cycling distance more than fourfold, from an average of 2.1km/day to 9.2km/day, and the proportion of their total trips made by bike rises from 17% to 49%. This demonstrates e-bikes' potential to replace short car journeys at scale.

E-bikes are even more effective at replacing car use in rural areas compared to urban settings, where alternative transport options are more available[22]. This suggests that focussing on promoting e-bikes in rural Scotland could have a bigger impact on reducing transport emissions. In addition, some smaller/shorter delivery journeys, typically carried out by vans or HGVs, could be replaced by e-cargo bikes, especially in denser, urban areas which may be less accessible for larger freight vehicles[23]. Replacing short to medium car journeys with e-bike journeys, will also lead to a reduction in traffic congestion and air pollution, with less demand being placed on road space[24]. Studies show that a single traffic lane can accommodate 5 to 12 times more passengers per hour on bicycles compared to private motor vehicles[25].

[18] (McQueen, MacArthur, & Cherry, 2020)
[19] (Propensity to Cycle Tool, 2019)
[20] (Bourne, et al., 2020)
[21] (Ballo, Meyer de Freitas, Meister, & Axhausen, 2023)
[22] (Hiselius & Svensson, 2016)
[23] (Carracedo & Mostofi, 2022)
[24] (Jones, Spencer, Beale, L.A, & Carien, 2022)
[25] (Ballo, Meyer de Freitas, Meister, & Axhausen, 2023)

Health and wellbeing benefits

Beyond emissions reductions, e-bikes also contribute to public health improvements. Physical inactivity is responsible for one-sixth of deaths in the UK. Active travel, including e-biking, reduces the risk of major health conditions such as cardiovascular disease, diabetes, and respiratory illnesses. A report by the Department for Transport found that 51% of e-bike users felt happier, and 41% felt healthier after adopting e-biking as a regular form of transport[26,27,28].

Because e-bikes remove many traditional barriers to cycling—such as fitness concerns and long travel distances—they offer a realistic way to expand the health benefits of active travel to a much wider population.

Demand for e-bikes and the current market in Scotland

Market trends and comparisons

Globally, China and Japan dominate e-bike sales, while many European countries, especially The Netherlands, Denmark, Germany, Switzerland have also experienced rapid growth. In the Netherlands for example, e-bike sales increased by 228% between 2007 and 2015[29]. Industry experts have predicted that e-bike sales in Europe will reach up to 17 million per year by 2030[30]. In comparison, a slight dip in conventional bike sales is being experienced across Europe, with 11.7 million units being sold in 2023, down from 14.7 million in 2022[31]. In the UK, 2023 saw the worst year since 1985 for conventional bike sales, following a brief post COVID-19 boom. Sales dropped by 23%

[26] (Neves & Brand, 2019)
[27] (Shimano, 2022)
[28] (Department for Transport, 2016)
[29] (Kroesen, 2017)
[30] (Urban Transport Group, 2021)
[31] (Confederation of the European Bicycle Industry, 2024)

in 2022 and a further 5% in 2023, with only 1.55 million conventional bicycles being sold[32].

In Scotland, e-bike purchasing rates and ownership remain much lower than other European countries. According to Cycling Scotland, in 2022 approximately 4% of the population of Scotland had an e-bike available within their household. In 2023 this had risen to 6%[33,34]. More broadly in the UK, between 2016 and 2017, there was a 220% increase in e-bike sales, and by 2018 3% of all bike sales in the UK were e-bikes[35], rising to 9% market share by 2023. This however remains low when compared to the European average (27% of total bike sale share in 2022)[36].

The UK government has been criticised for prioritising electric vehicle sales over e-bike sales, leading to this much slower uptake compared to other European countries. The focus is on encouraging electric vehicle usage through grants and infrastructure (increased number of charging points), rather than promoting alternative sustainable modes of transport such as public transport and active travel, including e-bikes.

For example, in 2019, Transport Scotland launched the E-Bike Loan Scheme, run by the Energy Saving Trust, which offered interest-free loans to individuals and businesses to purchase e-bike up to £3000 or e-cargo bikes up to £6000. However, the scheme was closed in March 2024, due to limited evidence of impact on e-bike uptake, and uncertainty in the desired impact amongst target demographics- albeit locally funded and run projects are planned with the aim of being more targeted and effective[37]. In comparison, there are currently eight different grants or loans on offer to support people in Scotland wishing to make the switch to electric vehicles, including individual grants of up to £3000 as well as interest-free loans and a range of support for businesses and communities. This policy

[32] (Bicycle Association, 2024)
[33] (Cycling Scotland, 2022)
[34] (Cycling Scotland, 2023)
[35] (Bicycle Association, 2020)
[36] (Bicycle Association, 2024)
[37] (Scottish Governement, 2019)

imbalance has made e-bikes less financially accessible in Scotland, limiting their potential as a sustainable transport alternative.

Expert insights

The experts interviewed provided an overview of how they've seen the e-bike market change in Scotland over time. They noted that, when first introduced, e-bikes were perceived as a niche, high-end product primarily for older or wealthier individuals looking to continue cycling. They recounted that early adopters tended to use e-bikes more for leisure rather than as a primary mode of transport, and some people viewed e-bikes as "cheating" due to their pedal assistance.

However, perceptions appear to have shifted over time. Interest in e-bikes as a legitimate transport option has increased, with experts suggesting this to be driven by falling prices, a wider variety of models, rising environmental awareness, and greater visibility. The Covid-19 pandemic may have also accelerated this trend, as cycling in general surged in popularity. While e-bike sales have continued to grow post-pandemic, an e-bike retailer has found that financial pressures such as the cost-of-living crisis have limited many people's ability to justify the purchase. Some still view e-bikes as a luxury, without fully recognising their utility.

Unlike in the past, e-bike ownership now spans diverse age groups, and they are used for a variety of purposes—including commuting, shopping, school runs, and exercise. Experts noted that the stigma around e-bikes as "cheating" has significantly diminished, making them more socially accepted.

> "I think, in the past five to ten years, they've become just completely almost democratic. There's an e-bike for almost anyone who wants to ride the equivalent bike. And I think the stigma maybe around doing less exercise, or that kind of cheating idea, has probably fallen away a good amount."

An e-bike retailer noted that e-bikes have also gained popularity among new and returning cyclists, and for those with an impairment or disability which reduced their confidence or ability for conventional cycling. While e-bike interest and purchase has primarily been in urban areas, experts working in rural communities have also reported benefits for rural users, particularly for leisure and exercise, overcoming hills, or short local trips.

Barriers to the uptake of e-bikes

What the literature says

The literature has identified several different barriers to e-bike uptake. Broadly, barriers to e-bike uptake can include:

- The weight of the bicycle (more than a conventional bike), which can reduce manoeuvrability and make navigating gates, steps etc. more difficult[38].
- Concerns over the battery power running out before the destination is reached, especially due to the increased weight of e-bikes, meaning cycling e-bikes without the battery assistance would be challenging[39].
- Safety fears (such as concerns about the higher speed that e-bikes can travel at, and fears around battery fires)[40].
- Security issues and worries about theft[41].
- Worries about judgement from 'conventional' cyclists; e-bike users may be concerned that they may be perceived as lazy[42].

[38] (Kazemzadeh & Koglin, 2021)
[39] (Kazemzadeh & Koglin, 2021)
[40] (Urban Transport Group, 2021)
[41] (Melia & Bartle, 2022)
[42] (Bourne, et al., 2020)

Cost

In addition to the barriers listed above, the high cost of e-bikes is the main reason people may be hesitant to buy an e-bike. In the UK, the average cost of an e-bike is £2250 (compared to an average of between £300-600 for a conventional bike[43])[44].

In the long term however, despite the higher upfront cost, an e-bike is likely to save people money if they use it to replace car journeys. According to Shimano's State of the Nation Report, 56% of UK residents main reason to consider buying an e-bike is because of the increased cost of running and maintaining a car. Whilst the initial outlay of purchasing an e-bike is higher than a conventional bike, the maintenance is cheaper, and returns are higher[45].

Public perception

Multiple studies have shown that those who cycle the least, or not at all (on conventional bikes), tend to be the most interested in buying an e-bike, however a lack of knowledge of how they work may impact their desire to purchase one[46, 47, 48]. Studies show that people are often encouraged to purchase an e-bike if someone they know already has one, especially if they have had the opportunity to try it before purchasing their own[49]. This is also likely due to the higher upfront and maintenance costs of e-bikes, meaning people are more likely to commit to a purchase if they have some prior experience/knowledge of e-bikes. This highlights the importance of positive social influence and messaging about e-bikes, as well as exposure to e-bikes.

Safety concerns

Potential e-bike users may be put off by the perceived safety risks of e-bikes, such as the higher speeds they can travel and the increased weight (compared to conventional bikes)

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[43] (Statista, 2024)
[44] (Jones & Harms, 2016)
[45] (Shimano, 2022)
[46] (Fyhri, Heinen, Fearnley, & Beate Sundør, 2017)
[47] (Simsekoglu & Klöckner, 2018)
[48] (Wunsch, et al., 2015)
[49] (Popovich, et al., 2014)

However, research has shown data on the frequency of accidents/injuries caused by e-bikes versus conventional bikes is similar, and e-bikes are not inherently more dangerous than conventional bikes [50]. This also means that in terms of policing/regulating e-bikes, they should be treated more in line with conventional bikes rather than vehicles[51].

The e-bike market is still considered niche, albeit growing rapidly. Encouraging a modal shift to e-bikes may be facilitated by combining push and pull factors, discouraging car use through making it less convenient whilst also encouraging e-bike usage[52]. For example. disruptions and discouragements to driving (such as clean air zones or low emission zones), combined with grants for e-bikes could encourage more people to consider e-bikes.

Expert insights

Barriers identified by the experts through their work in Scotland broadly align with what was found in the literature, with the most significant barrier being cost. While prices have dropped over time, e-bikes remain substantially more expensive than conventional bikes, making affordability a key obstacle - particularly in the current cost-of-living crisis. Experts note that many potentially interested users they encounter perceive e-bikes as too costly compared to cars, and this may be exacerbated in recent times given the absence of sustained government financial support.

Security concerns were also identified, as the high value of e-bikes makes them a target for theft. Potential buyers would also worry about limited secure storage options, both at home and in public spaces. The added costs of insurance, maintenance, and battery replacements were highlighted to further complicate affordability for lower-income individuals.

[50] (Jenkins, et al., 2022)
[51] (Jenkins, et al., 2022)
[52] (Moser, Blumer, & Hille, 2018)

Another major challenge is the removal of financial support schemes. The end of Scotland's interest-free e-bike loan scheme in 2024 significantly impacted sales. Interviewees noted that such schemes helped normalise e-bike ownership, particularly among those who would not have considered them otherwise. Without these supports, experts feared e-bike adoption becoming exclusive to higher-income groups.

> "It's definitely affected the amount of bikes that people buy. I think having something like that is huge, to tell people that you can actually do this. I think if you are there on the ground and you have an e-bike, and someone asks you how much it is, you say, it's £1,200, £1,500 but there's an interest-free loan that is available too, that can be enough for them to think that this is an actual reality, because a lot of people won't have that money sitting around."

Additional barriers the experts recounted from members of the public or interested buyers include lack of infrastructure, battery safety concerns, and social perceptions. Furthermore, some employers and transport providers restrict e-bike charging or storage due to concerns over battery fire risks, and the experts predict this would limit their usability for commuting.

> "I think obviously the perception of e-bikes, the more people say e-bikes are dangerous and they won't allow the charging on the premises, that's putting a lot of people off."

Finally, experts note that there remains a lack of public knowledge about e-bikes. Many people are unfamiliar with their benefits or are influenced by misconceptions, such as concerns about battery lifespan, fire hazards, or e-bikes being "cheating" compared to conventional cycling. The rise of cheap, unregulated e-bikes—often purchased online with speed restrictions removed—has also contributed to a perception among the public that e-bikes are unsafe.

"…we had the feeling when we tried to promote it among customers that probably when they heard 'e-cargo bike,' they just think about the classic Dutch cargo bike. They don't know how many other options there are, how different they can be in shape, and the ways they can carry cargo, even those that actually look like a little one".

Supports for e-bikes in Scotland

What the literature says

Research on e-bike adoption highlights several successful strategies that have been used internationally to encourage uptake. These broadly align with expert insights from our interviews and fall into four key areas: e-bike share schemes, financial incentives, awareness-raising initiatives, and infrastructure improvements.

E-bike Share Schemes

E-bike share schemes provide an opportunity for people to experience e-bikes without the financial commitment of ownership, helping to address cost barriers. A 2016 review of 16 e-bike share schemes in England found that they:

- Attracted new cyclists, particularly women and those previously deterred by fitness concerns.
- Encouraged longer and more challenging trips than conventional bike users typically undertook.
- Helped shift more journeys away from cars, particularly for commuting and short urban trips[53].

"When e-bikes are made available, they get used."[54]

[53] (Department for Transport, 2016)
[54] (Cairns, Behrendt, Raffo, Beamont, & Kiefer, 2017)

Although e-bike share schemes are most commonly found in urban areas, studies in China suggest that they can have a greater impact on emissions reduction in rural areas, where alternative transport options are limited. This indicates that Scotland could benefit from expanding e-bike share schemes beyond major cities[55].

However, there have been challenges with maintaining share schemes in Scotland. Initiatives in East Lothian, Midlothian, Inverness, and Fort William have faced vandalism and theft, leading to high repair costs and, in some cases, the suspension of services. For example, Hitrans' Hi-Bike scheme in Inverness suffered £50,000 in damages in 2024, leaving only six of the original 56 bikes operational[56].

The UK charity CoMo has issued guidance on minimising vandalism, recommending that docking stations be integrated into well-surveyed transport hubs and that community engagement strategies be used to foster local ownership of schemes[57].

Financial incentives

The high cost of e-bikes remains a significant barrier to uptake. Studies indicate that direct subsidies, VAT exemptions, or low-interest financing can substantially boost sales.

In France, a national e-bike subsidy launched in 2024 offers residents up to €400 for a standard e-bike and €2,000 for an e-cargo bike, encouraging people to switch from cars for shorter trips[58].

A similar rebate programme in Sweden, which covered 25% of the cost of a two-wheeled electric vehicle (up to SEK 10,000), resulted in over 100,000 e-bike purchases in one year, increasing market share from 16% to 18% in the following years—even after the subsidy ended. This suggests that initial

[55] (Li, Fuerst, & Luca, 2023)
[56] (BBC, 2024)
[57] (CoMo, 2022)
[58] (Cycling Electric, 2024)

financial support can create long-term demand by familiarising people with e-bikes[59,60,61,].

In contrast, the UK's lack of e-bike subsidies has been criticised for stifling growth compared to other European nations[62]. A 2024 report from Mintel found that the cost-of-living crisis, combined with the absence of financial incentives, has led many UK consumers to delay or forgo purchasing an e-bike altogether[63].

Awareness and Education

A lack of knowledge about e-bikes remains a major barrier to adoption, with many potential users uncertain about their benefits, safety, or functionality.

In 2024, the Electric Bike Alliance launched the "E-Bike Positive" campaign to address misinformation about battery safety and to encourage responsible purchasing. The initiative includes:

- A certification system to identify e-bikes that meet UK safety standards.
- A pledge from retailers to only sell legally compliant e-bikes.
- A consumer education programme, including a battery safety guide[64].

> "In countries where e-bikes have not yet taken a strong market position, spread of knowledge and letting people try an e-bike can be an effective strategy to get more people to buy them, and subsequently to get more people to use bicycles on their daily travels." [65]

[59] (Fyhri, Heinen, Fearnley, & Beate Sundør, 2017)
[60] (Söderberg, Adell, & Winslott Hiselius, 2021)
[61] (McQueen, MacArthur, & Cherry, 2020)
[62] (Bowden, 2023)
[63] (Mintel, 2023)
[64] (Electric Bike Alliance, 2024)
[65] (Fyhri, Heinen, Fearnley, & Beate Sundør, 2017)

Pilot schemes that allow people to test e-bikes before purchase have proven effective in increasing uptake. For example, the "E-Move" pilot in Wales, run by Sustrans Cymru, provided free four-week e-bike loans to individuals and businesses. Participants reported long-term changes in travel behaviour, with many switching to e-bike commuting even after returning the loaned bike. The scheme has since been extended due to its success, offering a potential model for Scotland to replicate.

Infrastructure Improvements

For e-bikes to become a practical alternative to cars, investment in supporting infrastructure is essential[66]. Studies highlight three key areas:

High-quality cycling networks – A 2024 Sustrans report found that 95% of survey respondents cited road quality and safety as the primary improvements needed to encourage cycling[67].

Charging and storage facilities – E-bike theft concerns deter potential buyers, particularly in high-density housing areas where secure home storage is limited. Investment in lockable charging stations at transport hubs and commercial centres can help mitigate this.

Integration with public transport – Making it easier to store or carry e-bikes on buses and trains can facilitate multi-modal journeys, particularly in rural areas[68].

A 2016 CycleBOOM report highlighted demand for long-stay, valet-style bike parking in city centres, workplaces, and train stations[69]. Providing secure storage would increase confidence in using e-bikes for everyday transport rather than just leisure.

Expert insights

Experts suggest that e-bike adoption in Scotland has been driven in part by various support measures, including purchase incentives, behaviour change initiatives, and infrastructure

[66] (Rérat, 2021)
[67] (Sustrans, 2023)
[68] (Ballo, Meyer de Freitas, Meister, & Axhausen, 2023)
[69] (Philips, Anable, & Chatterton, 2020)

improvements. Experts highlighted that these schemes have played a crucial role in making e-bikes accessible to a wider audience. However, many of these supports have been discontinued or reduced, creating uncertainty around the future of e-bike uptake.

Experts stated that one of the most impactful initiatives was the interest-free e-bike loan, administered by the Energy Saving Trust between 2018 and 2024. This scheme allowed individuals and businesses to purchase e-bikes with up to £3,000 in interest-free financing. An e-bike retailer interviewed credited this loan as a key factor in expanding e-bike ownership, particularly among those who would not have otherwise considered it.

Since the loan scheme ended, e-bike purchase support has been limited to the Low Emission Zone Support Fund and Travel Better Fund. However, these schemes primarily target those replacing non-compliant vehicles near Low Emission Zones, meaning broader financial assistance for e-bike adoption is lacking.

> "…[the Energy Savings Trust e-bike loan] honestly was a fantastic [thing] for any bike shop and customers…£3,000 to anybody was a great thing and to buy a bike with…they may have potentially been putting it off, it was almost like a tipping point to get it and move forward from there."

Another intervention that many experts saw as successful has been e-bike provision for organisations, including local councils, universities, and businesses. Some workplaces offer e-bike fleets for staff, while others have adopted e-cargo bikes for deliveries and transport. Through conversations with beneficiaries, experts who helped administer these workplace schemes found that they reduce car use for work-related trips, increase visibility of e-bikes in communities, and provide a cost-effective alternative to traditional fleet vehicles.

> “There’s a development officer in situ, they have a fleet of bikes and e-bikes, and they’ll either get them out to schools, workplaces, that kind of thing, and they’ll loan out the bikes, people get to use them, or they’ll take people on, and they’ll take people for learn-to-ride sessions. They’ll take people for returning-to-ride sessions, they’ll put on like group rides and led rides, just to try and make it easier for people to get back to cycling, basically.”

Addressing barriers and recommendations for future support

Experts agreed that reinstating direct financial incentives - such as the interest-free loan or an e-bike grant scheme - would have the most significant impact on uptake. This would help mitigate cost barriers, particularly for lower-income individuals. However, they also stressed that financial support should be paired with long-term investment in behaviour change programmes, as well as post-purchase assistance, such as grants for maintenance, insurance, and security equipment.

> “Don’t overlook the value of behaviour change and active travel. If you want people to use bikes, then we need to make it as easy as we can for them. Giving them a bike just isn’t the answer. In many cases they need a bit more support and if we want to get those away from the stereotype of young men on bikes in Lycra, then people need a wee bit more support.”

They recommended combining loan schemes with behaviour change programmes to create a clear pathway for new or returning cyclists to pursue e-bike ownership after engaging in behaviour change programmes. This could also build connections between behaviour change programmes and local bike shops, where expert advice and assistance can be provided.

> "And often we'd be working closely with a local bike shop so that we can say that [a beneficiary] has got this bike, and you can help them that way as well, which is really good for the local bike shop."

It was also emphasised that support programmes should specifically be tailored for lower-income individuals. Post-purchase assistance, such as grants for cycling equipment and for repair and maintenance costs, was strongly recommended. These costs are often unanticipated and can further increase the financial burden for lower-income buyers.

> "So, I think that, while it's very commendable and great to give people an e-bike, we also have to look at what are the logistics of where are they storing it? How are they maintaining it? How are they going to afford the extra bills? How are they insuring it?"

Another recommendation was further exploring how e-bike recycling can work. Second-hand e-bikes are a potential solution to the cost burden, however one participant described issues regarding recycling batteries and ensuring refurbished e-cycles are safe. They described this issue:

> "…the real challenge that they have is the batteries. How do they refurb batteries? How do they safely look after batteries? How do they ensure that the bikes that they are refurbing and putting back out are safe? Because there isn't really a standard…. there's lots of different e-bike manufacturers. Some of them are less than reputable and less than safe. So, those tend to be the cheap e-bikes that end up at the bike recyclers."

The experts also recommended investing in active travel infrastructure and expanding e-bike storage and charging facilities, especially near high-density housing, workplaces, and public transport hubs. They suggested a commitment to disincentivizing vehicle use where appropriate and adopting a network approach to e-bike planning. This would involve

ensuring e-bikes can easily integrate with public transport and can be securely stored at workplaces and public institutions. Such measures would enhance the practicality of using e-bikes for trips that are typically made by car and help increase the visibility of e-bikes.

> "You might not be able to carry your bike in a bus because there is no space. Some trains don't allow the battery in the train. So, if there was some more support, and perhaps even policies in this area, it could make things easier for those people that consider maybe a mixed journey with bike and public transport."

Finally, they highlighted the ongoing need to increase public knowledge about e-bikes, including their functions, benefits, and available models. Safety campaigns, consumer advice, and promoting local e-bike stores could help educate consumers, provide access to expert advice, and lead to more informed e-bike purchases.

The future of e-bikes

Interview participants had mixed views on the future of e-bikes in Scotland. They expressed that the rising cost of living and the end of e-bike loan supports may limit the number of individuals who can afford to purchase e-bikes, potentially restricting ownership to higher-income groups. There is also concern that if safe, regulated e-bikes remain unaffordable, people will increasingly turn to cheaper, unsafe imports - reinforcing negative perceptions and safety concerns.

> "But if you're on your own buying a bike for the first time, you can see how this might happen if the cheapest bike out there is… it can be with you in a couple of days, and it's really cheap, and you're able to tinker with it and regulate it yourself, or get rid of any speed regulations, or that kind of thing."

Interviewees anticipate that the future of e-bikes will also be influenced by the availability of funding to sustain behaviour change programmes and support schemes run by charities,

community groups, and organisations. These initiatives help introduce people to e-bikes and build interest, but their reliance on year-to-year funding creates challenges in long-term planning.

> "What I will say is the place-based projects are very resource intensive and current strategy, as you know, is capital funding. So, it's very difficult. We have to fight to keep those projects running because we see the value in them."

Our interviewees also foresee challenges in integrating e-bikes into daily travel patterns if concerns about battery safety restrict where they can be taken. For example, if e-bikes are not allowed on trains or buses, or if there are no options to store or charge them at workplaces, it could limit their popularity and reduce their use to primarily recreational or exercise purposes.

Despite these challenges, experts remain optimistic that e-bikes can play a transformative role in Scotland's transport future. However, sustained financial support, infrastructure investment, and regulatory improvements will be essential to ensure continued growth.

> "Obviously, if you can replace a lot of car mileage with bikes, which potentially you could, it could have a great impact. Personally, I think it's something that if you have more bikes around, they become more visual, people get used to them, and they consider doing it themselves, and it's like a positive feedback loop."

Appendix 1: Methodology

Research questions

- What is the potential for growth in the E-Bike market in Scotland, and why is it lagging other European countries?
- Where can e-bikes make the biggest difference to emissions in Scotland?
- What barriers are there to E-bike take up in Scotland?

Literature search and review approach

Relevant literature was searched for using Google, Google Scholar and Jstor. Search strings included ‘e-bikes-scotland’, ‘e-bike-usage-scotland’, ‘e-bike-sales-scotland’, ‘e-bike-benefits’, ‘e-bike-usage’.

The inclusion criteria focussed on identifying literature specifically on the topic of e-bike use in Scotland. Due to the low amount of literature on this specific topic the search was also broadened to look at e-bike usage in other European countries.

Using the search strings and inclusion criteria, relevant literature was identified based on titles and abstracts and was entered into a table with key information (date, author(s), summary, topic, source). A snowball approach was also used to identify additional relevant sources that were found in the initial literature.

Results

Based on the inclusion criteria, our initial search yielded 58 references, 46 of which were deemed relevant enough to include. Using snowballing, an additional 14 references were identified and included in the study, bringing the total to 58 references. Of these 28 were peer reviewed journal articles and 30 were grey literature.

Interviews

To address the range of research questions, interviews were sought to be conducted with a mix of e-bike retailers, cycling advocacy groups with e-bike specific projects/campaigns, and e-bike support or grant providers. A list of 10 potential organisations and/or interviewees were identified through online searches, recommendations from internal contacts, and snowball sampling. All candidates were based in Scotland and had extensive experience working with e-bikes in Scotland to ensure any findings would be specific to the Scottish context. Due to limitations in time availability among the candidates and duration to conduct the research, interviews were only conducted with 4 participants, with 3 working in an e-bike advocacy or support capacity and 1 e-bike retailer. Any further research would benefit by interviewing a wider group of industry professionals.

Interviewees participated in a 1-hour long qualitative semi-structured interview held online. Interview questions were based on the broader objectives of the research, with the focus of each interview adjusted to ensure interviewees were able to provide information on aspects most aligned with their expert capacity. The semi-structured nature of the interview also allowed probing questions to investigate their general experience of working with e-bikes in Scotland over time.

Interviewees were provided with a description of the research and broader interview aims at least 48 hours prior to the interview, alongside a privacy statement which ensured their anonymity and our commitment to protection of their data. Interviews were recorded after gaining consent from

participants. Recordings with then transcribed by an external transcription company.

A thematic analysis of the transcripts was undertaken. This involved manually coding the transcripts in Microsoft Excel and then conducting a frequency analysis to identify the most mentioned themes. The themes attracting the most comments were then used for the presentation of findings within this report.

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