EQUINOX

EQUINOX Trial Two Customer Engagement Report

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Executive summary

Introduction

EQUINOX (Equitable Novel Flexibility Exchange) is a Network Innovation Competition project, funded by Ofgem and led by National Grid Electricity Distribution in collaboration with Octopus Energy, Sero, ScottishPower, Passiv UK, West Midlands Combined Authority, Welsh Government, National Energy Action, SP Energy Networks, and Guidehouse. Between 2022 and 2025, EQUINOX is developing novel commercial arrangements and supporting technological integrations that unlock flexibility from residential low carbon heating. EQUINOX aims to develop a solution that meets the needs of all consumers, including those with vulnerabilities or experiencing fuel poverty.

The project successfully carried out its second trial between December 2023 and April 2024. The trial tested three novel commercial arrangements which saw domestic households who already had heat pumps installed offered financial incentives to turn their heat pump down for two-hour periods called EQUINOX events between 4:00pm – 8:00pm. The three commercial arrangements tested in trial two are described further in section two of this report.

The customer research utilised quantitative and qualitative methods including:

- Surveys immediately following EQUINOX events,
- Longer more comprehensive surveys at the start, mid-way through, and at the end of the trial
- Focus groups and interviews which occurred just after the mid-way point of the trial

During the second EQUINOX trial, customer research was carried out to understand: why customers signed up and were motivated to participate, what the pool of participants looked like and how that compared to the UK population, how satisfied customers were with the trial design and experience, how EQUINOX events altered customer behaviour and if they impacted thermal comfort, what were the barriers and benefits of participating, and whether or not customers with potential vulnerabilities were equally able to participate in and benefit from participating.

Executive summary

Main findings

Who participated:

A total of 1048 customers were onboarded to trial two.

Of these, 854 customers consented to data sharing and were invited to participate in customer research.

In general, EQUINOX participants owned their homes (with many living in semi-detached homes) and had an air source heat pump. However, there was an increase in trial two participants who rented their homes. Over half lived with one other person, most commonly a spouse or partner. Most households in the EQUINOX trial were from middle to higher income (£40,000 per annum and above) backgrounds and report being able to afford their energy and other household related bills.

Environmental reasons were the most popular reason for participating in each of the EQUINOX events, ahead of financial reasons.

Relatedly, environmental and economic motivations were the most common combination of reasons for getting a heat pump. These were the same reasons participants indicated they signed up to do the trial.

Customer satisfaction:

Nearly 80% of participants reported satisfaction with the trial.

In general, participants who performed high demand response during events were satisfied with the EQUINOX trial.

For the approximately 14% of participants who were dissatisfied, they mainly reported that they felt that the financial benefits to participate in events were too low. These customers correlated to those earning lower performance payments in events, often where they were already being rewarded for flexibility via time of use tariffs. This existing, inherent flexibility meant that there was little additional, explicit flexibility that they could offer during EQUINOX events

Executive summary

Main findings

Trial design:

Customers were generally satisfied with the day-ahead notification, and two-hour EQUINOX events during the evening peak occurring up to three times per week.

Throughout trial two, customers were notified about EQUINOX events either the day before the event, the morning of the event, or two hours prior to the event. The most preferred notice period (38%) for EQUINOX events was day ahead and the least preferred (7%) was two hours before an EQUINOX event.

EQUINOX events took place between 4:00pm – 8:00pm and lasted two hours. 86% of participants felt that the two-hour duration of EQUINOX events was about right. However, a similar percentage of participants indicated that they would be willing to try participating in a three-hour EQUINOX event.

EQUINOX events always occurred during the evening peak, but when asked about the likelihood to participate during the morning peak or on weekends participants indicated that trialling weekend events was preferable to trialling morning events.

Generally, EQUINOX events occurred zero to three times a week. Most participants (78%) reported this was about the right frequency. Of the participants who indicated the frequency of events was slightly too few or far too few, about 50% indicated they would be willing to participate in events multiple times a week, 29% indicating they would be willing to participate daily and 19% indicating that they would prefer EQUINOX events once a week.

Trial two included a select number of customers who allowed their supplier to control their heat pump remotely for EQUINOX events ("aggregator control"). The majority of customers managed their own heating controls, either with their existing app system or purely by making manual changes within the home Of participants who could not control their own heat pump remotely, most participants (72%) felt being able to do so would make participating in EQUINOX events easier.

Customers were unable to stack flexibility offerings. However, approximately two thirds of participants (63%) wanted to participate in another flexibility offering during trial two or reported being interested in participating in more than one flexibility offering at the same time in future (69%).

Executive summary

Main findings

Customer comfort:

After each EQUINOX event as well as during two longer surveys near the middle and end of the trial, participants were asked about their thermal comfort levels during EQUINOX events.

Immediately following EQUINOX events 92% of participants indicated they generally felt no or slight change in comfort levels as a result of participating in EQUINOX events.

In the EQUINOX end of trial survey, 92% of participants indicated no change or sometimes changes in comfort because of participating in EQUINOX events. Examined further, those who did report some change in comfort predominantly (91%) reported only mild discomfort, and very few reported making changes to their behaviours as a result of change in comfort level. Where they did, most indicated that they had added layers (e.g., jumpers, blankets) and used alternative heating methods.

After each of the 36 EQUINOX events, participants were sent a short survey from their energy supplier asking about comfort levels. These results presented an even more positive picture with about two thirds (67%) of participants indicating they never felt a change in their comfort levels during EQUINOX events.

We know from being able to measure the temperature loss of some aggregator control homes that the change in temperature during events can be minimal. However, from discussions with customers through interviews and focus groups we understand how personal this is and how thermal comfort is impacted by not only the characteristics of one's home (e.g., insulation level, etc.) but also personal preference and circumstance.

We are looking to assess and refine how we capture thermal comfort in upcoming trials, considering self-reported or other forms of measurement in addition to strengthening safeguards for customers who may be more vulnerable to the cold. Understanding that while participation is an individual choice, we do not want to incentivise customers to underheat their home. In the context of this diversity, we are pleased to note that heat pump flexibility appears to be a comfortable endeavour for most households participating in EQUINOX events.

Executive summary

Main findings

Vulnerability:

Results were consistent across vulnerable and non-vulnerable groups.

While vulnerability is multi-faceted, the focus for vulnerability in trial two was on customers with a reported disability and/or long-term health condition, especially if these were made worse by or more difficult to cope with when cold. We also considered ability to pay energy and other households bills.

Of participants who provided this information, 29% reported having a disability or long-term health condition, and of those who reported having a disability or long-term health condition, 71% identified that cold made it more difficult to cope with the disability or long-term health condition. 2% noted that they were unable to afford their energy bills. Using this data, we identified 206 potentially vulnerable participants on the trial.

We then assessed how potentially vulnerable participants' experiences and preferences compared to those of non-vulnerable participants. In regard to trial design factors, such as notification period and event length, we found there was little variation in experiences and preferences between the potentially vulnerable participants and non-vulnerable participants.

Regarding each trial satisfaction and payment amounts, there were similar levels of trial satisfaction and payment amount satisfaction across both potentially vulnerable and non-vulnerable participants. We note that these results are for a single "potentially vulnerable" grouping, and that increased focus on equitable participation in trial 3 may yield more nuanced results.

Lastly, when asked about automation, again both potentially vulnerable participants and non-vulnerable participants noted a similar desire to be able to control their own heat pump remotely in order to make participating in EQUINOX events easier.

During trial three we will be implementing an equitable participation framework that will further define and assess the customer journeys of potentially vulnerable customers to help strengthen our understanding of the impacts of the commercial arrangements and trial design on vulnerable customers.

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Introduction to research

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EQUINOX overview

What is EQUINOX? EQUINOX is an innovation project that is testing new commercial and technical arrangements to reward households with heat pumps for temporarily altering their heating choices without compromising on comfort. EQUINOX will save consumers money by lowering energy bills and mitigating costly network upgrades, while contributing to a more resilient and equitable low-carbon energy system.

Who is it funded by? EQUINOX is supported by the energy regulator Ofgem and funded through the regulator's Network Innovation Competition.

Who is it led by? EQUINOX is led by National Grid Electricity Distribution who are the Distribution Network Operator for the East and West Midlands, the South West and South Wales. They distribute the electricity that comes from the transmission system to the local businesses and homes in their areas.

Who else is involved? The project is undertaken in collaboration with Octopus Energy, Sero, ScottishPower, Passiv UK, West Midlands Combined Authority, Welsh Government, National Energy Action, SP Energy Networks, and Guidehouse.

Key facts

- EQUINOX is running from 2022 to 2025. The project's second trial ran from December 2023 to March 2024.
- EQUINOX is the largest heat pump trial in the UK. Its ambition is to have over 1,000 households with heat pumps take part. This was achieved in the second trial, where 1,048 households signed up to participate in winter 2023-2024.
- EQUINOX strives to target households with as much diversity as possible, ensuring that when designing commercial and technical arrangements, equity and vulnerabilities are taken into consideration.

Trial two overview

How the trial worked

Participants were asked to turn down their heat pumps during “EQUINOX events”, either manually or remotely via their existing phone app or directly by their supplier. EQUINOX events lasted two hours between 4:00pm-8:00pm to mimic typical network constraint times during event peak. In trial two, the events occurred between zero to three times a week during the trial period and EQUINOX tested three different commercial arrangements and three different heat pump control methods.

Commercial arrangements

1. **Payment M1: ‘**Higher utilisation payment’: Customers were paid per kWh of flexibility based on notice period.
2. **Payment M2: ‘**Lower utilisation payment’: Customers were paid per kWh of flexibility based on notice period.
3. **Payment M3:** ‘Availability payment & medium utilisation’: Participants were paid in advance of the availability of their heat pumps to be turned down remotely and per kWh of flexibility based on notice period.

Heat pump control methods

1. **Aggregator control:** Customers allowed their supplier to control their heat pump remotely for EQUINOX events.
2. **Manual customer control**: Customers were asked to manually turn down their heat pump during EQUINOX events.
3. **Remote customer control**: Customers were asked to turn down their heat pump during EQUINOX events using their existing app controls.

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Customer research[1]

Quantitative

Post-event surveys: A two to five question survey (depending on responses from customers) was sent by suppliers to households after each EQUINOX event to gather information on whether households participated and their comfort levels during the event.

Trial two surveys: Three longer surveys were conducted throughout the trial.

- **Start of trial:** to understand the demographics of trial participants
- **Mid-trial survey:** to assess early perceptions of the trial design
- **End of trial**: to understand the overall experience of participants

Qualitative

Interviews: 13 one-to-one semi-structured interviews with customers explored how participating in the trial impacted their daily lives, if at all, and to get deeper insights on their experience with the processes of the trial.

Focus groups: 8 focus groups were conducted with 4-6 customers per group totalling approximately 50 customers. They were asked similar questions as one-to-one interviewees, but with the added benefit of a chance to learn how others may have experienced the trial similarly or differently.

[1]Participants were given credits to their energy bill or reward credits for participating in research

Limitations: Caveats to this customer research

Self-selection

Participants are self-selecting: These results need to be interpreted with the understanding that the responses are from a self-selecting sample of households who took part in the EQUINOX trial. Their experiences cannot be interpreted as representative of all households but are thought to be representative of existing heat pump homes. Important insights can be drawn, particularly for consideration in future iterations of low carbon heating demand side flexibility offerings.

Vulnerability

Vulnerability: During trial two vulnerability was a key focus area of the trial. Vulnerability is nuanced and can be difficult to capture in a single or even a few indicators. During trial two we worked closely with partners whose focus is on energy equity and determined three vulnerability indicators to capture a specific set of potential vulnerability characteristics. EQUINOX is developing an equitable participation framework which will be applied to trial three to hopefully further increase the diversity of participants.

Customer demand response:

Customer demand response: During this trial we assessed the satisfaction of customers based on the level of flexibility that customers were able to provide. However, we did not consider the relationship between additional customer experience data and level of demand response. We are assessing how this can be examined more holistically in trial three.

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Trial two demographics

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Trial two participants

Introduction

We know that generally heat pump customers tend to be early adopters to this technology and therefore in order to understand the context of our findings and their wider applicability, we looked at the demographics of trial participants compared to the greater UK.

There was an initial pool of approximately 5600 customers from Octopus Energy, Sero and ScottishPower targeted for recruitment. Trial two aimed to recruit 1000 participant households, increasing cohort size by almost three times from trial one. All trial spots were filled, with a final onboarding figure of 1048 customers.

In this section we provide an overview of the data describing trial two participants. The analysis is primarily based on self-reported data from the start of trial survey.

82% (854 customers) consented to data sharing in the form of receiving longer-form surveys.

84% of these customers then completed the online survey sent at the start of the trial. This survey aimed to understand a customer's motivations to participate, their experience with trial sign up, their home heating set-up and collect overall participant demographics.

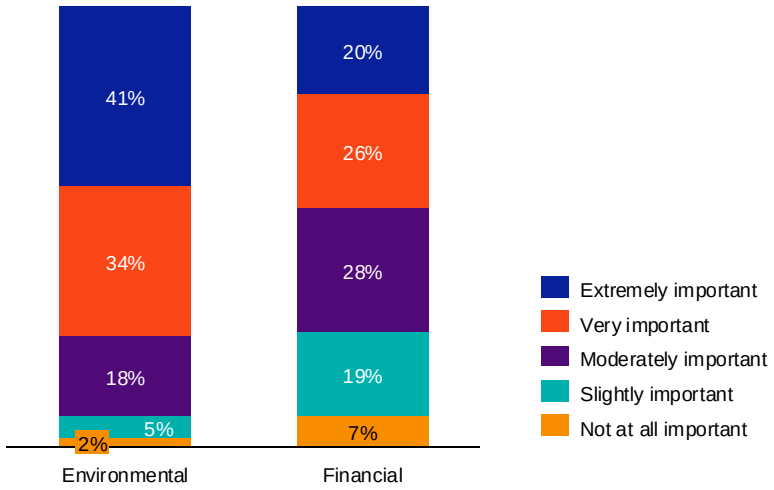
Results are presented as percentages and indicate the number of customers who answered each survey question. Variation in N is a result of questions with multiple permitted answers, of survey logic that asked follow on questions to some customers and not others and of a small number of customers beginning but not completing the survey.

Motivations for participating in trial

EQUINOX participants indicated that environmental reasons were a key driver in deciding to participate in the trial

When asked about how important environmental and financial reasons were in choosing to take part in the trial, 75% of participants indicated environmental reasons was either very or extremely important. 46% of participants indicated financial reasons were either very or extremely important in their decision to participate in the trial. This was consistent with focus group and interview responses who noted environmental reasons as the driving factor, also citing financial benefits and/or an interest in contributing to research and innovation.

How important were environmental / financial reasons in influencing your decision to participate in the trial, if at all? (n=732)



Quotes from focus groups and interviews

- **Environmental:** *I'm concerned about climate change, and I would do anything I can to help move us forward.*
- **Environmental:** *I used to work for an energy charity some time ago, so I'm interested in energy conservation, and energy efficiency.*
- **Environmental***: I'm interested in improving climate change, improving the environment, and I am a technology enthusiast.*
- **Financial:** *Mainly because my electric bill was high, and it was just a way of perhaps learning about how I could save money with the heat pump.*
- **Innovation:** *I thought it was just a good way to maybe help the National Grid, and the load balancing.*
- **Innovation:** *I think education and understanding more about how these things work and operate.*

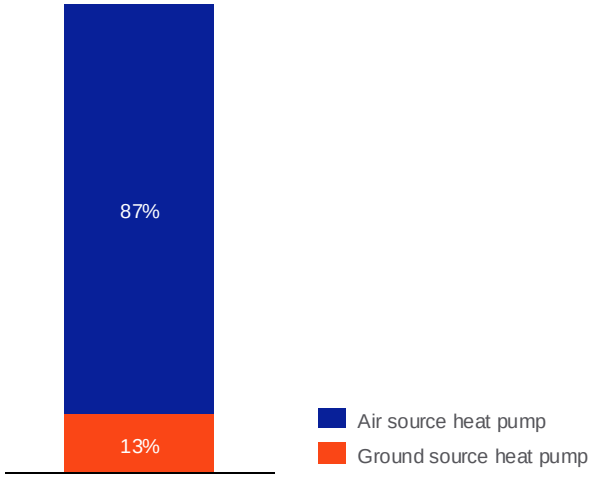
Sources: EQUINOX trial two start of trial survey, trial two focus groups and interviews

Heat pump ownership

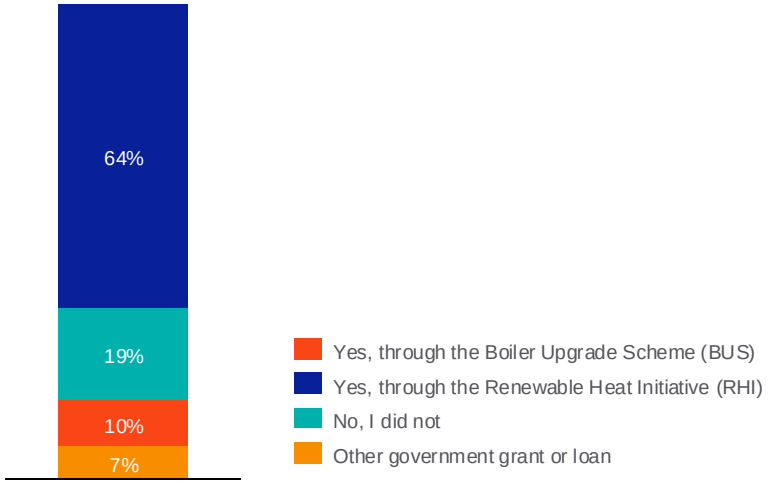
Most participants use air source heat pumps and obtained a government grant or loan to help purchase their heat pump

87% of participants have an air source (rather than ground source) heat pump, and 81% of participants used a government grant or loan to help purchase their heat pump. 36% of participants indicate that environmental reasons were one of the main motivation for getting a heat pump, followed by economic reasons (23%), living off the gas grid (20%), and then having purchased/moved into a property with a heat pump already installed (15%).

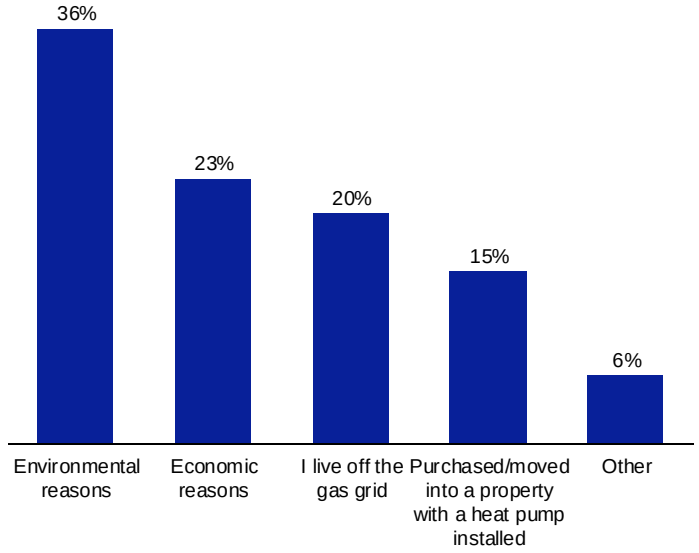
What kind of heat pump do you have in your home? (n=733)



Did use a government grant or loan to help you purchase your heat pump? (n=552)



What was your motivation for getting an air source heat pump? (n=1213) [1]



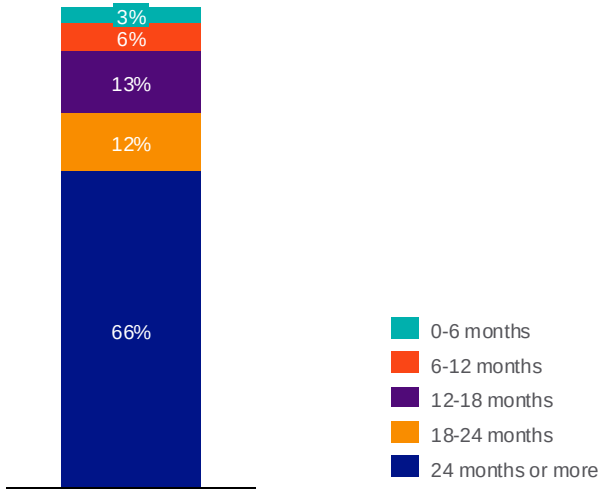
Source: EQUINOX trial two start of trial survey [1]Participants could select multiple answers

Heat pump operation

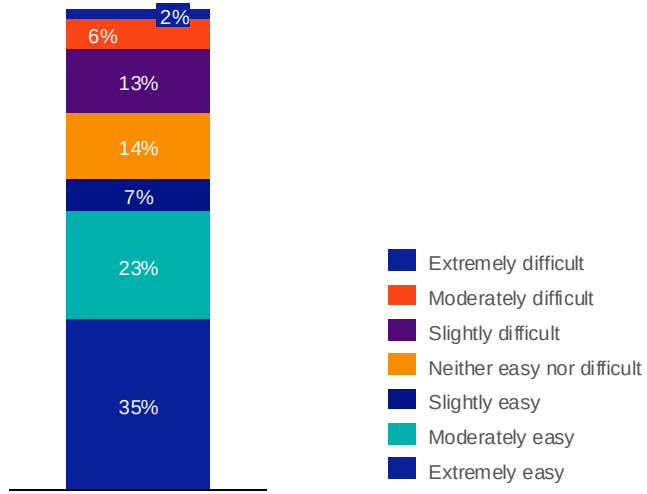
78% of participants have had a heat pump for more than 18 months and generally find their heat pump easy to operate

Participants are relatively experienced with their heat pumps; 91% of participants have owned their heat pumps for at least a year. 65% of participants reported finding it easy to use their heat pump. 21% of participants reported some level of difficulty in operating their heat pump. In focus groups and interviews, participants indicated that more information on how to use their heat pump and how best to optimise their home heating systems.

How long have you had a heat pump in your current home? (n=732)



How easy do you find operating your heat pump? (n=739)



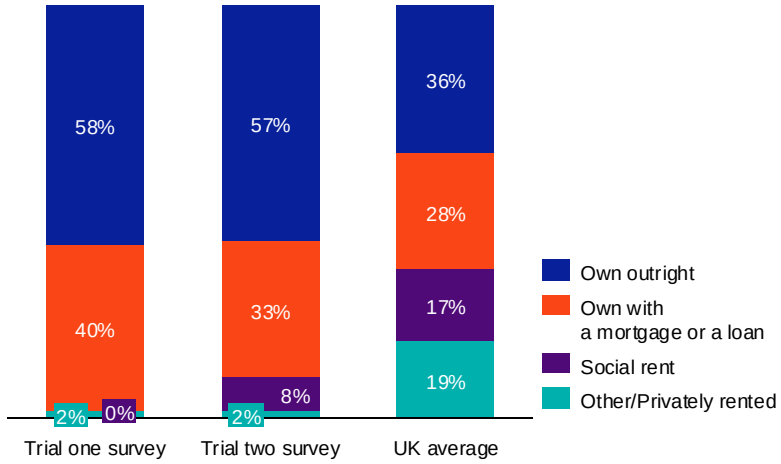
Source: EQUINOX trial two start of trial survey

Tenure and housing type

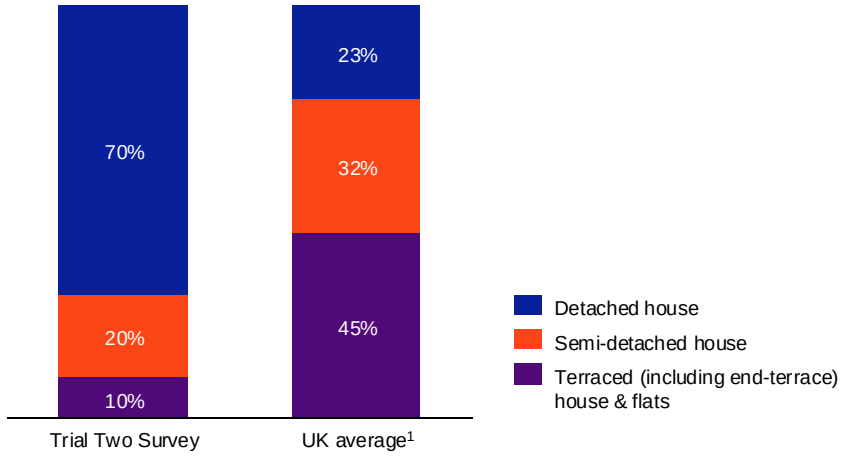
Trial two was more representative of tenure and housing type

There was a focus in trial two to increase representation from participants that did not own their own homes, including those who rent from private or social landlords. Although heat pumps are currently most common in owner-occupied properties, this focus was important in order to be more representative of the UK population. While majority of trial two participants are owner-occupiers, 8% of participants resided in social housing. This was an increase from trial one, but still below the UK average of 17%. 70% of trial participants live in a detached home, 20% lived in semi-detached homes, 10% lived in a terraced house/flat.

What is your financial relationship to your property?



What is your housing type?



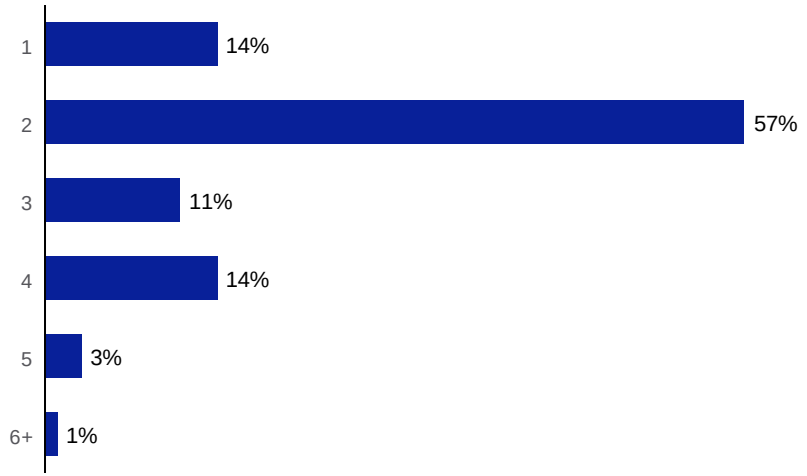
Sources: Office for National Statistics, Census 2021; [2] EQUINOX UK-Wide Survey August 2022, EQUINOX trial two start of trial survey

Household composition

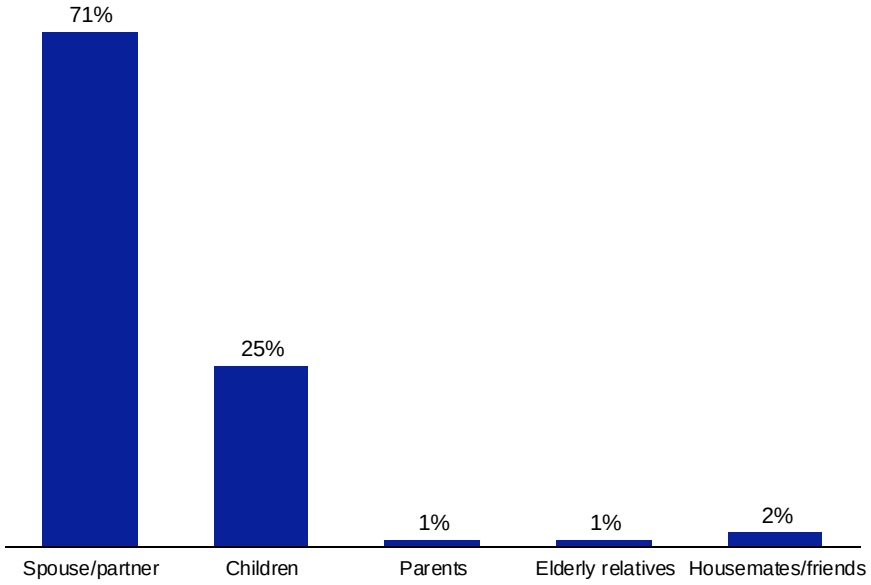
Most participants live with one other person and share their home with a spouse or partner

86% of participants live with at least one other person. The most common household composition was people who live with their spouse/partner, followed by people who live with their spouse/partner and children.

Including yourself, how many people permanently live in your household? (n=730)



Who do you share your household with? (n=842) [1]



Source: EQUINOX trial two start of trial survey

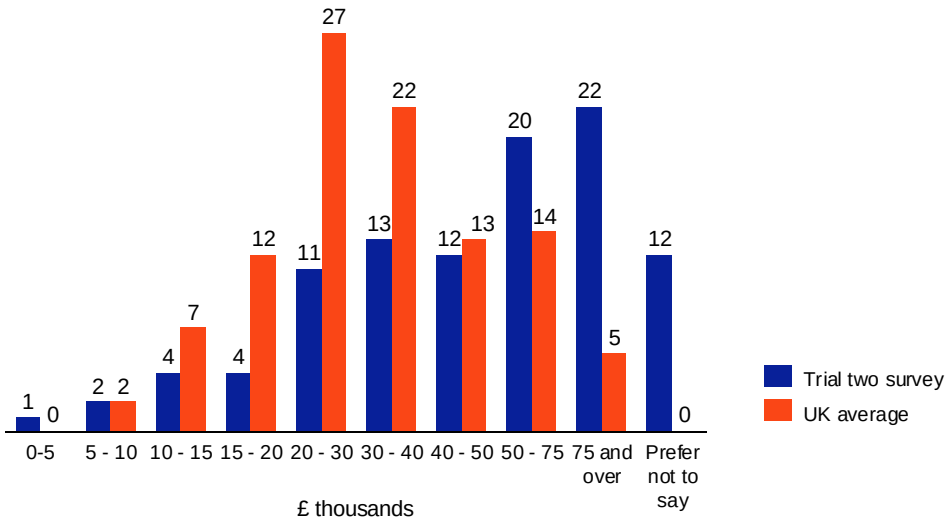
[1]Participants could select multiple answers

Household income and ability to pay energy bills

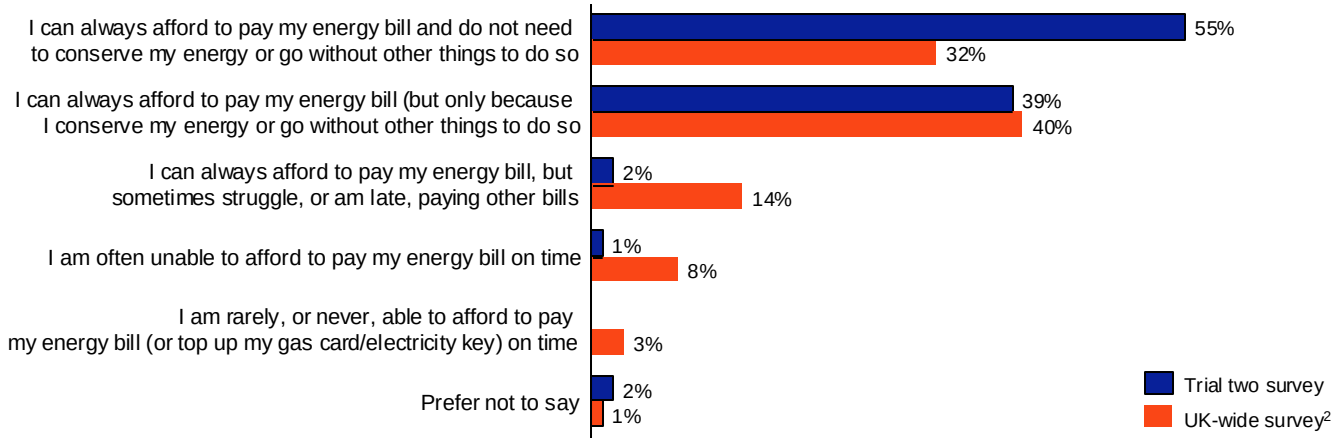
Compared to the UK average, the EQUINOX trial had a larger portion of participants with middle to higher household income

Most households in the EQUINOX trial report a household income between £40,000 - £75,000+, which is higher than the UK average. 55% of participants indicated that they could always afford to pay their energy bill without additional considerations, which is higher than the UK average of 32%. The proportion of participants who indicated that they struggle or are late to pay their energy bills (<3%) was much smaller than the UK average (25%). There was a greater proportion of participants who can always afford to pay their energy bill without needing to conserve energy as compared to the UK average.

Household income, %



Ability to pay energy bills %



Sources: Office for National Statistics, Census 2021; [2] EQUINOX UK-Wide Survey August 2022, EQUINOX trial two start of trial survey

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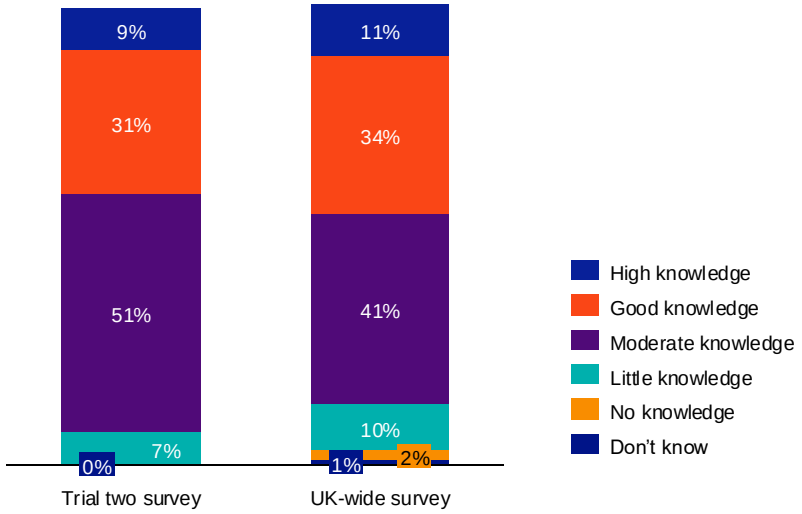
Views on climate change

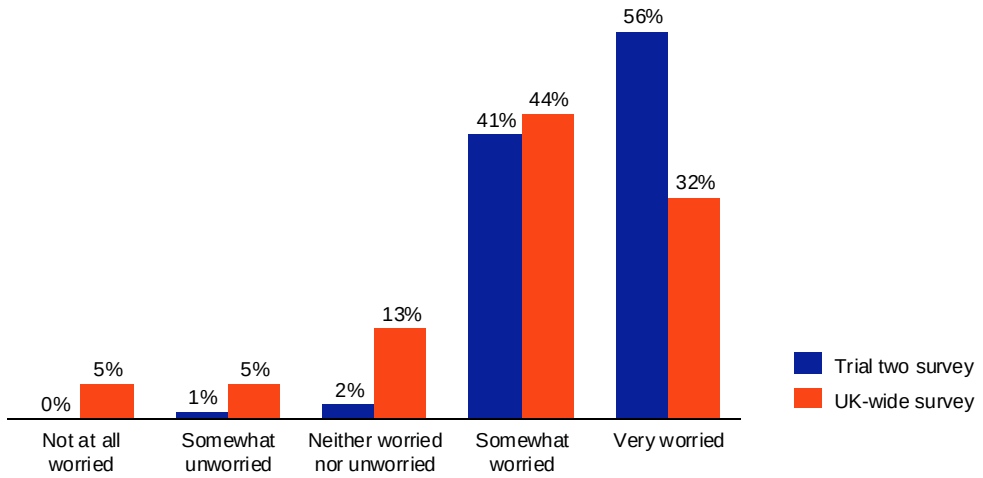
91% of EQUINOX participants reported having moderate to high knowledge about climate change

Trial two participants reported similar knowledge about climate change compared to the average UK wide responses. 97% of trial two participants indicated being somewhat or very worried about the impact on climate change as compared to 76% of the UK average.

How would you rate your knowledge about climate change?



How worried or unworried are you about the impact of climate change?



Sources: Office for National Statistics, Census 2021; [2] EQUINOX UK-Wide Survey August 2022, EQUINOX trial two start of trial survey

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Research findings

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Research findings

Introduction

As outlined in Section 2, the customer research design included both quantitative and qualitative components. Analysis provided in this section is based predominately on the longer mid-trial and end of trial surveys, and the focus groups and interviews.

This section is broken into four subsections:

- **Customer satisfaction** examines reason for satisfaction and dissatisfaction with the trial.
- **Trial design** assesses how participants viewed specific EQUINOX trial design factors including timing of events, notification methods and timing, event length, frequency of events, automation, and flexible service stacking.
- **Comfort** provides analysis on how participants felt their thermal comfort levels were affected due to participating in the EQUINOX trial.
- **Vulnerability** segments the aggregated data to highlight how potentially vulnerable participants' satisfaction, perception on design factors, and comfort may have varied compared to non-vulnerable participants. This subsection also describes how customers were categorised as potentially vulnerable and recognises the complex nature of determining vulnerability.

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4.1

Customer satisfaction

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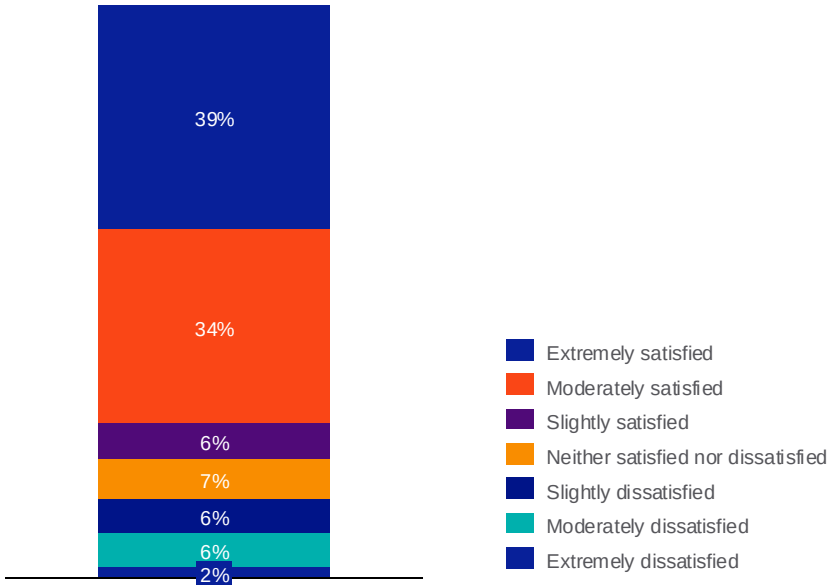
Satisfaction

The majority of trial participants were satisfied with the EQUINOX trial

79% of participants reported being satisfied with the overall EQUINOX trial, with 39% of customers reporting being extremely satisfied. 14% reported some level of dissatisfaction. Reasons for satisfaction and dissatisfaction are explored further in this section.

How satisfied are you with the overall EQUINOX trial so far?
(n=636)



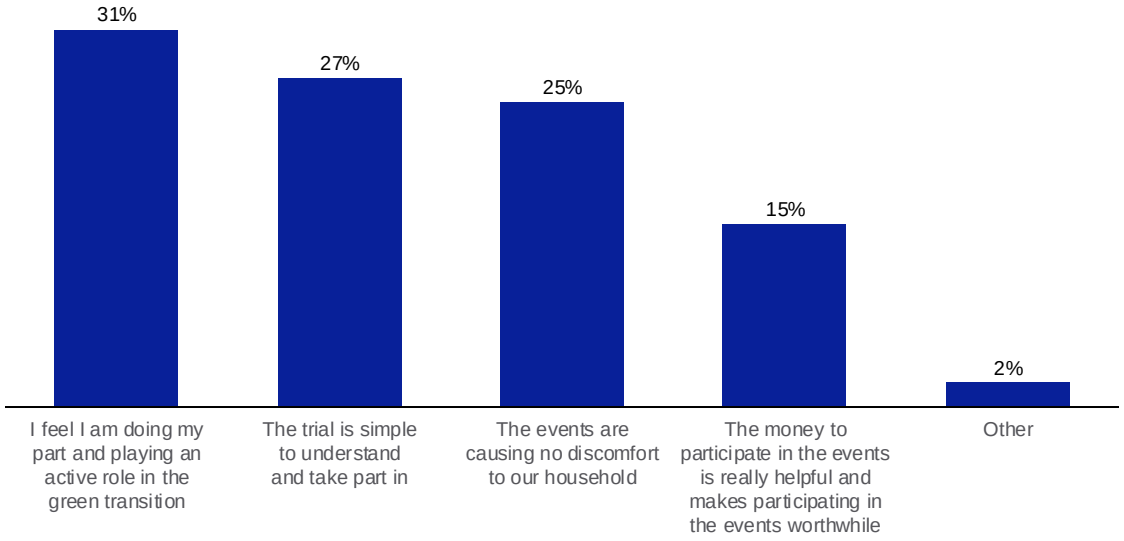
Source: EQUINOX trial two end of trial survey

Reasons for satisfaction

The most popular reason given for trial satisfaction was that they felt as though they were playing an active role in the green transition

31% of participants indicated they were satisfied with the trial because it made them feel as if they were playing an active role in the green transition. 27% of participants indicated it was because the trial was simple and easy to understand, and 25% participants noted it was because the EQUINOX events caused no discomfort. 15% were satisfied with the EQUINOX trial because the money to participate in the events was helpful and made participating in EQUINOX events worthwhile.

Why are you satisfied with the EQUINOX trial so far? (n=1285)[1]



Quotes from free text responses of participants who selected 'Other'.

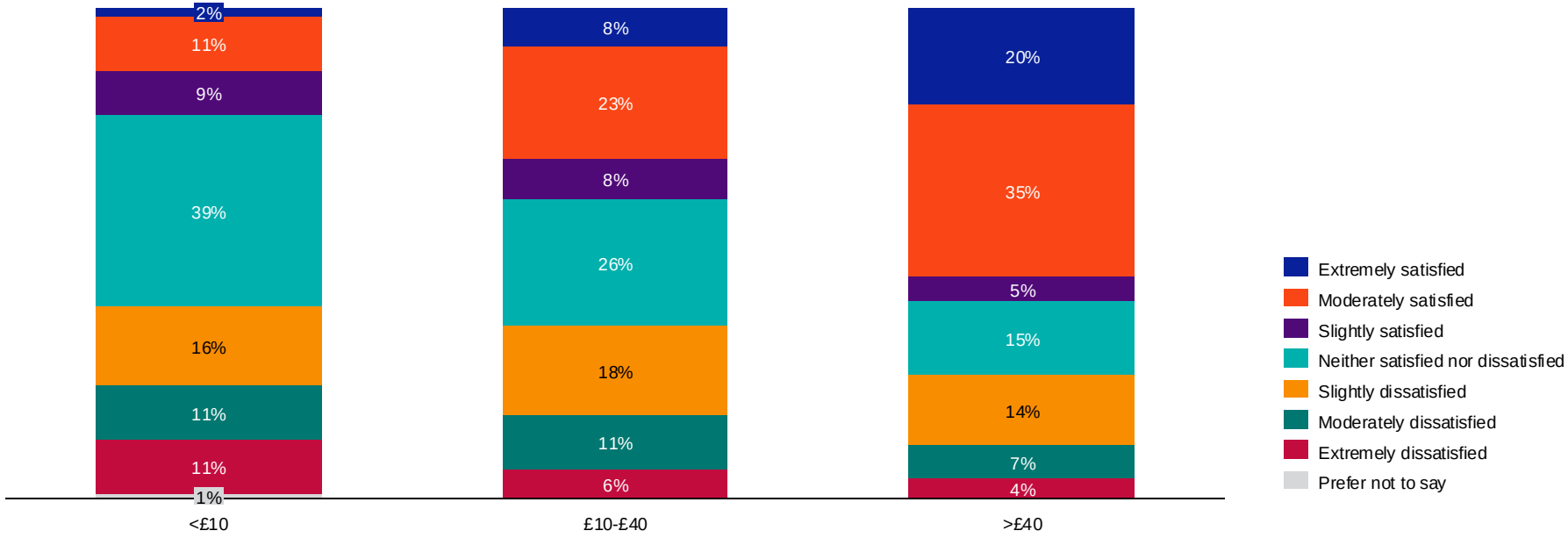
- *Easy to follow with clear instructions.*
- *Makes us more conscious of our electricity usage.*
- *Knowing when and how participating at the times stated helped me select a tariff that saved me more money this winter.*
- *I'm pleasantly surprised that my heat pump can be used in this way.*
- *It's great to be a small cog within a large 'research wheel'.*
- *Continued opportunity to learn more about the operation of our heat pump.*

Source: EQUINOX trial two end of trial survey[1]Participants could select multiple answers

Satisfaction compared to overall trial payment received

Participant satisfaction increased with total payment amount received

For each EQUINOX event, customers were either provided credit to their energy bill or reward credits based on the amount of kWh demand response achieved. Customers who earned more in payments tended to be more satisfied with the trial. 60% of customers who earned £40 or more were satisfied with the trial, compared to 39% and 22% for customers who earned between £10-£40 and less than £10 respectively.

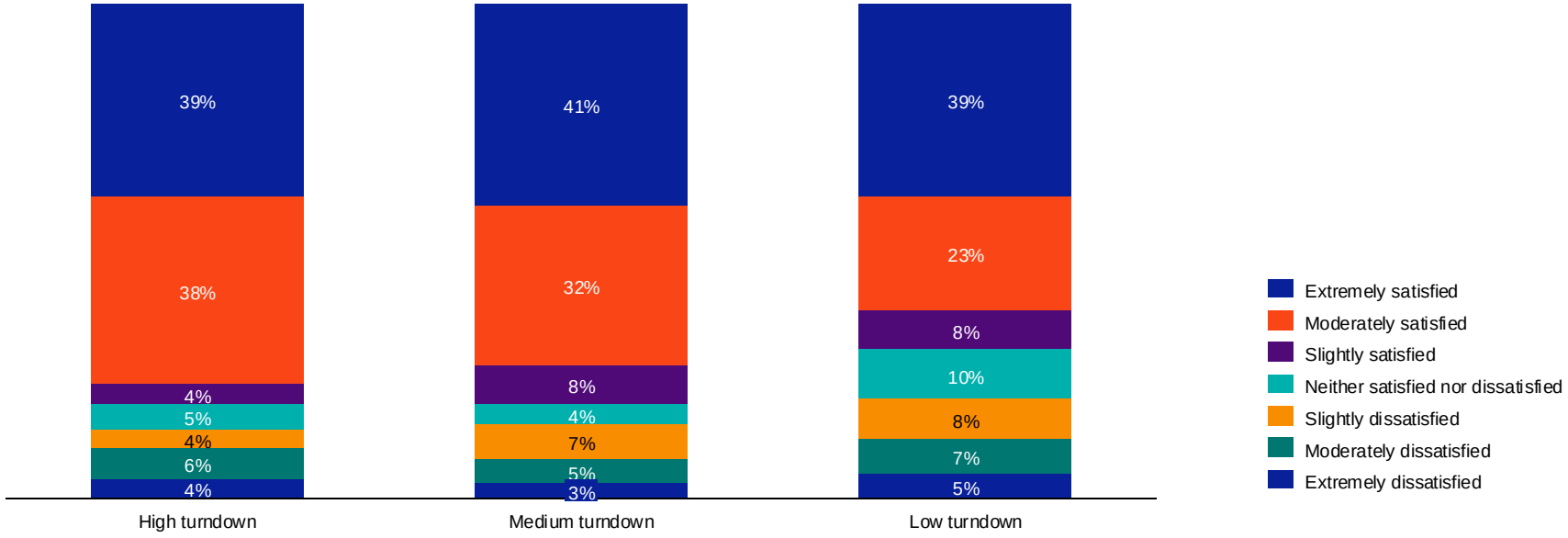


Source: Payment data received from Octopus Energy and therefore, this chart only includes Octopus Energy customers who also took the end of trial survey

Satisfaction compared to level of demand response [1]

Participants who provided higher demand response were generally satisfied with the EQUINOX trial

Looking at the relationship between trial satisfaction and level of demand response provided during EQUINOX events, we segmented participants into 'high', 'medium' and 'low' groups based on preliminary data on the distribution of kWh demand response per EQUINOX event. Households that were stratified as high or medium demand response 81% were satisfied with the trial, compared to 70% of households that were stratified as low demand response.



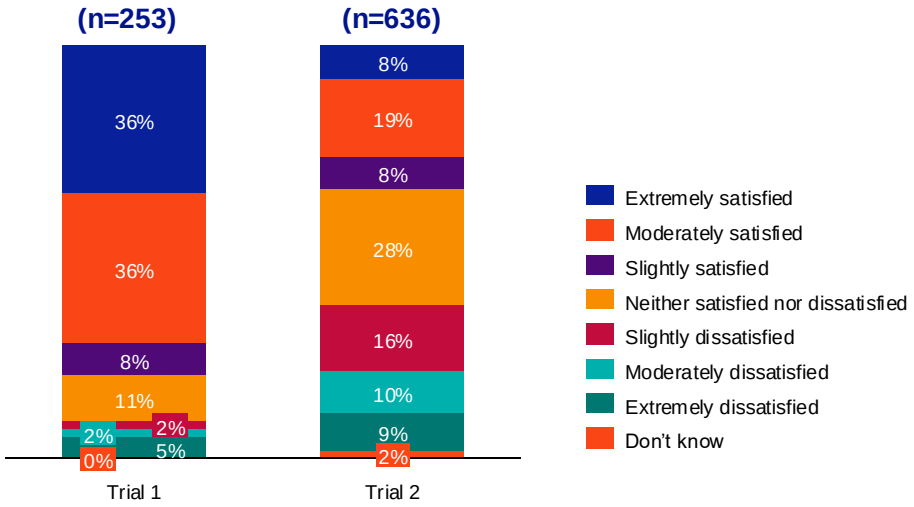
Source: EQUINOX trial two end of trial survey [1]High turndown is categorised as >=1.25 kWh of turndown, medium turndown is categorised as >=0.5kWh & <1.25kWh, and low turndown is categorised as <0.5kWh

Payment amount satisfaction

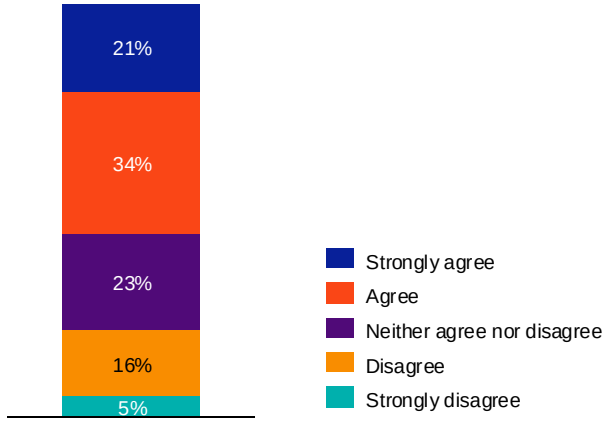
When asked specifically about satisfaction with payment amounts, the customer response was mixed

35% of trial two participants indicated they were satisfied with the trial payments, 45% were somewhat dissatisfied, and 28% were neither satisfied nor dissatisfied with the payment amounts. This is quite different than trial one satisfaction, but the reason could be that in trial one participants were mostly paid fixed amounts for participating in EQUINOX events, whereas trial two participants were paid by kWh turn down of their heat pump. The fixed payment amounts were higher than what participants received for kWh of demand response.

Trial one vs trial two - how satisfied are you with the payment amounts for participating in EQUINOX events?



How much do you agree with the following statement, "The way payment for providing heat pump turndown was calculated during trial two was clear to me?" (n=636)



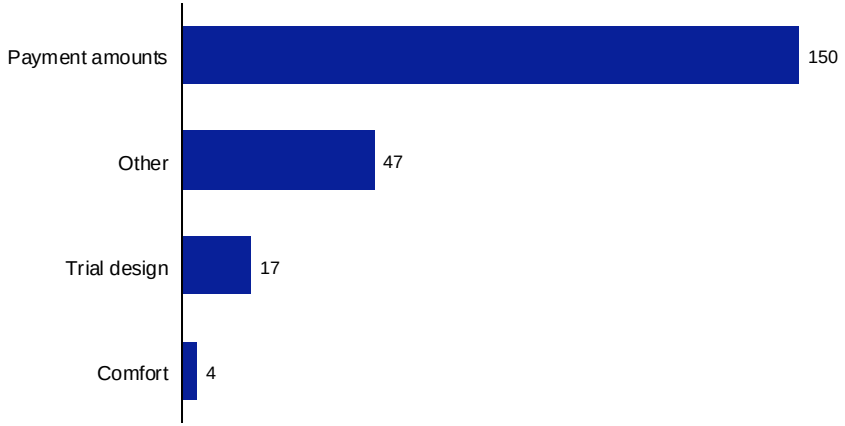
Sources: EQUINOX trial one end of trial survey, EQUINOX trial two end of trial survey

Reasons for dissatisfaction

Dissatisfied participants most frequently reported that the incentive payments received in the trial were too low

Incentive payments received following EQUINOX events corresponded to the measured kWh of demand response a household achieved during an event. This was measured at the home electricity meter, not directly from the heat pump. For a variety of reasons the kWh demand response varied greatly across the cohort. Customers who indicated dissatisfaction with the EQUINOX trial most frequently cited the incentive payments they received as a reason for that dissatisfaction. 'Other' responses were the second most popular reason, which referred to trial design factors such as notice periods, service stacking, and confusion around the purpose of the trial. Only four participants indicated that comfort was their reason for dissatisfaction.

Why have you been dissatisfied with the EQUINOX trial? (n=218) [1]



Source: EQUINOX trial two end of trial survey

[1]Participants could select multiple answers

'Quotes from free text responses of participants who selected 'Other'.

- *As I have home batteries, the benefits are virtually zero.*
- *Not sure my contributions made a difference.*
- *Lack of reasoning for methodology.*
- *Trials seem very random.*
- *At inconvenient time for personal reasons.*
- *Prevented me from taking part in saving sessions, where the benefits seemed greater.*

Conclusions and next steps

Satisfaction

79% of participants reported being satisfied with the overall EQUINOX trial, with 39% of customers reporting being extremely satisfied. Participants feeling as though they were playing an active role in the green transition was the most popular reason given for trial satisfaction. Followed by participants indicating the trial was simple and easy to understand and 25% of participants indicating that EQUINOX events caused no discomfort.

When looking at satisfaction compared to overall trial payment received participant satisfaction tended to be greater when total payment amount received increased. This aligns with findings that participants who provided higher demand responses tended to be more satisfied than customers who provided lower levels of demand response.

Where customers reported dissatisfaction, incentive payments were the most popular reason given. During trial three, we will continue to explore customer perceptions and behaviours based on payment amounts.

It is noted that the customers involved in EQUINOX trial two are not reflective of the wider UK population. They are thought to be representative of households who have heat pumps today, a technology that has not yet reached mass-market status.

Nonetheless, the green heating transition is accelerating quickly in the UK and there are government targets and initiatives to support installation of 60,000 heat pumps per year by 2030. By this time, heat pumps will cease to be an early adopter technology. In this context, the EQUINOX project will continue to strengthen its focus on equitable access for customers to the benefits of heat pump flexibility. A key next step for the project is to increase diversity of the customer base, and of under-represented customer groups, in trial three.

EQUINOX

4.2

Trial design

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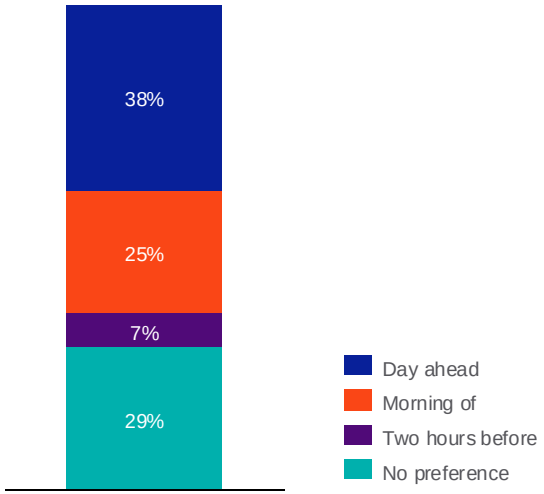
Notice periods for EQUINOX events

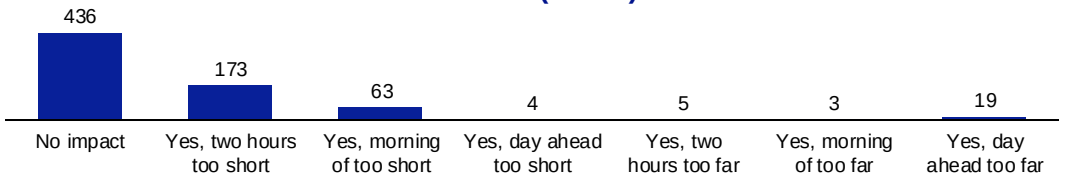
The most preferred notice period was day ahead, but the majority reported the different notice periods did not impact their participation

Throughout trial two, customers were notified about EQUINOX events either the day before the event, the morning of the event, or two hours prior to the event. The most preferred notice period (38%) for EQUINOX events was day ahead and the least preferred (7%) was two hours before an EQUINOX event. However, 62% indicated that the different notice periods did not impact their ability to participate.

What was your preferred notice period? (n=636)



Did the different notice periods impact your ability to participate in EQUINOX events? (n=703) [1]



Quotes from focus groups and interviews

- *I have smart controls on the heat pump, so short notice period doesn't affect my ability to control heating*
- *I have to be home to physically adjust and I am usually not home until after 6:00pm.*
- *Day ahead is too far as I can't plan that far in advance.*
- *Because the emails come to my mobile phone, the time they arrive makes little difference to me.*
- *Having plenty of notice meant that I could be home to take part.*
- *If I have visitors, the event may affect their comfortability so two hours may be too short.*

Source: EQUINOX trial two end of trial survey [1]Participants could select multiple answers

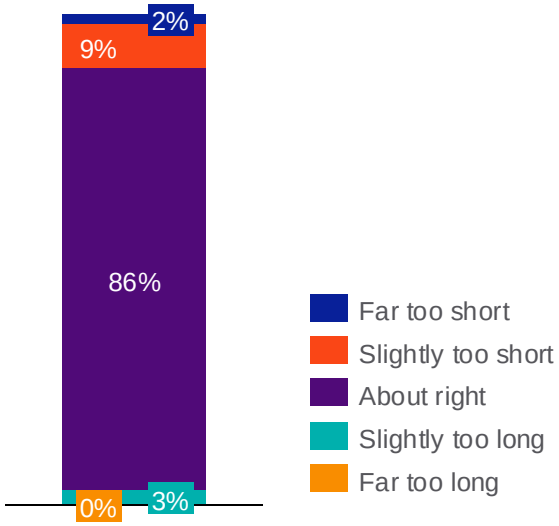
EQUINOX

EQUINOX event length

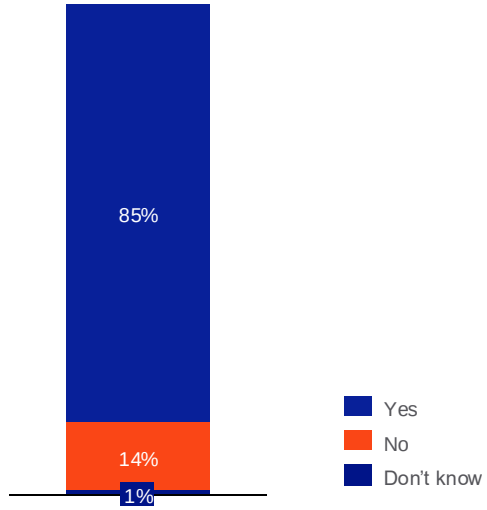
Most participants felt the two-hour duration of EQUINOX events was about right

EQUINOX events took place between 4-8pm and lasted two hours. 86% of participants felt that the two-hour duration of EQUINOX events was about right. However, 85% of participants indicated they would consider participating in a three-hour event; this is something we are considering exploring in trial three.[1]

What do you think about the two-hour duration of EQUINOX events? (n=636)



Would you consider participating in three-hour EQUINOX events? (n=636)



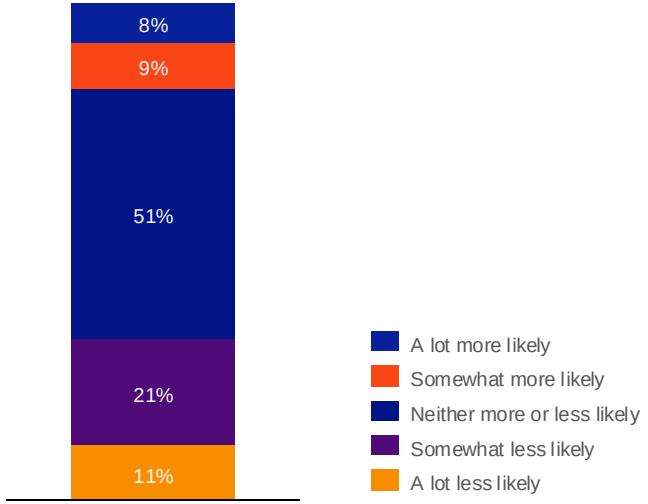
Source: EQUINOX trial two end of trial survey [1] 52% of trial participants are on a time of use tariff with a 3 hour disincentivised window, meaning these participants are already normally turning down for 3-hour periods.

Timing of EQUINOX events

Potentially trialling morning events would not impact trial participation

51% of participants indicated that changing the current event timings to the morning (between 6-10 am) would not impact whether they could participate. However, 32% indicated they would be somewhat less or a lot less likely to participate.

What is the likelihood you would participate in EQUINOX events if they took place during the morning between 6:00am – 10:00am? (n=636)



Source: EQUINOX trial two end of trial survey

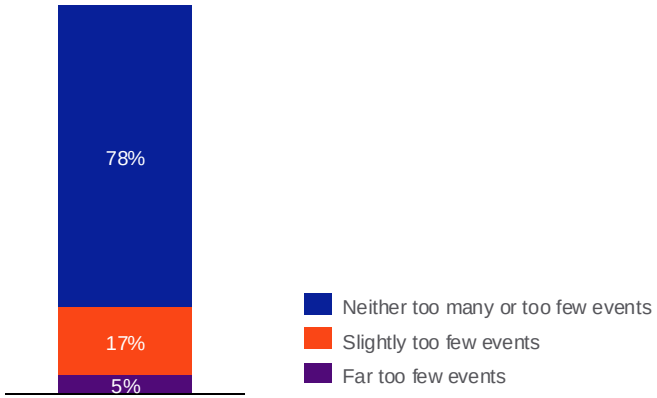
EQUINOX

Frequency of EQUINOX events

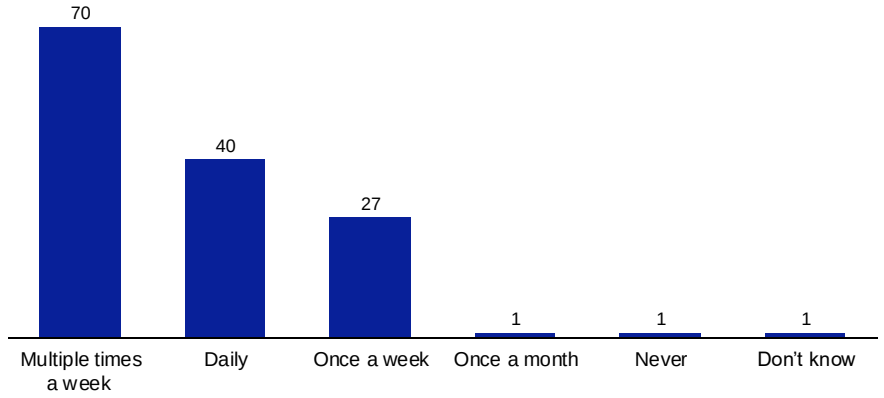
Participants felt that the current frequency (0-3 per week) of EQUINOX events was about right

On average during trial two, events occurred zero to three times per week. Most participants (78%) reported this was about the right frequency. Of the participants who indicated the frequency of events was slightly too few or far too few, about 50% of participants indicated they would be willing to participate in events multiple times a week, 29% of participants indicated they would be willing to participate daily, and 19% of participants indicating that they would prefer EQUINOX events once a week. There were no participants who indicated that they felt that there were too many events, indicating high willingness to participate regularly in low carbon heating flexibility.

What is your view on the current frequency (0-3 per week) of EQUINOX events? (n=636)



What frequency of EQUINOX events would you prefer? [1] **(n=140)**



Source: EQUINOX trial two end of trial survey

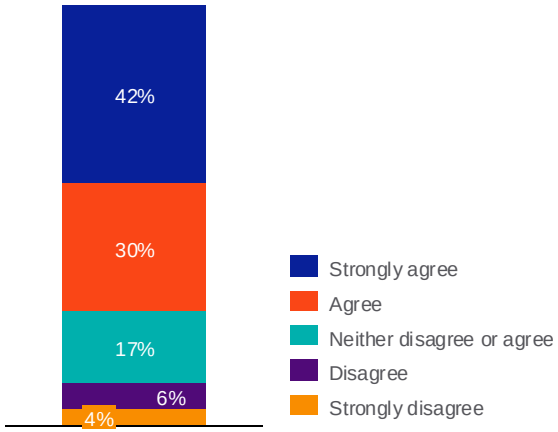
EQUINOX

Automation[1]

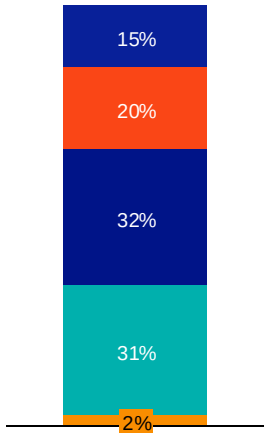
Most participants felt being able to control their heat pump remotely would make participating in EQUINOX events easier

Of participants who could not already control their own heat pump remotely, 72% indicated that this ability would make it easier to participate in EQUINOX events. 67% of Octopus Energy and ScottishPower participants would consider potentially letting a trusted third-party control their heat pump during the EQUINOX trial.

To what extent do you agree or disagree with the following statement: "The ability to control my heat pump remotely would make it easier to participate in EQUINOX events." (n=436)



What is the likelihood that you would consider allowing a trusted third-party to control your heat pump? (n=619)



Source: EQUINOX trial two end of trial survey

[1] Sero customers were excluded from this data set as Sero customers as their participation was already remotely controlled by their supplier

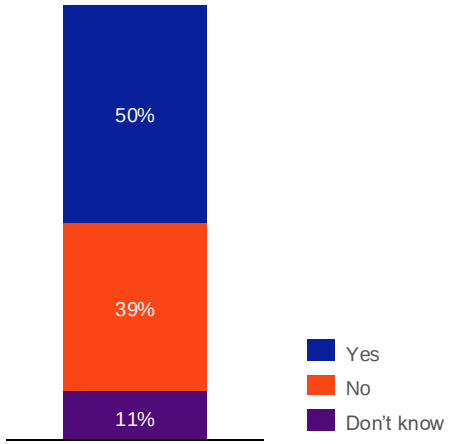
EQUINOX

No notice EQUINOX events

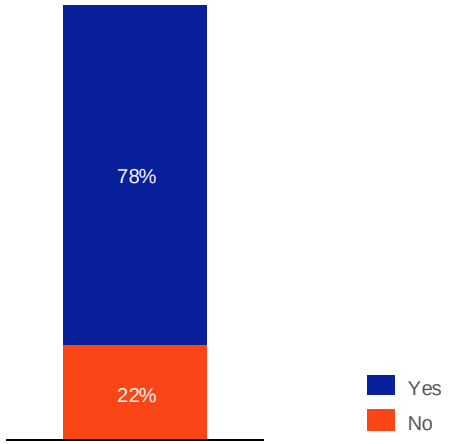
Only half of aggregator control participants indicated they realised the no notice events were occurring

For the group of aggregator control customers, we also trialled no notice events where participants' heat pumps were turned down without prior notification. Participants could still choose to override the event, if needed. Approximately 39% of the 19 aggregator control participants who participated indicated they did not realise these events were occurring compared to 50% indicating they did. Encouragingly 78% of participants felt sufficiently in control their heating.

Did you notice the 13 no-notice events while they were taking place? (n=19)



Did you feel sufficiently in control of your heating during the EQUINOX trial? (n=19)



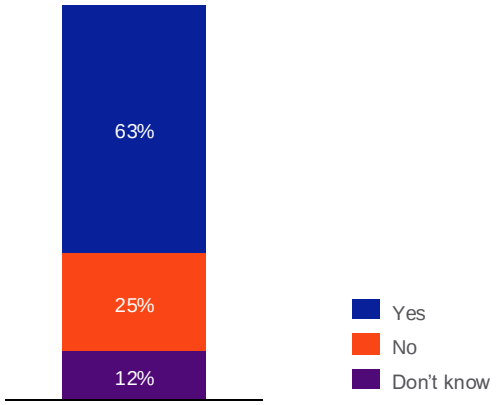
Source: EQUINOX trial two end of trial survey

Stacking

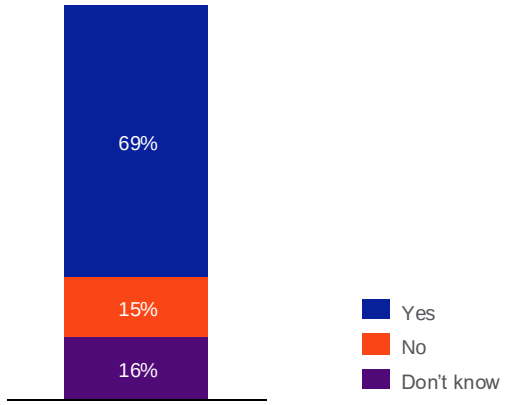
Most participants wanted to participate in additional flexibility offering during the trial

Approximately two thirds of participants wanted to participate in an additional flexibility offering during trial two (63%) or reported being interested in participating in more than one flexibility offering at the same time in the future (69%). Customers were unable to stack flexibility offerings during trial two but opportunities to facilitate stacking of flexibility services is being considered for trial three.

Did you want to participate in another flexibility offering or trial this winter but were unable to do so?
(n=636)



Would you be interested in participating in more than one flexibility offering/product/service at the same time?
(n=636)



Source: EQUINOX trial two end of trial survey

Conclusions and next steps

Trial design

Participants were notified of EQUINOX events either two hours prior to the event, morning of, or day ahead. The most preferred notice period was day ahead, but the majority reported the different notice periods did not impact their participation.

EQUINOX events occurred for two-hour windows, and while customers continue to feel two-hour EQUINOX events are “about right”, most signalled an openness to exploring longer three hour events. We are looking to integrate this into trial three given that DNO flexibility needs often last longer than two hours during peak periods.

Trial events to date have focussed on the evening peak (4-8 pm), which is when the network is often most constrained. However, there are times and locations when the network is constrained during mornings and weekends. Understanding the availability of heat pump flexibility at other times of day is being considered for trial three design.

Heat pump control continues to be manual for most participants. While we heard the trial was simple to participate in, many customers also acknowledged that technology, whether being able to directly control their heat pump via an app or through having a trusted third-party control their heat pump, would make participating in EQUINOX events even easier.

During trial two, we had a pool of automated control customers, whose heat pumps were controlled by their energy supplier; for trial three we are exploring avenues to enable us to test a larger pool of automated control customers.

Finally, we heard many customers wanted to participate in more than one flexibility trial or offering during trial two. While stacking continues to be a hot topic in the industry, the concept has not been well tested. We are looking ahead to how stacking could be enabled in trial three.

EQUINOX

4.3

Customer comfort

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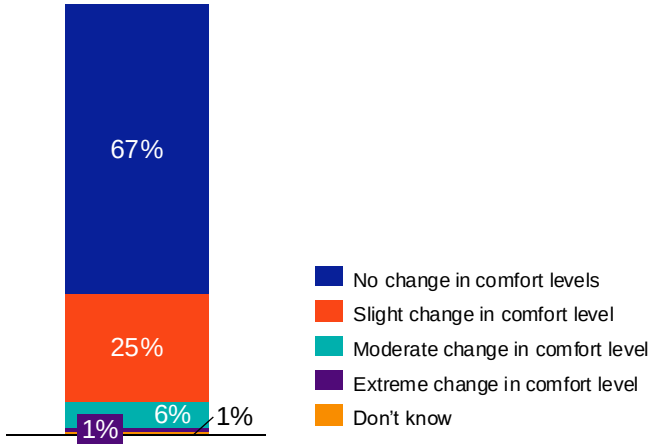
Event-by-event comfort

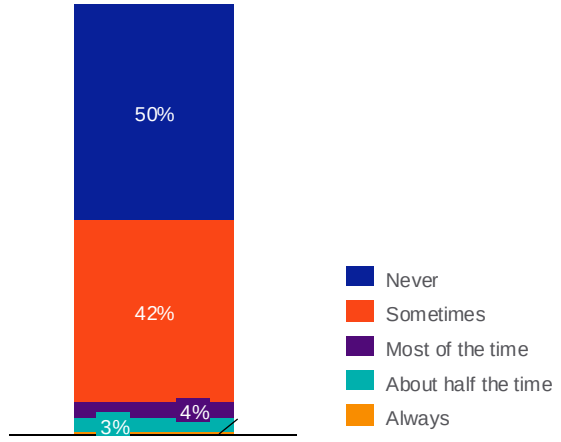
Immediately following EQUINOX events 92% of participants felt no or slight change in comfort levels

After each of the 36 EQUINOX events participants were sent a short survey from their energy supplier asking about comfort levels. The left graph shows the aggregated results from all 36 surveys; whereas the right graph shows the results from the end of trial survey which asked all participants to reflect on their experiences related to comfort throughout the EQUINOX trial. The two graphs are responses from two different questions asked in two different surveys. Customer comfort remains high in both surveys (92%) reported no or slight change, 92% reported never or sometimes feeling discomfort which illustrates the contextual importance of when and how customer comfort in demand response events is studied.

How much did the event impact comfort levels inside your home?
(Immediate post event surveys)



How frequently did participating in EQUINOX events cause any discomfort for you or someone else in the household?
(EQUINOX end of trial survey)
(n=636)



Source: EQUINOX post event surveys, EQUINOX trial two end of trial survey

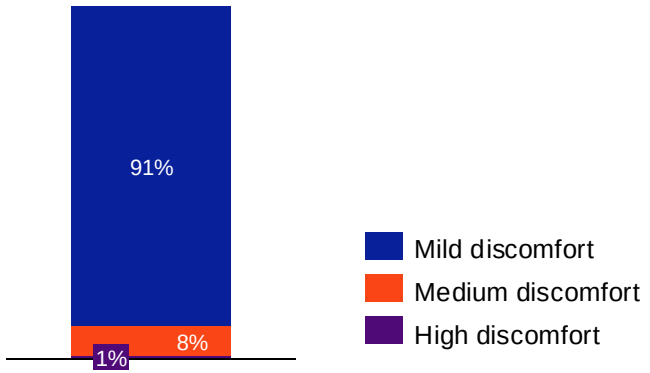
EQUINOX

Overall comfort

Most customers report minimal discomfort across the trial

Customers were asked in the end of trial survey about their recollection of any discomfort they may have experienced in relation to participating in EQUINOX events. This data is in addition to feedback that customers provided after each EQUINOX event, indicating whether or not they had experienced a change in thermal comfort. Although the data is broadly positive - most customers report never being uncomfortable or only mildly discomforted during events - it is not fully aligned with data that we see when looking at post-event surveys. End of trial results should be considered as a customer's perspective thinking back across the winter, rather than as an indicator of customer comfort in each event. As demonstrated in the previous slide, half of the participants (50%) indicated never feeling discomfort as a result of participating in EQUINOX events. For the remaining participants who reported feeling some level of discomfort, 91% reported feeling only mild discomfort, consistent with wanting to put on a jumper.

If you felt discomfort, what level of discomfort have you felt from participating in EQUINOX events? [1]
(n=318)



[1] Customers were only asked this question if they responded selected sometimes, most of the time, about half the time, and always when asked "how frequently did participating in EQUINOX events cause any discomfort for your or someone else in your household?"

Source: EQUINOX trial two end of trial survey

Conclusions and next steps

Comfort

Customer comfort is a top priority for EQUINOX. We are encouraged that most customers report staying comfortable in their homes during EQUINOX events. Both immediately after each EQUINOX event through a short survey and at the end of trial two, 92% report never or only sometimes feeling discomfort thinking back over the trial, and those who reported changes in their comfort 91% indicated mild changes to their comfort.

Of the participants who reported changes to their comfort levels, over 90% indicated only mild discomfort. Through focus groups and interviews participants indicated that if there were any changes to their comfort levels, they would add extra layers or use alternative heating. This reportedly primarily coincided with events on colder days.

We know from a subset of EPC A homes that the temperature loss during an event can be less than 1 degree Celsius on average. However, from discussions with customers through interviews and focus groups we understand that thermal comfort is impacted by the characteristics of one's home (e.g., insulation level, etc.), but also personal preference and circumstance.

How thermal comfort is captured is being assessed for trial three, considering self-reported or other forms of measurement in addition to strengthening safeguards for customers who may be more vulnerable to the cold. Understanding that while participation is an individual choice, the trial does not want to incentivise customers to underheat their home.

We will also review safeguards for customers who may be more vulnerable to the cold. Understanding that while participation is an individual choice, we do not want to incentivise customers to underheat their home.

EQUINOX

4.4

Vulnerability

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Potentially vulnerable participants

During the analysis of the surveys and focus groups, individuals were segmented based on self-reported characteristics to assess the impacts of EQUINOX events on potentially vulnerable participants.

Potential vulnerability was assessed via participants indicating one of the three self-reported questions:

- Responding that they were **sometimes, often, and/or rarely/never able to afford their energy bills** and other household bills.
- **Responding yes** to one of the following questions:
  - Including yourself, how many people in your household meet the following criteria? – Has a disability or long-term health condition
  - Do you feel this disability or long-term health condition is made worse or more difficult to cope with when it's cold?

With this approach we identified **206 potentially vulnerable participants** from the start of trial survey, and of those participants, **147 potentially vulnerable participants** participated in the end of trial survey.

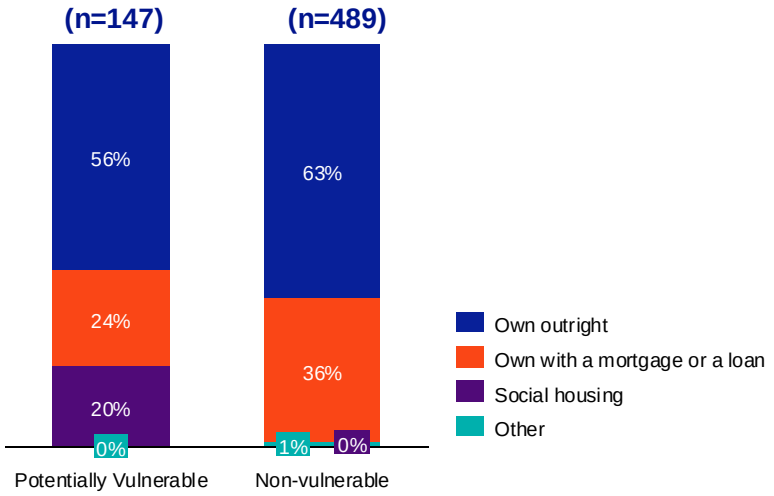
It is recognised that vulnerability is broad and complex. There are therefore challenges to categorise, identify, and account for vulnerabilities. Trial three hopes to consider additional individual and combined potential vulnerability factors to explore further impacts of demand side flexibility on vulnerable customers.

Potentially vulnerable demographics

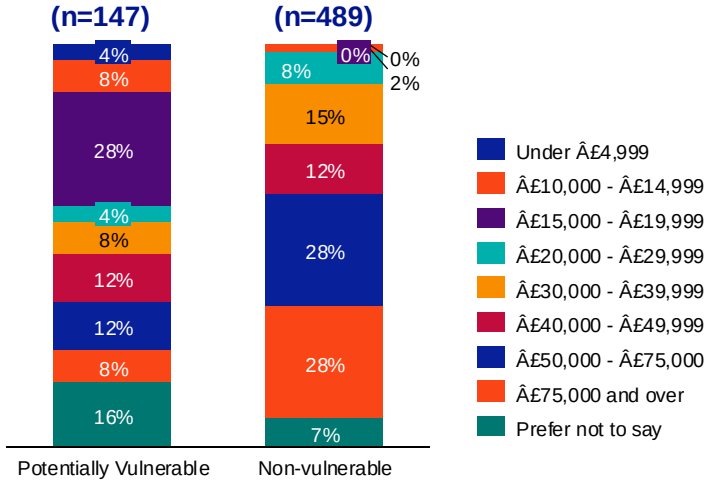
There is greater variation among potentially vulnerable participants across income, relationship to property and household composition

To understand if there is any significant overrepresentation of demographics between potentially vulnerable participants and non-vulnerable participants, additional analysis was conducted between the groups. 20% more potentially vulnerable participants live in social housing than non-vulnerable participants. There was also greater distribution across household income among potentially vulnerable participants. However, there seemed to be minimal difference between household composition across potentially vulnerable and non-vulnerable participants.

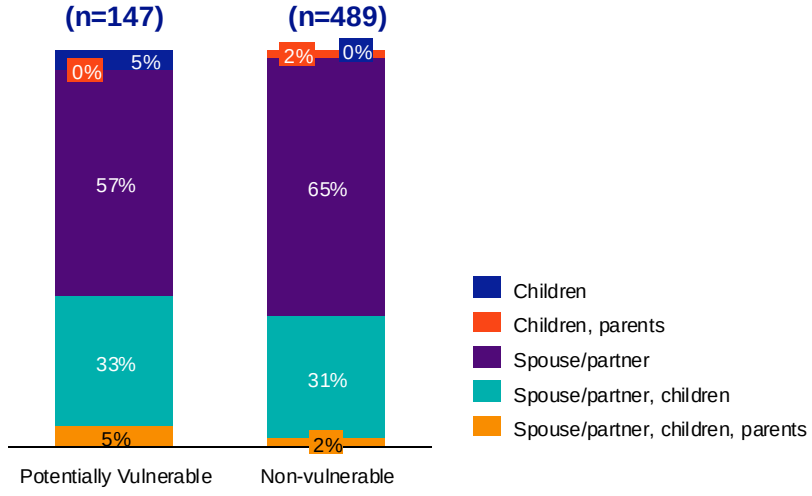
Which of the following best describes your relationship with the property you live in?



What is your annual household income before tax and other deductions?



Including yourself, how many people permanently live in your household?



Source: EQUINOX trial two end of trial survey

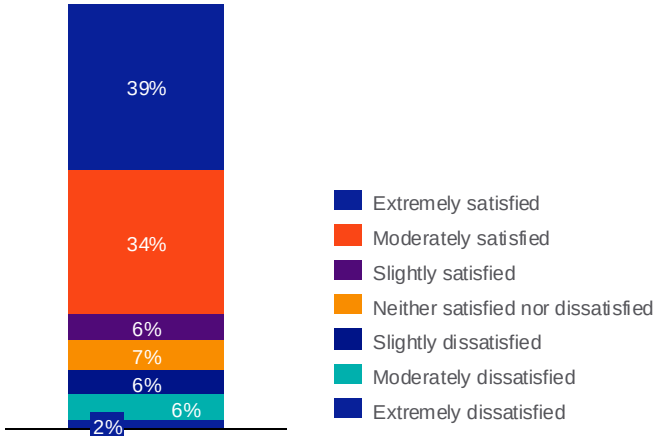
EQUINOX

Comparing trial satisfaction

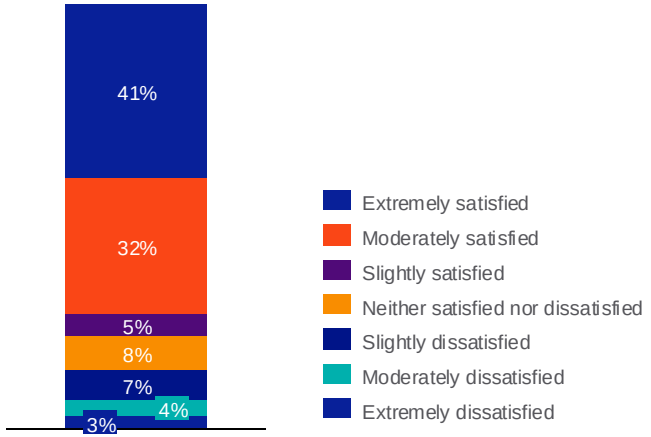
There seemed to be similar levels of satisfaction across the non-vulnerable and potentially vulnerable participants

Generally, potentially vulnerable participants were as satisfied or dissatisfied with the second EQUINOX trial as non-vulnerable participants. Similar to non-vulnerable participants, the most popular reason cited for satisfaction among potentially vulnerable participants was that the EQUINOX events had minimal impact on their daily lives, and the most cited reason for dissatisfaction was payment amounts.

How satisfied are you with the overall EQUINOX trial?
(non-vulnerable participants)
(n=489)



How satisfied are you with the overall EQUINOX trial?
(potentially vulnerable participants)
(n=147)



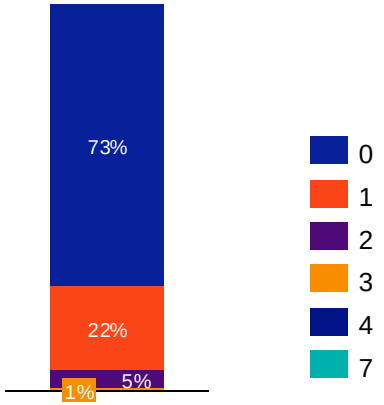
Source: EQUINOX trial two end of trial survey

Recruitment of potentially vulnerable participants

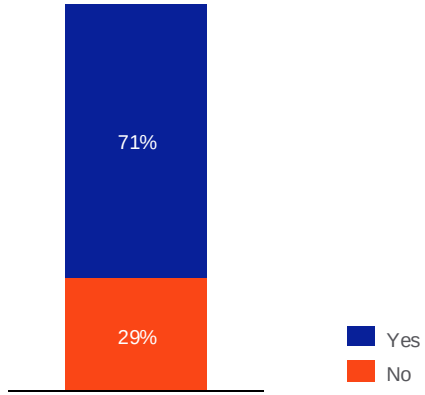
Recruiting potentially vulnerable customers was a key priority area for trial two

Recruiting potentially vulnerable customers was an area of focus for trial two. 29% of participants self-reported having a disability or long-term health condition. Of those who self-reported having a disability or long-term health condition, 71% identified that the disability or long-term health condition was made worse or more difficult cope when it is cold. Ultimately, it was determined to use self-reported disability or long-term health condition, and disability/long-term health condition being made worse when it's cold, as factors to segment for potentially vulnerable participants. These factors were selected as there were larger proportions of individuals from these categories than other potentially vulnerable categories or indicators and therefore, allowed for a larger segmentation and more robust analysis.

How many people in your household have a disability or long-term health condition. (n=729)



Is your disability/long-term health condition made worse or more difficult to cope with when it's cold? (n=194)



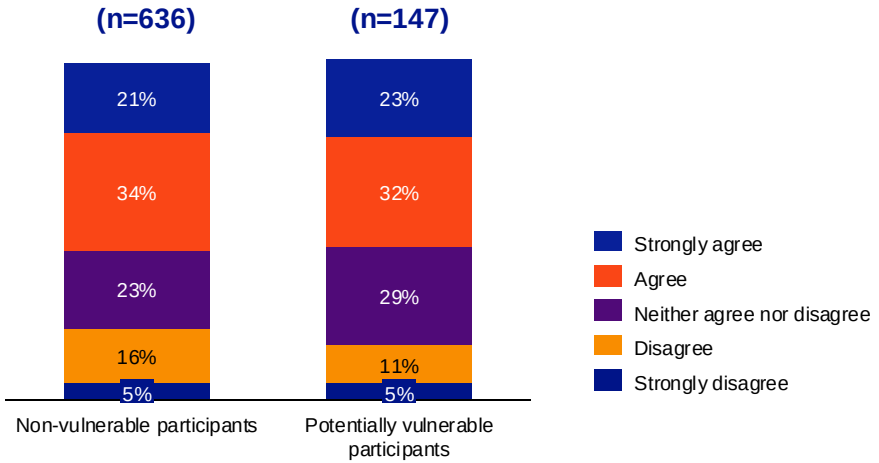
Source: EQUINOX trial two end of trial survey

Comparing views on payment

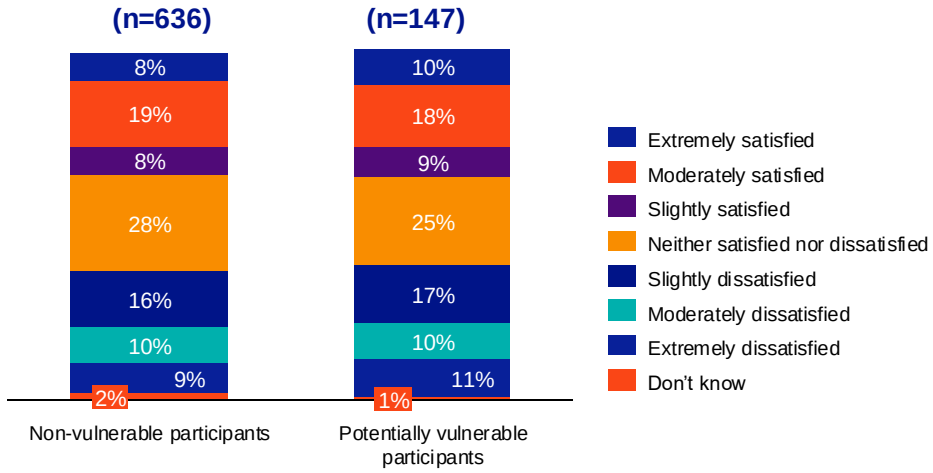
There was similar views on satisfaction with payments across both potentially vulnerable and non-vulnerable participants

About half of the potentially vulnerable participants (55%) indicated that the way payments for participating in EQUINOX events was calculated was clear. This was relatively similar across potentially vulnerable and non-vulnerable participants. 37% of potentially vulnerable participants indicated they were satisfied with the payment amounts for participating in EQUINOX events, which was similar to non-vulnerable participants (35%) satisfaction. Conversely, 38% of potentially vulnerable participants and 35% of non-vulnerable participants were dissatisfied with payment amounts. 25% of potentially vulnerable participants and 28% of non-vulnerable participants were neither satisfied nor dissatisfied with payment amounts.

How much do you agree with the following statement, "The way payment for providing heat pump turndown was calculated was clear to me?"



How satisfied are you with the payment amounts for participating in EQUINOX events?



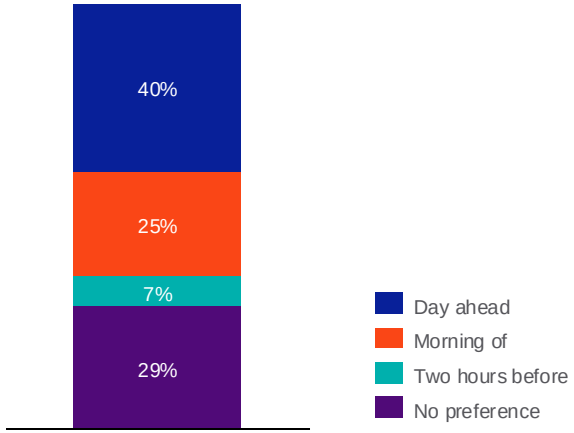
Source: EQUINOX trial two end of trial survey

Comparing perception on notifications

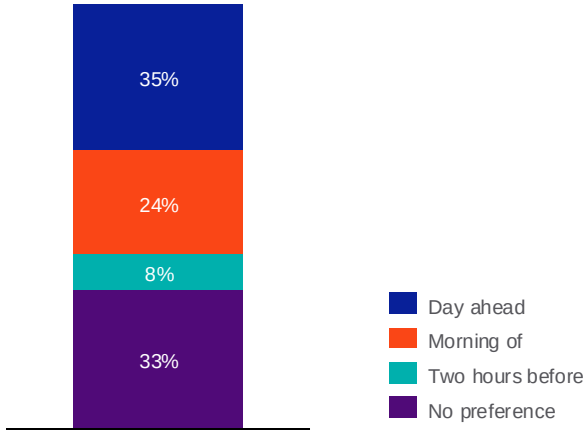
There was minimal difference on preference on notice periods between non-vulnerable and potentially vulnerable participants

According to EQUINOX end of trial survey responses, there was minimal difference in preferred notification of events between potentially vulnerable participants and non-vulnerable participants, with day ahead and morning of being the preferred notice period. 33% of potentially vulnerable participants and 28% of non-vulnerable participants had no preference on notice periods. Some potentially vulnerable and non-vulnerable participants told us in interviews and focus groups that it was important to have sufficient notice to prepare their heating needs as for some, the lack of remote control of their heating meant if they were not home at the time of an event, they were not able to take part.

What was your preferred notice period?
(non-vulnerable participants)
(n=489)



What was your preferred notice period?
(potentially vulnerable participants)
(n=147)



Source: EQUINOX trial two end of trial survey

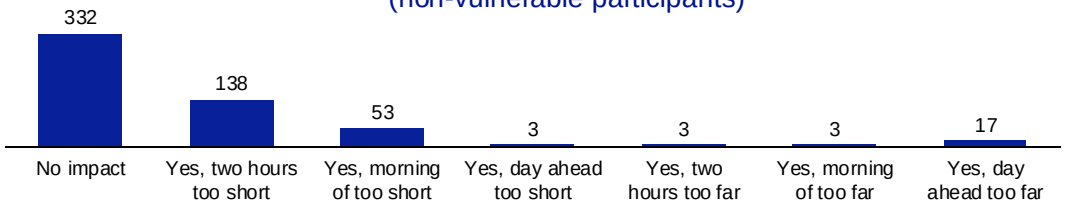
EQUINOX

Potentially vulnerable perceptions on notifications

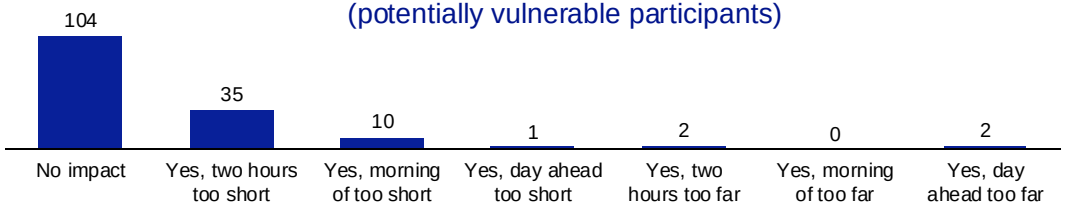
Generally different notice periods did not impact EQUINOX participation across non-vulnerable and potentially vulnerable participants

Most participants, regardless of potential vulnerabilities, indicated that the different notice periods did not impact their ability to participate in EQUINOX events. Through focus groups and interviews customers noted that employment status and location contributed to participants' preference and flexibility to participate in shorter-notice trial events, with those who didn't have remote access to their heat pumps, finding it more difficult to participate in trial events or those with shorter notice periods..

Did the different notice periods impact your ability to participate in EQUINOX events? (n=549)
(non-vulnerable participants)



Did the different notice periods impact your ability to participate in EQUINOX events? (n=154)
(potentially vulnerable participants)



Source: EQUINOX trial two end of trial survey

Quotes from focus groups and interviews

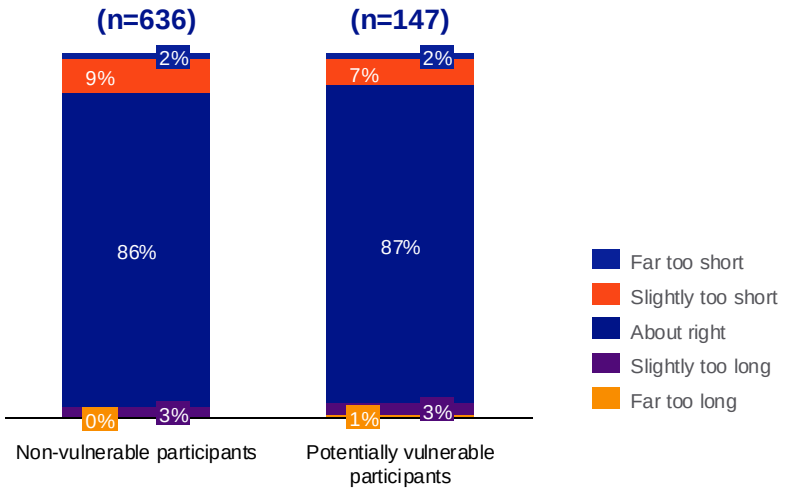
- *I have smart controls on the heat pump, so short notice period doesn't affect my ability to control heating*
- *Day ahead is too far as I can't plan that far in advance.*
- *Because the emails come to my mobile phone, the time they arrive makes little difference to me.*
- *Having plenty of notice meant that I could be home to take part.*
- *If I have visitors, the event may affect their comfortability so two hours may be too short.*
- *The only time it impacted was if we were out.*
- *As we have already adjusted our energy usage away from the peak period we carried on as normal.*

Potentially vulnerable perceptions on EQUINOX event length

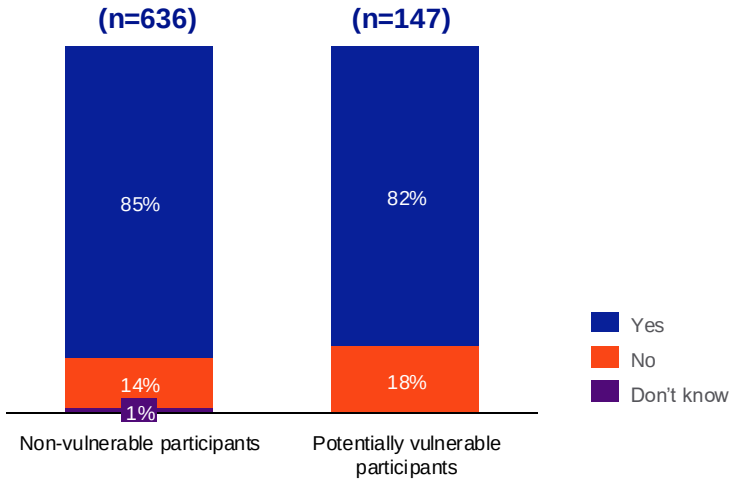
Potentially vulnerable and non-vulnerable participants felt the two-hour event length was about right

There was minimal difference between potentially vulnerable and non-vulnerable participants as it relates to the two-hour event length. Similarly, there was little variation between potentially vulnerable and non-vulnerable participants willingness to participate in a three-hour EQUINOX event. However, during the focus groups and interviews it was noted that if events ended after 7:00pm there was potential for changes in comfort due to the fact that there was sometimes overlap between their time of use tariff schedule (4:00 – 7:00pm) and the EQUINOX event. Meaning they would sometimes have their heat off for up to four hours.

What do you think about the two-hour duration of EQUINOX events?



Would you consider participating in three-hour EQUINOX events?



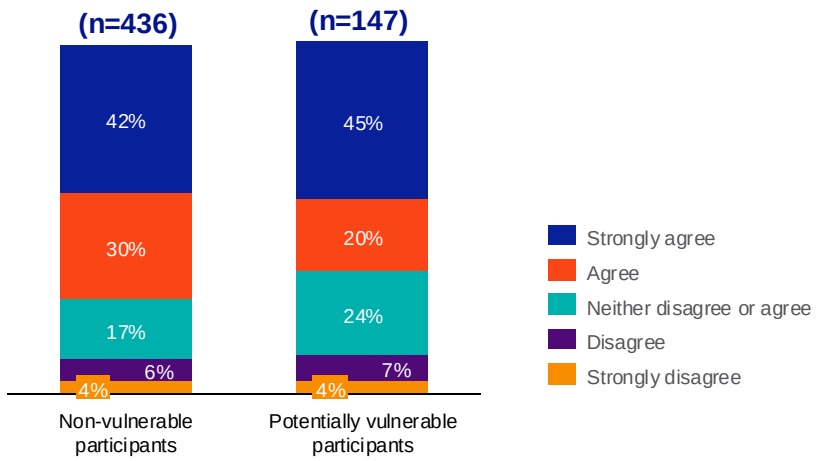
Source: EQUINOX trial two end of trial survey

Potentially vulnerable perceptions on automation

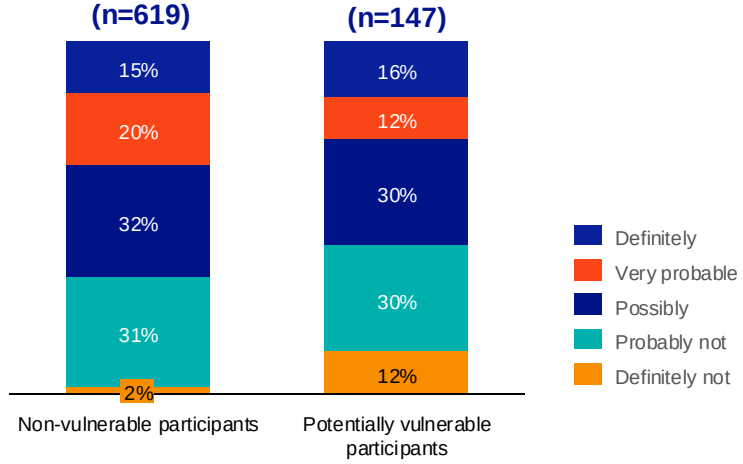
Potentially vulnerable and non-vulnerable participants noted controlling their heat pump remotely would make it easier to participate

Of those who cannot already control their heat pump remotely, 65% of the potentially vulnerable participants indicated that the ability to control their heat pump remotely would make it easier to participate in EQUINOX events. This is similar to non-vulnerable participants whereby 72% indicated that the ability to control their heat pump remotely would make it easier to participate in EQUINOX events. As it relates to allowing a trust third-party control participants heat pump 16% of potentially vulnerable participants and 15% of non-vulnerable participants indicated they would definitely allow third-party control, whereas 12% of potentially vulnerable participants and 2% of non-vulnerable participants indicate they would definitely not allow third-party control of their heat pump.

To what extent do you agree or disagree with the following statement: "The ability to control my heat pump remotely would make it easier to participate in EQUINOX events."



What is the likelihood that you would consider allowing a trusted third-party to control your heat pump?



Source: EQUINOX trial two end of trial survey

Conclusions and next steps

Vulnerability

Recruiting and analysing how potentially vulnerable customers experienced the trial was a key priority area throughout trial two. In particular, we chose to focus on customers with disabilities and long-term health conditions exacerbated by the cold.

In general, we were encouraged that across trial satisfaction, participation, and trial design, customers with potential vulnerabilities appeared to have similar preferences and experiences as compared to non-vulnerable participants.

During trial three we will be implementing an equitable participation framework that will further define and assess the customer journeys of potentially vulnerable customers to help strengthen our understanding of the impacts of the commercial arrangements and trial design on vulnerable customers.

We also plan to further understand the impacts and put safeguards in place. This could include careful consideration of the timing of events, particularly during periods of cold weather and reminding customers they should not turn down their heat pump below a temperature that impacts their individual comfort levels.

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