Department for Energy Security & Net Zero

Smart Energy Savings Competition (SENS)

Technical Report

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1 Introduction

The Smart Energy Savings Innovation (SENS) Competition (from here on referred to as 'the Competition' or 'SENS') led by the former Department for Business, Energy and Industrial Strategy (BEIS) committed up to £6.25 million, to support the development, trialling and evaluation of innovative feedback products and services that use smart meter data to help domestic consumers reduce their energy consumption.

Following a competitive application process in 2019, eight projects were selected to receive Phase One Competition (matched) grant funding to support the development of their products and/ or service. Following a stage-gate review, five projects, were taken through to Phase Two[1], to trial and evaluate their products and/or services in homes across Great Britain. The Competition was launched in February 2019[2], with trials concluding end of March 2022 (extended by one-year due to COVID-19 impacts).

Ipsos, in partnership with Energy Saving Trust, Manchester Metropolitan University and the University of Edinburgh were commissioned by BEIS as the Trial Design and Evaluation Lead (TDEL), to undertake a robust independent evaluation of the Competition, including separate trial evaluations for each of the individual projects, and to implement a wider package of research. Separately, BEIS awarded a grant to the Smart Energy Research Laboratory (SERL)[3] based at University College London (UCL), for the collection and provision of secure access to energy consumption data from trialists (with customer consent) to the TDEL for their analyses. BEIS also appointed an independent Project Management lead, AECOM, to oversee Competition Partner's (CP) project delivery and grant funding milestones.

This Technical Report describes the methodological approach taken to evaluate the Competition implemented by the Trial Design and Evaluation Lead (TDEL) team. It is part of a package of reports published for the Competition, including an overarching competition-level evaluation report and five separate trial-level evaluation reports, where details of the SENS innovation projects and their associated Competition Leads and Partners (including energy suppliers and third parties) are more fully provided.

The remaining structure of this report is as follows:

- **Chapter Two** describes the overarching evaluation approach and sources of evidence.
- **Chapter Three** provides information on the approach taken in developing the trial design protocols.
- **Chapter Four** summarises the approach to obtaining consent to participate in the trials.

[1] Three projects were unable to progress to in-home trials (though progress on product development was made).
[2] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/779452/sens-innovation-competition-guidance.pdf
[3] https://www.ucl.ac.uk/bartlett/energy/events/2021/may/smart-energy-research-lab-serl-new-energy-data-resource

- **Chapter Five** outlines the methodology used to analyse changes in energy consumption resulting from the interventions.
- **Chapter Six** provides a summary of the household survey methodology, including the sample selection criteria and sample sizes achieved per trial.
- **Chapter Seven** provides a summary of the qualitative research with intervention trialists methodology.
- **Chapter Eight** provides a summary of the qualitative research with Competition Partners, sector bodies and BEIS stakeholders methodology.
- **A glossary for this report.**
- **Annex 1** provides a summary of the Competition-level evaluation questions in scope of this evaluation and the sources of evidence used.
- **Annex 2** provides the baseline and endline survey questionnaires.
- **Annex 3** provides the opt-in consent statements used by CPs to obtain consent from households to take part in the trial.
- **Annex 4** provides an example qualitative topic guide used with intervention group trialists.

2 The evaluation approach and methodology

This section describes the main elements of the evaluation: the evaluation team who conducted it, its scope and objectives, the overall methodological approach, the primary data sources and data collection, and analytical methods applied. It also assesses the methodology and its strengths and limitations.

2.1 Evaluation team

The Trial Design and Evaluation Lead (TDEL) team led by Ipsos in conjunction with their consortium partners Energy Saving Trust, Manchester Metropolitan University and the University of Edinburgh, were appointed to work with Competition Partners to:

- Develop a robust and viable trial of their product;
- Lead a robust trial-level evaluation to identify the impact of each product/ service on trialists' energy consumption;
- Implement a package of wider research (with projects and domestic customers participating in the trial).

Additionally, TDEL were responsible for delivering an overall evaluation of the SENS Competition that involved:

- A synthesis of trial-level findings;
- An analysis of the short-term product development outcomes for Competition Partners CPs) funded through the Competition;
- An assessment of whether and how the Competition has contributed to the development of the market for products and services that use smart meter data;
- An evaluation of the Competition governance arrangements (and how these shaped the overall delivery of the Competition).

2.2 Evaluation questions

2.2.1 Evaluation objectives

The primary objectives of the trial-level evaluations were to:

- Test whether the SENS products and services piloted during Phase Two of the Competition were effective in realising their primary objective of reducing energy consumption (either gas and/ or electricity);
- Explore the causal mechanisms of changes in energy use;

- Identify how the impact of interventions varied across different customer segments and household types[4];
- Gather trialists' feedback on using the products and services in areas such as utility, perceived value and overall satisfaction;
- Synthesise trial level findings at the Competition level to draw clear conclusions from the evaluation of each trial and provide assessment of evidence against the key objectives of the Competition;
- Assess whether and how the Competition has had the intended short-term outcomes on the market for smart meter-enabled products and services, and the extent to which longer-term outcomes and impacts might be facilitated.

2.2.2 Primary Research Questions

The primary research question underpinning the impact evaluation explored 'to what extent the SENS products and services delivered energy savings in homes, in addition to those currently enabled by the baseline smart meter consumer proposition (i.e. a smart meter installation, access to near real time feedback on gas and electricity use via an IHD, and energy efficiency advice delivered at the point of installation) for domestic consumers'.

A full list of research questions in scope of this evaluation are included in Table 9 (Annex 1), alongside the primary data sources used to measure impact.

2.3 Key research and evaluation work strands

BEIS set out an aspiration that trials would take the form of Randomised Controlled Trials (RCTs), whereby domestic consumers would be randomly assigned to a control or treatment (hereinafter, intervention) group. Consumers in the control group would have the baseline smart meter offer consumer proposition (i.e., a smart meter installation, access to near real time feedback on gas and electricity use via an In-Home Display (IHD), and energy efficiency advice delivered at the point of installation); and consumers in the intervention group would have, in additional to all of the above, the SENS product or service being trialled.

Trials were also required to be large scale, with sufficient sample sizes (numbers of recruited trialists to intervention and control groups) to detect the anticipated percentage changes in energy consumption and variations among customer segments.

In practice the five trial designs recommended and implemented varied in methodological approach depending on factors such as the intervention and competition partner context. Designs alternative to RCTs, including matched control designs and theory-based evaluations were employed in trials where these were deemed most practical, whilst still delivering robust and useful evidence. Further modifications were made to accommodate the impacts of COVID-

[4] In practice, there were insufficient sample sizes to be able to analyses by customer segments and household types.

19 and changes in the retail market (see 'Wider Context in which the Competition Operated' section in the SENS Competition Report).

The key strands of TDEL work to deliver an evaluation of the Competition, overall, and the individual trials, included:

1. **Trial development and design**: TDEL worked with Competition Partners, including through a familiarisation and collaborative Theory of Change[5] workshop, to develop a trial protocol. The protocol set out a robust and viable trial evaluation methodology, outlining the required sample sizes expected to detect a significant effect (upon energy consumption), data collection requirements, recruitment methodology and approach for obtaining consent from potential trialists.
2. **Developing the consent forms and supporting recruitment materials**: TDEL oversaw implementation of an aligned approach to gaining all the necessary consent agreements and permissions for each trial to meet legal requirements (see Chapter Five for more information on how these consents were developed). TDEL finalised and piloted consent forms for recruiting domestic customers into the SENS trials, including initial cognitive testing to facilitate sign-up.
3. **Overseeing trial recruitment and delivery of the trial**: During Phase Two (trialling of products) of the Competition, TDEL oversaw the recruitment of trialists and delivery of each trial, including reviewing and inputting into recruitment materials, monitoring recruitment activity and advising on any enhancements to recruitment activities to maximise sign-ups to each trial. Thereafter, TDEL led on all quantitative and qualitative data collection, analysis and reporting both at trial and overall Competition levels.
4. **Collection of data**: During Phase Two, TDEL conducted quantitative data collection with trialists (baseline and endline household telephone survey) and qualitative data collection (interviews with trialists, funded and unfunded Competition Partners and sector body organisations). TDEL also led on the analyses of trialists' energy consumption data, securely collected and provided by the Smart Energy Research Laboratory, based at UCL (more information on this is provided in Chapter Five).
5. **Analysis**: Here, TDEL analysed all quantitative and qualitative data collected throughout the evaluation period in order to assess whether the expected outcomes and impacts of the Competition and the individual trials had been observed.
6. **Reporting**: TDEL synthesised and triangulated evidence from all quantitative and qualitative research to deliver an overall evaluation of the impact of the Competition.

Five separate trial-level reports were also completed that synthesised trial-level energy consumption findings, supplemented with insights from the quantitative and qualitative research, along with other monitoring data provided by CPs (for example engagement data).

[5] The Theory of Change for each SENS product set out how the product was expected to produce the trialist-level outcomes and impacts.

2.4 Overarching research and evaluation approach

2.4.1 Competition-level evaluation

The TDEL team delivered an overarching evaluation of Competition-level impacts on the wider market for energy saving products and services that utilise smart meter data. This review was structured within the context of the Theory of Change (see Competition Evaluation report for a detailed description of the Theory of Change) and assessed whether and how the Competition has had the intended short-term outcomes on the market for smart meter-enabled products and services, and the extent to which longer-term outcomes and impacts might be facilitated. Evaluation questions were split between those focussing on the Competition-level outcomes and those focussing on process issues, i.e. how effectively the Competition has been implemented; those in scope of this evaluation are included in Annex 1.

The evaluation encompassed both quantitative and qualitative elements.

Synthesis of trial level evidence

TDEL synthesised and triangulated trial-level evidence (energy consumption data, quantitative and qualitative research) to feed into the Competition level evaluation.

As the primary research question of the Competition related to measured energy impacts, this required quantitative estimates of energy savings at the trial level. TDEL synthesised evidence from across the trial level analysis of consumption data to assess whether the products / services had indeed led to a reduction in energy consumption and if so, what aspects or features of the products made energy savings more likely to occur.

The overarching framework for synthesis of evidence around the secondary outcomes for trialists was theory-based, reflecting the complexity of the SENS Competition (and the breadth of outcomes it sought to achieve).

To synthesise the evidence across the Competition, TDEL implemented an approach that drew upon the principles of Contribution Analysis (CA) and Process Tracing but was tailored to the needs of the SENS evaluation and the trial-level evaluation methodologies. It also drew upon the **mixed methods matrix** approach described by Creswell (2007)[6], informed by the Competition-level Theory of Change[7].

The process for implementing the mixed method approach involved the following steps:

- First, the Competition-level Theory of Change was broken down into a number of causal assumptions and other critical assumptions.
- Secondly, TDEL mapped the data available onto the matrix and then held an internal synthesis workshop to discuss the various sources of evidence available to assess the

[6] Creswell JW, Plano-Clark V. Designing and conducting mixed methods research. Sage, 2007.
[7] The Competition level Theory of Change is presented in the Competition level evaluation report and provides a graphical representation of how the activities funded by the Competition were expected to contribute to the chain of results that lead to the intended impacts.

validity of the hypothesis. The evidence was triangulated and categorised as to (a) whether the separate sources agree (convergence) or appear to contradict each other (dissonance); and (b) whether – overall – the hypothesis was supported, refuted or the evidence was inconclusive.

The findings of the above elements were synthesised to deliver an overall evaluation of the impact of the Competition alongside the impact of changes to the context within which the programme was delivered. TDEL also considered the wider evidence generated across the Competition around the extent to which the Theory of Change had held true, and the perceptions shared by BEIS and Competition Partners about the impact of the Competition.

A Competition level analysis of energy consumption data (aggregated across all trials) was not deemed possible, due to the variety in individual trial designs implemented:

- Each trial had its own anticipated effect size and trial sample sizes were designed around detecting these. Conducting a competition level analysis would have reduced the likelihood of detecting an overall effect size if the majority of the sample trialists were from trials with comparatively lower effect sizes.
- Control groups were constructed at the trial level and allowed for 'fair' comparison with the intervention group at the trial level. Comparing energy consumption between intervention group and control groups across trials would have the effect of confounding any measured energy impacts.

Instead, TDEL synthesised common patterns and findings from trial-level quantitative work, where this was appropriate.

Assessment of the competition's impact on the wider market

TDEL conducted 26 in-depth interviews with a range of key stakeholders to explore (from a range of perspectives) what impact the Competition had on the progress of innovation projects. These included:

- Funded Competition Partners (CPs), including leads and their partners, which tended to include representatives of the core trial delivery team but also those working in partnership, for example partners supporting the product development research or energy suppliers. These interviews explored how participation and Competition grant funding had impacted on their innovation product; in terms of its progress, focus and scope, and in terms of the collaborations and partnerships they had made;
- Unfunded Competition applicants (i.e. those which submitted an initial application but which were not selected), focusing on those closest to being awarded funding. This allowed TDEL to understand to what extent these projects progressed in the absence of BEIS grant funding;
- Stakeholders within BEIS, those involved in the design of SENS, its delivery and monitoring; and
- Sector bodies within the realm of smart energy, such as Smart Energy GB, British Electrotechnical and Allied Manufacturers' Association (BEAMA), Energy UK.

To deliver an assessment of the wider market developments for products or services that work with smart meter data, TDEL undertook desk-based research and analysis at the interim and final evaluation stage that encompassed:

- Identifying all products and services available in the market, or in latter stages of product development; and
- Identifying and defining market segments for products and services that utilise smart meter data in domestic properties.

2.5 Sources of evidence

Table 1 below provides a summary of the different sources of evidence used in this evaluation. A more detailed description of each source is provided below.

Table 1: Overview of primary and secondary sources of evidence

Energy Consumption Data Collection	TDEL Primary Data Collection	Secondary Data Sources
Energy consumption savings (and time of use impacts for the Energy Local trial) were analysed at a trial-level through statistical analysis of trialists' energy consumption data securely provided via UCL Smart Energy Research Laboratory (SERL).	A package of primary data collection was undertaken in order to assess impacts at the trial-level, including how, which features were most likely to have led to perceived behaviour changes. This included: • A baseline and endline telephone survey with a sample of intervention and control group trialists; • In-depth qualitative interviews with a sample of intervention group trialists. To assess competition-level impacts, TDEL undertook a series of qualitative interviews with stakeholders including funded and unfunded Competition Partners, BEIS stakeholders and sector body stakeholders.	TDEL used several secondary data sources to supplement the primary data collection and generate additional insights into how the Competition was delivered. This primarily included progress reports and trial-level product interaction/ engagement data provided by Competition Partners.

2.5.1 Primary sources of evidence

The trial-level evaluations employed the following primary sources of evidence.

Energy consumption data

Trialist's opt-in consent to access their energy consumption data for SENS evaluation purposes was collected by CPs, following which trialists were onboarded into the Smart Energy Research Laboratory (SERL), based at UCL. At this point, UCL SERL[8] remotely collected trialist energy consumption data and subsequently made pseudonymised energy consumption available to TDEL within a secure virtual research environment for the purposes of the trial evaluation. Participants could withdraw their consent at any time (by contacting specific helplines (telephone and email) set up by CPs) and were automatically removed from the study if they moved house or switched energy supplier during the trial period.

Energy consumption data analysis was undertaken in two stages:

- **Primary analysis**: At the outset of Phase Two, the primary outcome for analysis was defined as total consumption, typically of the fuel source, which was the focus of the intervention, over the 12-month observation period. The primary analysis was intended to be run on the complete 12-months of data with data aggregated across the half-hourly periods to sum over the year, for each trialist, to give an annual total consumption value. Due to various reasons (i.e., slower than anticipated planned recruitment and product installation phase), there were trialists where there was an incomplete 12-month data collection period. Here, energy consumption data was instead aggregated and refactored by taking the mean daily consumption during the period in which the trialist was in the trial (see Chapter Six for more information on the energy consumption analysis framework).
- **Secondary analysis**: Further secondary analysis explored how and why impact effects may have occurred. Similarly, where an impact effect had not been detected for total annual consumption, it offered an opportunity to detect evidence for effects which may have existed for particular trialists (see Chapter Six for more information on the energy consumption analysis framework).

Further details of the energy consumption analysis are provided in Chapter Six.

Quantitative telephone survey with trialists

TDEL conducted a baseline and endline telephone survey with intervention group trialists (i.e. trialists given access to the product) across all five trials, and control group trialists (i.e. trialists that were not given access to the product) for the SEN-ST and MEETS trials only.[9] The first wave of the survey (baseline) was staggered for trials based on their recruitment pace and took place between December 2020 and December 2021 and varied by trial. TDEL aimed to

[8] UCL SERL is an Engineering and Physical Sciences Research Council funded project that provides a secure portal for researchers to access high-resolution energy data. Available at: https://serl.ac.uk/

[9] SENS Energy Local and IDEAS did not recruit a control group and therefore a survey with this group was not required. GenGame recruited a control group at the end of the trial period and therefore were not recruited in time for the baseline and endline survey fieldwork.

survey trialists as close to the date on which they joined/ consented to the trial as possible to achieve a baseline position close to the trial start date. The second wave of the survey (endline) was administered for all trials during March 2022 at the end of the trial period (end March 2022).

The primary purpose of the telephone survey was to capture self-reported evidence on any behaviour changes over the trial period and interaction with the tool among intervention group trialists. The survey results were then triangulated with other sources to validate the findings from the energy consumption analysis. The key survey topics included:

- Heating behaviours such as whether heating was on while the house was unoccupied.
- Electricity-related behaviours such as turning off lights.
- Broader attitudes to energy efficiency i.e. whether people were concerned about saving energy and generally took steps to do so.
- Uptake of energy efficiency measures.
- Ability to manage bills and how this related to comfort, i.e. could trialists afford to heat their home to a comfortable temperature, or would they heat it more if they were able to afford to.
- Satisfaction with products/ services (endline survey and intervention group only).

The survey was intended to reach a large number of trialists (with target numbers set at the trial level, at the outset) that captured a range of views. Some trials however (SEN-ST, IDEAS and Energy Local) achieved lower than planned response rates. Survey response rates (target versus achieved) are provided in Chapter Six. The baseline and endline survey questionnaires are available in Annex 2.

Qualitative interviews with intervention group trialists

Qualitative interviews were conducted virtually (via MS Teams to comply with COVID-19 social distancing regulations at the time) with 15 intervention group trialists in each of the trials (with the exception of Energy Local for which 30 interviews were conducted) that were given access to the SENS products/ services over the trial period. Quotas were set for key demographics to ensure a range of views were captured including for age of trialist, age of their property and household income level.

The interviews were semi-structured and typically lasted 45-60 minutes. The topics covered included: if and how the trialist had engaged with the SENS products throughout the trial period; trialists' views and experiences of the SENS products and their perceived impact upon day-to-day behaviours and energy usage; and any changes in secondary evaluation outcomes (beyond energy consumption savings explored through the energy consumption analysis), such as improved household budgeting, improved thermal comfort, and attribution of these changes to participation in the SENS trial.

Additionally, for Energy Local, four qualitative interviews were conducted with club advisors at four Clubs, and three focus groups were conducted with club board members for three Clubs;

to discuss the context and functioning of each individual club, as well as the experiences of interviewees.

Focus groups (SENS Energy Local only)

Two focus groups (the first in November 2021 and a follow-up in February 2022) were also conducted virtually with hard-to-reach[10] Energy Local trialists' in the Roupell Park club in Brixton, London to explore motivations behind signing up to the club and experiences of participating.

The Competition-level evaluation also collected and made use of the following sources of evidence:

Qualitative interviews with Competition Partners

Interviews with CPs took place (remotely) during both phases of the Competition. TDEL conducted eight interviews at the end of Phase One (January 2020) and 11 interviews (including with those who were unsuccessful at receiving SENS funding) at Phase Two (February to March 2022) of the Competition to understand: key aspects of product design and delivery; their views on the support provided to them through the Competition; progress and next steps towards commercialisation; and their views on market enablers and barriers.

Qualitative interviews with sector bodies

Interviews with smart meter sector bodies (such as Smart Energy GB, BEAMA and Energy UK) took place at the end of the trial period and explored: the current market for domestic products and services that work with smart meters - in the UK; key barriers and drivers to growing the market; and views on the potential role of Government in enabling further market development.

Qualitative interviews with key project personnel

Interviews with key BEIS personnel involved in delivery or oversight of the Competition and with AECOM (Competition management and monitoring partners) were conducted to explore the role of the Competition governance arrangements in shaping the delivery of the Competition during its lifetime.

2.5.2 Secondary sources of evidence

The trial-level evaluations also made use of the following **secondary sources of evidence**.

Regular observation of product development and trial implementation activities

Competition Partners were required to update BEIS, AECOM (monitoring officers) and the TDEL of their trial delivery progress through submission of monthly deliverables. Further evidence was gathered through regular calls with Competition Partners to develop recruitment strategies, monitor recruitment progress and offer advice to maximise the impact of the trial intervention.

[10] The demographic profile of 'hard-to-reach' groups can be defined as BME communities, retired customers, those with a disability or vulnerability, those experiencing financial instability and those facing language barriers.

Product / service engagement data

With trialist consent, CPs securely collected and shared anonymised individual trialist-level product interaction data with TDEL[11] to support the analysis of energy consumption data, specifically where any treatment on the treated (TOT) analyses took place (i.e. exploring the treatment effect among those trialists who actually received the product/service). This supported TDEL in its understanding of how intervention group trialists were interacting with the SENS product / service. The types of metrics captured included, for example:

- Number of times each individual user logged into the webpage or app broken down by day or week.
- Number of times specific functions/pages within the product/service were clicked on.

Project and programme documentation

Monthly monitoring reports, trial-close out presentations and any other supporting monitoring evidence provided by CPs were examined.

[11] TDEL assigned a lead to each trial evaluation who were responsible for designing the trial and providing ongoing support to CPs in implementing the trial.

3 Trial Protocol Methodology

This section provides information on the approach taken in developing the individual SENS Trial Protocols.

The Trial protocol set out a robust and viable trial evaluation methodology, including; the required sample sizes expected to detect a significant effect (upon energy consumption); data collection requirements; recruitment methodology; and approach for obtaining consent from potential trialists (further details are outlined below).

During Phase One of the Competition, TDEL worked with CPs to develop a trial protocol tailored to the specific Theory of Change relevant to each project, considering: the nature of the product; its intended customer base and anticipated effect size; and accommodating its commercial context. CPs signed-up to trial protocol in order to progress to Phase Two of the Competition. Each trial protocol outlined:

- Trial-specific research questions;
- Overall trial evaluation design and methodology;
- Estimated recruitment and retention sample sizes expected to detect any energy consumption impacts;
- Recruitment strategy, including customer trialist journey to invite to participate and obtain required consents;
- Further data collection requirements for the evaluation (how and when these would be collected) e.g. engagement data;
- Data management plan (including data flows and data sharing agreements required);
- Analyses and types of statistical models that would be adopted; and
- Approaches for monitoring the trial, including risks and ethical considerations, and mitigations.

3.1 Trial Protocol Design

3.1.1 Familiarisation and Theory of change

In developing the Trial Protocols, the TDEL team attended an inception meeting with each SENS project, along with BEIS, to deepen its understanding of the SENS innovation product. This was followed by a half-day familiarisation workshop with each CP to collaboratively develop their project-level Theory of Change and identify any specific research questions. This allowed gathering of information needed to: i) design the overarching research and evaluation programme and ii) draft the trial protocol and to confirm a shared understanding of respective roles and responsibilities during trial implementation.

3.1.2 Determining Sample Size

Recommended sample sizes were calculated at the outset to enable each trial to detect an impact upon energy consumption, should one exist. The expected effect sizes[12] were based on evidence of previous research on similar or related energy saving products / services and their reported effect size. Anticipated effect sizes for the Competition products / services were then adjusted according to any differences in functionality relative to the similar products / services.

In any intervention there is both a risk of a false positive and a false negative conclusion, which arise due to taking samples from the population, and then dividing the sample into intervention and control at random. Two sources of uncertainty were initially identified: 1) around the population average treatment effect (ATE); and 2) around the sample ATE.

The selected sample sizes for each trial were calculated to reflect: the size of Types I[13] and II[14] errors that could be tolerated; the minimum detectable effect size; the sample selection and allocation design; the variability of the outcome measure (based on analysis of pre-existing consumption data and reduced where possible by including covariates in the analysis); anticipated drop-out rates; and anticipated rate of contamination.

Furthermore, selected sample sizes needed to consider trialist churn (withdrawal from the trial) over the trial period. For this reason, two target sample sizes were set for CPs implementing their trial design:

- **Retention Target sample size**: This sample size was specific to each trial and represented the absolute number of trialists needed to detect the anticipated effect size.
- **Recruitment Target sample size plus churn**: To achieve the target sample size for each trial (the absolute number of trialists needed to detect the anticipated effect size), TDEL made several assumptions around churn over the trial period. The following forms of churn were estimated and incorporated into the target sample size:
    - **Supplier switching**: Ofgem national average supplier switch rates were used to estimate the proportion of trialists that were expected to switch during the trial period. Trialists that switched supplier were automatically removed from the sample along with their energy consumption data during the trial period.
    - **Home moves**: English Housing Survey data on new households and recent movers was used to estimate the proportion of trialists that would move home during the trial period. Trialists that moved home were automatically removed from the sample along with their energy consumption data during the trial period.
    - **Active withdrawal of consent**: Experience from previous survey research was used to inform estimations of the proportion of trialists that were expected to withdraw their consent during the trial period. Trialists that actively withdrew their

[12] Measured as the percentage change in annual energy consumption assumed to occur through use of the product/ service.
[13] A false-positive (Type I error) occurs when one incorrectly concludes from the analysis that the intervention has had an impact.
[14] A false-negative (Type II error) is a lost opportunity (the analysis missed something which works).

consent were automatically removed from the sample along with their energy consumption data during the trial period.

The TDEL team used standard sample size estimation formulae[15] to estimate the required sample size for each trial, taking into account adjustments for each of the factors listed above. Various permutations of the input parameters were run to assess how the estimated required sample size varied and consider the consequent implications for trial cost, viability and robustness.

3.1.3 Overall Trial Design

The underlying requirement of the Competition was that the trials should be sufficiently robust in design and delivery to meet the Competition aims.

It was originally expected that trials would ideally take the form of Randomised Controlled Trials (RCTs) where possible, whereby domestic consumers would be randomly assigned to a control or intervention group. Consumers in the control group would have the baseline smart meter offer consumer proposition (i.e., a smart meter installation, access to near real time feedback on gas and electricity use via an IHD, and energy efficiency advice delivered at the point of installation); and consumers in the intervention group would have, in additional to all of the above, the SENS product or service being trialled.

This was the preferred approach as it removes systematic differences between these two groups on variables which could be related to the outcome being tested. Implementing RCTs requires large pools of eligible households available for recruitment into the trial prior to the trial starting and an appetite from suppliers to withhold the offering of a product/ service to half of those customers that consented to take part in the trial. Where an RCT was not possible, alternative trial designs were considered. The following items were discussed with CPs to inform the overall trial design:

- Upper and lower estimate target sample sizes (and any subgroup targets) needed to detect impact of the intervention on energy consumption savings, based on an expected effect size informed by previous research;
- How the intervention would be offered to intervention group trialists;
- The ‘packaging-up’ of multiple components of the intervention (if relevant, to inform any opportunities to unpick the added effect of different components through a ‘dosage approach’) as was the case for the MEETS trial which had various component parts of the overall intervention;
- Expected engagement with the intervention group over the course of the trial, and whether any interaction was needed above and beyond the direct delivery of the innovation (for example, check-ups on any technologies installed); and

[15] For example: https://www.ifs.org.uk/uploads/publications/wps/WP201517_update_Sep15.pdf

- Ensuring the TDEL understood how this engagement approach compared to any Business-as-Usual services or engagement that would be made available to the control group over the trial period (enabling TDEL to define the treatment contrast).

For each trial, the most robust and practicable evaluation design was employed as recommended by TDEL. These are outlined in the table overleaf. It should be noted that all SENS trialists received the baseline smart meter consumer proposition (i.e., a smart meter installation, access to near real time feedback on gas and electricity use via an IHD, and energy efficiency advice delivered at the point of installation).

Table 2: SENS Phase Two trial-level evaluation approaches

Trial	Evaluation design	Rationale for evaluation design
MEETS	RCT, whereby domestic consumers were randomly assigned to a control or intervention group. Consumers in the control group who had received the baseline smart meter consumer proposition (i.e., a smart meter installation, access to near real time feedback on gas and electricity use via an IHD, and energy efficiency advice delivered at the point of installation) only; and consumers in the intervention group who, in additional to all of the above, were offered SENS MEETS.	There was an ambition to carry out RCTs, considered the gold-standard for studying causal relationships as, through randomisation, they reduce bias and provide a rigorous tool to examine cause-effect relationships between an intervention and outcome. These trials were both deemed suitable for RCT design as they were able to implement both a control and intervention group and recruit sufficient numbers upfront for random allocation.
SEN-ST	RCT, whereby domestic consumers were randomly assigned to a control or intervention group. Consumers in the control group received the baseline smart meter consumer proposition (see above); and consumers in the intervention group received, in additional to all of the above, the SEN-ST product (installed alongside).	
SENS GenGame	Matched Control Design, with control group households who had received the baseline smart meter consumer proposition only (see above), and intervention group trialists, who in addition to the above, were provided access to GenGame Energy Saver App Intervention group trialists were recruited first. Control group trialists were recruited later in the trial period, though due to UCL SERL collection of historical energy consumption data, the energy consumption data periods were effectively the same for energy consumption analyses. To reduce potential self-selection bias, intervention and control group households were matched via Propensity Score Matching.	Due to the small recruitment pool at the start of the recruitment phase, the SENS GenGame trial was only able to fulfil its sample requirements by recruiting intervention and control group sequentially; there were insufficient eligible customers upfront to viably implement an RCT design.

Energy Local	Theory-based design that utilised a realist evaluation approach to testing the primary and secondary outcomes. With realist evaluation, the causal hypotheses were structured as a series of 'context – mechanism – outcome' (CMO) statements in which the aspect of the context (the environment in which an intervention is realised) causes the mechanism to fire, a 'mechanism' refers to the causal process that generates an outcome, and the outcome is any change being measured. This trial involved intervention group trialists only (who received Energy Local, in addition to the baseline smart meter consumer proposition).	Theory-based methods can be used to investigate net impacts by exploring the causal chains thought to bring about change by an intervention. They are suitable in situations, such as for Energy Local, where determining the effect size can often be difficult (including because a control group is not available or feasible), but the intention is to understand whether an intervention had an effect in the desired direction. While theory-based approaches do not provide precise estimates of effect sizes they can provide information on the extent of the change and why the change occurs.[16]
IDEAS	The trial was implemented as a Theory-Based design, using elements of process evaluation and contribution analysis. The approach involved setting out the attribution problem to be addressed (as detailed in the Theory of Change) and documenting the theoretical assumptions that needed to hold true and external factors assumed to affect the primary objectives of the IDEAS intervention. This trial involved intervention group trialists only (who received SENS IDEAS, in addition the baseline smart meter consumer proposition).	The IDEAS trial was originally proposed to be delivered as a matched control design. However, due to limitations faced during recruitment (linked to slower than expected smart meter rollout progress), the base of eligible customers was deemed too small to follow this approach. For this reason, the design was changed in-flight to a theory-based approach, deemed most suitable method to understand the impact of SENS IDEAS.

[16] Description of theory-based approaches based upon the HMT (2020) Magenta Book, p43.

3.1.4 Specifying Trial Data Collection Requirements

Once the most robust and viable trial design had been agreed, TDEL outlined the data collection requirements to identify impacts of the intervention upon energy consumption and other relevant outcomes. Data collection requirements were designed to understand not just whether energy consumption had changed, but how and why and the extent to which this was attributable to the SENS products.

Data collection requirements were broadly the same across the trials, implemented via a wider package of research. All trials conducted a baseline and endline quantitative telephone survey that helped to capture changes in self-reported attitudes towards energy, energy usage and management behaviours, uptake of energy efficiency measures, views of smart metering and engagement with the trials and products / services.

Furthermore, TDEL conducted in-depth interviews with intervention group trialists across all trials explore more deeply why trialists had made any self-reported changes to their energy consumption patterns.

By triangulating evidence from across the data sources, it was possible to understand whether and why there had been any changes in energy consumption over the trial period that could be attributed to the product/ service.

To further support TDEL in their energy consumption analysis, requirements were placed on CPs to provide TDEL with data on how intervention group trialists had engaged with the product/ service. For example, SEN-ST trial collected data on how trialists used the smart thermostat (based on appropriate consent being in place from the intervention group) during the SEN-ST trial. This supported TDEL in its understanding of how intervention group trialists were interacting with the smart thermostat. The types of metrics captured included:

- The temperature set points of the smart thermostat at 30-minute resolution during the trial period.
- The property's temperature at 30-minute resolution during the trial period.

This enabled TDEL to undertake secondary energy consumption analysis (see Chapter Six for further details).

4 Approach to obtaining consent

This section provides a summary of the consent requirements for trialists to participate in the trial, and the approach taken in developing a consent framework and subsequently obtaining this consent.

4.1 Consent Requirements

The primary focus of the evaluation was to ascertain if the SENS product or service helped trialists to use less energy. In order to be General Data Protection Regulation (GDPR), Smart Energy Code (SEC) compliant and to adhere to the Data Access and Privacy Framework[17], a suite of standardised opt-in consent forms and materials developed by UCL and TDEL, were employed by CPs (specifying how information will be used and for what purpose). This was required to obtain voluntary consent from trialists to participate in the trial, voluntary consent to provide access to energy consumption data for SENS evaluation purposes and to participate in wider SENS research and evaluation activities.

4.2 Approach to obtaining consent

4.2.1 Development of consents materials

In order to obtain consents, a suite of standardised consent forms and materials were developed that enabled CPs to recruit customers to their SENS trial. Signing up to take part in a SENS trial was entirely voluntary, and a trialist could withdraw their consent at any time without giving a reason.

TDEL worked with Competition Partners to implement the approach regarding consent, ethics and GDPR/ SEC Compliance to obtain all the necessary consent, agreements and permissions for each trial. This approach was developed through extensive collaboration between UCL SERL, BEIS and Smart Energy Code (SEC) Independent Privacy Auditor to ensure it was compliant with SEC obligations (gaining approval by the SEC Panel) and UCL's ethics panel requirements.

Following the set-up of appropriate Data Processing Agreements/ Data Sharing Agreements between key organisations participating in SENS, all evaluation data was subsequently accessed, securely stored and deleted in compliance with existing data access laws including GDPR.

17 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/758281/Smart_Metering_Implementation_Programme_Review_of_the_Data_Access_and_Privacy_Framework.pdf

4.2.2 Finalising and piloting of consent statements

To finalise the consent materials, TDEL led a small-scale pilot (in 2019 prior to the start of Phase Two) to cognitively test the consent forms including opt-instatements and accompanying information (including key facts about the trial, about the SEC, how UCL collect smart meter data, the SENS-specific Data Protection Privacy Notice and the final set of consent statements) with a range[18] of smart meter consumers, to maximise understanding, sign-ups and to ensure it met requirements. The interviews explored the issues consumers consider when deciding whether or not to give their consent; enabling TDEL to refine the content, specific wording and accompanying materials.

4.2.3 Recruiting trialists and obtaining consent

Competition Partners (specifically energy supplier partners in 4 of the SENS trials) were responsible for recruitment; contacting customers and obtaining the necessary consent for their respective trial in line with the requirements (outlined above) (specifying how information would be used and for what purpose). They recruited trialists (predominantly via initial recruitment emails) from their customer base, collecting the various permissions provided by trialists to partake in the trial. Opt-in consent was obtained from trialists to access the following across each trial, for research evaluation purposes:

- Collection of smart meter half-hourly[19] energy consumption data for trial period from SERL and 12 months historical pre-trial data (from SERL or meter readings from energy supplier).
- Names, addresses, e-mail addresses and telephone number of trialists (for TDEL to contact to invite to participate in quantitative survey and qualitative research).
- Engagement information, such as how frequently the trialist engaged with the SENS product.
- Matching variable data (collected through survey questions during the onboarding process). These included trialist region, property type and responses four questions about attitudes to climate change, gadgets, home comfort and feelings of control over energy use.

The full suite of opt-in questions used by CPs are provided in Annex 3.

4.3 Approach to monitoring withdrawals of consent

Throughout the trial period, CPs were responsible for actively monitoring any withdrawals of consent. These consisted of Change of Supplier, Change of Tenancy or Active Withdrawal of

[18] Across a mix of supplier, gender, age, meter type (credit or pre-payment meter), social grade and frequency of sharing information on social media. TDEL also ensured participation among more hard-to-reach customers, including those living in households where someone has a long-term health condition, and those who self-report to have lower levels of literacy.
[19] Half-hourly data was necessary for completing relevant sub-analyses of energy consumption data, including time of day effects, investigation of time of use effects and subsequent load shifting.

Consent. CPs were required to notify UCL SERL of any withdrawals on a weekly basis in order to offboard SENS trialists. Offboarding notifications for SENS trials were processed as follows:

- On receipt from a trialist (e.g. by email, post or third-party portal etc), the third-party (e.g. SENS Competition Partner) processed the request “without undue delay and at least within 14 Calendar Days”.
- On receipt into the SERL system from a third party (e.g. SENS Competition Partner), UCL processed the request “without undue delay and at least within 14 Calendar Days.” At which point, UCL SERL ceased any further data collection.

Furthermore, Competition Partners were responsible for notifying TDEL of any withdrawal of consent so that their personal details could be securely removed from where they had been stored and would no longer be contacted for further research (wider TDEL research and evaluation activities).

5 Energy consumption analysis framework

This section provides more information on the approach and methodology of the Energy Consumption Analysis.

The aims of the Energy Consumption Analysis (ECA) were to:

- Assess whether energy use was different over the trial period as a result of the SENS product/ service;
- Assess whether any observed consumption reductions could be attributed to the SENS products / services trialled.

The methodology involved various steps, including data processing and cleaning, and analysis. These steps are outlined below.

5.1 Data processing

Before undertaking any analyses of energy consumption savings, the data were first cleaned and processed. Smart meter data were then used to produce mean daily estimates of electricity and gas use, calculated for each trialist's participation period following an approach similar to that used by SERL for its data and statistical releases (see Elam, Webborn et al 2022, and Few, Pullinger et al 2022[20]).

Firstly, individual half-hourly and daily readings with any data quality issues (e.g. unrealistically large values[21], or values with incorrect timestamps) were removed. For each trialist (and by fuel type), usage for each day of the trial was calculated based on half-hourly readings where all half-hourly readings were available and valid. TDEL utilised half hourly data over daily readings from the meter where possible, deemed more reliable for obtaining estimates of daily use in two situations:

- Various smart meters default to reporting daily readings of zero during British Summer Time (BST); and
- Daily data received via SERL did not include export values (the amount of local energy generation that is exported to the energy grid instead of being used on site for self-use), whereas half-hourly does, so defaulting to half-hourly helped to identify homes with export values, as such these homes were omitted from further analysis.

[20] Elam, S., Webborn, E., McKenna, E., Oreszczyn, T., Anderson, B., Few, J., Pullinger, M., European Centre for Medium-Range Weather Forecasts, Ministry of Housing, Communities and Local Government, Royal Mail Group Limited. (2022). *Smart Energy Research Lab Observatory Data, 2019-2021: Secure Access*. [data collection]. *5th Edition.* UK Data Service. SN: 8666, DOI: 10.5255/UKDA-SN-8666-5; Few, Pullinger, McKenna, Elam, Webborn and Oreszczyn (2022) Smart Energy Research Lab: Energy use in GB domestic buildings 2021. Variation in annual, seasonal, and diurnal gas and electricity use with weather, building and occupant characteristics. (SERL Statistical Reports: Volume 1), https://serl.ac.uk/key-documents/reports/."

[21] Unrealistically large values were defined by SERL and can be viewed at the following: https://doc.ukdataservice.ac.uk/doc/8666/mrdoc/pdf/serl_smart_meter_documentation_edition04.pdf

Where this was not possible, usage for each day of the trial was based on the daily reading from the smart meter, where available and valid.

Each trialist's mean daily electricity and gas use for its trial period were then calculated based on the mean of the available daily readings. If less than 50% of the expected daily values were available for a given trialist and fuel, then the estimated mean daily value was not considered robust enough to use and was removed from further analysis. Further investigation into missing/ invalid data for households in the SERL Observatory panel[22] found that the proportion of missing/ invalid data does not generally change over time, removing any risk of introducing seasonal effects into the data. Using a 50% threshold was therefore deemed appropriate in creating an average daily reading.

Finally, mean daily electricity values for trialists that probably had microgeneration, like rooftop solar photovoltaic panel, were removed from analysis, as it was not possible to calculate their total usage from the smart meter data. These trialists were identified based on their having one or more electricity export readings during the trial period.

5.2 Primary analysis

5.2.1 Experimental and quasi-experimental trial designs

This section describes the framework for primary analysis for trials that utilised energy consumption data as the primary source of evidence to detect energy saving impacts of the product / service (i.e., SEN-ST, MEETS and SENS GenGame).

At the outset of Phase Two, the primary outcome for these trials was defined as total consumption, typically of the fuel source, which was the focus of the intervention, over the 12-month observation period. The primary analysis was intended to be run on the complete 12-months of data with data aggregated across the half-hourly periods to sum over the year, for each trialist, to give an annual total consumption value[23]. Due to various reasons (i.e., slower than planned recruitment and product installation phase), there were trialists with a shorter duration of data collection than initially planned (i.e. less than 12-months). Here, energy consumption data was instead aggregated and refactored by taking the mean daily consumption during the period in which the trialist was in the trial.

Analysis was completed at two levels:

- **Analysis of the fuel source that was explicitly targeted by the intervention:** The analysis took the form of a regression model where consumption (either gas, electricity or both, depending on the trial) was the outcome variable, a binary variable

[22] https://serl.ac.uk/researchers/

[23] This approach was taken over simply using start and end meter readings due to aspirations to explore season and time of use effects of the interventions. Secondly, BEIS required the impact analysis to be impartial and independent – hence suppliers providing readings directly to TDEL was not considered an option and collecting more aggregate data through SERL, as well as this data undergoing initial QA by the SERL team, was considered to be a more robust and impartial strategy that avoided potential issues with supplier-provided estimate of annual consumption.

distinguished the intervention and control groups and pre-trial consumption data was included as a covariate, along with various stratum identifiers. This was equivalent to an Analysis of Covariance (ANCOVA) design, controlling for previous consumption and design structure (stratification). The significance test of the coefficient of the intervention/ control variable was used to test the impact effect and the coefficient value informed the size of the impact effect.

- **Analysis of total (gas and electricity) consumption and spill-over effects into the secondary fuel source not directly targeted by the intervention:** It was deemed informative to explore the extent to which behaviour aimed at savings for a single fuel source transferred to the other source (otherwise known as 'spill-over' effects). Or, if the intervention was aimed at both sources, the extent to which consumption savings materialise in both fuel sources. Consequently, the regression approach outlined for the primary analysis was repeated for the alternative fuel source and for an appropriately combined duel fuel measure on consumption (kWh).

For projects where this was practicable (RCT designs; MEETS and SEN-ST), the primary requirement for the impact estimation was to test an intention to treat (ITT) estimator. The ITT estimator required the inclusion of all trialists allocated to the treatment group compared to all trialists allocated to the control group. In this way, the integrity of the randomisation scheme is maintained. The ITT was the estimate provided by the regression analysis described previously.

TDEL also explored the impact defined as the treatment on the treated (TOT) effect, i.e. those intervention trialists who were assigned and received the product, for example, trialists that received the SEN-ST thermostat package (as determined by installation data provided by CPs) or trialists that downloaded and subsequently used the GenGame app (at least once) - rather than an estimate of the effect on the whole intervention group (all those assigned). Estimating the TOT was a post-hoc exercise based on adjusting the ITT, rather than a direct estimation method. TOT estimation (for GenGame Energy Saver App) required being able to distinguish people in the intervention group who actively engaged with the product/ service at least once over the trial period. Given the availability of the engagement data provided by CPs and its quality in being capable of making this distinction, this approach was deemed viable. The analytic approach required no advanced approach, and simply required first running the regression test on the ITT impact estimator, then following the formula in Bloom[24] to calculate a TOT estimate.

For the matched control design (SENS GenGame), as matching variables were only collected for intervention trialists that downloaded the Energy Saver app, nearly 40% of the intervention group, those which never downloaded the app, could not be matched to control group trialists and the ITT effect could not be estimated. The analysis therefore focused on producing an estimate of the TOT.

[24] Bloom, H. 2006, The Core Analytics of Randomized Experiments for Social Research. Available at: https://files.eric.ed.gov/fulltext/ED493363.pdf

5.2.2 Theory-based trial designs

The IDEAS and Energy Local trials both utilised a theory-based framework to assess whether the product/ service was successful in achieving its primary objective, i.e. to reduce energy consumption among trialists. The energy consumption analysis carried out for these two trials was descriptive only (pre to in-trial analyses by a comparison month) and was triangulated with the quantitative telephone survey data and qualitative interview data.

In both trials, comparisons in mean daily consumption during a pre-trial and in-trial period were made where there were complete daily records during the two analysis periods.

Further analyses were undertaken to explore trial-specific outcomes / behaviours:

- **Load shifting effects**: Where the product / service was intended to result in consumption load shifting effects (i.e. moving electricity consumption from one time period to another), load profiles were plotted graphically during selected in-trial and post-trial periods. This required normalising individual trialists' half-hourly energy consumption values and taking the mean of these values across days in the analysis period. Mean half-hourly consumption load profiles were plotted and compared between the two trial periods.
- **Effects of high versus low engagement**: Where it was possible to identify low and high-engaged trialists (as identified via engagement data obtained from CPs), differences in pre-trial and in-trial mean daily consumption were made between the two groups.

5.3 Secondary analysis

Further secondary analysis was aimed at exploring how, why and for whom impact effects may have occurred. Similarly, where an impact effect was not detected for changes in daily consumption, it offered an opportunity to detect evidence for effects which may have existed for particular households or for particular times of the year:

- **Socio-demographic Group Differences**: For the MEETS and SEN-ST trials, the Index of Multiple Deprivation (IMD) was incorporated into the regression model to test for any effects within these subgroups.
- **Length of trial participation**: Due to varying levels of trial participation within trials (resulting from phased recruitment), where feasible, the above primary analysis was repeated, using various sub-sets of trialist data, dependent on the length in which they were in the trial, for example, three, six or twelve months. This enabled the effect of the intervention to be evaluated over a consistent period of time between intervention and control group trialists.
- **Seasonal effects**: Interventions, particularly those aimed at heating, were intended to show greater impacts during the colder months than at other times of the year. For these trials, sub-groups of trialists were created (i.e. with valid data over an entire

heating season – October to March – in both intervention and control groups) before the above primary analysis framework was implemented.

- **Heating degree day analysis to estimate annual consumption savings**: Where a statistically significant reduction in energy consumption of the product was detected (SENS GenGame and SEN-ST), annualised energy consumption savings were calculated. The outcome measure was taken to be the trialist's energy use divided by the mean ‘heating degree day’ value for the trialist’s participation period. Heating degree days (HDD) is “a measure of the extent to which external temperature over a given period fell below a level below which central heating is assumed to be required (in the UK, commonly taken to be 15.5^{o}C). The heating degree day values were calculated based on the hourly external temperature data.” This partially controls for the variation in average conditions arising from the differing participation periods. Pre-baseline annual electricity and gas usage data were also converted to per-HDD values and included in the models as control variables. The regression results therefore provided an estimate of the treatment effect size in terms of energy saving per HDD. This was then used to produce an estimate of the annualised saving that would result, by multiplying by the average HDD over the year for the trialists (in this case, the year up to and including the end of the trial period was used).

5.4 Quality Assurance

The analytical approaches and draft analyses undertaken as part of the Energy Consumption Analysis were discussed and peer reviewed through TDEL's analytics group, comprising the assigned analytical leads for each trial, the TDEL project manager and project director, as well as the Ipsos Head of Analytics.

6 Quantitative telephone survey with trialists methodology

This section provides more information on the approach and methodology of the quantitative telephone survey with intervention and control group trialists.

6.1 Methodology

6.1.1 Baseline survey with trialists

The quantitative baseline survey was administered by telephone to trialists (intervention and control groups where applicable (for SENS-ST and MEETS only)) that were contacted and invited to participate. The survey questions covered attitudes to energy, energy usage and management behaviours, uptake of energy efficiency measures, views of smart metering and engagement with the trials and products / services. The questions asked were largely consistent across trials, with a module of tailored questions aligned to the Theory of Change for each trial included. The full questionnaire is provided in Annex 2. Due to tailoring and a requirement for additional questions related to the Energy Local project and its theory-based evaluation design in particular, the average survey length for SENS Energy Local was 35 minutes, compared to 25 minutes for the other trials.

The survey was intended to reach a large number of trialists (with targets numbers initially set at the trial level). However, due to the number of trialists recruited to each trial being lower than initially planned (see overall impact evaluation report for an overview of trial recruitment figures), it was not necessary to draw a sample. Instead, all trialists who provided opt-in consent to be contacted, and provided contact details, were contacted to take part in the telephone survey. As trialists were recruited on an ongoing basis over approximately 12 months, the baseline survey remained open throughout this recruitment period to allow trialists to be surveyed as soon as possible after they had signed-up to the trial. The baseline survey was conducted between December 2020 and December 2021 and the exact timings varied by trial depending on recruitment progress.

Telephone surveys were administered by Ipsos UK's team of trained telephone interviewers. In order to maximise response, Ipsos standard processes were followed, with interviews scheduled according to trialist availability, from 9am to 9pm weekdays and 10am to 7pm weekends, and several contact attempts made for each trialist[25]. The average response rate from the baseline survey was 36%. The responses achieved from the baseline survey for each trial are detailed below in Table 3 overleaf.

[25] Participation was voluntary. If trialists declined to take part for any reason, they were not contacted further.

Table 3: Baseline Survey Fieldwork Summary

Trial	Fieldwork period	Total number of sample leads	Total Baseline Survey responses	Response Rate	Intervention Group	Control Group
MEETS (Lightbulb ES Limited)	December 2020 – December 2021	1562	698	45%	352	346
SEN-ST (Geo Ltd.)	March – July 2021	641	253	39%	66	187
SENS GenGame (intervention group only) (GenGame Ltd.)	August – December 2021	1450	315	22%	315	N/A
Energy Local (Energy Local CIC)	June – December 2021	88	52	59%	52	N/A
IDEAS (Eliq Ltd.)	July – December 2021	190	87	46%	87	N/A
Total		3931	1405	36%	872	533

6.1.2 Endline survey with trialists

All trialists whom had completed the baseline survey were re-contacted to take part in the endline survey. Trialists whom had withdrawn consent to be contacted or withdrawn from the trials since the baseline survey was completed, were excluded from the endline survey – and as the surveys were voluntary, trialists who had previously participated in the baseline survey could decline to take part in the endline survey.

While the majority of questions asked in the baseline survey were repeated in the endline survey to allow for comparisons of any changes in attitudes, views or behaviours, approximately 25% of the questions were changed to allow for a new question module on product interaction (asked only of intervention group trialists). Questions in this section were tailored to each trial, according to the functions of each product and the anticipated outcomes for users. The average survey length for the endline survey was 26 minutes, similar to the baseline survey. Across all trials, the endline survey was conducted between 1st March and 31st March 2022 (at the end of the trial period).

As with the baseline survey, the endline surveys were administered by Ipsos UK telephone interviewers, with interviews scheduled according to trialist availability, from 9am to 9pm weekdays and 10am to 7pm weekends, and several contact attempts made for each trialist. The average response rate from the endline survey was 48%. The responses achieved from the endline survey for each trial are detailed below in Table 4 overleaf.

Table 4: Endline Survey Fieldwork Summary

Trial	Fieldwork period	Total number of sample leads[26]	Total Endline Survey Responses	Response Rate	Intervention Group	Control Group
MEETS	March 2022	623	258	41%	117	141
SEN-ST	March 2022	224	95	42%	22	73
SENS GenGame	March 2022	286	149	52%	149	N/A
Energy Local	March 2022	49	26	53%	26	N/A
IDEAS	March 2022	86	41	48%	41	N/A
Total		1268	569	45%	355	214

[26] Number of trialists who completed the baseline survey and had not withdrawn consent.

6.2 Analysis

The impact of each trial was evaluated through a triangulation of evidence from all quantitative and qualitative research to deliver an overall evaluation of the impact of the intervention. Survey data was used to analyse changes in self-reported behaviours expected to change over the course of the trial as a result of the product/ service. The following points of analysis were used:

- Comparisons of attitudes and behaviours at baseline and endline: To ensure comparability, only data from respondents who completed both the baseline and endline surveys were compared; baseline survey respondents who did not complete the endline survey were excluded from analysis to ensure that the profile of baseline and endline respondents was the same. To assess the impact of the products, comparisons were also made between baseline respondents who had not used the product at the baseline[27], and endline respondents who had used the product.
- Comparisons of attitudes and behaviours between intervention and control trialists: This was possible for the MEETS and SEN-ST trials only; Energy Local, IDEAS and SENS GenGame did not have control groups.
- One sample t-tests between baseline and endline survey percentages were conducted at Competition level only (aggregated across all trialists) but not at individual trial level, to determine whether the change was statistically significant at conventional significance levels. Unless explicitly stated, any reported changes (baseline to endline) are indicative only and have either not undergone statistical significance testing or were not found to be statistically significant. Where changes were tested and found to be statistically significant, these have been explicitly stated in Competition report with a relevant indicator [28].

[27] Due to delays receiving sample contacts, in some cases baseline surveys were administered after trialists had already started using the products.
[28] '*' indicates statistical significance at the 10% confidence level, '**' indicates statistical significance at the 5% confidence level, and '***' indicates statistical significance at the 1% confidence level.

7 Qualitative research with intervention group trialists methodology

This section provides more information on the approach and methodology of the qualitative research with intervention group trialists.

7.1 Methodology

Between February and March 2022 (towards end of trial period), a series of in-depth qualitative interviews were carried out with intervention group trialists' to investigate their views and experiences of the SENS innovation products, along with their perceived impact upon day-to-day behaviours and energy usage.

Each in-depth interview was undertaken individually, lasting approximately one hour, and was conducted over the internet using online video conferencing software (MS Teams) to comply with social distance regulations at the time due to the ongoing COVID-19 pandemic. Following each interview, each trialist received £50 by bank transfer as a thank-you for their time, in line with common practice of offering incentives to maximise participation in qualitative research. Interviews were conducted by an Ipsos researcher or by a trusted external researcher with use of a discussion guide (see Annex 4 for an example discussion guide used). Discussion guides varied between trials, but they each covered the following broad themes:

- Motivations for joining the trial;
- Perceived interaction with the SENS innovation product (or in the case of Energy Local trialists, interaction with different aspects of the local club);
- Perceived energy use in the home;
- Perceived household budgeting and energy spending habits; and
- Overall satisfaction with the trial, product and any perceived impacts.

Interviews were conducted with trialists whom had provided permission, upon joining the trial, to be contacted to be invited to participate in further SENS research. Most trialists were recruited among trialists whom had taken part in the quantitative baseline telephone survey in 2021 and agreed to be re-contacted for further research. Ipsos sought to recruit 30 trialists from the Energy Local trial (in order to implement its theory-based design) and 15 trialists from each of the IDEAS, SENS GenGame, SEN-ST, and MEETS trials. These interview numbers were all met, making a total of 90 interviews across the trials.

Trialists were contacted and recruited for the interviews by a trusted external recruitment agency overseen by Ipsos. The recruiters were asked to recruit trialists to an approximate list of demographic quotas (see Table 5 overleaf) (purposive sampling criteria using baseline survey data were set to ensure the inclusion of a range of perspectives). Amongst trialists whom had taken part in the baseline survey, the quotas were set on information gathered from

trialists in the survey. For those who did not take part in the baseline survey quota information was recorded by recruiters at the screening stage. Recruitment was undertaken with use of a recruitment screener to obtain opt-in consent to take part in the research and to record the relevant quota information for those trialists who did not take part in the baseline survey.

Details regarding the quotas applied for the qualitative research in each trial, and the corresponding number of interviews achieved, can be seen in the table below. Note that due to limited sample size for certain trials, it was not possible to meet all quotas set on each trial. The rationale for not utilising quotas for IDEAS or Energy Local was that the available samples were too small for this to be feasible.

Table 5: Qualitative interviews with trialists quotas and achieved numbers

Trial	Quota
MEETS	Mix of age groups
	Either heat rooms not used to same temperature as those used or leave the heating on when going out or leave the heating on all the time in winter (reported at baseline)
	Self-reported difficulties in paying their energy bills (at baseline)
	Have received some type of intervention, i.e. received heating report and/or coaching messages
SEN-ST	Mix of age groups
	Either heat rooms not used to same temperature as those used or leave the heating on when going out or leave the heating on all the time in winter at the baseline (reported at baseline)
SENS GenGame	Mix of age groups
	Did not monitor their energy use against household budget (reported at baseline)
	Did not know what uses the most energy in their home (reported at baseline)
	Use the product frequently (every day / more than once a day) (reported at baseline)

Energy Local	(No quotas applied)
IDEAS	(No quotas applied)

7.2 Analyses

The findings from the survey analysis were utilised alongside a thematic analysis of in-depth responses reported by intervention group trialists. The analysis focused on providing insights that could explain 'why' certain findings had emerged from the energy consumption analysis and the quantitative telephone survey with intervention group trialists.

The following points of analysis were used across the trial reports and synthesised and triangulated at the Competition level:

- Interview data was analysed to further explore the reasons for reported levels of engagement/ disengagement with the products / services and the functions provided, as observed in the endline survey wave.
- Where there were instances of strong or sustained engagement in the SENS product, the data was further explored to see whether this was correlated with any self-reported changes between the baseline and endline survey waves in trialist understanding of energy use in the home.
- Where trialists reported improvements in the drivers of behaviour change, interview data was further explored to see whether this led to any specific behaviour changes or installation of energy saving measures in the home since the start of the trial. Where this was or was not the case, specific actions and reasons why they were/ were not taken were reported on.
- Interviews were analysed to determine whether any qualitative secondary outcomes could be observed beyond energy savings for example, perceived improved thermal comfort and household budgeting. Whether there was evidence or not of these outcomes being present, reasons for this were explored and reported on. These findings were further triangulated with baseline survey findings to assess whether i) there was any relationship between baseline levels of awareness of energy bills and likelihood to set and monitor household budgets and ii) baseline levels of preference to heat the home to a warm temperature and likelihood to seek thermal comfort after using the product.

8 Qualitative research with wider stakeholders– Methodology

This section provides more information on the approach and methodology of the qualitative research with Competition Partners, delivery partners and sector bodies.

8.1 Methodology

8.1.1 Competition Partners

Between February and March 2022, a series of in-depth qualitative interviews were carried out with CPs from each of the Phase One projects (where this was possible) and with one applicant that applied but following the competitive application process was not awarded matched grant funding. TDEL interviewed both the lead CP and their key partners (including energy supplier) to capture a range of views.

CPs were recruited for interviews by the core TDEL team and conducted by an experienced researcher. Each in-depth interview was undertaken either individually or with multiple persons from the same organisation, lasting approximately one hour, and was conducted over the internet using online video conferencing software (MS Teams) to comply with social distancing regulations at the time. Discussion guides were generally the same between each Competition Partner interviewed, though some modules were tailored to whether the Competition Partner was the technology owner or an energy supplier. The broad themes aimed to:

- Explore initial motivations for applying for Competition funding.
- Gather views on their experiences of SENS, the development of their product, and any perceived impacts of the SENS competition on their organisation (whether intended or unintended).
- Gather feedback on their experiences of the implementation of the SENS Competition.
- Where the interview took place with an unsuccessful applicant, explore what progress they had made, if any, in developing their product/ service since the point of applying in the absence of Competition funding.
- Explore next steps for commercialising their product/ service.

A total of 11 interviews were carried out with CPs. Table 6 overleaf outlines the number of interviews completed per project.

Table 6: Competition Partner - interview summary

Trial	Number of interviews
MEETS	1 x Lead Competition Partner
SEN-ST	1 x Lead Competition Partner 1x Energy Supplier Partner
SENS GenGame	1 x Lead Competition Partner 1x Energy Supplier Partner
Energy Local	1 x Lead Competition Partner 1x Energy Supplier Partner
IDEAS	1 x Lead Competition Partner 1x Energy Supplier Partner
Onzo (Phase 1 only)	1 x Lead Competition Partner
Element Energy (Phase 1 only)	1 x Lead Competition Partner
Total	11 interviews

8.1.2 Project personnel delivering the Competition

Throughout the Competition, a small number of in-depth qualitative interviews were also carried out with key personnel delivering the Competition, including senior staff from BEIS and AECOM.

The first stage of interviews took place at the interim stage during Autumn 2021 and focused primarily on experiences in delivering the Competition to date. A second set of interviews took place with key BEIS personnel during February to April 2022. Each in-depth interview was undertaken individually, lasting approximately one hour, and was conducted over the internet using online video conferencing software (MS Teams). Discussion guides were used during the interviews and primarily focused on:

- Exploring the rationale behind the SENS programme's conception, its objectives, context and external drivers influencing success of the programme in its implementation to date.
- Discussing the programme's governance structure, set up and delivery mode, its strengths and weaknesses in delivering against the programme objectives and drawing out any lessons learned for future delivery of similar programmes.

A total of six interviews were completed across the two waves. Table 7 outlines the number of interviews completed per wave.

Table 7: Project personnel delivering the Competition - interview summary

Organisation	Number of interviews (Autumn 2021)	Number of interviews (Spring 2022)
BEIS	2	3
AECOM	1	N/A
Total	3	3

8.1.3 Sector Bodies

Towards the end of the trial period and just beyond (February to April 2020), a series of further qualitative interviews were conducted with representatives from sector bodies operating within the smart energy sector, to investigate any changes in the market for products that use smart meter data in domestic properties and views on the future direction of the market.

Each in-depth interview was undertaken individually, lasting approximately one hour, and was conducted over the internet using online video conferencing software (MS Teams). Interviews were moderated by an Ipsos researcher or by a trusted external researcher with use of a discussion guide. The following themes were covered:

- Understanding views on the development and benefits of products and services that use smart meter data in the market.
- Identifying the key barriers and enablers for growth of the market and identifying any research/ publication which might support TDEL research.
- Understanding what lessons for future Government initiatives/ interventions can be drawn from the current state of the market and any barriers to growth identified.

BEIS were responsible for making first contact with potential organisations and interviewees identified by TDEL, outlining the purposes of the research and requesting consent to share contact details with TDEL. Once confirmed, contact details were passed on and TDEL commenced with recruitment of trialists.

A total of eight interviews were conducted with representative from a range of organisations (see Table 8 overleaf).

Table 8: Sector bodies interviewed

Sector body	Number of interviews
Smart Energy GB	1
BEAMA[29]	1
Energy UK	1
Citizens Advice	1
Carbon Trust	1
Delta EE	1
Electric Miles	1
Elexon	1
Total	8

8.2 Analyses

A thematic analysis of in-depth responses was conducted for each type of respondent (CPs, project personnel delivering the Competition and sector bodies). The analysis focused on providing contextual insights that could be used assess whether and how the Competition has had the intended short-term outcomes on the market for smart meter-enabled products and services, and the extent to which longer-term outcomes and impacts might be facilitated.

[29] British Electrotechnical and Allied Manufacturers Association

Glossary

ANCOVA	Analysis of Covariance
AQ	Annual Quantity (gas)
ATE	Average Treatment Effect
BAU	Business as Usual
BEAMA	British Electrotechnical and Allied Manufacturers' Association
BEIS	Department for Business, Energy and Industrial Strategy
BIT	Behavioural Insights Team
BST	British Summer Time
CA	Contribution Analysis
CAD	Consumer Access Device
CHP	Combined heat and power
CIC	Community Interest Company
CMO	Context-Mechanism-Outcome
CO2e	Carbon dioxide equivalent
COVID-19	Coronavirus Pandemic
CP	Competition Partner
CRL	Commercial Readiness Level
DCC	Data Communications Company
DESNZ	Department for Energy Security and Net Zero (formerly BEIS)
EAC	Estimated Annual (energy) Consumption
ECA	Energy Consumption Analysis
EL	Energy Local
ELC	(SENS) Energy Local Club

EPC	Energy Performance Certificate
GDPR	General Data Protection Regulation
GEO	Green Energy Options Ltd.
HAN	Home Area Network
HDD	Heating Degree Day
ICE	Igloo Customer Engine
IDEAS	Intelligent Digital Energy Advisory (SENS project)
IHD	In-Home Display
IMD	Index of Multiple Deprivation
ITT	Intention to Treat
KW	Kilowatts
kWh	Kilowatt-hour
M&MH	Me & My Home profile
MDE	Minimum Detectable Effect
MEETS	More Effective and Efficient Thermal comfort with Smart meter data (SENS project)
MI	Monitoring Information
MOP	Meter Operator
MPAN	Meter Point Administration Number
OLS	Ordinary Least Squares
OWL	A brand of electricity monitor used to monitor consumption in Roupell Park
PSM	Propensity Score Matching
RCT	Randomised Controlled Trial
SEC	Smart Energy Code
SECAS	Smart Energy Code Administrator and Secretariat

SENS	Smart Energy Savings Competition
SENS GenGame	SENS GenGame Energy Saver app (SENS project)
SEN-ST	Smart Energy-Smart Thermostat (SENS project)
SERL	Smart Energy Research Laboratory, based at University College London
SM	Smart Meter
SMETER	Smart Meter Enabled Thermal Energy Ratings
SMETS	Smart Metering Equipment Technical Specifications
SMETS1	Smart Metering Equipment Technical Specifications - First Generation
SMETS2	Smart Metering Equipment Technical Specifications - Second Generation
SMS	Smart Metering Services
SoLR	Supplier of Last Resort
TDEL	Trial Design and Evaluation Lead
TOT	Treatment on the Treated
TOU	Time of use
TOUT	Time of Use Tariff
TP	Trial Protocol
TRL	Technology Readiness Level
UCL	University College London
WAN	Wide Area Network

Annex 1 Competition-level evaluation questions and sources of evidence

Table 9: Competition-level evaluation questions and sources of evidence

Outcome area	Evaluation question	Source(s) of evidence
Energy efficient behaviour	Have trialists adopted more energy efficient behaviours?	Monitoring Information (MI) data from projects- on intensity and frequency of interaction with product
		Feedback of trialists to pre/ post surveys
		Qualitative fieldwork with trialists
		Additional trial-specific analysis
	What behaviours have been adopted, and how do these vary by trialist segment or product type?	Project descriptions and Theory of Changes/ evaluation plans
		Project data on user interactions (where available)
		Feedback of trialists to pre/ post surveys
		Qualitative fieldwork with trialists
		Energy consumption data of trialists available in SERL

Outcome area	Evaluation question	Source(s) of evidence
Energy consumption	Have the SENS trialled products resulted in trialists reducing their energy consumption? What was the impact of the products on the magnitude and temporal profile of trialist energy use? Did this vary across products and trialist segments targeted?	Behavioural data on energy use (collected through the surveys and qualitative fieldwork)
Trialist energy costs	Have SENS trialled products led to trialists reducing energy costs?	Feedback of trialists to pre/ post surveys and qualitative fieldwork
		Energy consumption data of trialists available in SERL
Other benefits (including comfort levels)	Which exogenous benefits have been materialised? I.e. did any of the products lead to comfort taking?	Project descriptions and Theory of Change
		Feedback of trialists to pre/ post surveys and qualitative fieldwork
Trialist satisfaction	Are trialists satisfied with products?	Feedback of trialists to pre/ post surveys and qualitative fieldwork

Outcome area	Evaluation question	Source(s) of evidence
	What trialist attributes are associated with different levels of satisfaction? Are there aspects of product or customer trialist journeys with which trialists are particularly satisfied/dissatisfied?	MI data from projects- on intensity and frequency of interaction with product
Market impacts	Has the SENS Competition accelerated the development of sponsored smart-meter enabled products and services? What are remaining barriers to commercialisation and wider adoption of the products sponsored? What steps have been taken by CPs funded towards wider scale commercial roll out?	Product development research (Phase 1)
		In-depth interviews of SENS Competition stakeholders

Outcome area	Evaluation question	Source(s) of evidence
	Which products have won follow-on funding / have attracted investor interest? How does this compare to products / services which unsuccessfully applied for SENS funding?	Trial and SENS-level monitoring, trial close-out reports
Wider take-up of the product	What can trial results tell us about the likelihood of wider take-up of smart meter enabled products and services? For instance, are some trialists more likely to respond positively to the offer of such products? What motivated trialists to accept the product?	Feedback of trialists to pre/ post surveys
		Qualitative fieldwork with trialists
		In-depth interviews of SENS Competition stakeholders.
		MI data from projects- on intensity and frequency of interaction with product
Wider market impacts	What wider trends in the market for smart meter enabled products and services can be observed since the start of the SENS Competition? How has this market matured since the start of the SENS Competition?	Assessment of market for smart meter enabled products and services.

Outcome area	Evaluation question	Source(s) of evidence
	Do these wider market trends support or challenge key assumptions made in the Competition level Theory of Change?	Qualitative assessment of Competition impacts.
Programme management	Did the SENS governance and delivery mode allow effective implementation of the SENS Competition? What lessons can be learned from this for future Government initiatives?	Management documentation made available by BEIS/ AECOM
		In-depth interviews of SENS Competition stakeholders.
	Have CPs encountered any challenges in delivering the SENS trials? What lessons can be learned from this for future Government initiatives?	In-depth interviews of SENS Competition stakeholders.
	Did any specific contextual factors influence the effective delivery of the SENS Competition?	Management documentation made available by BEIS/AECOM

Outcome area	Evaluation question	Source(s) of evidence
	What lessons can be learned from this for future Government initiatives?	In-depth interviews of SENS Competition stakeholders.

Annex 2 Survey questionnaires

Baseline questionnaire

DUMMY VARIABLES

CP#	Competition Partner Lead (internal)	CP NAME (for trialists)/ energy supplier partner	SENS TOOL/ PRODUCT NAME (for trialists)
1	Eliq Limited	Bristol Energy/ Together Energy	IDEAS feature on Be connected app
2	Energy Local CIC	Energy Local/ Octopus Energy	Energy Local Club
3	GenGame Limited	SO Energy	Energy Saver App
4	Geo Limited	Shell Energy Retail Limited	Geo smart thermostat package
5	Lightbulb ES Limited	Igloo Energy Supply Limited	Smart Heating Research Project package

SCREENERS/ INTRODUCTION

READ OUT UNLESS CP=2

Good morning/ afternoon/ evening. My name is … from Ipsos MORI, the independent research organisation. [NAMED CONTACT FROM SAMPLE] recently signed up for a trial with [CP NAME] for the [TOOL NAME] which aims to help households like yours to use less energy.

READ OUT IF CP=2

Good morning/ afternoon/ evening. My name is … from Ipsos MORI, the independent research organisation. [NAMED CONTACT FROM SAMPLE] recently signed up for a trial with [CP NAME] as a member of Energy Local [CLUB NAME] , which aims to help households like yours to use energy more efficiently and effectively.

ASK ALL

S1. Please can I speak to [named person – FROM SAMPLE]?
SINGLE CODE

- Yes – GO TO S3

- No – GO TO S2

IF RESPONDENT IS NOT NAMED PERSON [S1 CODE 2]

S2. Can you confirm if [named person – FROM SAMPLE] lives at this address?

SINGLE CODE

- Yes, they still live at this address – ARRANGE APPOINTMENT TO CALL BACK WHEN NAMED CONTACT
- AVAILABLE
- No, no-one of that name lives at this address – THANK AND CLOSE
- Information refused – THANK AND CLOSE

ASK ALL

S3. As you may remember when you signed up to the trial, Ipsos MORI are independently evaluating [TOOL NAME] on behalf of the UK Government, to help the Government understand whether this and similar [IF CP=2: initiatives; ELSE: products] are effective at reducing household energy use, or not. When signing up for the trial, you agreed that [CP NAME] could share your contact details with Ipsos MORI so that we could invite you to give feedback on how your home uses energy.

Are you willing to help answer a few questions about how you currently use energy in your home? It should take around IF CP=2: 35; ELSE: 25] minutes.

Of course, participation in the survey is voluntary but your answers will be very helpful for this research. Are you happy to proceed with the interview?

IF NECESSARY: If you would like to read the privacy notice beforehand to understand more about how we use your data, you can access it online at: [INSERT LINK]

SINGLE CODE

- Yes – CONTINUE WITH INTERVIEW
- No – THANK AND CLOSE

ASK ALL

S4. Thank you very much for agreeing to take part. Can I just check that you have not withdrawn from {IF NOT CP=2 the [TOOL NAME] trial/ IF CP=2: Energy Local [CLUB NAME]} since signing up?

SINGLE CODE

- Yes, still in trial
- No, withdrawn – THANK AND CLOSE

ASK UNLESS CP=2

S5. Can I also check if you have changed your energy supplier since you signed up to the trial? [INSERT DATE]

SINGLE CODE

- Yes
- No

ASK IF YES AT S5 UNLESS CP=2

S6. IF CP=2: Which, if any of the following energy suppliers did you buy your electricity from before switching to Octopus Energy? ELSE: Which, if any, of the following energy suppliers have you switched to since you signed up to the trial?

SINGLE CODE

- British Gas
- EDF
- E.ON
- npower
- Scottish Power
- SSE
- Shell Energy
- Ovo Energy
- Bulb
- Octopus Energy
- Bristol Energy
- Other (SPECIFY)
- None of these
- Don't know

ASK IF YES AT S5; DO NOT ASK IF CP=2

S7. And when you switched your energy supplier [IF CODES 1-12 AT S6]: to [INSERT NAME OF SUPPLIER FROM S6], was this so you could join the trial, or entirely for other reasons? INTERVIEWER TO READ OUT IF NECESSARY: for example, did you switch to get a cheaper tariff?

SINGLE CODE

- To join the trial – CONTINUE

- Entirely for other reasons – THANK AND CLOSE

ASK GENGAME AND ENERGY LOCAL (CP=2 OR 3)

S14. How do you currently pay for the gas you use in your home?

SINGLE CODE

- Direct debit
- Quarterly payment on receipt of bill
- Pre-payment (PPM, or card or key meter)
- Payment card
- Fuel direct
- Other
- I don't have gas in my home
- Don't know – DO NOT READ OUT

ASK GENGAME AND ENERGY LOCAL (CP=2 OR 3)

S15. And how do you currently pay for the electricity you use in your home?

SINGLE CODE

- Direct debit
- Quarterly payment on receipt of bill
- Pre-payment (PPM, or card or key meter)
- Payment card
- Fuel direct
- Other
- Don't know – DO NOT READ OUT

ASK ALL ELIQ AND ENERGY LOCAL (CP=1&2)

S15A. Is your household's gas and electricity supplied by the same energy supplier?

SINGLE CODE

- Yes
- No
- Don't know – DO NOT READ OUT

ASK ALL ELIQ AND ENERGY LOCAL (IF CP=1 OR 2)

S16. Are you charged different amounts for your household's electricity at different times of the day? For example, do you pay less at off peak periods, such as late at night, and more in peak periods such as between 4pm and 8pm.

READ OUT

SINGLE CODE

- Yes, I am charged different amounts at different times
- No, I am charged the same amount at all times
- Don't know – DO NOT READ OUT

ASK ALL IN TREATMENT GROUP AND IF CP=3 [FROM SAMPLE]

S8a. Can I just check, have you downloaded the Energy Saver App yet?

SINGLE CODE

- Yes
- No
- Don't know
- Not applicable

ASK ALL IN TREATMENT GROUP [FROM SAMPLE]; IF CP=3, ONLY ASK IF CODE 1 AT S8a

S8. [IF CP=3: And] Can I just check, [IF CP=2: Have you used the Energy Local dashboard since joining the club?; ELSE: have you personally interacted with [TOOL NAME] yet?]

SINGLE CODE

- Yes
- No
- Don't know
- Not applicable

ASK IF CODE 1 AT S8

S9. How often have you typically interacted with {IF EL (CP=2): Your energy dashboard, ELSE: [TOOL NAME]} since you first had access to it?

SINGLE CODE

- More than once a day
- Every day
- Most days

- About once or twice per week
- About once or twice per month
- Less often than once per month
- Don’t know – DO NOT READ OUT

ASK ALL

S10. Including yourself, how many people normally live at this address?

ENTER NUMBER. CANNOT BE ZERO.

- Don’t know
- Refused

ASK ALL

S11. In which of these ways do you occupy this accommodation?

SINGLE CODE

- Own it outright
- Own it with a mortgage (or loan)
- Pay part rent and part mortgage (shared ownership)
- Rented from local authority
- Rented from housing association/ trust
- Rented from private landlord
- Other
- Don’t know DO NOT READ OUT

ASK IF CP=2

S17. Can you remember how you first heard about Energy Local [CLUB NAME]?

SINGLE CODE

DO NOT READ OUT

- From friends, family, neighbours or colleagues/ word of mouth
- A local event
- Social media/ facebook/ twitter/ Instagram
- Email
- Leaflet/ letter through my door
- Poster

- Other (SPECIFY)
- None of these
- Don’t know

ASK IF CP=2

S18. And what would you say were the main reasons that you decided to join Energy Local [CLUB NAME]?

MULTICODE

DO NOT READ OUT

- To support local businesses/ keep money in the local economy
- It’s a community led initiative
- It’s based on renewable energy
- To reduce energy use
- To do my bit for the environment/ to combat climate change
- Save money on energy bills
- Friend recommended I join
- Better understanding of energy use
- Didn’t trust/ like old energy supplier
- Other (SPECIFY)
- None of these
- Don’t know

Energy behaviours and attitudes

ASK ALL

Q1. I am now going to read out a number of statements that other people have made about the energy they use at home. Please tell me to what extent you agree or disagree with each one?

READ OUT

SINGLE CODE FOR EACH ROW

RANDOMISE STATEMENTS

DOWN SIDE OF GRID

- I have tried to reduce the amount of energy I use at home
- I am more concerned about having a warm and comfortable home than saving energy

- I feel in control of how much energy I personally use
- I know what uses the most energy in my home
- I am very conscious about the cost of the energy I am using
- I don't spend much time thinking about my energy use
- I am aware of improvements that can be done to make my home more energy efficient
- ASK GEO (IF CP=4) ONLY: I have a good understanding of how much it costs to heat my home
- ASK GEO (IF CP=4) ONLY: It's more efficient to have the heating on all day at a lower temperature than for short periods at higher temperatures

ACROSS TOP OF GRID

- Strongly agree
- Tend to agree
- Neither agree nor disagree
- Tend to disagree
- Strongly disagree
- Don't know – DO NOT READ OUT

ASK ALL

Q2. I am now going to read out some things that people may do in their homes. For each one, please tell me to what extent you agree or disagree with the statement "I tend to…"

READ OUT

SINGLE CODE

RANDOMISE STATEMENTS

DOWN SIDE OF GRID

- Leave the lights on when not in the room
- Boil the kettle with more water than needed
- Wash clothes at 40°C or higher
- Heat rooms that are not being used to the same temperature as those that are being used
- Leave the heating on when going out for a few hours
- Ignore the energy consumption of new products or appliances when buying them

ACROSS TOP OF GRID

- Strongly agree

- Tend to agree
- Neither agree nor disagree
- Tend to disagree
- Strongly disagree
- Don't know – DO NOT READ OUT

ASK ALL ELIQ AND ENERGY LOCAL (IF CP = 1 OR 2)

Q3. How often do you tend to use each of the following appliances between 4pm and 8pm, if you have them?

READ OUT

SINGLE CODE FOR EACH ROW

DOWN SIDE OF GRID

- Your washing machine, or the wash cycle on your washer/dryer
- Your tumble dryer, or the dry cycle on your tumble dryer
- Your dishwasher

ACROSS TOP OF GRID

- 1. Always
- 2. Most of the time
- 3. Sometimes
- 4. Hardly ever
- 5. Never
- 6. Not applicable - I/ we don't have this appliance
- 7. Don't know / Can't remember – DO NOT READ OUT

ASK ALL

Q4. I would like to understand how you currently heat this property. Please tell me whether you heat this property in any of the following ways? Please say yes to all that apply.

MULTI CODE

- Central heating
    - Gas
    - Oil
    - Solid fuel – coal or biomass (e.g. wood)
- Fixed room heaters

    - Electric (storage)
    - Gas
    - Electric (not storage/ radiator)
    - Solid fuel (open fire/enclosed stove) – coal or wood
- Portable heaters
    - Electric
    - Other
- Other
    - Communal or district heating
    - Other [SPECIFY]
    - Don't know – DO NOT READ OUT

IF MORE THAN ONE CODE AT Q4

Q5. And what is the main way you heat this property during the winter?

SINGLE CODE

INTERVIEWER READ OUT CODES SELECTED AT Q4 AND SELECT ONE AS MAIN HEATING SYSTEM
ALLOW DON'T KNOW
ASK ALL

Q6. How much do you agree or disagree with the following statements?

SINGLE CODE EACH ROW

DOWN SIDE OF GRID

- I could afford to make my home warmer if I wanted to
- During the winter, I am usually able to keep my home at a comfortable temperature
- It is difficult to heat my home to a comfortable temperature even with the heating on
- It is too expensive to heat my home to a comfortable temperature

ACROSS TOP OF GRID

- 1. Strongly agree
- 2. Tend to agree
- 3. Neither agree nor disagree
- 4. Tend to disagree
- 5. Strongly disagree

- 6. Don’t know – DO NOT READ OUT

ASK ALL

Q7. I am now going to read out some things that some homes may have installed to help them control their heating. Please can you tell me, which, if any, of the following controls you have in your home?

INTERVIEWER IF NECESSARY: When answering please think about whether or not this has been installed in your property, even if the decision was not made by you personally. Please also let me know if you think any of these controls are not possible to install in your home.

SINGLE CODE EACH ROW

READ OUT

DOWN SIDE OF GRID

- Valves to control the temperature of individual radiators
- A central thermostat to set the temperature of your whole home IF NECESSARY: that is not attached to your boiler
- A central timer, allowing you to set the heating to come on at desired times of the day, such as the times you are most likely to be in the house
- A programmable thermostat, allowing you to set your heating to different temperatures at different times IF NEEDED: for example, you might set it to be warmer in the mornings
- An automated or smart thermostat which can control your heating automatically or remotely, for example through an app [such as Hive or Nest]

ACROSS TOP OF GRID

- Yes
- No
- Not possible
- Don't know - DO NOT READ OUT

ASK IF CODES 1 AT Q7C, D OR E

Q8. Which of the following best describes how long your heating is on or off each day in winter?

SINGLE CODE

- I/ we switch it on and off when we need to by using a switch on the control panel or boiler, or through an app
- I/ we set a timer so the heating comes on only at specific times of the day

- I/ we leave the heating on all the time
- Other (SPECIFY)
- None of these
- Don’t know – DO NOT READ OUT

ASK IF CODE 1 AT Q7B, D OR E

Q9. And which of the following best describes how you typically set the temperature of your heating when it is on?

SINGLE CODE

- I/ we set the temperature on the thermostat or programmer to be the same most days
- I/ we turn the temperature up or down regularly depending how cold or warm my/ our home is

ASK LIGHTBULB ONLY (IF CP=5)

Q10. How useful or not do you think it is, or would be, for your household to be able to control your heating automatically or remotely with a smart thermostat such as Hive or Nest?

READ OUT

SINGLE CODE

- Very useful
- Fairly useful
- Not very useful
- Not at all useful
- Don’t know – DO NOT READ OUT

ASK ALL

Q11. Which one of these best describes how well you and your household are keeping up with your energy bills at the moment? Please just choose the option that applies. INTERVIEWER TO ADD IF QUESTIONED: if your household finances have changed as a result of the COVID-19 pandemic, please say which of the following describes how well you are keeping up with your energy bills now rather than before the pandemic.

SINGLE CODE

READ OUT

- I/we manage very well
- I/we manage quite well
- I/we get by alright

- I/we have some difficulties
- I/we have severe difficulties
- Don’t know – DO NOT READ OUT
- Prefer not to answer – DO NOT READ OUT

ASK ALL ELIQ OR ENERGY LOCAL (IF CP = 1 OR 2)

Q12. I am now going to read out a number of statements that other people have made about their energy bills. Please tell me to what extent you agree or disagree with each one. INTERVIEWER TO ADD IF QUESTIONED: if your household finances have changed as a result of the COVID-19 pandemic, please answer based on your ability to pay your bills now rather than before the pandemic

READ OUT

SINGLE CODE FOR EACH ROW

DOWN SIDE OF GRID

- It’s difficult to predict how much I will spend on energy each month
- I worry about the cost of energy over the next few years

ACROSS TOP OF GRID

- Strongly agree
- Tend to agree
- Neither agree nor disagree
- Tend to disagree
- Strongly disagree
- Don’t know – DO NOT READ OUT

ASK ALL

Q13. [IF CP=2: Before joining Energy Local had; ELSE: Have] you ever…

SINGLE CODE EACH ROW

READ OUT

DOWN SIDE OF GRID

- Worked out what a normal level of energy use is for your household i.e. what you use on a typical day, week or month?
- Monitored what you spend on energy, for example against a budget?

ACROSS TOP OF GRID

- Yes, I have
- No, I have not
- Don't know – DO NOT READ OUT

ASK IF CODE 1 AT Q13 STATEMENT A

Q14. And which if, any of the following have you used to work out what a normal level of energy use is for your household [IF CP=2: before joining Energy Local]?

MULTICODE

- A paper or email energy bill from your energy supplier
- An online account with your energy supplier
- An app from your energy supplier
- An app (not through your energy supplier)
- A smart energy display/ In-Home Display
- Meter readings you have taken yourself
- Don't know – DO NOT READ OUT

ASK IF CODE 1 AT Q13 STATEMENT B

Q15. And which if, any of the following have you used to monitor what you spend on energy, for example against a budget [IF CP=2: before joining Energy Local]?

MULTICODE

- A paper or email energy bill from your energy supplier
- An online account with your energy supplier
- An app from your energy supplier
- An app (not through your energy supplier)
- A smart energy display/ In-Home Display
- Meter readings you have taken yourself
- Don't know – DO NOT READ OUT

ASK IF CODE 2 AT Q13

Q16. And how useful or not do you think it is, or would be, for your household to be able to…

DOWN SIDE OF GRID

- IF CODE 2 AT Q13A: Work out what a normal level of energy use is for your household i.e. what you use on a typical day, week or month?

- IF CODE 2 AT Q13B: Monitor what you spend on energy, for example against a budget?

ACROSS TOP OF GRID

- Very useful
- Fairly useful
- Not very useful
- Not at all useful
- Don't know – DO NOT READ OUT

Uptake of energy efficiency measures

ASK ALL

Q23. I am now going to read out some things that people might have done to their home. For each, please can you tell me if it has been fitted anywhere in your home, or not?
When answering please think about whether or not this has been done to your property, even if the decision was not made by you personally or was done before you moved in.

SINGLE CODE

INTERVIEWER: PLEASE USE THE FOLLOWING RULES WHEN CODING:

IF BECAUSE THEY ARE RENTING, THEY CANNOT CHOOSE TO INSTALL THE MEASURE, OR IF IT IS NOT PHYSICALLY POSSIBLE TO INSTALL THE MEASURE (E.G. CANNOT INSTALL LOFT INSULATION IF PROPERTY DOES NOT HAVE A LOFT) CODE AS '2

RANDOMISE

- Installing loft insulation or top-up loft insulation
- Installing draught proofing to windows and/or doors
- Installing under floor insulation
- Installing double glazing
- Installing wall insulation
- Installing a renewable heating system (for example a biomass boiler, ground or air source heat pump or solar thermal system)
- Replacing an older gas boiler with a more efficient condensing gas boiler
- Installing solar panels
- Yes, this is fitted somewhere in my home
- No, this is not fitted anywhere in my home
- Don't know – DO NOT READ OUT

ASK IF ENERGY LOCAL (CP=2) AND Q23_H=2

Q23A. What would you say are the main reasons that you have not installed solar panels at your home?

MULTI CODE

DO NOT READ OUT

INTERVIEWER: PROBE TO DISTINGUISH BETWEEN CODES 3 AND 4. BOTH MAY APPLY, BUT SOME PEOPLE WOULD BE ABLE TO AFFORD THE UPFRONT COSTS, BUT THINK THEY WOULD LOSE MONEY IN THE LONG RUN

- Not interested
- Don’t like how they look/ how they’d make house look/ aesthetic reasons
- Cannot afford the initial outlay/ upfront cost too high/ could not get finance
- Savings not worth it/ would take too long to pay for itself
- Wouldn’t produce enough energy
- Not my decision to make because I’m renting the property
- Not possible to install in my property
- Other (SPECIFY)
- None of these
- Don’t know

ASK ALL ENERGY LOCAL(IF CP=2)

Q24. As far are you know, approximately what proportion of your household’s energy supply currently comes from local energy sources, such as local solar panels or wind turbines.

READ OUT

SINGLE CODE

- All of it/ 100%
- The vast majority/ 80% or more
- Most of it/ more than 50% but less than 80%
- About half/ 50%
- Some of it/ more than 20% but less than 50%
- A small amount/ less than 20%
- None
- Other (please specify)

- Don’t know – DO NOT READ OUT

ASK ALL ENERGY LOCAL (IF CP=2)

Q25. How important or unimportant is it to you that some of your energy comes from local energy sources, such as local solar panels or wind turbines?

READ OUT

SINGLE CODE

- Very important
- Fairly important
- Not very important
- Not at all important
- Don’t know – DO NOT READ OUT

ASK ALL ENERGY LOCAL (IF CP=2)

Q25B. To what extent do you agree or disagree with the following statements?

SINGLE CODE

READ OUT

RANDOMISE STATEMENTS

DOWN SIDE OF GRID

- I regularly participate in local community initiatives or projects
- I don’t have the time to participate in local community initiatives or projects
- I’m happy to pay a higher price in shops, pubs or restaurants if it helps support local businesses
- I would be happy to spend more on my energy bills if it was generated locally
- Local community initiatives or projects rarely achieve their goals
- Being environmentally friendly is an important part of who I am
- I am prepared to greatly reduce my energy use in order to tackle climate change
- I have a good understanding of how much my household spends on energy

ACROSS TOP OF GRID

- Strongly agree
- Tend to agree
- Neither agree nor disagree

- Tend to disagree
- Strongly disagree
- Don’t know – DO NOT READ OUT

Key underlying factors that may influence energy use and uptake of tools

ASK ALL

Q26. Thinking now about your home, how much do you agree or disagree with these statements that other people have said? It doesn’t matter if they don’t apply to your current situation; we are interested in what you generally think about this.

SINGLE CODE

READ OUT

RANDOMISE STATEMENTS

DOWN SIDE OF GRID

- A. I’m the type of person who likes to have the newest gadgets in my home
- B. It’s not worth me doing things to help the environment if others don’t do the same INTERVIEWER NOTE TO THE 2nd STATEMENT “INTERVIEWER – PLEASE NOTE NEGATIVELY WORDED STATEMENT”
- C. I’m always looking out for new ideas to improve my home
- D. I’m happy to share my energy data with companies who will use it to help me save energy
- E. I’m happy to share my energy data with companies who will use it to help other people save energy
- F. IF CP=2 ONLY: I would prefer to get tips on how to save energy from people I know than from my energy supplier

ACROSS TOP OF GRID

- Strongly agree
- Tend to agree
- Neither agree nor disagree
- Tend to disagree
- Strongly disagree
- Don’t know – DO NOT READ OUT

ASK ALL

Q27. What, if anything, prevents you from doing more to make your home more energy efficient?

DO NOT READ OUT

MULTICODE

- Cost of improvements is too high
- No guarantee that it will save me money
- Don't know what to do
- Don't know where to get information
- Don't trust installers/suppliers to give me unbiased information
- Confused/received conflicting information
- Hassle/disruption of making improvements
- May change character/appearance of my home
- May lose space (e.g. room space, storage space in loft)
- Structural considerations (e.g. shared walls, lease restrictions, planning permission needed, period
- features in home, live in conservation area)
- No interest in energy efficiency/green issues
- Lack of time
- Other priorities at the moment (e.g. work, new baby)
- Already doing enough
- Landlord/freeholder won't allow
- Won't stay here long enough
- Other (specify)
- None of these

ASK ALL SINGLE FUEL CUSTOMERS (CODE 2 AT S15A)

Q28. Overall how satisfied or dissatisfied are you with your electricity supplier?

SINGLE CODE

- Very satisfied
- Fairly satisfied
- Neither satisfied nor dissatisfied
- Fairly dissatisfied
- Very dissatisfied

- Don’t know – DO NOT READ OUT

ASK ALL DUAL FUEL CUSTOMERS (CP=3,4,5 OR S15A=1)

Q29. Overall how satisfied or dissatisfied are you with your gas and electricity supplier?

SINGLE CODE

- Very satisfied
- Fairly satisfied
- Neither satisfied nor dissatisfied
- Fairly dissatisfied
- Very dissatisfied
- Don’t know – DO NOT READ OUT

ASK ALL ELIQ, ENERGY LOCAL AND GENGAME (IF CP = 1,2 OR 3)

Q30. Thinking about the overall service that your energy supplier provides to you, to what extent do you trust them or not to provide you with a service that meets your needs?

Please answer on a scale of 1 to 10 where 1 is don’t trust them at all and 10 is trust them completely.

READ OUT

SINGLE CODE

- 1 = I don’t trust them at all
- …
- 10 = I trust them completely
- Don’t know – DO NOT READ OUT

ASK ALL ELIQ AND GENGAME (IF CP = 1 OR 3)

Q31. And thinking about your overall experiences of them, how easy or difficult do you find dealing with your energy supplier?

Please answer on a scale of 1 to 10 where 1 is extremely difficult and 10 is extremely easy.

READ OUT

SINGLE CODE

- 1 = It is extremely difficult
- …
- 10 = It is extremely easy

- Don’t know – DO NOT READ OUT

Views of smart metering

ASK ALL

Q32. I’m now going to ask you some questions about your smart meter. Approximately when was your current smart meter installed?

SINGLE CODE

- In the last month
- 1 to 3 months ago
- 4 to 6 months ago
- 7 to 12 months ago
- More than 1 year ago but less than 2 years ago
- More than 2 years ago
- It was already installed when I moved into the property
- I haven’t got a smart meter yet
- Don’t know/ Can’t remember – DO NOT READ OUT

ASK ALL UNLESS Q32=8

Q33. And did you have another smart meter before your current meter, for example one provided by a different supplier? IF CODE 8 AT Q32

SINGLE CODE

- Yes, in this property
- Yes, in a previous property
- No
- Don’t know – DO NOT READ OUT

ASK ALL UNLESS Q32= CODE 8

Q34. Overall how satisfied or dissatisfied are you with your current smart meter?

SINGLE CODE

- Very satisfied
- Fairly satisfied
- Neither satisfied nor dissatisfied
- Fairly dissatisfied
- Very dissatisfied

- Not had my smart meter long enough to say
- Don’t know – DO NOT READ OUT

DO NOT ASK IF CODE 6 AT Q34 OR CODE 8 AT Q32

Q35. How likely or not would you be to recommend a smart meter to a friend, colleague or relative? Please give your answer on a scale of one to ten where one means you would definitely not recommend a smart meter and ten means you would definitely recommend a smart meter if asked?

SINGLE CODE

- 1 = would definitely not recommend
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10 = definitely would recommend
- Don’t know – DO NOT READ OUT

ASK ALL

Q36. Thinking about the last couple of months, how often, if at all, have you looked at information about how much energy you are using (either in pounds and pence or kilowatts) [IF PPM: or your credit balance] through each of the following:

READ OUT

SINGLE CODE EACH ROW

DOWN SIDE OF GRID

- Your In-Home Display
- SKIP IF CP=2: An app from your energy supplier that shows data from your smart meter
- Your online account with your energy supplier
- ASK IF S8=1: IF EL (CP=2): Your energy dashboard, ELSE: [TOOL NAME]

AROSS TOP OF GRID

- Most days

- About once or twice per week
- About once or twice per month
- Less often than once per month
- Never
- I don't have this
- Don't know – DO NOT READ OUT

ASK ALL GEO (IF CP=4)

Q37. How useful or not do you think it is, or would be, for your household to be able to:

READ OUT

SINGLE CODE FOR EACH ROW

DOWN SIDE OF GRID

- See in advance how much it would cost to heat your home for the whole winter with your current heating settings
- See in advance how much it would cost to heat your home for the whole winter with different heating settings, such as reducing the temperature by one degree

ACROSS TOP OF GRID

- Very useful
- Fairly useful
- Not very useful
- Not at all useful
- Don't know – DO NOT READ OUT

ASK ALL UNLESS Q32= CODE 8

Q38. I'd now like you to think one more time about the way you currently use energy in your home and to what extent, if at all, this has changed since you had your smart meter installed, including the In-Home Display if you have one.

Would you say that having a smart meter, including the In-Home Display has…

READ OUT

SINGLE CODE

- made a great deal of difference to how you use energy in your home
- made a fair amount of difference to how you use energy in your home
- made a little difference to how you use energy in your home

- made no difference to how you use energy in your home
- Don't know – DO NOT READ OUT

ASK ALL

Q39. Over the last year, would you say that generally your understanding of how your household uses energy has:

READ OUT. NOTE TO INTERVIEWER: If respondent asks whether to think about gas or electricity, ask them to think about both (if they have both) and think overall about how well they understand the total energy they use.

SINGLE CODE

- Got a lot better
- Got a little better
- Stayed about the same
- Got a little worse
- Got a lot worse
- Don't know – DO NOT READ OUT

ASK IF CODES 1-2 AT Q39 BUT NOT IF Q32=CODE 8

Q40. You said your understanding of how your household uses energy has got better. Would you say that this is…

- entirely because of your smart meter and/or In-Home Display
- mostly because of your smart meter and/or In-Home Display but partly for other reasons
- partly because of your smart meter and/or In-Home Display but mostly for other reasons
- entirely for other reasons
- Don't know – DO NOT READ OUT

DEMOGRAPHICS

Finally, we would like to ask you a couple of other questions to ensure we are talking to a wide range of people.

ASK ALL

DM1. Please can you tell me which of these age brackets you fall into?

SINGLE CODE

- A. 18-24
- B. 25 -34

- C. 35 - 44
- D. 45 - 59
- E. 60 - 64
- F. 65-74
- G. 75 and over
- H. Refused – DO NOT READ OUT

ASK IF S10>1

DM2. Without giving me their specific ages, are you able to tell me how many people living in your household are aged either 16 or under or 65 or over?

- People living in household aged 16 or under
- People living in household aged 65 or over
- Don't know
- Refused

NOTE TO SCRIPTER: S10 MINUS DM2_1 = NUMBER OF ADULTS IN HOUSEHOLD, A DUMMY VARIABLE CALLED A1

ASK ALL

DM5. Do you know approximately when this property was built? IF NECESSARY: By that I mean when was the original building built, even if it was extended or converted later.
ONLY READ OUT IF NEEDED, PROBE FOR CORRECT ANSWER

SINGLE CODE

- Before 1850
- 1850-1899
- 1900-1918
- 1919-1930
- 1931-1944
- 1945-1964
- 1965-1980
- 1981-1990
- 1991-1995
- 1996-2001
- 2002 or later

- Don’t know– DO NOT READ OUT

DM6. What type of property do you live in?

DO NOT READ OUT

SINGLE CODE – PROBE FOR CORRECT ANSWER

- Flat or Maisonette
- Terrace Property
- Semi Detached Property
- Detached Property
- Other (specify)
- Don't know – DO NOT READ OUT
- Refused– DO NOT READ OUT

ASK ALL

DM7. Does anyone in your household have a long-standing illness, disability or infirmity? By long-standing I mean anything that has troubled you or them over a period of time or that is likely to affect you or them over a period of time.

SINGLE CODE

- 1. Yes
- 2. No
- 3. Don't know – DO NOT READ OUT
- 4. Refused – DO NOT READ OUT

ASK ALL

DM8. To check, is your household's total income, before tax and any other deductions more than or less than £16,000 per year, or not? (IF MORE) And is it more than £30,000, or more than £50,000?

SINGLE CODE

- Less than £16,000 per year
- Between £16,001 and £30,000 a year
- Between £30,001 and £50,000 a year
- Above £50,000 a year
- Don't know
- Refused

ASK ALL S10>1

DM9. I would now like to ask you about the member of your household who is the Chief Income Earner, that is the person with the largest income, whether from employment, pensions, state benefits, investments or any other source. Is this you:

SINGLE CODE

- 1. Yes
- 2. No
- 3.Don't know – DO NOT READ OUT
- 4. Not applicable - DO NOT READ OUT

ASK IF S10=1 OR CODES 1-2 AT DM9

DM10. And can you confirm [IF CODE 1 at DM9 OR S10=1:your; IF CODE 2 at DM9 = their] working status?

SINGLE CODE ANSWER ONLY. IF STUDENT AND PART TIME WORK CODE AS STUDENT, IF MORE THAN ONE INCOME SOURCE– CODE THE ACTIVITY WHICH PROVIDES THE RESPONDENT WITH THE HIGHEST INCOME (E.G. IF THEY ARE RETIRED AND WORKING PART-TIME, DO THEY RECEIVE THE HIGHEST INCOME FROM THEIR PENSION OR THE PART-TIME WORK?). ALLOW DON'T KNOW. ALLOW REFUSED.

SINGLE CODE

- Working full time (30+ hours per week)
- Working part time (less than 30 hours a week)
- Retired
- Unemployed
- Looking after home/family
- Unable to work due to illness/ disability
- Furloughed
- Student
- Other (please specify)
- Don't know – DO NOT READ OUT
- Prefer not to answer – DO NOT READ OUT

ASK ALL

DM11. I'm now going to ask you some questions about how much time people in your household spend at home. In a typical week, on how many weekdays are you currently spending most of the day out of the home, for example to do paid or voluntary work, to study,

or to undertake caring responsibilities. If this has changed in the last few months as a result of the COVID-19 pandemic (for example if you are working from home more often, or working fewer hours, or studying remotely) please let me know how many days you normally spend out of the home now, rather than what you used to do before the pandemic.

- None – I am normally at home every weekday
- 1
- 2
- 3
- 4
- 5 – I normally spend every weekday out of the home
- Don't know – DO NOT READ OUT
- Prefer not to answer – DO NOT READ OUT

ASK IF A1>1. DISPLAY AS GRID, ANSWER CODES AS ROWS, A COLUMN FOR EACH PERSON. NUMBER OF COLUMNS = A1-1

DM12. I'd now like to about the others in your household aged 16 and over. Thinking about the [IF A1>2: first/ second/ third etc.] other person aged 16 or over, in a typical week, on how many weekdays are they currently spending most of the day out of the home, for example to do paid or voluntary work, to study, or to undertake caring responsibilities. Again, if this has changed in the last few months as a result of the COVID-19 pandemic please let me know how many days they normally spend out of the home now, rather than what they used to do before the pandemic. INTERVIEWER TO REPEAT FOR EACH PERSON AND COMPLETE GRID

- None – they are normally at home every weekday
- 1s
- 2
- 3
- 4
- 5 – they spend every weekday out of the home
- Don't know – DO NOT READ OUT

Prefer not to answer – DO NOT READ OUT

ASK ALL

DM13. Which, if any, state benefits or allowances do you or anyone in your household currently receive? Please include any benefits, allowances, tax credits or other payments you receive.

INTERVIEWER PROMPT: Anything else? Your answers are completely confidential.

MULTICODE

DO NOT READ OUT

- Job seekers allowance
- Income support
- Working tax credit
- Child tax credit
- Pension credit
- Housing benefit
- Council tax benefit
- Disability living allowance
- Universal credit
- Other state benefits
- None of these
- Don’t know
- Prefer not to answer – DO NOT READ OUT

Close

Thank you for taking the time to fill out this survey, we really appreciate your time and your responses will be very valuable to us. It will not be possible to identify your responses, and your personal data will be securely stored and deleted at the end of the research in line with GDPR requirements.

[READ OUT IF CP=2 ONLY: You will receive a letter in November from Ipsos MORI explaining how they and UCL want to access your energy data to support the evaluation of the Energy Local clubs. Please keep an eye out for this.

We will also invite you to take part in a follow-up survey next year, to find out more about how you are getting on with [TOOL NAME]. You do not have to do anything about this now – next year we will contact you and you will have the option not to take part if you choose.

We may also conduct some more in-depth follow-up interviews over the next few months with people who have participated in this survey to explore [IF CP=2: your experiences of Energy Local; ELSE: how they are using [TOOL NAME]] in more detail. This is likely to involve a researcher interviewing you in person or remotely for around an hour and you would receive £40 as a thank you for your time.

INTERVIEWER NOTE: IF ASKED, INTERVIEWS MAY BE REMOTE VIDEO INTERVIEWS, OR CARRIED OUT IN HOME, SHOULD THE COVID-19 SITUATION PERMIT AND IF PEOPLE ARE HAPPY. BUT PLEASE TRY TO AVOID DISCUSSION OF THIS UNLESS ASKED DIRECTLY – THE MODE OF THE QUAL INTERVIEWS WILL BE DETERMINED IN

DUE COURSE AND WILL BE AFFECTED BY COVID-19 REGULATIONS WHICH ARE SUBJECT TO CHANGE.

Not everyone completing the survey will be invited - if you are selected for one of these interviews an Ipsos MORI researcher will contact you in the Autumn when you will be able to choose whether or not you would like to participate. You do not have to do anything about this now.

Thanks again for your time.

Endline questionnaire

DUMMY VARIABLES

CP#	Competition Partner Lead (internal)	CP NAME (for trialists)/ energy supplier partner	SENS TOOL/ PRODUCT NAME (for trialists)
1	Eliq Limited	Bristol Energy/ Together Energy	IDEAS feature on Be connected app
2	Energy Local CIC	Energy Local/ Octopus Energy	Energy Local Club
3	GenGame Limited	SO Energy	Energy Saver App
4	Geo Limited	Shell Energy Retail Limited	Geo smart thermostat package
5	Lightbulb ES Limited	Igloo Energy Supply Limited	Smart Heating Research Project package

SCREENERS/ INTRODUCTION

READ OUT IF TREATMENT AND CP = 1,3,4 OR 5

Good morning/ afternoon/ evening. My name is … from Ipsos MORI, the independent research organisation. [NAMED CONTACT FROM SAMPLE] signed up for a trial with [CP NAME] for the [TOOL NAME] which aims to help households like yours to use less energy.

READ OUT IF CP=2

Good morning/ afternoon/ evening. My name is … from Ipsos MORI, the independent research organisation. [NAMED CONTACT FROM SAMPLE] signed up for a trial with [CP NAME] as a member of Energy Local [CLUB NAME], which aims to help households like yours to use energy more efficiently and effectively.

READ OUT IF CONTROL

Good morning/ afternoon/ evening. My name is … from Ipsos MORI, the independent research organisation. [NAMED CONTACT FROM SAMPLE] took part in a survey recently about household energy use.

ASK ALL

S1. Please can I speak to [named person – FROM SAMPLE]?
SINGLE CODE

- Yes – GO TO S3
- No – GO TO S2

IF RESPONDENT IS NOT NAMED PERSON [S1 CODE 2]

S2. Can you confirm if [named person – FROM SAMPLE] lives at this address?

SINGLE CODE

- Yes, they still live at this address – ARRANGE APPOINTMENT TO CALL BACK WHEN NAMED CONTACT
- AVAILABLE
- No, no-one of that name lives at this address – THANK AND CLOSE
- Information refused – THANK AND CLOSE

ASK ALL

S3. TREATMENT: In [INSERT MONTH AND YEAR BASELINE SURVEY COMPLETED, FROM SAMPLE], you took part in an Ipsos MORI survey about how you use energy, as part of our independent evaluation of [TOOL NAME]. We are carrying out this evaluation on behalf of the UK Government, to help the Government understand whether this and similar [IF CP=2: initiatives; ELSE: products] are effective at reducing household energy use and helping people use energy more effectively, or not. We are carrying out another survey now to hear more about your experiences of [TOOL NAME] over the last few months.

CONTROL: As you may remember, you recently signed up to take part in a government-sponsored trial for an innovative smart meter-enabled product, [TOOL NAME], as part of which you were randomly allocated into the control group. In [INSERT MONTH AND YEAR BASELINE SURVEY COMPLETED, FROM SAMPLE], you took part in an Ipsos MORI survey about how you use energy, as part of our independent evaluation of [TOOL NAME]. We are carrying out this evaluation on behalf of the UK Government, to help the Government understand whether innovative feedback products that work with smart meter data are effective at reducing household energy use and helping people use energy more effectively, or not. We are carrying out another survey now to hear more about how you use energy at home.

Are you willing to help answer a few questions about how you currently use energy in your home? It should take around IF CP=2: 35; ELSE: 25] minutes.

Of course, participation in the survey is voluntary but your answers will be very helpful for this research. Are you happy to proceed with the interview?

IF NECESSARY: If you would like to read the privacy notice beforehand to understand more about how we use your data, you can access it online at: [INSERT LINK]

SINGLE CODE

- Yes – CONTINUE WITH INTERVIEW
- No – THANK AND CLOSE

ASK ALL

S4. Thank you very much for agreeing to take part. Can I just check that you have not withdrawn from {IF NOT CP=2 [TOOL NAME] trial/ IF CP=2: Energy Local [CLUB NAME]} since signing up?

SINGLE CODE

Yes, still in trial

No, withdrawn – THANK AND CLOSE

ASK UNLESS CP=2

S5. Can I also check if you have changed your energy supplier since you signed up to the trial? [INSERT DATE]

SINGLE CODE

Yes

No

ASK IF YES AT S5 UNLESS CP=2

S6. IF CP=2: Which, if any of the following energy suppliers did you buy your electricity from before switching to Octopus Energy? ELSE: Which, if any, of the following energy suppliers have you switched to since you signed up to the trial?

SINGLE CODE

- British Gas
- EDF
- E.ON
- npower
- Scottish Power
- SSE
- Shell Energy

- Ovo Energy
- Bulb
- Octopus Energy
- Bristol Energy
- Igloo Energy
- SO Energy
- Together Energy
- Other (SPECIFY)
- None of these
- Don’t know

ASK IF YES AT S5; DO NOT ASK IF CP=2

S7. And when you switched your energy supplier [IF CODES 1-12, 15,16,17 AT S6]: to [INSERT NAME OF SUPPLIER FROM S6], was this so you could join the trial, or entirely for other reasons? INTERVIEWER TO READ OUT IF NECESSARY: for example, did you switch to get a cheaper tariff?

SINGLE CODE

- To join the trial
- Entirely for other reasons (please specify-[record OE response])

ASK ALL

S10. Including yourself, how many people normally live at this address?

ENTER NUMBER. CANNOT BE ZERO.

- Don’t know
- Refused

Energy behaviours and attitudes

ASK ALL

Q1. I am now going to read out a number of statements that other people have made about the energy they use at home. Please tell me to what extent you agree or disagree with each one?

READ OUT

SINGLE CODE FOR EACH ROW

RANDOMISE STATEMENTS

DOWN SIDE OF GRID

- I have tried to reduce the amount of energy I use at home
- I am more concerned about having a warm and comfortable home than saving energy
- I feel in control of how much energy I personally use
- I know what uses the most energy in my home
- I am very conscious about the cost of the energy I am using
- I don't spend much time thinking about my energy use
- I am aware of improvements that can be done to make my home more energy efficient

ASK GEO (IF CP=4) ONLY: I have a good understanding of how much it costs to heat my home

ASK GEO (IF CP=4) ONLY: It's more efficient to have the heating on all day at a lower temperature than for short periods at higher temperatures

ACROSS TOP OF GRID

- Strongly agree
- Tend to agree
- Neither agree nor disagree
- Tend to disagree
- Strongly disagree
- Don't know – DO NOT READ OUT

ASK ALL

Q2. I am now going to read out some things that people may do in their homes. For each one, please tell me to what extent you agree or disagree with the statement "I tend to…"

READ OUT

SINGLE CODE

RANDOMISE STATEMENTS

DOWN SIDE OF GRID

- Leave the lights on when not in the room
- Boil the kettle with more water than needed
- Wash clothes at 40°C or higher
- Heat rooms that are not being used to the same temperature as those that are being used
- Leave the heating on when going out for a few hours

- Ignore the energy consumption of new products or appliances when buying them

ACROSS TOP OF GRID

- Strongly agree
- Tend to agree
- Neither agree nor disagree
- Tend to disagree
- Strongly disagree
- Don’t know – DO NOT READ OUT

ASK ALL ELIQ AND ENERGY LOCAL (IF CP = 1 OR 2)

Q3. How often do you tend to use each of the following appliances between 4pm and 8pm, if you have them?

READ OUT

SINGLE CODE FOR EACH ROW

DOWN SIDE OF GRID

- Your washing machine, or the wash cycle on your washer/dryer
- Your tumble dryer, or the dry cycle on your tumble dryer
- Your dishwasher

ACROSS TOP OF GRID

- Always
- Most of the time
- Sometimes
- Hardly ever
- Never
- Not applicable - I/ we don’t have this appliance
- Don’t know / Can’t remember – DO NOT READ OUT

ASK ALL

Q4. I would like to understand how you currently heat this property. Please tell me whether you heat this property in any of the following ways? Please say yes to all that apply.

MULTI CODE

- Central heating
- Gas

- Oil
- Solid fuel – coal or biomass (e.g. wood)
- Fixed room heaters
- Electric (storage)
- Gas
- Electric (not storage/ radiator)
- Solid fuel (open fire/enclosed stove) – coal or wood
- Portable heaters
- Electric
- Other
- Other
- Communal or district heating
- Other [SPECIFY]
- Don’t know – DO NOT READ OUT

ASK IF MORE THAN ONE CODE AT Q4

Q5. And what is the main way you heat this property during the Winter?

SINGLE CODE

INTERVIEWER READ OUT CODES SELECTED AT Q4 AND SELECT ONE AS MAIN HEATING SYSTEM
ALLOW DON’T KNOW

ASK ALL

Q6. How much do you agree or disagree with the following statements?

SINGLE CODE EACH ROW

DOWN SIDE OF GRID

- I could afford to make my home warmer if I wanted to
- During the Winter, I am usually able to keep my home at a comfortable temperature
- It is difficult to heat my home to a comfortable temperature even with the heating on
- It is too expensive to heat my home to a comfortable temperature

ACROSS TOP OF GRID

- Strongly agree
- Tend to agree

- Neither agree nor disagree
- Tend to disagree
- Strongly disagree
- Don’t know – DO NOT READ OUT

ASK ALL

Q7. I am now going to read out some things that some homes may have installed to help them control their heating. Please can you tell me, which, if any, of the following controls you have in your home?

INTERVIEWER IF NECESSARY: When answering please think about whether or not this has been installed in your property, even if the decision was not made by you personally. Please also let me know if you think any of these controls are not possible to install in your home.

SINGLE CODE EACH ROW

READ OUT

DOWN SIDE OF GRID

- Valves to control the temperature of individual radiators
- A central thermostat to set the temperature of your whole home (IF NECESSARY): that is not attached to your boiler
- A central timer, allowing you to set the heating to come on at desired times of the day, such as the times you are most likely to be in the house
- A programmable thermostat, allowing you to set your heating to different temperatures at different times (IF NEEDED): for example, you might set it to be warmer in the mornings
- An automated or smart thermostat which can control your heating automatically or remotely, for example through an app [such as Hive or Nest]

ACROSS TOP OF GRID

- Yes
- No
- Not possible
- Don't know - DO NOT READ OUT

ASK IF CODES 1 AT Q7 C, D OR E

Q8. Which of the following best describes how long your heating is on or off each day in Winter?

SINGLE CODE

- I/ we switch it on and off when we need to by using a switch on the control panel or boiler, or through an app
- I/ we set a timer so the heating comes on only at specific times of the day
- I/ we leave the heating on all the time
- Other (SPECIFY)
- None of these
- Don't know – DO NOT READ OUT

ASK IF CODE 1 AT Q7 B, D OR E

Q9. And which of the following best describes how you typically set the temperature of your heating when it is on?

SINGLE CODE

- I/ we set the temperature on the thermostat or programmer to be the same most days
- I/ we turn the temperature up or down regularly depending how cold or warm my/ our home is
- Other (SPECIFY)
- None of these
- Don't know – DO NOT READ OUT

ASK ALL

Q11. Which one of these best describes how well you and your household are keeping up with your energy bills at the moment? Please just choose the option that applies.

INTERVIEWER TO ADD IF QUESTIONED: if your household finances have changed as a result of the COVID-19 pandemic, please say which of the following describes how well you are keeping up with your energy bills now rather than before the pandemic.

SINGLE CODE

READ OUT

- I/we manage very well
- I/we manage quite well
- I/we get by alright
- I/we have some difficulties
- I/we have severe difficulties
- Don't know – DO NOT READ OUT
- Prefer not to answer – DO NOT READ OUT

ASK ALL ELIQ OR ENERGY LOCAL (IF CP = 1 OR 2)

Q12. I am now going to read out a number of statements that other people have made about their energy bills. Please tell me to what extent you agree or disagree with each one. INTERVIEWER TO ADD IF QUESTIONED: if your household finances have changed as a result of the COVID-19 pandemic, please answer based on your ability to pay your bills now rather than before the pandemic.

READ OUT

SINGLE CODE FOR EACH ROW

DOWN SIDE OF GRID

- It's difficult to predict how much I will spend on energy each month
- I worry about the cost of energy over the next few years

ACROSS TOP OF GRID

- Strongly agree
- Tend to agree
- Neither agree nor disagree
- Tend to disagree
- Strongly disagree
- Don't know – DO NOT READ OUT

Uptake of energy efficiency measures

ASK ALL

Q23. I am now going to read out some things that people might have done to their home. For each, please can you tell me if it has been fitted anywhere in your home, or not?

When answering please think about whether or not this has been done to your property, even if the decision was not made by you personally or was done before you moved in.

SINGLE CODE

INTERVIEWER: PLEASE USE THE FOLLOWING RULES WHEN CODING:

IF BECAUSE THEY ARE RENTING, THEY CANNOT CHOOSE TO INSTALL THE MEASURE, OR IF IT IS NOT PHYSICALLY POSSIBLE TO INSTALL THE MEASURE (E.G. CANNOT INSTALL LOFT INSULATION IF PROPERTY DOES NOT HAVE A LOFT) CODE AS '2

RANDOMISE

- Installing loft insulation or top-up loft insulation
- Installing draught proofing to windows and/or doors
- Installing under floor insulation
- Installing double glazing
- Installing wall insulation
- Installing a renewable heating system (for example a biomass boiler, ground or air source heat pump or solar thermal system)
- Replacing an older gas boiler with a more efficient condensing gas boiler
- Installing solar panels

- Yes, this is fitted somewhere in my home
- No, this is not fitted anywhere in my home
- Don't know – DO NOT READ OUT

ASK ALL ENERGY LOCAL (IF CP=2)

Q24. As far are you know, approximately what proportion of your household's energy supply currently comes from local energy sources, such as local solar panels or wind turbines.

READ OUT

SINGLE CODE

- All of it/ 100%
- The vast majority/ 80% or more
- Most of it/ more than 50% but less than 80%
- About half/ 50%
- Some of it/ more than 20% but less than 50%
- A small amount/ less than 20%
- None
- Other (please specify)
- Don't know – DO NOT READ OUT

ASK ALL ENERGY LOCAL (IF CP=2)

Q25. How important or unimportant is it to you that some of your energy comes from local energy sources, such as local solar panels or wind turbines?

READ OUT

SINGLE CODE

- Very important
- Fairly important
- Not very important
- Not at all important
- Don’t know – DO NOT READ OUT

ASK ALL ENERGY LOCAL (IF CP=2)

Q25B. To what extent do you agree or disagree with the following statements?

SINGLE CODE

READ OUT

RANDOMISE STATEMENTS

DOWN SIDE OF GRID

- I regularly participate in local community initiatives or projects
- I don’t have the time to participate in local community initiatives or projects
- I’m happy to pay a higher price in shops, pubs or restaurants if it helps support local businesses
- I would be happy to spend more on my energy bills if it was generated locally
- Local community initiatives or projects rarely achieve their goals
- Being environmentally friendly is an important part of who I am
- I am prepared to greatly reduce my energy use in order to tackle climate change
- I have a good understanding of how much my household spends on energy

ACROSS TOP OF GRID

- Strongly agree
- Tend to agree
- Neither agree nor disagree
- Tend to disagree
- Strongly disagree
- Don’t know – DO NOT READ OUT

Key underlying factors that may influence energy use and uptake of products

ASK ALL

Q26. Thinking now about your home, how much do you agree or disagree with these statements that other people have said? It doesn't matter if they don't apply to your current situation; we are interested in what you generally think about this.

SINGLE CODE

READ OUT

RANDOMISE STATEMENTS

DOWN SIDE OF GRID

- I'm the type of person who likes to have the newest gadgets in my home
- It's not worth me doing things to help the environment if others don't do the same INTERVIEWER NOTE TO THE 2nd STATEMENT "INTERVIEWER – PLEASE NOTE NEGATIVELY WORDED STATEMENT"
- I'm always looking out for new ideas to improve my home
- I'm happy to share my energy data with companies who will use it to help me save energy
- I'm happy to share my energy data with companies who will use it to help other people save energy
- IF ENERGY LOCAL ONLY (CP=2): I would prefer to get tips on how to save energy from people I know than from my energy supplier

ACROSS TOP OF GRID

- Strongly agree
- Tend to agree
- Neither agree nor disagree
- Tend to disagree
- Strongly disagree
- Don't know – DO NOT READ OUT

ASK ALL

Q27. What, if anything, prevents you from doing more to make your home more energy efficient?

DO NOT READ OUT

MULTICODE

- Cost of improvements is too high
- No guarantee that it will save me money

- Don’t know what to do
- Don’t know where to get information
- Don’t trust installers/suppliers to give me unbiased information
- Confused/received conflicting information
- Hassle/disruption of making improvements
- May change character/appearance of my home
- May lose space (e.g. room space, storage space in loft)
- Structural considerations (e.g. shared walls, lease restrictions, planning permission needed, period
- features in home, live in conservation area)
- No interest in energy efficiency/green issues
- Lack of time
- Other priorities at the moment (e.g. work, new baby)
- Already doing enough
- Landlord/freeholder won’t allow
- Won’t stay here long enough
- Other (specify)
- None of these

ASK ALL ELIQ AND ENERGY LOCAL (CP=1 or 2)

S15A. Is your household’s gas and electricity supplied by the same energy supplier?

SINGLE CODE

- Yes
- No
- Don’t know – DO NOT READ OUT

ASK ALL SINGLE FUEL CUSTOMERS (CODE 2 AT S15A)

Q28. Overall, how satisfied or dissatisfied are you with your electricity supplier?

SINGLE CODE

- Very satisfied
- Fairly satisfied
- Neither satisfied nor dissatisfied
- Fairly dissatisfied

- Very dissatisfied
- Don’t know – DO NOT READ OUT

ASK ALL DUAL FUEL CUSTOMERS (CP=3,4,5 OR S15A=1)

Q29. Overall, how satisfied or dissatisfied are you with your gas and electricity supplier?

SINGLE CODE

- Very satisfied
- Fairly satisfied
- Neither satisfied nor dissatisfied
- Fairly dissatisfied
- Very dissatisfied
- Don’t know – DO NOT READ OUT

ASK ALL

Q30. Thinking about the overall service that your energy supplier provides to you, to what extent do you trust them or not to provide you with a service that meets your needs?

Please answer on a scale of 1 to 10 where 1 is don’t trust them at all and 10 is trust them completely.

READ OUT

SINGLE CODE

- 1 = I don’t trust them at all
- …
- 10 = I trust them completely
- Don’t know – DO NOT READ OUT
- ASK ELIQ and Lightbulb ONLY (IF CP=1 or 5) It’s too soon to say

ASK GENGAME, Lightbulb and GEO ONLY (IF CP = 3, 4 or 5)

Q31. And thinking about your overall experiences of them, how easy or difficult do you find dealing with your energy supplier?

Please answer on a scale of 1 to 10 where 1 is extremely difficult and 10 is extremely easy.

READ OUT

SINGLE CODE

- 1 = It is extremely difficult

- …
- 10 = It is extremely easy
- Don’t know – DO NOT READ OUT
- ASK Lightbulb ONLY (IF CP= 5) It’s too soon to say

Views of smart metering

ASK ALL

Q32. I’m now going to ask you some questions about your smart meter. Approximately when was your current smart meter installed?

SINGLE CODE

- In the last month
- 1 to 3 months ago
- 4 to 6 months ago
- 7 to 12 months ago
- More than 1 year ago but less than 2 years ago
- More than 2 years ago
- It was already installed when I moved into the property
- I haven’t got a smart meter yet
- Don’t know/ Can’t remember – DO NOT READ OUT

ASK ALL UNLESS Q32=8

Q33. And did you have another smart meter before your current meter, for example one provided by a different supplier? IF CODE 8 AT Q32

SINGLE CODE

- Yes, in this property
- Yes, in a previous property
- No
- Don’t know – DO NOT READ OUT

ASK ALL UNLESS Q32= CODE 8

Q34. Overall, how satisfied or dissatisfied are you with your current smart meter?

SINGLE CODE

- Very satisfied
- Fairly satisfied

- Neither satisfied nor dissatisfied
- Fairly dissatisfied
- Very dissatisfied
- Not had my smart meter long enough to say
- Don’t know – DO NOT READ OUT

DO NOT ASK IF CODE 6 AT Q34 OR CODE 8 AT Q32

Q35. How likely or not would you be to recommend a smart meter to a friend, colleague or relative? Please give your answer on a scale of one to ten where one means you would definitely not recommend a smart meter and ten means you would definitely recommend a smart meter if asked?

SINGLE CODE

- 1 = would definitely not recommend
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10 = definitely would recommend
- Don’t know – DO NOT READ OUT

ASK ALL

Q36. Thinking about the last couple of months, how often, if at all, have you looked at information about how much energy you are using (either in pounds and pence or kilowatts) [IF PPM: or your credit balance] through each of the following:

READ OUT

SINGLE CODE EACH ROW

DOWN SIDE OF GRID

- Smart meter In-Home Display (IF NECESSARY). This is the standard display screen that you may have received for free from your energy supplier when you had a smart meter installed

- SKIP IF CP=2: An app from your energy supplier that shows data from your smart meter
- Your online account with your energy supplier
- ASK ALL TREATMENT: IF EL (CP=2): Your energy dashboard, IF LIGHTBULB (CP=5) information received from [TOOL NAME]: ELSE: [TOOL NAME]

AROSS TOP OF GRID

- Most days
- About once or twice per week
- About once or twice per month
- Less often than once per month
- Never
- I don't have this
- Don't know – DO NOT READ OUT

ASK ALL UNLESS Q32= CODE 8

Q38. I'd now like you to think one more time about the way you currently use energy in your home and to what extent, if at all, this has changed since you had your smart meter installed, including the In-Home Display if you have one.

Would you say that having a smart meter, including the In-Home Display has…

READ OUT

SINGLE CODE

- made a great deal of difference to how you use energy in your home
- made a fair amount of difference to how you use energy in your home
- made a little difference to how you use energy in your home
- made no difference to how you use energy in your home
- Don't know – DO NOT READ OUT

SENS product tool interaction and monitoring of energy use

ASK IF TREATMENT GROUP AND IF GENGAME (CP=3)

S8a. Can I just check, have you downloaded the Energy Saver App yet?

SINGLE CODE

- Yes
- No
- Don't know

- Not applicable

ASK ALL IN TREATMENT GROUP. IF CP=3, ONLY ASK IF CODE 1 AT S8a

S8. [IF CP=3: And] Can I just check, [IF CP=2: Have you used the Energy Local dashboard since joining the club?; IF Lightbulb (CP = 5) Have you engaged with [TOOL NAME] yet? (ELSE: have you personally interacted with [TOOL NAME] yet?]

SINGLE CODE

- Yes
- No
- Don't know
- Not applicable

ASK IF TREATMENT GROUP AND IF GEO (CP = 4) AND CODE 1 at S8

S8b. Can I just check, have you engaged with any of the following components of [TOOL NAME]?

MULTI-CODE EXCEPT 3 AND 4

- The GEO Home app
- The GEO Trio + In-Home Display
- None of these
- Don't know

ASK IF TREATMENT GROUP AND IF LIGHTBULB (CP = 5) AND CODE 1 at S8

S8c. Can I just check, have you engaged with any of the following components of [TOOL NAME]?

MULTI-CODE EXCEPT 5 AND 6

- Me and My Home page
- Heating logger
- Heating report
- Coaching messages
- None of these
- Don't know

ASK IF CODE 1 AT S8

S9. How often have you typically IF EL (CP=2): interacted with your club and/or the energy local dashboard since you first had access to it? IF Lightbulb (CP = 5) engaged with [TOOL

NAME] since you first signed up to the trial ELSE: interacted with [TOOL NAME]} since you first had access to it?

SINGLE CODE

- More than once a day
- Every day
- Most days
- About once or twice per week
- About once or twice per month
- Less often than once per month
- Don't know – DO NOT READ OUT

ASK ALL

Q13. Have you ever…

SINGLE CODE EACH ROW

READ OUT

DOWN SIDE OF GRID

- Worked out what a normal level of energy use is for your household i.e. what you use on a typical day, week or month?
- Monitored what you spend on energy, for example against a budget?

ACROSS TOP OF GRID

- Yes, I have
- No, I have not
- Don't know – DO NOT READ OUT

ASK IF CODE 1 AT Q13 STATEMENT A

Q14. And which if, any of the following have you used to work out what a normal level of energy use is for your household?

MULTICODE

- A paper or email energy bill from your energy supplier
- An online account with your energy supplier
- An app from your energy supplier
- An app (not through your energy supplier)
- A smart energy display/ In-Home Display

- Meter readings you have taken yourself
- ASK TREATMENT ONLY [TOOL NAME]
- Don’t know – DO NOT READ OUT

ASK IF CODE 1 AT Q13 STATEMENT B

Q15. And which if, any of the following have you used to monitor what you spend on energy, for example against a budget

MULTICODE

- A paper or email energy bill from your energy supplier
- An online account with your energy supplier
- An app from your energy supplier
- An app (not through your energy supplier)
- A smart energy display/ In-Home Display
- Meter readings you have taken yourself
- ASK TREATMENT ONLY [TOOL NAME]
- Don’t know – DO NOT READ OUT

ASK IF CODE 1 AT S8

S9NEW. Have you IF EL (CP=2) used your energy local dashboard IF GenGame, Eliq or Geo (CP=1,3 or 4) used [TOOL NAME] to do any of the following since you first had access to it?

If Lightbulb (CP=5) Have you engaged with [TOOL NAME] to do any of the following since you first signed up to the trial?

SINGLE CODE PER ROW

- Yes
- No
- Don’t know – DO NOT READ OUT
- [TOOL NAME] does not have this feature – DO NOT READ OUT

RANDOMISE STATEMENTS (EXCEPT I & J, and K & L, WHICH SHOULD BE ASKED SEQUENTIALLY)

- ASK ALL Get tips on how to use less energy
- ASK ALL Get information on the best time to use energy
- ASK GEO (IF CP=4) ONLY Create and view a schedule for when your heating comes on
- ASK GEO (IF CP=4) ONLY Create and view a schedule for your hot water

- ASK GEO (IF CP=4) ONLY Automatically switch your heating off if you are out
- ASK GEO (IF CP=4) ONLY Explore your past energy use
- ASK GEO (IF CP=4) ONLY Set and review gas or electricity budgets
- ASK ELIQ, GEO, LIGHTBULB & GENGAME (IF CP=1, 3, 4 or 5) ONLY Get advice or tips on how to reduce your heating bills
- ASK GEO, ENERGY LOCAL, GENGAME & ELIQ ONLY (IF CP= 1,2, 3 or 4) See how much electricity you have used over the last week or month
- ASK GEO, ENERGY LOCAL, GENGAME & ELIQ ONLY (IF CP= 1,2, 3 or 4) See how much electricity you are using at that point in time
- ASK GEO, LIGHTBULB, GENGAME & ELIQ ONLY (IF CP= 1,3,4 or 5) See how much gas you have used over the last week or month
- ASK GEO, LIGHTBULB, GENGAME & ELIQ ONLY (IF CP= 1,3,4 or 5) See how much gas you are using at that point in time
- ASK GENGAME ONLY (IF CP = 3) Find out how much carbon your household has saved
- ASK GENGAME ONLY (IF CP = 3) Find out which appliances are consuming the most energy
- ASK ENERGY LOCAL (CP=2) ONLY: Remotely control wired appliances that have a smart plug

ASK IF CODE 1 AT S8

QS9OPEN. Is there anything else that you have IF EL (CP=2) used your energy local dashboard IF GenGame, Eliq, Geo or Lightbulb (CP=1,3, 4 or 5) used [TOOL NAME] to do that has not already been mentioned? Please describe if so.

- Yes – Interviewer record open-ended response
- No

ASK GENGAME ONLY (CP = 3)

QGAM1. Have you used the gaming feature of the Energy Saver App, which allows you to accept challenges, accumulate points and take part in prize draws?

SINGLE CODE

- Yes
- No
- Don’t know – DO NOT READ OUT

ASK GENGAME ONLY (CP = 3) AND IF CODE 1 AT QGAM1

QGAM2. Please indicate to what extent you agree or disagree with the following statement about the challenges and rewards system of the Energy Saver App:

A: The challenges and rewards system of the Energy Saver App made me use the app more than I otherwise would have

- Strongly agree
- Tend to agree
- Neither agree nor disagree
- Tend to disagree
- Strongly disagree
- Don’t know

Impact and views of SENS products

ASK ALL

Q39. Over the last year, would you say that generally your understanding of how your household uses energy has:

READ OUT. NOTE TO INTERVIEWER: If respondent asks whether to think about gas or electricity, ask them to think about both (if they have both) and think overall about how well they understand the total energy they use.

SINGLE CODE

- Got a lot better
- Got a little better
- Stayed about the same
- Got a little worse
- Got a lot worse
- Don’t know – DO NOT READ OUT

ASK IF CODE 1 AT S8 (have used tool) AND CODE 1 OR 2 AT Q39

Q41. You said your understanding of how your household uses energy has got better. Would you say that this is…

- entirely because of the information you have received from [TOOL NAME]
- mostly because of information you have received from [TOOL NAME] but partly for other reasons
- partly because of information you have received from [TOOL NAME] but mostly for other reasons

- entirely for other reasons
- Don’t know – DO NOT READ OUT

ASK IF CODE 1 AT S8 (have used tool)

Q42: Compared with before you started IF EL (CP=2) using the Energy Local dashboard IF Lightbulb (CP=5) engaging with [TOOL NAME] ELSE using [TOOL NAME] has there been any change in how confident you are in knowing each of the following?

Single code per row

- Much more confident now
- A little more confident now
- As confident as they were before
- A little less confident now
- Much less confident now
- Don’t know

- ASK ENERGY LOCAL, GENGAME & ELIQ ONLY (IF CP= 1,2, or 3) What activities or pieces of equipment require a lot of energy in your home
- ASK LIGHTBULB, ENERGY LOCAL, GENGAME & ELIQ ONLY (IF CP= 1,2,3 or 5) What changes you could make to save the amount of energy used in your home
- How much your household spends on energy each month
- The times of day or night in which your home uses the most energy
- The days of the week on which your home uses the most energy
- ASK GENGAME & ELIQ ONLY (IF CP= 1 or 3) Which tariff /payment plan you have with your energy supplier (i.e. how much you pay for each unit of energy at different times of day and night)

ASK IF CODE 1 AT S8 (have used tool)

Q43: Please indicate to what extent you agree or disagree with the following statements:

- A: ASK Eliq, Energy Local, GenGame and GEO ONLY (CP = 1,2,3,4) I have tried to reduce the amount of electricity my household uses since I started to IF EL (CP=2) use the Energy Local dashboard ELSE use [TOOL NAME].
- B: ASK Eliq, GenGame, GEO and Lightbulb ONLY (CP = 1,3,4 or 5) I have tried to reduce the amount of gas my household uses since I started to IF Eliq, GenGame or GEO (CP = 1,3 or 4) use [TOOL NAME] IF Lightbulb (CP=5) engage with [TOOL NAME].

Single code per row

- Strongly agree
- Tend to agree
- Neither agree nor disagree
- Tend to disagree
- Strongly disagree
- Don’t know

ASK IF CODE 1 AT S8 (have used tool)

Q44: Please indicate to what extent you agree or disagree with the following statements:

- I have found it easier to heat my home to a comfortable temperature since I started to IF EL (CP=2) use the Energy Local dashboard IF Lightbulb (CP=5) engage with [TOOL NAME] ELSE use [TOOL NAME].
- I have found it easier to control how much I spend on energy since I started to IF EL (CP=2) use the Energy Local dashboard IF Lightbulb (CP=5) engage with [TOOL NAME] ELSE use [TOOL NAME].

Single Code

- Strongly agree
- Tend to agree
- Neither agree nor disagree
- Tend to disagree
- Strongly disagree
- Don’t know

ASK ALL TREATMENT

Q50. Overall, how satisfied or dissatisfied are you with [TOOL NAME]?

SINGLE CODE

- Very satisfied
- Fairly satisfied
- Neither satisfied nor dissatisfied
- Fairly dissatisfied
- Very dissatisfied
- Don’t know – DO NOT READ OUT

ASK ALL TREATMENT

Q51. How likely or not would you be to recommend [TOOL NAME] to a friend, colleague or relative? Please give your answer on a scale of one to ten where one means you would definitely not recommend [TOOL NAME] and ten means you would definitely recommend [TOOL NAME]?

SINGLE CODE

- 1 = would definitely not recommend
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10 = definitely would recommend
- Don’t know – DO NOT READ OUT

DEMOGRAPHICS

Finally, we would like to ask you a couple of other questions to ensure we are talking to a wide range of people.

ASK IF S10>1

DM2. Without giving me their specific ages, are you able to tell me how many people living in your household are aged either 16 or under or 65 or over?

- People living in household aged 16 or under
- People living in household aged 65 or over
- Don’t know
- Refused

NOTE TO SCRIPTER: S10 MINUS DM2_1 = NUMBER OF ADULTS IN HOUSEHOLD, A DUMMY VARIABLE CALLED A1

ASK ALL

DM7. Does anyone in your household have a long-standing illness, disability or infirmity? By long-standing I mean anything that has troubled you or them over a period of time or that is likely to affect you or them over a period of time.

SINGLE CODE

- Yes
- No
- Don't know – DO NOT READ OUT
- Refused – DO NOT READ OUT

ASK ALL

DM8. To check, is your household's total income, before tax and any other deductions more than or less than £16,000 per year, or not? (IF MORE) And is it more than £30,000, or more than £50,000?

SINGLE CODE

- Less than £16,000 per year
- Between £16,001 and £30,000 a year
- Between £30,001 and £50,000 a year
- Above £50,000 a year
- Don't know
- Refused

ASK ALL S10>1

DM9. I would now like to ask you about the member of your household who is the Chief Income Earner, that is the person with the largest income, whether from employment, pensions, state benefits, investments or any other source. Is this you:

SINGLE CODE

- Yes
- No
- Don’t know – DO NOT READ OUT
- Not applicable - DO NOT READ OUT

ASK IF S10=1 OR CODES 1-2 AT DM9

DM10. And can you confirm [IF CODE 1 at DM9 OR S10=1:your; IF CODE 2 at DM9 = their] working status?

SINGLE CODE ANSWER ONLY. IF STUDENT AND PART TIME WORK CODE AS STUDENT, IF MORE THAN ONE INCOME SOURCE– CODE THE ACTIVITY WHICH PROVIDES THE RESPONDENT WITH THE HIGHEST INCOME (E.G. IF THEY ARE RETIRED AND WORKING PART-TIME, DO THEY RECEIVE THE HIGHEST INCOME FROM THEIR PENSION OR THE PART-TIME WORK?). ALLOW DON’T KNOW. ALLOW REFUSED.

SINGLE CODE

- Working full time (30+ hours per week)
- Working part time (less than 30 hours a week)
- Retired
- Unemployed
- Looking after home/family
- Unable to work due to illness/ disability
- Furloughed
- Student
- Other (please specify)
- Don't know – DO NOT READ OUT
- Prefer not to answer – DO NOT READ OUT

ASK ALL

DM11. I'm now going to ask you some questions about how much time people in your household spend at home. In a typical week, on how many weekdays are you currently spending most of the day out of the home, for example to do paid or voluntary work, to study, or to undertake caring responsibilities.

- None – I am normally at home every weekday
- 1
- 2
- 3
- 4
- 5 – I normally spend every weekday out of the home
- Don't know – DO NOT READ OUT
- Prefer not to answer – DO NOT READ OUT

ASK IF A1>1. DISPLAY AS GRID, ANSWER CODES AS ROWS, A COLUMN FOR EACH PERSON. NUMBER OF COLUMNS = A1-1

DM12. I'd now like to about the others in your household aged 16 and over. Thinking about the [IF A1>2: first/ second/ third etc.] other person aged 16 or over, in a typical week, on how many weekdays are they currently spending most of the day out of the home, for example to do paid or voluntary work, to study, or to undertake caring responsibilities. INTERVIEWER TO REPEAT FOR EACH PERSON AND COMPLETE GRID

- None – they are normally at home every weekday
- 1s

- 2
- 3
- 4
- 5 – they spend every weekday out of the home
- Don’t know – DO NOT READ OUT
- Prefer not to answer – DO NOT READ OUT

ASK ALL

DM13. Which, if any, state benefits or allowances do you or anyone in your household currently receive? Please include any benefits, allowances, tax credits or other payments you receive.

INTERVIEWER PROMPT: Anything else? Your answers are completely confidential.

MULTICODE

DO NOT READ OUT

- Job seekers allowance
- Income support
- Working tax credit
- Child tax credit
- Pension credit
- Housing benefit
- Council tax benefit
- Disability living allowance
- Universal credit
- Other state benefits
- None of these
- Don’t know
- Prefer not to answer – DO NOT READ OUT

ASK ALL

RC1. If you have consented to sharing your household’s energy data as part of the [CP NAME] trial, we would also like to ask for your consent to link this data with your survey answers. It is optional but would greatly help the evaluation if you are willing to provide your consent. This data will only be used for the purpose of this specific research.

Do you consent to Ipsos MORI linking the energy consumption data you consented to be shared as part of the trial with the survey answers you have provided?

- Yes
- No
- Not applicable / I did not consent to sharing my household's energy data – DO NOT READ OUT

ASK ALL TREATMENT

RC2. [CP = 1,2,3,4] We would also like to ask for your consent to link data from [TOOL NAME] on how you have used and interacted with [CP = 1,3,4] 'the app' [CP = 2] 'the dashboard and portal' during the trial with the survey responses you have provided.

[CP = 5] We would also like for your consent to link data on how you have engaged with [TOOL NAME] during the trial with the survey responses you have provided.

This will help us learn more about which parts of [TOOL NAME] are most effective in helping households use energy more efficiently and effectively. It is optional but would greatly help the evaluation if you are willing to provide your consent. This data will only be used for the purpose of this specific research.

Do you consent for this data to be linked to the survey responses you have provided?

- Yes
- No
- Not applicable – DO NOT READ OUT

Close

Thank you for taking the time to participate in both this and the previous survey, we really appreciate your time and your responses will be very valuable to us. It will not be possible to identify your responses in published reports from this research, as they will be aggregated with responses from other people who have completed the survey Your personal data will be securely stored and deleted at the end of the research in line with GDPR requirements.

Annex 3 SENS opt-in consent questions to recruit trialists

Please complete this after you have read the information on the preceding screens.

If you are willing to participate, please provide your consent by ticking each of the boxes below. All boxes must be ticked to take part in the study.

I have read and understood all the information provided and I voluntarily consent to participate in the study. ☐

I confirm that I am [*NAME AND ADDRESS OF HOUSEHOLDER*]. ☐

I confirm that I am aged 18 or over and regularly live at this address. ☐

Did you move into this address in the last 12 months?* No ☐ Yes ☐

*This is so UCL does not access smart meter data for any previous household that lived at your address.

If you answered 'Yes', please write in the month and year you moved in:
Month _____ Year _____

I consent to my name, address and smart meter registration information being shared with UCL so that they can collect smart meter data for this address from this point going forward and historic smart meter data for up to the previous 12 months. This data, and my Energy Performance Certificate information, will only be used by UCL and the Ipsos MORI team for the purposes of the research study, as explained in this Information Page. Please note: your name and address will never be made publicly available and you will never be identified in any research results. ☐

I give permission for my energy supplier to provide up to 12 months of my previous energy meter readings for this property to Ipsos MORI for the purposes of research only. ☐

I give permission for you to share my contact details with Ipsos MORI so they can invite me to provide feedback on how my home uses energy and the [*product name*] (if I am one of the households which receives it). I understand participation in these research activities will be voluntary and I would be under no obligation to take part if invited. ☐

I understand that I can withdraw consent at any time using the contact details provided to me. ☐

I understand that the [product name] is being offered as part of a research trial. I understand that this means that signing up now does not necessarily mean that my home will be one of those randomly selected to receive the [product name] in the near future. ☐

I understand that Ipsos MORI and UCL are not responsible for the [product name], they are only responsible for the independent evaluation of the [product name]. ☐

I understand that, according to data protection legislation, 'Public Task' will be the lawful basis for UCL to process my data, while Ipsos MORI will rely on the consent I have given. ☐

Thank you for reading this information. We will send a copy of this information and your consent details to you for your records. You may also find this information at any time by visiting [*CP RELEVANT ADDRESS HERE*].

Annex 4 Example qualitative interview topic guide – GEO (SENS-ST)

Structure

Section	Time	Details
Introduction and warm up	5-10 mins	Introduction to the interview and understanding household behaviours and characteristics.
Motivations and signing up	5 mins	Understanding trialists motivations behind signing up to the trial.
Tool interaction	10-15 mins	Discussion of the trialists' interactions with the GEO Home App and GEO IHD - understanding what they do and don't use, reasons why and opinions on each feature.
Perceptions of home comfort	10-15 mins	User perceptions of home comfort, including learning how the trialist heats their home, and attribution of this to the GEO intervention.
Household budgeting	5-10 mins	Understanding the trialist’s energy budgeting behaviours, including whether they have a budget, how they monitor this, and usefulness of the GEO intervention in managing this aspect of their consumption.
Overall satisfaction and impacts	5 mins	Trialists' overall satisfaction with the Geo Home App and GEO IHD device and concluding remarks.
Interview wrap-up	2 mins	Wrap-up and concluding remarks

Key

- Questions in bold are priority questions to ask all
- Questions not in bold and in bullet points are follow-up questions to use if needed/at interviewer discretion

- Additional prompts or probes to help trialists answer questions are in italics
- Instructions to interviewers are in CAPITALS

My name is [xxxxx] and I work for Ipsos MORI, the independent research company.

As you know, Ipsos MORI are independently evaluating the Geo Trio + Heating smart thermostat Trial on behalf of the UK Government, to help the Government understand whether this and similar products are effective at reducing household energy use, or not. You may remember taking part in a telephone survey in [INSERT MONTH, AND YEAR IF DEPTH IS IN 2022]. Today we're going to discuss some similar topics but, in more depth, and also see how you have been getting on with the Geo mobile app and smart thermostat now you have had access to them for a few months.

The discussion will last up to an hour.

There are no right or wrong answers. Everything you say is completely confidential. All information we collect is anonymised. Your name will not be linked to anything you tell me. We will write a report at the end of the research, which may be published. We will pick out key themes and might use quotes, but we will not name anyone or say who has said what. Quotes will just be linked to you being someone that participated in the Geo Trio + Heating smart thermostat Trial.

You can take part in the interview today, but you can still change your mind if you don't want us to include any of your anonymised quotes in the research report. If you do want your comments to be not included, you can contact us on the contact details on the information sheet, up until March 2022. Ask if trialist has any questions.

IF REMOTE INTERVIEW:

- Confirm trialist has reviewed and sent back the consent form in an email saying they agree/consent prior to the interview.

Ask if happy for the interview to be recorded, record consent after starting the recording. If trialist does not consent to be recorded, explain that we will capture their verbal consent to take part on the recording for our records, and then turn off the recording and take notes for the duration of the interview.

We would like to record the interview so that we don't forget what you have said. Only the people interviewing and/ or involved in the analysis will have access to the recording which will be destroyed within three months of us writing the report. Would you be OK with this?

IF THEY SAY NO:

- Ok, no problem. But we need to record for auditing purposes that you are happy to take part in the interview. I would like to confirm a few points with you, and after that I will switch off the recorder. Is that ok?

IF THEY SAY YES, SWITCH ON RECORDER/RECORDING SOFTWARE (OBS)

IF CONDUCTING A VIRTUAL INTERVIEW, READ OUT ALL AREAS THAT THE INTERVIEW WILL COVER – USE SURVEY RESPONSES TO TAILOR THE AREAS MENTIONED

Warm up

1. Please could you tell me a little bit about yourself? What do you tend to get up to day to day? Probe on

- Work (if currently in work, type of work)
- Hobbies and interests

EXPLORE THEIR HOME/FAMILY CIRCUMSTANCES

2. And could you tell me a little bit about your home?

- What type of property do you live in? House/flat? And how old is the property?
- How long have you lived here?
- Who else do you live with?
- How long have you lived in your local area/ community?

Motivations and signing up

3. Can you remember when you first heard about the Geo Trio+ Heating smart thermostat trial?

- Did you hear about it from Shell Energy? Were you already a customer of Shell Energy?

4. What did you think about Geo Trio+ Heating smart thermostat trial once you had heard about it?

5. What made you decide to sign up for the trial?

- How did you think it could benefit your household?
- Did you expect it to help your household to save energy? And save money on energy bills?
- Were you motivated by doing your bit for the environment/ reducing your carbon footprint?
- What were your thoughts on the free smart thermostat? Are you the type of person who likes to have the latest gadgets?

Tool interaction

Geo Home App

6. Have you downloaded the Geo Home app?
    - IF NOT: have you heard about the Geo Home App?
    - IF YES: for what reasons did you decide not to download the app?
7. [IF THEY HAVE DOWNLOADED IT] Have you used the app since you downloaded it?
    - IF NOT: what are the reasons you have not used the app? probe: not useful/ don't think I need it, didn't understand how to use it

IF VIDEO CALL AND HAVE DOWNLOADED IT: Can you talk me through the app and how it works? ALLOW THE PARTICIPANT TIME TO TALK YOU THROUGH AND OBSERVE HOW THEY USE IT. ASK THEM TO SHOW THE MAIN PAGES WHICH THEY TEND TO USE AND ASK THEM TO DESCRIBE THE FUNCTIONALITY OF THE PAGE AND WHAT IT ALLOWS THEM TO DO.

8. How did you learn how to use the app?
    - Did the installer demonstrate it when they visited? What can you remember about this?
    - Which screens or bits of information did they show you?
    - Is there anything you think they could have done differently when they were showing you the app?
    - Were you provided with information by Geo at/ around installation? By email/ hard copy?
    - Did you look for information yourself? On the Geo website? Where else?
    - What specifically were you looking for?
    - IF PROVIDED WITH OR FOUND INFORMATION ON HOW TO USE IT: What did you think about the information you found or received? Where was this from? How helpful was it? Did it help you do what you wanted?
    - Did you work it out yourself? How easy or difficult did you find this?
9. How often do you typically use the app?
    - How has this changed since you first had access to it?
    - IF USED IT MORE AT START BUT LESS NOW: why do you use the app less now than when you first had access to it? What, if anything would make you use it more often again?
10. When do you tend to use the app?
    - For example, do you use it at a regular time such as every morning, or the same day each week?
    - Do you use it (more) when the weather is cold or does this make no difference?
11. Which features of the app do you tend to use?
    - PROBE FOR EACH OF THE FOLLOWING:

- View current home energy usage in real-time
- Explore past energy use
- Set and review gas and electricity budgets
- Set the temperature of your heating and control your hot water
- View schedules for heating and hot water
- Use auto away mode
- Why do you use this feature? What is useful about them?
- How helpful have you found these features?

12. Are there any features of the app that you don't use? PROBE FOR EACH OF THE FOLLOWING:

- View current home energy usage in real-time,
- Explore past energy use
- Set and review gas and electricity budgets
- Set the temperature of your heating and control your hot water
- View schedules for heating and hot water
- Use auto away mode
- Why don't you use these features? Why are they not useful to you?

13. How easy or difficult do you find it to use the app?

- What about it makes it easy or difficult to use?

14. What have you learned from using the app? PROBE SPECIFICALLY:

- Has your understanding of your household energy use changed since seeing how your energy consumption changes in real-time?
- Do you feel better informed on how to manage your heating?
- Do you feel better informed about how much your heating costs you on a monthly basis?
- Do you feel better informed of the monetary value of changing your level of comfort in the home?
- ANYTHING ELSE: what has it told you that you didn't know before?

15. What support or advice have you had from Geo in how to use the app?

- How useful was this support or advice?
- What other support would you have wanted?
- [IF RELEVANT] Did the support or advice you received from Geo have an impact on whether and how much you used the app? Why/why not?

In home display

16. Were you provided with the Trio+ In-Home Display (IHD)?

- IF NOT: were you offered one?
- IF NOT: were you expecting to be offered one? Did you ask about this at your installation/ after?
- IF YES: for what reasons did you decide not to accept the In-Home Display?

IF VIDEO CALL AND USED IT: Can you talk me through the IHD and how it works? ALLOW THE PARTICIPANT TIME TO TALK YOU THROUGH AND OBSERVE HOW THEY USE IT. ASK THEM TO SHOW THE MAIN PARTS OF THE INTERFACE WHICH THEY TEND TO USE AND ASK THEM TO DESCRIBE THE FUNCTIONALITY OF THE PAGE AND WHAT IT ALLOWS THEM TO DO.

17. How did you learn how to use the In-Home Display?

- Did the installer demonstrate it when they visit? What can you remember about this?
- Which screens or bits of information did they show you?
- Is there anything you think they could have done differently when they were showing you the In-Home Display?
- Were you provided with information by Geo at/ around installation? By email/ hard copy?
- Did you look for information yourself? On the Geo website? Where else?
- What specifically were you looking for?
- IF PROVIDED WITH OR FOUND INFORMATION ON HOW TO USE IT: What did you think about the information you found or received? Where was it from? How helpful was it? Did it help you do what you wanted?
- Did you work it out yourself? How easy or difficult did you find this?

18. How often do you typically use the In-Home Display?

- How has this changed since you first had access to it?
- IF USED IT MORE AT START BUT LESS NOW: why do you use the display less now than when you first had access to it? What, if anything would make you use it more often again?

19. When do you tend to use the In-Home Display?

- For example, do you use it at a regular time such as every morning, or the same day each week?
- Do you use it when the weather is cold?

20. Which features do you tend to use?

- PROBE FOR EACH OF THE FOLLOWING:

- View current home energy usage in real-time,
- Explore past energy use
- Set and review gas and electricity budgets
- Set the temperature of your heating and control your hot water
- View schedules for heating and hot water
- Use auto away mode
- Why do you use this feature?
- IF NOT ALREADY COVERED ABOVE WHEN DISCUSSING THE GEO HOME APP FEATURES: What is useful about them?
- How helpful have you found these features?

21. Are there any features you don't use?

- Why don't you use these features?

22. How easy or difficult do you find it to use the In-Home Display?

- What about it makes it easy or difficult to use?

23. What have you learned from using the In-Home Display? IF NOT COVERED BY DISCUSSION OF GEO HOME APP?

- Has your understanding of your household energy use changed since seeing how your energy consumption changes in real-time?
- Do you feel better informed on how to manage your heating?
- Do you feel better informed about how much your heating costs you on a monthly basis?
- Do you feel better informed of the monetary value of changing your level of comfort in the home?
- ANYTHING ELSE: what has it told you that you didn't know before?

24. What support or advice have you had from Geo in how to use the In-Home Display?

- How useful was this support or advice?
- What other support would you have wanted?

25. Given what we have discussed, how do you prefer to control your heating – is this through the app or via the IHD?

- Why do you say this?
- What are the advantages?
- What are the disadvantages?

Improved perceptions of home comfort

Now I'd like to talk more about how you heat your home.

26. Could you talk me through how you tend to choose the times that you heat your home in winter?

- Is it on all the time, set to a timer/ schedule, or do you turn it on and off manually when required?
- IF SET TO TIMER: do you have the same schedule for every day? probe to understand if different at weekends, and if it varies on weekday e.g. if certain days more people are at home
- Can you set it to be on at different times in different rooms, or is it set for the home as a whole?

27. And what about the temperature that the heating is set to – how do you normally set this?

- For example, what temperature is your thermostat currently set to, if you have one?
- Is it always set to this temperature in winter, or do you move it up and down?
- IF THEY CHANGE IT: For what reasons would you tend to change the temperature? probe: Based on the outside temperature/ weather forecast? Based on how cold it feels inside? How much you have been spending on energy recently?
- Do you set the same temperature for the whole home, or can you set different temperatures in different rooms?

28. Compared with last winter, have you made any changes in how you heat your home? CHECK THROUGHOUT FOR ROLE OF GEO APP AND/ OR TRIO+ IHD IN THIS

- For example, changes to the hours the heating is on?
- Changes in the temperature the heating is set to?
- Changes in how you heat individual rooms? e.g. heating less-used rooms for less time and/ or at lower temperatures.

29. So far, this winter, would you say you've generally been able to keep your home to a comfortable temperature?

- What makes you say that? probe if been uncomfortably cold on some days

30. IF NO ABOVE: What would you say are the main reasons that you've not been able to keep your home to a comfortable temperature?

- Probe: cost of gas has increased
- Difficulties paying bills/ need money for other things
- Poor insulation
- Cold weather

31. How does this compare with last winter? Are you finding it easier or more difficult to keep your home to a comfortable temperature? What makes you say this?

- IF MORE DIFFICULT, PROBE: colder weather, higher gas prices, impacts of COVID-19 e.g. on household income.
- IF MORE DIFFICULT: How, if at all, has the Trio + smart thermostat helped manage these issues?
- IF EASIER How, if at all, has the Geo Home App or Trio+ In-Home Display helped you keep your home to a comfortable temperature?
- What else has helped? PROBE: warmer temperatures, upgrades to e.g. insulation, windows, new boiler

32. Do you set a heating and hot water schedule either via the Geo Home App or the IHD interface? MAY HAVE BEEN COVERED ABOVE. PROBE FOR BOTH HEATING AND HOT WATER SCHEDULES:

- How did you go about setting this schedule? Do you typically do this through the GEO Home App or via the IHD interface? Do you have a preference?
- Can you talk me through the schedule? probe on: time(s) heating is set to be on, weekday vs weekend, temperature(s) it is set to
- Have you changed it since you first set it? If so, in what ways? What prompted you to change the settings? Probe for differences in outdoor temperatures.
- Do you ever override the schedule with the app? If so, in what circumstances?
- Do you tend to use the auto away function when you are leaving the home? If yes, in what circumstances? Probe for when all out the house, holidays, weekends away etc

Improved household budgeting

Now I'd like to talk a bit more about your energy bills. I'd like to reassure you all the information you provide here is confidential, and that if there are any questions you don't want to answer that is fine, just let me know and we can move on.

33. In general, how are you managing with your energy bills at the moment?

- Do you think they are about right, too low or too expensive?
- Do you ever have any difficulties paying bills? In what ways?
- Have you had to cut spending in other areas to keep up with your energy bills? In what ways?

34. And would you say you are finding it easier, or more difficult, to manage your energy bills this Winter compared with last Winter? What makes you say this? What has led to this change? (If relevant)

- Has the Geo Home App helped you to manage your bills? Or the Trio+IHD? In what ways?

35. Do you have a budget for how much you spend on energy? Could you talk me through it?

- IF NO BUDGET: What would you say are the main reasons you don't set a budget for how much you spend on energy?
- What do you think could make you start setting a budget?
- IF YES BUDGET:
- Is this per week, month, or year?
- How long have you been doing this? What made you start?
- How did you go about setting it?
- Do your energy costs change with the seasons? How do you budget for this?
- How do you account for unexpected excess expenditure on energy costs? Probe for cold weather, energy price increases, more people at home during school holidays or over Christmas etc.

36. Do you track how much you are spending against the budget? How?

- IF YES
- How often do you track this?
- When did you start doing this? IF BEFORE THE TRIAL: how did you do this before joining the Trio + Heating smart thermostat Trial?
- Has the Geo Home App helped you with this? Or the Trio+ IHD? In what ways?
- If it looks like you might go over your budget, what do you do differently, if anything?

Satisfaction with Trio+ Heating smart thermostat Trial

37. Overall, how satisfied or dissatisfied are you with your participation in the Trio + Heating smart thermostat Trial? What makes you say that?

38. And how satisfied or dissatisfied are you with the Geo Home app? What makes you say that? And how satisfied or dissatisfied are you with (IF NOT COVERED EARLIER)

- how easy it is to use
- the information you received about it
- the features it has

39. And how satisfied or dissatisfied are you with the Trio+IHD? What makes you say that? And how satisfied or dissatisfied are you with (IF NOT COVERED EARLIER)

- how easy it is to use
- the information you received about it

- the features it has

40. Would you recommend the GEO Trio + smart thermostat and IHD? Why/ why not?

- IF YES
- Who would you recommend this to?
- What kinds of things would you say to them as part of your recommendation? What are the good things about these products? And any challenges with using them?
- ALL
- Will you continue to use the GEO Trio+ smart thermostat after the end of the trial? Why/why not?

41. Overall, how would you describe the impact of being in the Trio + Heating smart thermostat Trial?

- IF NECESSARY, PROBE ON: has it helped you to save energy? And save money on your energy bills? In what ways? Environmental benefits of taking part in the trial?
- Has it benefited you in any other ways? If so, how? PROBE ON: Increased disposable income due to reduced energy bills.
- Has it led to you changing any of your habits or behaviours? In what ways?
- How do your experiences compare with what you expected when you signed up?

Wrap up

Given everything we have discussed today, do you have anything else you'd like to add? Probe for: Anything we might have missed? Anything you feel is important from your perspective to mention?

42. Is there anything you would like to ask me before we wrap up?

Interviewer Prompt: Remind the trialist that as a thank you for taking part – they will receive a £50 bank transfer. Criteria will be in touch to organise this.

THANK AND CLOSE

This publication is available from: www.gov.uk/government/publications/smart-energy-savings-sens-competition-evaluation

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