Public

June 2025

CrowdFlex Utilisation Winter Trial 2024/25: Customer feedback

End of Trial Report

NESO
National Energy System Operator

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Table of Contents

1. Executive Summary

This report presents the results of the customer surveys from the CrowdFlex utilisation trial for winter 2024/25, covering feedback from 15,982 unique respondents and building on the research and report from the CrowdFlex summer trial.

For the first time, CSE's social research incorporates data on electricity usage and volume of flex delivered and analyses this alongside our survey data, giving enhanced understanding of how different groups experienced the trial (though as explained in our methodology, this data should be taken only as an indicator of successful shifting, rather than an accurate measure of flexibility achieved in each event). We also analyse change over time, with customers who have completed repeated surveys over the last 9 months. This research enables us to understand CrowdFlex from a customer's perspective, and the experiences of different types of consumer, which will be crucial for delivering effective widespread flex services in future.

Following the introduction and methodology, sections 4-6 explore who took part in the winter trial, their motivations for signing up and continuing to take part, and how they shifted their electricity use. Sections 7-9 explore participants sentiments about the trial, whether they found it easy or lost interest. In section 10 we look at differences in participation for different groups, evidencing clearly that consumer characteristics do impact participation in different ways. The final section looks in depth at the experiences of those taking part since the start of the CrowdFlex trial and whether these have changed over time.

Key findings:

- **Habit formation:** 1/3 of participants said they participated because they got into the habit of responding to events. Habit formation is becoming a stronger factor as the trial progresses. Longer-term participants are becoming less interested in the challenge but continue to participate, which is positive for the future as flexibility services become less of a novelty.
- **Positive perceptions**: 2/3 of respondents felt that they were making a difference with their participation, and almost 2/3 enjoyed the trial. Several measures of trial

perceptions are actually improving over time, a positive indication for the ability of CrowdFlex to engage people over the longer-term. However, vulnerable groups, and those without low carbon technologies were generally less satisfied.

- **Green engagement:** Over the past year, repeat participants became significantly more motivated by achieving a cleaner grid. Participants are becoming more environmentally conscious through the trial, just as they are becoming more aware of their own energy usage.

- **Reaching vulnerable customers:** CrowdFlex appears to be successfully engaging vulnerable customers, although the total volume of flex they delivered was often lower. All vulnerability groups except those with health conditions were more likely to participate in more events. Households in the lowest decile for electricity usage participated much more, as well as more consistently. However despite OVO's customer communications telling participants to only shift 'non-essential' electricity, vulnerable groups were more likely to report turning off essential appliances (e.g. medical equipment, fridges / freezers), and there is no sign of households risking less as the trial goes on.
- **Renters**: We see a consistent finding that social and private renters report high event participation and say they are enjoying CrowdFlex more than other groups. However, this is contradicted somewhat by the trial data as renters did not deliver as much total flex, and were awarded the consistency bonus less often than other groups. This suggests that they are not participating as effectively as they feel they are.

- **Turn up events**: Some participants struggled to participate in turn up, particularly at short notice as they no longer had any electricity-intensive activities to shift. Participants with multiple vulnerabilities were 5% more likely to rate turn up events as difficult. We also identified some misunderstanding of the purpose of turn up.

- **Automation of shifting:** Respondents using automation tools shifted on average 30% more electricity, and earned significantly more rewards. Automated shifting increased by 22% since the start of the trial. The biggest motivator for uptake of automation was the chance to save money.

- **CrowdFlex prioritised:** Customers are often involved with other shifting services, but only 9% said they found a difficulty in combining services. CrowdFlex was usually prioritised in these situations, which may impact other flex services.
- **Loss of interest:** Just 12% of repeat participants said they were losing interest as the trial goes on and self-reported participation rates did not change significantly over time. The most commonly provided reason for losing interest was that the financial rewards "no longer seemed worth it". Participants who said they had formed a habit were 8% less likely to lose interest.
- **Ethnic minorities underrepresented:** Non-white customers have been consistently underrepresented throughout the CrowdFlex surveys, as identified in the previous report. This has implications for the generalisability of the results, particularly in different localities. The reasons for this underrepresentation should be explored in future work.

Recommendations

Further research is needed to understand the reasons for underrepresentation of ethnic minorities and how this might be mitigated to reduce the risk of excluding non-white customers from demand flexibility.

As this research provides empirical evidence that those using automation earned more in the trial, there is an opportunity to communicate these findings within the trial to those currently shifting manually, as well as to future participants in flex schemes.

Provision of free or subsidised lower cost or small-scale smart tech to trial participants might support people to become more effective at shifting through automation, especially when combined with information and support on how to get the most out of it. Involvement from their existing, trusted provider could help to address people's reservations around upfront costs, understanding, and trust.

As households with lower usage were more likely to achieve the consistency bonus, further analysis could explore whether this offers a viable route to addressing inequality issues by rewarding participation of those households that are unlikely to earn large rewards but can offer a highly consistent low volume flexibility.

Targeting households with low carbon technology towards technology specific services or Type-of-Use tariffs may remove some of the challenges these households experience in participating in events. One example of this targeting has already been trialled in CrowdFlex through moving electric vehicle owners from the utilisation to availability trial; further analysis of the impacts of that move could be useful.

There is a small but strong-feeling minority for whom short notice flex events do not work well (for example, those who don't check communications regularly or those who don't have much energy-intensive activity they can shift). Targeting these people towards a different type of service may be beneficial.

As demand shifting appears to work well for those with electric heating and could offer a route to reduce high electricity costs faced by this group, targeting of flex services towards those with electric heating will be beneficial for consumers and for the energy system.

Demand side response service providers (DSRSPs) should provide tailored support for vulnerable households about safe and effective demand shifting. This is key, as the widespread consumer-led flexibility needed to deliver clean power will be harder to achieve if large parts of the population are excluded or there is a perception that demand flexibility only works for the well-off. For energy supplier DSRSPs many of these households may already be known to them through the Priority Services Register.

2. Introduction

This project is funded by energy network users and consumers through the Strategic Innovation Fund, a programme from the UK's independent energy regulator Ofgem managed in partnership with Innovate UK.

This report presents the results of the customer feedback surveys in the CrowdFlex utilisation trial for winter 2024/25. The surveys were sent to all participating customers apart from those in the trial control group. A total of 11,876 customers completed surveys at the end of the winter trial, supplementing 10,790 surveys completed at the mid-point of the winter trial. Given a large portion of mid-winter survey participants also completed surveys at the end of winter, a focus has been placed on these latter surveys, though differences between these results have been delineated where appropriate, and the mid-winter results feature in section 11's longitudinal analysis.

These survey responses mean that there were 15,982 unique respondents during the winter trial, and 18,100 total unique respondents at this stage in the trial including summer 2024. A total of 26,351 surveys have been completed to date by these respondents, as broken down in figure 1.

This report builds on the research and report from the CrowdFlex summer trial (available at: https://smarter.energynetworks.org/projects/10070764/).

The customer feedback work within CrowdFlex is designed to answer three research questions:

- What strategies do different consumer groups use to turn up and turn down?
- Do consumer characteristics correlate to: ease of participation; levels of satisfaction with events and rewards; willingness to maintain participation; understanding of effective demand shifting?
- Does engagement change over time for different consumer groups? (For example, can we see habits formed, technologies adopted, willingness to participate change?)

The summer trial report started to answer the first two of these questions. In this report we compare the results from the previous two surveys, in summer 2024 and mid-winter

2025, with the most recent survey at the end of winter 2025. In addition, for the first time, we incorporate electricity usage data from the trial.

These questions have been answered through the lens of particular consumer groups and vulnerability characteristics, as detailed below and in appendix 2.

For the third question, on engagement change over time, we analyse a combination of direct survey questions and change over time for participants who have completed all three surveys at this stage of the trial.

Consumer groups

As outlined in the research questions, we aim to understand how different types of energy consumers participate in the trial, and whether certain characteristics of the person or their home correlate to different experiences. To do this, we have defined four broad groups. The latter three groupings are informed by CSE's theoretical model, 'the Capabilities Lens', which sets out the necessary and desirable characteristics that enable people to benefit from smart energy offers such as CrowdFlex.

Households that may be vulnerable in the energy market because of their circumstances – this includes those reporting financial insecurity, households that include somebody with a long-term health condition, and people of pensionable age. We have aligned this grouping broadly with Ofgem vulnerability definitions[1] and the Priority Services Register eligibility criteria[2].

Households that may face barriers to demand shifting – this includes those reporting financial insecurity, those with low electricity use, and those living in rented homes.

[1] Ofgem defines vulnerability as when a consumer's personal circumstances and characteristics combine with aspects of the market to create situations where they are significantly less able to protect or represent their interests in the energy market, or may be significantly more likely to suffer detriment and that detriment is likely to be more substantial than for other consumers. Vulnerability in the energy market is not wholly about rising prices, though they can exacerbate problems for consumers. Vulnerability can also be struggling to access and choose the best tariffs, or living in a cold, damp home. Ofgem Consumer Vulnerability Strategy 2013, accessed at www.ofgem.gov.uk

[2] To align with the NESO archetypes and due to limits on survey length, the PSR criteria for households with children under 5 could not be included.

Households that may have enablers for demand shifting – this includes those that own low carbon technologies which can enable easier or more effective demand shifting. Examples of such technologies include EVs and EV chargers, heat pumps, renewable generation technology (solar photovoltaic, other electricity generation), and batteries.

High and low electricity users. High electricity users theoretically have more volume to shift, but other factors may limit this. For example, if they live in multiple occupancy homes that are difficult to coordinate, if they live in poorly insulated homes or with inefficient electric heating, or if they have high electricity use due to health or medical needs. Low electricity users will struggle to shift and may be driven to take more risky behaviour such as turning off essential appliances. People may use little due to being a small household, because they limit use due to affordability, or because they use low carbon technology such as solar to limit their use of grid electricity – all of which have different implications when considering equality and vulnerability.

More detail on these groups and their rationale for inclusion is provided in appendix 2. Group differences in participation are explored in detail in section 10.

3. Methodology

Over the duration of the CrowdFlex customer research, customers have completed surveys several months apart, enabling longitudinal analysis to understand change over time. In addition, new participants were recruited into the trial, adding more survey respondents at each stage. This gives us a tiered survey design, shown in Figure 1.

The end of winter trial surveys were conducted in April 2025. This round consists of 3 surveys to different cohorts:

- survey 1.3 for brand new respondents
- survey 2.2 for those who completed their first survey at the mid-winter point
- survey 3 for participants who took part in surveys both at the end of the summer trial and at the mid-winter point.

Most survey questions were identical; but there were differences for appropriateness– for example, brand new participants in survey 1.3 were not asked if they were losing interest over time.

The appropriate survey was shared via email with all utilisation trial participants. Responses that were completed in a time below 2 median standard deviations below the median were excluded from this analysis, as we consider these to be abnormally fast response times, which may not have provided accurate responses.

After cleaning the data in this way, we were left with a total of 11,876 survey responses for analysis. 1,181 were filling out their third survey, having participated consistently since the beginning of the study, and representing an attrition rate of 68%.

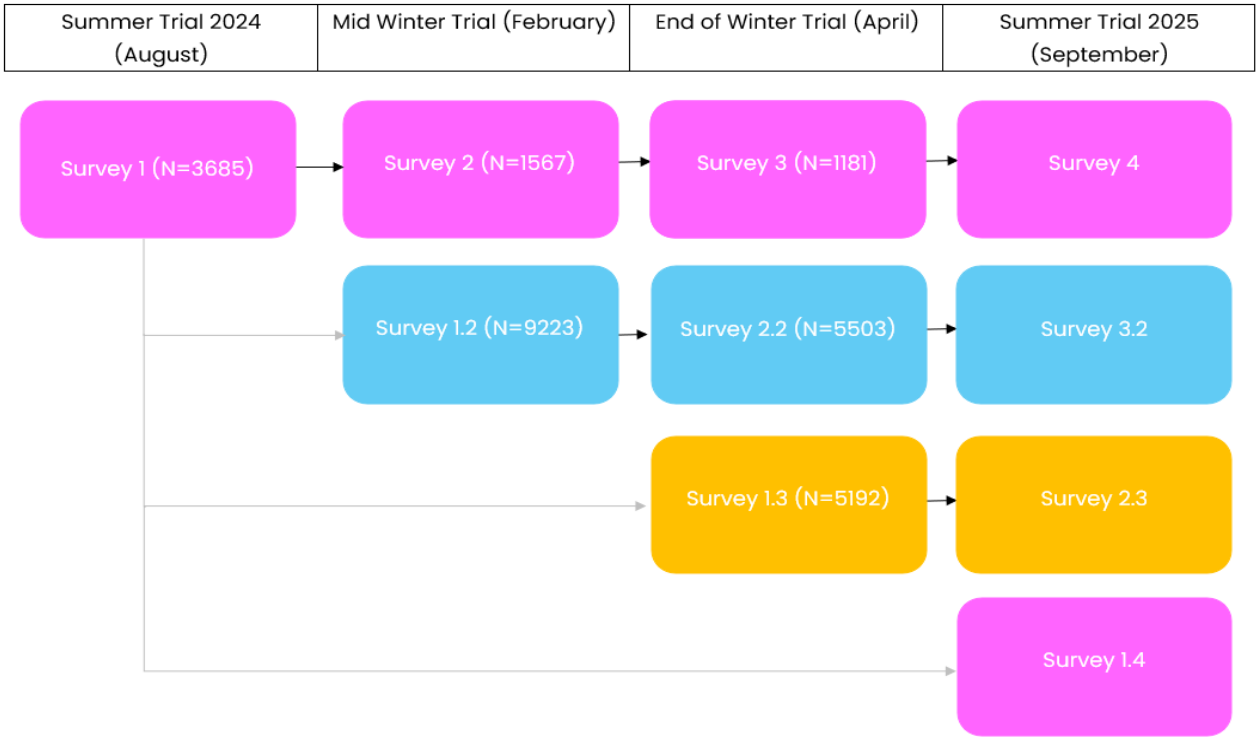


Figure 1 Survey Flowchart

Statistical tests

Significance testing shows the difference between a group and the remainder of the population, so a statement such as 'Group X were more likely to say Y' indicates they are more likely to say Y than those that don't fall within group, rather than in comparison to another group. All significance testing has been completed with a 95% confidence interval, meaning we can say with 95% confidence that this finding will hold in a wider population. Throughout this report, all statistics reported in this format have been tested to be significant at 95% confidence interval.

Unless stated, findings are across the entire sample (surveys 1.3, 2 and 3, n=11,876). Where findings have been limited e.g. to only survey 2.2 and 3, this is because there is no correlating question in the remaining survey(s).

For further detail on the statistical tests throughout the report, please see appendix 1.

Trial data

For survey 2.2 and 3 respondents, energy consumption data has been analysed to provide further insights into event participation and to give a more complete picture of respondent's energy characteristics, which can be used to better understand the impact of the trial on different demographics. The data comprises variables derived from CrowdFlex participants' smart meter data, shared by OVO with CSE with consent from participants under the terms and conditions of the project. It includes: energy consumption by decile, trial arm, volume of flexibility delivered, and rewards earned for the period of the CrowdFlex trial up to the end of winter.

The main variable used in this part of the analysis is the volume of flex delivered by respondents in kWh, along with each household's overall energy consumption, split into deciles, where the tenth decile represents the top 10% overall energy consumption, across trial participants who were asked to participate by OVO at the mid-winter surveys. The amount of reward received through consistent event participation (in £) has also been investigated.

The volume of flex delivered by a household is analysed per event. This has been calculated using the total kWh shifted in the correct direction by a household (i.e. the electricity usage reduction in turn down events and the electricity usage increase in turn up events). This value was then divided by the number of events a household was notified of, to achieve an estimate for the volume flexed by a household per event. It is important to note that this does not account for missed or misinterpreted notifications, or for a household having an inability to participate in specific events due to reasons independent of the trial. **Therefore this data should be taken as an indicator of successful shifting, rather than an accurate measure of flexibility achieved in each event,** and is not comparable to the primary research findings of the trial published alongside this report (see document 'CF017_Winter Report_ Utilisation Trial_V1.0').

Qualitative analysis

Free text responses to three questions were analysed using a natural language processing model. Bigram word clouds were created using counts of each combination of two words. These words were not lemmatised, to avoid changing grammatical structure. Any combinations of two stop words were excluded from counts.

Limitations

One limitation within this analysis is the inability to calculate with confidence the volume of electricity shifted per event knowingly participated in, as the data available to CSE is the number of events participants were notified of and the volume of flex they delivered across all events. This means we cannot account for participants who shifted their electricity usage in the correct direction by chance, or those who result in low 'per event' shift volumes due to having missed an above average number of event notifications. Further, event length has not been analysed, so per-event volume shifts don't take into account the varying lengths of events a participant may have been notified of. Therefore the findings we provide on volumes shifted should be taken as an indicator of successful shifting, rather than an accurate measure of flexibility achieved in each event.

Given the differing incentive level offered to different trial arms, and the additional complexities this brings, the rewards received hasn't been analysed at length for this report. Incentives will be explored further in the summer 2025 trial report, building on the CNZ winter trial analysis with particular regard to the effect on different consumer groups.

As in the end of summer trial report, another limitation is that only one demand side response service provider (DSRSP) participated in the utilisation trial and therefore we only have feedback from their customers. We are therefore not able to account for any impact that OVO's approach to customer communications may have shaped experience, beyond the changes in approach OVO employed across the summer and winter trials.

4. Demographic and Household Characteristics

Representativeness

The following section describes the make-up of the end of winter survey respondents. Each of these groupings has been determined using responses to the first survey completed by each respondent, so changes over time in terms of these factors have not been captured in this analysis.

Group	Count	Proportion of sample	Comparison to GB population
Health condition	3,239	27%	24%
Older Household	5,326	45%	19%
Financially insecure	446	4%	NA
Social renter	1,304	11%	17%
Private renter	1,423	12%	18%
Electric vehicle +Charger owners	301	3%	5%
Home Battery Owners	318	3%	1%
Solar Photovoltaic (PV) Owners	1,042	9%	2%
No Low Carbon Technologies (LCTs)	10,144	85%	NA
Electric heating	1,532	13%	8%
Total	11,876	-	-

Table 1 Group breakdown

As found during the summer trial, there's an overrepresentation of participants with health conditions and older households compared to Great Britain (GB) averages, suggesting these groups are willing to engage with demand shifting schemes.

There was a continued slight underrepresentation of renters, which may be due to the fact that this group have barriers to engaging in demand shifting schemes.

Owners of an electric vehicle (EV) and charger are underrepresented, and saw a drop compared to the previous summer trial. However, this is because electric vehicle owners were invited to take part in a separate CrowdFlex trial (the 'availability trial'), focusing specifically on using their vehicle for flex, in partnership with Ohme and OVO. CSE are currently analysing the results of the availability trial survey, to be reported separately.

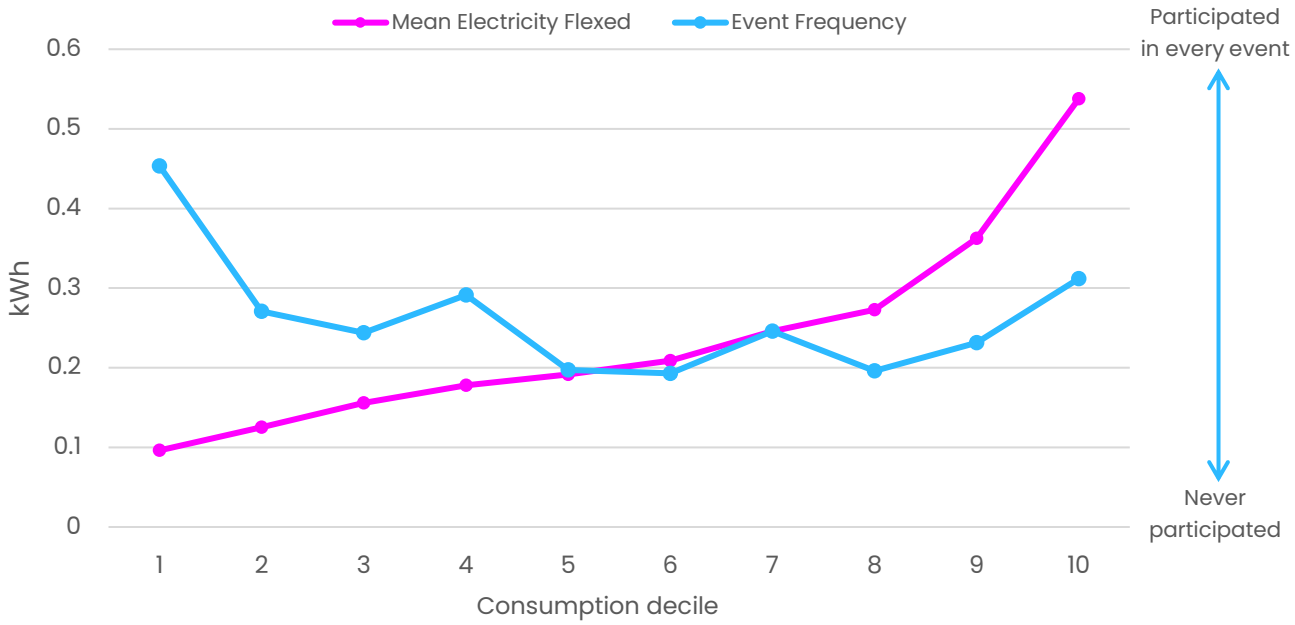
Electricity usage

Given the inclusion of the trial data at this stage of the analysis, the amount of electricity used by a household has been included as a lens through which we can analyse the distribution of responses to questions. However, it's also interesting to note the distribution of other groups through electricity usage deciles.

Older households and both types of renters had lower electricity usage profiles, based on the trial data decile, whilst those with health conditions had higher usage. Financially insecure households and those with multiple vulnerabilities didn't have significantly different usage profiles from those outside their groups.

During exploratory analysis it became apparent that those households that constitute the lowest electricity use decile were outliers in particular metrics. The 680 households in this decile were significantly more likely to participate in events, and significantly more likely to find turn down events easy than those with higher electricity consumption profiles.

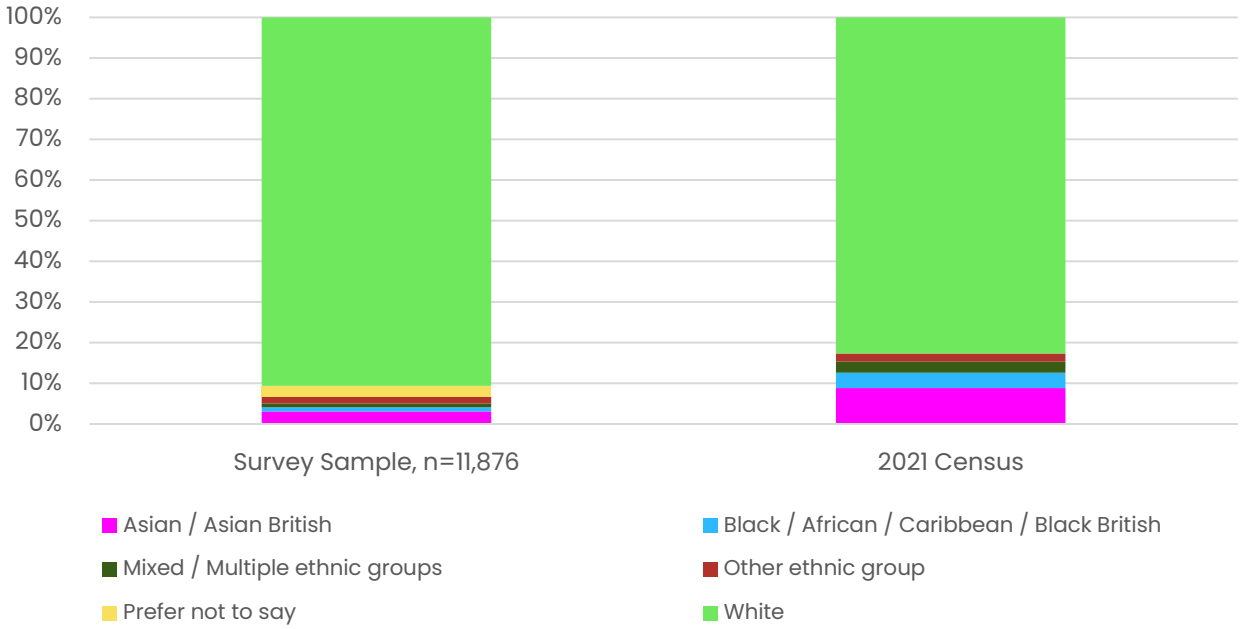
Figure 2 Consumption decile by flex volume and participation



Those in the lowest decile were 7 percentage points more likely to live in socially rented accommodation, 4 percentage points more likely to rent privately, and more likely to own either a home battery or solar photovoltaics. However, they were 5 percentage points less likely to have a health condition.

Ethnicity

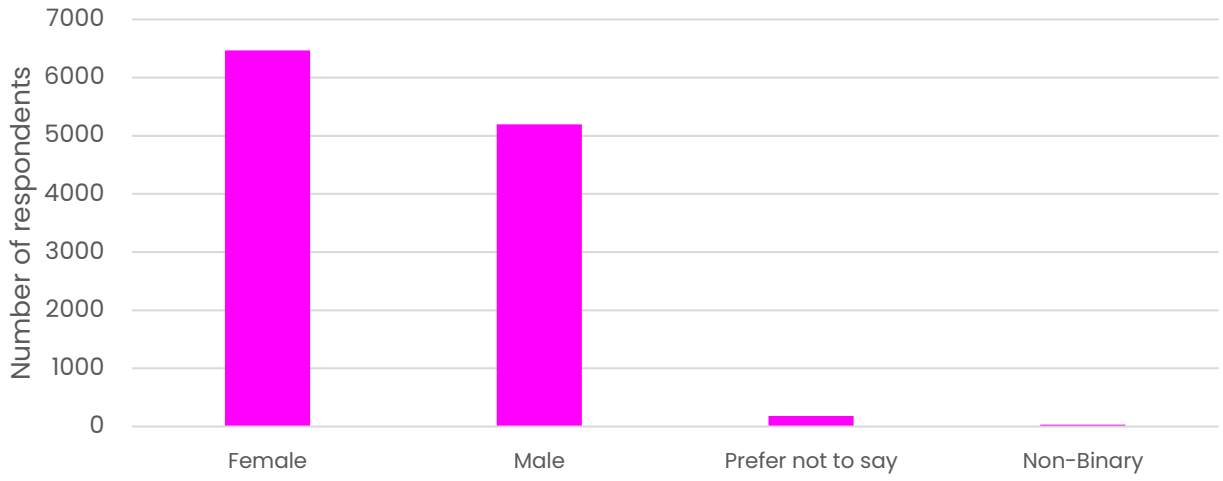
Figure 3 Respondent ethnicity



As seen previously, there is a substantial overrepresentation of White participants, and underrepresentation from all other ethnic groups. This finding is important to emphasise, since it suggests that ethnic minorities might be at risk of exclusion if they are not engaging in flex schemes such as CrowdFlex. Further research would be useful to understand the reasons for this, and how it might be mitigated.

Gender

Figure 4 Respondent gender



In line with previous findings, there were a greater number of female respondents than male, though it's unclear if this is representative of either OVO account holders, CrowdFlex participants, or simply survey respondents.

Conclusion

The demographic analysis finds the same conclusions as the summer trial surveys, with an imbalance of gender and an underrepresentation of ethnic minorities participating. This mirrors findings of other flexibility scheme evaluations[3]. Further research is needed to understand the reasons for underrepresentation of ethnic minorities and how this might be mitigated to reduce the risk of excluding non-white customers from demand flexibility.

[3] CSE (2023) Household engagement with the Demand Flexibility Service 2022/23 https://www.neso.energy/document/282981/download; CSE (2025) Experiences of domestic flex: Two years of the DFS, not yet published

5. Motivation and Maintaining Participation

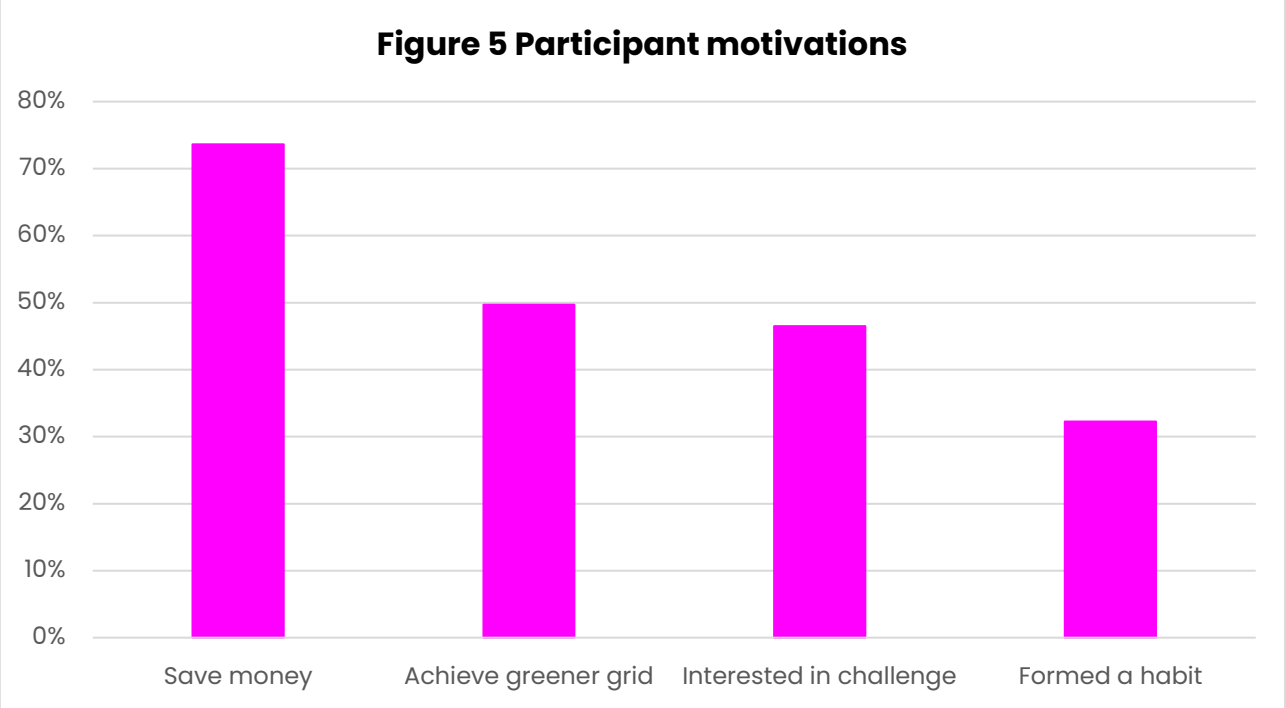
Sign up and continuation motivations

As in the summer, the winter trial showed that the greatest motivation for participating in CrowdFlex was the opportunity to save money (74%).

32% of repeat responders (survey 2.2. and 3) indicated that they participated because they got into the habit of responding to events. This suggests that nearly 1/3 of participants may be likely to continue to engage with demand shifting, even if trial conditions changed. Taken together with the findings on increased awareness of energy usage and demand shifting (section 7), this suggests that for some participants, CrowdFlex will have a positive impact on shifting behaviour beyond the trial.

"Being part of the trial helps me feel like I'm doing something to help decrease my carbon footprint that's relatively easy. Not only that, on power up events it helps remind me to stick a washing on or do some batch cooking!"

"found out I can delay start my washing machine! never used that feature before"



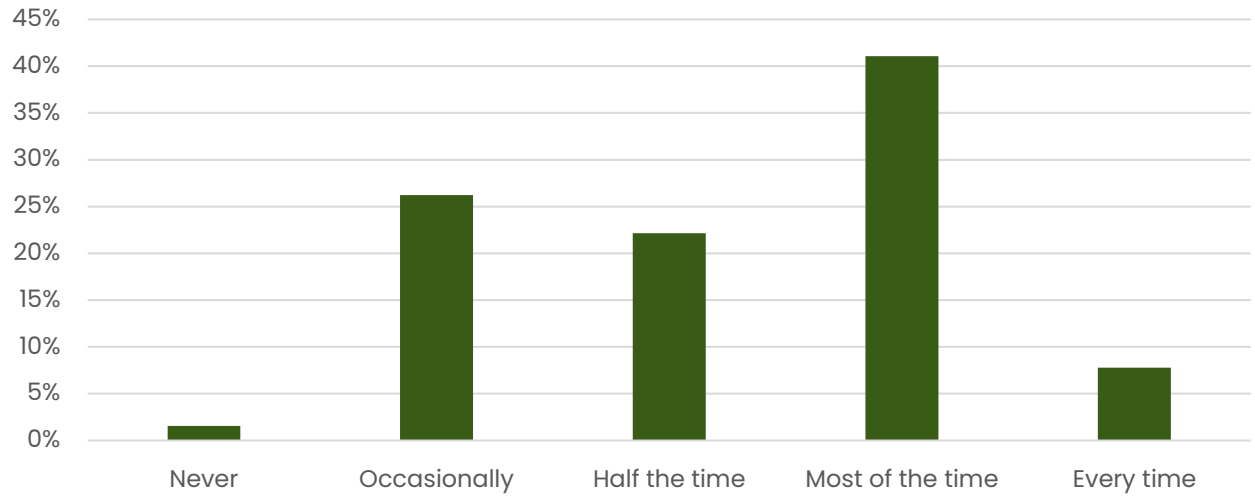
Responses to the question 'Why do you continue/did you decide to take part in CrowdFlex?' (n=11,876)

Generally, those within vulnerability groups were less likely to be motivated by achieving a greener grid or having an interest in the challenge, whilst those with some form of low carbon technology were more likely to have this as a motivation.

Older households were more likely to have formed a habit than younger ones. These group differences are explored in more depth in section 10.

Event participation

Figure 6 Event participation



Responses to the question 'When you receive a notification about a Power Move Flex event, how often do you go on to change how much electricity you use during the time slot?' (n=11,876)

Nearly half of respondents took part in most or every event. Compared to the summer trial, the proportion of respondents participating in every event decreased, though this may well be attributed to the increased number of events over a longer period during the winter trial. As seen in section 11, there has been no significant change in overall event participation across surveys, taking all frequencies into consideration.

All vulnerability groups except those with health conditions were more likely to participate in more events than those outside these groups, and so were both types of renters. This indicates that the CrowdFlex trial is successfully engaging with those who might otherwise be vulnerable or excluded in the energy system. However, those without any Low Carbon Technologies (LCTs) participated in a lower number of events than those with these technologies.

Consistency bonus

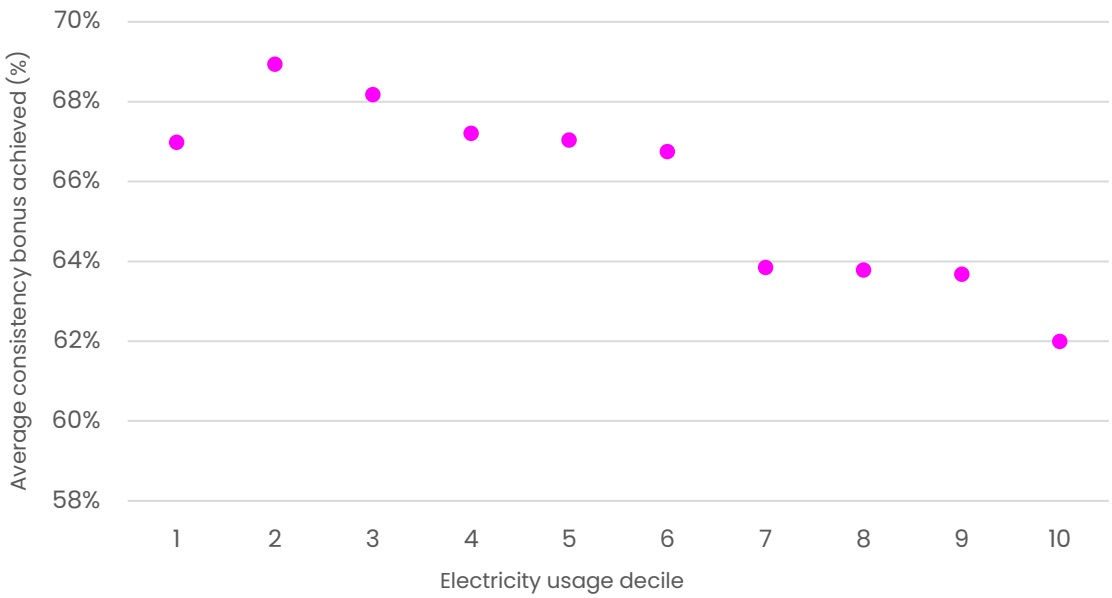
The consistency bonus was a bonus awarded to households within a particular trial arm who successfully participated in more than half of the events in any given month. There were 2,808 households from surveys 2.2 and 3 with data on their consistency bonus.

Older households were the only grouping out of all the defined vulnerabilities and energy capabilities to be significantly more likely to achieve the consistency bonus frequently, indicating this demographic is a dedicated one.

When grouped into deciles of electricity usage, households with lower usage were more likely to achieve the consistency bonus, as seen in Figure 7. This indicates that this mechanism may be succeeding in rewarding households with lower use, who shift less electricity during events (as seen in section 10). The CNZ winter trial analysis found that the consistency bonus did lead to increased shifting when compared to the low incentive level alone, with a comparable response to the high incentive level.

As evidenced in section 10 of this report, low electricity users face a range of challenges in participating. Further analysis through the summer trial could explore whether the consistency bonus offers a viable route to addressing inequality issues by rewarding participation of those households that are unlikely to earn large rewards but can offer a highly consistent low volume flexibility.

Figure 7 Electricity usage against consistency bonus



Conclusion

The strongest motivation remains the opportunity to save money. 1/3 of participants said they participated because they got into the habit of responding to events. Older households were more likely to say this than younger households. Older households also participated consistently through the trial.

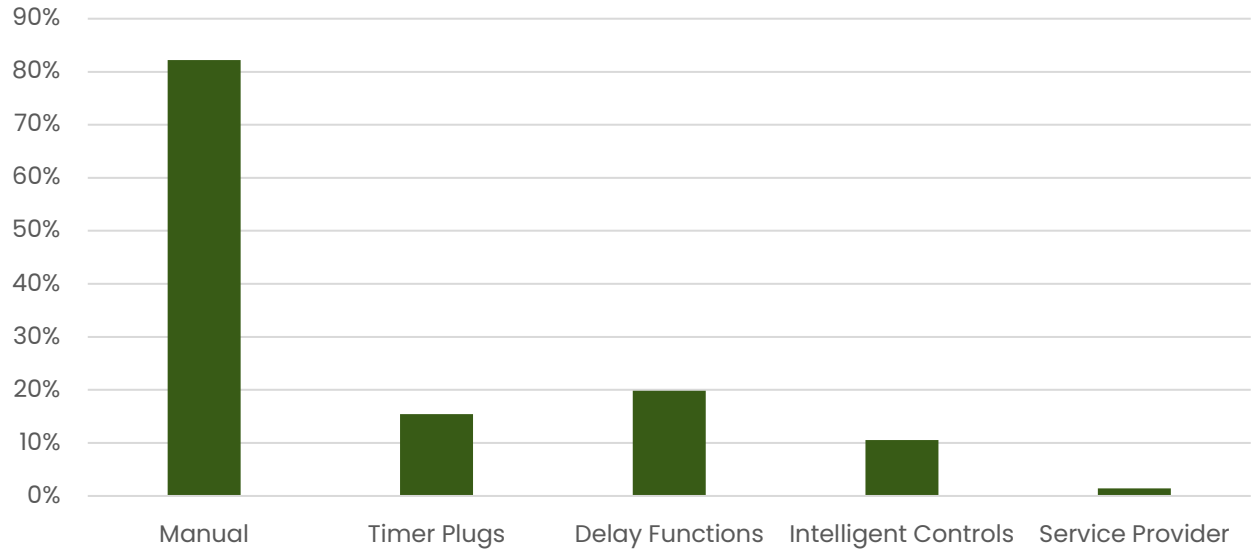
2/3 of respondents felt that they were making a difference with their participation, and almost 2/3 enjoyed the trial. Several measures of trial perceptions are actually improving over time, a positive indication for the ability of CrowdFlex to engage people over the longer-term.

Self-reported event participation remained high, particularly for renters and vulnerable groups. For renters, however, the trial data does not support this as they were less likely to be awarded the consistency bonus.

As households with lower usage were more likely to achieve the consistency bonus, further analysis could explore whether this offers a viable route to addressing inequality issues by rewarding participation of those households that are unlikely to earn large rewards but can offer a highly consistent low volume flexibility.

6. Shifting strategies

Figure 8 Shifting strategy



Responses to the question 'How do you manage your energy to make the most of cheaper, off peak rates or rewards sessions?' (n=11,876)

As found throughout this study, a substantial majority of participants shift their energy use manually. However, this percentage has dropped slightly since the summer trial, coming from 87% to 82%, accompanied by an increase in participants using some form of automation to manage their usage, as expanded on in section 11.

Respondents with some form of low carbon technology were more likely to shift their usage using automation, as well as being more open to future automation. Conversely, renters were in general less likely to use automation, and vulnerable groups were less open to automation.

Respondents who used one of the automation tools referenced in the survey (timer plugs, delay functions or intelligent controls) were likely to shift a greater volume of electricity in both turn up and turn down events than those who didn't, with an average of 0.07kWh more shifted per event – 30% greater than the average of 0.23 kWh shifted per event. This suggests that automated shifting is more effective than manual shifting, and that supporting people to automate can improve outcomes in terms of both

financial rewards for participants and the effective use of domestic flexibility to help balance the electricity grid.

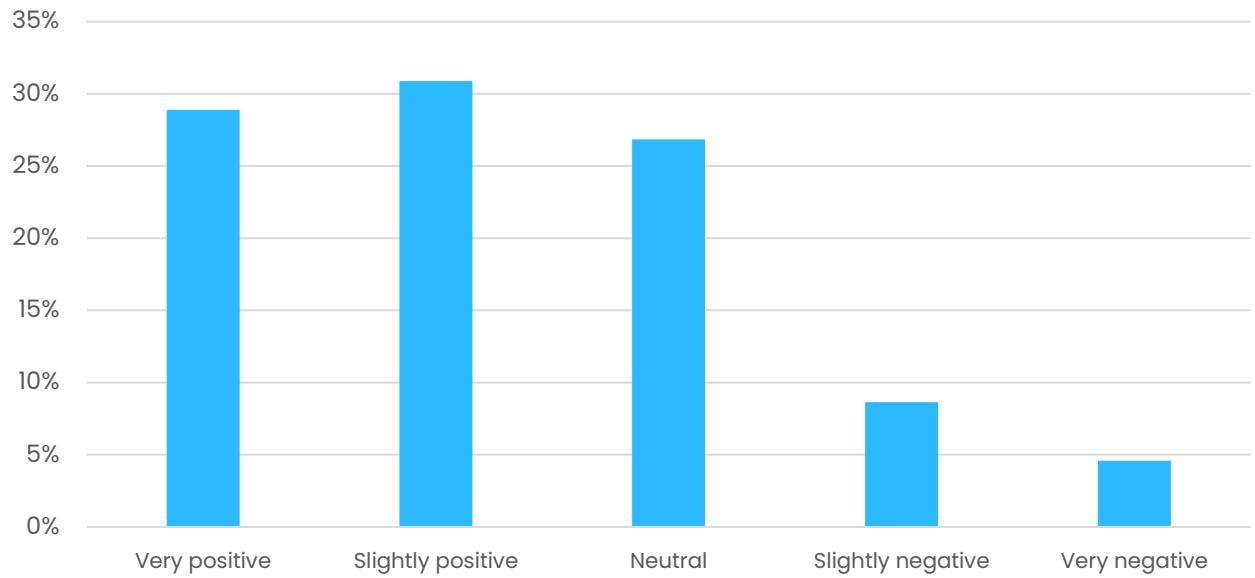
From survey 1.3 (the only survey at this stage asking respondents which activities they shifted), women were 11% more likely to shift laundry and 5% more likely to shift cooking than men, and also more likely to shift heating, bathing, and going to bed. Men in turn were more likely to shift car charging than women.

Automation

Survey 2.2 and 3 respondents were asked how they felt about using automated systems to manage their energy usage. Generally, respondents were open to this, with only 14% feeling negative to some extent.

"Never, ever, trust a computer. Good old fashioned timers work and I am in control"

Figure 9 Openness to automation

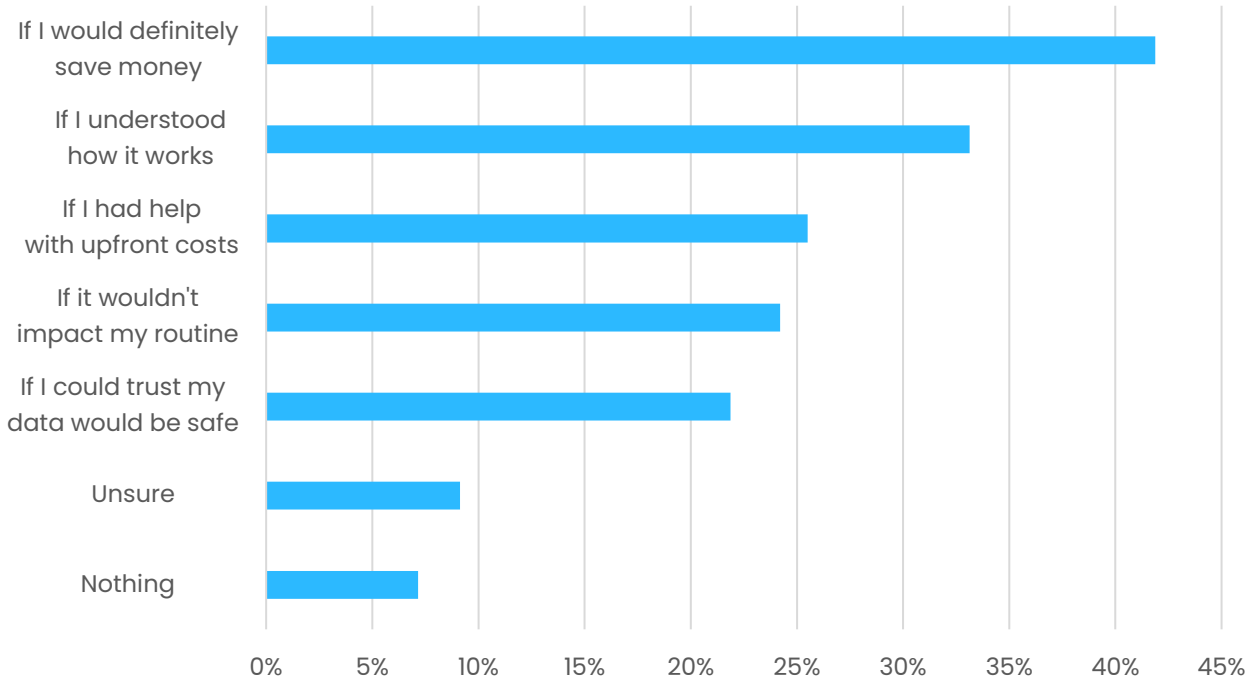


Responses to the question 'In the future, how would you feel about using an automated system to manage your electricity use' (n=6684)

Those with vulnerabilities and those with low electricity usage were less likely to automate, as seen in more detail in section 10. Those respondents who felt any way

other than very positive about the prospect of automation were also asked what might increase their comfort levels, as seen in figure 10. As might be expected, the opportunity to save money would be the biggest motivator. That those who used automation to shift their electricity use were significantly more likely to earn more total rewards, and that this holds true even when controlling for electricity usage, shows that increased communication of the benefits of automation could lead to improved engagement with the trial.

Figure 10 Factors that would improve automation uptake



Responses to the survey question 'Is there anything which would make you feel more positive about using an automated system?' (n=6,684)

"Sometimes I'm not at home and unable to participate. I wish I had access to smart devices that enable remotely controlled energy consumption"

"I like taking part but would be easier if OVO provided some additional smart devices to help turn off products.''

Conclusion

Most participants shifted their use manually, though automation is being utilised more as the trial progresses. This is important, as participants using automation tools shifted more electricity.

Respondents using automation tools shifted on average 30% more electricity and earned significantly more rewards in total. Automated shifting increased by 22% since the start of the trial.

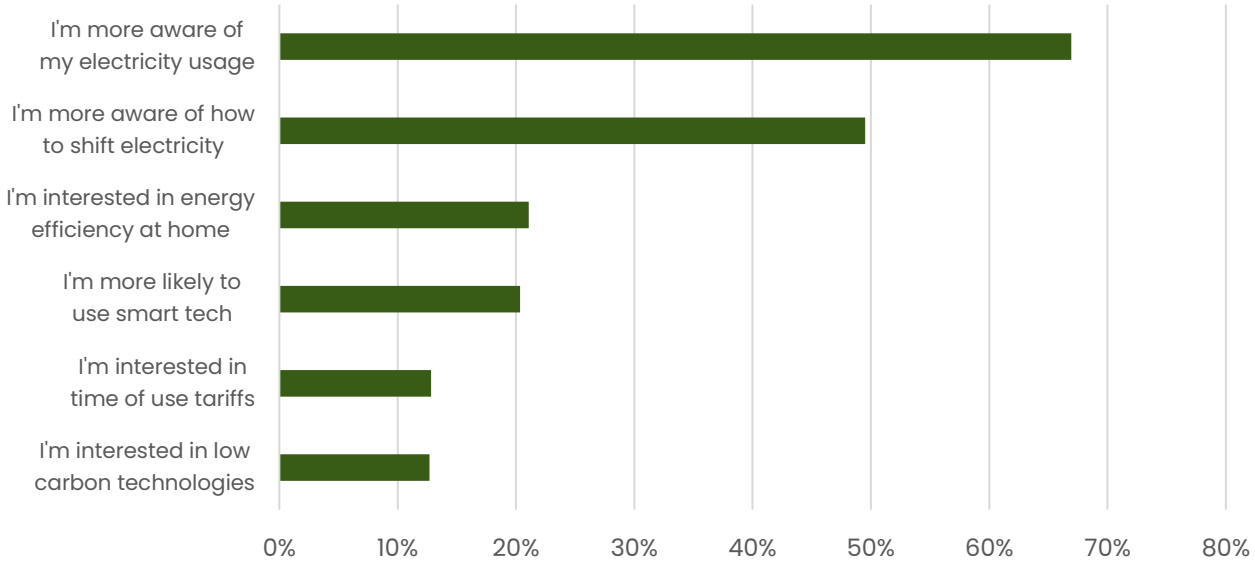
Looking forwards, participants are fairly open to automation, and money saving is the factor that would most improve positivity towards automation. As this research provides empirical evidence that those using automation earned more in the trial, there is an opportunity to communicate these findings within the trial to those currently shifting manually, as well as to future participants in flex schemes. Those with limited technology, vulnerabilities and low electricity usage are less open to switching to automation.

7. Perceptions

Trial Perception

The findings from the winter echoed those from the summer trial for how respondents perceived the trial.

Figure 11 Trial perception



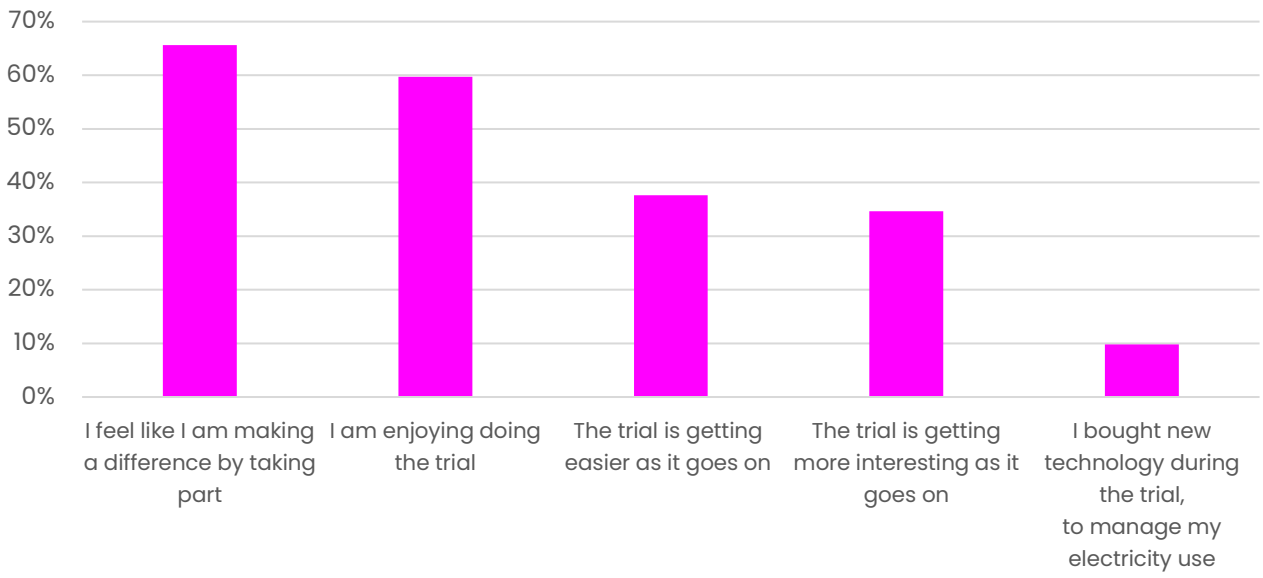
Responses to the question 'We're interested in whether taking part is having an impact on how you think about energy. Please tick if any of the following statements apply to you' (n=11,876)

Vulnerable groups were generally more likely to have improved awareness of their electricity usage. This suggests that CrowdFlex is succeeding at improving energy awareness and engagement amongst some of the most vulnerable groups.

Trial Satisfaction

"Great scheme to make you think about how we use fuels, love it"

Figure 12 Trial satisfaction



Responses to the question 'Which of the following statements do you agree with?' (n=11,876)

Two thirds of respondents said they felt that they were making a difference with their participation. This is an important measure, because it shows that CrowdFlex is connecting to people's altruistic and values-based motivations, beyond just the monetary rewards. 60% also said that they were enjoying the trial, another positive indication for people's continued motivation. 10% of respondents said that they bought new tech to help them manage their energy usage. However, amongst repeat respondents, those who reported buying tech weren't significantly more likely to have switched to automated shifting strategies.

Vulnerable households were generally less likely to say they felt they were making a difference or enjoying the trial, whilst renters were more likely to say this, despite their lower levels of actual electricity shifting as shown in section 8.

Low electricity usage households were less likely to feel they'd made a difference, but no less likely to find the trial easier or more interesting with time. As seen in section 10, this did not result in less frequent event participation.

Households with electric heating or both an electric vehicle and charger were more likely to have positive trial perceptions and, as seen in section 8, this accompanies a higher volume of electricity shifted.

We also asked an open text question about why people are enjoying the trial. As shown in the word cloud below, saving money, enjoying the challenge and making a difference came through strongly in the feedback.

Bigram word cloud – analysis of survey question "In the space below, please try and tell us why you are enjoying the trial." (n=3,871)

CrowdFlex prioritisation

Of the 1,353 respondents who were involved with another trial or tariff/bolt on service during the CrowdFlex trial, 62% reported that they felt these services suggested using electricity at conflicting times of the day. However, only 9% of households using multiple services said that they found a difficulty combining these services.

Further, as seen in Figure 12, respondents were more likely to prioritise CrowdFlex during these conflicting periods than their other service. As such, we might conclude that CrowdFlex isn't significantly threatened by users engaging in additional services, though there will likely be an effect on these other services.

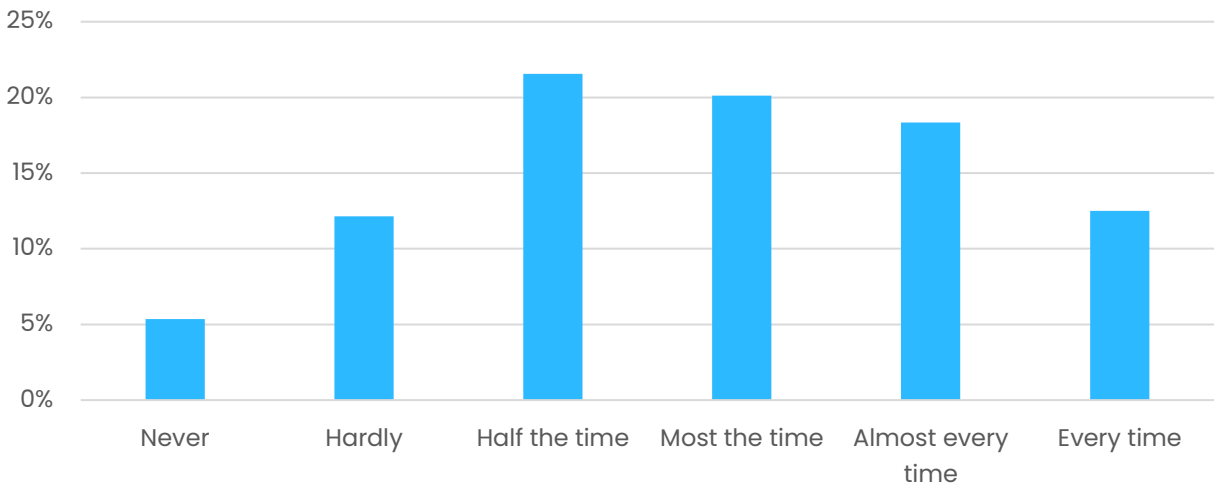
"Power up event sometimes conflicts with my Economy 10 schedule"

"Somewhat tricky to save during the day as the overnight tariff is cheaper than the reward for using Power Move during the day."

Financially insecure respondents were more likely to prioritise CrowdFlex over their other services, whilst both battery and solar photovoltaics owners were both less likely.

There was no significant relationship found between the electricity usage of a household and their tendency to prioritise CrowdFlex over an alternative service.

Figure 13 CrowdFlex preference

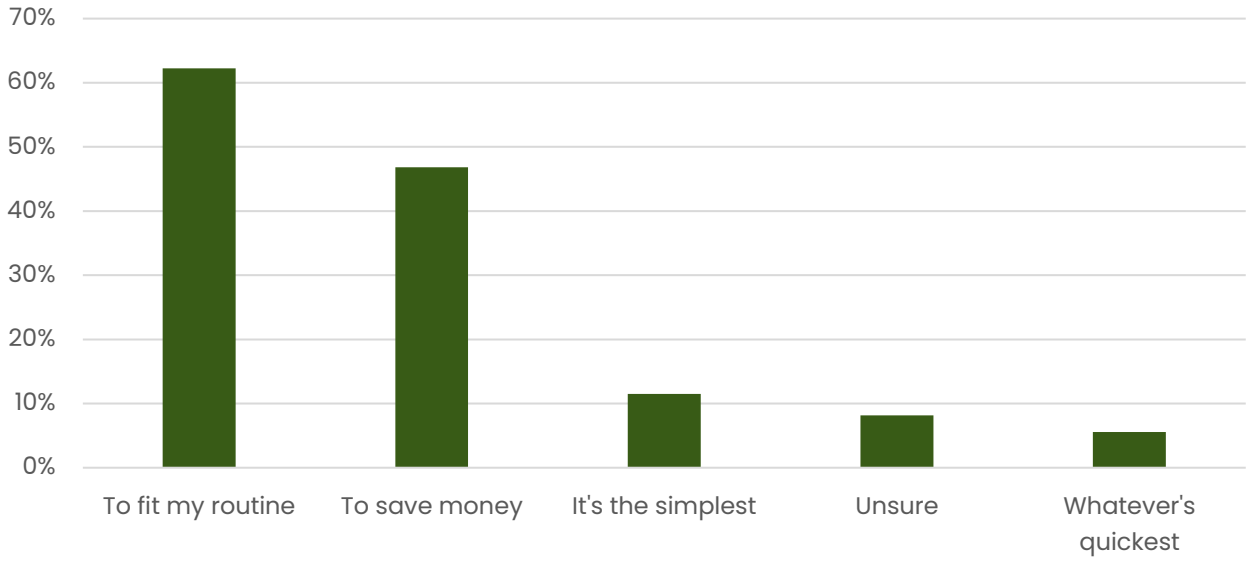


Responses to the question 'When this [trial conflict] happened, roughly how much of the time did you choose to shift your electricity using CrowdFlex, instead of the other tariff or service?'(n=840)

This finding holds when looking at both turn up and turn down events individually. Suggesting that competing services have not reduced the volume of flexibility delivered through CrowdFlex.

Of participants completing their first survey during the winter trial (surveys 1.2 and 1.3) the majority who found conflict between services chose to prioritise the service that best fit their routine. This, along with the signs of CrowdFlex prioritisation, suggests that CrowdFlex may do a better job of fitting in with a household's routine than other services.

Figure 14 Service prioritisation reason



Responses to the question 'How do you choose whether to prioritise your tariff/other bolt on services over responding to the Power Move Flex events?' (n=4,097)

Conclusion

The trial appears to have had a positive effect on electricity usage and shifting awareness, particularly from vulnerable groups.

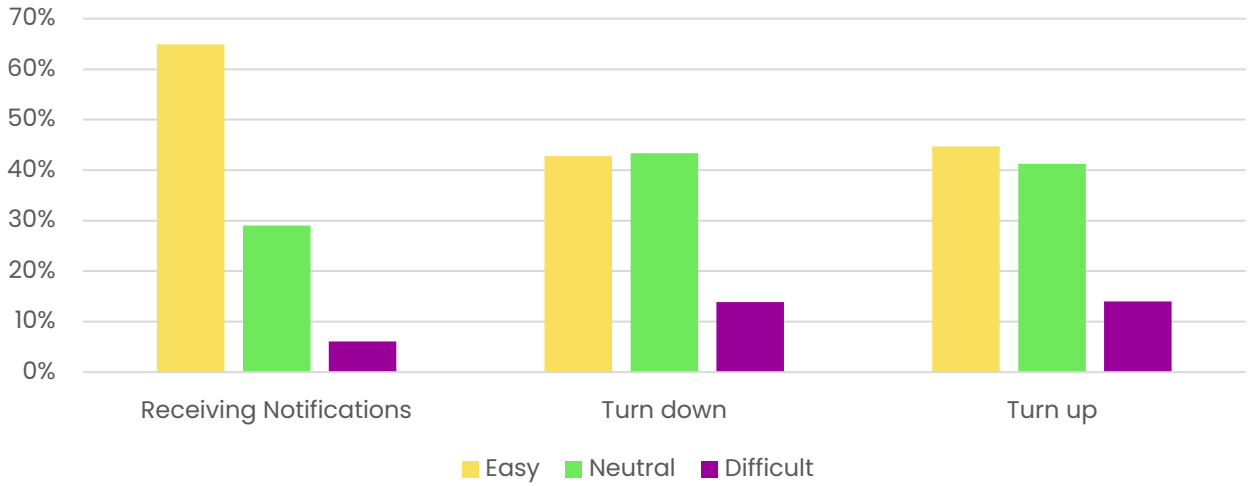
Most participants felt they were either making a difference through participating, or that they were enjoying the trial.

Renters showed higher levels of trial satisfaction, whilst vulnerable groups and those without low carbon technologies were generally less satisfied. Households with electric heating or both an electric vehicle and charger were more likely to have positive trial perceptions and, as seen in section 8, this accompanies a higher volume of electricity shifted.

Generally, there wasn't conflict between CrowdFlex and other demand shifting services, and any existing conflict didn't have a large impact on the volume of flexibility delivered in the CrowdFlex trial. When there was a perceived conflict, CrowdFlex was often favoured, especially by renters.

8. Ease of Participation

Figure 15 Trial area participation ease



Responding to the survey question 'How easy is it for you to take part in Power Move Flex / CrowdFlex?' (n=11,876)

This part of the survey was designed to understand how easy people find different elements of the trial – for example signing up (asked at the start of the trial only), receiving notifications and rewards, or actually taking part in the events.

Generally people continue to find the trial easy or neither easy/difficult. As was found in the summer trial, turn up and turn down events were the aspects of the trial found most challenging, with 14% of respondents finding both these aspects of the trial difficult.

Vulnerable households were on the whole more likely to find aspects of the trial challenging, whereas renters were more likely to find them easy. As reflected through this report, households with a combination of electric vehicle and charger or those with electric heating were less likely to have challenges, and this goes for these particular trial aspects too.

Predictably, high electricity usage households found turn down events easier.

Longer and shorter notice periods, and SMS as well as email notifications were tested more often in the winter trial, and though the majority reported receiving notifications to

be easy, some of the data indicates that changes to event notifications were having a detrimental effect on participation. Repeat survey responders reported that receiving notifications was getting significantly more difficult as the trial progressed (see section 11). It also came through in the qualitative feedback, though some of this sentiment may relate to the differences between OVO's static time of use service 'Power Move' when compared to the dynamic CrowdFlex events:

"When I originally participated I saved money as it was easier to remember when to reduce power consumption. Since the change to random times and late notice of upcoming events it is more difficult"

The preference for longer notice periods came through in the open-text feedback as shown in the word cloud below in response to the question "Is there anything which would increase your level of interest?"

Bigram word cloud – analysis of survey question "Is there anything which would increase your level of interest?" (n=586)

"Your distribution of information to announce next event works on the assumption that all recipients are tied to a smart phone and therefore get those messages whenever they are sent. Some of us are not and may be dinosaurs but you have no right to make that assumption."

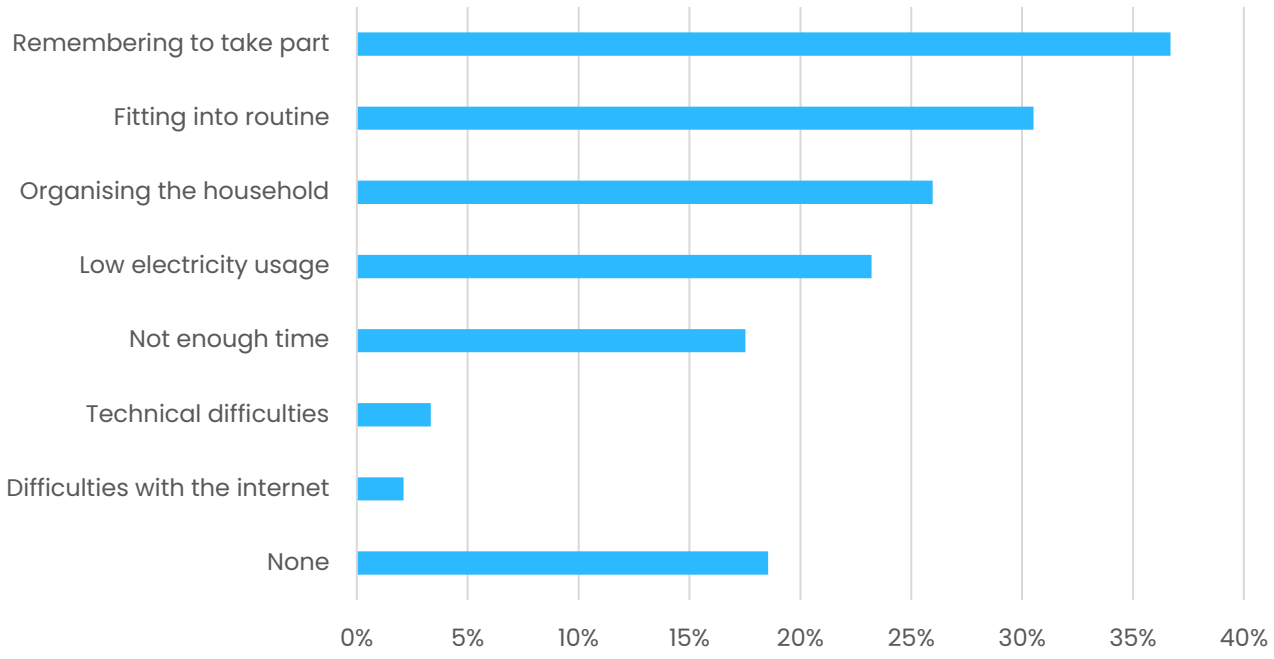
Despite OVO's guidance around *shifting* rather than *creating* demand, it is also clear from some qualitative responses that some people do not fully understand the concept of turn up and how this delivers grid and environmental benefits. This suggests that there is work to be done to explore how customers understand the core concepts of demand shifting, and why increasing consumption may be acceptable if this is aligned with increasing constrained renewables.

'I do struggle with Power Up events […] as it makes me feel I am using more power than I might need to.'

"We think it is unacceptable to ask people to use more electricity than is needed, during POWER UP, to be awarded a few pence. When greenhouse gases are causing irreversible damage to our eco system."

Challenges

Figure 16 Trial challenges



Responses to the question 'Do you or your household experience any of the following challenges in taking part?'(n=11,876)

As in the summer, remembering to take part in events was the biggest challenge faced by respondents, with 37% of the sample saying they had trouble remembering to take part. This was followed by difficulties fitting shifting into their routine, reported by 31%.

"Sometimes the Moves happen with very little notice which is annoying, I think letting you know 2 days before a Move is good & then the day before so you can plan to move your power use more."

Vulnerable groups, with the exception of older households, were more likely to find all areas challenging. Those with electric heating were less likely to find challenges with the trial.

Risky behaviours

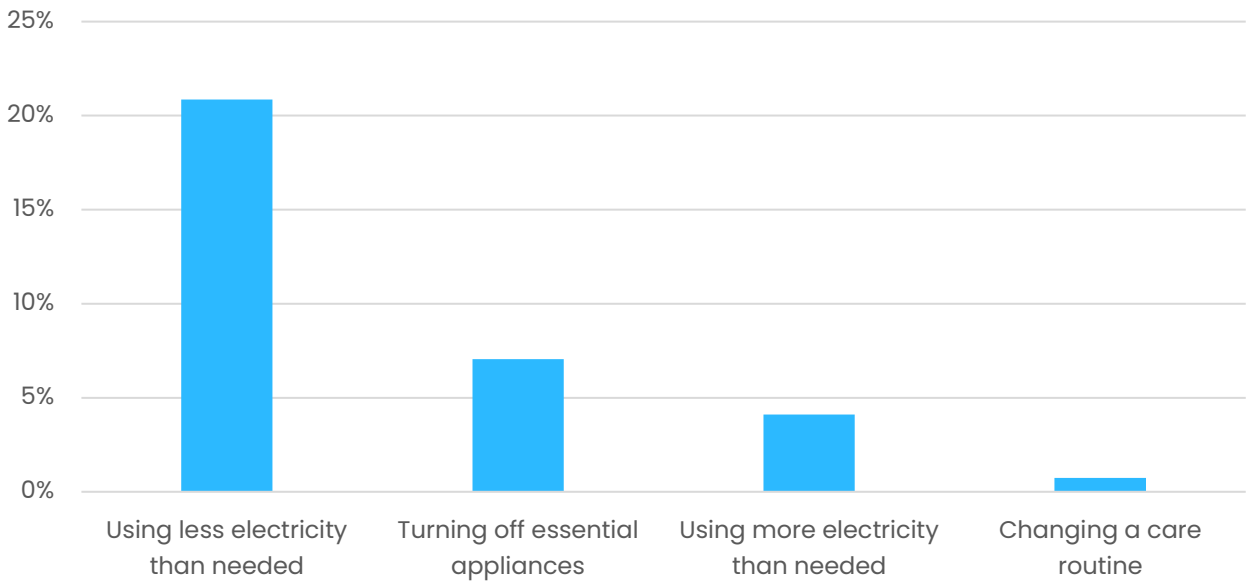
Though OVO's customer communications were clear that participants should only shift 'non-essential' electricity, it remains important to understand the extent that people may put themselves at risk in order to earn rewards.

Participants were asked whether they were regularly doing any of the following during the trial:

- Using less electricity than I need (e.g. not eating dinner or sitting in the dark or cold)
- Using more electricity than I need (e.g. turning on appliances I didn't need)
- Switching off essential electrical appliances (e.g. medical equipment, fridges / freezers)
- Changing care routine without consulting a medical professional

The illustrative examples were provided in the survey question to drill down into whether these activities resulted in harm or discomfort, to get a clearer picture of this, the end of summer 2025 trial surveys will directly ask people whether taking these actions resulted in negative impacts on their comfort or wellbeing.

Figure 17 Risky behaviours



Responses to the question 'Are you regularly doing any of the following during the trial?' (n=11,876)

As presented in figure 17, and as found in the summer trial, the most common 'risky behaviour' was using less electricity than needed, with 21% of respondents reporting this.

Broadly, vulnerable groups, low electricity users and renters, with the exception of older households, were more likely to report risky behaviours, whilst those with LCTs were less likely.

Effective shifting

The volume of electricity shifted during events has been used to provide an indication of effective participation. To quantify this, the amount of energy shifted in the correct direction across the trial has been divided by the number of events a household was notified of, this being taken as that household's average shift per event. It is important to note that this does not account for missed or misinterpreted notifications, or for a household having an inability to participate in specific events due to reasons independent of the trial. Therefore this data should be taken as an indicator of successful shifting, rather than an accurate measure of flexibility achieved in each event, and is not comparable to the primary research findings of the trial published alongside this report.

Using the survey-linked trial data, across all survey respondents, an average of 0.23 kWh was shifted in the correct direction for each event they were notified of. An analysis of the volume of electricity correctly shifted revealed that renters shifted significantly less electricity than non-renters, as did older households. This is interesting considering the high levels of engagement shown by renters (see section 7) along with the fact that older households were more likely to achieve the consistency bonus than younger households. A conclusion we can draw from this is that CrowdFlex is engaging effectively with particular demographics, but this does not necessarily mean they are shifting high volumes of electricity.

Those who reported difficulty with receiving notifications during the trial shifted lower volumes of electricity, supporting our recommendation from the summer trial that getting notifications right is an important aspect of making the service effective.

Households with some form of low carbon technology shifted 0.20kWh (87%) more per event than those without.

Those who delivered a high volume of flex per turn down event were more likely to deliver a high volume per turn up event, with a strong correlation between these factors. This is an important finding as it shows that there is a group of highly effective demand shifters, who are delivering a high volume of flex for both turn up and turn down events.

Conclusion

As in the summer trial, turn up and turn down events remained the most difficult aspect of the trial (when compared to receiving notifications or rewards). Vulnerable groups generally found these aspects more difficult, whilst renters found them easier. However, renters shifted a lower volume of electricity than non-renters.

Remembering to take part in events was often reported as a barrier to engagement, and households with higher electricity demands found this aspect more difficult. Though only 6% of respondents reported receiving notifications to be difficult, the qualitative feedback shows that one-size doesn't fit all and reveals some strong feelings about short notice periods. Given that short notice response is a fundamental part of CrowdFlex, targeting people who can't flex at short notice towards a different type of service may be beneficial (for example, those who don't check communications regularly or those who don't have much activity they can shift).

Over 1/5 of households reported using less electricity **than they needed** during events, with financially insecure and low energy consumption households more likely to say they have done this. (Not eating dinner or sitting in the dark or cold were provided as illustrative examples of 'using less than I need' in the survey question on this topic.)

Those who shifted demand effectively in turn up events did the same in turn down events, indicating a highly engaged group who are shifting effectively.

However, as analysis of the volume of electricity correctly shifted by renters and older people shows, though this scheme is engaging effectively with particular demographics, this does not necessarily mean they are shifting high volumes of electricity.

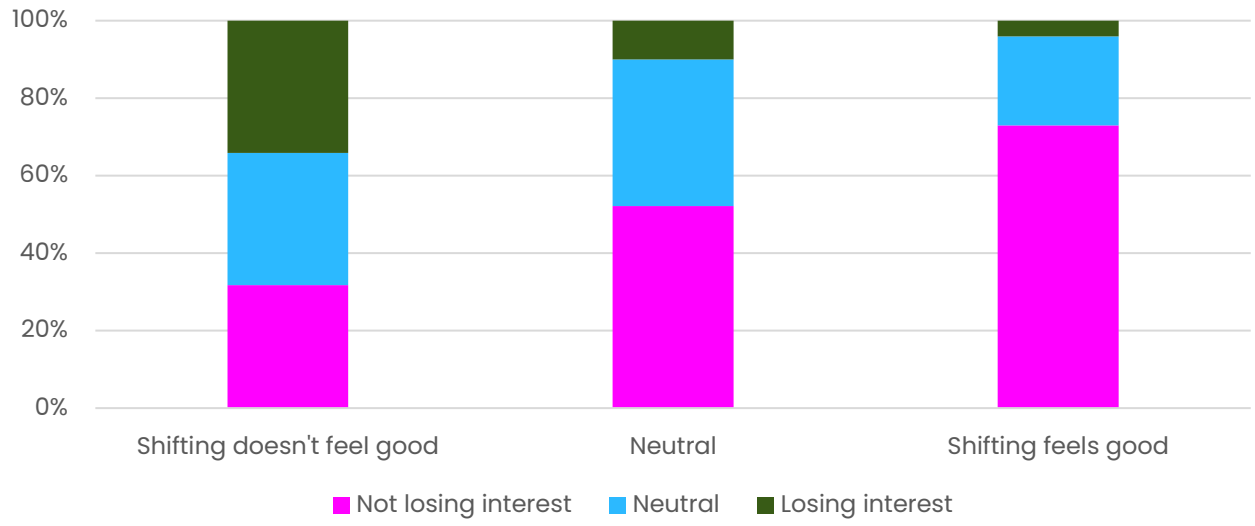
9. Loss of Interest

Loss of interest regression analysis

Across surveys 2.2 and 3, a total of 826 respondents (12%) said that they were "losing interest as the trial goes on". To understand more about those participants who said that they were losing interest in the trial, we conducted a regression analysis as detailed in appendix 1 to determine the factors that are most important in whether people reported losing interest.

The analysis revealed that the most important factor in whether a participant was losing interest with the trial was whether they felt good about shifting their electricity use through the trial, with a significant relationship between these responses.

Figure 18 Electricity shifting feelings



This shows the importance of a positive feeling involved with the trial for continued engagement, above factors such as direct financial rewards. This may also indicate that the impact of the trial will extend beyond direct participation in the trial, with participants potentially choosing to flex their demand for the sake of feeling good, regardless of other factors.

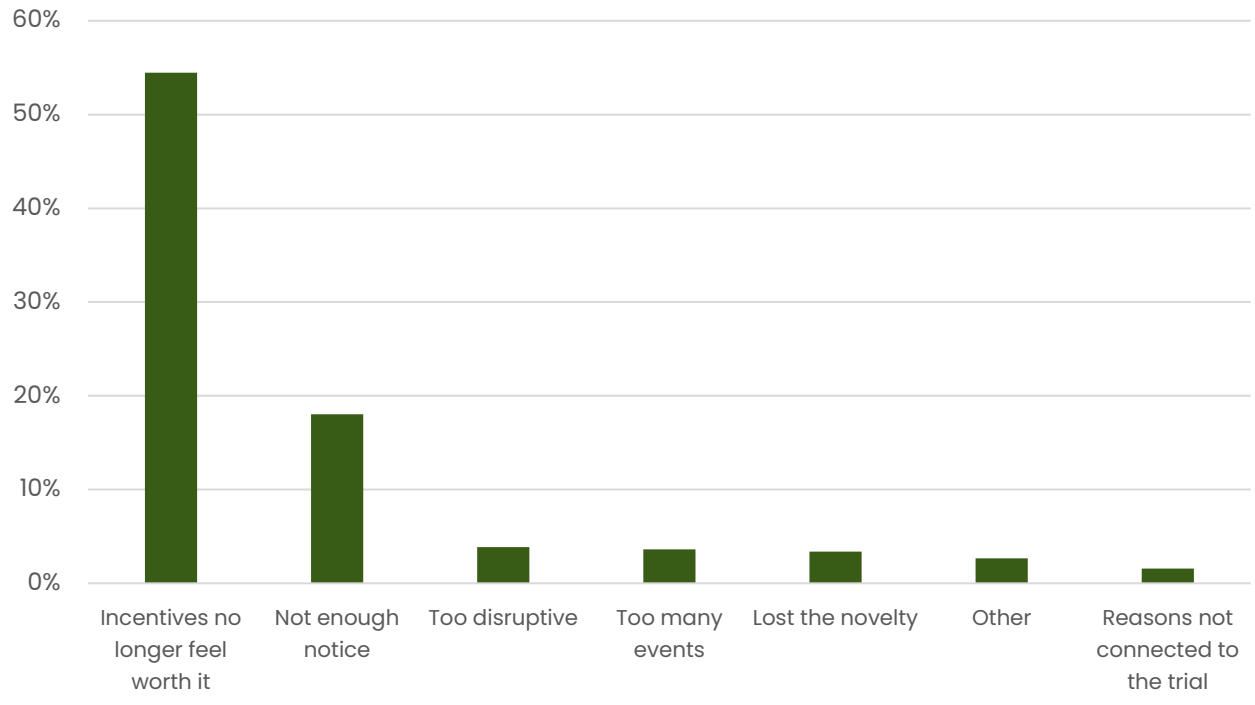
Whether respondents were motivated by saving money also ranked in the top 5 factors for losing interest. Being motivated by savings made a participant significantly less likely to lose interest. Therefore, flex schemes will need to ensure that there is enough of an incentive to keep participants engaged, as shown in figure 19 below.

In terms of vulnerability characteristics, the most important factor in whether a participant said they were losing interest was age, with older households less likely to lose interest. This was however less of a factor than electricity usage - higher usage households were less likely to lose interest.

"Just too many events . Totally lost interest"

Loss of interest self-reported reason

Figure 19 Loss of Interest reason



Responses to the question 'Why would you say you are losing interest in the trial?' (n=826)

Figure 19 presents the reasons provided for why a household lost interest in the trial. This clearly shows that perceived poor financial returns lead to trial disengagement. However, participants were significantly less likely to report the rewards not being worth

it in survey 3 compared to survey 1, whilst (as seen in section 11) the proportion of participants motivated by saving money didn't change significantly between these surveys.

18% said that the notice periods for the events were too short and that this led to them losing interest. Short notice periods were also flagged frequently by respondents in open responses. The issue wasn't only with having time to get organised for an event, but respondents also struggled to participate in turn up events on little notice as they no longer had electricity-intensive activities to shift.

"I was sometimes annoyed to get a Power Up notification at short notice when I had already done e.g. washing/tumble drying/dishwashering during the day, i.e. I couldn't physically power anything in my house up during those times!"

There was also an open response option to the question of why participants were losing interest, which included reports of difficulties due to low energy usage and the timing of events.

"Some times are not doable without setting timers."

This suggests that wider uptake of automation could help overcome the difficulty found in the timing of events, and reduce loss of interest for some participants.

Participants who said that a key motivation for taking part was that they had formed a habit (see section 5) were also 8% less likely to say they were losing interest in the trial compared to those who didn't say they had formed a habit. This shows that habit-forming can be crucial in maintaining engagement, complementing the finding that difficulties around notifications or remembering to take part are large barriers to effective involvement in the trial.

Conclusion

A large factor in not losing interest was whether participants reported that demand shifting 'feels good'. As this means different things to different people, understanding more about motivations for taking part and providing messaging around achieving these motivations may help keep people interested over time. Ease in receiving rewards and the motivation to save money were also influential.

High electricity demand households and older households were less likely to lose interest. This aligns with expectations in relation to smart energy capabilities – people with high electricity use have additional drivers for taking part to reduce their bills and

older people are more likely to be at home during the day and therefore have the opportunity to shift more easily.

When asked to elaborate on reasons for losing interest, poor incentives were given as the biggest factor.

10. Group Analyses

As outlined in the introduction, we aim to understand how different types of energy consumers participate in the trial, and whether certain characteristics of the person or their home correlate to different experiences. To do this, we have defined four broad groups. The latter three groupings are informed by CSE's theoretical model, 'the Capabilities Lens', which sets out the necessary and desirable characteristics that enable people to benefit from smart energy offers such as CrowdFlex.

- **Households that may be vulnerable in the energy market because of their circumstances** – this includes those reporting financial insecurity, households that include somebody with a long-term health condition, people of pensionable age and those with multiple vulnerability characteristics. We have aligned this grouping broadly with Ofgem vulnerability definitions and the Priority Services Register eligibility criteria.
- **Households that may face barriers to demand shifting** – this includes those reporting financial insecurity, those with low electricity use, and those living in rented homes.
- **Households that may have enablers for demand shifting** – this includes those that own low carbon technologies which can enable easier or more effective demand shifting. Examples of such technologies include electric vehicles and chargers, heat pumps, renewable generation technology (solar photovoltaics, other electricity generation), and batteries.
- **High and low electricity users**. High electricity users theoretically have more volume to shift, but other factors may limit this. For example, if they live in multiple occupancy homes that are difficult to coordinate, or they live in poorly insulated homes or with inefficient electric heating, or if they have high electricity use due to health or medical needs. Low electricity users will struggle to shift and may be driven to take more risky behaviour such as turning off essential appliances. People may use little due to being a small household, because they limit use due to affordability, or because they use low carbon technology such as solar to limit their use of grid electricity – all of which have different implications when considering equality and vulnerability.

Households that may be vulnerable in the energy market because of their circumstances

Group	Group size	Average volume shifted per event (kWh)	Proportion of households without low carbon technology
Financially insecure	446	0.20	91%
Health conditions	3,239	0.22	85%
Older households	5,326	0.22*	84%
Multiple vulnerabilities	1,688	0.22	85%
Full sample	11,876	0.23	85%

Table 2 Potentially vulnerable group statistics (*significantly different from those outside the respective group)

Older households

Older Households self-reported as participating in significantly more CrowdFlex events than younger households, as well as achieving the consistency bonus more frequently.

However, they shifted a slightly lower volume of electricity per event (0.22 kWh compared to an overall average of 0.23kWh).

They were 12 percentage points less likely to be motivated by saving money, but 7 percentage points more likely to have formed a habit.

They were more likely to find turn up events difficult and turn down events easy, which is surprising given they had lower electricity usage than younger households.

This group were 3 percentage points more likely to have learnt about their electricity usage during the trial, but less likely to engage with automated shifting, which has been shown as important for effective shifting. They were also slightly more likely to find challenges with using the internet in the trial, which tracks with this reluctance towards automation.

Given their high engagement, this resistance to automation presents as a real barrier to more impactful participation in the trial for this group.

"From what I know, these systems at present cost a lot of money, so it's out of the question for a pensioner on a low income."

Financially insecure households

Financially insecure households self-reported as participating more frequently than secure households, though they didn't achieve the consistency bonus or shift volumes of electricity to a significantly different extent.

This group was 5 percentage points more likely to be motivated by saving money than those outside the group, and 13 percentage points less likely to be interested in the challenge. In the summer we found that this group were *more* likely to participate due to an interest in the challenge.

These households were 9% more likely to find receiving rewards difficult.

Health conditions

Having a health condition meant a household was more likely to find the trial challenging - they were 4 percentage points less likely to report 'no challenges' than other households, they also reported finding both turn up and turn down events more difficult.

They were more likely to learn about their electricity usage, but less likely to have learnt how to shift. Further, they were more likely to report risky behaviours, using less electricity than needed 3 percentage points more often than other households.

There is cause for concern if those already vulnerable are taking risks to participate in demand shifting. This could be addressed through targeted messaging or guidance from DSRSPs as many health conditions would enable the household to join the Priority Services Register.

Despite these challenges, households with health conditions didn't participate in the trial in significantly different ways to those households without health conditions in terms of the frequency of events participated in, the consistency bonus achieved, or the volume of electricity shifted. Those with health conditions used more electricity than other households.

Multiple vulnerabilities

Households falling into multiple vulnerability groups reported participating in more events than those with one or no vulnerability, but they didn't achieve the consistency bonus more frequently or shift a greater volume of electricity. This group were 7 percentage points less likely to be motivated by saving money, but 5 percentage points more likely to have formed a habit.

Having said this, this group was 5 percentage points more likely to find a challenge in remembering to take part, which we've seen as a strong barrier to engagement. They were also less open to automation than those outside the group, further entrenching this barrier.

Similarly to those with health conditions, this group engaged in risky behaviours, being 3 percentage points less likely to report no risks.

Households that may face barriers to demand shifting

Group	Group size	Average volume shifted per event (kWh)	Proportion of households without low carbon technology	Proportion of households with multiple vulnerabilities
Social renters	1,304	0.16*	88%	24%
Private renters	1,423	0.20*	96%	9%
Full sample	11,876	0.23	85%	14%

Table 3 Household with potential barriers group statistics (*significantly different from those outside the respective group)

Social renters

Social renters self-reported as participating more frequently than those outside this group and felt both turn up and down events easier to participate in than non social-renters.

However, they achieved the consistency bonus less frequently and shifted 0.07 kWh (29%) less per event, which is a significant finding.

They were 5 percentage points less interested in the challenge than other households.

Challenges including fitting demand shifting into their routine, and timing difficulties were 8 percentage points and 4 percentage points less potent to this group than those outside it. However, they were less open to automation, and 7 percentage points more likely to engage in risky behaviour during the trial.

Private renters

There were many similarities between both types of renters through this analysis. Private renters also self-reported as participating in more events but achieved the consistency bonus less than non private-renters. This group shifted 3kWh (13%) less per event, another significant finding, though this isn't as low a figure as for social renters.

Private renters were 8 percentage points more likely to be motivated by the opportunity to save money, and more likely to find receiving rewards difficult.

Like social renters, private renters found both turn up and turn down events easier to engage with than those outside this group and were 11 percentage points less likely to engage with no risky behaviours. Looking at the actual shifting taking place, by both types of renters, it's clear that they are not participating as effectively as they feel they are.

They were more open to automation though they stated they were less likely to use low carbon technologies going forwards than non private-renters.

Households that may have enablers for demand shifting

Group	Group size	Average volume shifted per event (kWh)	Proportion of households with multiple vulnerabilities
Solar photovoltaic owners	1,042	0.36*	16%
Home battery owners	318	0.48*	16%

Electric vehicle owners	301	0.84*	12%
Households with electric heating	1,532	0.38*	15%
Households with no low carbon technologies	10,144	0.20*	14%
Full sample	11,876	0.23	14%

Table 4 Households with potential enables group statistics (*significantly different from those outside the respective group)

Solar photovoltaics owners

Owners of solar photovoltaic panels self-reported as participating less frequently in events than those without this technology but shifted 58% more electricity per event. This is the smallest increase compared to any other technology analysed here, but is still a significant increase.

This group was 4 percentage points less likely to be motivated by saving money, but more motivated by both achieving a cleaner grid and an interest in the challenge than those without solar photovoltaics.

The main challenge for solar photovoltaics owners appears to be their low electricity usage, as they were more likely to find turn up events difficult and more likely to find low electricity usage a challenge. This group were 6 percentage points less likely to have improved understanding of their energy use, and this may be because they have pre-existing strong knowledge in this field.

As found across the different technology groups, risk is less prevalent in a solar photovoltaic owning household's engagement with the trial than those without this technology.

Home Battery Owners

There were 318 home battery owners included in this analysis from the 3 surveys. 36% of the 179 survey 2.2 and 3 respondents who own home batteries stated that they never used them to participate in CrowdFlex events. However, this group still shifted a significantly greater volume of electricity than those without a home battery. When asked why they didn't use their batteries, the most common response, from 49% of respondents, was that they were unaware of this functionality. Although 75% of battery

owners also owned solar photovoltaics, this suggests that solar self-consumption was not the main driver of lack of home battery participation in CrowdFlex.

Overall, battery owners were less likely to find the trial 'more interesting with time'. Though battery owners without solar photovoltaics report more positive experiences, the picture is unclear and we can't entirely attribute problems to owning solar photovoltaics.

Home batteries, along with heat pumps, were the least commonly bought tech from survey 3 participants, with only 9 households (0.7%) buying one during the trial.

Electric vehicle and charger owners

Owners of both an electric vehicle and a charger participated in more events than those without both of these pieces of technology, and shifted an average of 0.63 kWh more (297%) per event than those without this equipment. However, they didn't participate more consistently than those outside this group. They were significantly more likely to find turn up events easy, but didn't find turn down events easier to a significant degree.

This group were 11 and 10 percentage points more likely to be motivated by an interest in the challenge and achieving a cleaner grid respectively, and were 5 percentage points less likely to use less electricity than they needed.

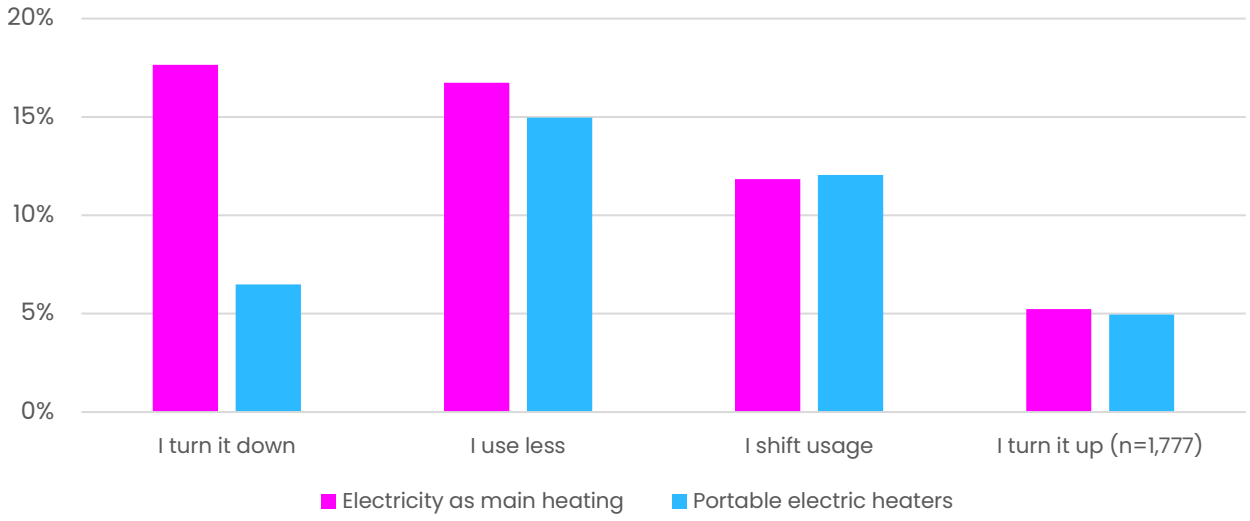
This group were also more engaged with automated shifting methods, and were 9 percentage points less likely to shift manually.

Electric heating

There were 1,343 households with electric heating across surveys 1.2 and 1.3, of which 757 (56%) flexed their electricity usage with their heating. As seen in figure 20, those who shifted their electric heating had different strategies depending on whether this was their main source of heating or not, though neither were unlikely to use it during turn up events.

From the surveys completed at the end of winter, 61% of households with electric heating said they had improved their understanding of their electricity usage.

Figure 20 Electric heating management



Responses to the question 'You mentioned you are changing how you use your electric heating to take part in events. Which of the following describes what you are doing?'(n=4,804)

Those with electric heating self-reported participating in more events than those without, and shifted a greater volume of electricity (67%), though they weren't more consistent in their participation than those outside of this group.

As might be expected, they found turn down events easier to participate in than those without electric heating.

Those with electric heating were less likely to find difficulties organising their households and changing their routine, indicating that being able to shift heating may reduce some barriers to CrowdFlex participation.

Households without low carbon technologies

Households without any low carbon technologies participated less than those with at least one type of low carbon technology. As a result, they shifted 13% less electricity per event.

They were 3 percentage points more likely to use less electricity than they needed to.

As might be predicted, this group were both more likely to shift manually and less open to automation.

Electricity Usage

A comparison between electricity consumption and event participation revealed that households with lower consumption profiles participated in a greater number of events. However, this is heavily influenced by the high participation of the lowest decile, as discussed in section 4, and with the removal of this decile this finding is no longer significant.

High electricity users were more likely to find challenges in organising their household, remembering to participate, changing their routine, and finding time to take part. However, it is worth noting that these challenges may be more likely to impact larger, busier households, which might have higher electricity consumption profiles, therefore their electricity consumption may not be the causal factor creating challenges with the trial.

Participants with lower overall electricity usage were also more likely to switch manually in response to events, with a 14% difference between the highest and lowest use deciles. This difference suggests that supporting automated shifting for low usage households should be a priority going forwards, and might be effective in increasing the flex they are able to deliver. This is important given that, as would be expected, low electricity usage households are likely to shift lower volumes of electricity during events and households using less electricity were also less likely to be open to automation, the lowest usage decile 14 percentage points less likely to show an interest in smart tech than the highest usage decile.

Out of the motivations suggested, the opportunity to save money was the only one with a significant difference across households with different electricity consumptions, with those in the highest decile 6 percentage points more likely to state this than those in the lowest. This finding holds true when controlling for financial insecurity. This validates our assumptions that those with higher electricity bills have additional drivers to participate in demand shifting.

Households with lower electricity usage were more likely to switch off essential appliances and use less electricity than they needed, with the lowest decile 13% more likely to report using less than they need compared to the highest use decile.

As reported in section 8, 23% of households self-reported that they ‘don't typically use much electricity’, as a challenge to participating. 59% of respondents attributed this low usage to their household being small, though 10% reported that they had to reduce their usage due to unaffordable bills.

Conclusion

In response to our research question, we can see clearly that consumer characteristics do impact participation in different ways.

CrowdFlex appears to be successfully engaging vulnerable customers, although the total volume of flex they deliver often lower and these groups are evidently at risk of exposing themselves to discomfort or harm – they may struggle with digital and automated options (older people), be less likely to earn rewards (those struggling financially) and be more likely to put themselves at risk (those with a health condition or multiple vulnerabilities). To reduce the risk of vulnerable groups being left behind in the low carbon transition (a key objective for Ofgem), demand side response service providers should provide tailored support for vulnerable households about safe and effective demand shifting. This is key, as the widespread consumer-led flexibility needed to deliver clean power will be harder to achieve if large parts of the population are excluded or there is a perception that demand flexibility only works for the well-off. For providers that are also energy suppliers, many of these households may already be known to them through the Priority Services Register.

Those with low carbon technologies provided far greater volumes of flex than those without, however this was not without its challenges. Targeting households with low carbon technology towards technology specific services or Type-of-Use tariffs may remove some of the challenges these households experience in participating in events. One example of this targeting has already been trialled in CrowdFlex through moving electric vehicle owners from the utilisation to availability trial; further analysis of the impacts of that move could be useful.

Surprisingly, renters continue to report that it's easy to take part but looking at the actual shifting taking place it's clear that they are not participating as effectively as they feel they are. Households in the lowest decile for electricity usage participated much more, as well as more consistently. However, this comes at a cost, as they were more likely to turn off essential appliances. High electricity users also face challenges, often to do with managing larger households.

11. Longitudinal Analysis

A longitudinal analysis was completed using survey 3 respondents' answers to compare results over time, and so includes the 1,181 respondents who completing survey 3. These households have participated in CrowdFlex since summer 2024 and have completed three surveys:

- Survey 1 – summer 2024 trial, end of trial survey
- Survey 2 – winter 2024-2025 trial, trial mid-point survey
- Survey 3 – winter 2024-2025 trial, end of trial survey

Longitudinal analysis has been completed for event participation, trial motivations, shifting methods, trial satisfaction and risky behaviours. Further longitudinal analysis, with the entire time-period of the CrowdFlex study, will be conducted at the end of the summer 2025 trial.

Event participation

Self-reported participation in events did not change significantly over time.

Trial motivations

Between surveys 1 and 3, repeat participants became significantly more motivated by achieving a cleaner grid. This indicates that participants are becoming more environmentally conscious through the trial, just as they are becoming more aware of their own energy usage, and suggests that participation in CrowdFlex may have actually increased environmental motivations in its participants.

Further, there was a significant increase in those forming a habit between surveys 2 and 3, with 9% more stating this in survey 3. This is a positive sign for the future of domestic flexibility if people become habituated to flexing over time.

The number of individuals motivated by an interest in the challenge had a significant drop off of 10% between survey 1 and 3 though this doesn't imply less interest in the trial overall, given event participation didn't fall. Again, this is positive for the future normalisation of flexible household energy use, if we see people maintaining participation even when the novelty of a new challenge has faded. As seen in section 9,

only 3% of respondents who were losing interest in the trial attributed this to the trial losing its novelty.

The opportunity to save money didn't change significantly as a motivation between surveys 1 and 3, remaining the most important motivation throughout.

Trial satisfaction

We further found positive sentiments across the three surveys, with respondents reporting the trial becoming easier with time, more interesting with time and had an increased feeling that one was making a difference. For all these factors the greatest difference came between survey 2 (mid-winter) and survey 3 (end of winter). Thus, several measures suggest that perceptions of the trial are actually improving over time. Combined with the increase in habit formation, this is a positive finding overall for flex schemes such as CrowdFlex which will need to engage people consistently over the longer-term.

Ease of participation

Receiving event notifications was found significantly more difficult as the trial progressed, with 84% finding this easy in the summer trial but only 56% finding it easy by the winter trial. This may be a result of the different notice periods being tested in the winter trial, or may be due to the increased number of events meaning this is a more frequent issue. This remains one of the biggest problem areas for participants suggesting that DSRSPs still have work to do to establish the best of way of providing notifications, recognising that this won't be the same for everybody.

Participants also found both turn up and down events more difficult by survey 3 (as opposed to other trial elements such as receiving notification or rewards), though the only significant changes for these factors occurred between the first two surveys (i.e. between the summer trial survey and mid-winter trial survey). This is a potential concern. If people report the trial becoming generally easier and habits forming over time, but the actual demand shifting difficult, it may be that positive sentiment is not translating into effective flexibility. It may be possible to explore this further with trial data at the end of the summer 2025 trial.

Shifting methods

Another positive takeaway from this section of analysis is that automated shifting was employed significantly more at each survey, with 22% more households reporting to shift using some automation method between surveys 1 and 3. This is accompanied by 3% fewer households shifting manually between surveys 1 and 3. However, for both of these findings, the largest changes occurred between surveys 1 and 2, so we may infer this is a result of initial acclimatisation to the trial, and may not continue at the same rate going forwards. This is overall a positive trend in terms of demand shift, since customers with some form of automation are able to participate with lower personal labour cost and with less chance of forgetting or dropping out over time.

Risky behaviours

There was no significant difference in engagement with risky behaviours, as defined in section 8, between surveys 1 and 3. Meaning that despite finding it easier with time some people continue to use compromising shifting strategies such as using less electricity than they need or turning off essential appliances. Though OVO customer comms already tells customers to only shift non-essential electricity, this suggests there remains a need for further specific messaging around risky or adverse behaviour that should be avoided, to help ensure trial participants are able to contribute the demand shifting without putting themselves at risk. For the summer 2025 trial we will further explore whether taking these actions has resulted in harm or discomfort.

Conclusion

Those taking part since summer 2024 remain positive about participation – they continue to take part in events, it's becoming more of a habit for many, and several measures suggest that perceptions of the trial are actually improving over time. People are less interested in the challenge but continue to participate which is positive for the future when flexibility moves out of innovation and into the mainstream.

Over the past year, repeat participants became significantly more motivated by achieving a cleaner grid. Participants are becoming more environmentally conscious through the trial, just as they are becoming more aware of their own energy usage.

Long term participants have increased their use of automated shifting methods which means their participation should be easier and more effective. However, the actual turn

up and turn down events is the area where difficulty remains suggesting that this positive sentiment may not be translating into effective flexibility.

Some people continue to take risky shifting behaviours, suggesting that even after a year of taking part there is still work to do to help people participate easily and without compromising their comfort or safety.

12. Conclusions and recommendations

Demographic and Household Characteristics

The demographic analysis finds the same conclusions as the summer trial surveys, with an imbalance of gender and an underrepresentation of ethnic minorities participating. This mirrors findings of other flexibility scheme evaluations[4]. Further research is needed to understand the reasons for underrepresentation of ethnic minorities and how this might be mitigated to reduce the risk of excluding non-white customers from demand flexibility.

Motivation and Maintaining Participation

The strongest motivation remains the opportunity to save money. 1/3 of participants said they participated because they got into the habit of responding to events. Habit formation is becoming a stronger factor as the trial progresses. Older households were more likely to say this than younger households. Older households also participated consistently through the trial.

2/3 of respondents felt that they were making a difference with their participation, and almost 2/3 enjoyed the trial. Several measures of trial perceptions are actually improving over time, a positive indication for the ability of CrowdFlex to engage people over the longer-term.

Self-reported event participation remained high, with high participation reported from renters and vulnerable groups, though for renters the trial data appears to contradict this as they were less likely to receive the consistency bonus.

As households with lower usage were more likely to achieve the consistency bonus, further analysis could explore whether this offers a viable route to addressing inequality issues by rewarding participation of those households that are unlikely to earn large rewards but can offer a highly consistent low volume flexibility.

[4] CSE DFS evaluations – add ref

Shifting strategies

Most participants shifted their use manually, though automation is being utilised more as the trial progresses. This is important, as participants using automation tools shifted more electricity. Respondents using automation tools shifted on average 30% more electricity, and earned significantly more rewards. Automated shifting increased by 22% since the start of the trial.

Looking forwards, participants are fairly open to automation, and money saving is the factor that would most improve positivity towards automation. As this research provides empirical evidence that those using automation earned more in the trial, there is an opportunity to communicate these findings within the trial to those currently shifting manually, as well as to future participants in flex schemes. Provision of free or subsidised lower cost or small-scale smart tech to trial participants might support people to become more effective at shifting through automation, especially when combined with information and support on how to get the most out of it. Involvement from their existing trusted provider could help to address people's reservations around upfront costs, understanding, and trust.

Those with limited technology, vulnerabilities and low electricity usage are less open to switching to automation.

Customers are often involved with other shifting services, but only 9% said they found a difficulty in combining services. This conflict didn't have a large impact of on the volume of flexibility delivered in the CrowdFlex trial. When there was a perceived conflict, CrowdFlex was often favoured, especially by renters.

Perceptions

The trial appears to have had a positive effect on electricity usage and shifting awareness, particularly from vulnerable groups.

Most participants felt they were either making a difference through participating, or that they were enjoying the trial. Renters showed higher levels of trial satisfaction, whilst vulnerable groups and those without low carbon technologies were generally less satisfied.

Ease of Participation

As in the summer trial, turn up and turn down events (rather than receiving notifications or rewards) remained the most difficult aspect of the trial. Vulnerable groups generally found these aspects more difficult, whilst renters found them easier. However, renters shifted a lower volume of electricity than non-renters.

Remembering to take part in events was often reported as a barrier to engagement, and households with higher electricity demands found this aspect more difficult. Though only 6% of respondents reported receiving notifications to be difficult, the qualitative feedback shows that one-size doesn't fit all and reveals some strong feelings about short notice periods. Given that short notice response is a fundamental part of CrowdFlex, targeting people who can't flex at short notice towards a different type of service may be beneficial (for example, those who don't check communications regularly or those who don't have much energy-intensive activity they can shift).

Over 1/5 of households reported using less electricity **than they needed** during events, with financially insecure and low energy consumption households more likely to say they have done this. (Not eating dinner or sitting in the dark or cold were provided as illustrative examples in the survey question on this topic.)

Those who shifted demand effectively in turn up events did the same in turn down events, indicating a highly engaged group who are shifting effectively.

However, as analysis of the volume of electricity correctly shifted by renters and older people shows, though this scheme is engaging effectively with particular demographics, this does not necessarily mean they are shifting high volumes of electricity.

Loss of Interest

A large factor in not losing interest was whether participants reported that demand shifting 'feels good'. As this means different things to different people, understanding more about motivations for taking part and providing messaging around achieving these motivations may help keep people interested over time. Ease in receiving rewards and the motivation to save money were also influential.

High electricity demand households and older households were less likely to lose interest. This aligns with expectations in relation to smart energy capabilities – people with high electricity have additional drivers for taking part to reduce their bills and older people are more likely to be at home during the day and therefore have the opportunity to shift more easily.

When asked to elaborate on reasons for losing interest, poor incentives were given as the biggest factor.

Group Analyses

In response to our research question, we can see clearly that consumer characteristics do impact participation in different ways.

CrowdFlex appears to be successfully engaging vulnerable customers, although the total volume of flex they deliver is often lower and these groups are evidently at risk of exposing themselves to harm or discomfort – they may struggle with digital and automated options (older people), be less likely to earn rewards (those struggling financially) and be more likely to put themselves at risk (those with a health condition or multiple vulnerabilities). To reduce the risk of vulnerable groups being left behind in the low carbon transition (a key objective for Ofgem), DSRSPs should provide tailored support for vulnerable households about safe and effective demand shifting. For energy supplier DSRSPs many of these households may already be known to them through the Priority Services Register.

As we highlighted following the CrowdFlex summer 2024 trial, unequal participation raises questions around whether industry should focus on encouraging all eligible households to take part in flexibility services like CrowdFlex, or if they should be targeted at those households more likely to find dynamic demand shifting easy and effective. But the winter trial findings demonstrate that these groups want to engage and should be supported to do so. The widespread consumer-led flexibility need to deliver clean power will be harder to achieve if large parts of the population are excluded.

Those with low carbon technologies provided greater volumes of flex than those without, however this was not without its challenges. Targeting households with low carbon technology towards technology specific services or Type-of-Use tariffs may remove some of the challenges these households experience in participating in events. One example of this targeting has already been trialled in CrowdFlex through moving electric vehicle owners from the utilisation to availability trial; further analysis of the impacts of that move could be useful.

As we might expect, demand shifting appears to work well for those with electric heating - they found it easy, participated often, and shifted higher volumes than other groups. As flexibility rewards could offer a route to reduce high electricity costs faced by this group, targeting of flex services towards those with electric heating will be beneficial for consumers and for the energy system.

Surprisingly, renters continue to report that it's easy to take part, but looking at the actual shifting taking place it's clear that they are not participating as effectively as they feel they are.

Households in the lowest decile for electricity usage participated much more often, as well as more consistently. However, this comes at a cost, as they were more likely to turn off essential appliances. High electricity users also face challenges, often to do with manging larger households.

Longitudinal Analysis

Those taking part since summer 2024 remain positive about participation – they continue to take part in events, it's becoming more of a habit for many, and several measures suggest that perceptions of the trial are actually improving over time. People are less interested in the challenge but continue to participate which is positive for the future as flexibility services moves out of innovation and into the mainstream.

Over the past year, repeat participants became significantly more motivated by achieving a cleaner grid. Participants are becoming more environmentally conscious through the trial, just as they are becoming more aware of their own energy usage.

Long term participants have increased their use of automated shifting methods which means their participation should be easier and more effective. However, turn up and turn down events are the areas where difficulty remains suggesting that this positive sentiment may not be translating into effective flexibility.

Challenges remain around the provision of notifications and people continue to take risky shifting behaviours, suggesting that even after a year of taking part there is an issue concerning safe participation. This suggests there is still work to do to for service providers to ensure to help people can take part participate easily and without compromising their comfort or safety.

13. Appendices

Appendix 1: Extended methodology

R language was used to complete the analysis presented throughout this report, including the statistical testing outlined below.

The surveys were cleaned of PII before importing into R, and they were further cleaned to ensure correct routing, and to remove 'speeders' who we suspect of having rushed through a survey. We did this by removing anyone who completed the survey in a time shorter than two median absolute deviations below the median completion time.

To assess differences between participants that fall within a group versus those outside the group (for example, older households versus non-older households) with regard to a given binary survey question, a chi-square test was performed. This is an appropriate test given that the group classifications are binary, and the size of the surveys were sufficiently large.

A Welch Two Sample t-test was used when the dependent variable was ordinal (such as a Likert scale of "Agree", "Neither agree nor disagree" and "Disagree"). This test allowed us to see whether the difference in the means between populations within groups and outside of groups were significantly different. The assumption of normality required for this test was handled given the large sample sizes provided by the survey responses.

When evaluating continuous outcomes, such as some of those present in the trial data (e.g. electricity shifted), generalised linear models (GLMs) were employed. When evaluating continuous variables against binary outcomes, a binomial GLM was used, and when evaluating them against ordinal outcomes an ordinal logistic regression was used.

In order to determine the most important factors in the outcome of particular questions, namely whether participants were losing interest in the trial and how difficult they found turn up events, an XGBoost model was created using the xgboost package. This model is capable of dealing with missing data without imputing values, which is important for this dataset, particularly in cases where participants filled out multiple surveys. The regressors used in this analysis were variables derived from the following questions:

- Which of the following statements do you agree with?
  a) The trial is getting easier as it goes on

b) I feel like I am making a difference by taking part

- c) I bought new technology during the trial, to help manage my electricity use
  Please say how much you agree with the following statements:
  a) the trial helps me to reduce my energy demand
  b) changing my energy demand as part of the trial feels good
  b) I don't have many other options to reduce my energy demand
  d) The trial has helped to remove some barriers to tackling our household's energy demand
- Why do you continue to take part in CrowdFlex / Power Move Flex?
  a. To save money
  b. Interest in the challenge
  c. Help achieve a cleaner and greener electricity grid
  d. Got into the habit of responding to the events
- As well as Power Move Flex, do you use any other tariffs or services to shift electricity use to certain times of day to save money?
- How do you manage your energy to make the most of cheaper, off peak rates or rewards sessions?
- Are you regularly doing any of the following during the trial?
  a. Use less electricity than I need (e.g., not eating dinner or sitting in the dark or cold)
  b. Use more electricity than I need (e.g., turning on appliances I didn't need)
  c. Switch off essential electrical appliances (e.g., medical equipment, fridges / freezers)
  d. Change my care routine without consulting a medical professional
- How easy is it for you to take part in Power Move Flex / CrowdFlex? For each of the following:
  a. Noticing event notifications
  b. Turn up events
  c. Turn down events
  d. Receiving rewards
- Do you or your household experience any of the following challenges in taking part?
  a. Organising myself or others in the household
  b. Remembering to take part
  c. Having a routine which is hard to change
  d. Don't typically use much electricity
  e. Difficulty accessing or using technology (e.g., timers, smart appliances)
  f. Difficulty accessing or using the internet (e.g., on a computer or app)

g. Not enough time

- Do any of the following aspects of the trial make it hard for you to take part?
  a. Not enough notice of event
  b. Overly complicated and technical language
  c. Not enough communication about the results
  d. Not enough advice on how to participate safely or effectively
  e. Technical difficulties (e.g., not receiving notifications, smart meter not working)
  f. Reward not worth it
  g. There are too many events
- We're interested in whether taking part is having an impact on how you think about energy. Please tick if any of the following statements apply to you
  a. I'm more aware of electricity usage in my home
  b. I'm more aware of how to shift my electricity use to other times of day or week
  c. I'm more likely to use timers, home energy apps, or smart technologies
  d. I'm interested in getting energy-efficient appliances and / or insulating my home
  e. I'm interested in getting a low carbon technology like an electric vehicle, battery, heat pump or solar panels
  f. I'm interested in signing up to a time of use tariff or getting my supplier to manage my electricity use
- Please tell us about the total annual income of your household
- How well would you say you are managing financially these days?
- How many people live in your home, including yourself? Please include all those who are there regularly, even if not every day.
  a. Number of children (17 and below)
  b. Number of adults (18 to 64)
  c. Number of adults (65 and above)
- Do you currently have any of the following low carbon technologies at home? Please only select answers which you or people in your household use.
  a. Electric vehicle (plug in to charge – not a hybrid)
  b. Electric vehicle charger
  c. Solar panels for electricity (Solar PV)
  d. Solar panels for hot water (Solar thermal)
  e. Other electricity generation e.g., micro wind, micro hydro
  f. Battery / home energy storage
  g. None of the above
- How do you heat your home? If you use multiple heating sources, select the one you use the most.

- What is your ethnic group?
- Do you (or any other adults / children in your household) have any physical or mental health conditions or illnesses lasting or expected to last 12 months or more?
- How would you rate your home's insulation?
- Which of these best describes your home?
  a. Owner-occupied (outright or with mortgage)
  b. Shared ownership
  c. Private Rented (from a private landlord, agency or other)
  d. Social Rented (from a housing association or local authority)
  e. Rent free or other

The XGBoost model that was used had the hyperparameters of learning rate, maximum depth and number of rounds fine-tuned to improve the performance of the model. The root mean square deviation was used as the metric for evaluating the model's performance. The importance of factors in the model was then evaluated using the fractional contribution of each feature based on the gain of the feature's split.

This regression was used to provide an indication of important factors, which were then further quantified using significance tests.

In completing a longitudinal analysis, one-way repeated-measures ANOVA tests were used to compare surveys 1, 2 and 3, with a pairwise t-test used as a post-hoc test helping to identify differences between each survey results. The assumption of normality was dealt with as above, and a visual inspection of boxplots was used to affirm a roughly equal variance amongst the survey responses.

This was replaced with a binomial logistic regression where the outcome was binary. Two separate reference levels (survey 1 and survey 2) were used in order to capture differences between all 3 surveys. Multicollinearity was not an issue with this logistic regression given there was only a single regressor (i.e. survey number).

Appendix 2: Consumer groups

Throughout the CrowdFlex study, customers groupings have been used to provide a lens for the effect of the CrowdFlex trial on particular demographics. Table 1 provides a description of each grouping along with a rationale for its inclusion.

Survey question	Rationale for inclusion
People self-reporting financial insecurity. Any participant that selected "Finding it quite difficult" or "Finding it very difficult" in response to 'How well would you say you are managing financially these days? Would you say you are…'	People on lower incomes might be considered vulnerable in the energy market because they may be more likely to suffer detriment because of higher energy bills or inappropriate energy tariffs. We use a self-reported measure because income is not a suitable proxy for financial insecurity, since people's outgoings differ for complex reasons.
Households containing somebody with a long-term health condition. Any participant that selected "Yes" to 'Do you (or any other adults / children in your household) have any physical or mental health conditions or illnesses lasting or expected to last 12 months or more?'	People with a health condition lasting 12 months or more, including chronic or long-term illness or disability, might be considered vulnerable in the energy market because they may be more likely to suffer detriment as a result of cold homes, or may rely on medical equipment that uses electricity.
Older households. Based on responses to 'How many people living in your home, including yourself… are adults (65 and above)'. Households with an equal number of, or more, members over 65 than adults under 65 were included in this category.	Older people may be considered vulnerable in the energy market because they may use more energy due to being at home for longer periods and may be more likely to suffer health detriment as a result of cold homes.
Households with multiple vulnerability factors. Any participant that reported more than one factor (health condition, over 65, financial insecurity).	Vulnerability should be understood as intersectional. Multiple vulnerability factors increase the risk of detriment.
People living in social rented homes. Any participant living in a home rented from a housing association or local authority.	People living in rented homes may be restricted in what measures they are permitted to install in their home, or may

('Which of these best describes your home?')	not wish to spend money on a building which does not belong to them, preventing them from engaging in the smart energy transition. In the context of domestic demand shifting, participation may be limited as they are unable to change their heating, electrical systems, and appliances and unable to utilise low carbon technology such as battery storage or EVs. There are some key differences between these two groups, as social rented homes are likely to be more energy efficient and more likely to have low carbon technologies compared to private rented homes
People living in private rented homes. Any participant living in a home rented from a private landlord, agency or other. ('Which of these best describes your home?')	
Electric vehicle + charger owners. Based on responses to 'Do you currently have any of the following low carbon technologies at home?'	Ability to charge an electric vehicle at home provides a large shiftable electricity load.
Home battery owners. Based on responses to 'Do you currently have any of the following low carbon technologies at home?'	Ability to store electricity supports shifting outside of peak demand times.
Solar photovoltaic owners. Based on responses to 'Do you currently have any of the following low carbon technologies at home?'	Potential to interact with shifting services differently given their existing focus on shifting to match solar photovoltaic electricity production.
Electric heating. Based on 'How do you heat your home? If you use multiple heating sources, select the one you use the most.'	Potential to interact more effectively with demand shifting, with a particular focus on heating.
No low carbon technology. Based on responses to 'Do you currently have any of the following low carbon technologies at home?'	Those without any low carbon technologies may find it more difficult to participate in turn up or turn down events.

These groups are treated as non-exclusive throughout the analysis in that, for example, if a household has an electric vehicle + charger then they will be in the electric vehicle

and charger group, regardless of the fact that they may also have renewable energy generation or a battery. Similarly, that same household would also be in the battery group, even though they also have an electric vehicle. This structure holds for all the above-mentioned groups.