# E-Move

## Annual Report 2022-23

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# Contents

# Executive summary

## The E-Move project is an electric cycle loan scheme for residents of Aberystwyth, Rhyl, Barry, Swansea and Newtown; and an electric cargo cycle loan scheme for organisations based in Aberystwyth, Rhyl, Barry, Newtown and Swansea. The E-Move project has run for two years, starting in April 2021.

This report considers data captured during the second year of the project's activities, from April 2022 to March 2023. The monitoring and evaluation data includes surveys, GPS data and one-to-one interviews with E-Move participants to measure progress against Welsh Government evidence requirements.

## E-cycles for communities

- E-cycles were loaned to **337** people across **5** locations in Wales throughout the 2022-23 financial year. Of the **306** who gave information regarding their gender, **152** were women and **151** were men.
- **66%** of loans were in urban areas, and **27%** were rural areas (**7%** of loans were unassigned).

Active travel trips increased by **49%**.

Car trips dropped by **45%**.

Participants made an average of **10.9** e-cycle trips a week, with average trip length of **4.2 km**.

Altogether, participants are estimated to have saved roughly **816.4 kg of $CO_2$** by using e-cycles instead of driving.

**48%** of participants said that **e-cycles enabled journeys that they otherwise would not have been able to make**.

**76%** of participants reported positive impact on their **health**, and **79%** of users reported positive impact on their **wellbeing**.

- E-cycles **facilitated travel** for participants whose mobility was limited by **poor public transport**, **lack of access to cars**, and **age and/or health conditions**.

- Benefits to health and wellbeing included **improved fitness**, **reduced isolation**, and **increased independence**.

**73%** of participants intended to **cycle more regularly** after the loan

**46%** of participants said they were likely to **buy an e-cycle** after the loan period or bought one during the loan period.

The biggest **barrier to continued e-cycle use** after the end of the loan was the **cost of e-cycles**. Other barriers included:

- Secure storage
- Lack of reliable cycle maintenance
- Lack of dedicated active travel infrastructure

Gender disaggregated data suggested:

- Women were twice as likely to be in part time work as men **31%** to **15%**.
- Women were less likely to be regular cyclists than men before the loan **18%** to **28%**.

**Men made more trips than women** using the e-cycle, but **women replaced 45% of car trips with e-cycle**, compared to **20%** for men.

Women were more likely to be making trips with the purpose of escorting family or friends **12%** than men **8%**. Twice as many women mentioned using the e-cycle with children than men.

## E-cargo cycles for organisations

E-cargo cycles were loaned to **31 organisations** across Wales – of these there were **15 micro-organisations, 1 small and 2 medium organisations** (others did not return relevant data).

Before the loans, the organisations were making **171** weekly **car or van trips** this fell to **65** during the loan[1]

Before the loans, organisations made **12** weekly trips by **e-cargo cycle** this rose to **102** during the loan

The average e-cargo cycle trip length was **4.3 km**.

Altogether, the organisations are estimated to have saved **425 kg of $CO_2$** by using e-cargo cycles in the place of cars or vans.

The **biggest incentives for organisations to adopt e-cargo cycles** were:

- Financial support (grants, funding, bursaries)
- Improved cycle infrastructure
- Improved cycle parking

The four most influential factors in affecting the ability of organisations to adopt e-cargo cycles after the loan were: **public perception**, **employee fitness**, **weight and size of goods to be transported** and **active travel infrastructure.**

Organisations reported that some of the **benefits of using an e-cargo cycle** were:

- Reduced travel costs
- Quicker journey times (over short distances) and improved access
- Improved staff wellbeing
- Improved inclusivity as staff no longer needed a driving license

**80%** of organisations said they were likely to **buy an e-cargo cycle** after the loan period or bought one during the loan period.

[1] This is derived from a small sample of organisations that completed both the pre- and post-loan survey

# 1. Introduction

The E-Move project consists of an electric cycle loan scheme for residents of Aberystwyth, Rhyl, Barry, Swansea and Newtown; and an electric cargo cycle loan scheme for organisations based across the same five towns and cities.

## 1.1 About the project

The Welsh Government-funded E-Move pilot project has been running since April 2021. The project operates across five Welsh towns and cities - Aberystwyth, Rhyl, Barry, Swansea and Newtown. For the majority of the 2022-23 project year, each site location had its own dedicated project officer managing e-cycle and e-cargo cycle loans. After a staffing change, one officer managed the Newtown and Aberystwyth sites simultaneously. Our objectives for the E-Move project were as follows:

| 1. **E-cycles for communities** | |
|---|---|
| **Objective:** To establish and manage low-cost, community-based e-cycle hire and loan pilot schemes in at least four areas with high levels of deprivation in Wales, to promote and gather evidence from participants on e-cycle usage. | |
| **Locations:** | O Barry O Swansea O Newtown O Rhyl O Aberystwyth |
| **Bike provision:** | O 80 e-cycles across the 5 sites |

| 2. **E-cargo cycles for businesses** | |
|---|---|
| **Objective:** To establish and manage e-cargo cycle 'library' pilot schemes in at least two urban locations for two years in Wales, inviting local businesses and individuals to engage in trialling different e-cargo cycle models to promote and gather evidence on e-cargo cycle usage. | |
| **Locations:** | O Barry O Swansea O Newtown O Rhyl O Aberystwyth |
| **Bike provision:** | O 16 e-cycles across the 5 sites |

## 1.2 About the second annual report

This report captures evidence on the project's activities in the second year of the pilot, from April 2022 to March 2023. We will measure this evidence against key reporting criteria from Welsh Government (see **Appendix 2**), measuring the impact of e-cycle and e-cargo cycle hire and loan schemes delivered as part of E-Move.

## 1.3 E-Move Project Inputs and Outputs 2022-23

The E-Move project required a series of necessary inputs in order to fulfil its function as an e-cycle and e-cargo cycle loan scheme effectively. The E-Move project also sought to deliver outputs that went beyond providing e-cycle loans to participants, in order to maximise its potential for delivering high impact positive change in the project's focus areas.

The most important inputs that allowed us to deliver this project were the time, experience and expertise of the E-Move project officers; and the project's inventory of e-cycle and e-cargo cycles. The outputs meanwhile included workshops, presentations, and demonstrations to widen participation and build confidence and skill within our focus communities. These are broadly classed as 'activities' in the following section.

### E-cycles for communities

These loans were delivered across five sites in Wales: Barry and Swansea in South Wales, Newtown and Aberystwyth in Mid Wales, and Rhyl in North Wales. These cycles were split among the five sites (see **Table 1**).

- There were 353 e-cycle loans, made to 337 individuals
- There were 80 e-cycles that were held in the delivery team's inventory (see Error! Reference source not found.)
- There were 12 different e-cycle models loaned out to beneficiaries, with the addition of the MiRider folding bikes in 2023.

### Comments on e-cycle inventory between E-Move project years

Two out of five EMU EVO cycles obtained in the 2021-22 project year were subsequently returned to suppliers due to faults. This compares to three returns from among the Tern HSD Models (of which there were 45 in total), and no major defects from any of the eight Benno E-joys, nine Bergamont E-villes, ten Tern GSDs, or any of the e-cargo cycles. Due to the relatively small numbers of cycles this could be down to coincidence, but the initial learning from across the past two years is that models created by Tern, Bergamont and Benno appear to be quite reliable.

Faults require loans to be ended early or interrupted, and maintenance issues have resource implications (both financial and staff-based). Reliability is therefore an important attribute when selecting cycle models for schemes such as E-Move.

**Table 1: E-cycles in the project inventory, by model and site location**

| E-cycle model | Aberystwyth | Barry | Newtown | Rhyl | Swansea | Total |
|---|---|---|---|---|---|---|
| Benno E-joy | 1 | 2 | 1 | 2 | 2 | 8 |
| Bergamont E-ville Edition 50 | 1 | 1 | 1 | 0 | 0 | 3 |
| Bergamont E-ville Edition 54 | 0 | 1 | 1 | 1 | 2 | 5 |
| Bergamont E-ville Expert Rigid 46 | 0 | 0 | 0 | 1 | 0 | 1 |
| EMU Classic | 0 | 0 | 1 | 0 | 0 | 1 |
| EMU EVO Crossbar | 0 | 1 | 1 | 0 | 0 | 2 |
| EMU EVO Step through | 0 | 0 | 1 | 0 | 0 | 1 |
| M6L Brompton | 1 | 1 | 1 | 1 | 0 | 5 |
| MiRider | 0 | 0 | 2 | 0 | 0 | 2 |
| Tern GSD 10 | 1 | 4 | 1 | 2 | 2 | 10 |
| Tern HSD P9 | 2 | 0 | 2 | 6 | 6 | 16 |
| Tern HSD S8i | 1 | 10 | 3 | 7 | 5 | 26 |
| **Total** | 7 | 20 | 15 | 20 | 17 | 80 |

Additional notes: one Tern HSD S8, based in Aberystwyth, was sold to Bikeability Swansea during the 2022-23 project year. The proceeds were used to procure two new MiRider folding bicycles. Two new Bromptons have been procured since April 2022; one is being used in Newtown, while another is on loan to a Sustrans colleague working on the Active Journeys programme. An EMU EVO Step through and an EMU EVO Crossbar were each returned from Abergavenny to the supplier due to faults. The replacement Crossbar model was issued to Barry. Two e-cycles were stolen during the 2022-23 project year, both in Rhyl. An additional three Tern HSDs were returned to suppliers and replaced.

### E-cargo cycles for businesses

These loans were delivered across five sites in Wales: Swansea, Barry, Rhyl, Newtown and Aberystwyth. During the 2022-23 year:

- There were 36 e-cargo cycle loans made to 31 organisations and businesses.
- There are 16 e-cargo cycles currently held in the delivery team's inventory, all retained from the previous project year.
- Four different e-cargo cycle models were held in the repository and loaned out to beneficiaries.

The breakdown of e-cargo cycle models are recorded in **Table 2.**

**Table 2 E-cargo cycles in the project inventory, by model and site location**

| E-cargo cycle model | All sites |
|---|---|
| 2021 Bergamont E-Cargoville | 4 |
| Cube Cargo Hybrid | 4 |
| XYZ cargo cycle | 4 |
| Urban Arrow Shorty | 4 |
| **Total** | **16** |

### Project activities

Project officers conducted 22 activities during the 2022-23 project year. Events were held across all five project sites. These included promotional demonstrations at various schools and events for children, outreach events targeting local communities (including a men's group and various small festivals), and two visits by local politicians. See **Table 3** (below) for details of all the events officers conducted during the project year.

**Table 3 Activities conducted by project officers in 2022-23 project year**

| Site | Activities held |
|---|---|
| **Aberystwyth** | **May 2022 -** A community hub event led to seven families signing up.<br><br>**June 2022 -** Aber Cycle Fest: an officer gave a visual presentation and offered cycle try-outs.<br><br>**June 2022** - 'Have a go' networking event held in conjunction with Plascrug primary school.<br><br>**July 2022** – 'Have a go' session at Penparcau hub near Aberystwyth. |
| **Barry** | **June 2022** – Bike demo for Welsh Government employees, where staff could try out e-cycles.<br><br>**July 2022** – Information stand held at Barry Friendship Tree Festival, where officers engaged with members of the community and shared details of the project.<br><br>**August 2022 -** Bling your Bike at Awesome Wales. Children made tassels for their bikes, while Sustrans staff spoke about opportunities in Barry (including both E-Move and schools projects).<br><br>**October 2022 -** Coffee morning at Pencoedtre High School: an officer held an information stand and discussed the project with parents.<br><br>**October 2022** - Barry Men's Forum: an officer co-presented with a colleague about E-Move and wider Sustrans projects.<br><br>**December 2022** – Bike demo at Jenner Park Primary, offering try-outs and activities for both children and parents.<br><br>**March 2023 -** International Women's Day event: an information stall was held at the event, organised by the charity Women Connect First, which seeks to empower Black and minority ethnic women. |
| **Newtown** | **September 2022** – A Sustrans stall promoted the project at the Newtown Food Festival, which signed eight individuals up to the waiting list for loans.<br><br>**September 2022 -** Sustrans Stall at the Newtown Community Fun Festival signed up five individuals to the waiting list. |
| **Rhyl** | **May 2022** – Presentation and Q&A given at the online event The Something Club, a 'Virtual E-Bike Café'.<br><br>**May 2022** – Northeast Wales Cycle Path Volunteers Conference: a Sustrans colleague delivered a presentation on E-Move, prepared by the local E-Move officer.<br><br>**May 2022 -** E-bike demo event at Marsh Tracks: try-outs were held at a safe, traffic-free venue, ideal for building confidence in individuals that were new to (or returning to) cycling. Fourteen people attended and tried |

| | |
|---|---|
| | the e-cycles. Six attendees went on to complete application forms and were added to the Rhyl waiting list.<br><br>**May 2022** – Promotional event at the Urdd Eisteddfod festival in Denbigh, which was celebrating digital arts this year. E-Move and Active Journeys were represented at the festival, with a weeklong presence through Monday to Friday. E-cycles and E-Cargo cycles were available to try. Sustrans collaborated with Denbighshire County Council (DCC), who provided balance bikes and a pump track for children.<br><br>**July 2022** – Visit to the E-Move project in Rhyl by the Member of Parliament for Vale of Clwyd. The MP was received by the E-Move Coordinator [redacted] Sustrans' Policy and External Affairs Manager.<br><br>**January 2023** - Visits from Councillor [redacted] DCC lead for Environment and Transport, and a group of young people with additional learning needs from Ysgol Tir Morfa. The children had been learning about cycle mechanics and rebuilding a bike at school. They were able to learn more about e-cycles and demo some of the bikes.<br><br>**March 2023 -** E-cycle demo event at Ysgol Esgob Morgan, St Asaph, during the Big Walk & Wheel (Stroliwch a Roliwch). The officer engaged with pupils from years three to six and provided an opportunity for their parents to learn about E-Move and to demo an e-cycle at the end of the school day. |
| **Swansea** | **October 2022** – E-cycle demo at Blaen-Y-Maes Primary school, where parents and staff trialled e-bikes.<br><br>Another demo at the Phoenix Centre in Townhill was cancelled due to bad weather conditions. |

# 2. Reach and sample size

## 2.1 Combined e-cycle and e-cargo cycle loan statistics

The statistics presented in this section give an overview of combined data for e-cycle and e-cargo cycle loans. For disaggregated statistics, please visit the sections presenting loan information for e-cycles (**section 3.1**) and e-cargo cycles (**section 3.2**).

### Cycle loan numbers

Loans were made to 369 unique individuals or organisations/businesses. Some loan beneficiaries swapped their cycle models once or more during the duration their loans, resulting in a higher count of 404 cycle loans. As shown in **Table 4**, e-cycle and e-cargo cycle loans combined had a cumulative duration of more than 18,000 loan days (the equivalent of over fifty years) in 2022-23. Combined, e-cycle and e-cargo cycle loans had an average loan length of just over seven weeks per rider.

Loan beneficiaries identifying as men had 1.11 bike loans on average, compared to 1.08 per beneficiary identifying as a woman. This suggests either:

1. That men were slightly more likely to extend their loan upon completion of the initial loan period.

2. That men were slightly more likely to express a desire to use a different cycle.

Loans spanning two project years were cut off for reporting purposes from 31/03/2023. This means that figures presented in this report accurately capture the number of loans made within the 2022-23 project year. However, average loan durations are understated here (due to the exclusion of loan days falling within either the 2021-22 or 2023-24 years).

**Table 4: Loan numbers and lengths for e-cycles and e-cargo cycles combined**

| | Loans | Total number of loan days | Average days per loan (mean) | Average days per loan (median) |
|---|---|---|---|---|
| Loans to unique beneficiaries | 369<br>338 community loans<br>31 organisational loans | 18659 | 51 | 38 |
| Bike loans[2] | 404<br>368 community loans<br>36 organisational loans | 18659 | 46 | 36 |

**Table 5** presents an overview of the number of urban and rural loans (also visualised in **Figure 1**), and loan durations by their urban and rural classification. There were two-and-a-half times more loan beneficiaries in urban areas than rural areas in 2022-23; with urban loans also lasted almost eight days (16%) longer than rural loans on average. This gap has narrowed by about ten percentage points compared to last year[3].

**Table 5: Loan numbers and lengths for e-cycles and e-cargo cycles combined, by urban and rural classification**

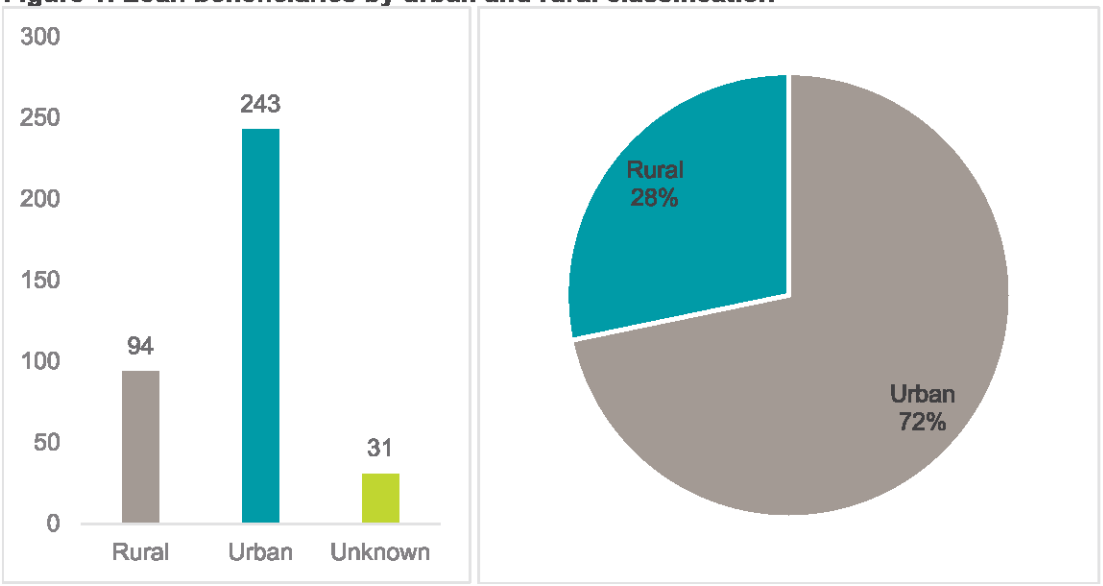
| Urban and rural classification | Number of loans | Total number of loan days | Average loan length (days) |
|---|---|---|---|
| Rural | 95 | 4113 | 43 |
| Urban | 243 | 12386 | 51 |
| Unknown status | 31 | 2160 | 70 |
| Total | 369 | 18659 | 51 |

[2] Including multiple loans to individual beneficiaries.
[3] See the caveat overleaf about a classification change.

During the 2021-22 project year, only 18% of loan beneficiaries were classified as living in rural areas. In the 2022-23 year this figure increased to 28%[4]. This may reflect increased uptake among rural areas, but it largely reflects a refinement of the classification system.

- In the first project year, beneficiaries' urban/rural status was classified according to their own, subjective assessment of where they live (officers asked individuals how they would describe their local area).
- During the most recent year, beneficiaries were classified according to their postcode, using Welsh Government's standardised system of Rural/Urban classification by LSOA.
- No classification could be established for 31 individuals (eight percent of beneficiaries), due to a lack of postcode data, issues with the data or a lack of corresponding rural/urban information.

**Figure 1: Loan beneficiaries by urban and rural classification**




[4] Of those loans for which we have classification data

## 2.2 E-cycles for communities

The E-Move project loaned e-cycles to 337 people during the 2022-23 project year. These were distributed across all five project locations in both urban and rural settings, as shown in **Table 6.**

**Table 6: Distribution of community e-cycle loans across locations**

| Location | Total number of loans | Number of loans in rural areas / (% of total) | Number of loans in urban areas / (% of total) |
|---|---|---|---|
| **Aberystwyth** | 60 | 13 *(22%)* | 42 *(70%)* |
| **Barry** | 74 | 22 (*30%)* | 48 (*65%)* |
| **Newtown** | 46 | 20 (*43%)* | 20 (*43%)* |
| **Rhyl** | 107 | 17 (*16%)* | 83 (*78%)* |
| **Swansea** | 51 | 19 (*37%)* | 29 (*57%)* |
| **Total** | **337** | **91 (*27%)*** | **222 (*66%)*** |

Note: The percentages above do not add up to 100%, as 25 loans (7%) could not be classified as either urban or rural, due to data not being returned by loan beneficiaries or the GPS monitors.

Overall, 222 participants (66%) resided in urban areas, while 90 (27%) were based in rural locations. Information is missing for a further 25 individuals (7%).**Table 7** and **Figure 2** present loan numbers by their geographical location and gender breakdown. We do not have gender characteristics for all loan beneficiaries as this question was non-mandatory in the survey. There is missing data for around one in every twelve participants who chose not to answer the gender monitoring questions. Of those who did answer this question, there were 152 female beneficiaries, 151 male beneficiaries, and one non-binary beneficiary during 2022-23. The non-binary response has been included in the table below as 'Prefer not to say' to prevent any individuals from being identifiable.

Two beneficiaries specifically indicated they preferred not to say, while data is missing for another 31 individuals and was not collected for the 36 business/organisational loans who left the response box blank. In the future this question could be made mandatory whilst retaining the option 'prefer not to say' to increase response rates and get a better understanding as to whether people did not want to answer the question or simply missed the question.

**Table 7: Loan beneficiaries by location and gender (n=337)**

| Gender | Aberystwyth | Barry | Newtown | Rhyl | Swansea |
|---|---|---|---|---|---|
| Women | 26 | 28 | 30 | 45 | 23 |
| Men | 25 | 39 | 13 | 48 | 26 |
| Prefer not to say | 3 | 0 | 0 | 0 | 0 |
| Did not answer the question | 5 | 7 | 3 | 13 | 2 |
| Total | 60 | 74 | 46 | 106 | 51 |

As shown in **Figure 2**, the split of women and men loan beneficiaries was relatively even overall. In Barry there were more male loan beneficiaries, whereas in Newtown there were more female beneficiaries. At the other three sites, the gender distribution was quite even.

**Figure 2: Beneficiaries by location and gender (n=337)**

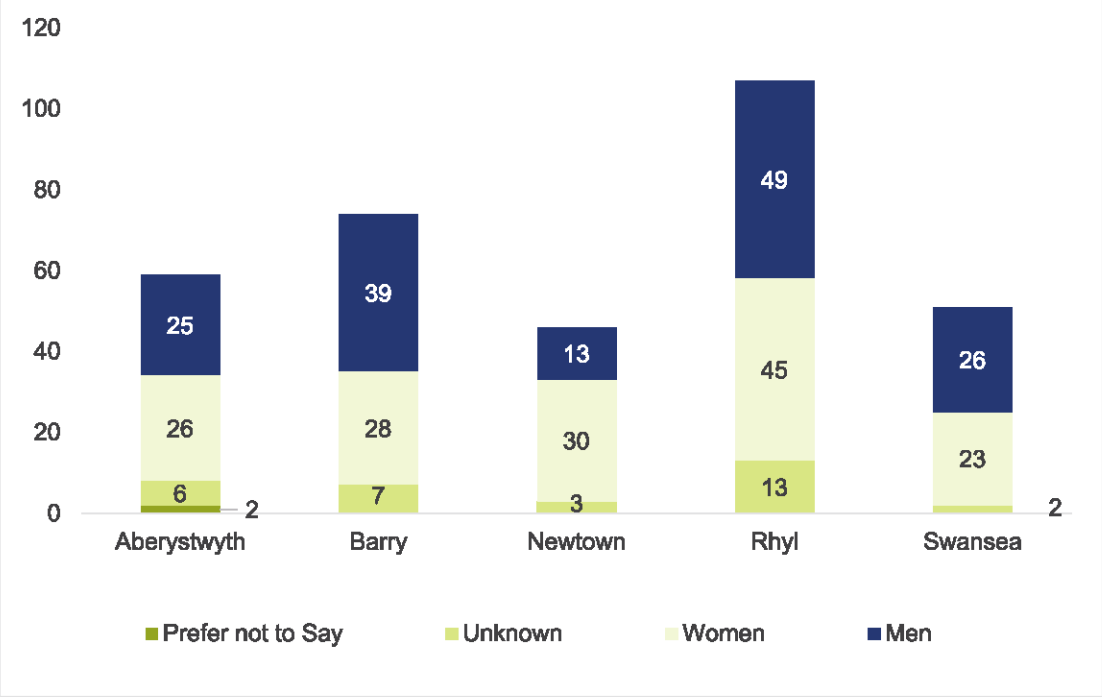


**Table 7** breaks down the numbers of women and men in each of the five sites. One non-binary response has been excluded from the table to prevent any individuals from being identifiable.

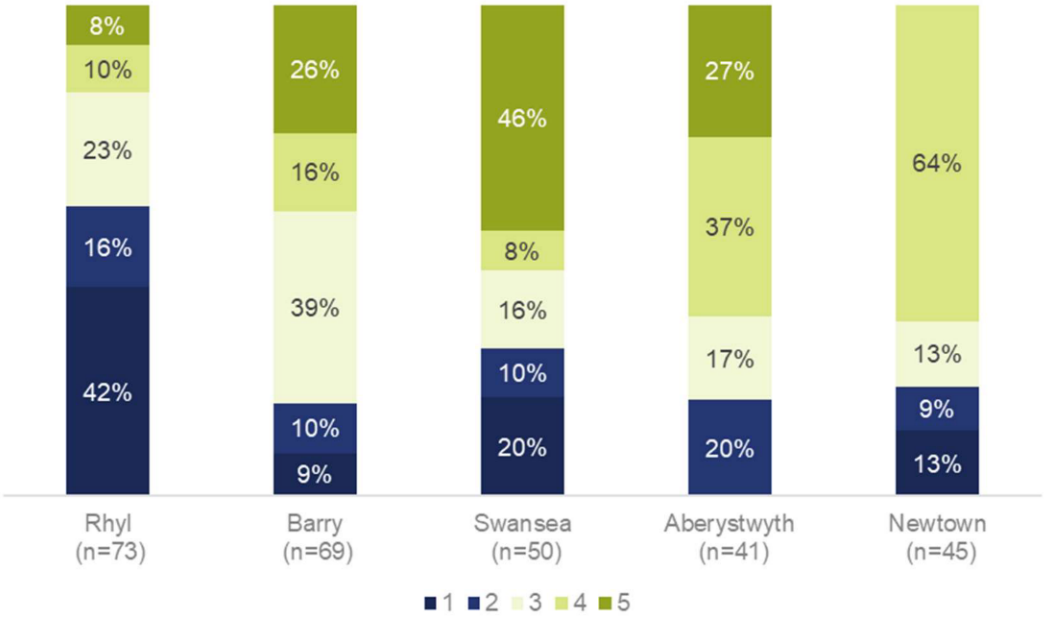
**Table 8** presents the average WIMD decile and individual LSOA (Lower Super Output Area) rank for each region. These were calculated using participants' home postcodes. In 2022-23, the average WIMD decile was six overall, and the average LSOA rank was 978 out of 1,917 (with the highest deciles and LSOA ranks representing the least deprived areas).

**Table 8: Loan beneficiaries' average WIMD decile and LSOA rank by region (n=313)**

| | Aberystwyth | Barry | Newtown | Rhyl | Swansea | Average |
|---|---|---|---|---|---|---|
| **WIMD decile** | 6 | 6 | 6 | 4 | 7 | **6** |
| **LSOA rank** | 1079 | 1093 | 1117 | 677 | 1217 | **980** |

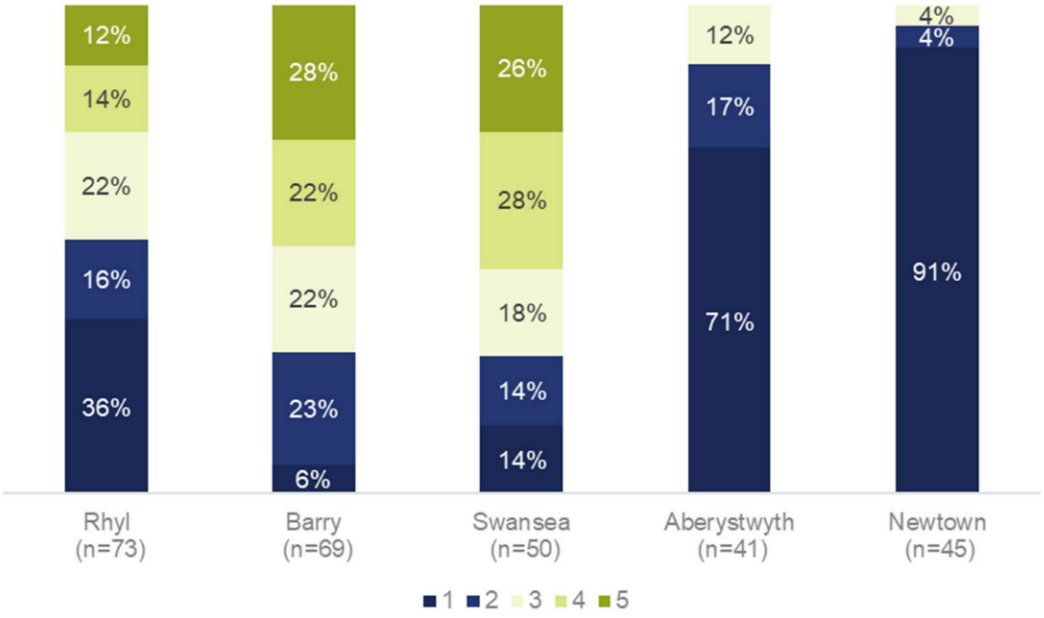
Rhyl is the most deprived of the five E-Move locations, and this is reflected in the WIMD scores linked to beneficiaries' postcode data. At the other end of the spectrum, Swansea beneficiaries lived in the least deprived communities overall.

**Figure 3: Survey respondents' overall WIMD quintile** (based on 278 survey respondents)




The WIMD data also gives us insight into access to services, as it considers a household's ability to access a range of services considered necessary such as food shops, GP, schools, and sports facilities in it's ranking. When we look at this across our E-Move regions we see that participants from Aberystwyth and Newtown have some of the worst access to services of all our participants (**Figure 4**). This is likely due to participants living in rural areas and shows effective targeting of participants who may need better transport links.

**Figure 4: WIMD access to services quintiles** (based on 278 survey respondents)



## 2.3 E-cargo cycles for businesses

There were 31 businesses and organisations across our targeted cities and towns that participated in the e-cargo cycle loan scheme. By the end of March 2023, there were 15 live e-cargo cycle loans ongoing alongside several other completed loans that had not yet submitted a post-loan survey response; their feedback therefore could not be included in the relevant survey analysis sections of this report relating to E-cargo cycles for businesses.

Most e-cargo loans were made to businesses and organisations – 68% (21 loans) - were associated with urban postcodes. Four loans (13%) were rural, while data was lacking for another six.

**Table 9: E-cargo cycle loan numbers by location**

| Location | Total number of loans | Number of loans in rural areas / (% of total) | Number of loans in urban areas / (% of total) |
|---|---|---|---|
| **Aberystwyth** | 12 | 1 (*8%*) | 7 (*58%*) |
| **Barry** | 4 | 0 (-%) | 3 (*75%*) |
| **Newtown** | 1 | *1 (100%)* | 0 (0%) |
| **Swansea** | 14 | 2 (*14%*) | 11 (*79%*) |
| **Total** | **31** | **4 (*13%*)** | **21 (*68%*)** |

Note: Percentages above do not add up to 100%, as 19% of e-cargo loans could not be classified as either urban or rural due to data not being returned by loan beneficiary.

# 3. Evidence

This section addresses the evidence requirements in the Welsh Government reporting criteria set out in Appendix 2. The following analysis considers See.Sense GPS tracker data, survey responses and participant interviews. More information regarding data collection methods and analysis can be found in Appendix 1.

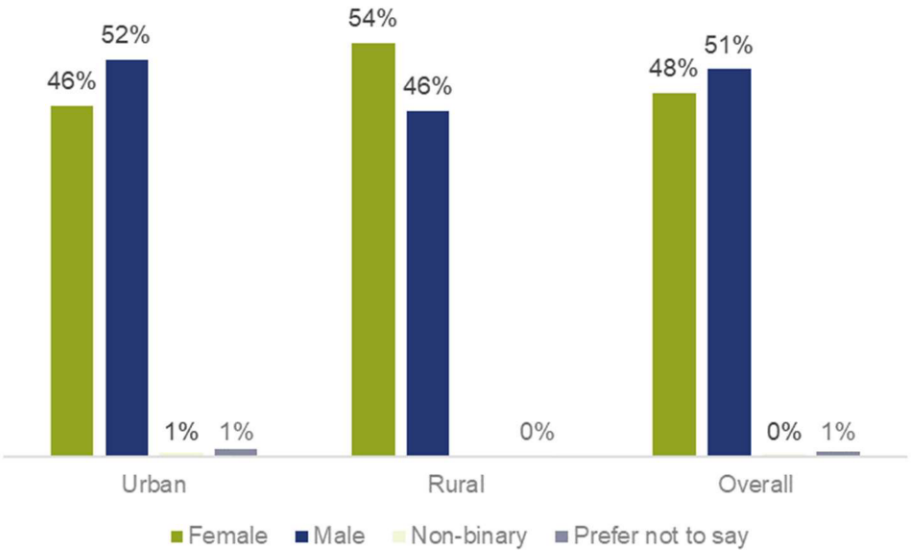
## 3.1 E-cycles for communities

### 3.1.1 Demographic profile of participants

#### Gender

Not every one of the 337 loan beneficiaries completed a pre-loan survey which contained the demographic questions. Additionally if a beneficiary did complete a pre-loan survey, they did not necessarily answer every question. Where a graph or figure indicates a value for "n" that is less than 337 it is because we only have data for that number of beneficiaries. We have gender information for 304 individuals however because 9 people gave that information informally but without returning the pre-loan survey. The following section considers the number of beneficiaries who completed the pre-loan survey and does not include information that was volunteered to project officers on an informal basis. This is why totals presented here might differ from those presented in Section 2. The loans were shared equally across genders; 51% of participants were male, 48% were female, 1% were non-binary and 1% selected 'prefer not to say'. **Figure 5** shows the gender of participants in urban and rural areas. Across urban and rural areas the spread was very similar; in rural areas, 54% of participants identified as female, and 46% as male. In urban areas, 46% of participants were female, and 52% were male, 1% were non-binary and 1% chose not to say.

**Figure 5: Gender among urban and rural participants** (based on 294 responses to the pre-loan survey, including 79 rural loans and 199 urban loans)

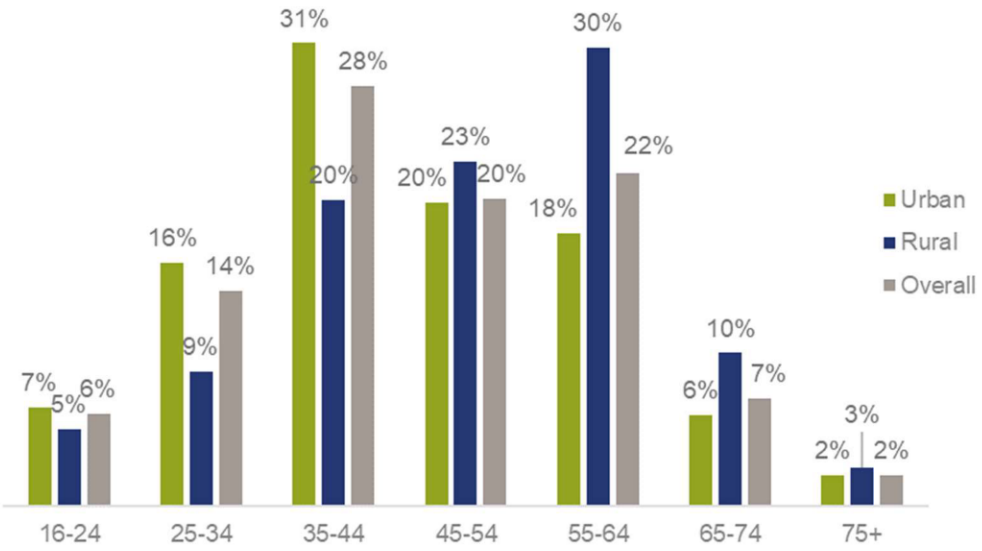



### Age demographics for e-bike recipients

People aged 35-44 made up the largest cohort among respondents to the pre-loan survey, followed by those aged 55-64. The age structure of the pre-loan survey population loosely resembles a bell-shaped curve, peaking between the 30s and 50s, as shown in **Figure 6.**

**Figure 6** indicates how rural areas (n=79) tended to skew slightly older, whereas urban areas (n=199) skewed slightly younger. In rural locations, 55-64-year-olds accounted for just under a third of the sample, but those 65 and older made up just than 13% of the rural sample. Urban areas had relatively higher numbers of 25-44-year-olds among survey respondents. It would be worthwhile comparing these figures against latest census data for Wales to understand if they are representative of the wider population. However, 2021 census data for age has not yet been disaggregated by urban and rural regions for Wales.

**Figure 6: Age profile of respondents to the pre-loan survey by urban and rural classification** (based on 294 respondents to the pre-loan survey, including 79 rural loans and 199 urban loans)



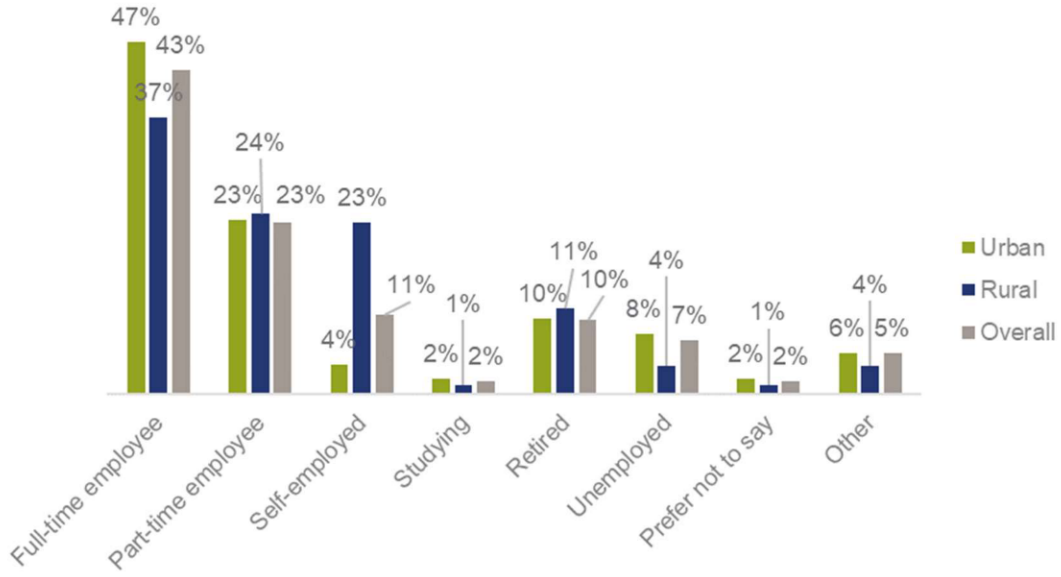

## Employment status

Almost half (43%) of survey respondents were full-time employees, and three quarters (76%) of respondents were in some form of employment[5]. Around a fifth (19%) of respondents were either retired or unemployed, or studying while not working. Among the 5% of respondents that selected 'other', the majority were not in work, but of those several were either carers, starting work soon, or seeking asylum and therefore not allowed to work (see **Figure 7**).

Almost half (47%) of urban respondents (n=199) were in full time employment, whereas a higher rate of rural respondents (n=79) were self-employed, 23% compared to 4% of urban respondents.

5 Of all those who answered 23% of respondents were part-time employees and 11% were self-employed.

**Figure 7: Employment among participants by urban and rural classification** (based on 295 responses to the pre-loan survey, including 83 rural loans and 202 urban loans)



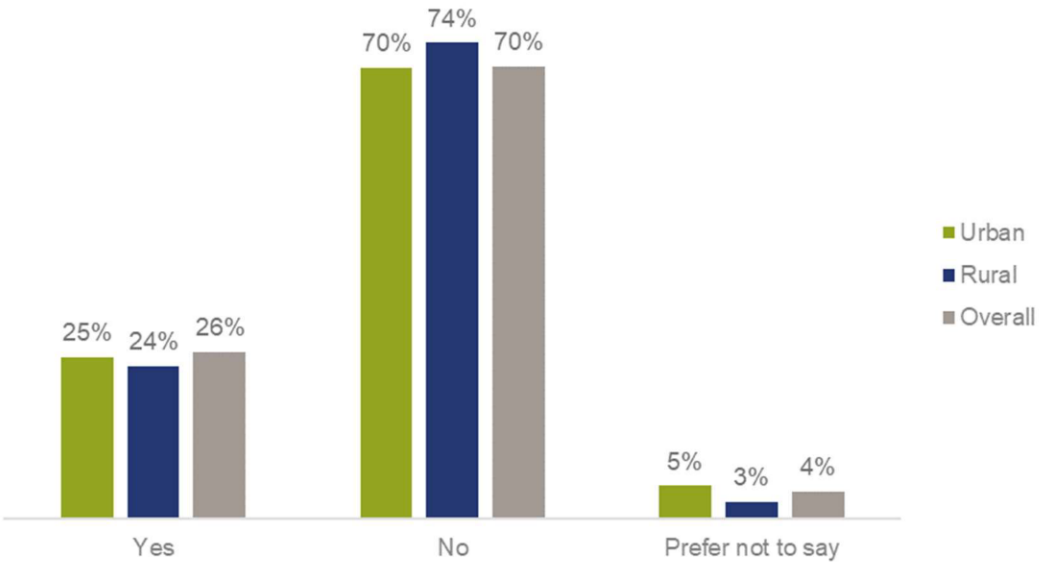

## Disability and health conditions

Significant numbers of loan participants identified as having a long-term physical or mental health conditions or illness (lasting or expected to last 12 months or more). As **Figure 8** indicates, over one quarter of the 287 pre-loan survey participants who answered this question considered themselves to have a disability or chronic health condition.

The proportion of survey respondents who identified as having a disability or long-term health condition was roughly the same in urban and rural settings (see **Figure 8**), in line with estimates that around one in five people live with a disability in England and Wales[6].

[6] Disability, England and Wales: Census 2021

**Figure 8: Share of respondents to the pre-loan survey with disabilities or a long-term health condition, by urban and rural classification** (based on 287 responses to the pre-loan survey, including 76 rural loans and 195 urban loans)

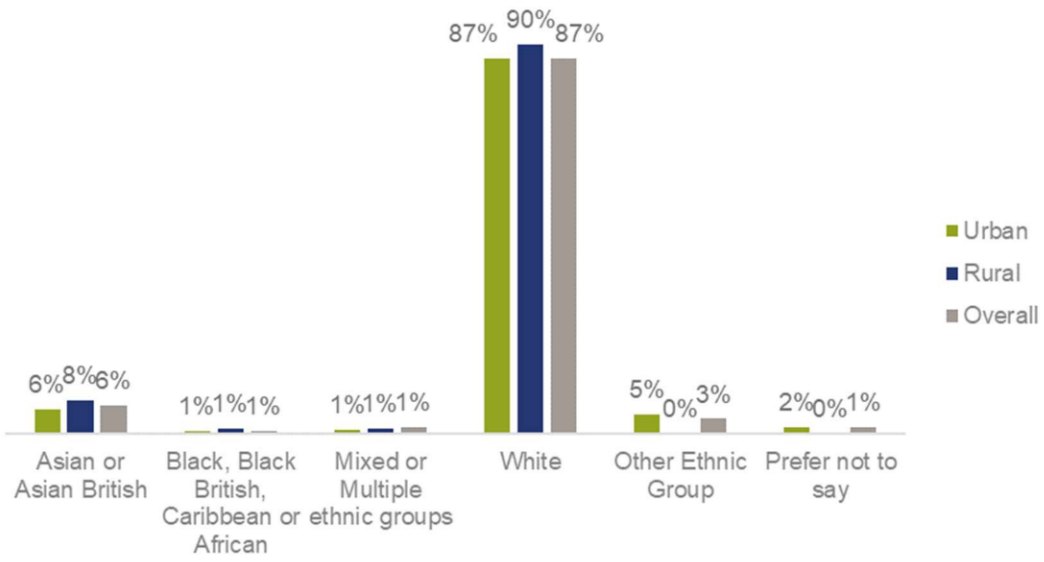



## Ethnicity

White survey respondents made up close to 87% of the total, with the remainder split between Asian, Black, mixed or other ethnic groups, and 1% preferring not to state their ethnicity.

Urban loan beneficiaries were predominantly white; Asian, Black and mixed/multiple ethnicity respondents made up 12% of all responses. Similarly in rural areas 90% of respondents were white, with Asian, Black and mixed/multiple ethnicity respondents making up the remaining 10%. This correlates with Welsh census data; wherein 93.8% of people who live in Wales are white, with 6.3% belonging to another ethnic group. This information is displayed in **Figure 9.**

**Figure 9: Ethnicity of participants** (based on 293 responses to the pre-loan survey, including 79 rural loans and 198 urban loans)




## 3.1.2 Loan length and trip statistics

On average, each participant borrowed an e-cycle for roughly six weeks and made around 21 e-cycle trips during their loan, with an average trip length of 4.1 km[7]. Considering just the See.Sense data, this would mean an average of between three and four trips per week, meaning that on average each loan beneficiary used their e-cycle every other day. However this is discordant with the survey results presented in  in section 3.1.3, which suggests that the average number for loan beneficiaries was 10.9 e-cycle trips per week.

This discrepancy could be due to a number of reasons. It may reflect a tendency towards overreporting frequency of usage. Overreporting is well documented in many spheres, particularly where respondents feel that higher or lower responses are seen more favourably. Beneficiaries may perceive the need to try to demonstrate that they were using cycles. This highlights the unreliability of some survey data. It could also be due to complications with GPS tracker data, as we are aware that not all trips were recorded and uploaded by the trackers.

Loan lengths were similar in urban and rural areas, respectively averaging 46 and 49 days. Each rider travelled an average of just under 85 km over the course of their loan and spent around eight hours using their e-cycle. This data is displayed below in **Table 10.**

[7] This is the mean trip length, significantly longer than the median of 2.4km.

**Table 10: E-cycle loan data and trip statistics**

| | Mean | Median | Minimum | Maximum |
|---|---|---|---|---|
| **Loan length (days)** | 44 | 37 | 1 | 339 |
| **Number of trips per loan** | 21 | 11 | 198 | 1 |
| **Distance per trip (km)** | 4.1 | 2.4 | 0.5 | 40.5 |
| **Distance per rider (km)** | 84.6 | 39.7 | 0.8 | 658.5 |
| **Trip duration (minutes)** | 23 | 17 | 2 | 239 |
| **Time spent travelling per rider (hours)** | 8.0 | 4.3 | 55.4 | 0.1 |

The most common purposes for e-cycle trips were 'Exercise/Relaxation' (25%) and 'Commuting' (24%).**Table 11** details all the trip purposes reported by e-cycle loan recipients.

**Table 11: Purposes of e-cycle trips, taken from post-loan survey data (n=255)**

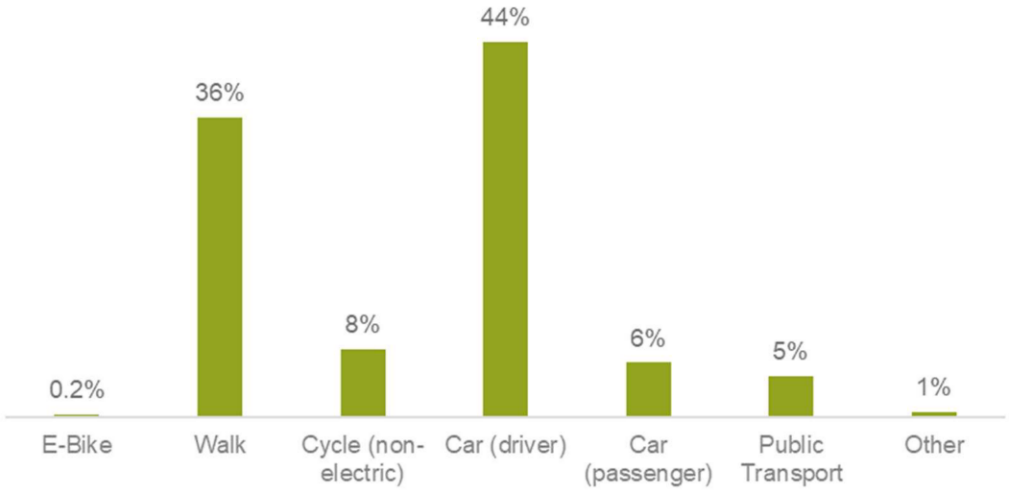
| Purpose of e-cycle trip | Percentage of total trips (%) |
|---|---|
| **Exercise / Relaxation** | 25% |
| **Commuting** | 24% |
| **Shopping** | 16% |
| **Social / Entertainment** | 14% |
| **Escort Trips** | 10% |
| **Personal business** | 6% |
| **Business** | 3% |
| **Education** | 2% |

### 3.1.3 Travel mode share of participants and modal shift

Prior to participation in the project, 51% of participants' trips were made by car (as driver or passenger; about a third (36%) of trips were made on foot, and 8% by cycle. **Figure 10** illustrates the mode share for all weekly trips prior to participation.

Three participants reported making some trips by e-cycle before the start of their loans, reporting 18 weekly e-cycle trips between them.

**Figure 10: Percentage of trips in a 7-day period before the loan by travel mode** (based on 295 responses to the pre-loan survey)




### Trip numbers made by any active mode of travel while loaned the e-cycle, compared to before the loan

Overall active travel trips increased by 49%, from 2,274 weekly trips before the loan to 3,382 weekly trips during the loan (see **Table 12** ). This equates to an average of 10.2 weekly active travel trips per participant before the loan, which increased to 15.2 during the loan.

Most people who used non-electric cycles before the loan replaced these trips with the e-cycles during the loan, with non-electric cycle trips dropping by 81%, from 2.2 weekly trips to 0.4 on average.

Participants also used the e-cycles to replace walking trips, which dropped by 52%, from 8.0 to 3.9.

Participants who used the e-cycle to replace other active travel journeys reported being able to go further and faster than they would have done by standard cycle or by walking, allowing them to take detours to avoid busy roads or run additional errands. Having the support from the electric assist made them more confident in tackling hills they wouldn't have ventured up otherwise. Several participants mentioned that the e-cycle offered them a new way of getting exercise too.

**"Because using the e-bike was so enjoyable I didn't want to use the car. Using e-bike we were able to explore our local area we found places that we didn't even know existed."**

**Table 12: Active travel trips in a 7-day period before and 7-day period during the loan**

| | Walk | Cycle (non-electric) | E-cycle | All Active travel |
|---|---|---|---|---|
| **Before the loan** | 8.0 | 2.2 | 0.1 | 10.2 |
| **During the loan** | 3.9 | 0.4 | 10.9 | 15.2 |
| **Change** | -4.1 | -1.8 | 10.9 | 5.0 |
| **% change** | -52% | -81% | 17,250% | 49% |

### Trip numbers made by car while loaned the e-cycle, compared to before the loan

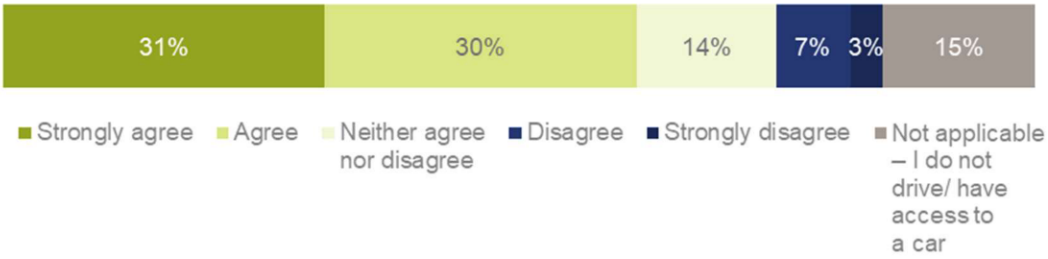
As shown in **Table 12**, car trips reduced by 45% during the loan, from 2,839 weekly trips (11.3 on average) before the loan to 1,571 during the loan (6.2 on average). The reduction was greater for car trips made as a driver, which fell by 45%, while trips as a car passenger fell by 41%.

**Table 13: Average car trips in a 7-day period before and a 7-day period during the loan**

| | Car driver | Car passenger | All car trips |
|---|---|---|---|
| **Before the loan** | 11.3 | 1.5 | 12.8 |
| **During the loan** | 6.2 | 0.9 | 7.1 |
| **Change** | -5.1 | -0.6 | -5.7 |
| **% change** | -45% | -41% | -45% |

Participants who usually drive reported that participating in the participant had enabled them to reduce their car usage. As shown in **Figure 11**, 61% of all the respondents agreed or strongly agreed that "Loaning the e-cycle enabled me to reduce my car usage". 72% of all respondents had access to a car.

**Figure 11: Perceived impacts on car usage, "Loaning the e-cycle enabled me to reduce my car usage"** (Based on 251 responses)



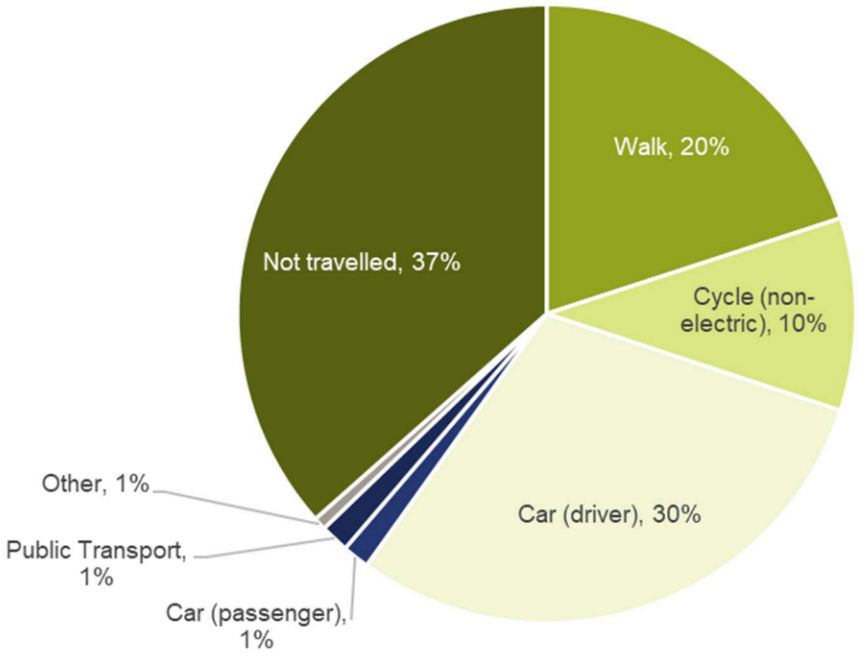

Participants who used the e-cycles to replace car journeys reported that for some journeys the e-cycle was more enjoyable than using the car, as well as being just as quick. Other positives recipients shared included not have to worry about traffic or parking and saving money on fuel.

### Proportion of e-cycle trips that would otherwise have been made by other modes or not travelled

We estimate[8] that 20% of e-cycle trips were replacing walking, 31% replaced car trips (as a driver or passenger), and 10% replaced non-electric cycling trips; while 37% of trips would not have been made. The percentages of which travel modes were replaced by e-cycles is presented in **Figure 12**. The methodology of how this was calculated is detailed in **Appendix 1: Methodology**.

[8] This is based on the travel modes that participants reported using for different purposes before and during the loan, and not on direct reports of the modes they would otherwise have used for their journeys. An explanation of the calculations and assumptions used in this estimate can be found in the Methodology section.

**Figure 12: Proportion of e-cycle trips that would otherwise have been made by other modes**




### 3.1.4 Impact on travel behaviour between rural and urban areas

There were some differences in loan and trip statistics between loan beneficiaries in urban and rural areas. Most notably that the average trip distance for urban beneficiaries was 4.2 km whereas it was 5.3 km for rural beneficiaries. The average total distance a rider cycled on their e-cycle during their loan was higher in urban areas with an average of 91.6 km compared 66.3 km in rural areas. This might be explained by the fact the urban beneficiaries on average made more trips during each loan (23) compared to rural beneficiaries (13). A more detailed breakdown of loan data and trip statistics is displayed below in **Table 14.**

**Table 14: E-cycle loan data and trip statistics by urban and rural location as per GPS data**

| | Urban | | Rural | |
|---|---|---|---|---|
| | Mean | Min - Max | Mean | Min - Max |
| **Loan length (days)** | 46 | 3 to 339 | 49 | 14 to 131 |
| **Number of trips per loan** | 23 | 1 to 149 | 13 | 1 to 55 |
| **Trip distance (km)** | 4.2 | 0.5 to 33.3 | 5.3 | 0.5 to 40.5 |
| **Distance per rider (km)** | 91.6 | 0.8 to 658.5 | 66.3 | 3.4 to 321.2 |
| **Trip duration (minutes)** | 25.1 | 1.7 to 239.1 | 27.5 | 1.5 to 151.7 |
| **Time spent travelling per rider (hours)** | 8.9 | 0.2 to 55.4 | 5.6 | 0.3 to 24.1 |

Our data showed differences in e-cycle trip purpose between urban and rural beneficiaries. The greatest difference we saw was in commuting; where 23% of urban beneficiary trips were made for commuter journeys, compared to 31% for rural beneficiary commuter trips. Another significant difference was for e-bike use for social and entertainment trips; these journeys made up 16% of rural beneficiary trips, compared to a smaller 11% for urban beneficiary trips. Escort trips also saw a difference in percentage with 11% for urban beneficiaries and 5% for rural beneficiaries.

**Table 15: Purposes of e-cycle trips, taken from post-loan survey data (based on 159 responses classed as 'urban' and 59 responses classed as 'rural')**

| Purpose of e-cycle trip | Percentage of total trips (%) | |
|---|---|---|
| | **Urban** | **Rural** |
| **Exercise / Relaxation** | 25% | 24% |
| **Commuting** | 23% | 31% |
| **Shopping** | 18% | 15% |
| **Social / Entertainment** | 11% | 16% |
| **Escort Trips** | 11% | 5% |
| **Personal business** | 5% | 4% |
| **Business** | 3% | 3% |
| **Education** | 3% | 1% |

### 3.1.5 Carbon saving calculations

The following sections appraise the potential carbon savings associated with the use of loaned e-cycles. For more detailed information on the methodology used for estimating carbon dioxide ($CO_2$) savings, see the **Appendix 1: Methodology** on See.Sense monitors and carbon savings contained within **Appendix 1: Methodology.**

#### Carbon savings from the use of e-cycles

On average, each trip of average 4.1 km would save around 0.62 kg of carbon dioxide compared to an equivalent car journey (assuming an average emission rate of 150 g of $CO_2$ per km). This is a potential saving of 12.7 kg for a loan beneficiary across the length of their loan. If all trips made with the loaned e-cycles replaced car journeys, we estimate that the $CO_2$ savings across all riders and all trips would be 2613.8 kg.

However, many e-cycle trips replace journeys that would otherwise have been made on foot, by non-electric cycles, public transport, or other means. We therefore estimate an average carbon saving of around 4.0 kg per loan, in line with our calculation that around 31% of e-cycle trips replace car journeys, including journeys made as either drivers (30%) or passengers (1%). This corresponds to a total saving across all loan beneficiaries of 816.4 kg. **Table 16**Error! Reference source not found. presents potential $CO_2$ savings per loan beneficiary and for all loan beneficiaries. See **Appendix 1: Methodology** for an explanation of the analysis.

The estimated actual carbon savings of 4.0 kg per loan translate to a weekly saving of around 0.59 kg per loan beneficiary.

**Table 16: Maximum and estimated $CO_2$ savings from the use of e-cycles** (based on GPS data returned from 206 loan beneficiaries)

| $CO_2$ savings | Per rider (kg) | Total (kg) |
|---|---|---|
| Potential maximum for all trips | 12.7 | 2613.8 |
| Estimate for trips replacing car driver journeys | 3.8 | 779.5 |
| Estimate for trips replacing car passenger journeys | 0.2 | 36.9 |
| Estimate for trips replacing driver and passenger journeys combined | 4.0 | 816.4 |

Note – these calculations assume emissions of 150 g of $CO_2$ per km travelled. Figures are rounded to one decimal place.

### Carbon savings in rural and urban locations

We also split these potential $CO_2$ savings by urban and rural location of loan beneficiaries. The values displayed in **Table 17** below might not add-up to the values in Error! Reference source not found. – this is because not all loan beneficiaries we captured trip data for using See.Sense have their urban or rural home location on record. We found that the percentage of journeys that would otherwise have been made as either drivers or passengers varied a small amount between urban and rural locations. Additionally, given the smaller sample sizes for the urban and rural disaggregation it seemed more rigorous to use the value of 31% of trips that would otherwise have been car journeys, as both a driver and passenger, which were replaced by e-cycle.

In **Table 17** below there were greater $CO_2$ savings overall for urban loan beneficiaries which is due to the much larger number of loan beneficiaries living in urban areas over rural areas. Even when normalised for the number of loan beneficiaries, the average $CO_2$ savings per beneficiary were higher in urban areas, at 4.2 kg, than for rural areas, at 3.1 kg. This is likely due to the higher number of average trips beneficiaries in urban areas made.

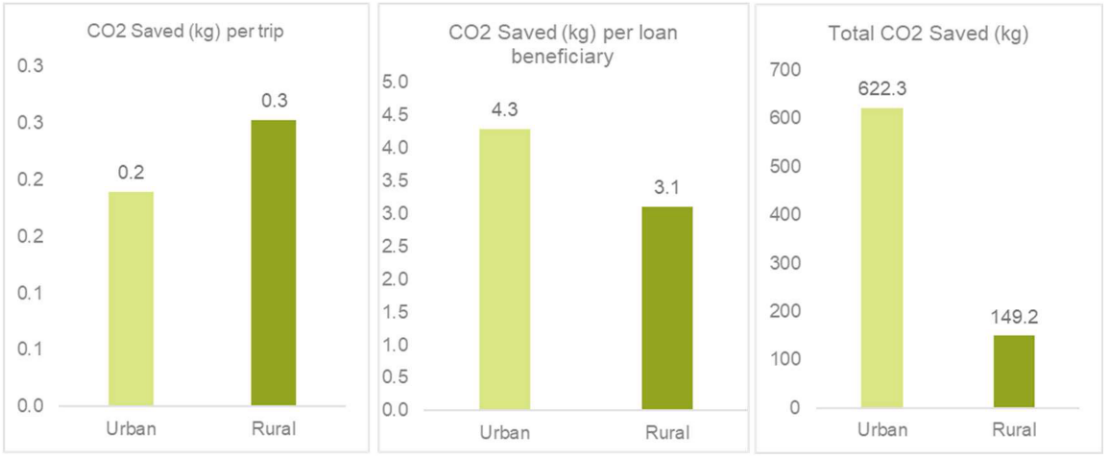
**Table 17: Maximum and estimated $CO_2$ savings from the use of e-cycles split by urban and rural locations** (based on GPS data returned from 131 loan beneficiaries in urban locations and 41 loan beneficiaries in rural locations)

| $CO_2$ savings | Urban | | Rural | |
|---|---|---|---|---|
| | Per rider (kg) | Total (kg) | Per rider (kg) | Total (kg) |
| Potential maximum for all trips | 13.7 | 1992.8 | 10.0 | 477.8 |
| Estimate for trips replacing driver and passenger journeys combined | 4.2 | 617.8 | 3.1 | 148.2 |

Note – these calculations assume emissions of 150 g of $CO_2$ per km travelled. Figures are rounded to one decimal place.

The three graphs portrayed side by side in **Figure 13** model estimated *actual* carbon savings, calculated at being 31% of the potential maximum savings associated with trip data. The charts show that average carbon savings were around a third higher per trip in rural areas, due to longer average trip distances. Despite this, each urban loan beneficiary saved around a third more than their rural counterparts over the course of their loans, due to the greater numbers of trips they typically made. When looking at the overall estimated savings, this gap widens further due to the higher number of urban loan beneficiaries, with estimated carbon savings in urban areas more than four times greater than the estimated savings in rural areas.

**Figure 13: Estimated actual $CO_2$ savings (kg) at different levels, by urban and rural classification** (n=172)




The impression given by this year's E-Move dataset is that the carbon savings associated with e-cycle loans appear to be higher in urban areas than rural areas, for two main reasons:

- Demand for / uptake of cycle loans may be higher (although this could be due to the nature and locations of the regional loan schemes)
- Usage is greater in urban areas, with a higher trip frequency per user.

From a resourcing perspective, it therefore makes sense to focus resources on urban areas in future loan schemes if reducing carbon emissions is the primary goal. Conversely, if the primary purpose of a loan scheme is to enhance beneficiaries' access to trip destination points, and overcome barriers to travel, rural schemes may offer people viable journey options where no public transport alternatives exist.

### 3.1.6 Impact on an individual of the e-cycle loans

Enabling trips the participants would otherwise not have been able to make.

There were 48% of participants agreed or strongly agreed that "Loaning the e-cycle enabled me to make journeys I otherwise would not have been able to make" (see **Figure 14**).

The e-cycles enabled users to overcome local geographies such as steep hills and allowed people to travel further than they had before. Access to e-cycles also enabled some users to make journeys they would otherwise have struggled to make, due to limitations of mobility associated with health conditions.

**Figure 14: Participants agreeing or disagreeing with the statement "Loaning the e-cycle enabled me to make journeys I otherwise would not have been able to make"** (based on 252 responses to the post-loan survey)

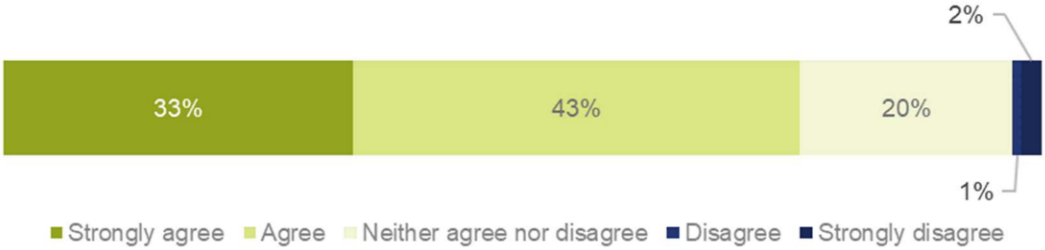

**Trips enabled by e-cycles**

- Local trips: many participants used the e-cycles for local trips that they would otherwise have driven for. Participants mentioned picking their children up from school, going to the local shops, and visiting friends and family.
- Access to work: Many participants used the e-cycles for commuting, with several replacing would-be car trips with e-cycle journeys to work. Participants were able to use the e-cycles as part of a longer work journeys by cycling to the train station and then travelling on.
- Access to green space: Participants used the e-cycles to get to beaches, parks and out into nature. Participants reported that getting this time outdoors boosted their wellbeing.

### Impacts on Physical Health

Over three quarters (76%) of respondents agreed or strongly agreed with the statement "Loaning the e-cycle has had a positive impact on my health" (see **Figure 15)**

**Figure 15: Participants agreeing or disagreeing with the statement "Loaning the e-cycle has had a positive impact on my health".** (Based on 253 responses)



Participants reported:

- Using the e-cycle for exercise.
- Increased physical activity due to using e-cycle for active travel.
- Using e-cycle to access other forms of exercise such as going to the gym.

Physical health benefits included:

- Improved fitness
- Losing weight

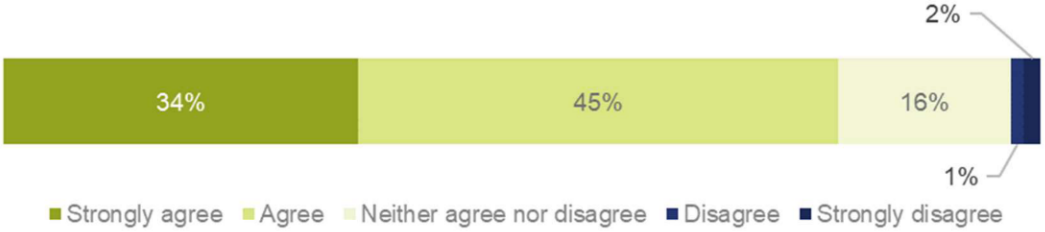
Some participants reported positive impacts of using the e-cycles on specific health conditions, including depression, anxiety, high blood pressure and diabetes.

> "I've been suffering from depression and since loaning the e-bike I feel a HELL of a lot better due to getting fresh air and exercise."

### Impacts on mental health and wellbeing

79% of respondents agreed or strongly agreed with the statement "Loaning the e-cycle has had a positive impact on my wellbeing".

**Figure 16: Participants agreeing or disagreeing with the statement "Loaning the e-cycle has had a positive impact on my wellbeing".** (Based on 251 responses)




Wellbeing and mental health benefits included:

- Fresh air/being outdoors.
- Being in nature.
- Feeling more relaxed/less stressed.
- Getting "out and about".
- A sense of freedom.
- Spending time with others.
- Getting exercise .

Many participants mentioned that just having the e-cycle encouraged them to get out the house more often, which led to them getting more fresh air, and spending more time with others. Having the e-cycle seemed to act as a catalyst for behaviours that benefit wellbeing.

> "I'm fitter, feels like I've left the day behind after cycling home from work. I'm sleeping better, my mood is better; I'm more awake and focussed in work"

The electric assist on the e-cycles was an important factor in making these journeys possible; as it enabled participants to cycle up hills, travel longer distances, carry loads and enabled them to transport children. Participants described the following ways in which having an e-cycle supported them to make journeys by active travel:

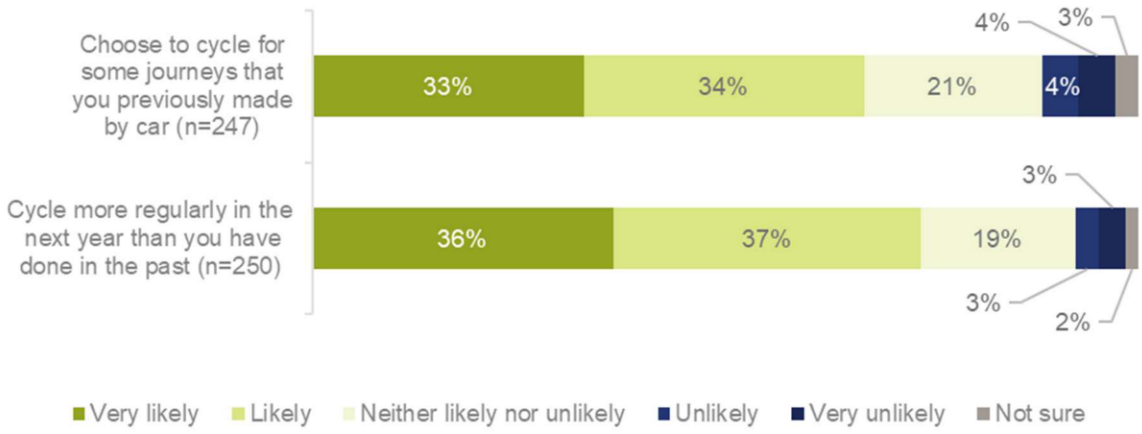
- **Time saving**: the speed of the e-cycles encouraged respondents to use them for journeys they would otherwise have made by car, as walking or using a non-electric cycle would have taken too long. Those who replaced walking journeys with e-cycle trips also appreciated the time saved.
- **Enabling new journeys:** the extra power made travelling easier and more appealing. Respondents talked about being able to commute over big hills without being too sweaty when arriving for work, being able to travel despite health problems that would have stopped them otherwise and being able to transport children.
- **Increased confidence**: the boost from the e-cycles meant participants felt more confident travelling on the road, as they were not entirely reliant on their own power and could hold their own in traffic.

### 3.1.7 Impact of e-cycle loan on perceptions of cycling and likely future behaviour

#### Intentions to cycle more in future

The project had a positive impact on participants' perceptions of cycling, with 73% of respondents saying they were likely or very likely to cycle more regularly in the next year than they had done in the past, and 67% saying they were likely or very likely to choose to cycle for some journeys that they previously made by car.

**Figure 17: Responses to the question "In the next year, how likely is it that you will do the following?"**

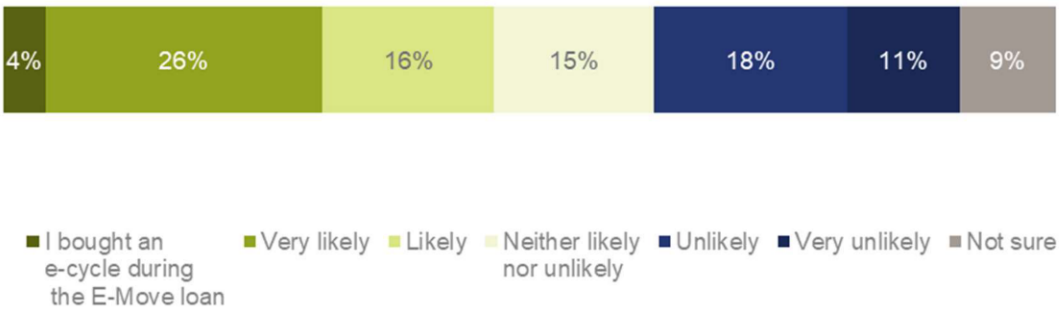



### Intention to buy an e-cycle

Participation in the project gave participants a chance to try different models of e-cycle, and increased participants understanding of the uses and limitations of e-cycles.

Following their loans, 42% of respondents said they were likely or very likely to buy an e-cycle in the next year, and 4% (10 people) said they had already bought an e-cycle during the loan period.

**Figure 18: Responses to the question "In the next year, how likely is it that you will buy an e-cycle?"** (Based on 251 responses)



The most frequently reported barrier to buying an e-cycle was **cost** – when asked the question "If you are not sure or are unlikely to buy a cycle or an e-cycle in the future, what kind of incentives or changes would make you more likely to do so?" 80 out of 169 respondents mentioned the cost of e-cycles in their responses.

Participants suggested the following ways in which the limitations due to cost could be mitigated:

- The opportunity to rent the cycles.
- Loans or grants to support e-cycle purchases.
- Second hand or reconditioned e-cycles being available to buy.
- Long term cycle loans.

Other changes that would encourage the participants to buy an e-cycle included

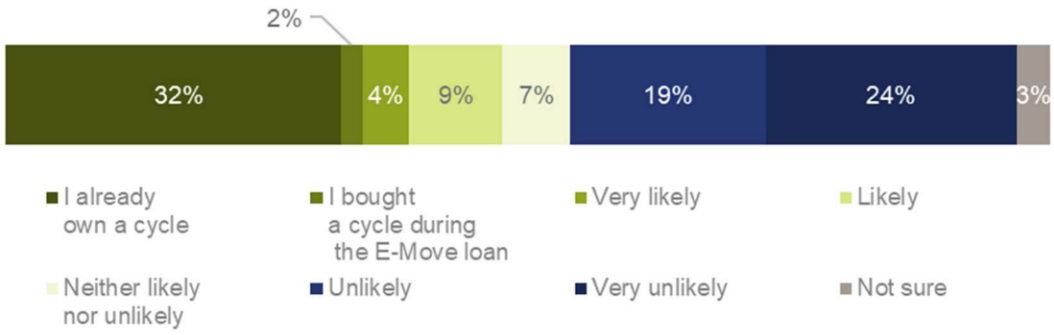
- Secure storage (both at home and away).
- Lighter e-cycles, several participants found them too heavy to manoeuvre .
- Safer or better cycle infrastructure in their area.

### Intention to buy a non-electric cycle

Some respondents have decided to buy non-electric cycles after the E-Move loan. 13% of respondents said they were likely or very likely to buy a non-electric cycle in the next year, and 2% (five respondents) said they had bought a non-electric cycle during the loan. 32% of respondents already owned a cycle at the start of the loan.

Of the respondents who did not already own a cycle, 20% of the reported that they were likely or very likely to buy a non-electric cycle in the next year.

**Figure 19: Responses to the question "In the next year, how likely is it that you will buy a regular (non-electric) cycle?"** (Based on 246 responses).




Participants who did not expect to buy an e-cycle within the next year were less likely to say they would cycle more in future. Some participants intended to continue cycling using non-electric cycles after the end of the project, but for other participants having no access to an e-cycle was a barrier to continued cycling.

The main reason for recipients who did not expect to buy an e-cycle in the next year gave for feeling disinclined to ride a non-electric cycle after the loan period was the loss of support from the electric assist function, though some participants also reported that their own cycles were in poor condition or were less well equipped than the cycles they had loaned.

### 3.1.8 Perceived barriers and incentives affecting uptake of e-cycles

Participants reported the following barriers to using the e-cycle more:

- The e-cycle being too heavy.
- Poor weather.
- Lack of cycling infrastructure.
- Insufficient lighting at night or not wanting to cycle in the dark.
- Limited battery life, and anxiety about running out of power.
- Health problems limiting cycling.
- Mechanical problems such as punctures.
- Security - concerns about theft when away from home.

- Traffic and dangerous drivers.
- Awkward storage at home eg keeping it in the living room or upstairs.

Participants also reported the following incentives that motivated them to use the e-cycles:

- Getting exercise.
- Social support (e.g. riding with friends).
- Enjoyment.
- Good weather.
- Valuing the sustainability benefits over using a car.
- Cost savings on fuel and parking.
- Making the most of their time with the bike.
- Adapted equipment that let them carry children, pets or items.

### 3.1.9 Gender disaggregation

In line with new gender budgeting ambitions, we have disaggregated the analyses by gender to get better insights in to how this project is affecting women. In this section of the analysis, we are only looking at participants who identified either as female or male, the sample size of those who identified as 'non-binary' or 'prefer not to answer' was too low to be statistically significant and is therefore not presented here.

We found that there were several stark differences between our male and female participants even before the loans had started – even though women had a higher rate of employment overall than men (80% to 73%), women were twice as likely to be in part time work as men (31% to 15%) (see **Figure 20**). Women were also less experienced cyclists than men overall, with only 18% of female participants having cycled regularly before the loan, compared to 28% of men (**Figure 21**).

When asked prior to the loan "If you do not already cycle regularly, what has prevented or currently prevents you from using a cycle?", 36 women cited hills or local geography as a reason, compared to only 18 men. Similarly, six women cited their lack of confidence when cycling compared to just one man.

**Figure 20: Survey responses to "Which of the following best describes your employment status?"**

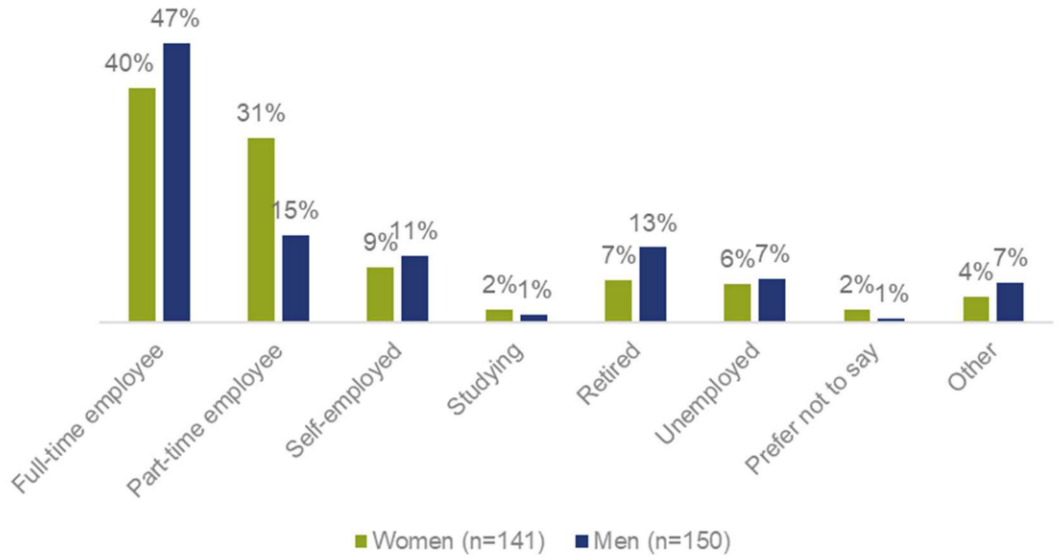
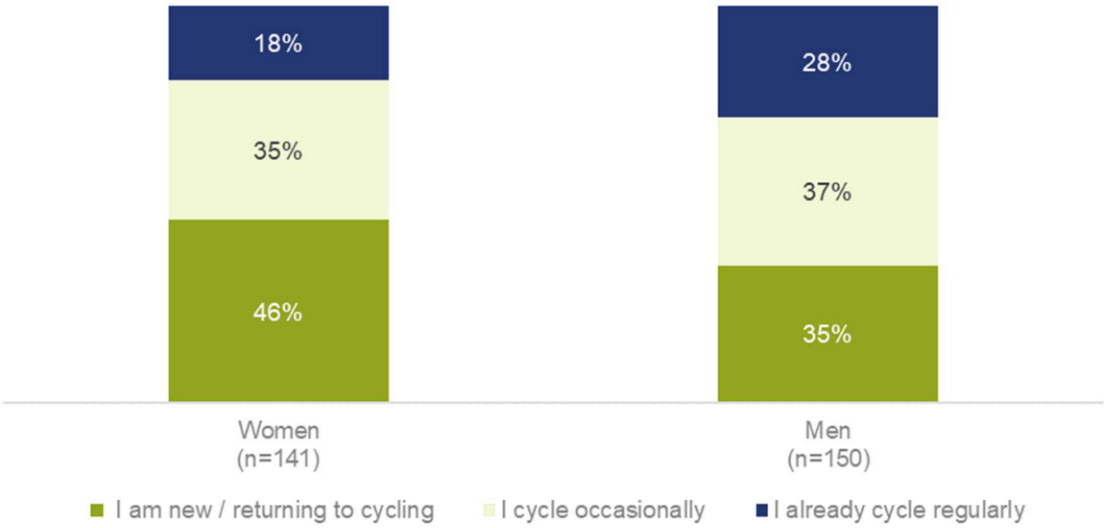


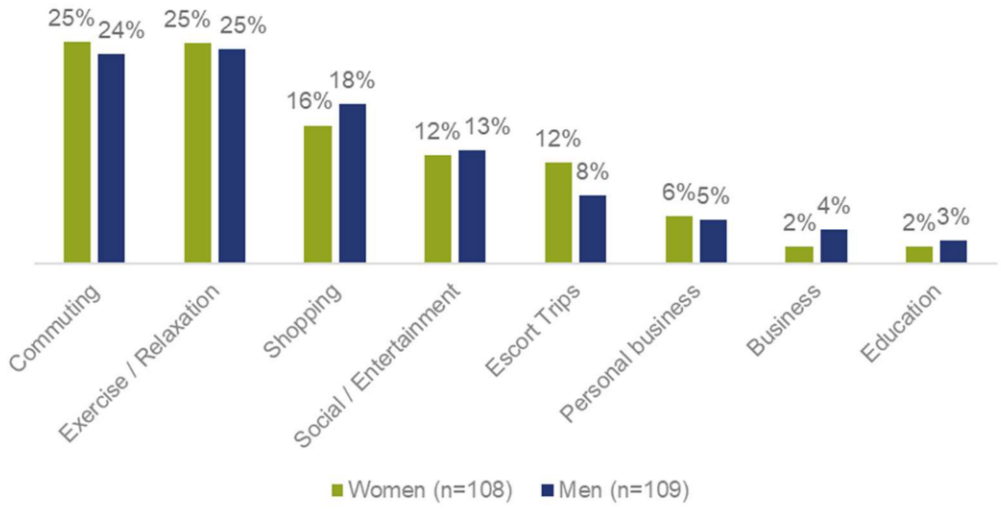

**Figure 21: Survey responses to "Which of the following statements best describes your cycling experience?"**




Women and men had different travel habits prior to the loans too. Women took fewer weekly trips; 3,474 compared to men who took 3,700. Women tended to use cars more than men; 54% of women's trips were made by car (as a driver or passenger) compared to 48% of men's trips. Women were also less likely to cycle, with only 6% of women's journeys being made by cycle compared to 10% of men's.

When using the e-cycle women still made fewer trips than men; 2,214 vs men's 2,814. Men and women typically had similar purposes for travelling, but women were more likely to be making escort trips (12% to 8%, **Figure 22**). This matches with twice as many women participants saying they had used the e-cycle with children compared to men.

**Figure 22: Pre-loan trip purposes**




Even though men tended to use the e-cycle more than women (an average of 12.8 trips per week compared to 8.9 for women (**Figure 23**), women replaced more car trips than men; 45% of trips previously made by car were replaced with e-cycle trips by women, compared to 20% for men. Women also replaced fewer walking trips than men, women replaced 16% of trips compared to 23% by men (**Figure 24**).

**Figure 23: Difference in average number of trips per week by mode**

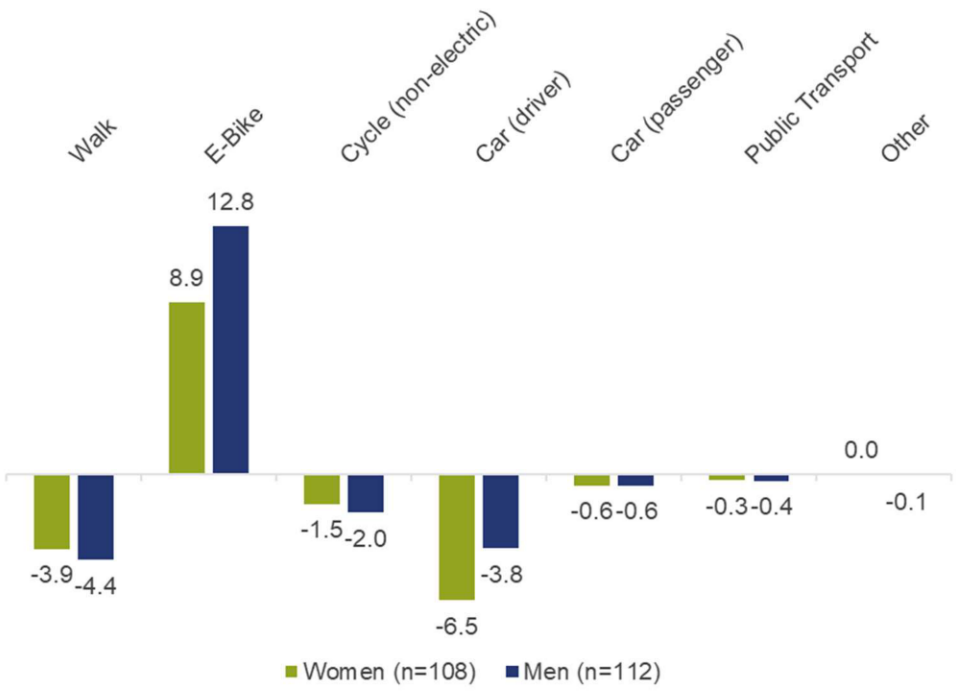
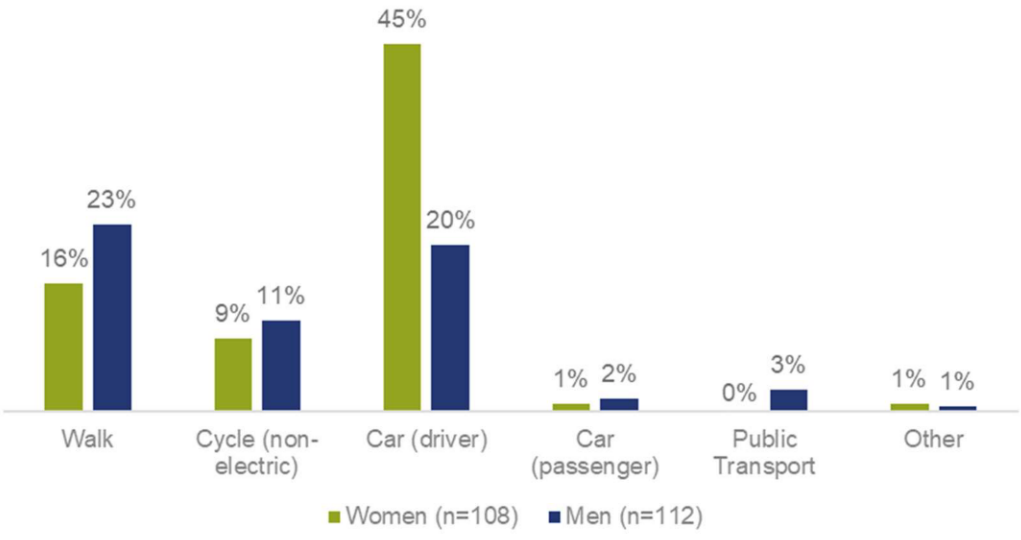
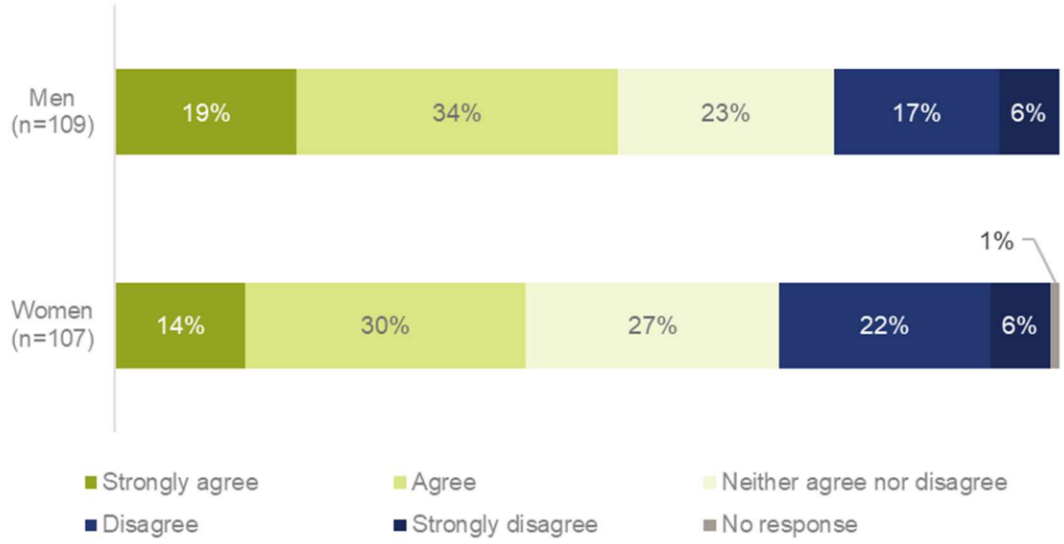



**Figure 24: Trips made for purposes that the user also reported making by e-bike during the loan**




Women did not think that the e-cycle had enabled them to make journeys they otherwise would not have been able to make to the same extent as men - 44% of women agreed with this statement, compared to 53% of men (**Figure 25**).

**Figure 25: Survey responses to "Loaning the e-cycle enabled me to make journeys I otherwise would not have been able to make"**




This may tie in with barriers that women mentioned more often than men when asked "Was there anything that discouraged you from using the e-cycle during the loan?", these included:

- The weather.
- The bike being heavy.
- Lack of secure parking away from home.
- Confidence.
- Their children (this ranged from not having the correct bike or equipment to transport them, or having childcare responsibilities that did not allow for bike travel).
- Not wanting to travel in the dark.
-

Some of these can potentially be addressed by having greater access to equipment such as child seats and protective weather gear, as well as perhaps training to boost confidence on the bike.

### 3.1.10 E-cycle case studies

Case study 1 – [redacted]

**Getting back into cycling: overcoming asthma and the North Welsh hills**

**"I will be upset, very sad, when I have to give it back. It will feel like a breakup... I will miss it"**

[redacted] used to love cycling as a kid but had to stop due to his asthma, which has gradually worsened over time. Living in North Wales, which is "all ups and downs", he found conventional pedal cycles exhausting to use as he got older.

[redacted] has used the loan bike to drive to work, to transport his young kids around, and to do bulk shops, strapping his purchases onto the cargo rack. In the past, [redacted] says he'd "be always in the car and just nipping down the road". Apart from driving, [redacted] says that the main travel options around their home in Rhyl are taxis – which often have an hour's wait time – and buses, which, in his experience, are often late. The e-cycle has proven to be a better option than either of these:

"It gets me to work quicker than public transport, quicker than a taxi and cheaper than a taxi."

"The battery range on it is brilliant. The pickup on the speed, all right you're running a bit late for work, just peddle a bit faster. I'll be honest, there's not much difference from being in a car. Car it would have got me to work in ten minutes, on a bike, 15 minutes, so £5 and you're saving so much fuel."

[redacted]

As a long-term driver cycling around, [redacted] has been surprised by the aggression he has encountered from some car drivers:

"I've been on a bike now and I have had a few encounters where people blow the horn at you and I think to myself, I've got every right to ride too. I've got every right to the roads, so blowing your horn what for?"

Although most people he sees out on the streets of Rhyl are travelling by car, [redacted] says he's always happy when he passes other cyclists, to see people out getting exercise. He's quite well known in the local area, and recently he has been using that platform to act as an ambassador for e-cycles:

**"Myself, as I ride around I hype them up… - show people... I help out at the food bank. I do charity work and a lot of people know me and they've seen me on the e-bike, and, 'Oh, that's good. What is that?' I'm like, 'It's an electric bike. It's very handy. It helps me get around.' I promote it quite a lot!"**

Case study 2 - "[redacted]

**Sticking to two wheels: getting by without a car in Mid Wales**

[redacted] can drive, but "wasn't sure" about getting a car and thought they would like to try out an e-cycle as an alternative. This turned out to be a good move: Jackie found the e-bike to be "pretty quick… very easy to use, very comfortable… easier than a car."

**"…it made me relax, it made me… Like when you go on the e-bike, it's not like walking, because when you walk you can still use your phone, and when you're in the car you can still listen to your phone, but on the bike you have to focus, and that gives me the space and time to just get away off the phone, social media and everything. So, it was very nice when I would be on the bike, relaxing, calming."**

[redacted] found accessible and secure parking to be the biggest obstacle to using the bike for daily chores, saying that the main worry she had in public places was around where to leave it safely. When nipping into a shop quickly, she would often take it into the premises with her, to avoid leaving it outside. Jackie's experience highlights an experience shared by many – outside urban areas with high rates of cycling, adequate cycle parking is often lacking. This is a particularly problematic for larger cycles – including cargo bikes, and also adapted cycles, which are often used as mobility aids.

[redacted] is based in Aberystwyth, and she describes the surrounding area as fairly flat and quite safe, with wide roads and plenty of space. She used the cycle regularly but didn't ride it to her workplace because of a very steep hill and poor road surface on the route there. She felt that training would be beneficial for inexperienced and unconfident cyclists:

**"I think riding on the road, it's quite dangerous. So, I think one of the challenges is that if the rider is not very experienced, it's going to be a bit hard for him and for people in the cars and people walking as well. So, I think people, before they ride a bike, they should be shown or at least talked through about how to ride it, on which side of the road. I already know these things because I had a bike before, but maybe other people don't."**

[redacted] now sold on the convenience of e-bikes and is thinking about getting one herself. The main problem for her, as for so many others, is cost. She suggested a lengthening of the E-Move loan period, to help people who struggled to afford an e-cycle.

## 3.2 E-cargo cycles for businesses

### 3.2.11 Size and nature of participating businesses

Of the 18 organisations who completed the pre-loan survey, 15 were micro-organisations[9], one was a small organisation and two were medium organisations.

**Table 18: Sizes of participating organisations[9]**

| | Number of Employees | Number of participating organisations | Total |
|---|---|---|---|
| **Micro** | 0 | 6 | **15** |
| | 1-4 | 8 | |
| | 5-9 | 1 | |
| **Small** | 10-19 | 0 | **1** |
| | 20-49 | 1 | |
| **Medium** | 50-99 | 2 | **2** |

Organisations and businesses using the e-cargo cycles included non-profits, food and beverage businesses, and gardeners.

**Table 19: Sectors of organisations participating in participant** (based on 18 responses to the pre-loan survey)

| Sector | Count |
|---|---|
| Food and beverage | 3 |
| Non-profit or charity | 3 |
| Education | 2 |
| Retail | 2 |
| Gardening | 2 |
| Beauty and wellness | 1 |

[9] Organisation sizes defined according to https://statswales.gov.wales/Catalogue/Business-Economy-and-Labour-Market/Businesses/Business-Structure/Headline-Data/latestbusinessstructureinwales-by-sizeband-measure

| | |
|---|---|
| Construction | 1 |
| Hospitality | 1 |
| Other | 3 |

The organisations planned to use the e-cargo cycles for purposes including:

- Commuting
- Transporting tools or stock
- Staff travel between sites
- Deliveries

When surveyed after the loan, participants reported having used the e-cargo cycles for food deliveries, for staff to get between sites, and for transporting tools and stock.

### 3.2.12 Loan characteristics and trip statistics

E-cargo cycles were loaned to 31 participating businesses and organisations across five towns: Swansea, Aberystwyth, Barry, Newtown and Rhyl. Of the 17 organisations for which we have GPS trip data for, we have associated urban-rural location data for 12. Two organisations in Swansea were in rural locations, while the rest in Aberystwyth, Barry and Swansea were all urban.

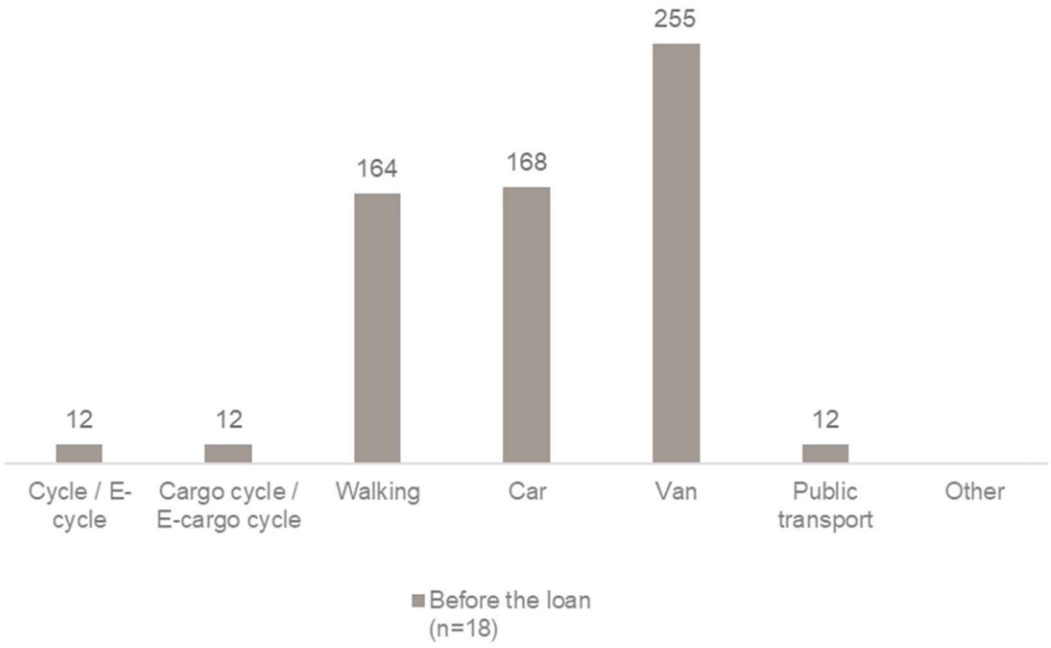
Three Aberystwyth loans, comprising two businesses operating out of Ceredigion and one out of Powys, were classed as 'large town (sparse)'. The remaining seven urban loans – all in Swansea and the Vale of Glamorgan – are categorised as 'Large town (less sparse)'. This reflects the comparatively denser urbanisation of the sites in South Wales, compared with the towns of Mid Wales.

The average duration of e-cargo cycle loans was 140 days, significantly longer than the 44-day average for community e-cycles. Both figures are likely to understate loan durations, as any outstanding loans were cut off at 31/03/2023 for the evaluation of this project year's outcomes and outputs.

#### Travel behaviour before and after the loans

There were 18 organisations that completed a pre-loan survey and 7 organisation that completed both a pre-loan and post-loan survey. The total number of trips recorded for all 18 organisations in the pre-loan survey is displayed in **Figure 26.**

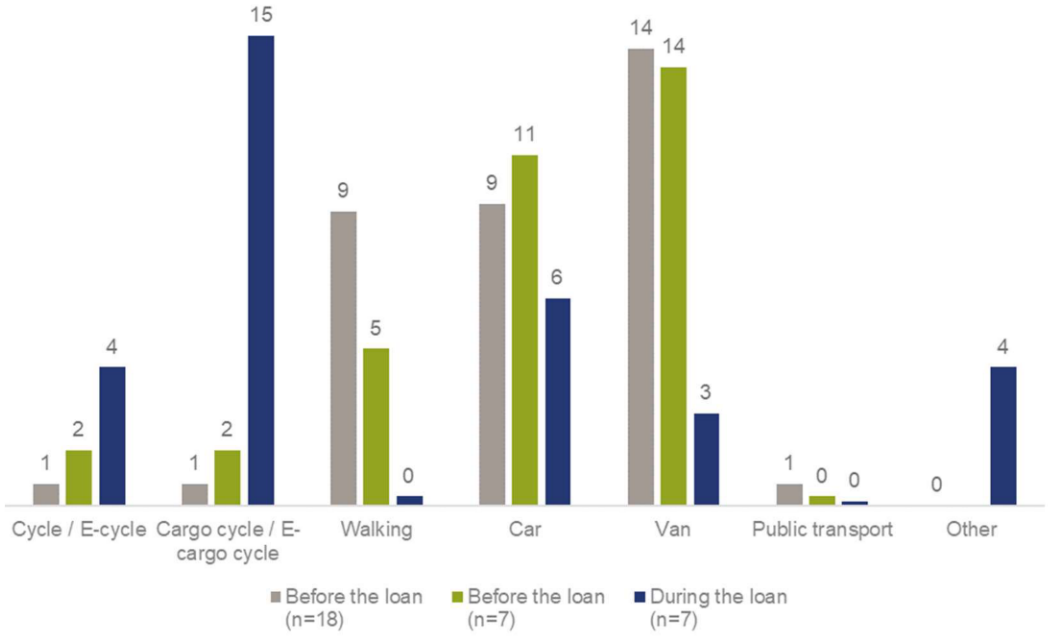
**Figure 26: Total number of weekly trips by mode before the e-cargo cycle loan** (based on 18 responses to the pre-loan survey)




We can only compare changes in trips by mode for organisations that completed both a pre-loan and post-loan survey. However, **Figure 26** displays the average number of trips by mode per week. Since this is normalised by the number of surveys returned, we can identify whether the subset of 7 organisations who completed both a pre-loan and post-loan survey is representative of the 18 organisations in total. The average number of trips by mode per week are also displayed in **Figure 27**.

For all modes other than 'walk', where the average number of trips differs by 4, the average number of trips differs by only 1 or 2 per mode. It might be reasonable to assume that the subset of 7 organisations is representative in demonstrating the change in weekly trips caused by the e-cargo cycle loan for all 18 participating organisations. However, it is worth remembering that organisations who had a positive experience with the e-cargo cycle loan and who substituted more journeys might be more inclined to respond to the post-loan survey. Consequently, organisations who substituted more van and car journeys with e-cargo cycle journeys could be over-represented in this analysis.

**Figure 27: Average number of weekly trips by mode before and during the e-cargo cycle loan** (based on 18 responses to the pre-loan survey and 7 responses to the post-loan survey)




The total number of trips by mode made by organisations before and during the loan is displayed in **Figure 28**. The largest drop in weekly trips by mode is for 'van', with 75 fewer trips. These were likely replaced by 'cargo or e-cargo cycle' trips which experience the greatest increase in trips per week of 90. Some of these van journeys might also have been replaced by 'other' modes which was one organisation who began using an e-van.

There were also large decreases in 'car' and 'walk' modes from 76 to 45 and 34 to 2 respectively, along with a small increase in 'cycle and e-cycle' from 12 to 30.

**Figure 28: Total number of weekly trips by mode before and during the e-cargo cycle loan** (based on 7 organisations' responses who completed both the pre-loan and post-loan survey)

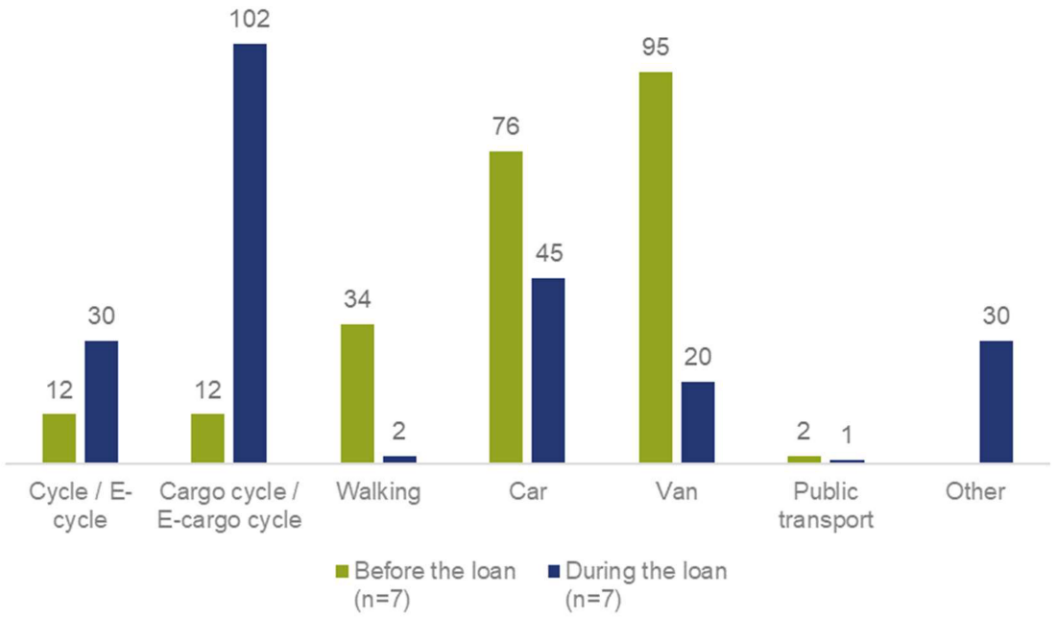
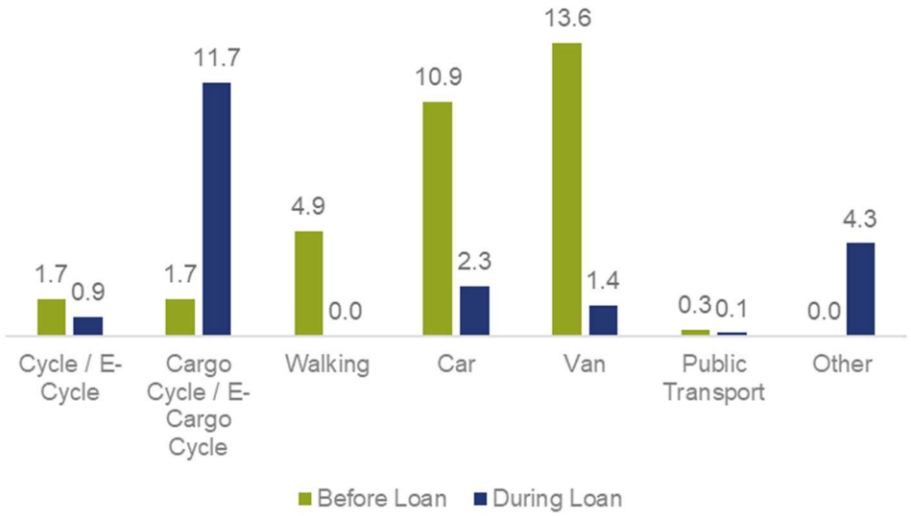


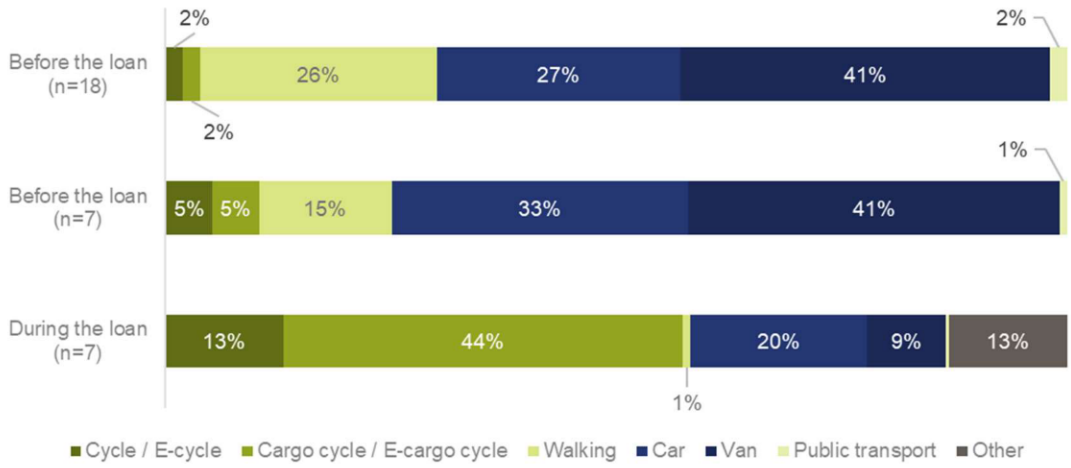

**Figure 29: Average number of weekly trips by mode before and during the e-cargo cycle loan** (based on 18 responses to the pre-loan survey and 7 responses to the post-loan survey)




The scale of change between trip modes can be more easily seen in **Figure 30** where the percentage of total trips is displayed. The largest decreases were 'van' by 32%, 'walk' by

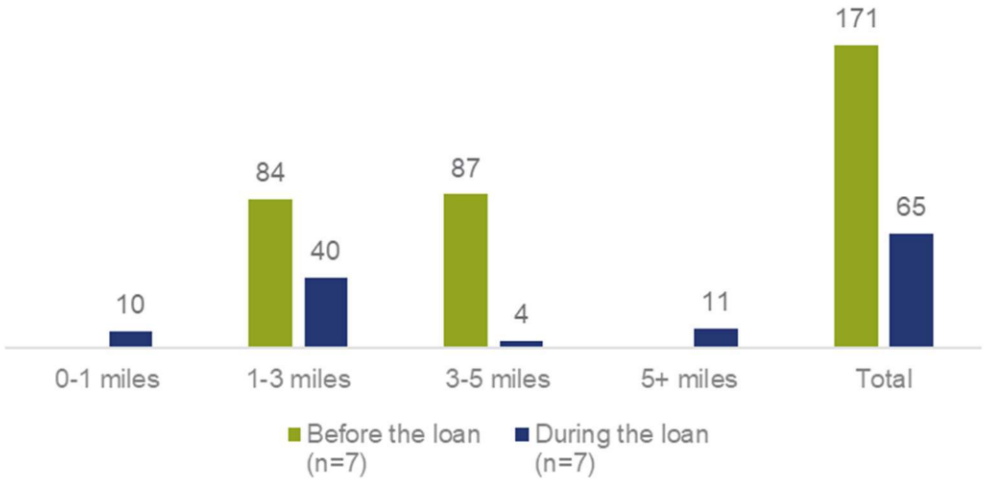
14% and 'car' by 13%. The largest increases were for 'cargo and e-cargo cycle' by 39% and 'other' by 13%.

**Figure 30: Percentage of weekly trips by mode before and during the e-cargo cycle loan** (based on 18 responses to the pre-loan survey and 7 responses to the post-loan survey)



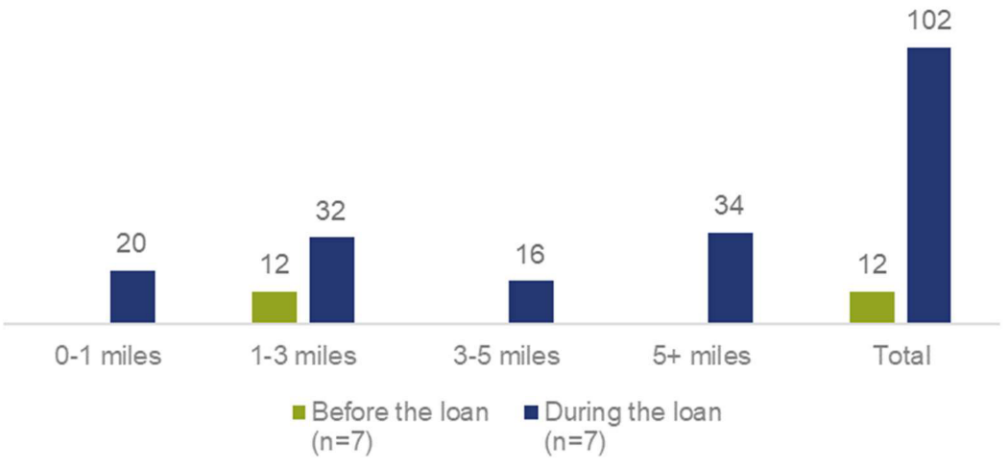

From the 7 organisations who returned both a pre-loan and post-loan survey it is possible to disaggregate the trip data by distance. From **Figure 31** we can see the split of the sum of van and car trips across various trip distances.

**Figure 31: Total number of weekly trips by van and car before and during the e-cargo cycle loan** (based on 7 organisations' responses who completed both the pre-loan and post-loan survey)



Comparing this to **Figure 32** which does a similar thing for cargo and e-cargo cycles, it is possible to see how organisations' behaviour changed regarding the typical distance trips they reported making before and during the e-cargo cycle loan.

**Figure 32: Total number of weekly trips by cargo or e-cargo cycle before and during the e-cargo cycle loan** (based on 7 organisations' responses who completed both the pre-loan and post-loan survey)




For cars and vans, the 171 trips made every week before the loan were between 1 and 5 miles. Whereas for cargo and e-cargo cycles there were just 12 trips a week made by one organisation, and they were all within 1 to 3 miles.

During the loan period we see van and car journeys of between 1 and 3 miles halving from 84 trips to 40 across recipients, while car and van trips of between 3 and 5 miles virtually disappeared in this same timeframe - dropping from 87 to 4. The total number of car and van trips made during the loan period reduced significantly from 171 to 65 – reflecting fewer trips being made overall, rather than trips of different distances being made.

Within this data we did observe a slight increase in van and car trips begin being made for journeys of less than 1 mile and greater than 5 miles during the loan period– although this might not have anything to do with the e-cargo cycle loan and could be a response to a change to the operation needs of the organisations.

There is an even greater change in e-cargo cycle use, with total trips increasing from 12 to 102 across the loan period. These are evenly distributed across distance ranges, although the greatest change is for trips greater than 5 miles, which grew from 0 to 34.

"It was a fun way to get around. If I'd not had the bike I would have been relying on my wife to help with getting stock by car or would have started to learn to drive."

### E-cargo cycle usage - trip numbers and lengths

During the 2022-23 project year, there were 17 organisations with See.Sense GPS data. These organisations made a total of 787 e-cargo cycle trips, with an average per loan beneficiary making 46 trips. The average trip distance was 3.6 km, and the longest recorded trip was 31.5 km (**Table 20:** Recorded e-cargo cycle usage during loans (based on trip data from 17 loan beneficiaries where the See.Sense GPS sensors recorded data) .

**Table 20: Recorded e-cargo cycle usage during loans** (based on trip data from 17 loan beneficiaries where the See.Sense GPS sensors recorded data)

| | Mean | Median | Minimum | Maximum | Total |
|---|---|---|---|---|---|
| **Loan length (days)** | 140 | 123 | 7 | 365 | 2382 |
| **Number of trips per loan** | 46 | 19 | 4 | 277 | 787 |
| **Distance per trip (km)** | 4.3 | 4.3 | 1.4 | 7.7 | 73.7 |
| **Distance per loan (km)** | 166.6 | 54.9 | 15.0 | 705.0 | 2832.9 |
| **Trip duration (minutes)** | 26 | 27 | 10 | 44 | - |
| **Time spent travelling per loan (hours)** | 16.2 | 6.9 | 2.4 | 91.6 | 275.0 |

Usage levels varied substantially between loans. One of the seventeen loans that returned GPS data, based in Barry, covered a weekly average of 25 km over almost three months. By contrast, another e-cargo cycles loan in Swansea averaged just 0.6 km a week over almost six months in section.3.2.11 Intended trip purposes are discussed in Size and nature of participating businesses.

## 3.2.13 Carbon saving calculations

As shown in **Table** 21, we estimate total carbon dioxide savings from the use of loaned e-cargo cycles to exceed 420 kg[10].

[10] Note that totals presented in here are underestimates, due to See.Sense GPS trackers only recording data for 17 of the 31 participating organisations.

Each organisation saved an estimated average of 25 kg of $CO_2$ over the course of their loan, which itself averaged at 20 weeks. This translates to a reduction of 1.25 kg of carbon dioxide emissions per e-cargo cycle per week.

This calculation is based on the assumptions that all e-cargo cycle journeys made by the participating organisations would otherwise have been made by car or van. For these substituted journeys an average value of 150 g of $CO_2$ per km travelled was used to calculate the $CO_2$ emissions saved.

The estimated weekly $CO_2$ saving of 1.25 kg is around twice as high as the equivalent figure (of 0.59 kg kg) for community e-cycle loans, despite lower weekly usage levels for e-cargo cycle loans. This is because a higher proportion of e-cargo cycle trips are assumed to directly replace journeys made by vehicles.

**Table 21: $CO_2$ savings from the use of e-cargo cycles – totals and averages per trip and per loan beneficiary**

| | Per trip | Per rider | Total |
|---|---|---|---|
| Potential $CO_2$ savings (kg) | 0.54 | 25 | 425 |

### 3.2.14 Impact on businesses of an e-cargo cycle loan

The potential savings in direct transport costs (eg fuel and parking) varied between organisations. Most participating organisations reported spending £10-£50 a week on transport before their loans, while one spent between £0-£10 and two spent over £50.

**Table 22: Responses to the question "In a typical week, how much does your organisation spend on transport (eg fuel, parking, etc)?"** (based on 7 organisations who answered both the pre-loan and post-loan survey)

| | £0-£10 | £10-£50 | £50-£100 | £100-£200 | £200-£500 | £500+ |
|---|---|---|---|---|---|---|
| **Before loan** | 1 | 4 | 1 | 0 | 1 | 0 |
| **During loan** | 3 | 3 | 0 | 1 | 0 | 0 |

During the loans, three out of seven businesses reported a decrease in their weekly spending on transport, three reported no change, and one reported an increase. All ten businesses that answered the post loan survey reported that they estimated there would be a positive net financial impact of switching most of their businesses' motorised vehicle journeys to e-cycle journeys.

There is also potential for organisations to save on staff time spent travelling. The organisations reported spending an average of 33 hours a week of staff time on transport before their e-cargo cycle loans, however businesses reported spending 8.3 hours per week on transport during the e-cargo cycle loans.

### 3.2.15 Barriers and incentives affecting uptake of e-cargo cycles

Comparing the question "How much do the following factors influence your ability to replace current work-related travel with an e-cargo bike?" in the pre-loan survey and the post-loan survey gave an indication that organisations were not always accurate in predicting which factors would prove most influential as a barrier to the uptake of e-cargo cycles. Additionally, it suggests there may be a widespread knowledge gap in organisation's ability to anticipate the realities and set expectations around what e-cargo cycles can offer them.

In **Figure 33**, the percentages of total responses for both the pre-loan and post-loan surveys made up of 'very influential 'or 'extremely influential' answers are displayed for each factor. This only considers answers from organisations that completed both the pre-loan and post-loan survey to give an accurate reflection of how organisations opinions changed after the e-cycle loan. There are five factors that were considered as influential before the loan for organisations – but that no organisation thought was influential after having trialled an e-cargo cycle. These were 'topography', 'employee safety', 'bicycle parking facilities', 'distance', and 'staff skills'. This suggests that these factors might not be as influential as organisations originally anticipated.

Conversely, there were some factors that received a similar percentage of 'very influential' and 'extremely influential' total responses both before and after the loan. One example was 'weight and size of goods to be transported' - which received 40% of responses in the pre-loan survey and 43% in the post-loan survey. The factor 'time' was also close, with 17% in the pre-loan and 14% in the post-loan. This suggests that the e-cargo cycle loan did not dramatically alter organisations perceptions regarding how the size and weight of freight, or time; a factor which might be influential in assessing the uptake of e-cargo cycles.

There were only two factors that received a greater percentage of responses in the post-loan survey than the pre-loan survey, and those were 'public perception' and 'active travel infrastructure quality'. This suggests that organisations may have underestimated how influential these would be until the had trialled the e-cargo cycle.

Overall it appears that the e-cargo cycle loan was successful in altering organisations perceptions in what would be influential in affecting their uptake of e-cargo cycles. Organisations were not always good at predicting what would be influential and what would not be before the loan. This illustrates why an e-cargo cycle loan is important in giving organisations a risk-free opportunity to understand how the new technology can fit into their operations.

**Figure 33: Responses in the pre- and post-loan survey that were 'very influential' or 'extremely influential' to the question "How much do the following factors influence your ability to replace current work-related travel with an e-cargo bike?"** (based on 7 responses, not all respondents answered all questions)

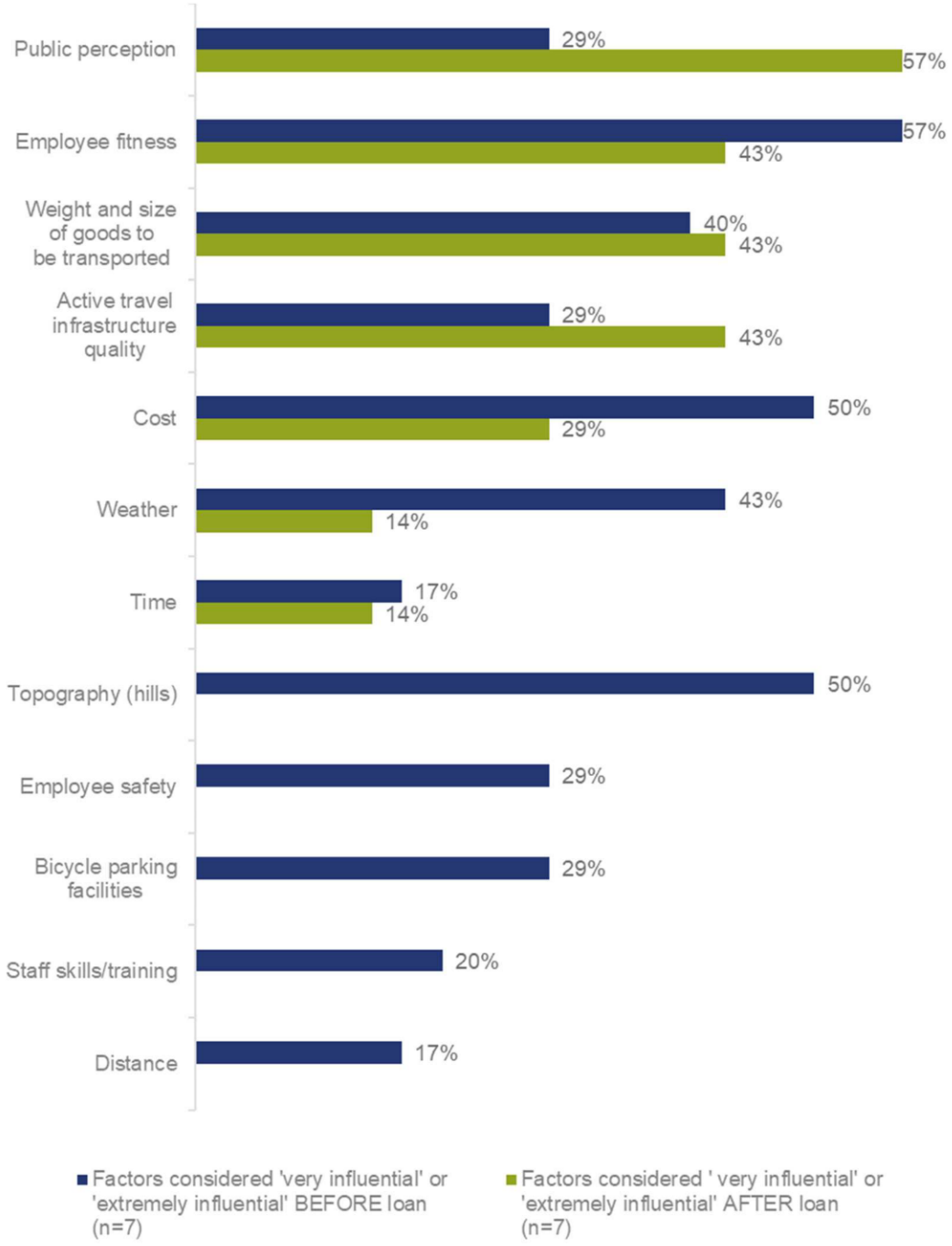


**Figure 34** has the percentage of responses for the same question as Error! Reference source not found. but for just the post-loan survey. It gives an indication as to what the most significant factor influencing ability to replace current work-related travel with an e-cargo cycle is for organisations after they have trialled the e-cargo cycle in more detail.

'Public perception' was the most influential by far, however, unlike many of the other factors it seemed to have a positive influence with organisations saying things like:

- Good for the profile of the organisation.
- Got publicity from people outside asking about the bike and the novelty of seeing it.
- Opened conversations.
- Always brought a smile to members of the public and customers.
- Helped the image of the business.

With organisations even saying:

"I was likened to Granville from Open All Hours quite a lot!"

'Cost' was also an influential factor for positive reasons as well and made up one of the additional benefits for organisations using e-cargo cycles. These benefits included:

- Reduced travel costs and saving money on fuel.
- Quicker journey times (over shorter distances).
- General access, with the ability to cut through traffic, park more easily, load straight to the door and get to where a van cannot.
- Improved staff wellbeing with work being fun, better work life balance, physical exercise, and improved mental health.
- It was sometimes more inclusive for organisations as it meant employees without licenses could make journeys where they otherwise wouldn't be able to in a car or van.

The factor 'employee fitness' is a bit more ambiguous as to whether it is a barrier or an incentive – but based off the qualitative feedback above it could be the case that it is a positively influential factor in the uptake of e-cargo cycles.

There were also barriers to the uptake of e-cargo cycles identified by organisations – these included:

- Storage capacity for carrying larger and heavier things.
- Price of e-cargo cycles.

- Secure parking and keeping the e-cargo cycle safe at night.
- Distance and time to far away sites.
- Staff buy-in (one organisation saying staff would not ride it).
- Safety, with one organisation saying:

"Dangerous roads mean I could not travel further afield."

Comparing these qualitative insights with **Figure 34** we can get an insight as to how influential these factors might be. For example 'distance' was mentioned as a barrier to the uptake of e-cargo cycles but only 40% of organisations thought that it was 'somewhat influential' and 60% thought it was 'not influential at all'.

However 'dangerous roads' were mentioned as a barrier to the uptake of e-cycles and similarly 'active travel infrastructure quality' was considered 'very influential' by 40% of organisations and 'somewhat influential' by 30% of organisations. Only 10% of organisations thought it was 'not influential at all'. This suggests that even though organisations are more comfortable using e-cargo cycles on the road than regular cargo cycles, there is still a perception that the roads are unsafe, and an expectation that improved infrastructure would make things better.

"Traffic, although not a particular difficulty or negative for myself as an experienced rider, it became clear the lack of infrastructure locally, safe routes, parking and lock up."

Cost represents a major barrier for many organisations to using e-cargo cycles, and there were mentions that a formal economic plan making it easier for organisation to purchase e-cycles would be a good incentive.

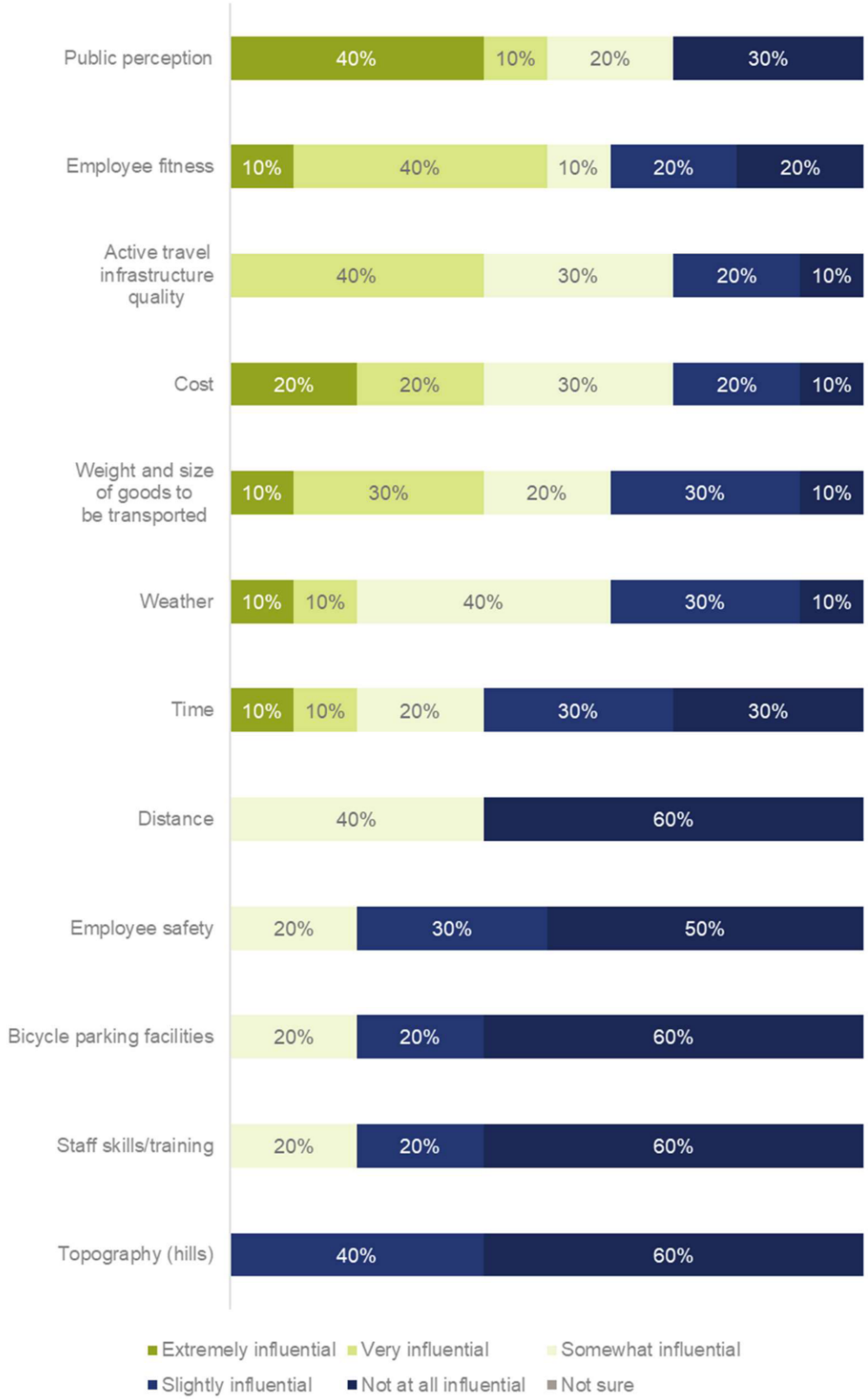
"It was great- I'd buy one if I could afford one."

"Scheme is fantastic. A great introduction in to using an e-cargo bike, but once you have had that experience you could feel dependent on that scheme unless you had a sound business plan to purchase your own e-cargo bike"

There were a number of incentives listed by organisations that would make them more likely to purchase an e-cargo cycle in the future:

- Financial support (grants, funding, bursaries).
- Improved cycle infrastructure.
- Improved cycle parking.

**Figure 34: Responses in the post-loan survey to the question "How much do the following factors influence your ability to replace current work-related travel with an e-cargo bike?"** (based on 10 responses, not all respondents answered all questions)



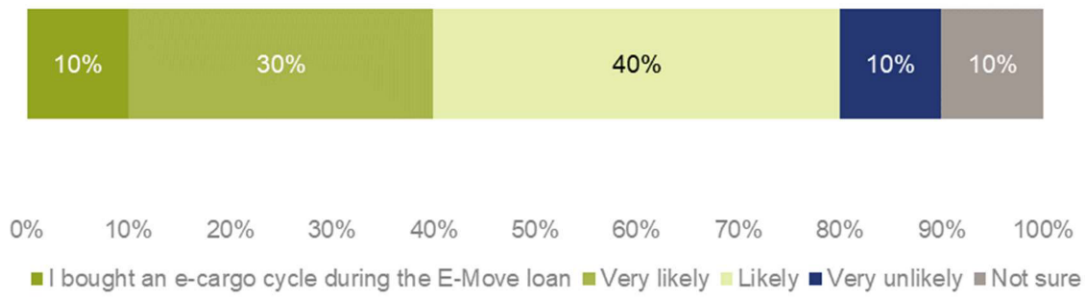
### 3.2.16 Impact of loan on perceptions on e-cargo cycles use for businesses and likely future behaviour

Overall organisations experience with the e-cargo cycles seem positive. When asked 'How likely are you to purchase an e-cargo cycle in the future' organisations seemed overwhelmingly likely to purchase them – with one having already done so.

"I bought an e-Brompton as a direct result of the loan"

Responses to the question are displayed below in **Figure 35**. Only one organisation said they were very unlikely to purchase an e-cargo cycle in the future.

**Figure 35: Responses in the post-loan survey to the question "How likely are you to purchase an e-cargo cycle In the future?"** (based on 10 responses)




In summary, the e-cargo cycle loans were successful in giving organisations a taste for how an e-cargo cycle could fit into their operations. On the whole, experiences were positive to the point that many organisations think it is likely they will purchase an e-cargo in the future. Future consideration ought to be given to how economic models could be developed to make it easier for small and medium enterprises to purchase e-cargo cycles.

"It's been really easy- so straight forward and hassle free. "

"Overall very positive. Opened my eyes to how easy it would be to transport things around town on an e-cargo bike."

### 3.2.17 E-cargo cycle case studies

Case study 3 - [redacted]

**Switching out the car: e-cargo cycles for business journeys and commuting**

[redacted] works for Crisis as part of their learning team, teaching their service users DIY and gardening skills. He used to use a little runabout car, which he got rid of after joining the E-Move scheme. Compared to running his old car, Paul has found the bike to be cheaper and better for both his physical and mental health. Using the e-cargo cycle also brought the unexpected benefit of allowing him to get materials closer to workplace sites, as parking was less of a problem.

**"I'd love to see more of them. I think they're really, really good, and I think a lot of businesses and charities could use them."**

[redacted] transports items that are 'bulky… but not massive", such as plants, tools and compost, which makes an e-cargo cycle perfect for the role. He uses the cycle for both commuting and business journeys. For [redacted] the greatest personal benefit the loan had brought was "cycling through woodland and along the seafront" to reach the office every day, rather than driving in rush hour traffic. Cycling to work takes him the same amount of time that driving had.

"I started this job in January and it was the first email I actually sent, to ask about the bike. I thought it would work really well with my job, and it's turned out to be brilliant."

[redacted] believes that the biggest barriers to their use are the cost and a general awareness that it is possible to use them for a wide variety of tasks. He added:

"I didn't know when I started if it was possible to do my job with it, and it is, so I've proven that."

[redacted] is currently hoping to get an e-cargo bike through the government's cycle to work scheme; Crisis hadn't previously registered with a scheme, but after he messaged HR to enquire about the scheme the organisation announced that they will be subscribing to one in the coming year.

Case study 4 - [redacted]

**Forget the driving lessons: running a small business with an e-cargo cycle**

[redacted] single-handedly runs a coffee shop serving commuters at a train station in South Wales. They haven't got a driving licence and previously planned to learn to drive for work, before securing the premises for their small business and hearing about the E-Move loan scheme. [redacted] chose to try out an e-cargo cycle loan instead of pursuing a driving licence and has found that the bike meets all their needs.

**"I've loved it, it's made everything so much easier, the time, I get to pick up stock really quickly, I get to work and home much quicker, it doesn't take up a lot of space to store it, it doesn't take long to charge. It's just brilliant. It's amazing, yes, I love it. I don't want a car. There's no point."**

The revelatory thing for [redacted] has been the amount of time they save. Picking up stock, transporting loads of around 30 litres a week, the e-cargo cycle has met all the needs of their small-small operation.

[redacted] had previously relied on their partner to drive them on occasional trips to pick up stock and had otherwise walked to and from work. Compared to their previous travel habits they are currently saving huge amounts of time and can also make business trips autonomously without relying on the availability of their partner's time.

## "[I] tried it out, and it was way more convenient for me to have the bike than to get a car, cost-wise, time-wise."

The loan has made Emile seriously reconsidered learning to drive and getting a car, having witnessed that they can manage all their business' needs with an e-cargo cycle. [redacted] would love to buy one of their own after the loan finishes – but noted how cost is the biggest barrier for them, with the high market cost of e-cargo cycles is currently preventing them from realising this ambition:

"When they become more accessible and more affordable, I think more people will happily have one and commute more."

# 4. Appendix 1: Methodology

## A mixed-methods approach was used to gather evidence on the outcomes of the loan schemes, consisting of quantitative and qualitative tools.

Tools were selected based on their ability to fulfil the requirements of the Welsh Government Reporting Criteria (Appendix 2: Welsh Government Reporting Criteria). This section details the methodology used for each data collection tool.

## 4.1 Monitoring tools

### Surveys

Participants completed initial surveys before commencing loans, and follow-up surveys after completing them. Surveys were distributed by project officers and later inputted into the software programme JISC for analysis.

Surveys collected information on the numbers of trips individuals/organisations made for different purposes, by travel mode, along with details of the use of loaned cycles, and any accompanying changes in car usage. Participants were asked about any benefits the loans conferred, any effects on their health or wellbeing, and likely future travel behaviours, as well as any barriers to the use of e-cycles or e-cargo cycles.

Surveys accompanying e-cargo cycle loans also collected information on the amount of time staff spent travelling for work, and the costs incurred. Participants were also asked about the suitability of e-cargo cycles for undertaking business journeys within their sector and their local area.

### See.Sense monitors

GPS trackers were provided by the company See.Sense. These trackers measured the number of trips made by each cycle, along with distances travelled (per trip), time spent travelling (in minutes per trip) and average speeds (per trip).

During the 2022-23 project year the delivery team continued to experience similar technical difficulties with many of the GPS trackers as experienced in the first project year. There was an additional barrier to the collection of data this year, due to network issues around the time of the annual data download. See.Sense stated that these network issues prevented some trackers from uploading all trip data correctly.

### One-to-one interviews

Interviews were conducted with project participants towards the end of loans, or after loan period has finished. These sessions explored participants' experiences of the loans, providing more qualitative detail than surveys or other data collection methods, along with personal stories and insights.

**Table 23** briefly summarises the data captured by the interviews for each loan category. See **Appendix 2: Welsh Government Reporting Criteria** for a detailed breakdown of the monitoring and evaluation criteria being assessed through different data collections methods.

**Table 23: Welsh Government monitoring criteria assessed using interview data**

| Interview tool | Welsh Government indicators | Monitoring and evaluation requirements assessed |
|---|---|---|
| E-cycle interviews | 7, 8 and 9 | Qualitative data on health and wellbeing impacts, changing perceptions of cycling and likely future behaviour, and any barriers to using the cycles. |
| E-cargo cycle interviews | 4, 5, 6, 7, 8 and 9 | Qualitative data on the uses of loaned e-cargo cycles, their suitability for different organisations and purposes, their commercial benefits, any geographical/infrastructural limitations, and barriers to their use. |

## 4.2 Analysis

### Calculations for "Proportion of e-cycle trips and distance that would otherwise have been made by another mode of transport or not at all)"

The proportion of e-cycle trips and distance that would otherwise have been made by other modes was not measured directly, and instead was estimated from participants' responses in the pre-loan and post-loan surveys to the question: "*In the last 7 days [of your E-Move loan], how many trips* have you made for the reasons below and how did you make these trips?*".

The estimate was made by calculating the reduction in trips by each mode, for purposes that the participants reported using an e-cycle for during the trial. If a participant reported using an e-cycle for commuting during the trial, but not for education, a drop in car use for commuting by that participant would be included, but a drop in car use for education would not, as this would be assumed to have happened for other reasons.

For each purpose the participants who reported at least one e-cycle trip for that purpose in the follow up survey were identified. The total number of trips those participants made by each mode at baseline and follow up was then calculated, as in the example below for the purpose of 'commuting' in **Table 24.**

**Table 24: Number of commuting trips by mode reported by participants who also commuted by e-cycle**

| | Walk | E-cycle | Cycle (non-electric) | Car (driver) | Car (passenger) | Public Transport | Other | Not travelled |
|---|---|---|---|---|---|---|---|---|
| **Before the loan** | 74 | 2 | 27 | 324 | 49 | 56 | 4 | 27 |
| **During the loan** | 40 | 599 | 7 | 103 | 22 | 31 | 0 | 18 |
| **Change** | -34 | 597 | -20 | -221 | -27 | -25 | -4 | -9 |

These were then summed across purposes, to give the total number of trips by each mode made for purposes that the participant also reported using the e-cycle for during the loan, as shown in **Table 25. Table 26** shows the total number of trips made by each mode, for comparison.

**Table 25: Trips made for purposes that the participant also reported using the e-cycle for during the loan**

| | Walk | E-cycle | Cycle (non-electric) | Car (driver) | Car (passenger) | Public Transport | Other | Not travelled |
|---|---|---|---|---|---|---|---|---|
| **Before the loan** | 962 | 8 | 318 | 1120 | 139 | 103 | 22 | 2672 |
| **During the loan** | 480 | 2419 | 75 | 401 | 105 | 67 | 6 | 3553 |
| **Change** | -482 | 2411 | -243 | -719 | -34 | -36 | -16 | 881 |

**Table 26: Total trips by travel mode**

| | Walk | E-cycle | Cycle (non-electric) | Car (driver) | Car (passenger) | Public Transport | Other | Not travelled |
|---|---|---|---|---|---|---|---|---|
| **Before the loan** | 1749 | 14 | 477 | 2503 | 332 | 273 | 40 | 5388 |
| **During the loan** | 839 | 2419 | 94 | 1368 | 192 | 199 | 29 | 5140 |
| **Change** | -910 | 2405 | -383 | -1135 | -140 | -74 | -11 | -248 |

For each mode, the change in trips made for purposes that the participant also reported using the e-cycle for during the loan was then divided by the change in e-cycle trips to give the proportion of e-cycle trips that would otherwise have been made by that mode. This is illustrated in **Figure 24** of this report.

These were summed across modes to give the proportion of e-cycle trips replaced by another mode, which was subtracted from 100% to give the proportion of e-cycle trips that would otherwise have been made by another mode of transport, or not made at all.

**Table 27: Proportion of e-cycle trips that would otherwise have been made by other modes**

| | Walk | Cycle (non-electric) | Car (driver) | Car (passenger) | Public Transport | Other | Trips not otherwise made |
|---|---|---|---|---|---|---|---|
| **Proportion of e-cycle trips replacing each mode** | 20% | 10% | 30% | 1% | 1% | 1% | 37% |

### Carbon savings

See.Sense's methodology for estimating carbon savings assumed that cycle trips replaced vehicular journeys – the vehicular journeys which were replaced were presumed to emit, on average, 150g carbon dioxide per km travelled.

The data that See.Sense supplied was then plotted against loan information from the project officer's booking sheets, creating a dataset that logged all the information listed above against rider and cycle IDs. Initial outputs were coded by See.Sense, who provided the Research and Monitoring team with trip data broken down by trip, by loan and by date.

We conducted validity checks to ensure that these outputs matched, cleaned this data and analysed it in more detail. The granularity of trip-level data allowed us to calculate averages per loan, across the whole dataset, and by riders' urban and rural classification.

### E-cycle trips replacing car and van journeys

Our surveys of loan participants collected data on the numbers of weekly trips they made, by different modes of transport, for various purposes. Based on our analysis of this survey data, we estimate that 30% of the trips made by e-cycles (**Table 27**) replaced car (driver) journeys, while an additional 1% of those trips replaced passenger journeys. Other trips made using the loaned e-cycles are assumed to replace journeys which would either have been made on foot, by public transport, or using other cycles; some trips would not have been made at all without access to an e-cycle and are therefore not 'replacement' journeys.

**Table 28** applies these estimates (of 30% of trips replacing car driver journeys, and 1% replacing passenger journeys) to the aggregated data generated by the GPS trackers, to estimate the numbers of trips that are likely to have replaced vehicular journeys, and the road kilometres that may have been saved as a result. The average journey length of 4.1km among e-cycle trips in our dataset was used to estimate the total distance travelled across trips that likely replace car journeys.

As indicated in **Table 28** , we believe that each loan beneficiary may have taken around six fewer journeys in vehicles as a direct result of the e-cycle loan. Of these, we estimate that all of them were 'driver journeys'.

We can be certain that the use of e-cycles to undertake journeys which loan beneficiaries would otherwise have made as drivers *directly equates* to a reduction in road km driven (in this case around 25km per participant), with equivalent reductions in the emissions of $CO_2$ and other pollutants. These trips are effectively 'taking cars off the road', with associated carbon savings and air quality benefits.

The effects of trips replacing car *passenger* journeys is less straightforward to analyse. There is some ambiguity over whether these trips directly equate to an equivalent reduction in numbers of car journeys. If the individual were getting a lift with a partner, friend or family member who would have made the trip anyway, there may not have been any reduction in road traffic. In some cases a 'passenger journey' may not have been made otherwise; in these instances, cycle trips are reducing road traffic while also lessening riders' reliance upon others, simultaneously saving time for people that would otherwise be required to take on the role of driving these passengers. In this year of E-Move it seems that very few participants were replacing car passenger journeys with e-cycle trips, so this ambiguity may not be of material consequence.

**Table 28: E-cycle trips replacing car journeys – estimated vehicle trips and km driven**

| | Estimated no. trips replaced (all) | Estimated trips replaced per rider | Estimated vehicle km replaced (total) | Estimated vehicle km replaced (per rider) |
|---|---|---|---|---|
| **Driver journeys** | 1283 | 6 | 5197 | 25 |
| **Passenger journeys** | 61 | 0 | 246 | 1 |
| **All vehicle journeys (total)** | 1344 | 6 | 5443 | 26 |

Note - values are rounded to the nearest whole integer. Totals may not add up due to rounding.

# 5. Appendix 2: Welsh Government Reporting Criteria

In the grant award letter provided to Sustrans, Welsh Government set out specific monitoring and evaluation requirements for both project strands, including qualitative and quantitative data collection. The information below maps the Welsh Government indicators (in the exact original phrasing) against the relevant section headings within the report, where they have been addressed. The wording of headings has generally followed the Welsh Government phrasing wherever possible. There have been minor alterations to condense titles and increase readability, along with minor changes to the order in which the monitoring indicators appear in the report.

**Table 29** matches the headings used within this report to the Welsh Government reporting requirements that they directly address, and which concern community e-cycle loans **Table 30** does the same thing for e-cargo cycle loans. Reporting requirements that were primarily addressed through quantitative analysis of survey responses, loan data and GPS data are shaded in light green. The (unshaded) remainder were chiefly addressed through qualitative analysis of survey comments and one-to-one interviews.

**Table 29: Welsh Government reporting criteria for the evaluation of community e-cycle loans**

| | Welsh Government reporting requirement | Relevant chapter in the report |
|---|---|---|
| 1 | Demographic profile of those people taking up loan / hire of e-bike (including gender, age, and income or employment status) | 3.1.1 Demographic profile of participants |
| 2 | Data on length of hire and loan periods, trip numbers, trip purposes, | 3.1.2 Loan length and trip statistics |

| | | |
|---|---|---|
| | trip lengths, route taken and elevation change | |
| 3 | Travel mode share from users (including car use, public transport, walking, conventional cycling etc) prior to participation in scheme | 3.1.3 Travel mode share of participants and modal shift |
| 4 | Travel mode share from users (including car use, public transport, walking, conventional cycling etc) during participation in scheme, to specifically bring out:<br>a Proportion of e-bike trips / distance that would otherwise have been made by walk / conventional bike / car as driver / car as passenger / public transport / other / not travelled<br>b Distance/trip numbers made by any active mode of travel while loaned / hiring the e-bike, compared to before the loan and/or afterwards<br>c Distance/trip numbers made by car while loaned / hiring the e- bike, compared to before the loan and/or afterwards | 3.1.3 Travel mode share of participants and modal shift |
| 5 | Differences in effect on travel behaviour between rural and urban areas | 3.1.4 Impact on travel behaviour between rural and urban areas |
| 6 | An estimate of the average carbon saving per person / loan, again distinguishing between impacts in rural and urban areas | 3.1.5 Carbon saving calculations |
| 7 | Qualitative data from users on how participation in schemes has impacted them; their health and well-being and whether it enabled trips they would otherwise not have been able to make | 3.1.6 Impact on an individual of the e-cycle loans |
| 8 | Impact of participation on perceptions of cycling and likely future behaviour/intentions at the end of loan / hire period (e.g. will / will not buy an e-bike; what further incentive would be needed for users to buy an e-bikes); | 3.1.7 Impact of e-cycle loan on perceptions of cycling and likely future behaviour |

| | | |
|---|---|---|
| | some of these should be compiled in user stories | |
| 9 | Perceived barriers to using the e-bike more | 3.1.8 Perceived barriers and incentives affecting uptake of e-cycles |

**Table 30: Welsh Government reporting criteria for the evaluation of e-cargo cycle loans to organisations**

| | Welsh Government reporting requirement | Relevant chapter in the report |
|---|---|---|
| 1 | Data from users to understand trip numbers, trip lengths, trip purposes. To include quantification of car or van mileage replaced by e-cargo bike use | 3.2.12 Loan characteristics and trip statistics |
| 2 | Analysis of resultant carbon savings | 3.2.13 Carbon saving calculations |
| 3 | Seen/predicted financial impact on businesses as a result e- cargo bike usage | 3.2.14 Impact on businesses of an e-cargo cycle loan |
| 4 | Qualitative information on the range of uses of e-cargo-bikes i) by organisations and businesses e.g. food delivery / services (plumber, electrician etc.) / small packages / etc.; (ii) by individuals (e.g. family shopping / transporting children etc. | 3.2.11 Size and nature of participating businesses |
| 5 | Qualitative information on the size of organisation or business an e-cargo bike library scheme is most suitable for? (e.g. micro / SME / other) | 3.2.11 Size and nature of participating businesses |
| 6 | Qualitative information on how geography influences potential for e-cargo bike uptake (e.g. city centre / inner urban / suburban / rural) | 3.2.15 Barriers and incentives affecting uptake of e-cargo cycles<br>3.2.16 Impact of loan on perceptions on e-cargo cycles use for businesses and likely future behaviour |
| 7 | Data from users to understand how participation in schemes has influenced their perceptions on e-cargo bikes use for businesses and likely future behaviour (e.g. intention to buy an e-cargo bike at end of trial); some compiled as case study examples | 3.2.16 Impact of loan on perceptions on e-cargo cycles use for businesses and likely future behaviour |

| | | |
|---|---|---|
| 8 | User perceptions of barriers to the adoption of e-cargo bikes, and how these could be overcome | 3.2.15 Barriers and incentives affecting uptake of e-cargo cycles |
| 9 | User perceptions on benefits to their business | 3.2.14 Impact on businesses of an e-cargo cycle loan |

# 6. Appendix 3: Cardiff MSc Collaboration

For E-Move project year 2021-22 we had recorded more interviews with participants than monitoring requirements required. We also did not have sufficient budget to analyse these 'surplus' interviews.

Fortunately, with thanks to [redacted] - a senior lecturer in human geography at Cardiff university, we were able to share this data with him and an MSc student he was supervising at the time. This led to a fruitful collaboration where the MSc student was able to analyse this data as part of their MSc thesis to a depth where Sustrans would not have been able to, due to project restraints such as time and budget. They published their thesis in October 2022, which was beyond the reporting deadline for the first project year of E-Move. This is why it is included here in the appendix of the second project year of E-Move.

The thesis is called *"The E-Move electric bike loan scheme and trial. A qualitative analysis of E-cycling practices in rural Welsh communities, and the potential for low-carbon Transport System transitions."* Sustrans published a blog article talking about the success of the collaboration with Cardiff University along with some of the findings of the thesis, which include success of the project, and ways it can be further improved. The blog can be found here.

Below are some of the research findings and conclusions taken from the thesis.

1 What were the key motivations and barriers to use of loaned e-cycles whilst participating in the E-Move trial, and how did these vary amongst E-Move participants?

**Key motivations**

- Desire to meet mobility needs (if they were without access to personal motorised transport)
- Overcome lack of transport options due to poor public transport
- Desire to replace car journeys (from cost-saving to environmental protection standpoint)
- More leisure and exercise

**Existing barriers**

- Physically challenging (lack of fitness, difficult terrain, challenges with growing older)
- Lack of segregated cycle routes (safety concerns)
- Concerns over other traffic behaviours (e-cyclists either invisible to drivers or 'hyper-visible' and considered a nuisance)

**Experiences of the E-Move trial**

- Electric assistance reduced 'physical exertion' barrier and allowed people to cycle further and more often
- Extended 'lifetime cycling' for older participants
- Shift in view on cycling from 'daunting' and 'exhausting' to 'fun' and 'exhilarating'. Provided a sense of achievement and enjoyment for many
- Improved capability of dealing with challenges along with an increased sense of independence
- E-cycle improved acceleration making users feel more comfortable cycling alongside road traffic
- Lack of dedicated infrastructure still a safety concern for many, especially women
- Size and weight of e-cycles a barrier to storage, transporting and walking-with e-cycle, especially for women and older people
- Evidence that e-cycles triggered transformative change in people's live (especially those who had no access to cars, had experienced mental or physical health problems or were older). This was most true in places where public transport provision is underdeveloped

2 To what extent did e-cycling practices interact with other daily practices, and how did this vary amongst E-Move participants?

**Shopping, and short journeys**

- The key to enabling shopping trips was electric assistance, added sturdiness and availability of panniers
- Reduced physical effort and increased ability to ride with heavier loads (unattainable to feasible)
- Some agency required from individual to adapt weekly habits to replace car with e-cycle

- Added financial value of e-cycle and lack of secure cycle parking made people anxious to use them for high street shopping (reduced trip chaining)
- In many cases e-cycles considered more convenient for short trips, visiting friends and family and completing small shopping trips
- People 'felt good' replacing car journeys with e-cycle (environmental protection and health benefits)
- E-cycling and driving modes compete with one another. E-Move provides opportunity to renegotiate the split of participants between driving and e-cycling. This is especially true for shorter journeys.

**Mobilities of care**

- Potential to save money and time when transporting kids via e-cycle (cut through traffic, no fuel costs, less reliant on taxis)
- Not appropriate for everyone's circumstances (even a powerful e-cycle would struggle trip chaining with a child, and shopping in difficult terrain). Carrying kids on a bike is not viewed as a societal norm. There can be judgement from other that this is considered an 'unsafe' or 'irresponsible' way to transport children
- E-cycles are slower than cars, so difficult to trip chain if the distances and timescales involved demand an individual uses a car over an e-cycle
- There is a difference between how men and women consider e-cycles in the context of carrying children

**E-cycling as a practice**

- Dramatic changes in perception of e-cycling and its capability to replace driving across all participants
- People surprised how easy it was to 'trip-chain' - generally little knowledge of e-cycles as a technology
- Assistance from project officers delivering trial was very helpful in building participants confidence
- In low cycling contexts (such as rural Wales) e-cycling is 'hyper visible' - in its early adoption phase stereotypes of e-cyclists are likely to develop. It is important that the 'image' of e-cyclists that is adopted is inclusive to later adopters aren't put off as they feel 'e-cycling isn't for them'
- One female participant who is a mother wants to champion e-cycles and show all her friends how transformative it has been in her life. Academic research indicates that 'having children' is a very common transition point in a family's (but especially mothers' lives) that move them away from cycling to driving

- Need a broad and positive range of representations of e-cyclists so people feel like it is for them, and they can take it up

3 What are the barriers to long-term recruitment to e-cycling practices?

**Capital cost**

- Market forces will drive cost of e-cycles down as technology improves and economies of scale kick in, but that is not very proactive
- High initial outlay, and since fuel price increase and cost of living were reasons cited for people wanting to trial e-cycles, this is a problem
- The quality (and therefore cost) of e-cycle provided in E-Move are very expensive, cheaper models on the market just aren't as good. Cheaper models should be included in the trial in future years so that participants can get an understanding of what they can expect for their budget

**Road conditions that perpetuate marginalisation**

- Feelings of illegitimacy and vulnerability on the road
- Safety concerns and fear of 'unsafe, aggressive and unpredictable driving behaviour'. Women are over-represented in the group that raised this concern
- Roads and places still designed for cars and not cycles/e-cycles

**E-cycling as an unknown 'entity'**

- Lack of visibility and tacit forms of understanding around e-cycling. Needs to become 'more normal' before mass adoption is likely

4 How can the adoption of e-cycle be increased through addressing the following barriers:

**High cost**

- Government funded discounts or subsidies
- Interest free loan schemes (as currently offered for cars)
- Continuation, extension, and expansion of E-Move trial (or others like it)

**Lack of Infrastructure**

- On-road infrastructure and dedicated cycle lanes
- Further qualitative research on underrepresented groups to understand how infrastructure can serve their needs
- Introduce 'cycling hubs' from which e-cycles can be loaned and stored (dispersed across satellite settlements as well)

**Individual needs and cultural perception**

- Diverse range of e-cycles to cater for everyone's unique needs (eg female participants suggested they might prefer lighter models)
- Participants advocated for Sustrans to deliver an advertising and information campaign to raise awareness (should be more focussed on demo days, guided bike rides and extension of E-Move trial)