E-Move

Annual Report 2021-22

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Contents

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Executive summary

E-Move is an electric cycle loan scheme for residents of Aberystwyth, Rhyl, Barry, Swansea and Newtown, and organisations based in those locations. The project is divided into two strands: e-cycles for communities and e-cargo cycles for Businesses.

This report includes data captured during the first year of the project's activities, from April 2021 to March 2022. 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..

The e-cargo cycle loans were still ongoing at the end of the first year, so follow up data on this strand is not yet available. Evidence on the e-cargo cycle strand is therefore limited to data from the baseline survey and GIS monitoring, and the evidence requirements on the e-cargo cycle strand have only been able to be partially addressed at the time of writing.

E-Cargo Cycles for Businesses

E-cargo cycles were loaned to **7 micro organisations** and **1 small organisation**[14] in **2 locations** in Wales.

Before the loans, the organisations were making **12.5** weekly **car or van trips**.

During the loans, organisations made **1.7** weekly trips by **e-cargo cycle**.

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

Altogether, the organisations are estimated to have saved **130kg of CO_2** by using e-cargo cycles in the place of cars or vans.

On average, each organisation is estimated to have saved **18kg of CO_2** over the course of their loan, or roughly **1.1kg** per week.

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E-Cycles for Communities

- E-cycles were loaned to **130** people across **5** locations in Wales throughout 2021/22.

- **81%** of loans were in urban areas, and **19%** were rural[1].

Active travel trips increased by **25%.**

Car trips dropped by **39%.**

Participants made an average of **3.7** e-cycle trips a week, with average trip length of **4.2 km.**

Altogether, participants are estimated to have saved roughly **470 kg of CO$_2$** by using e-cycles instead of driving.

49% of participants said that **e-cycles enabled journeys that they otherwise would not have been able to make.**

70% of participants reported positive impact on their **health**, and **76%** of users reported positive impact on their **wellbeing**.

- Access to e-cycles facilitated **access to work** and **access to green space.**

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

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

79% of participants intended to **cycle more regularly** after the loan

57% of participants intended to **buy an e-cycle** 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 cycle maintenance skills

- Access to cycle repair

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[1] Loans were classified as urban or rural by project officers, depending on whether participants lived inside or outside of town.

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1.Introduction

E-Move is an electric cycle loan scheme for residents of Aberystwyth, Rhyl, Barry, Swansea and Newtown.

1.1 About the project

The Welsh Government-funded pilot project has been running since April 2021. The project is divided into two strands and operates across five sites. Both South Wales sites (Barry and Swansea) were simultaneously managed by one project officer. Each of the Mid Wales locations (Newtown and Aberystwyth) and Rhyl were managed by a dedicated officer at each location.

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:	• Barry • Swansea • Newtown • Rhyl • Aberystwyth
Bike provision:	• 20 e-cycles per site (80 e-cycles in total)

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:	• Swansea • Aberystwyth
Bike provision:	• 8 e-cargo cycles per site (16 e-cargo cycles in total)

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1.2 About the first annual report

This report captures evidence on the project's activities in the first year of the pilot, from April 2021 to March 2022, and measures against key reporting criteria from Welsh Government (see **Appendix 4.2.1**), measuring the impact of e-cycle and e-cargo cycle hire and loan schemes delivered as part of E-Move.

1.3 E-Move Programme Outputs 2021-22

In the first year of delivery, E-Move recorded the following outputs:

Six training, promotional and outreach activities were conducted, including try-out sessions and events in schools or targeted districts (see Notes – several e-cycles were moved from Newtown to Aberystwyth, as officers coordinated their efforts to match demand and capacity across Mid Wales.

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- **Table 3)**

1.3.1 E-cycles for communities

- One hundred and sixty-eight e-cycles loans were made to 130 individuals
  - 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

Seventy-nine e-cycles were acquired and held in the delivery team's inventory (see

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- **Table 1)**
  - Eleven different e-cycle models loaned out to beneficiaries

These cycles were split evenly among the five sites (see

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▪ **Table 2)**

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Table 1: E-cycles in the delivery team's inventory, by model

E-cycle model	Number of cycles
Benno e-joy	8
Bergamont E-ville Edition 50	3
Bergamont E-ville Edition 54	5
Bergamont E-ville Expert Rigid 46	1
EMU Classic	1
EMU EVO Crossbar	2
EMU EVO Step through	2
M6L Brompton	3
Tern GSD 10	10
Tern HSD P9	17
Tern HSD S8i	27
Total	79

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Table 2: E-cycles in the delivery team's inventory, by model and site location

E-cycle model	Aberystwyth	Barry	Newtown	Rhyl	Swansea
Benno e-joy	1	2	1	2	2
Bergamont E-ville Edition 50	2	1	0	0	0
Bergamont E-ville Edition 54	0	1	1	1	2
Bergamont E-ville Expert Rigid 46	0	0	0	1	0
EMU Classic	0	0	1	0	0
EMU EVO Crossbar	1	0	1	0	0
EMU EVO Step through	1	0	1	0	0
M6L Brompton	1	1	0	1	0
Tern GSD 10	1	4	1	2	2
Tern HSD P9	3	0	2	6	6
Tern HSD S8i	0	10	5	7	5
Total	10	19	13	20	17

Notes – several e-cycles were moved from Newtown to Aberystwyth, as officers coordinated their efforts to match demand and capacity across Mid Wales.

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Table 3: 2021-22 Project year activities

Site	Activities held
Aberystwyth	No activities or training sessions were held during the 2021-22 project year (although several have been conducted or scheduled in the first few months of the 2022-23 project year)
Barry	One event was conducted during the project year
Newtown	Try-out session in November 2021
Rhyl	Visit from Lee Waters, Deputy Minister for Climate Change, in September 2021. Beneficiaries shared their experiences of using the e-cycles.
	Active Journeys / E-Move collaborative networking event at Ffordd Las Community Centre, Rhyl, March 2022. Attended by stakeholders, from Denbighshire County Council, Transport for Wales, Rhyl Town Council, as well as current and prospective E-Move loan beneficiaries.
Swansea	One outreach event at a school
	An event in Townshill district

1.3.2 E-cargo cycles for businesses

- Ten e-cargo cycle loans were made to nine organisations and businesses

  - E-cargo cycle loans were delivered in two locations: Swansea and Aberystwyth (one Mid Wales cycle was also loaned to the Newtown site)

Sixteen e-cargo cycles were acquired and held in the delivery team's inventory (see

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- **Table 4)**
  - Four different e-cargo cycle models were held in the repository and loaned out to beneficiaries. The locations of these different models are recorded in **Table 5**.

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Table 4: E-cargo cycles in the delivery team's inventory, by model

E-cycle model	Number of cycles
2021 Bergamont E-Cargoville	4
Cube Cargo Hybrid	4
XYZ cargo cycle	4
Urban Arrow Shorty	4
Total	16

Table 5: E-cargo cycles in the delivery team's inventory, by model and site location

E-cargo cycle model	Aberystwyth	Barry	Newtown	Rhyl	Swansea
2021 Bergamont E-Cargoville	2	0	0	0	2
Cube Cargo Hybrid	2	0	0	0	2
XYZ cargo cycle	2	0	0	0	2
Urban Arrow Shorty	2	0	0	0	2
Total	8	0	0	0	8

Notes – Both Cubes based in Aberystwyth have been loaned to the Newtown site. One of the XYZs in Swansea has been loaned to Rhyl; the other was temporarily loaned to Newtown.

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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-cycles and e-cargo cycles. For disaggregated statistics, please visit the sections presenting loan information for e-cycles (**Data on length of hire and loan periods, trip numbers, trip purposes, and trip lengths)** and e-cargo cycles (**Loan lengths and characteristics**).

Cycle loan numbers

Loans were made to 139 unique individuals or organisations/businesses. Some loan beneficiaries swapped their cycles once or more while their loans, resulting in a higher count of cycle loans. As shown in **Table 6**, e-cycle and e-cargo cycle loans, combined, had a cumulative duration of 7101 loan days (which equates to almost twenty years), averaging at just over seven weeks per rider loan.

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

Table 6: Loan numbers and lengths for e-cycles and e-cargo cycles combined

Loans	Total loan days	Average days per loan (mean)	Average days per loan (median)
139	7,101	51	43

Table 7 presents an overview of the number of urban and rural loans (also visualised in **Figure 1**), and loan durations (shown in **Figure 2**), by their urban/rural classification. Eighty-

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two per cent of loan beneficiaries were in urban areas; urban loans also lasted over a quarter longer than rural loans on average.

Table 7: Loan numbers and lengths for e-cycles and e-cargo cycles combined, by urban/rural classification

Urban/rural classification	Loans	Total loan days	Average loan length (days)
Urban	114	6112	54
Rural	25	989	40
Total	139	7101	51

Figure 1: Loan numbers by urban/rural classification[1]

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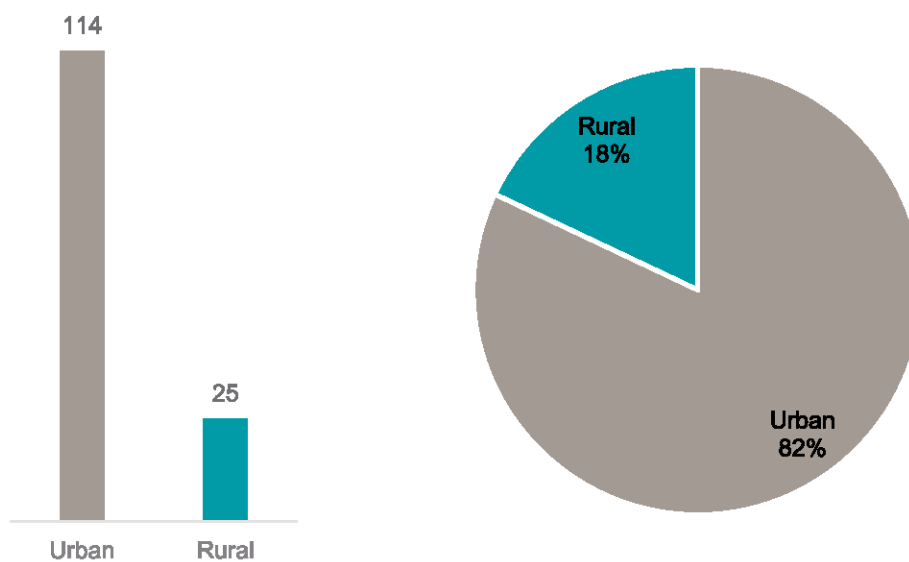
Figure 2: Average (mean) loan lengths (days) by urban/rural classification
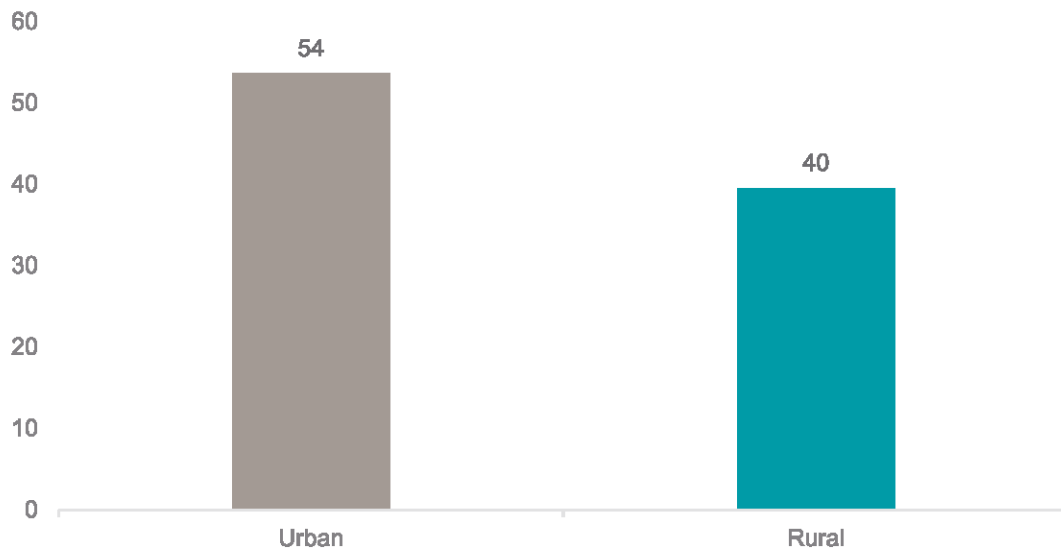
Figure 3 breaks down loan numbers by their geographical location. Significantly more loans took place in Rhyl than at other sites.

Figure 3: Loan numbers by location
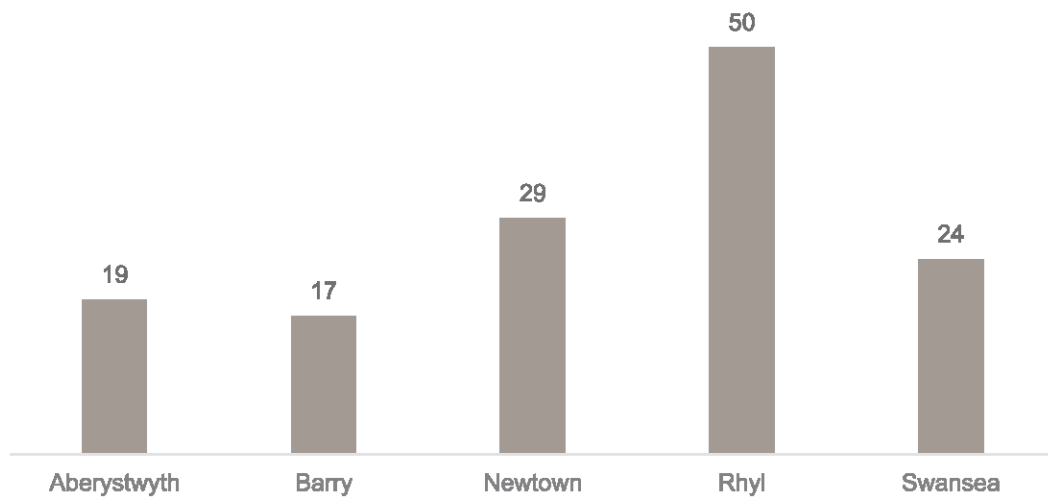
2.2 E-cycles for Communities

The E-Move project loaned e-cycles to 130 people during the 2021-22 project year. These were distributed across all five project locations, as shown in **Table 8**.

Table 8: Distribution of E-cycle loans across locations

Location	Number of loans
Aberystwyth	14
Barry	17
Newtown	29
Rhyl	50
Swansea	20
Total	130

105 participants (81%) resided in urban areas, while 25 (19%) were based in rural locations.

Figure 4: Urban and rural e-cycle loans (percentage share)

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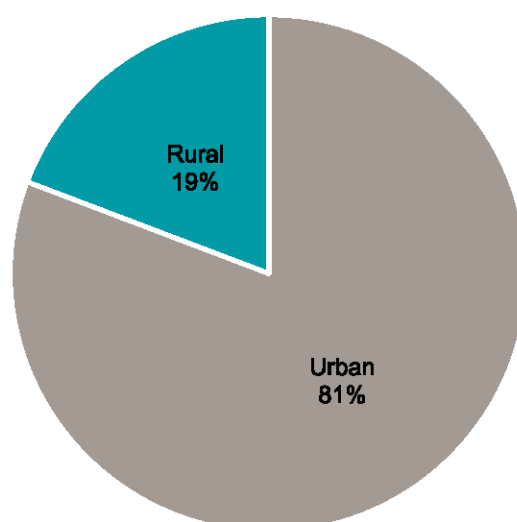
2.3 E-Cargo Cycles for businesses

Nine businesses and organisations in Aberystwyth and Swansea participated in the e-cargo cycle loan scheme. All the loans were ongoing at the end of March 2022. All e-cargo cycle loans are classed as urban.

Table 9: E-cargo cycle loan numbers by location

Location	Number of loans
Swansea	3
Aberystwyth	6
Total	9

3. Evidence

This section addresses the evidence requirements in the Welsh Government reporting criteria set out in Appendix 2.

3.1 E-cycles for communities

3.1.1 Demographic profile of participants

Gender

60% of participants were male, 39% were female, and 1% selected 'prefer not to say'. **Table 10** shows the split of responses between all the gender options in the survey.

Table 10: Gender among participants (based on 119 responses in the pre-loan survey)

Gender[2]	Count	Share (%)
Female	47	39%
Male	71	60%
Prefer not to say	1	1%
No response	3	
Total (excluding non-responses)	119	100%

[2] No survey respondents identified as non-binary or selected 'other'/preferred to self-describe.

Figure 5: Gender among survey respondents (based on 119 responses to the pre-loan survey)

60%

39%

1%

Female   Male   Prefer not to say
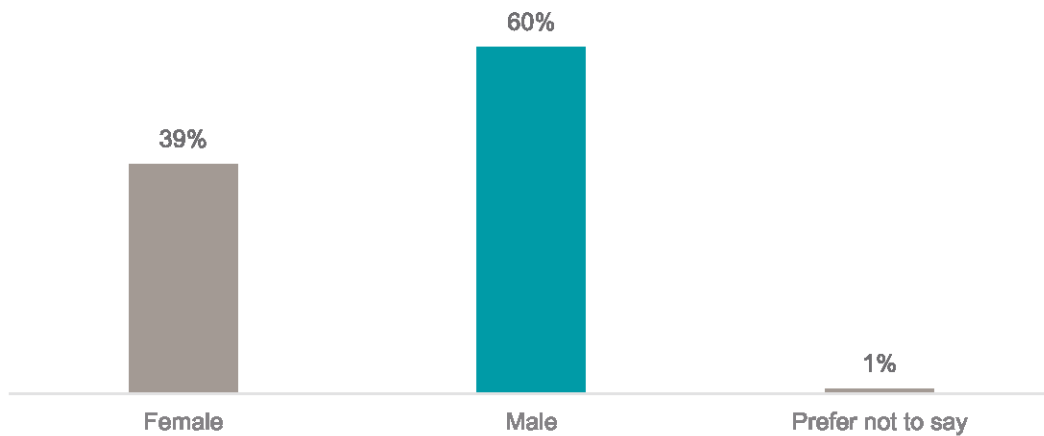
Gender among Urban and Rural participants

Figure 6 shows the gender of participants in urban and rural areas. In rural areas, 61% of participants identified as female, and 35% as male, with 4% choosing 'prefer not to say'. In urban areas, 34% of participants were female, and 66% were male.

Figure 6: Gender among urban and rural participants (based on 108 responses to the pre-loan survey, including 23 rural loans and 85 urban loans)

66%

60%

34%

36%

0%

4%

Urban   Rural

■ Female
■ Male
■ Prefer not to say

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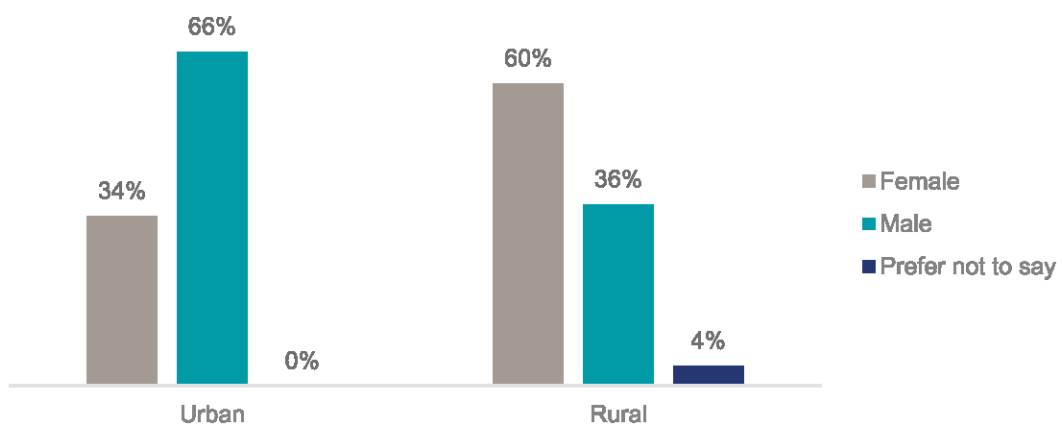
Age

People aged 45-54 made up the largest cohort among respondents to the pre-loan survey, followed by those aged 35-44.. The age structure of the pre-loan survey population resembles a bell-shaped curve, peaking at the 40s and 50s, as shown in **Figure 7**.

Figure 7: Age profile of participants (based on 124 responses to the pre-loan survey)
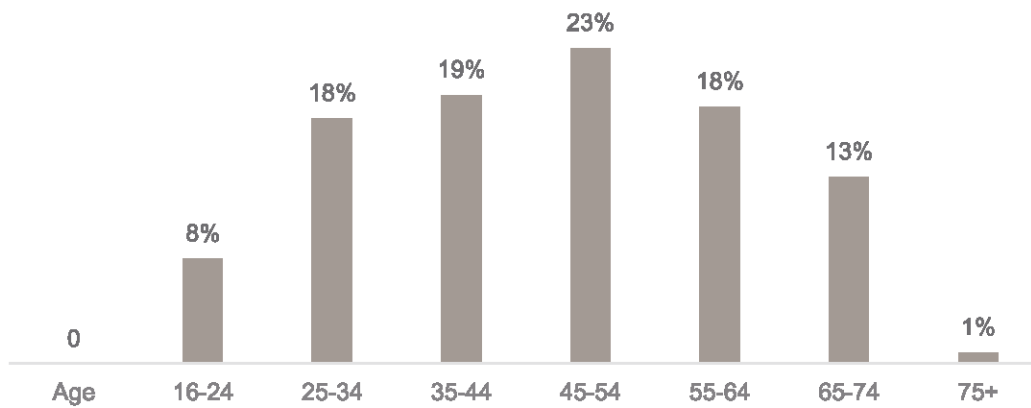
Over-55s and under-25s made up a relatively larger proportion of survey respondents in rural areas (n=23) than in urban areas (n=88). In rural locations, 55-64-year-olds accounted for over a third of the sample. Urban areas had a more bell-shaped population curve, with relatively higher numbers of 25-44-year-olds among survey respondents.

Figure 8: Age profile of respondents to the pre-loan survey by urban/rural classification (based on 117 respondents to the pre-loan survey, including 25 rural loans and 92 urban loans)
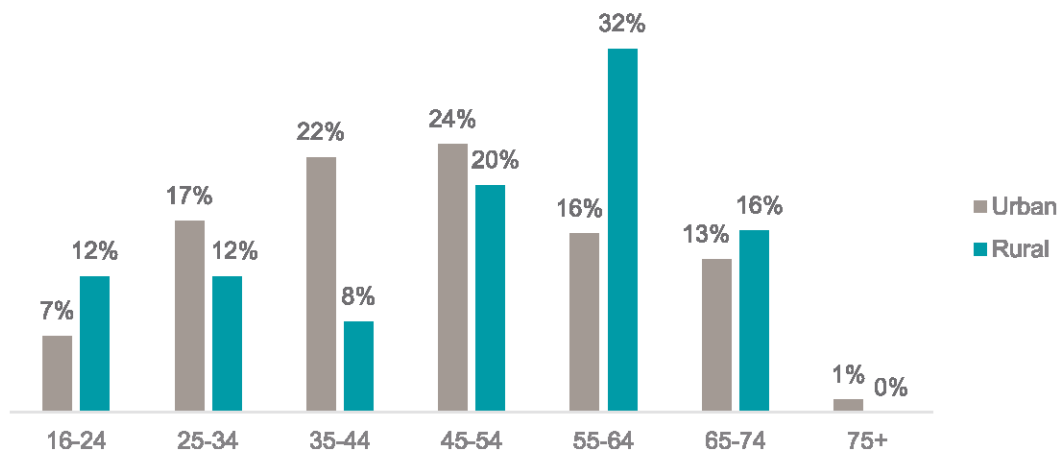
Employment status

Around a third of survey respondents were full-time employees, and just over half of respondents were in some form of employment[3]. Around a third of respondents were either retired or unemployed, or studying while not working. Among the 15 respondents that selected 'other', the majority were not in work, but of those several were either carers, or volunteers, or were starting work soon.

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3 Sixteen per cent of respondents were part-time employees and 11% were self-employed.

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Figure 9: Employment among participants (based on 137 responses from 130 respondents to the pre-loan survey)[4]
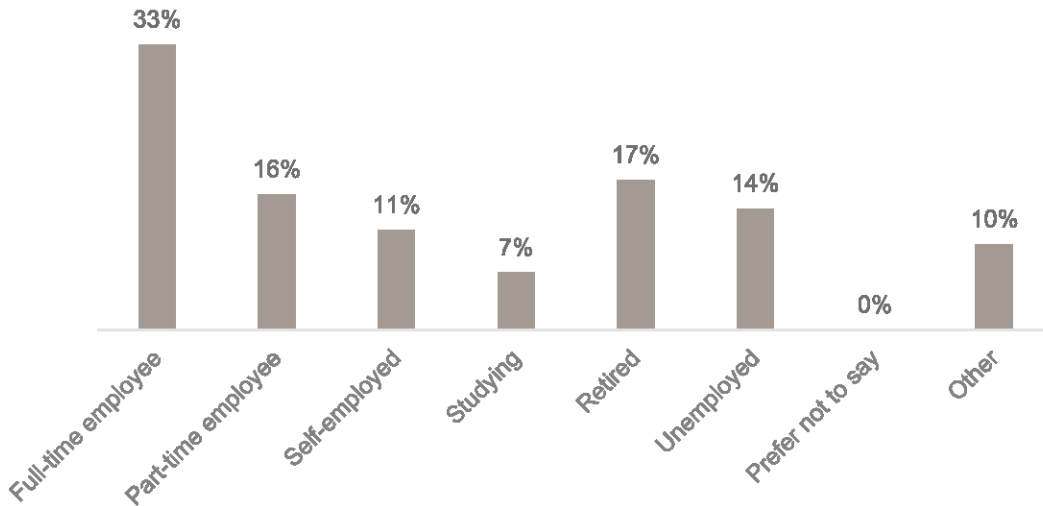
In line with the age profiles of urban and rural loan beneficiaries, rural areas (n=24; 26 responses) saw a higher percentage of retirees, whereas a greater proportion of survey respondents in urban areas (n=90; 92 responses) were full-time employees.

Figure 10: Employment among participants by urban/rural classification (based on 121 responses to the pre-loan survey, including 27 rural loans and 94 urban loans)
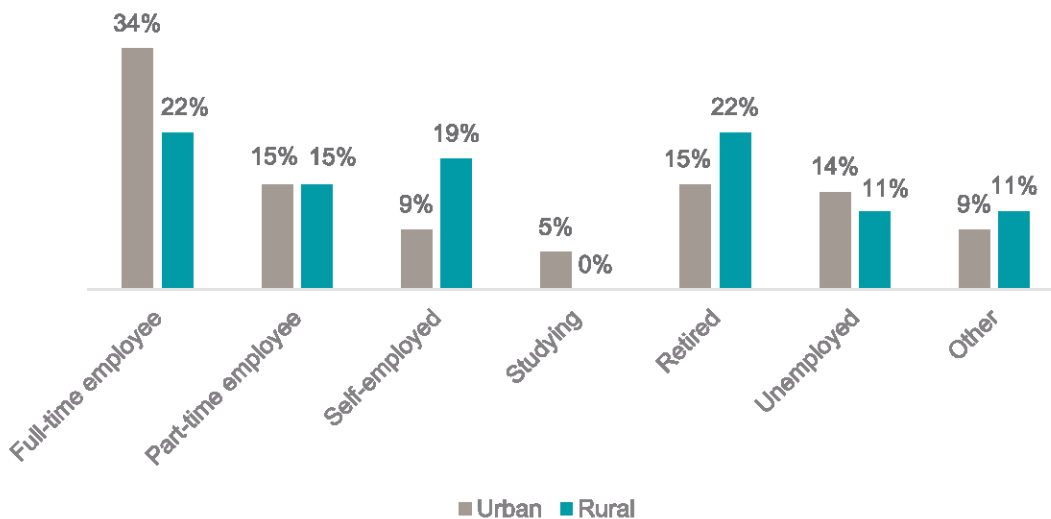
[4] Responses totalled 137 due to some respondents having selected multiple categories.

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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 11** indicates, almost one quarter of the 126 pre-loan survey participants who answered this question considered themselves to have a disability or chronic health condition.

Figure 11: Responses to the question "Do you have any long-term physical or mental health conditions or illnesses lasting (or expected to last) 12 months or more?" (Based on 126 responses to the pre-loan survey)
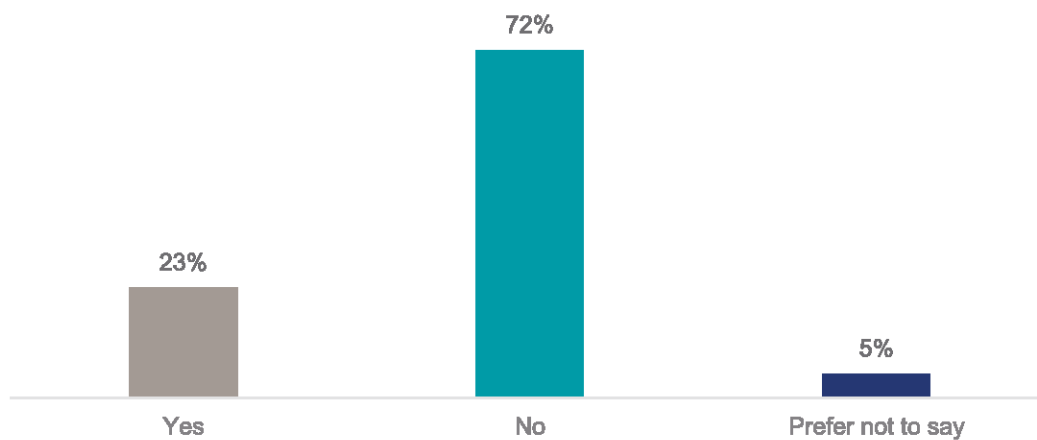
The proportion of survey respondents who identified as having a disability or long-term health condition was roughly the same in urban and rural settings (see **Figure 12**), in line with estimates that around one in five people live with a disability nationwide.

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Figure 12: Share of respondents to the pre-loan survey with disabilities/long-term health conditions, by urban/rural classification (based on 113 responses to the pre-loan survey, including 24 rural loans and 89 urban loans)
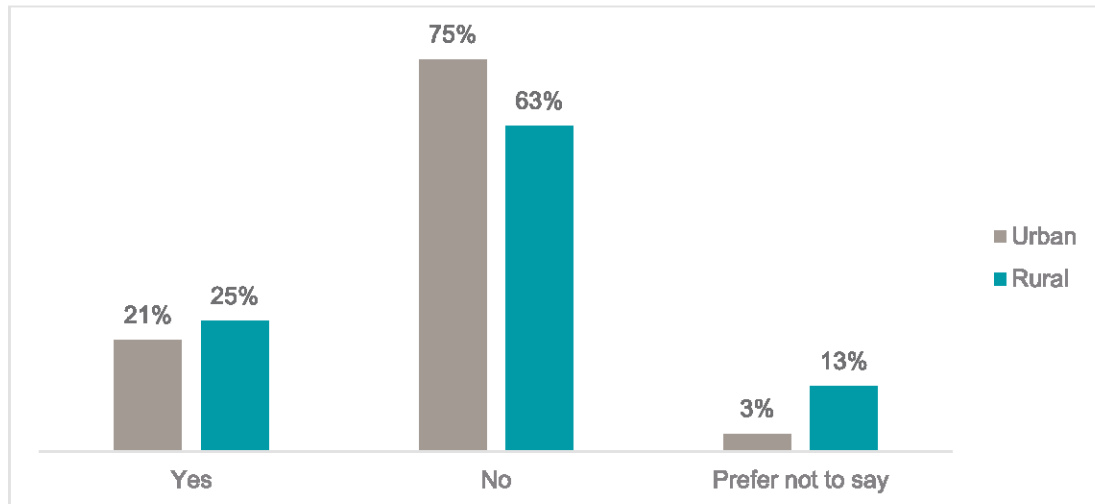

Ethnicity

White survey respondents made up close to 90% of the total, with the remainder split between Asian, Black and mixed ethnic groups, or preferring not to state their ethnicity.

Figure 13: Ethnicity of participants (based on 129 responses to the pre-loan survey)
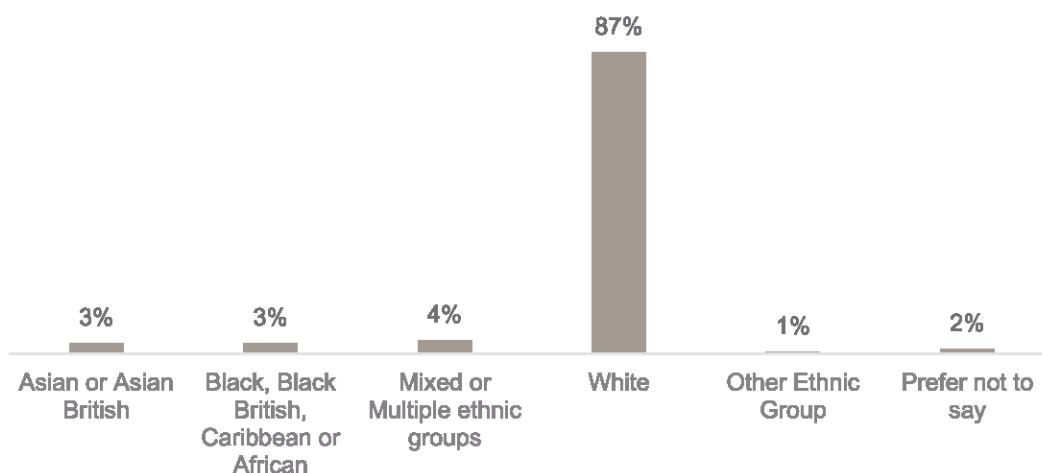
All survey respondents associated with rural loans either identified as White or preferred not to state their identity. Urban loan beneficiaries where also predominantly White, but Asian, Black and mixed/multiple ethnicity respondents each made up 3 or 4% of all responses.

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Figure 14: Ethnicity of participants (based on 116 responses to the pre-loan survey, including 25 rural loans and 91 urban loans)
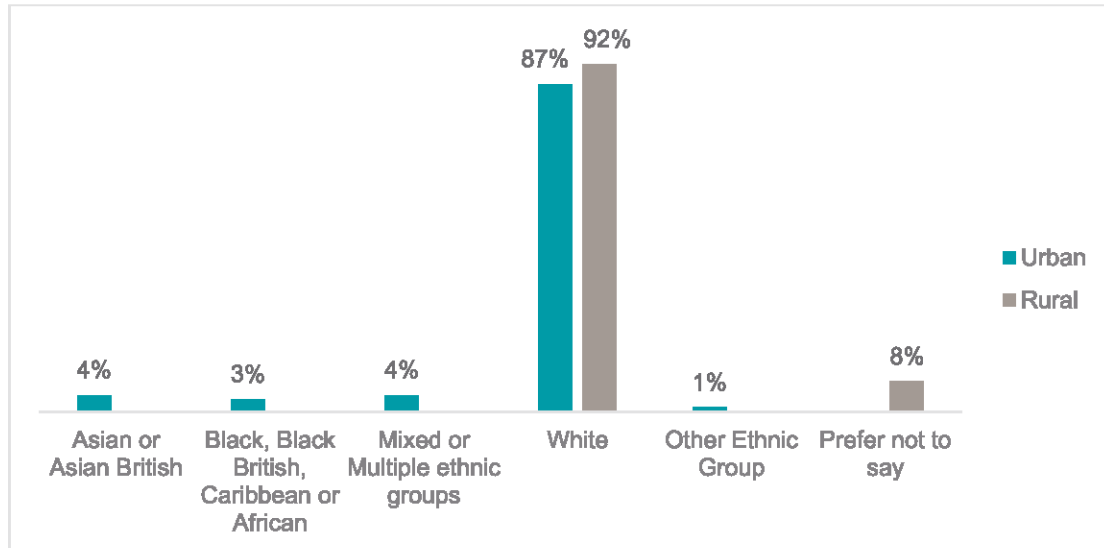
3.1.2 Data on length of hire and loan periods, trip numbers, trip purposes, and trip lengths

On average, each participant borrowed an e-cycle for 47 days and made 24 e-cycle trips during their loan, with an average trip length of 4.2 km. This translates to around 3.7 weekly trips per loan, meaning that on average each loan beneficiary used their e-cycle at least once every other day.

Each rider travelled an average of just over 100 km over the course of their loan and spent almost 10 hours using their e-cycle. Travel speeds approached 11 km/hr on average.

Table 11: E-cycle loan data and trip statistics

Average loan length	47 days
Number of trips per loan	24
Average trip distance	4.2 km
Maximum trip distance	69 km

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Average distance travelled (per rider)	103 km
Average trip duration	0.4 hours
Average time spent travelling (per rider)	9.7 hours

The most common purposes for e-cycle trips were Exercise/Relaxation (28%) and Commuting (25%). **Table 12** shows all the trip purposes reported by e-cycle loan recipients.

Table 12: Purposes of e-cycle trips, taken from post-loan survey data (n=72)

Purpose	%
Exercise / Relaxation	28%
Commuting	25%
Shopping	14%
Social / Entertainment	11%
Business	9%
Personal business	6%
Education	3%
Escort Trips	2%
Volunteering	2%

3.1.3 Travel mode share from participants prior to participation in project

Prior to participation in the project, 39% of participants' trips were made by car (as driver or passenger). 37% of trips were made on foot, and 10% by cycle. **Figure 15** shows the mode share for all weekly trips prior to participation.

Four participants reported making some trips by e-cycle before the start of their loans, reporting 11 weekly e-cycle trips between them.

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Figure 15: Percentage of weekly trips by travel mode prior to participation (based on 122 responses to the pre-loan survey)
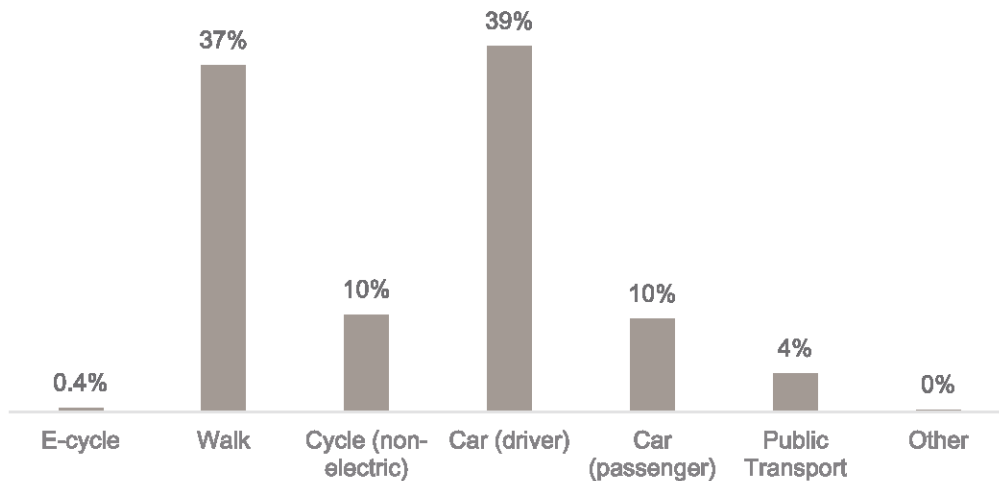
3.1.4 Travel mode share while participating in the participant

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 25%, from 10.7 weekly trips before the loan to 13.5 weekly trips during the loan (see **Table 13**).

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 79%, from 2.1 weekly trips to 0.4.

Participants also used the e-cycles to replace walking trips, which dropped by 41%, from 8.5 to 5.

Participants who used the e-cycle to replace other active travel journeys reported making longer and more varied journeys using the e-cycles than they would have by conventional cycle or on foot. The electric assist enabled them to cycle up hills, and gave them reassurance that they would have enough energy to cycle home.

"I usually walk for exercise, but I cycled more and further."

Post-loan Community E-cycle survey

Table 13: Active travel trips before and after the loan

	Walk	Cycle (non-electric)	E-Cycle	All Active travel
Before the loan	8.5	2.1	0.2	10.7
During the loan	5.0	0.4	8.0	13.5
Change	-3.5	-1.6	7.8	2.7
% change	–41%	-79%	4209%	25%

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

As shown in **Table 14**, car trips reduced by 39% during the loan, from 8.8 weekly trips before the loan to 5.4 during the loan. The reduction was greater for car trips made as a driver, which fell by 42%, while trips as a car passenger fell by 29%.

Table 14: Car trips before and after the loan

	Car driver	Car passenger	All car trips
Before the loan	6.9	1.9	8.8
During the loan	4.0	1.4	5.4
Change	-2.9	-0.5	-3.4
% change	–42%	-29%	-39%

Participants who usually drive reported that participating in the participant had enabled them to reduce their car usage. As shown in **Figure 16**, 50% of all the respondents agreed or strongly agreed that "Loaning the e-cycle enabled me to reduce my car usage". That is 64% of respondents who had access to a car.

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Figure 16: Perceived impacts on car usage. (Based on 64 responses)

Loaning the e-cycle enabled me to reduce my car usage

23%	27%	16%	6%	6%	22%

■ Strongly agree ■ Agree ■ Neither agree nor disagree ■ Disagree ■ Strongly disagree ■ Not applicable – I do not drive/ have access to a car
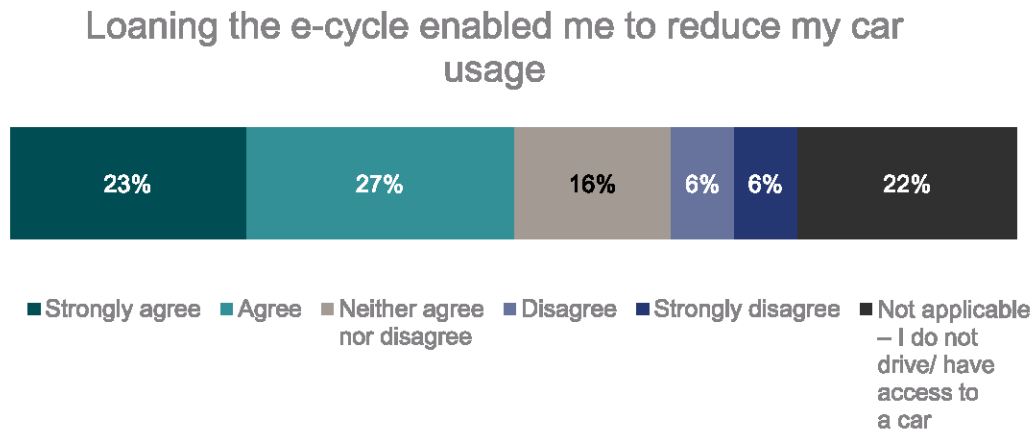
Participants who used the e-cycles to replace car journeys reported that for some journeys the e-cycle was just as quick as using a car and was easier to park.

"The school run to St Curig, when the weather was fine, was much better than taking the car! More fun for the kids. Didn't have to worry about getting there early to park! And I actually found it took no longer than if I had picked them up in the car!"

Post-loan community e-cycle survey

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

We estimate[5] that 32% of e-cycle trips were replacing walking, 29% replaced car trips (as a driver or passenger), and 16% replaced non-electric cycling trips, while 24% of trips would not have been made.

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[5] 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.

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Figure 17: Proportion of e-cycle trips that would otherwise have been made by other modes

Pie chart:
- Walk, 32%
- Cycle (non-electric), 16%
- Car (driver), 25%
- Car (passenger), 4%
- Public Transport, 0%
- Other, 0%
- Not travelled, 24%
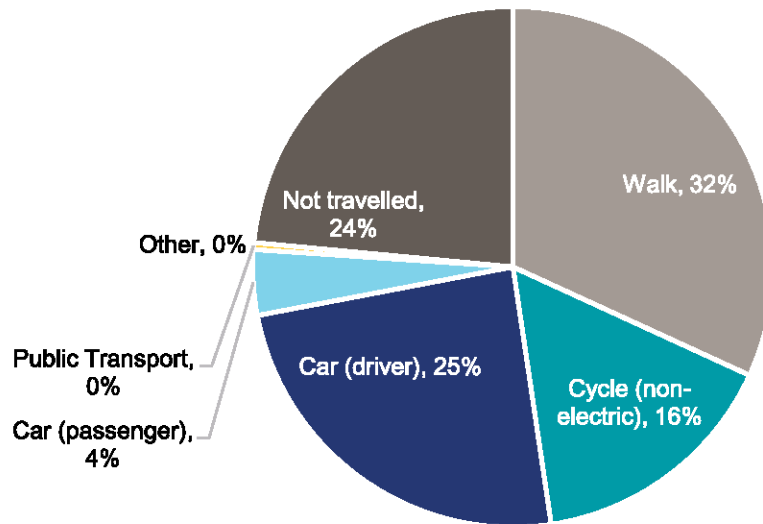
3.1.5 Differences in effect on travel behaviour between rural and urban areas

Overall, as shown in **Figure 18**, loan beneficiaries living in urban areas travelled further than those living in rural areas (i.e. outside of towns).

Figure 18: Average cumulative distance travelled (km) per loan beneficiary, by urban/rural classification (n=106)

Bar chart:
- Urban: 109
- Rural: 76

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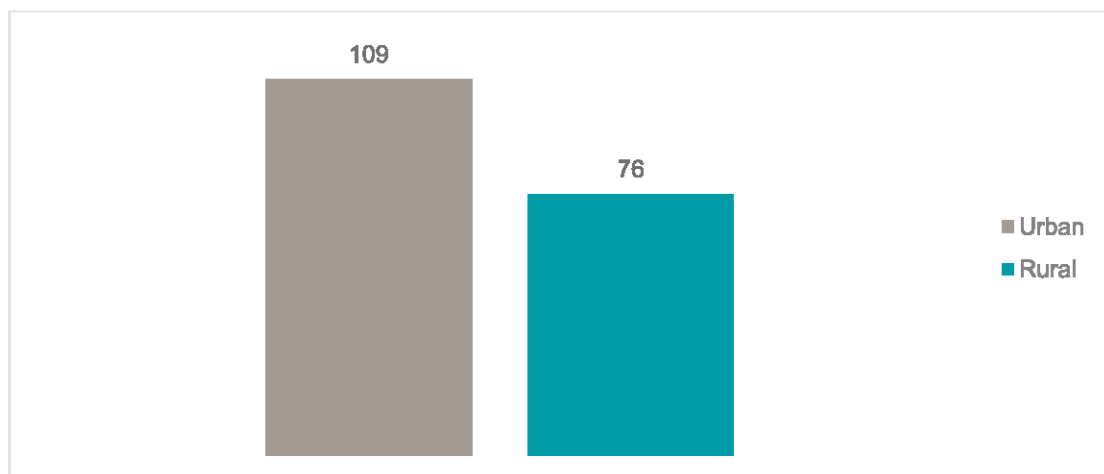
As shown in **Figure 19**, urban loan beneficiaries made more trips, which were shorter on average. Loan beneficiaries living in rural areas typically made longer but more infrequent trips.

Figure 19: Mean trip distance (km) by urban/rural classification (n=106)
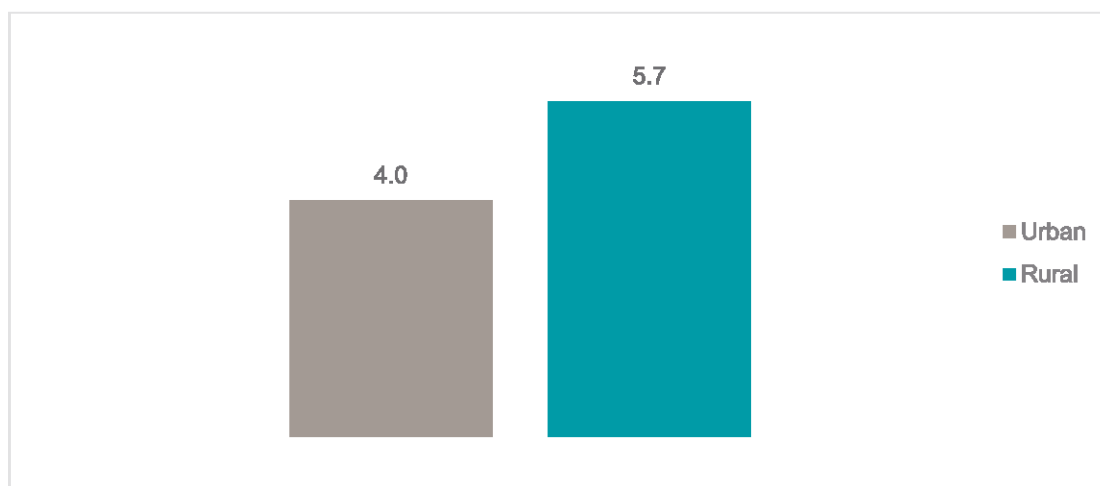
When we consider the median trip distance rather than the mean, as in **Figure 20**, the gap between urban and rural trip lengths widens.

Figure 20: Unweighted average of riders' median trip distances (km), by urban/rural classification (n=106)

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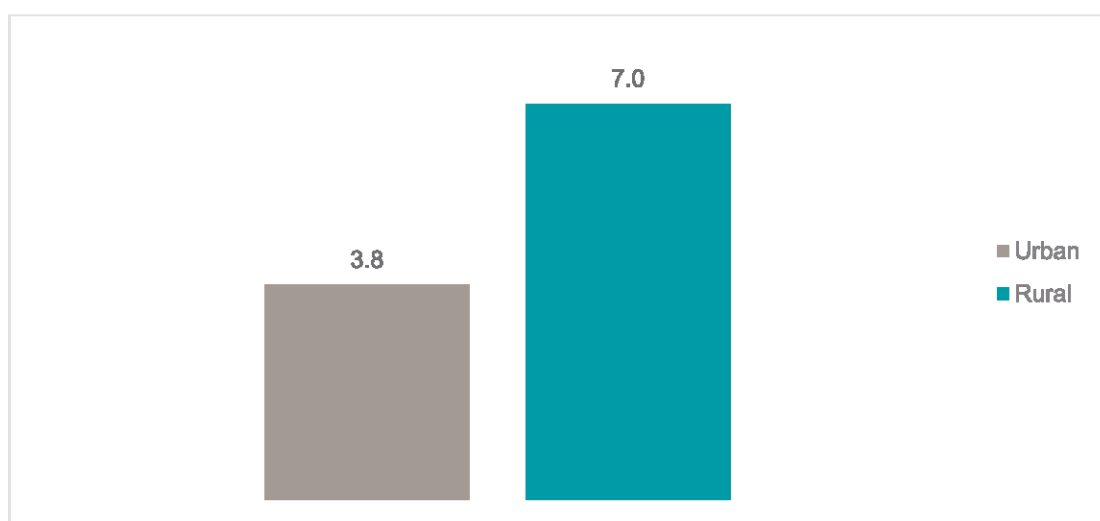
Rural cyclists were able to travel at slightly higher speeds than urban cyclists on average (see **Figure 21**).

Figure 21: Average speed (km/hr) by urban/rural classification (n=106)
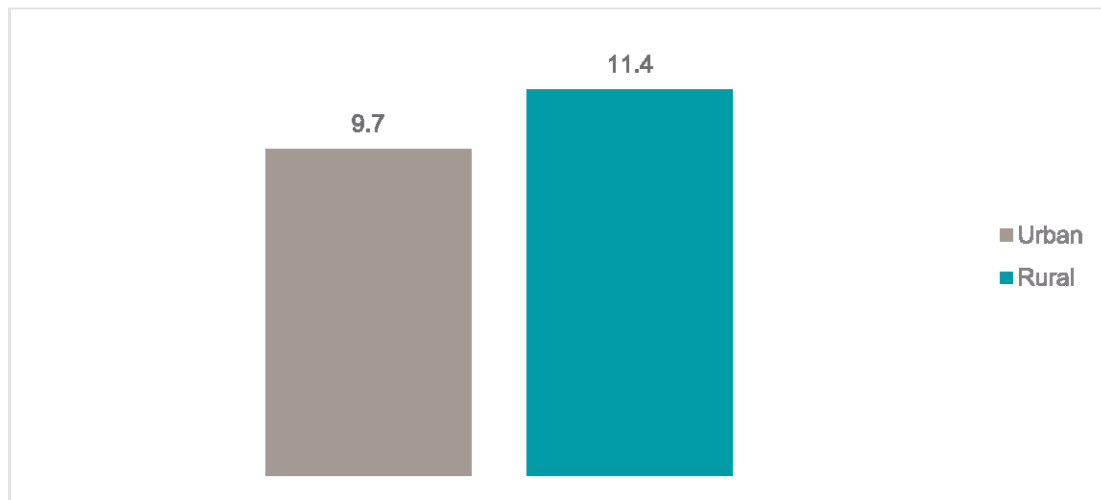
3.1.6 An estimate of the average carbon saving per person / loan, again distinguishing between impacts in rural and urban areas

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 sections on See.Sense monitors and carbon savings contained within **Appendix 1: Methodology.**

Carbon savings from the use of e-cycles

We estimate that each e-cycle loan yields carbon dioxide (CO_2) savings of around **4.4kg**, although this figure could be as high as 15kg. **Table 15** presents potential CO_2 savings per loan beneficiary and overall.

On average, each trip would save around 0.63kg of carbon dioxide compared to an equivalent car journey[6]. If all trips made with the loaned e-cycles replaced car journeys, we estimate that the CO_2 savings would exceed 15kg per loan.

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6 This is calculated assuming that replaced vehicle journeys emit 150g of CO_2 per km.

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Realistically, 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 4.4kg per loan, in line with our calculation that around 29% of e-cycle trips replace car journeys (including journeys made as either drivers or passengers).

See **Section 4.2.2** for an explanation of the analysis.

Table 15: Maximum and estimated CO_2 savings from the use of e-cycles (based on GPS data returned from 106 out of 130 e-cycle loan beneficiaries)[7]

CO_2 savings	Per rider (kg)	Total (kg)
Potential maximum	15	1600
Estimate replacing car driver journeys[8]	3.8	400
Estimate replacing car passenger journeys[9]	0.63	67
Estimate replacing driver and passenger journeys combined	4.4	470

Note – these calculations assume emissions of 150g of CO_2 per km travelled. Figures are rounded to two significant figures.

Carbon savings in rural and urban locations

Estimated carbon savings in urban areas were greater than estimated savings in rural areas, as shown by **Figure 22**.

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7 Note that totals presented here are likely to be underestimated by up to 20%, because 24 loans did not have associated GPS data.
8 This is based on our analysis of survey responses, which predicts that 25% of e-cycle journeys would otherwise been made within vehicles, as drivers.
9 This is based on the analysis of survey responses, which estimates that 4% of e-cycle journeys would otherwise been made within vehicles, as passengers.

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Figure 22: Estimated average CO_2 savings (kg) per loan by urban/rural classification (n=106)
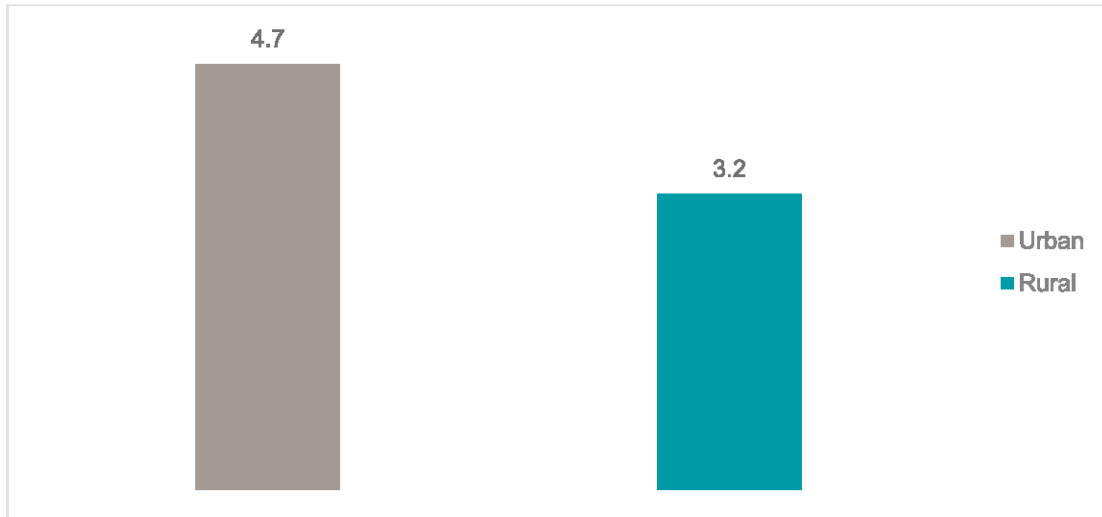
Overall, due to the higher number of urban loans, cumulative carbon savings were far higher across urban loans, as shown in **Figure 23**.

Figure 23: Estimated CO_2 savings (total) by urban/rural classification[10] (n=106)
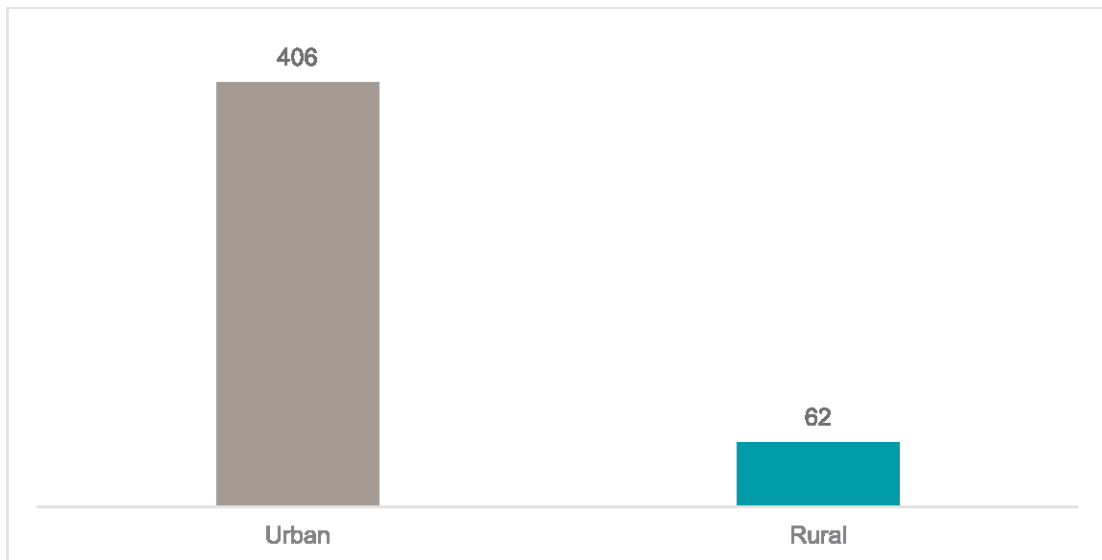
[10] Note that totals presented here are likely to underestimate real values by up to 20%, because 24 loans did not have associated GPS data.

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3.1.7 Qualitative data from users on how participation in participants has impacted them; their health and well-being and whether it enabled trips they would otherwise not have been able to make

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

49% 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 24).

Access to e-cycles enabled some users to travel despite limitations due to age or health conditions. The e-cycles also enabled users to overcome limitations due to poor public transport, or not being not having access to a car.

Figure 24: 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 64 responses to the post-loan survey)

Loaning the e-cycle enabled me to make journeys I otherwise would not have been able to make

20%	30%	31%	9%	9%

■ Strongly agree ■ Agree ■ Neither agree nor disagree ■ Disagree ■ Strongly disagree
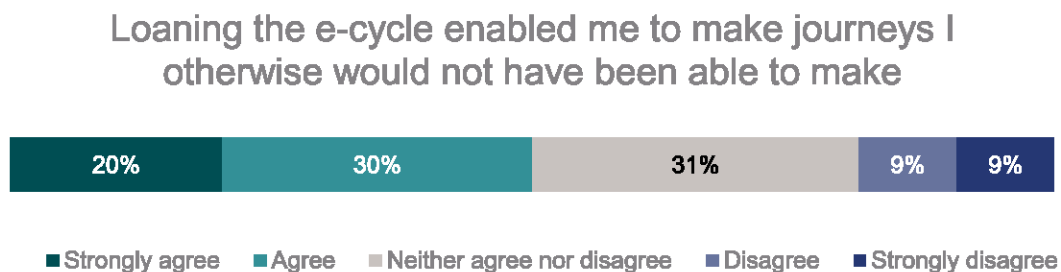
Trips enabled by e-cycles

- Access to work: Many participants used the e-cycles for commuting, and several participants reported that having the e-cycles allowed them to take on work they would not otherwise have been able to do, or helped them to be at work on time, which had previously been challenging

- Access to green space: Participants were able to explore their local area, visiting places further away than they would otherwise have been able to reach, accessing places they could not get to by car, and using local cycle paths.

- Making more frequent journeys

- Shopping locally instead of at big supermarkets, because the e-cycle enabled them to make more frequent, smaller shopping trips

- Getting out and about and staying mobile

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Impacts on Physical Health

70% of respondents agreed or strongly agreed with the statement "Loaning the e-cycle has had a positive impact on my health" (see **Figure 25**).

Figure 25: Participants agreeing or disagreeing with the statement "Loaning the e-cycle has had a positive impact on my health". (Based on 64 responses)

"For exercising, I found the e-cycle very rewarding, as my walking capabilities have diminished due to my hip. Instead of the weight bearing on my joints the cycle took the brunt."

Post loan community survey

Loaning the e-cycle has had a positive impact on my health

25%	49%	20%	3%

■ Strongly agree ■ Agree ■ Neither agree nor disagree ■ Disagree ■ Strongly disagree
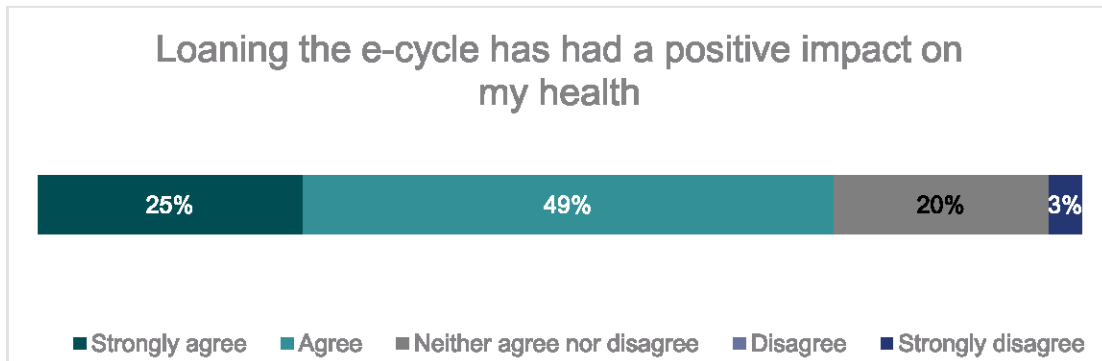
Participants reported:

- 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 getting to a swimming pool

Physical health benefits included:

- Improved fitness
- Losing weight

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

Impacts on mental health and wellbeing

76% of respondents agreed or strongly agreed with the statement "Loaning the e-cycle has had a positive impact on my wellbeing".

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Figure 26: Participants agreeing or disagreeing with the statement "Loaning the e-cycle has had a positive impact on my wellbeing". (Based on 63 responses)

Loaning the e-cycle has had a positive impact on my wellbeing

| 27% | 44% | 27% | 3% |

■ Strongly agree ■ Agree ■ Neither agree nor disagree ■ Disagree ■ Strongly disagree
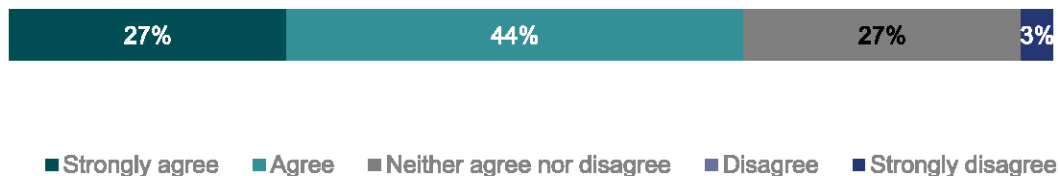
Wellbeing and mental health benefits included:

- Enabled socialising and reduced isolation
- Independence (not relying on lifts)
- Fresh air/being outside
- Improved confidence
- Improved resilience
- Having a new hobby/interest in life
- Freedom

"I suffer from depression which is worsened by isolation. The e-bike has given me freedom to make positive actions to counter this."

Post loan community survey

Barriers to active travel overcome by electric assist

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 cycle against the wind. 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 not have made by non-electric cycle or on foot, because it would have taken too long.

- **Sense of security**: the extra power made travelling easier and more appealing, and gave the users a sense of security in setting out on a journey, that they would be able to get home without running out of strength.

- **Increased safety in traffic**: participants reported being able to choose more hilly routes to avoid traffic, and feeling safer in traffic than they would on a non-electric cycle, because they were able to travel at the speed of the traffic.

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3.1.8 Impact of participation on perceptions of cycling and likely future behaviour/intentions at the end of loan / hire period

Intentions to cycle more in future

The project had a positive impact on participants' perceptions of cycling, with 79% 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 27: Responses to the question "In the next year, how likely is it that you will do the following?"

Cycle more regularly in the next year than you have done in the past

39%	40%	11%	5%	5%

■ Very likely ■ Likely ■ Neither likely nor unlikely ■ Unlikely ■ Very unlikely ■ Not sure

Choose to cycle for some journeys that you previously made by car

32%	35%	17%	12%	5%

■ Very likely ■ Likely ■ Neither likely nor unlikely ■ Unlikely ■ Very unlikely ■ Not sure
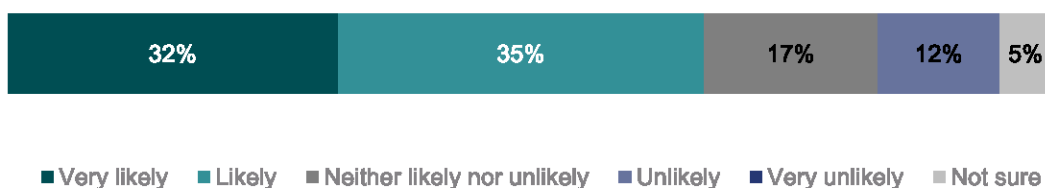
Intention to buy an e-cycle

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, 54% of respondents said they were likely or very likely to buy an e-cycle in the next year, and 3% (2 people) said they had already bought an e-cycle during the loan period.

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Figure 28: Responses to the question "In the next year, how likely is it that you will buy an e-cycle?". (Based on 61 responses)

In the next year, how likely is it that you will buy an e-cycle?

| 3% | 25% | 30% | 7% | 13% | 8% | 15% |

- N/A - I bought a cycle during the E-Move loan
- Very likely
- Likely
- Neither likely nor unlikely
- Unlikely
- Very unlikely
- Not sure
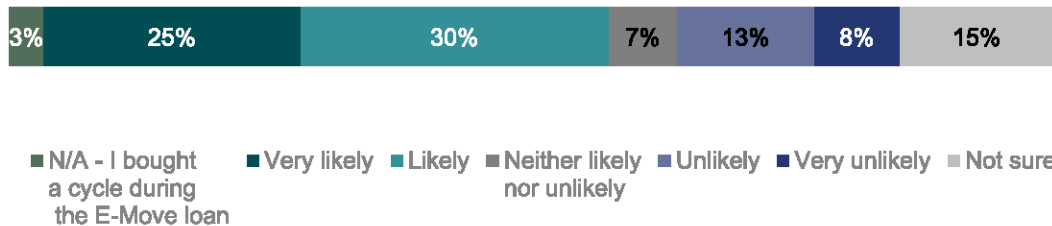
The most frequently reported barrier to buying an e-cycle was **cost** - 75% of respondents to the question "If you are not sure or are unlikely to buy a cycle or an e-cycle in the future, what kind of incentives or changes would make you more likely to do so?" mentioned the cost of e-cycles in their responses.

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

- The opportunity to buy the cycles second hand at the end of the loan

- Loans or grants to support e-cycle purchases

- Longer loans

- Loaning out less expensive models, so that participants can afford to buy models they have tried

- Buying an e-cycle conversion kit as a cheaper alternative

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

- Secure storage

- Support with cycle maintenance skills

- Improved access to cycle repair - one participant reported living at a significant distance from the nearest cycle shop, so they were not confident that they could bring the cycle in for repairs if it had problems

Intention to buy a non-electric cycle

Some respondents have decided to buy non-electric cycles after the E-Move loan. 16% of respondents said they were likely or very likely to buy a non-electric cycle in the next year,

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and 2% (one respondent) said they had bought a non-electric cycle during the loan. 31% of respondents already owned a cycle at the start of the loan.

Of the respondents who did not already own a cycle, 23% of the reported that they were likely or very likely to buy a non-electric cycle in the next year.

Figure 29: Responses to the question "In the next year, how likely is it that you will buy a regular (non-electric) cycle?" (based on 62 responses)
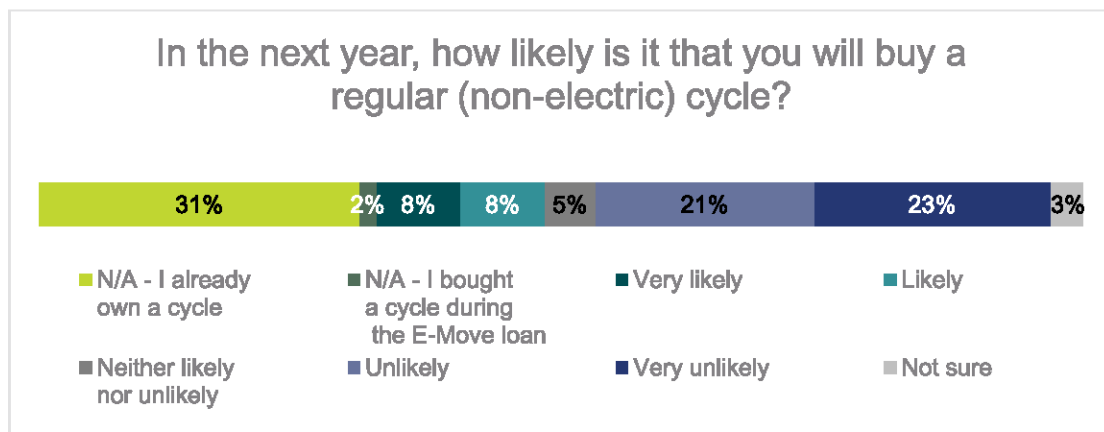
Participants who did not expect to buy an e-cycle within the next year were less likely to say they would cycle more in future. Some participants intended to continue cycling using non-electric cycles after the end of the project, but for other participants having no access to an e-cycle was a barrier to continued cycling.

The main reason for this was the lack of support from the electric assist, but participants also reported that their own cycles were in poor condition, or were less well equipped than the cycles they had loaned.

3.1.9 Perceived barriers to using the e-cycle more

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

- Problems with the e-cycle model used, including:
    - Too heavy
    - Too long
    - Not suitable for hills
    - Not suitable for rough or muddy ground

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- Lack of cycling infrastructure or insufficient lighting at night

- Limited battery life, and anxiety about running out of power

- Weather

- Health problems limiting cycling

- Mechanical problems

- Security - concerns about theft (e.g. lock too short to secure to lamppost)

- Traffic

- Difficulties with other path participants

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

- Good infrastructure

- Social support (e.g. riding with friends)

- Enjoyment

- Encouragement by children

- Valuing the sustainability benefits over using a car

- Cost savings

- Suitable cycle model (e.g. light, sturdy)

- Quality of cycle/equipment (e.g. lights, "modern")

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Increased sense of independence: e-cycles combatting isolation in a rural area

Carol (not their real name) does not drive and lives in an area they describe as "very, very rural", with poor public transport links. Carol had previously cycled to and from work on a non-electric cycle, but the only possible route is along an A-road that is heavily used by haulage lorries and agricultural vehicles. The journey there and back was "terrifying" because of the lack of cycle infrastructure and driver behaviour. Because of the hilly terrain, Carol also found it exhausting cycling a pushbike home after work.

"But it was just transformative, absolutely amazing. I couldn't recommend it highly enough to anybody…"

Carol suffers from quite severe depression and PTSD, and their remote living situation and lack of transport options had increased their feelings of social isolation, negatively affecting their mental health. Loaning an e-cycle helped them to escape feelings of being 'trapped' or over-reliant on others.

"…it meant that I could move myself around independently, without relying on other people or bad public transport; it meant that I could take on more work; it meant that I could do things like go and visit friends and family at any time that I wanted to, without having to rely on anybody and suffer from just that isolation that you can get when you live in a rural place."

Carol found that the experience transformed their perception of cycling and their own ability to be a cyclist, allowing them to see cycling as "a real transport solution, rather than a … a fitness passion kind of thing". When asked whether the loan has influenced the way she will travel in the future, Carol is emphatic: "yes, definitely, definitely!"
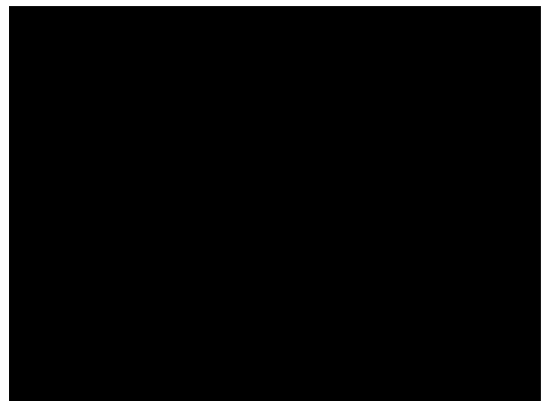
The main drawbacks, as Carol perceived them, were poor infrastructure and cost. They observed that "it's a big initial outlay" and that people in transport poverty, who would benefit the most from access to e-cycles, would struggle to purchase them. Carol was animated talking about ways to help other people to overcome these barriers and share in the benefits of e-cycle use, 'the solution that I've been waiting for', speaking about their ideas for a community hub and cycle paths to local schools.

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Saving time and money, and getting out and about more: the wellbeing benefits of cycling in a small Welsh town

John (not their real name) lives five minutes from a town centre. Unlike Carol, John does have access to public transport links; however, they have found these services to be expensive, sometimes unreliable, and lacking in linkages between many destinations.

Having an e-cycle made it far easier for John to make routine, local trips – if they ran out of food, they would cycle to the supermarket to buy groceries instead of buying snacks and fast food more locally. What was previously a 30-45-minute walk became an easy ten-minute ride. John found that their mental health improved considerably, that they saw loved ones in person more often, and that they were eating more healthily and doing more exercise.

"I don't feel as depressed and stuck in the flat on my own and I've got the choice of going out to visit friends and family, which is a big boost in mental health..."

Like many other loan recipients, John acknowledges that cost is probably the biggest barrier preventing e-cycles being used more widely; they thought a permanent loan scheme with longer loans would help to address this, enabling more people to try cycling. At the same time, they were effusive about the money-saving potential e-cycles hold:

"So, 'You've got the car there, how much are you paying in your car in petrol? Use this bike and how much are you using on electric instead?' It's a big difference if somebody uses a car [...] they look at it and go, 'Wow! That saving in my bank's different. I've got a lot more money.'"

Even compared to public transport, John finds the financial benefits to be significant:

"...with a bike you can charge the battery, say for a pound, and it lasts me two weeks. I'm happy with doing that rather than the paying £4 for one day's trip. It's a big saving".

When asked whether they thought people who either don't cycle or can't cycle very easily would change their views about cycling after trying out an e-cycle, John is just as adamant as Carol that they would. He says: "At first I was a bit hesitant, I thought, 'Ooh no, I don't know if I wanna do this', but once I'd rode it a few times and got used to the bike I was praising it to everybody, recommending them to try and get these electric bikes."

3.2 E-cargo cycles for businesses

All of the e-cargo loans that started in the 2021-22 project year were still ongoing when the year ended, so there is no follow up survey data on the organisations' experiences of the cargo cycles. The Welsh Government reporting criteria have been addressed as far as they can be using pre survey data and the data from the See Sense tracker.

3.2.10   Loan lengths and characteristics

E-cargo cycles were loaned to nine participating businesses and organisations. All these loans (located in and around Swansea and Aberystwyth) were classified as urban.

The average duration of e-cargo cycle loans was 103 days, significantly longer than the 47-day average for community e-cycles.

Both figures understate loan durations, as outstanding loans were cut off at 31/03/2022 for the evaluation of this project year's outcomes and outputs.

As all nine e-cargo cycle loans that commenced in the 2021-22 project year were still live as of 01/04/2022, the stated loan duration of 103 days is expected to *significantly* understate loan lengths, to a greater extent than the equivalent figure for e-cycle loans.

3.2.11   Data from participants to understand trip numbers, trip lengths, and trip purposes

Travel behaviour before the loans

Before their e-cargo cycle loans, the organisations reported making an average of ten van trips and 2.5 car trips a week in pre-loan surveys. One organisation was already using an e-cargo cycle, making 36 weekly trips.

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Figure 30: Average weekly trips by mode before the e-cargo cycle loan (based on 8 responses to the pre-loan survey)
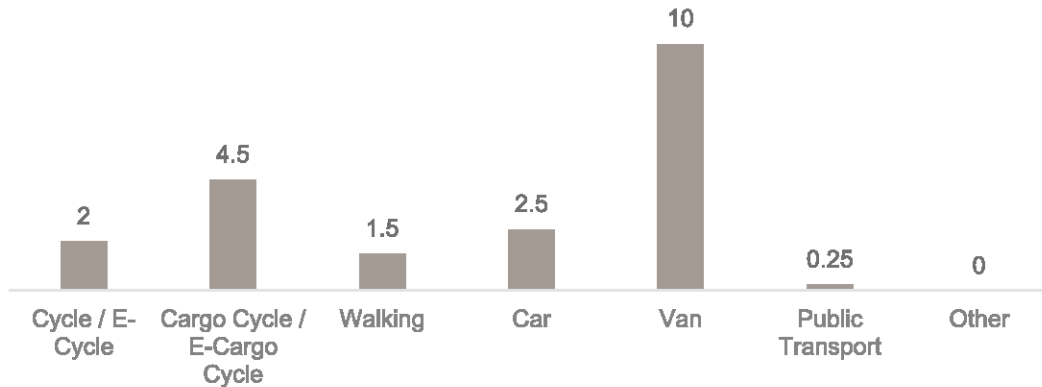
The majority of car and van trips (87%) were journeys over five miles. The organisations reported making an average of 1.6 weekly car and van trips of less than five miles.

Figure 31: Average weekly car and van trips by trip length (based on 8 responses to the pre-loan survey)
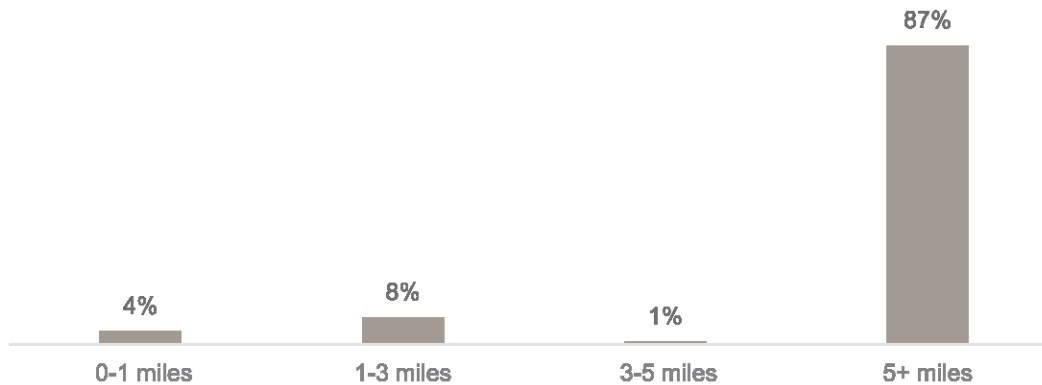
E-cycle usage - trip numbers and lengths

During the 2021-22 project year, organisations with associated See.Sense GPS data made a total of 200 e-cargo cycle trips, with a weekly average of 1.7 cargo cycle trips for each loan. This figure is less than half of the equivalent figure for community e-cycles, which stood at around 3.7 trips per week. The average trip distance was 4.3 km, and the longest recorded trip was 17 km.

Table 16 presents figures on trip numbers.

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Table 16: Recorded e-cargo cycle usage during loans (based on trip data from 7 riders where the See.Sense GPS sensors recorded data)

Trips (total)[11]	Trips per rider	Average weekly trips	Maximum trip distance (km)
200	29	1.7	17

Table 17 details average trip distances and durations, and cumulative distances covered and time spent travelling per loan beneficiary and across all loans.

Usage levels varied substantially between loans. Two of the seven loans that returned GPS data covered just under 600km between them, accounting for around 70% of the total distance travelled by all seven cycles. By contrast, the e-cargo cycles loaned to three organisations had each travelled less than 50km.

Table 17: Distances travelled and time spent travelling (average and total values based on trip data from 7 riders where the See.Sense GPS sensors recorded data)

	Per trip	Per rider	Total
Distance travelled (km)	4.3	120	860
Time spent travelling (hours)	0.5	14	97

Intended trip purposes are discussed in **section 3.2.14**.

3.2.12 Analysis of resultant carbon savings

As shown in **Table 18**, we estimate total carbon dioxide savings from the use of loaned e-cargo cycles to exceed 130kg[12].

Each organisation saved an estimated average of 18kg of CO_2 over the course of their loan, or roughly 1.1kg per week.

---

[11] Note that totals presented in Tables 16 and 17 are underestimates, because See.Sense GPS trackers only recorded data for 7 out of 9 participating organisations.
[12] Note that totals presented in here are underestimates, because See.Sense GPS trackers only recorded data for 7 out of 9 participating organisations.

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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 150g of CO_2 per km travelled was used to calculate the CO_2 emissions saved.

The estimated weekly CO_2 saving of 1.1kg is two thirds higher than the equivalent figure (of 0.7kg) 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 thought to directly replace journeys made by vehicles.

Table 18: 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)	0.6	18	130

3.2.13 Potential financial impact on businesses as a result e-cargo cycle usage

The potential savings in direct transport costs (e.g. fuel and parking) varied between organisations. Most participating organisations reported spending £10-£50 a week on transport before their loans, while two spent £50-£100, and one spent £100-£200.

Table 19: Baseline responses to the question "In a typical week, how much does your organisation spend on transport (e.g. fuel, parking, etc)?" (based on 8 responses to the pre-loan survey)

	£0-£10	£10-£50	£50-£100	£100-£200	£200-£500	£500+
Number of organisations	0	5	2	1	0	0

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There is also potential for organisations to save on staff time spent travelling. The organisations reported spending an average of 19 hours a week of staff time on transport before their e-cargo cycle loans.

3.2.14 Qualitative information on the range of uses of e-cargo-cycles

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

Table 20: Sectors of organisations participating in participant (based on 8 responses to the pre-loan survey)[13]

Sector	Count
Food and beverage	3
Non-profit or charity	3
Waste management, Recycling, home repairs	1
Land management	1
Local authority	1

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

- Deliveries, including food and other goods

- Business travel for meetings or management trips

- Transporting materials, including tools for park ranger duties and taking waste and recycling to the tip

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[13] Note that this total does not add to 8 because some organisations reported belonging to multiple sectors

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3.2.15 Qualitative information on the size of organisation or business an e-cargo cycle library scheme is most suitable for

Of the eight organisations who completed the pre-loan survey, seven were micro organisations[14] and one was a small organisation.

In the 2022-23 project year, the participating organisations will be asked about how well the participant works for organisations of their size.

Table 21: Sizes of participating organisations[14]

	Number of Employees	Number of participating organisations	Total
Micro	0	2	**7**
	1-4	3	
	5-9	2	
Small	10-19	1	**1**
	20-49	0	

3.2.16 Qualitative information on how geography influences potential for e-cargo cycle uptake

Insufficient data has been gathered to address this question in the 2021-22 project year.

3.2.17 Data from participants to understand how participation in schemes has influenced their perceptions on e-cargo cycles use for businesses and likely future behaviour

Insufficient data has been gathered to address this question in the 2021-22 project year.

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

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3.2.18 Participant perceptions of barriers to the adoption of e-cargo cycles, and how these could be overcome

As shown in **Figure 32**, the most significant factor influencing ability to replace current work-related travel with an e-cargo cycle was "Distance", which 75% of respondents considered to be very influential or extremely influential.

63% of respondents considered "Weight and size of goods to be transported" to be very or extremely influential.

"Employee safety" and "Weather" were also significant factors for some organisations, with 25% considering them to be extremely influential.

63% of respondents considered "Cost" to be very or extremely influential. This may be a barrier or an incentive to the adoption of e-cargo cycles, as businesses balance the high cost of purchasing an e-cargo cycle against the cost savings from reduced expenditure on fuel and parking.

Figure 32: Responses in the pre-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 8 responses)

	Extremely influential	Very influential	Somewhat influential	Slightly influential	Not at all influential	Not sure
Distance	13%	63%	25%			
Weight and size of goods to be transported	13%	50%	25%			13%
Cost	13%	50%	38%			
Topography (hills)	13%	38%	25%	13%	13%	
Infrastructure quality (e.g. cycle routes…	13%	38%	25%	25%		
Employee fitness	13%	25%	25%	25%	13%	
Public perception	25%	13%	13%	13%	25%	13%
Employee safety	25%	13%	38%	13%	13%	
Time	13%	25%	38%	13%	13%	
Weather	25%		38%	13%	25%	
Staff skills/training	13%		50%	38%		
Bicycle parking facilities			25%	25%	38%	13%

3.2.19 Participant perceptions on benefits to their business

No data is available on the participant's perceptions of the benefits of e-cargo cycles to their organisations after participation in the participant.

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Ahead of their loans, the participants expected benefits to their organisations including:

- Avoiding parking problems

- Building the capacity of the business

Organisations also valued the potential benefits to public perceptions of their organisation. Two organisations (25%) considered "Public perception", to be extremely influential in their ability to replace current work-related travel with an e-cargo cycle, and one considered it very influential.

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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

4.1.1 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.

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E-cargo cycle business surveys

The first year of project delivery saw e-cargo cycle loans to nine loan beneficiaries either completed or started. All nine loans were still live at the end of the project year, so no loan recipients completed follow-up interviews or post-loan surveys in the first year of the project.

Our reporting for the 2021-2022 project year therefore lacks the qualitative detail we expect to provide for the coming 2022-2023 year. Without survey and follow-up interview data, qualitative analysis is limited to baseline survey data. These responses captured participating organisations' expectations, hopes and doubts prior to the loans, but cannot provide any information about their practical experiences of loaning the e-cargo cycles.

4.1.2 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).

4.1.3 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.

In the 2021-22 project year a total of 36 interviews were conducted with beneficiaries of the community e-cycle loan scheme. However, no post-loan interviews were conducted with participants who had loaned e-cargo cycles. This was due to the lower number of e-cargo cycle loans and the fact that these loans last for longer (typically three months or more). By the end of the project year, nine cargo cycles were on loan, but none had yet been returned. It is expected that e-cargo cycle interviews will take place in the 2022-23 project year for these loans.

Table 22 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.

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Table 22: 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

4.2.1 Calculations for "Proportion of e-cycle trips/distance that would otherwise have been made by walk / conventional cycle / car as driver / car as passenger / public transport / other / not travelled"

The proportion of e-cycle trips/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 in **Table 23**.

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Table 23: 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
Before the loan	33.00	0.00	26.00	60.00	11.00	8.00	0.00
During the loan	8.00	129.00	0.00	20.00	6.00	6.00	0.00
Change	-25.00	129.00	-26.00	-40.00	-5.00	-2.00	0.00

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 24**. **Table 25** shows the total number of trips made by each mode, for comparison.

Table 24: 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
Before the loan	266.00	10.00	77.00	186.00	39.00	24.00	0.00
During the loan	117.00	474.00	3.00	72.00	20.00	26.00	0.00
Change	-149.00	464.00	-74.00	-114.00	-19.00	2.00	0.00

Table 25: Total trips by travel mode

	Walk	E-Cycle	Cycle (non-electric)	Car (driver)	Car (passenger)	Public Transport	Other
Before the loan	500.00	11.00	123.00	407.00	112.00	78.00	0.00
During the loan	294.00	474.00	26.00	237.00	80.00	63.00	0.00

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Change	-206.00	463.00	-97.00	-170.00	-32.00	-15.00	0.00

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, shown in **Figure 17** in the main 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 not otherwise have been made.

Table 26: 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	32%	16%	25%	4%	0%	0%	24%

4.2.2 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.

This roughly corresponds to a journey by a petrol car averaging 30mpg (consuming roughly one British gallon of petroleum – 4.546l – per 30 miles travelled). The American equivalent, which may be more commonly referenced within international carbon saving methodologies, is around 37mpg, due to the conversion factor between British and American gallons. A diesel vehicle averaging 35mpg (or 42mpg using American gallons) is presumed to yield similar carbon emissions.

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

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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/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 25% of the trips made by e-cycles (listed above in Error! Reference source not found.) replaced car (driver) journeys, while an additional 4% 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 27 applies these estimates (of 25% of trips replacing car driver journeys, and 4% 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 4.2km 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 27**, we believe that each loan beneficiary may have taken around eight fewer journeys in vehicles as a direct result of the e-cycle loan. Of these, we estimate that around seven 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 30km 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 ferry them around.

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Table 27: 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	640	6	2700	25
Passenger journeys	110	1	450	4.2
All vehicle journeys	740	7	3100	29

Note - distances in kilometres are rounded to two significant figures, while trip numbers are rounded to the nearest whole integer and two significant figures. Totals may not add up due to rounding.

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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 is a direct copy of these requirements.

Table 28: Welsh Government reporting criteria

Community E-Bikes
Quantitative Evidence:
1 Demographic profile of those people taking up loan / hire of e-bike (including gender, age, and income or employment status)
2 Data on length of hire and loan periods, trip numbers, trip purposes, 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
4 Travel mode share from users (including car use, public transport, walking, conventional cycling etc) during participation in scheme, to specifically bring out:
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
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
c Distance/trip numbers made by car while loaned / hiring the e- bike, compared to before the loan and/or afterwards
5 Differences in effect on travel behaviour between rural and urban areas

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6   An estimate of the average carbon saving per person / loan, again distinguishing between impacts in rural and urban areas

Qualitative Evidence:

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,

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); some of these should be compiled in user stories

9   Perceived barriers to using the e-bike more

E-Cargo Bike Libraries

Quantitative Evidence:

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

2   Analysis of resultant carbon savings

3   Seen/predicted financial impact on businesses as a result e- cargo bike usage

Qualitative Evidence:

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.

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)

6   Qualitative information on how geography influences potential for e-cargo bike uptake (e.g. city centre / inner urban / suburban / rural)

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

8   User perceptions of barriers to the adoption of e-cargo bikes, and how these could be overcome

9   User perceptions on benefits to their business

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