



EQUINOX

EQUINOX trial three: Engaging vulnerable customers

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Name	Role
Raeesa Hirji, Samantha Piller (Guidehouse)	Authors
Callum Coghlan, Alyssa Fournier, Alex Jakeman (Guidehouse) Ayah Hatim, Helen Stockton (National Energy Action) Stuart Fowler (NGED) Jessica Colleen, Tessa Hillen (Octopus Energy) Watson Peat (ScottishPower)	Reviewers
Ryan Huxtable (NGED)	Approver

Contact Details

Email:
ngedinnovation@nationalgrid.co.uk

Postal:
Innovation Team, National Grid
Pegasus Business Park, Herald Way
Castle Donington, Derbyshire DE74 2TU

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Glossary of terms

- **Customers:** Term used when referring to customers of energy suppliers generally.
- **Longer Events Flex:** Investigated demand turndown for more than two hours, on non-consecutive weekdays, during the network evening peak.
- **Morning Peak Flex:** Investigated demand turndown on non-consecutive weekdays, during the morning network peak.
- **Turn Up Flex:** Investigated demand turn up on non-consecutive days, around midday, including a weekend event.
- **Equitable Participation Framework (EPF):** A framework developed to identify potentially vulnerable participants and understand how intersecting energy vulnerabilities could impact participation in flexibility services
- **Daily Evening Flex:** The name of the trial three mini-trial. Investigated turndown across consecutive weekdays, during the network evening peak.
- **Events:** Periods of the day when trial participants were asked to provide demand response.
- **Households:** Households that use a heat pump as their primary method of space heating.
- **Daily Morning Flex:** Investigated turndown across consecutive weekdays, during the network morning peak.
- **Participants:** Term used when referring to customers taking part in EQUINOX trials.
- **Potentially vulnerable participants:** Participants who were segmented based on various vulnerability indicators.
- **Trial three:** A collective term for the five mini-trial events that occurred between December 2024 – March 2025.

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Executive summary

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Trial three overview

Over three winters, Equitable Novel Flexibility Exchange (EQUINOX) engaged over 2000 households to assess domestic heat pump flexibility as a network demand response asset, with a strong emphasis on equitable participation, including vulnerable and fuel-poor customers.

Trial three built on the learnings from the first two EQUINOX trials and focused on testing the feasibility and impact of longer-duration events and more frequent events. Each mini-trial focused on different aspects of heat pump flexibility:

- **Heat pump turn up flexibility ('Turn Up Flex')**: demand turn up events on non-consecutive days, between 12 - 2pm.
- **Longer heat pump flexibility event ('Longer Events Flex')**: demand turndown events of differing lengths, on non-consecutive days, between 4 - 8pm.
- **Morning heat pump flexibility events ('Morning Peak Flex')**: demand turndown events on non-consecutive days, between 8 - 10am.
- **Daily morning heat pump flexibility ('Daily Morning Flex')**: 'everyday' demand turndown events on weekdays, across consecutive weeks and between both 8 - 10am and 5 – 7pm.
- **Daily evening heat pump flexibility ('Daily Evening Flex')**: 'everyday' demand turndown events on weekdays, across consecutive weeks and occurring between 4 – 8pm.

This report details the experiences and perceptions of potentially vulnerable customers, the barriers they faced in participating in the trials, and how their participation compared to the general trial population.

Further details on the overall participant experience can be found in the summary trial reports, and the overall consideration of vulnerable customer experience in trial three is in Deliverable 5: Learnings from engaging customers and can be found [here](#).

Executive summary

Main findings

Assessing vulnerability:

843 households participated in trial three across one or more of the five mini trials.

These participants were at the heart of the EQUINOX trial and from the project outset, we prioritised ensuring that all customers including potentially vulnerable customers and fuel poor customers could participate and benefit equitably from the trials.

Trial three made progress in recruiting a more diverse customer base than in previous EQUINOX trials and in recruiting more potentially vulnerable customers. For EQUINOX, recruiting a customer pool representative of the UK population was a challenge as heat pumps are not yet widespread across all demographics. It was therefore important to engage organisations that serve underrepresented groups and local authorities to promote the trial and help to recruit these underrepresented groups. During trial three we attempted to reach more potentially vulnerable customers via different methods including door knocking and recruiting customers who meet eligibility criteria for specific government incentives.

In addition to the recruitment methods considered for trial three, ahead of trial three we developed the Equitable Participation Framework (EPF) which was a tool that enabled us to consider more factors in trial design and helped to define specific vulnerability indicators that should be accounted for when considering vulnerability. We selected eight vulnerability indicators to assess vulnerability in trial three. **This resulted in 47% of trial three participants being classified as potentially vulnerable.**

Applying the EPF to trial three and expanding the range of vulnerability factors increased the proportion of customers classified as potentially vulnerable. It is important to consider that vulnerability depends on the situation and the conditions the customer is subject to. Whilst there is a lot of pre-existing work on vulnerability which should be used as an initial resource to identify factors that may contribute to a person or a household being in a vulnerable situation, projects should refine their approach to vulnerability to capture the specific nuances that may be more relevant to trial participants.

Executive summary

Main findings

Equitable access to flexibility:

EQUINOX focused on ensuring equitable access to flexibility services for all participants. To do so we captured the experiences and perceptions of trial participants through surveys, interviews and focus groups. We conducted numerous surveys to understand customer experiences and preferences. While these quantitative findings provided insightful data, supplementing this data with qualitative insights was helpful in adding additional perspective to the data. Focus groups and interviews with potentially vulnerable customers allowed us to more deeply understand specific customer experiences.

To assess equitability of the trial, we assessed vulnerable and non-vulnerable participants' overall satisfaction in each of the mini-trials, payment satisfaction and how satisfied customers were with the event frequency.

Trial satisfaction: Participants reported high levels of satisfaction across the mini-trials. 92-100% of potentially vulnerable participants were satisfied or neither satisfied nor dissatisfied. 68-75% of potentially vulnerable participants responded they would not change anything about the trials when asked.

Payment satisfaction: While there was variation in the levels of satisfaction with payment received for participating in the trial events, there were consistencies between potentially vulnerable and all participants. Moreover, satisfaction and dissatisfaction was predominately related to whether participants felt like payment received was a fair reflection of the effort for participating, rather than a reflection of any impact on comfort.

Event frequency: Potentially vulnerable participants indicated similar views to those of all participants. Remote customer control¹ were more likely to find the frequency of events 'about right' when compared to manual customer-controlled heat pumps, highlighting that it could be easier for remote control customers to access flexibility offerings on a more frequent basis.

Overall, we are encouraged by the findings from the trial as they offer real-world insight into the experiences of participants, including potentially vulnerable participants. They demonstrate that vulnerable and fuel poor groups can be engaged in heat pump flexibility, while also showing the key points of difference and support required throughout that engagement.

¹Remote customer control refers to customers who have the ability to control their heat pump remotely using an app or smart device.

Executive summary

Main findings

Heating and comfort:

Customer comfort was a top priority for EQUINOX. Ahead of trial three, the implementation of the EPF further enhanced our understanding of the additional factors that can allow customers to more easily and comfortably participate in flexibility offerings. Ultimately, contributing to the equitable participation of all customers.

Segmenting for vulnerability allowed us to compare the experiences and outcomes of potentially vulnerable participants against the broader participant pool. This was essential for understanding how different customers perceived key trial performance, including comfort levels.

We are encouraged that most participants reported staying comfortable in their homes during EQUINOX events. In the end of trial surveys, all participants were asked how the trial events impacted the comfort levels of their home. In most cases, a noticeable change in home comfort never or only sometimes caused a change in comfort to someone in the home. Very few participants reported that this change in comfort occurred more often than sometimes.

For daily trial participants, 82-84% of potentially vulnerable participants reported no or slight impact on the comfort of their home. This figure was consistent across both trials but does include 3% of customers in Daily Evening Flex who report that events made their home slightly warm.

A noticeable impact on home comfort did not always translate to a change in comfort for individuals and across both mini-trials. In free text survey responses and during focus groups and interviews, we predominantly heard that participants would use additional heating or wear additional layers to compensate if there were changes in household comfort levels. These results support our wider findings that potentially vulnerable customers who choose to engage with heat flexibility can typically do so comfortably.

Overall, the customer appetite to participate in a range of novel commercial offerings while also being able to maintain high customer comfort has been a key project success and provides important insights, particularly for consideration in future iterations of heat pump flexibility offerings.

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Introduction to research and trials

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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 could 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 is 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 the end of 2025. The project's third trial ran from September 2024 to April 2025.
- EQUINOX is the largest heat pump trial in the UK. 1,282 unique households were onboarded across all three trials.
- EQUINOX targets a diverse set of customers, ensuring that when designing commercial and technical arrangements, equity and vulnerabilities are taken into consideration.

Customer research¹

Quantitative

We used the following surveys to collect data to inform this report and the overall trial three results.



- **Recruitment survey:** Administered to participants when they were recruited. Collected information about the participant's heat pump and household characteristics.
- **Start of trial survey:** Administered before the start of the trial. Collected information on the demographics of trial participants.
- **End of trial survey:** Administered to participants following the commencement of the trials to understand their overall experience.

Qualitative



Interviews: Four one-to-one semi-structured interviews with participants, including potentially vulnerable participants, 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: Six focus groups conducted with 4-6 participants per group totalling approximately 30 participants. Three of these focus groups included only potentially vulnerable customers. They were asked similar questions as one-to-one interviewees.

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. This has been an effective strategy within EQUINOX trials, ensuring that customers always had a choice to take part in trials once invited.

Nonetheless, it presents a challenge in that we do not have representation from customers who do not choose to take part, and that there may be customers who do not feel able to take part in heat pump flexibility did not enrol into the trials.

Vulnerability



Vulnerability: Building on the success of trial two, trial three delved deeper into the experiences of potentially vulnerable participants. Ahead of trial three, we developed the Equitable Participation Framework (EPF) to facilitate greater representation of potentially vulnerable participants, while also being a useful reference for future flexibility services and products to ensure equitable participation. Whilst the EPF enables us to consider more factors in trial design, we recognise this approach may not have captured all vulnerabilities. Conversely, vulnerabilities may have been over-represented based on mitigating circumstances not accounted for.

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Assessing vulnerability

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Assessing vulnerability in trial three

In trial three there were five mini-trials that Octopus Energy and ScottishPower customers participated in. While in principle the trials were similar in that we were looking to test customers willingness and ability to adjust their heat pump during specified times, for pre-determined length of times, there were some trial design factors that varied including the time of day the trials took place and length of the event.

For EQUINOX, recruiting a customer pool representative of the UK population was difficult as heat pumps are not yet widespread across all demographics. This is an important consideration because as heat pumps continue to be installed in more homes, the population of heat pump users changes and will begin to more closely match the UK population. If we can understand how well our trial participants represent the general UK population, then we have some measure of assurance that our results will or will not continue to be relevant as DNOs undertake future planning activities. To reach a greater diversity of heat pump households, it was important that we engaged organisations that serve underrepresented groups and local authorities to promote the trial and help to recruit more vulnerable customers.

843 households participated in trial three across one or more of the five mini-trials.

This section summarises the demographics of trial three participants. The analysis is primarily based on self-reported data from the start of trial survey for each mini trial and is further assessed in **Deliverable 5: Learnings from engaging customers and trial three mini-trial reports** which can be found [here](#).

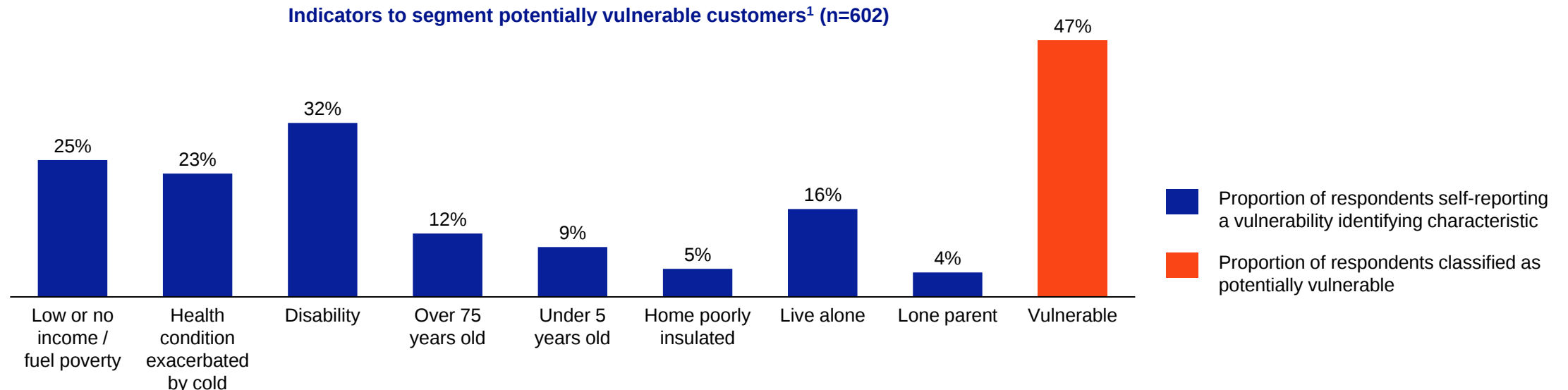
The start of trial survey results were used to segment participants into two groups: non-vulnerable participants and potentially vulnerable participants. The self-reported vulnerability factors that were considered as part of the vulnerability segmentation included: household income, self-reported disabilities and/or health conditions, age, home insulation, living alone and single parents.

Results are presented as percentages or absolute numbers in brackets indicating the number of participants who answered each survey question – this varies due to questions having multiple permitted answers, survey logic asking follow on questions to some customers and not others, and a small number of participants beginning but not completing the survey.

Vulnerability demographics of customers in trial three

Based on eight self-reported vulnerability factors, 47% of trial three participants are considered potentially vulnerable.

In trial three we developed and implemented an Equitable Participation Framework (EPF) to refine how vulnerability was assessed. This resulted in eight vulnerability indicators being selected to segment for potentially vulnerable customers. The eight vulnerability indicators used to segment for potentially vulnerable participants are shown in the blue bars in the graph below. We then added all those customers who reported at least one of these vulnerability indicators resulting in, 47% of participants being considered potentially vulnerable.

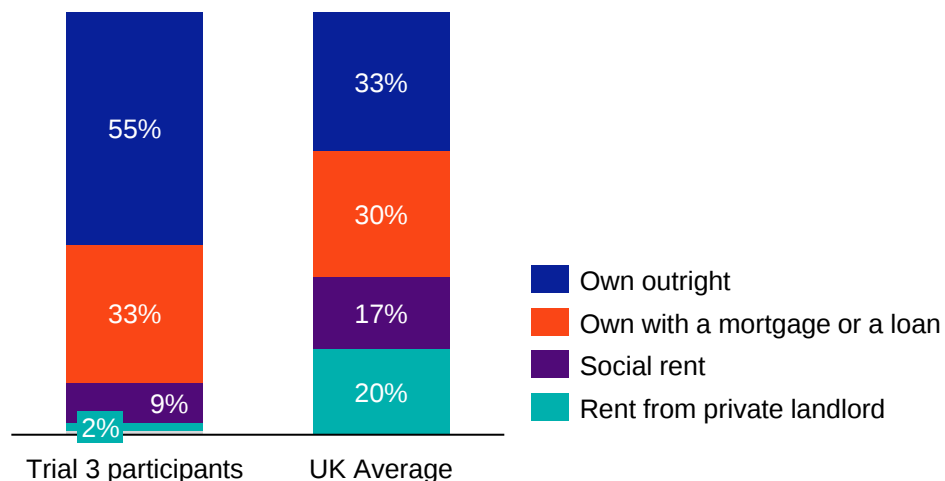


Overall trial demographics compared to UK averages

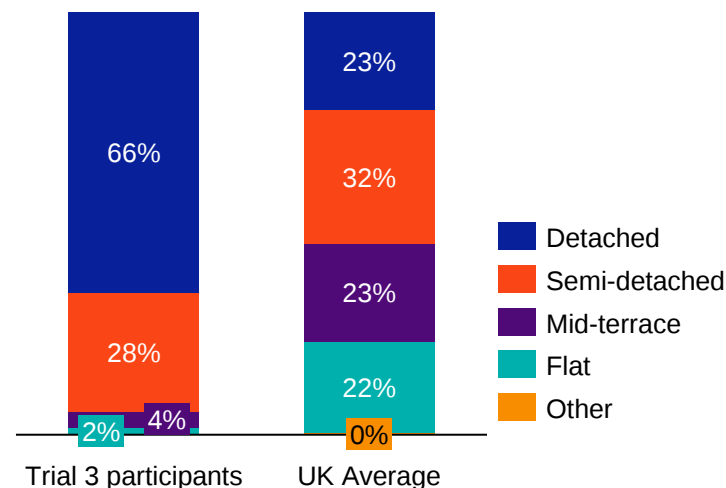
More trial participants own their home and live in a detached home than the UK average.

Whilst trial three had even further diversity in participant type than earlier trials, there were some differences when compared to the UK average. Generally, trial three participants owned their home and lived in detached or semi-detached homes. Based on household composition and income 25% of EQUINOX households were deemed to be living below the minimum income standard¹, as compared the UK average of 36%. This aligns with our understanding of the current heat pump population. If we can understand how well our trial participants represent the general UK population, then we have some measure of understanding of how our results will or will not continue to be relevant as DNOs undertake future planning activities.

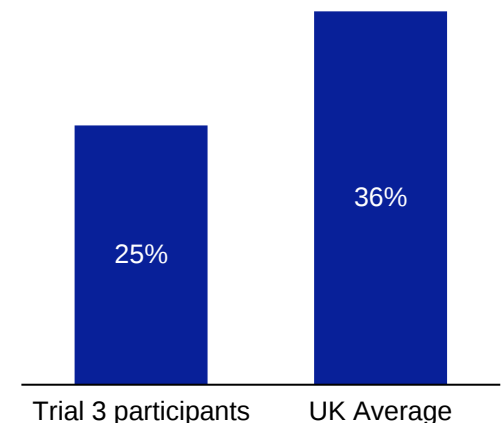
Which of the following best describes your relationship with the property you live in? (n=602)



Which of these best describes your home? (n=492)



Households living below the minimum income standard (n=602)



¹Minimum income calculator UK, 2025, <https://www.minimumincome.org.uk/>.

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Equitable access to flexibility

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Equitable access to flexibility

EQUINOX focused on ensuring equitable access to heat pump flexibility services for all participants.

To assess equitability of the trial, we assessed vulnerable and non-vulnerable participants' overall satisfaction in each of the mini-trials, payment satisfaction and how satisfied customers were with the event frequency.

Satisfaction: Participants reported high levels of satisfaction across the mini-trials. 92-100% of potentially vulnerable participants were satisfied or neither satisfied nor dissatisfied. 68-75% of potentially vulnerable participants responded they would not change anything about the daily trials when asked.

Payment satisfaction: Throughout the trial, participants were rewarded for their participation in events. Additionally, they had the opportunity to be further rewarded for completing trial surveys and participating in focus groups and interviews. Participants were asked in the end of trial survey about their satisfaction with the payment received for participation in trial events.

- 52% of low-income participants and slightly fewer (43%) of high-income participants indicated they were satisfied with the payment earned¹ to participate.
- 63% of satisfied participants cited this was because they felt that it was a fair reflection of the effort to participate in the events.
- Of those who were dissatisfied with the payment (23% of low-income customers and 34% of high-income customers), 55 participants felt that it was an unfair reflection of their effort to participate in the event.

Event frequency: Potentially vulnerable participants indicated similar views to those of all participants. Remote customer control² were more likely to find the frequency of events 'about right' when compared to manual customer controlled³ heat pumps, highlighting that it could be easier for remote control customers to access flexibility offerings on a more frequent basis.

¹Details about trial incentives are discussed in the trial reports.

²Remote-customer control refers to customers who have the ability to control their heat pump remotely using an app or smart device.

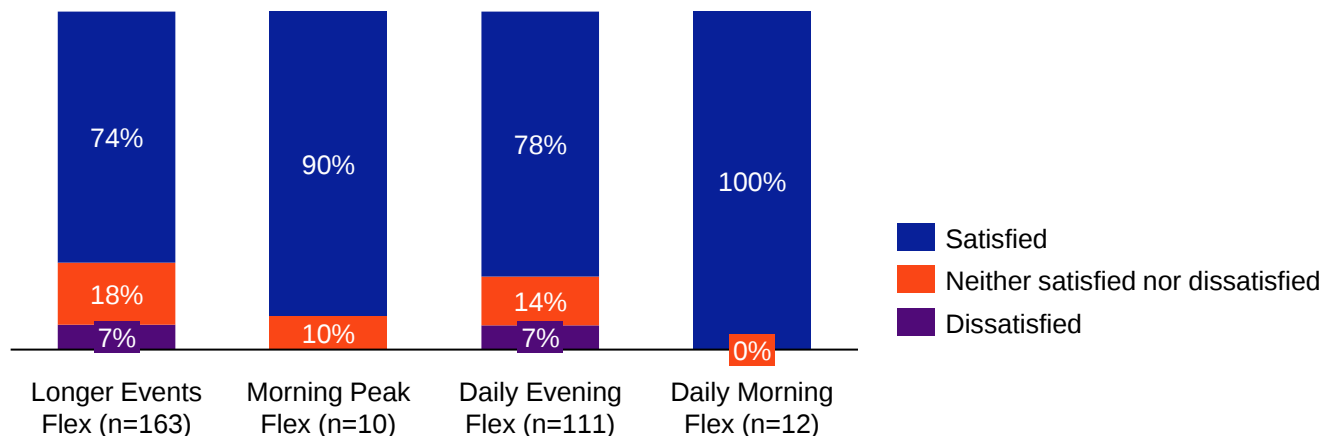
³Manual-customer control refers to customers who can only control their heat pump at the heat pump or directly at the thermostat.

Trial satisfaction of potentially vulnerable customers

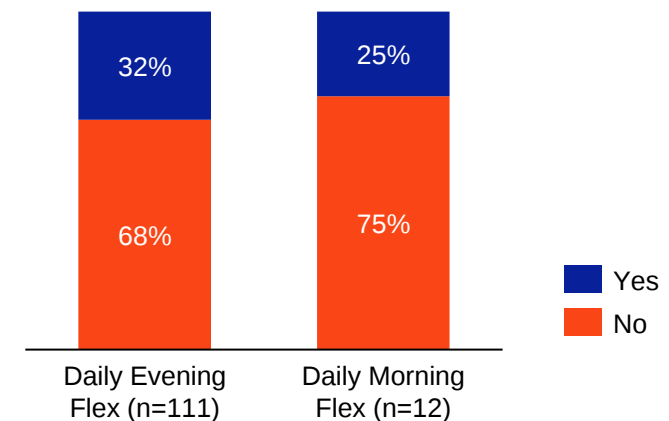
92-100% of potentially vulnerable customers indicated they were satisfied or neutral about the trial experience.

Satisfaction levels were very positive across mini-trials. There were similarities between potentially vulnerable participants and all participants, with 93-100% of all participants reporting being satisfied or neutral about the trial experience, as compared to 92-100% of potentially vulnerable participants. Following the Daily Morning and Evening Flex trials participants were asked if they would change anything about the trial. 68-75% of potentially vulnerable participants responded they wouldn't change anything about the trials, showing that potentially vulnerable customers were satisfied with their experience in participating in daily events. This demonstrates interest and eagerness from customers to take part in heat flexibility, including those identified as potentially vulnerable.

Overall, how satisfied were you with the EQUINOX trial?
(potentially vulnerable participants only)



Based on your experience in the daily flex trial, is there anything you would change?

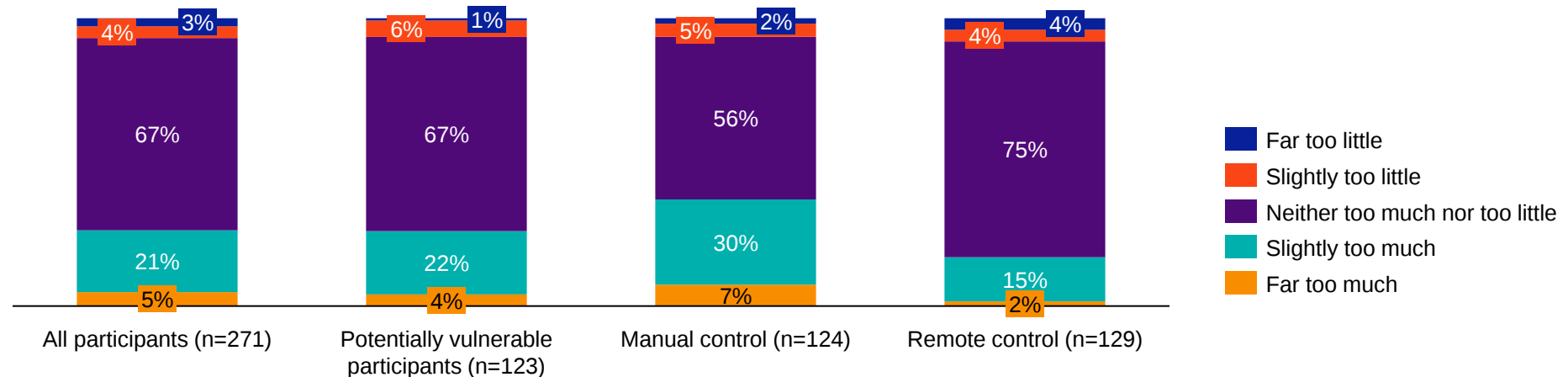


Event frequency

Potentially vulnerable customers indicated similar views on the frequency of events as compared to all participants.

75% of remote-control participants¹ reported that the event frequency of five consecutive days was appropriate. This is consistent with what we heard in focus groups and interviews - customers who can control their heat pump remotely tend to find participating in events easier as they do not need to be home to physically turndown their heat pumps. This could be why proportionately more manual-control² participants indicated that event frequency was slightly or far too much.

During the first four weeks of the EQUINOX daily flex trial, there was one event per day for 5 consecutive days. What is your view on this frequency?

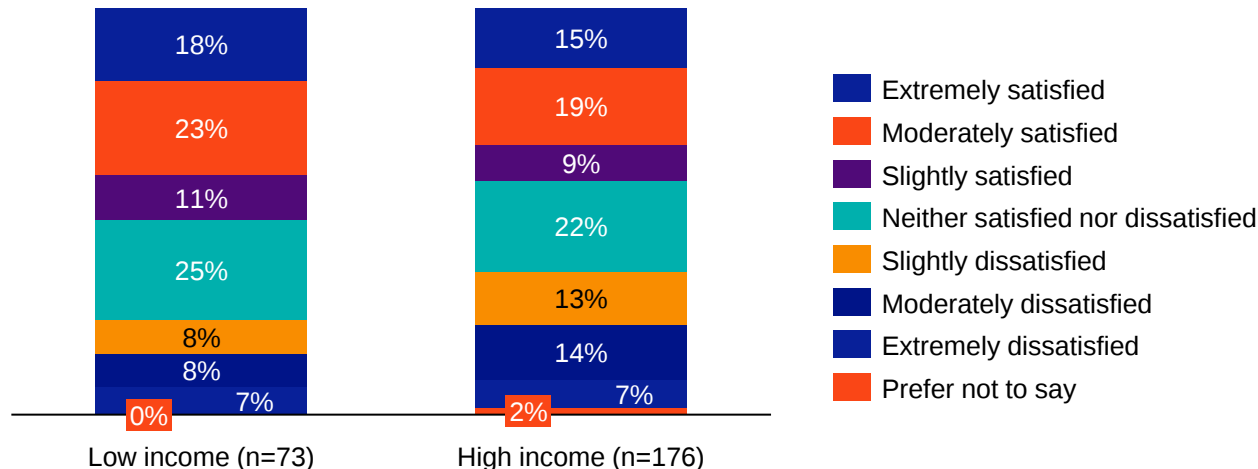


Payment satisfaction

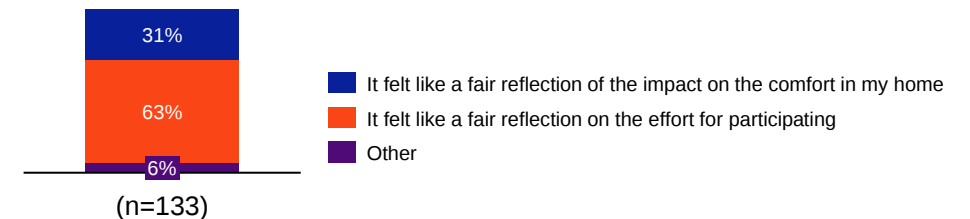
High-income and low-income households indicated similar levels of satisfaction with payment amounts received.

52% of low-income participants and slightly fewer (43%) of high-income participants were satisfied with this payment amount. 23% of low-income participants and 34% of high-income participants were dissatisfied. In the Daily Morning and Evening Flex trials, customers received £1-3 per week¹ performance incentive for staying below their daily baseline during the event window for at least 4 out of 5 days. Satisfaction and dissatisfaction was predominately related to whether participants felt like payment received was a fair reflection of the effort for participating, rather than a reflection of any impact on comfort. This trial incentive may not reflect what a business-as-usual customer offering could look like as this could also incorporate other flexibility values.

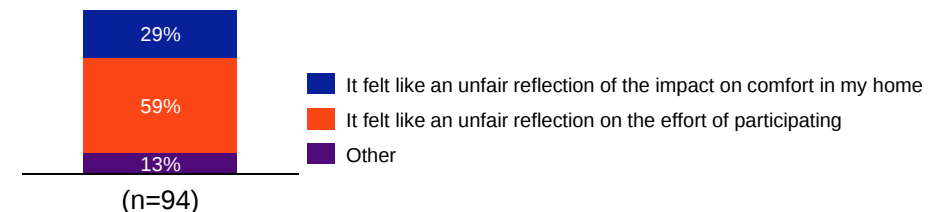
How satisfied were you with this payment amount given the effort required to take part?



Why were you satisfied with the payment? (potentially vulnerable participants)



Why were you dissatisfied with the payment? (potentially vulnerable participants)



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Heating and comfort

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Comfort in trial three

Customer comfort is a top priority for EQUINOX. To contribute to the equitable participation of all customers, throughout trial three we sought to strengthen our understanding of the factors that allow customers to more easily and comfortably participate in heat pump flexibility offerings.

From discussions with customers through interviews and focus groups we understand that thermal comfort is impacted by the characteristics of the home (e.g., insulation level, etc.), but also of personal preference and circumstance. Additionally, the start and end of trial surveys explored participants' heating practices, home insulation levels, and comfort levels throughout the trial.

- In the start of trial survey, 87% of potentially vulnerable participants indicated that they can normally keep their whole home comfortably warm. Customers who found this difficult to achieve, or who reported that they cannot normally do so, reported that this was often because of cost. Whether or not a participant had difficulty in keeping their whole home warm was a selection criteria for segmentation as potentially vulnerable.
- At the end of each mini-trial participants were asked about the thermal comfort levels of their home during the trial period. 82-84% of potentially vulnerable participants noticed no change or a slight change in comfort levels of their home across the daily trials.
- We also asked in the end of trial survey for participants to reflect on their individual comfort. In most cases, a noticeable change in home comfort never or only sometimes caused a change in comfort to someone in the home. We further explored change in comfort in the focus groups and interviews and we heard that those that noted a change in comfort would utilise alternative heating or wore additional layers.

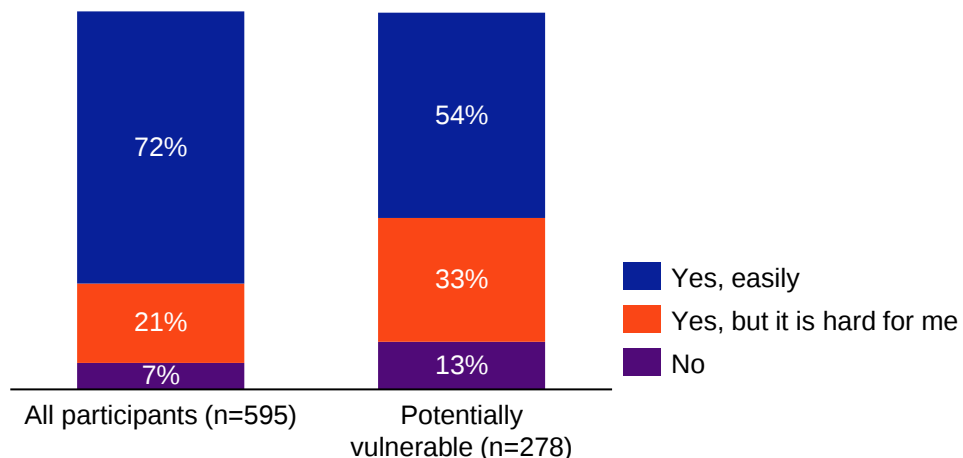
Throughout the trial we have been encouraged by customer appetite to engage with a range of novel commercial offerings while also being able to maintain high customer satisfaction and comfort across the trial period. These findings highlight that, with the appropriate considerations, potentially vulnerable customers are interested and can be equitably engaged in heat flexibility offerings. This reinforces that it is critical that flexibility programs have all customers in mind from the outset.

Heating and comfort

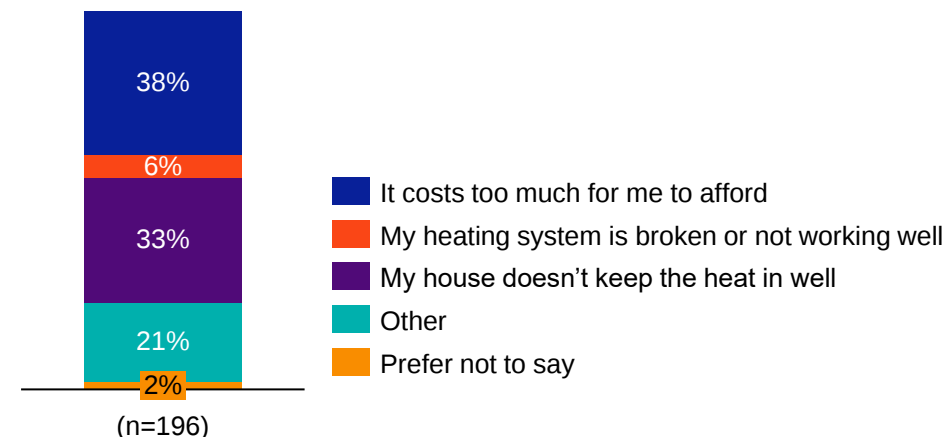
87% of potentially vulnerable participants indicated that they can normally keep their house comfortably warm.

The start of trial surveys asked participants whether they can comfortably keep their house warm throughout the winter, and if not, why not. This was to flag where energy affordability might be a concern for participants and to understand the potential insulation levels of the home. Generally, participants can keep their homes comfortably warm. Potentially vulnerable customers were more likely to indicate that this was hard to do. For these participants, and those who couldn't normally keep their whole home comfortably warm, cost was the most common reason (38%) or that their house doesn't keep in the heat well (33%). Whether or not a participant had difficulty in keeping their whole home warm was a selection criteria for segmentation as potentially vulnerable.

Can you normally keep your whole house comfortably warm when you need or wish to?



Please tell us why you answered 'no' or 'yes but it is hard for me' in the last question? (potentially vulnerable participants)

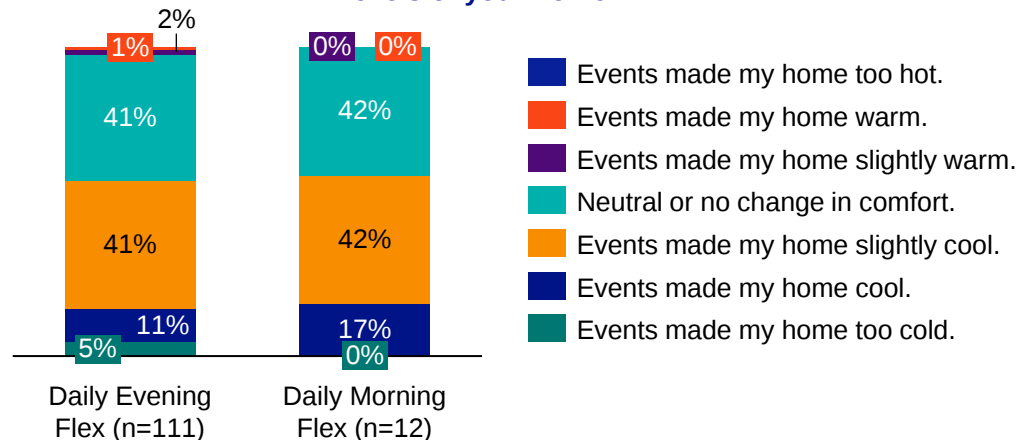


Comfort during daily events

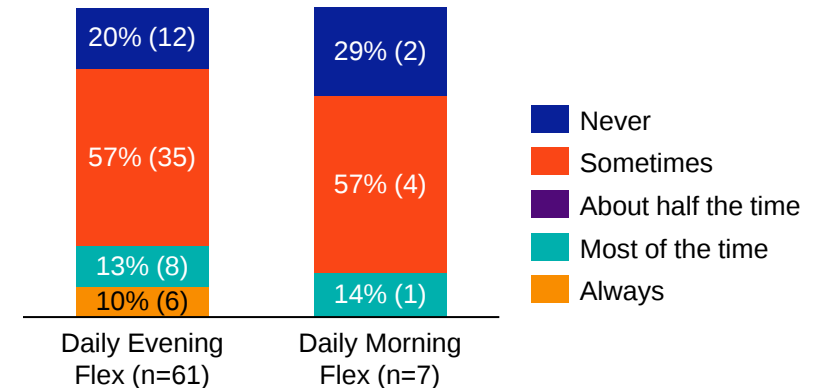
82-84% indicated that daily events had no or slight impact on the comfort of their home.

End of trial surveys asked how daily trial events impacted home comfort levels. 82-84% of potentially vulnerable participants reported no or slight impact on the comfort of their home. This figure was consistent across both trials but does include 3% of customers in Daily Evening Flex who report that events made their home slightly warm. A noticeable impact on home comfort did not always translate to a change in comfort for individuals and across both mini-trials, only 49 of daily evening participants and 5 daily morning participants, indicated that a change had caused discomfort to someone in their home. In free text survey responses and during focus groups and interviews, we predominantly heard that participants would use additional heating or wear additional layers to compensate if there were changes in household comfort levels. These results support our wider findings that potentially vulnerable customers who choose to engage with heat flexibility can typically do so comfortably.

How much, if at all, did the EQUINOX events impact the comfort levels of your home?



When you experienced the change in comfort level of your home, did that cause discomfort for anyone in your home at the time?



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Key learnings

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Key learnings for ensuring equitable access to flexibility

1. Identifying vulnerability

Vulnerable and fuel poor groups are interested in taking part in heat pump flexibility and can equitably benefit from taking part. Identifying vulnerability depends on the situation and the conditions the customer is subject to. Whilst there is a lot of pre-existing work on vulnerability which should be used as an initial resource to identify factors that may contribute to a person or a household being in a vulnerable situation, projects should refine their approach to vulnerability to capture the specific nuances that may be more relevant to trial participants.

2. Recruitment

Customer recruitment methods are important to consider from the outset as they can impact the diversity of customers recruited. For EQUINOX, recruiting a customer pool representative of the UK population was difficult as heat pumps are not yet widespread across all demographics. It was therefore important to engage organisations that serve underrepresented groups and local authorities to promote the trial and help to recruit these underrepresented groups.

3. Trial design

Customer recruitment and ongoing customer engagement are inescapably shaped by trial design. Therefore, they should be considered throughout the trial design process and not separate. Prioritising voluntary participation and empowering households to engage on their own terms may be valuable approaches too for commercial flexibility products, which must be practical and appealing for a wide range of customers. Embedding customer experience into demand response trial design enables high customer engagement rates.

Key learnings for assessing and engaging vulnerable customers

1. Research methods

Qualitative research can help contextualise insights gathered from quantitative research. Throughout EQUINOX we conducted numerous surveys to understand customer experiences and preferences. While these results provided insightful data, supplementing this data with qualitative insights was helpful in adding additional perspective to the data. Focus groups and interviews with potentially vulnerable customers allowed us to more deeply understand specific customer experiences. Qualitative research enables better understanding of the complexity of heating behaviours and habitual practices which might impact demand-shifting.

2. Secondary research

Supplementing trial results with additional research can add nuance and context. For EQUINOX, we contracted a third-party agency to understand the broader perspectives and opinions on heat pump adoption and the energy transition. This was beneficial as heat pump owners are not currently representative of the broader UK demographic. Being able to use this secondary research to benchmark against our trial results allowed us to understand the similarities and differences between different demographics. Similarly, we conducted a survey for social tenants in the West Midlands area which provided insights that we could use to inform how flexibility can benefit a diverse subset of customers.

3. Customer engagement

Although customers with heat pumps could generally be considered as early adopters and highly engaged at this stage, we did not find that participants were a monolith in either their experiences in the trials or in the way they use electricity. This has clear impacts on trial results and on data analysis, but also impacted how we communicated with customers, requiring a balance between simplicity and making sufficient information available for interested participants.

National Grid Electricity Distribution plc
Avonbank
Feeder Road
Bristol BS2 0TB
United Kingdom

nationalgrid.co.uk