



Department for
Energy Security
& Net Zero

Smart Energy Savings Competition (SENS): Intelligent Digital Energy Advisory (IDEAS)

Trial Level Evaluation Report

June 2023

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Contents

Executive Summary	5
Rationale for and objectives of the SENS Competition	5
Overview of the SENS product	6
Evaluation approach and methodology	6
Outcomes for trialists trialling the product	7
Conclusions	8
1. Introduction	9
1.1 Purpose of this report	9
2. Summary of Trial	11
2.1 The SENS IDEAS intervention	11
2.2 Aims of the intervention and how it was expected to achieve these	14
2.3 Design of the SENS IDEAS trial	17
2.3.1 Theory-based design	17
2.3.2 Households eligible to participate in the SENS trial and the evaluation	18
2.3.3 Recruitment strategy	19
2.3.4 Other issues which affected the implementation of the trial	20
3. Methodology	22
3.1 Data Collection	22
3.1.1 Energy consumption data	22
3.1.2 Engagement data	22
3.1.3 Quantitative telephone survey with trialists	23
3.1.4 User in-depth interviews	23
3.2 Analytical methods	23
4. Outcomes for trialists	26
4.1 Key findings	26
4.2 Trialist engagement with the SENS IDEAS intervention	27
4.3 How the SENS IDEAS intervention increased knowledge	27
4.3.1 Trialists are better informed about energy consumption and how to save energy	28
4.3.2 Trialists feel more in control of their energy use and reduced bill shock	30
4.4 How the SENS IDEAS intervention changed behaviour	31

4.4.1 Effects on energy use behaviour and investment in energy saving measures _____	31
4.5 Effects of the SENS IDEAS on trialists' energy consumption, thermal comfort and engagement / trust in their energy supplier _____	32
4.5.1 Reduced trialist's energy consumption _____	33
4.5.2 Improved perception of home comfort _____	36
4.5.3 Improved engagement and trust with Together Energy / Bristol Energy _____	37
5 Conclusions _____	38
Glossary _____	40
Annex A – SENS IDEAS intervention Theory of Change _____	43
Annex B – SENS IDEAS Trial Overview _____	44

Executive Summary

Rationale for and objectives of the SENS Competition

Smart meters are replacing traditional gas and electricity meters in homes and small businesses across Great Britain as part of an important upgrade to the national energy infrastructure, underpinning the cost-effective delivery of Government's Net Zero commitment. They are a critical tool in the transition to a low carbon energy system, for example by enabling incentives for consumers to use energy when renewable generation is available. Prior to the Competition, BEIS concluded that evidence suggested smart meters would result in average reductions of 3% for electricity customers, 2.2% for gas credit customers, and 0.5% for gas pre-payment customers¹.

Early evaluation and research have shown that these savings are realised through access to near real time feedback (via In-Home Displays, IHDs), energy efficiency advice at the point of installation, and accurate bills². The Smart Energy Savings Innovation (SENS) Competition was developed on the assumption that more sophisticated uses of energy consumption data can deliver additional savings to those already achieved by having a smart meter installed in the home.

The SENS Competition was 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. SENS was launched February 2019, with trials concluding end of March 2022 (extended by one-year due to COVID-19 impacts).

The Objectives of the Competition were to:

- Identify innovative products and services using smart meter data, which can deliver energy savings in homes in excess of those currently identified in the smart meter impact assessment, for either the Great Britain population or specific groups within it.
- Ensure that solutions are attractive and valued by consumers and are easily available (using existing technologies and delivery channels or cost-effective new hardware).
- Support the development of a domestic market for energy management products and services, securing investment from technology providers, energy suppliers, and third parties.

1

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/831716/smart-meter-roll-out-cost-benefit-analysis-2019.pdf

² <https://www.gov.uk/government/publications/smart-metering-early-learning-project-and-small-scale-behaviour-trials>

Overview of the SENS product

The SENS Intelligent Digital Energy Advisory (IDEAS) innovation project was delivered by Eliq Limited, in partnership with Together Energy Limited (and, prior to that, with Bristol Energy). SENS IDEAS was a new artificial intelligence software feature within the existing 'Be Connected' app already delivered to legacy Bristol Energy customers prior to the Competition. By using trialists' gas and electricity smart meter consumption data, combined with home profile data that trialists submitted in the app, the IDEAS feature aimed to provide personalised energy advice for trialists on how they could save energy. Trialists were matched to the most relevant advice for their home and circumstances. The advice was personalised based on their own smart meter data and motivations (provided in response to five in-app prompts) and then delivered using the Be Connected mobile application.

Evaluation approach and methodology

The Competition appointed a separate Trial Design and Evaluation Lead (TDEL) team, led by Ipsos, in conjunction with Energy Saving Trust, Manchester Metropolitan University and the University of Edinburgh to conduct an independent evaluation of the Competition and the individual products and services trialled through the Competition.

This trial-level evaluation sought to test whether the SENS IDEAS product was successful in realising its primary objective of reducing energy consumption (gas and electricity) and what aspects of the IDEAS feature made energy savings more likely to occur.

The primary research question underpinning the evaluation of SENS IDEAS (feature of the existing BE Connected app) was initially intended to be answered using a Matched Control Design, in which trialists would have been divided into an intervention and control group. Trialists in the control group who would have already 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); and trialists in the intervention group, in addition to all the above, would have been given access to the IDEAS intervention feature - with groups matched on a set of key variables.

As part of the initial evaluation design, recruitment targets were estimated that would produce the sample sizes needed to detect the expected impact from the SENS IDEAS intervention. Due to challenges faced in recruiting a sufficient number of trialists (related to COVID-19 and issues impacting the wider energy retail market), the trial design was changed during the course of the trial to a Theory-Based Design. At this point, the IDEAS trial had already recruited a sufficient number of trialists for the trial to be implemented using a Theory-Based Design (requiring an intervention group only), yet still aimed to recruit as many trialists as possible; in to maximise sample sizes for energy consumption analyses, surveys and interviews. Overall, 250 trialists were recruited to the trial, downloading the IDEAS feature of the Be Connected app. Signing up to take part in a SENS trial was entirely voluntary, and consent could be withdrawn at any time without giving a reason.

This evaluation utilised a Contribution Analysis evaluation approach to assess whether the SENS IDEAS was successful in achieving its primary objective, i.e. to reduce energy consumption among trialists. This approach encompassed using energy consumption data, survey data and in-depth interview data to either validate or invalidate the various aspects of the SENS IDEAS Theory of Change.

This analysis was supported by a package of wider research activities including baseline and endline quantitative telephone surveys with trialists (exploring attitudes to energy, energy usage and management behaviours, uptake of energy efficiency measures, and engagement with the trials and product); and in-depth qualitative interviews with 15 trialists to find out their experiences of use of the intervention.

Outcomes for trialists trialling the product

The SENS IDEAS app reached fewer trialists than originally anticipated and was not delivered according to its original design. In this context this trial cannot be seen as definitive evidence of impacts (or lack of impact).

The comparative before-and-in-trial analysis of trialists' energy consumption data indicatively found that energy consumption was lower over the trial period compared to before the trial. Further evidence from the interview and survey data also indicatively showed that trialists had attempted to reduce their energy consumption over the trial period. However, the evidence gathered, analysed and triangulated for this evaluation indicated no causal relationship between the IDEAS intervention and the observed reduction in energy consumption.

The IDEAS feature was an additional element of the Be Connected app, already in existence prior to the SENS Competition, which intended to offer tailored advice (referred to as 'tips') to trialists to help them reduce their energy consumption over time. As trialists engaged with the IDEAS feature, data would be gathered on the types of interactions and this would lead to increased personalisation of the tips. Due to an insufficient number of trialists and a delayed rollout of the IDEAS feature, it was not possible to provide the more personalised tips as originally envisaged. Similarly, and related to the shorter trial period, there were limited interactions between trialists and the IDEAS feature. This further impacted on the personalisation of the tips and the overall number of tips given.

More widely, features of the Be Connected app were viewed useful by trialists interviewed, particularly the functions that provided a summary of current and previous energy consumption. There was evidence to suggest that the app, through these features, contributed to enhancing users' knowledge of the appliances that consumed energy in the home and to reducing unexpected bill shocks for some trialists interviewed.

There was an appetite from trialists to receive the tips and advice provided through the IDEAS feature. However, trialists perceived the tips and advice (as they were finally delivered in the adapted / 'reduced' version of the feature) as lacking in novelty and personalisation. This was also because the trialists already had some awareness of how to save energy in the home.

Generally, trialists felt less in control of their energy usage between baseline and endline survey waves, potentially due to rising energy bills, which made it difficult for trialists to link any changes in behaviour to reductions in energy consumption and bill savings.

Conclusions

Due to COVID-19 and the wider retail context, IDEAS experienced delivery challenges that prevented its full product functionality being delivered or tested. While trialists signed up to use the IDEAS product had indicatively lower energy consumption over the trial period compared to before the trial (pre to in-trial descriptive analysis), taken together with triangulation of wider evidence and context, this evaluation indicated no causal relationship between the IDEAS intervention and the observed reduction in energy consumption.

In part due to a change in energy supplier partner, low numbers of trialists had access to the product over a relatively short period of time. As a result, the IDEAS feature could not be delivered as originally planned, with generalised or impersonal tips being provided (rather than the intended tailored or personalised approach), and with limited consumer interaction .

Here, the trial was unable to deliver all planned functionality to the number of trialists as initially intended. In this context, the evidence base available for the evaluation has limited internal validity, and this trial cannot be seen as providing definitive evidence of impacts (or lack of impact) of SENS IDEAS upon energy consumption.

Despite these challenges, the core Be Connected app was well received by trialists and led to positive effects in terms of knowledge of home energy consumption. Trialists were generally supportive of IDEAS tips and advice to help them reduce their energy consumption, and there was a clear appetite to receive more novel and personalised tips.

1. Introduction

The Smart Energy Savings Innovation Competition (from here on referred to as ‘SENS’ or ‘the Competition’) 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 customers reduce their energy consumption.

Following a competed application process, 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 process, five projects, were taken through to Phase Two, to trial and evaluate their products and/or services in homes across Great Britain. The Competition was launched February 2019, 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) based at University College London (UCL), for the collection and provision of secure access to energy consumption data from trial households (with customer consent) to the TDEL for their analyses. BEIS also appointed an independent Project Management lead, AECOM, to oversee Competition Partner’s project delivery and grant funding milestones.

This report is part of a package of reports published for the Competition, including an overarching competition-level evaluation report, a technical evaluation report and five separate trial-level evaluation reports (of which this is one report).

1.1 Purpose of this report

This report presents the evidence from the trial and evaluation of the Intelligent Digital Energy Advisory, IDEAS feature (SENS IDEAS) that was taken through to Phase Two of the Competition to trial and evaluate in real-world households across Great Britain. The report presents the descriptive analysis of energy consumption data and other primary and secondary data that were used to answer the primary research question of the IDEAS trial outlined below (as well as analysis of other secondary outcomes presented in more detail in chapter four).

What is the added gas and electricity saving achieved from the SENS IDEAS feature of the Be Connected app, over and above the baseline smart meter consumer proposition (i.e. a smart meter, an In-Home Display (IHD), and energy efficiency advice provided at install)?

Subsequent chapters of this report provide a summary of the SENS IDEAS intervention and trial design (chapter two) and trial evaluation methodology (chapter three). The overall evaluation findings relating to the primary and secondary outcomes are presented in chapter four including evidence triangulated across the different data sources collated during the SENS IDEAS trial, including qualitative and quantitative research strands. Chapter five presents the key conclusions from the trial evaluation.

2. Summary of Trial

This chapter provides a short introduction to the SENS IDEAS intervention, including its core functionality and mechanisms for behaviour change as presented through its Theory of Change. The core features of the trial design are also presented here.

2.1 The SENS IDEAS intervention

The SENS Intelligent Digital Energy Advisory (IDEAS) intervention was delivered by Eliq Limited, initially in partnership with Bristol Energy. Bristol Energy were later acquired by Together Energy Limited in September 2020³, who retained the Bristol Energy brand and took over the SENS partnership. Together Energy Limited later went into administration in February 2022⁴. At this point, trialists continued to have access to the Be Connected App and the new IDEAS feature. Energy consumption data collected by UCL SERL for the evaluation ceased at this point, two months before the end of the planned trial end-date (March 2022).

Table 1 below provides an overview of the intervention including the Competition delivery partners and a description of the product.

Table: 1 SENS IDEAS delivery partners and product description

Project Title	Competition delivery partner(s)		SENS product
	Lead	Partner(s)	
Intelligent Digital Energy Advisory (IDEAS)	Eliq Limited	Bristol Energy (later acquired by Together Energy Limited)	<p>An additional artificial intelligence software feature within the existing 'Be Connected' app (already developed by Eliq prior to the Competition).</p> <p>By using trialists' gas and electricity smart meter consumption data, combined with home profile data that trialists submitted in the app, Eliq aimed to create and distribute personalised energy advice for trialists on how they could save energy. Trialists were matched to the most relevant advice for their home and circumstances. It was intended that the advice would be personalised based on their own smart meter data and motivations (provided in response to five in-app prompts)</p>

³ <https://www.bristol-energy.co.uk/together-energy-acquires-bristol-energy-residential-customers>

⁴ <https://www.ofgem.gov.uk/publications/ofgem-appoints-british-gas-take-customers-together-energy-retail-ltd>

			and then delivered using the Be Connected mobile application.
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As summarised in Table 1, the aim of the SENS IDEAS intervention was to develop and trial artificial intelligence software, which would use smart meter energy consumption data and home profile data to create personalised energy advice.

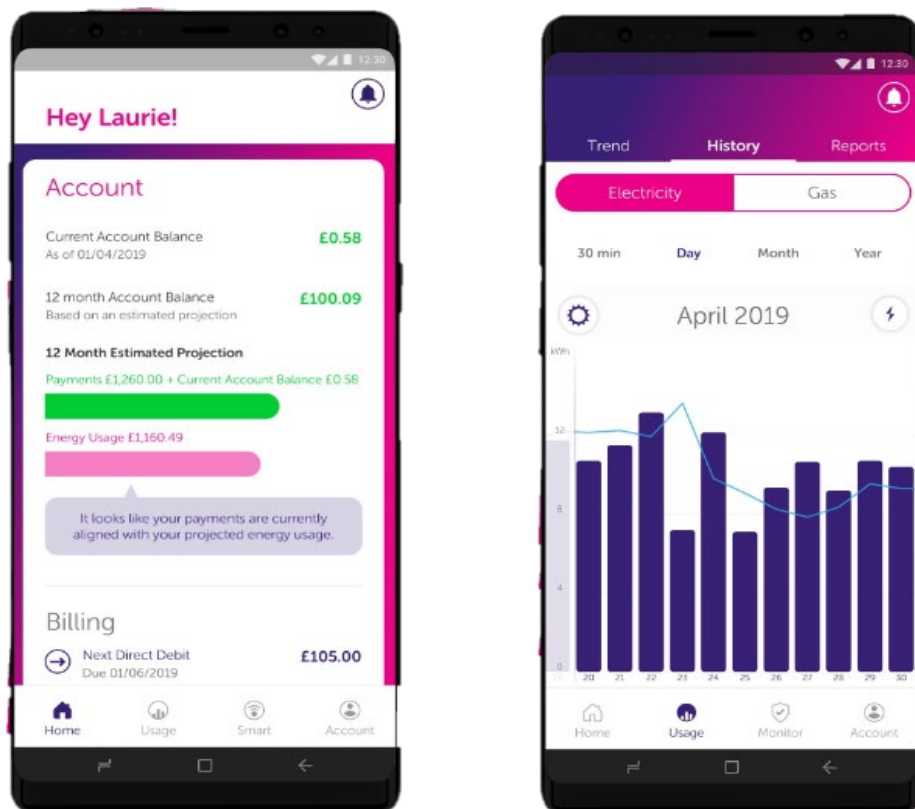
Due to various challenges, including COVID-19 impacts and changes in the wider energy retail market (see Recruitment Section 2.3.3 below), there was insufficient recruitment to the trial and uptake of the Be Connected app (or IDEAS feature) for the software developed by Eliq to be implemented as planned; meaning that trialists were not able to benefit from the level of personalisation intended within the initial design of the feature. Instead, trialists were given generic energy tips which broadly mapped to their initial responses to a series of motivational statements to which they were invited to react when first downloading the feature.

Prior to the development of the IDEAS feature, Bristol Energy already had a mobile application (the Be Connected app), which was available free of charge to all customers with a smart meter installed. The app allowed customers to:

- View account balance and bills;
- View energy usage: half-hourly, daily, weekly, monthly, annually;
- Receive alerts for high usage; and
- Receive comparisons with similar homes.

Figure 1 (overleaf) provides an overview of the basic features provided in the Be Connected app.

Figure 1: Features of Be Connected app



Around 5% of Bristol Energy’s customers were actively using the Be Connected app (5,600 active users) by December 2020 (when the trial was due to be launched), of whom approximately 25% had SMETS1⁵ DCC enrolled meters. Once the trial began, the app – which was required in order to access the IDEAS feature - was continuously offered to trialists alongside the installation of SMETS2⁶ meters, where trialists provided information as part of the installation procedure and were targeted with emails encouraging them to download the app. Bristol Energy and subsequently Together Energy also intended to widely promote the IDEAS feature; however, in practice whilst some promotion of the app took place through emails and as part of the smart meter installation process, IDEAS was mainly promoted in-app with existing users of Be Connected being encouraged to download the feature. The trial recruitment process in which IDEAS was promoted in-app with existing users may have led to the challenges faced with recruitment onto / take up of IDEAS (see section 2.3.4).

The IDEAS feature was an additional element of the Be Connected app, which would offer tailored advice (referred to as ‘tips’) to trialists to help them reduce their energy consumption over time. The tips were drawn from a database of more than 100 different energy saving suggestions, which were collated and analysed by Eliq and (their sub-contracted partner) the Centre for Sustainable Energy (CSE) before being categorised to allow the software to identify tips which were useful and relevant to different types of trialists.

⁵ SMETS1-DCC designates the first generation of smart meters having been migrated to the Wide Area Network (WAN) and communicating information to a Data Collection Company (DCC). SMETS stands for “Smart Meter Equipment Technical Specifications”. More details can be found here: <https://www.britishgas.co.uk/business/blog/smart-meters-explained/>

⁶ SMETS2 meters were the second generation of smart meters installed in homes across Great Britain.

Once trialists had downloaded the app and the IDEAS feature, including providing consent to participate in the trial, they were prompted to say whether they agreed or disagreed (on a scale of 1 to 5) with the following statements:

- I think it is fun to try new things.
- I always like to have the latest technologies.
- I am concerned about climate change.
- I do not mind spending a bit more now if it saves money in the long run.
- I am always looking for ways to save money in my day-to-day life.

Based on an analysis of this information, four different user categories were developed:

- Greens
- Moderate Greens
- Technologically motivated
- Cost driven

These categories formed the basis of a process which would select tips considered most relevant to these groups and deliver these to the trialists. The intention was also that the categories would be further refined as more data was gathered on trialists' interactions with the feature and how this impacted on their energy usage (measured by ongoing analysis of granular smart meter data). This would increase the personalisation of the tips. This next step was not possible within the trial as insufficient trialists were recruited and there was limited time for them to interact with the feature.

2.2 Aims of the intervention and how it was expected to achieve these

Several primary and secondary outcomes were identified at the outset of the trial (see Table 2). The mechanisms for realising these outcomes are presented below. This information is also summarised in the Theory of Change diagram (see Figure 16) presented in Annex A.

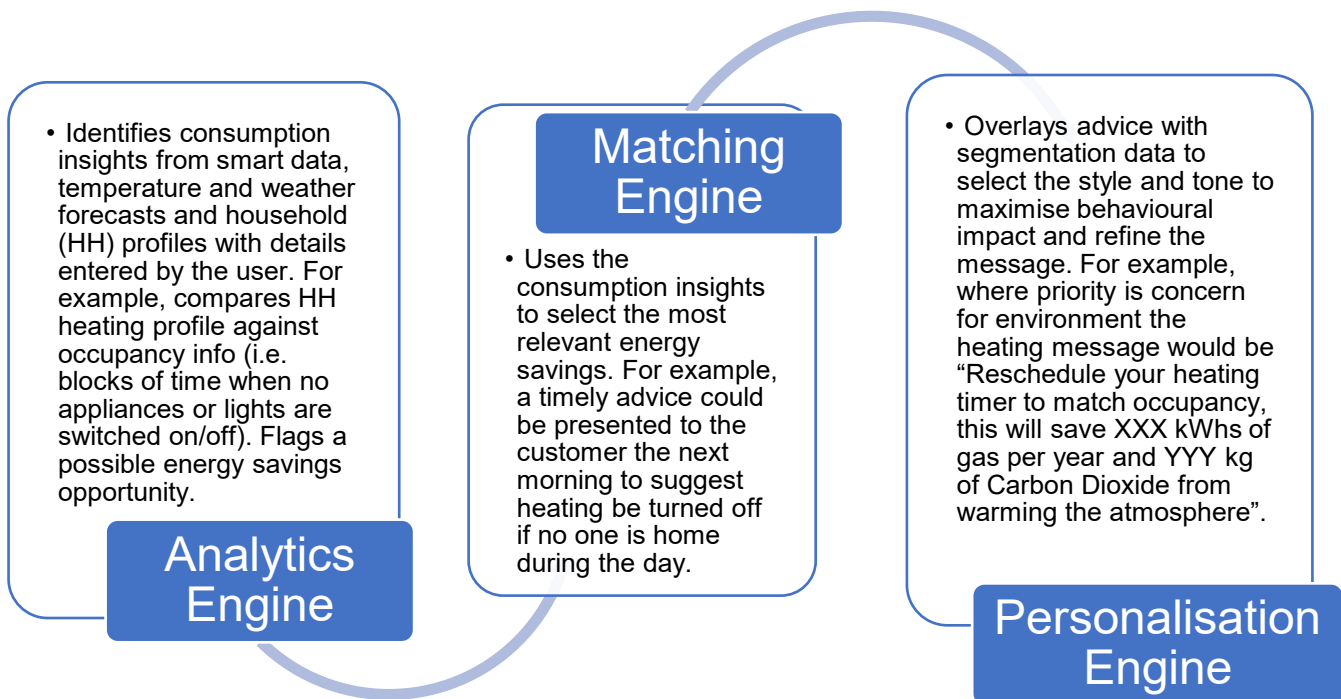
Table 2: Primary and secondary objectives of the SENS IDEAS intervention

Primary/ Secondary	Outcomes to be evaluated
Primary	Reduction in gas and electricity consumption

Secondary	Improved engagement and trust with energy supplier ⁷
	Improved perception of home comfort

The core intervention processes of the IDEAS feature are described in Figure 2 below.

Figure 2: Summary of intervention processes



Once tips were delivered to trialists, the IDEAS feature would record whether users had seen / read the advice, whether the advice was considered useful (based on in-app feedback) and whether they took any action to implement the tip (based on in-app feedback and analysis of energy usage). This was intended to help Eliq’s algorithm to understand which tips were perceived as most relevant to each trialist as well as those which were already known to the trialist, so that better targeted and more useful tips could be identified in future. Tips were prompted by smart meter energy consumption data triggers, such as high energy use or comparatively high heating use, for example.

Feedback from trialists was to be used to ensure that the tips being provided would keep improving and become better and more personalised with time. In the daytime heating example above, the heating profile would be reassessed against the profile that originally triggered the message. If the analytics detected a significant shift or change to a gas saving outcome, a message would be triggered, for example:

“Well done, you’ve reduced your heating energy use and saved XXX kWh gas and YYY kg of Carbon Dioxide”.

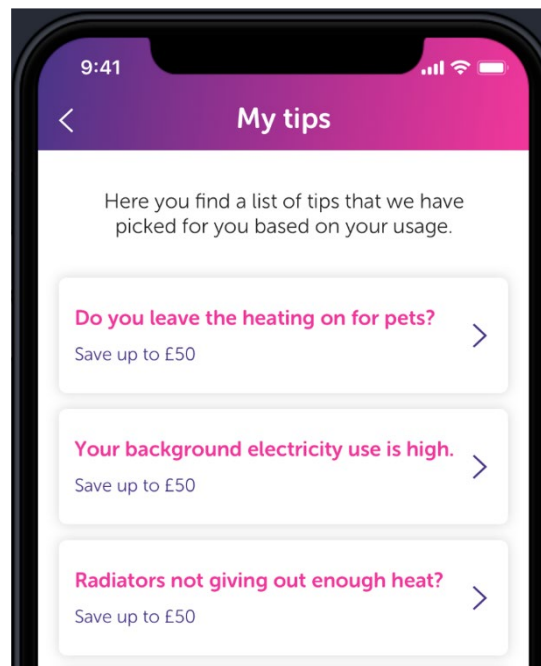
⁷ Due to the acquisition of Bristol Energy by Together Energy and subsequent liquidation of Together Energy it was not possible to provide reliable evidence to assess improved engagement and trust with energy supplier.

If no change was identified, then an alternative message appropriate to the motivations expressed by trialists on registering (e.g. financially motivated, environmentally motivated, tech savvy) was presented, for example:

“Get your boiler serviced annually to keep it fit and avoid heating problems. Good boiler maintenance ensures efficient combustion so you get the most from every unit of fuel you use. A boiler – like an engine – needs a good flow of air and fuel through the system. Cleaning burners and flues lets fuel burn efficiently and increases the life of the appliance.”

“A good time for a service is late summer – better than risking a system breakdown (the boiler, not you) in the depths of winter! If you live in a private rented home, it is the landlord’s responsibility to get the boiler checked once a year. If you own your home look on the Gas Safe Register for accredited gas engineers.”

Figure 3: Example of tips provided through the SENS IDEAS intervention



As the trialist received increased access to information regarding energy consumption in the home and tailored recommendations on how to save energy provided via the app, it was anticipated that they would change their behaviour in the following ways:

- In the short-term, they were expected to engage more with the app and make more frequent changes to their energy use behaviour.
- By providing bespoke household advice on effective ways to control energy use, the intervention intended to educate users of the drivers of energy consumption and ways to save energy in their homes.

- The self-learning algorithm used to generate real-time and bespoke energy saving advice was expected to help households reduce energy bill spend and better understand energy usage going forward to manage future bills.
- Trust in the app was expected to lead both to a reduction in overall energy consumption and to improve customer engagement and trust with Together Energy.

For these outcomes to materialise, several assumptions needed to hold true during the trial period. First, customers who already had the basic Be Connected app needed to be willing to sign up for the IDEAS feature. Those who did not already have the app, needed to be willing to download it and then accept the update including the IDEAS feature. Second, users needed to be comfortable providing household information, e.g. type and number of appliances in the home. Users also needed to provide accurate household information on topics such as: heating type, water heating type, electric vehicle ownership, and cooking.

For the app to encourage ongoing engagement, users needed to trust the advice being offered, not feel overburdened with information and feel able to act on the advice given. They would also need to know how to apply advice to change energy consumption, e.g. how to reduce household temperature. The advice would need to be sensitive both to the household context, (i.e. not encouraging users who are fuel poor to reduce their consumption further) and to the wider context (e.g. increased take-up of electric vehicles; changes in weather and energy prices). Finally, users would need to be able to self-fund or obtain funding to implement the energy efficiency measures being recommended and, in some cases, would also need permission to make material changes (e.g. from a landlord to install double glazing).

2.3 Design of the SENS IDEAS trial

2.3.1 Theory-based design

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. Trialists in the control group would have 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); and trialists in the intervention group would have, in addition to all of the above, the SENS product or service being trialled.

Detailed consideration was given to the potential for an RCT, however, there were multiple challenges that limited the feasibility of this design in practice. Most importantly, the roll-out of the Be Connected app, in its basic form, had already progressed and was at the time available in mobile application stores. This precluded the randomisation of the offer of the app without high reputational and commercial risks for Bristol Energy. Instead, the IDEAS trial was initially designed as a Matched Control Design trial. However, due to challenges faced during trial recruitment (see section 2.3.3), the base of eligible customers was deemed too small to follow this approach. For this reason, a Theory-Based Design approach was deemed the most suitable method to understand the impact of the IDEAS intervention.

Contribution Analysis framed the evaluation and was used to identify the contribution that the IDEAS feature had made to the outcomes outlined in section 2.2. This involved an explicit account of the alternative routes (beyond the scope of the intervention) to any outcomes observed. This was important for building a credible understanding about the relative contribution made by the IDEAS feature to the desired outcomes as opposed to other factors. Evidence from both the descriptive analysis of energy consumption data and primary quantitative and qualitative research, was assembled to develop a plausible explanation of the extent to which IDEAS was a causal factor in achieving the outcomes foreseen in the Theory of Change (see Annex A).

The evaluation methodology comprised the following steps:

- **Setting out the attribution problem to be addressed:** The Theory of Change provided details regarding how the intervention was expected to lead to the identified primary and secondary outcomes.
- **Description of theoretical assumptions and external factors:** Key assumptions at each step in the Theory of Change were clearly documented to provide a detailed examination of alternative routes to impact and external factors acting at the household level – these were drawn from a TDEL-led review of contextual and secondary data as well as the baseline quantitative primary research.
- **Populating the model with data and evidence:** Data collection (both via descriptive analysis of energy consumption data and quantitative and qualitative primary research) for the impact indicators helped provide evidence to support an analysis of the observed changes in outcomes, and (through qualitative interviews) the processes and paths of influence through which these were or were not realised.
- **Assembling and assessing the Theory of Change and challenges to it:** The evidence was reviewed to consider whether it supported or refuted the Theory of Change for the intervention and whether, or not, peripheral factors could be discounted as explanations for outcomes.
- **Revising the Theory of Change and ongoing gathering and synthesising of evidence:** Ongoing analysis and collaborative testing of the Theory of Change was carried out throughout the evaluation period, culminating in this trial report presenting the evidence and making a qualitative assessment of its strength in supporting the intervention's influence on observed outcomes.

2.3.2 Households eligible to participate in the SENS trial and the evaluation

All dual fuel households who had a second generation (SMETS2) smart meter, or a first generation (SMETS1) smart meter Data Communications Company (DCC) - enrolled, installed at the time of recruitment (June 2021 – December 2021) were eligible to participate in the SENS IDEAS trial. Potential trialists needed to be existing Together Energy (legacy Bristol Energy) customers who already had or were willing to download the Be Connected app and the IDEAS feature.

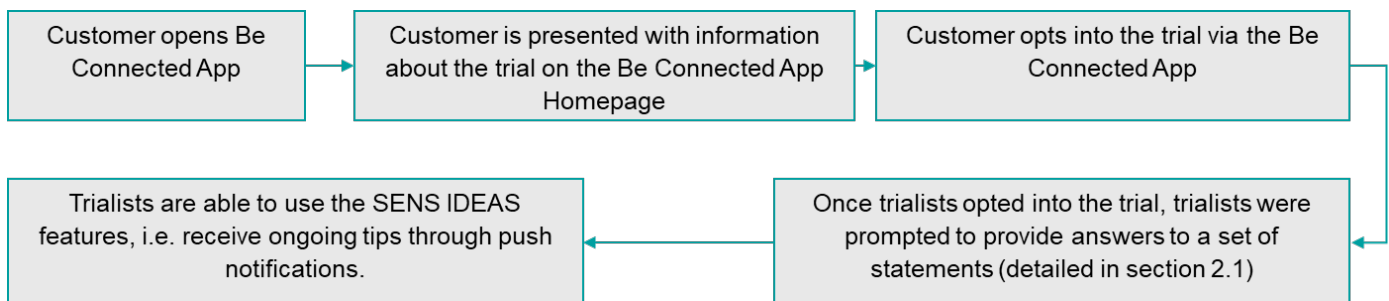
2.3.3 Recruitment strategy

Recruitment was led by Together Energy (and, prior to that, Bristol Energy), including developing the recruitment materials and the format of the consent form (using standardised opt-in consent forms that were GDPR (General Data Protection Regulation) and SEC (Securities and Exchange Commission) compliant, developed by UCL and TDEL).

Signing up to take part in a SENS trial was entirely voluntary, and consent could be withdrawn at any time without giving a reason. To assess the primary aim of the project, trialists gave opt-in consent to provide access to their smart meter data for the evaluation, using a virtual ‘secure lab’ analysis environment, provided by UCL. This smart meter data was used by TDEL and UCL SERL solely for the evaluation. Trialists also consented to providing pre-trial consumption data through Together Energy.

The SENS trial was promoted to eligible customers through emails (for those who had not yet downloaded the Be Connected app) and through in-app push notifications (for those who had). A series of emails, notifications (pushed via the app) and reminders (situated on the app home page) were released, aiming at recruiting trialists. After clicking on the notification in-app, or the relevant email and typeform message, trialists were led through the consent documentation and process to ensure fully informed consent is provided. More information on the recruitment flow is provided in Figure 4 below.

Figure 4: Recruitment journey



At the beginning of the trial, TDEL estimated planned recruitment targets of the sample sizes needed to detect the expected impact from the SENS IDEAS intervention (based on the originally planned intervention package) under a matched control design. Based on an anticipated 5% reduction in household energy (gas and electricity combined) consumption during the trial, estimated from previous studies⁸, along with the amount of variability in energy consumption that could be explained by pre-trial consumption data, it was calculated that the trial would need to recruit and retain 1,140 households in both the intervention and control groups. To account for an assumed 30% drop out rate (average number of households switching energy supplier according to Bristol Energy records, moving home within a 12-month period or actively withdrawing from the trial), and to improve the quality of the matching

⁸ Bent, C., Dromacque, C., Kmetty, Z., Grigoriou, R. & Mikkelsen, T. (2017). The NATCONSUMERS handbook A guide to introducing ICT tools for customer engagement in energy savings. Available at: https://www.researchgate.net/publication/318902388_The_NATCONSUMERS_handbook_A_guide_to_introducing ICT_tools_for_customer_engagement_in_energy_savings

algorithm, the initial recruitment targets were therefore set at 1,629 in both the intervention and control group.

Due to various challenges, including COVID-19 impacts and changes in the wider retail market (see also SENS Evaluation Competition Report), in practice there was lower than expected trial recruitment and uptake of the Be Connected app (or IDEAS feature), along with changes to the software functionality (which were not implemented as planned). These challenges included:

- Following COVID-19, remobilisation of smart metering roll-out by Bristol Energy continued to face further challenges;
- In September 2020, Bristol Energy was acquired by Together Energy Limited. Contractual negotiations between Bristol Energy and Together Energy resulted in a pause in trial recruitment;
- Together Energy had a slower than expected roll-out of SMETS1 DCC enrolled and SMETS2 installations;
- Delays to progress in the roll-out of the Be Connected app and delays in finalising the IDEAS feature, led to it being launched in May 2021 (5 months behind intended timings);
- Prioritisation of consumer communications by Together Energy with limited opportunities to contact consumers about the IDEAS features, and the trial more generally, and with marketing focussed on core Be Connected App (rather than the IDEAS feature).

Eliq, along with Bristol/ Together Energy, worked hard to maximise recruitment, developing a splash page⁹, alternative typeform sign-up and other targeted approaches to recruitment. The wording of communications was also adjusted to reflect the learning from other trials to encourage sign-up.

Due to aforementioned challenges faced in recruiting a sufficient number of trialists, the trial design was changed during the trial to a Theory-Based Design (see section 2.3.1). At this point, the IDEAS trial had already recruited a sufficient number of trialists to implement a theory-based design (requiring an intervention group only) but they still attempted to recruit as many trialists as possible to maximise the size of the sample that could be invited to take part in surveys and interviews; and, used in the final energy consumption analysis.

Overall, 250 trialists were recruited to the trial, including downloading the IDEAS feature of the BE Connected app.

2.3.4 Other issues which affected the implementation of the trial

In February 2022, Together Energy Limited went into administration¹⁰. Although the app remained live for legacy Bristol Energy customers, it no longer directly linked to their smart

⁹ An introductory screen a user sees when visiting a website or webapp page.

¹⁰ <https://togetherenergy.co.uk/>

meter data, meaning much of its previous functionality stopped working. At this point, collection of energy consumption data via SERL (for the evaluation) was also stopped. Taken together this ended the trial earlier than planned. However, TDEL wider research activities, including interviews with trialists continued thereafter, up until the end of the originally anticipated trial period (end March 2022).

3. Methodology

This section describes the methodological approach taken to implementing the trial design, including the approach taken to data collection and analytical methods employed for the energy consumption analysis. More information is provided in the accompanying Technical Report published alongside this report.

3.1 Data Collection

The Theory-Based Evaluation design utilised a range of data sources to provide evidence against the primary and secondary research questions for the IDEAS trial.

3.1.1 Energy consumption data

Gas and electricity consumption data was collected (with consent) to cover two periods:

- During the trial: Gas and electricity consumption data was securely provided to TDEL via SERL (responsible for managing the collection and provision of smart meter data from trialists with their consent to TDEL for the purposes of the evaluation) at 30-minute resolution for the trial period.
- Before the trial: Gas and electricity consumption data was accessed for a period of up to 12 months before the start of the trial, with the pre-trial time period and resolution varying based on availability on a per-household basis. Where trialists did not have a smart meter for up to 12 months prior to their joining of the trial, energy consumption data was provided to the TDEL by Together Energy Limited (and, prior to that, Bristol Energy), using information from quarterly / annual bills and meter readings for the 12 months preceding the trial.

3.1.2 Engagement data

The Competition Partner lead, Eliq Limited collected data (with consent) on trialists' engagement with the IDEAS feature. This made it possible to understand which trialists had downloaded the feature, which pieces of advice they had received and how they interacted with those pieces of advice. The types of metrics captured by Eliq included:

- Date and time of advice provided through the IDEAS feature;
- The content of tips received; and
- Trialists' responses to the tips (accepted, rejected, ignored or marked as irrelevant).

This high-level engagement data was shared by Eliq with TDEL for analysis purposes.

3.1.3 Quantitative telephone survey with trialists

All trialists were invited to take part in a baseline (July – December 2021) and endline telephone (March 2022) survey to ascertain attitudes to energy, energy usage and management behaviours, uptake of energy efficiency measures, views of smart metering and engagement with the IDEAS feature. The baseline survey received responses from 87 trialists and the endline surveyed 41 trialists (see Annex B for more detail). While most questions asked in the baseline survey were repeated in the endline survey to allow for comparisons, about a quarter of the questions were changed to investigate interaction with the IDEAS feature, based on emerging insights that this had been low. More details on the timings and key topics explored by the telephone survey are included in the accompanying Technical Report.

One sample t-tests between baseline and endline survey percentages were conducted for the survey findings at the 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.

3.1.4 User in-depth interviews

TDEL also conducted qualitative interviews with 15 consented trialists. These were recruited from those who completed the endline surveys so there is some overlap with survey responses.

The interviews were semi-structured, typically lasted 45-60 minutes. The topics covered included: if and how the trialist had engaged with the IDEAS feature throughout the trial period; trialists' views and experiences of the IDEAS feature and 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. A range of quotas across different demographics and household characteristics were sought, covering householder age, property age and income. Further details of this can be found in chapter seven of the Technical Report.

3.2 Analytical methods

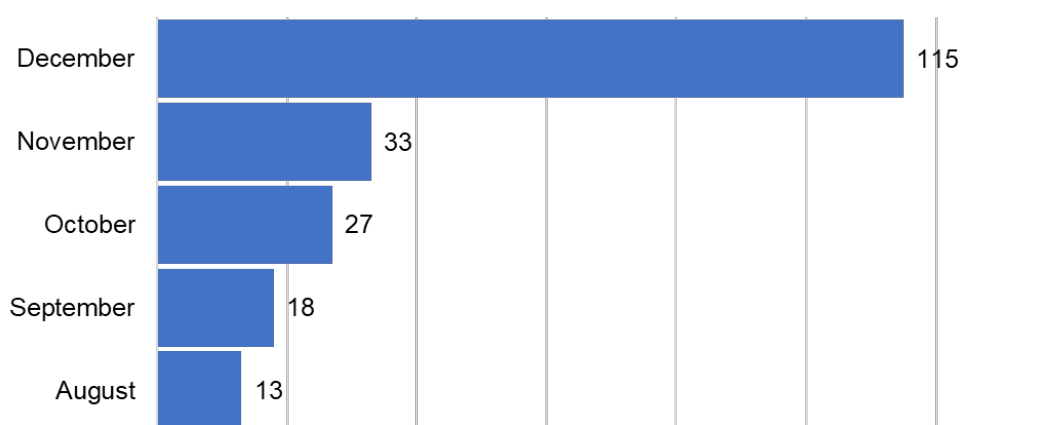
This evaluation utilised a Contribution Analysis evaluation approach to assess whether SENS IDEAS was successful in achieving its primary objective, i.e. to reduce energy consumption among trialists.

This approach encompassed using energy consumption data, survey data and in-depth interview data to either validate or invalidate the various aspects of the SENS IDEAS Theory of Change (see Annex A). Causality of the SENS IDEAS intervention was inferred from the following evidence:

- **The activities of the intervention implemented:** product engagement data was assessed to understand the extent to which the core features of the SENS IDEAS intervention were actually delivered as originally intended and used by trialists.
- **Verification of the Theory of Change:** survey, interview data and energy consumption data were analysed to determine whether the pathway to outcomes was observed, whether the primary and secondary outcomes were observed and whether assumptions held true during the trial as planned.
- **External factors influencing the intervention** were assessed and scored on the significance of their contribution in influencing the primary and secondary outcomes.

To test for the achievement of the primary objective, i.e. a reduction in energy consumption among trialists, TDEL first conducted analysis of trialist energy consumption data, descriptive in nature due to the lack of a counterfactual scenario (not required to implement a Theory-Based Design). In order to examine any changes in energy consumption, a pre- to in-trial comparison analyses approach was chosen- here it was first necessary to select months where data was available for 2021 (in-trial) and 2020 (pre-trial)¹¹. This was largely contingent on the data coverage for each month (i.e. how many trialists had at least 15 daily observations during each month that could then be used to determine a monthly consumption average) and the data collection period. Due to the energy supplier for this trial (Together Energy) entering administration, the collection of energy consumption data for the evaluation (via SERL) ceased from January 2022. For the above reasons, December was chosen as the comparator month with the greatest data coverage both pre-trial and in-trial across the trialists onboarded into SERL. Figure 5 below highlight the coverage of trialist data on a monthly basis during the trial period.

Figure 5: Number of trialists with at least 15 daily readings during month in pre-trial and in-trial periods



Base: 151 trialists which could be matched in UCL SERL environment.

¹¹ Due to the seasonality of energy consumption, pre-trial months should be compared with the same months during the in-trial period.

It should be noted that not all 250 trialists onboarded into SERL could be linked to unique identifiers provided by Eliq. The final number of trialists included in the energy consumption analysis is based on those which could be linked using these identifiers (i.e. 151 trialists).

Once the comparator month was selected, the following iterations of analysis on the primary outcome was undertaken:

- Comparison of pre-trial (December 2020) and in-trial (December 2021) average monthly consumption.
- Comparison of percentage change in mean daily consumption during the comparator months (December 2020 and December 2021) between those that received more than five tips versus those that received fewer than five tips.
- Comparison of percentage change in mean daily consumption during the comparator months (December 2020 and December 2021) between those that implemented at least one tip versus those that implemented no tips.

Due to a lack of a counterfactual scenario, there are several caveats associated with interpreting the findings from the energy consumption analysis:

- From March 2021, the Government started to lift COVID-19 restrictions and began its four-step roadmap to end COVID-19 restrictions. Prior to this, household movement was restricted, with households required to stay indoors and work from home where possible. This is likely to have put upward pressure on daily energy consumption in the months preceding Government easing of lockdown restrictions.
- A milder winter during 2021 compared to 2020. Many trialists interviewed highlighted the 2021/22 winter was milder than the previous winter, potentially driving a comparative reduction in consumption between December 2020 and December 2021.

Due to the limitations described above, other sources of evidence were used in the evaluation approach. The methods used to analyse these data sources (quantitative telephone survey and in-depth interviews) are provided in more detail in the accompanying Technical Report.

Moreover, there were limitations of the survey and interview data that should be borne in mind when interpreting the results presented in chapter four. Higher energy prices came into effect towards the end of the trial period (October 2021), with possible associated changes in energy usage and behaviours for trialists. This may have confounded any self-reported changes in behaviour or attitudes during the endline survey and in-depth interviews (conducted throughout February and March 2022).

4. Outcomes for trialists

This chapter describes the extent to which the results of the trial provided evidence that the expected outcomes of the SENS IDEAS feature were achieved, i.e. that the evidence collected supports the hypothesis that using the IDEAS feature led to a reduction in average gas and electricity consumption, improved trust in trialists' energy supplier and improved thermal comfort. The evidence base comprised energy consumption data, survey data, in-depth interviews and data on engagement with the product.

4.1 Key findings

The results of the comparative before-and-in-trial analysis of trialists' energy consumption data indicatively found that energy consumption was lower over the trial period compared to before the trial. Further evidence from the interview and survey data also indicatively showed that trialists had attempted to reduce their energy consumption over the trial period. However, the evidence gathered, analysed and triangulated for this evaluation indicated no causal relationship between the IDEAS intervention and the observed reduction in energy consumption.

The IDEAS feature was an additional element of the Be Connected app, already in existence prior to the SENS Competition, which would offer tailored advice (referred to as 'tips') to trialists to help them reduce their energy consumption over time. As trialists engaged with the IDEAS feature, data was gathered to increase personalisation of the tips. Due to an insufficient number of trialists and a delayed rollout of the IDEAS feature, it was not possible to provide the more personalised tips. There were also limited interactions between trialists and the IDEAS feature. This further impacted on the personalisation of the tips and the overall number of tips given.

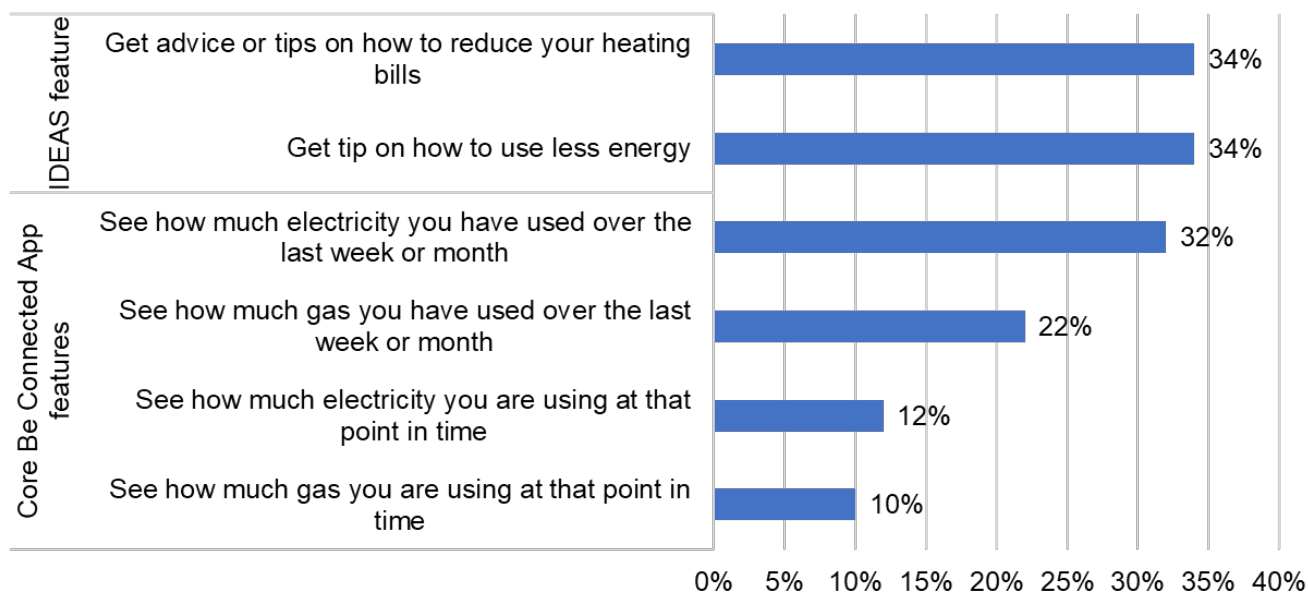
Here, the trial was unable to deliver SENS product functionality and to the number of trialists as initially intended. In this context, the evidence base available for the evaluation has limited internal validity, and this trial cannot be seen as providing definitive evidence of impacts (or lack of impact) of SENS IDEAS upon energy consumption.

Features of the Be Connected app were viewed as useful by trialists interviewed, particularly the functions that provided a summary of current and previous energy consumption. There was evidence to suggest that the app, through these features, contributed to enhancing users' knowledge of the appliances that consume energy in the home and to reducing unexpected bill shocks for some trialists interviewed.

4.2 Trialist engagement with the SENS IDEAS intervention

Trialists surveyed used a variety of different features provided through the SENS IDEAS intervention. Figure 6 shows that the most commonly reported feature used by trialists was getting advice and tips on how to use less energy and reduce their heating bills (both 34%). Trialists also viewed their current and historical energy consumption, though this was part of the original Be Connected app functionality and was not a feature of the SENS IDEAS intervention.

Figure 6: Proportion of trialists that have used the IDEAS feature and the core Be Connected App features.



Base: Endline trialists only: 41. Respondents were able to select multiple options at interview.

4.3 How the SENS IDEAS intervention increased knowledge

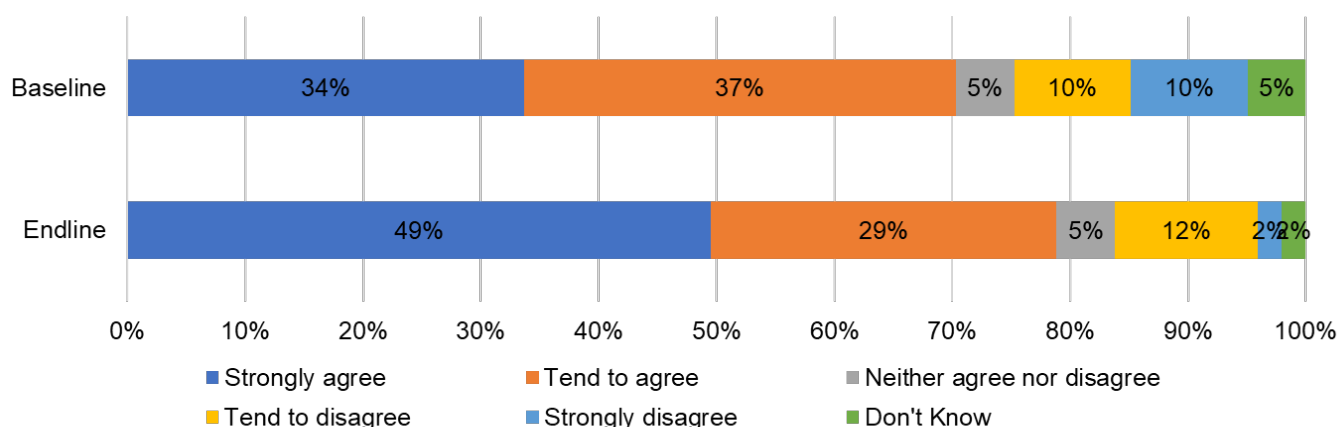
The IDEAS feature was expected to produce a range of effects in the form of attitudinal changes towards how trialists view their own energy consumption:

- **Users were expected to be better informed about how to save energy:** The IDEAS feature highlighted specific ways that trialists could save energy through tailored advice or prompts.
- **Users were expected to feel more in control of their energy use and reduced bill shock:** Consumer bills might vary significantly over the course of the year as the temperature changes; the SENS IDEAS feature was expected to contribute to reducing bill shock.

4.3.1 Trialists are better informed about energy consumption and how to save energy

Trialists’ knowledge of what used the most energy in their home indicatively improved between baseline and endline from 71% to 78%, corresponding to those who agreed that they knew what used the most energy in their home (see Figure 7 below), with a portion of trialists interviewed being able to give precise answers such as specific appliances or “the heating”.

Figure 7: Proportion of trialists that knew what used the most energy in their home.



Base: Trialists that responded to both survey waves (41).

Evidence from the qualitative interview data suggested this was driven by an ability to view half-hourly energy consumption data (provided via the core Be Connected App, as opposed to the new IDEAS feature), as this enabled trialists to observe how products and appliances used in the home impacted energy consumption. There was no evidence from the interview data to suggest the IDEAS feature contributed to this enhanced knowledge of which appliances consumed the most energy in the home.

“I’m very savvy about things. What they [the IDEAS feature] might tell me, I might already be doing or have it in place.”

The core focus of the IDEAS feature was to inform trialists of ways to save energy in the home through the provision of useful and tailored energy saving advice and tips. However, in practice generic tips were delivered, rather than tailored tips as originally planned.

There was weak evidence of trialists being more informed of ways to save energy in the home since using the SENS IDEAS feature. An analysis of the engagement data provided by Eliq showed this was largely due to the tips provided being neither useful nor tailored; 41% of all tips were skipped due to trialists having already ‘completed’ the advice provided, and a further 15% were deemed not relevant to the household.

Several trialists interviewed further validated this, mentioning having received irrelevant tips, or no tips at all from the app about improving home insulation and/ or felt that they had already done everything feasible to save energy.

“I rarely receive notifications for anything. The tips are sometimes irrelevant. I don’t need to be told to clean my fridge for example. I have already acted on tips; these were nothing new to me.”

There was a small minority of trialists interviewed who were able to verbalise additional ways that they could further save energy in the home (these are outlined in more detail in section 4.4.1). Trialists interviewed were generally unable to attribute this to tips and advice that were provided through the IDEAS feature.

Trialists highlighted several areas of further product development that could improve the overall user experience and deliver greater benefits for users in this area:

- **Novelty of the information provided:** Several trialists interviewed could not remember either receiving a tip via the IDEAS features or what type of advice the tip provided. Where trialists could remember, most felt some tips were not novel enough, often encouraging trialists to take energy saving actions that they were already implementing.

“I can’t do anything else; already installed everything possible in the house and already applying all the tips received through the app – none of them [the tips] are things I am not doing already.”

“I find a bit simplistic, the tips are things I’m already doing, so I wouldn’t look at them.”

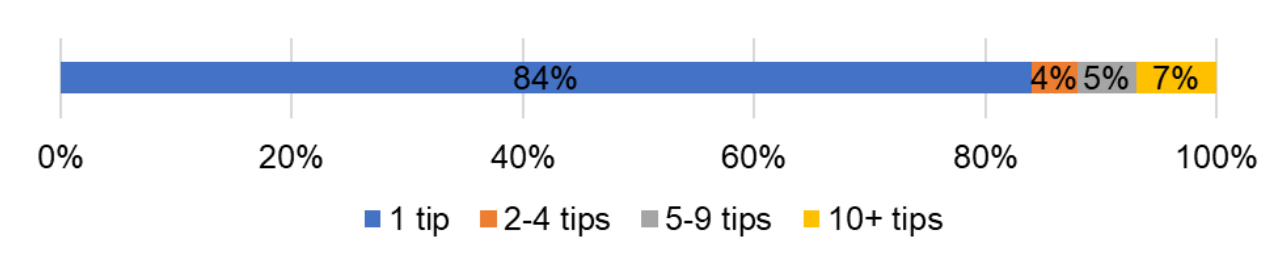
- **Inability to save tips provided:** One trialist would have liked to save the tips for future reference. This was in fact a feature of the app; as such, further guidance on how to use the IDEAS feature would have been useful here¹².

Moreover, trialists were generally dissatisfied with the lack of new tips provided throughout the trial period. A small proportion (7%) of trialists received more than 10 tips over the course of the trial (see Figure 8), whereas the majority (84%) received just one tip (typically immediately after joining the trial). This is likely due to tips being triggered by smart meter data readings that indicated the trialist had either abnormally high or comparatively high energy consumption. This low number of tips across trialists highlights trialists were already demonstrating energy efficient behaviours (thereby not prompting additional tips due to high consumption).

Furthermore, due to a delayed rollout of the IDEAS feature (see section 2.3.3 and 2.3.4 for more information) and earlier than planned trial close date (due to Together Energy entering administration), interactions between trialists and the IDEAS feature were further impacted.

¹² It is noted that none of the 15 trialists interviewed were provided guidance on how to use the IDEAS feature.

Figure 8: Percentage of trialists receiving tips through the IDEAS feature, by number of tips received.



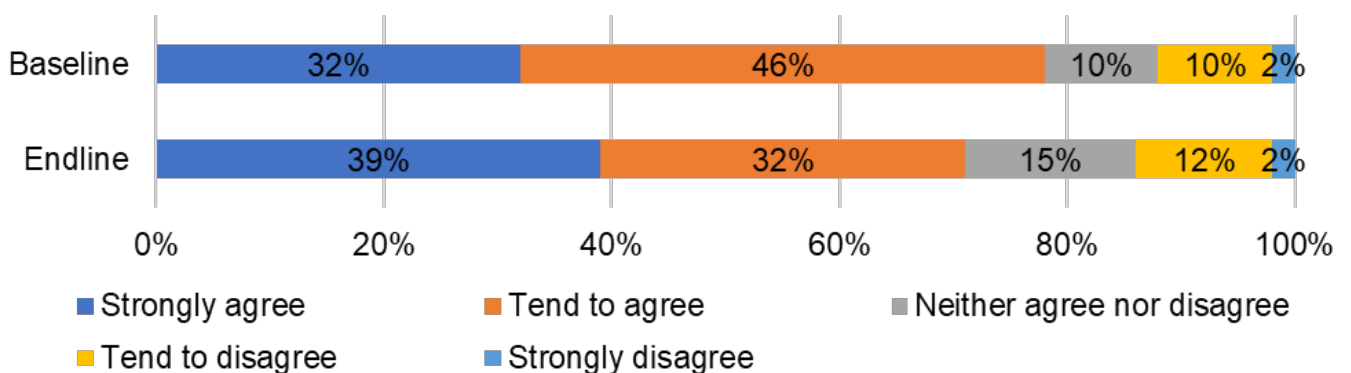
Source: Eliq engagement data. Base: 250 trialists.

4.3.2 Trialists feel more in control of their energy use and reduced bill shock

Most trialists interviewed were already conscious about the cost of their energy consumption at the start of the trial, though this proportion increased over the trial period. This was likely influenced by rising energy prices over the trial period (specifically towards the end of the trial period). Interview data suggested trialists reported being more confident in monitoring day to day usage and making comparisons to previous months, as well as being more mindful of their energy consumption. It is important to note the ability to view current energy consumption and compare to previous months was part of the core Be Connected App, rather than the IDEAS feature itself.

Despite this, the proportion of trialists feeling in control of how much energy they used reduced between the baseline and endline (see Figure 9). Some trialists interviewed did however note that due to rising energy prices, they were less able to link any improvements in energy saving behaviour to reduced energy bills.

Figure 9: Agreement / disagreement with the statement: “I feel in control of how much energy I personally use”.



Base: Baseline: 41, Endline: 41.

4.4 How the SENS IDEAS intervention changed behaviour

Through a combination of more information and greater trust in the information provided, the following outcomes at the trialist level were expected to materialise:

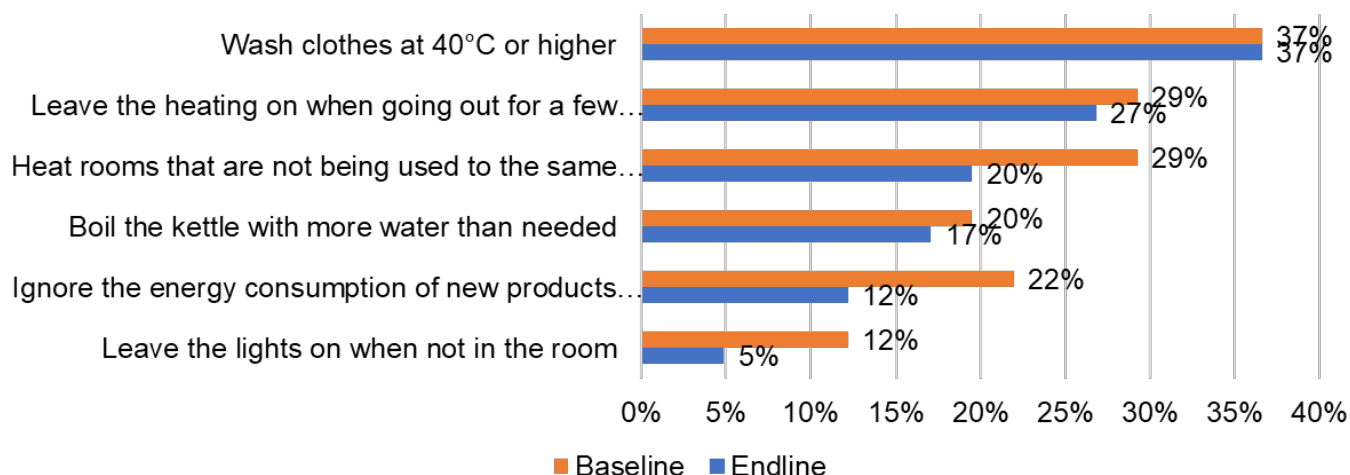
- **Trialists adopt more energy efficient behaviours:** Trialists were expected to make use of the information presented by the product, including making use of specific advice prompted by the product, to change their behaviours.
- **Increased demand for additional energy saving measures:** Based on the advice received and an increased understanding of their energy consumption, trialists were expected to implement energy saving measures in their home, such as replacing appliances with more efficient alternatives, or installing insulation or double glazing.

4.4.1 Effects on energy use behaviour and investment in energy saving measures

There was indicative evidence of trialists having adopted more energy efficient behaviours between the baseline and endline survey, (see Figure 10). Low base sizes at the baseline and endline should be considered however, when comparing proportions between each wave. Some examples of trialists adopting more energy efficiency behaviours include:

- **Not leaving the heating on when going out for a few hours.** Survey results indicatively showed slightly lower proportions of trialists leaving their heating on when going out for a few hours at the endline (27%) compared to at the baseline (29%).
- **Not heating rooms that are not being used to the same temperature as those that are being used.** Survey results indicatively suggested lower proportions of trialists heating rooms that were not being used to the same temperature as those that were being used at the endline (20%) compared to at the baseline (29%).
- **Not boiling the kettle with more water than needed.** Survey results indicatively showed lower proportions of trialists boiling the kettle with more water than needed at the endline (20%) compared to at the baseline (17%).
- **Not ignoring the energy consumption of new products or appliances when buying them.** Survey results showed indicatively lower proportions of trialists ignoring the energy consumption of new products or appliances when buying them at the endline (22%) compared to at the baseline (12%).
- **Not leaving the lights on when not in the room.** Survey results indicatively showed lower proportions of trialists leaving the lights on when not in the room at the endline (12%) compared to at the baseline (5%).

Figure 10: Proportion of trialists that implemented energy saving behaviours.



Base: Trialists that responded to both survey waves (41).

A review of the interview data highlighted some other examples of trialists adopting energy efficient behaviours:

- Adjusting radiators, turning central heating down by one degree or turning the heating off completely when out of the property;
“I’m making sure the washing machine has a full load, turning the heating off if not in use – same with radiators.”
- Switching off appliances when they were not in use;
- Reducing the shower temperature and/or length;
“I’m taking less time in the shower than I did before.”
- Reducing draughts in the property; and,
- Drying clothes outside, when the weather permitted it, rather than using the tumble drier.

The majority of trialists interviewed did not receive many tips and were therefore unable to provide evidence of any energy saving behaviours attributed to the tips provided through the SENS IDEAS intervention. Furthermore, some trialists interviewed reported using their IHD (as part of their baseline smart meter consumer proposition) and the core Be Connected app functionality to track how these behaviours led to changes in their energy consumption and associated costs, rather than the SENS IDEAS intervention.

4.5 Effects of the SENS IDEAS on trialists’ energy consumption, thermal comfort and engagement / trust in their energy supplier

The primary intended outcome of the SENS IDEAS feature was a reduction in trialists’ energy consumption, achieved through adoption of more energy efficient behaviours or energy saving

measures as above. The feature was also expected to generate secondary benefits of improved perception of thermal comfort in the home and improved engagement and trust with Together Energy (and, prior to that, Bristol Energy).

4.5.1 Reduced trialist's energy consumption

To assess whether trialists changed their energy consumption, TDEL compared monthly energy consumption in several ways. First, a simple before-and-in trial comparison was conducted of monthly energy consumption during December 2020 and December 2021 to observe changes in pre-trial to in-trial energy consumption among trialists where data could be linked in SERL¹³ (see Figure 11 overleaf). Due to the lack of a control group, there are clear limitations to using this comparison to determine changes in consumption that could be attributed to the IDEAS feature (in particular, the advice and tips provided). As a result, two additional comparisons were made:

- **Comparison between trialists that received more than five tips versus those receiving less than five tips:** This provided further insight into the extent to which any reductions seen across the entire IDEAS sample were a result of the number of tips provided (see Figure 12).
- **Comparison between trialists that implemented at least one tip versus those that implemented no tips:** This provided further insight into the extent to which any reductions seen across the entire IDEAS sample were a result of the utility of the tips provided (see Figure 13).

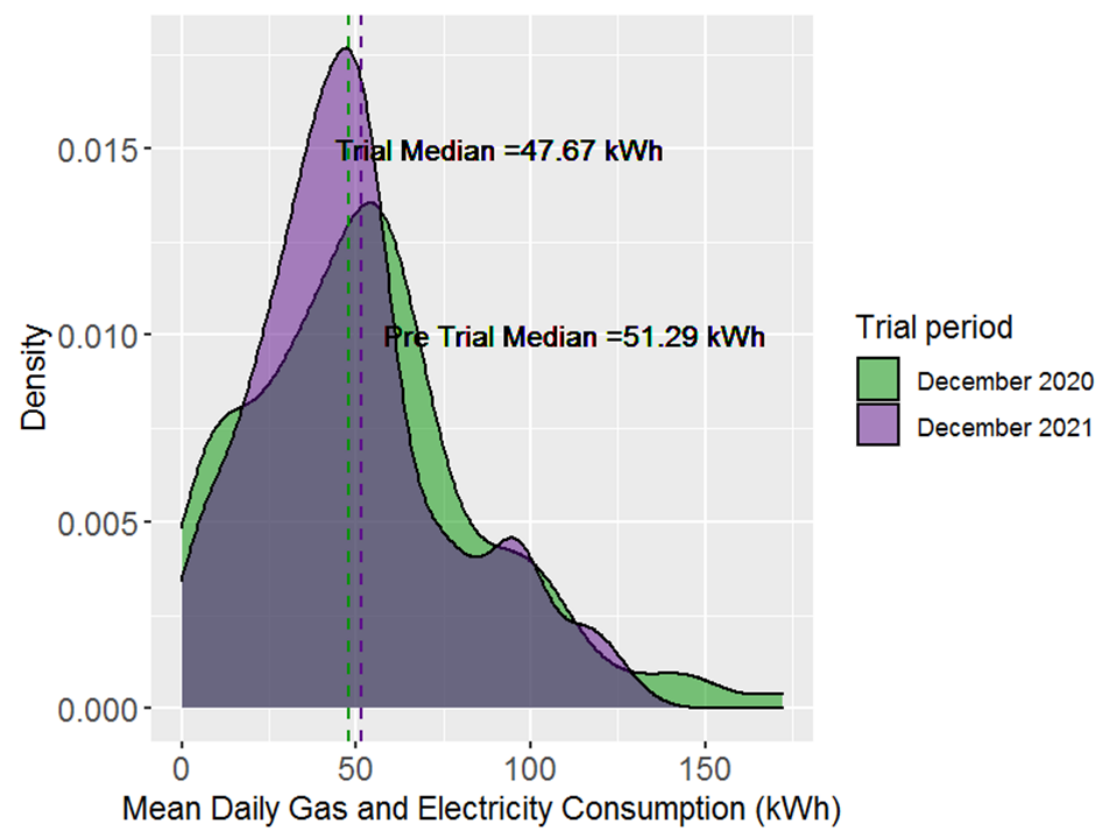
The main observations that can be drawn from the data:

- In-trial consumption was slightly lower than pre-trial consumption indicating some reduction in energy consumption among intervention group trialists (see Figure 11).
- Mean daily consumption was positively skewed in both analysis periods, indicating a non-normal distribution with some individuals consuming larger than 'normal' amounts of gas and electricity on a daily basis¹⁴.
- Trialists that received more than five tips experienced a comparatively smaller reduction in their energy consumption in comparison to those which received less than five tips (See Figure 12). This may be a result of the IDEAS model for delivering tips, however; tips were prompted by smart meter energy consumption data triggers, such as high energy use or comparatively high heating use, for example. Trialists which did not receive many tips could therefore be considered 'top-performers', i.e. were already demonstrating energy efficient/saving behaviours, that did not require further prompts through the app.
- Trialists that implemented at least one tip throughout the trial period experienced a comparatively smaller reduction in their energy consumption in comparison to those which did not implement at least one tip (see Figure 13).

¹³ Trialists' SERL records were linked to unique reference numbers provided by Eliq.

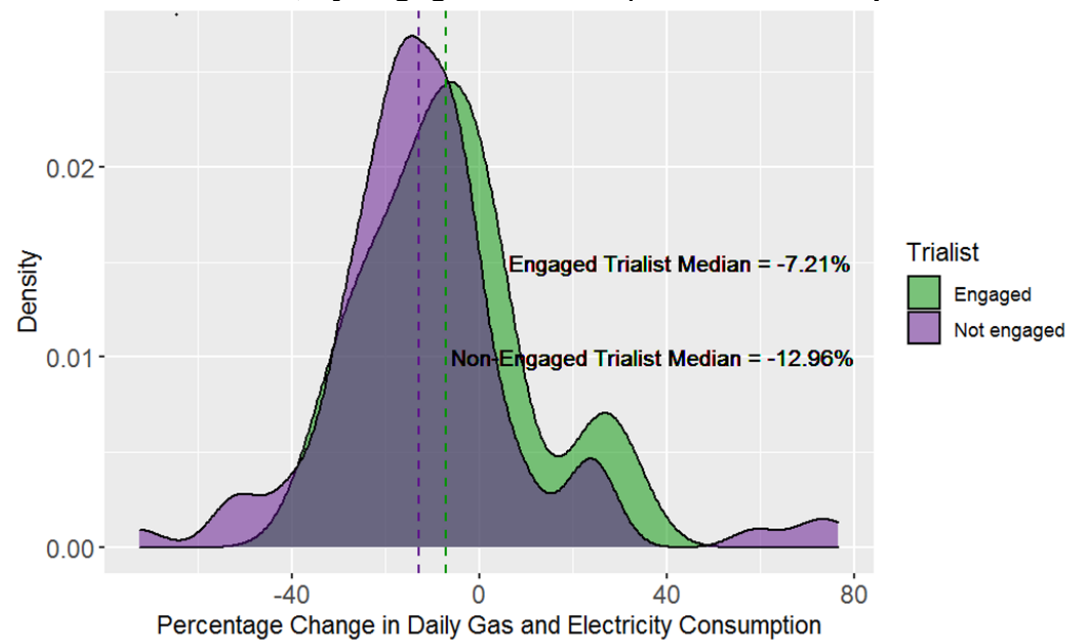
¹⁴ <https://www.ofgem.gov.uk/publications/decision-typical-domestic-consumption-values-2021>

Figure 11: Mean consumption (kWh) density plot before (December 2020) and after (December 2021) SENS intervention



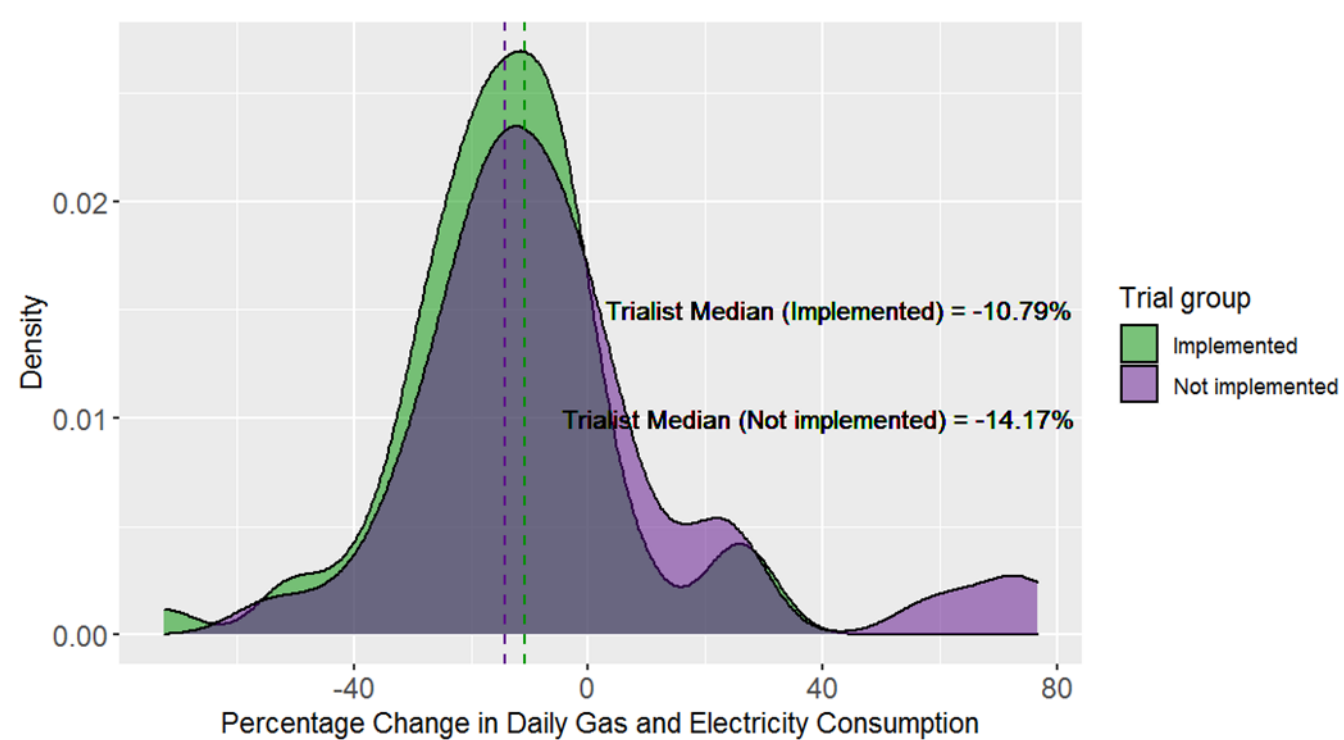
N=114 trialists with at least 50% daily records during the analysis period.

Figure 12: Percentage change in mean daily consumption (kWh) between December 2020 and December 2021, by engagement level (after removal of potential outliers)



N=104 trialists with at least 50% daily records during the analysis period and % changes less than 150%.

Figure 135: Percentage change in mean daily consumption (kWh) between December 2020 and December 2021, by whether the trialist implemented at least one tip or not (after removal of potential outliers)



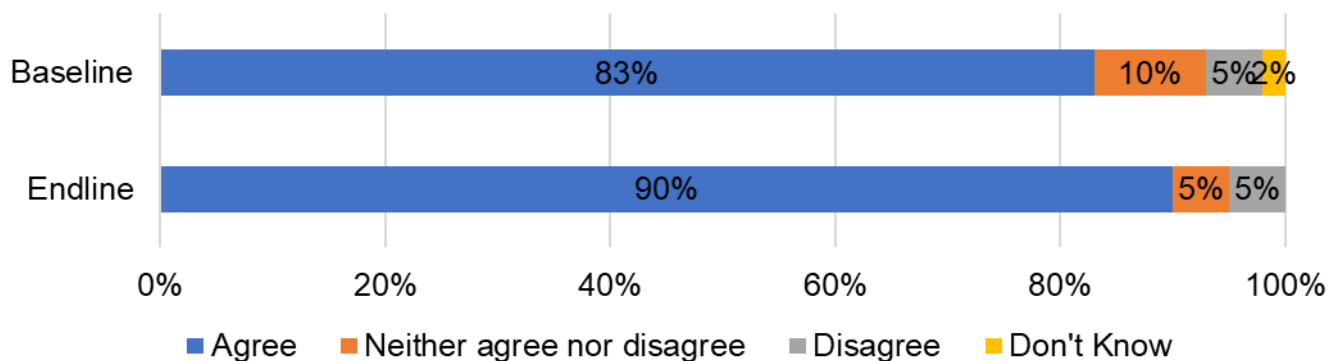
N=104 trialists with at least 50% daily records during the analysis period and % changes less than 150%.

The results presented here are broadly in line with trends seen in the latest SERL annual report¹⁵ - summarising gas and electricity use in 2021 for the SERL Observatory panel (consisting of 13,000 homes that are broadly representative of the GB population). This means that these changes were observed more widely (outside of SENS) and the indicative energy consumption analyses findings of savings here, cannot be solely attributed to the SENS intervention.

Whilst the energy consumption analysis suggested no effect of the tips and advice aspects of the SENS IDEAS intervention on energy consumption, there was indicative evidence of trialists self-reported behaviours trying to reduce the amount of energy they used at home. Trialists surveyed self-reported they had tried to reduce the amount of energy they used at home (see Figure 14). This had increased indicatively from 83% at baseline to 90% at endline.

¹⁵ Smart Energy Research Lab: Energy use in Great Britain's domestic buildings 2021. Statistical Reports: Volume 1. April 2022. Available at: <https://discovery.ucl.ac.uk/id/eprint/10148066/1/SERL%20Stats%20Report%201.pdf>

Figure 64: Agreement / disagreement with the statement: “I have tried to reduce the amount of energy I use at home”.



Base: Trialists that responded to both survey waves (41).

In-depth interview evidence suggested this could be attributed to:

- Trialists having implemented energy saving actions based on greater levels of awareness of what consumes the most amount of energy in the home as a result of viewing their present and past energy consumption through the Be Connected app.
- Rising energy costs towards the end of the trial period prompting trialists to minimise their energy bills by taking energy saving actions at home.

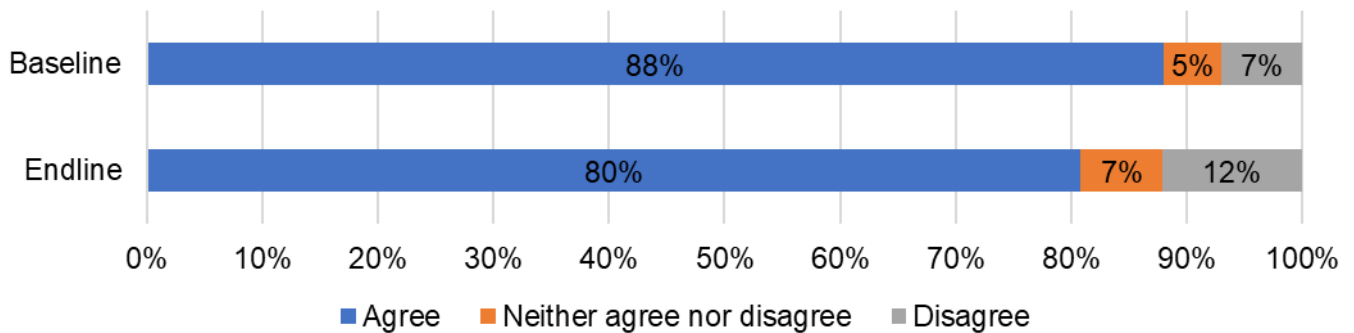
4.5.2 Improved perception of home comfort

The primary mechanism by which improved levels of home comfort was expected to be achieved was through reduced wasteful energy consumption leading to targeted use of energy to heat the home better. If, for example, trialists only heated their home when it was occupied, when previously it was heated whilst also unoccupied, they may find they can afford to heat it to higher temperatures but for less time than before, resulting in more comfort.

While trialists indicatively demonstrated improved energy-saving behaviours over the trial period (see Figure 9), they generally reported that it was more difficult to keep their home to a comfortable temperature during the in-trial winter period compared to the pre-trial winter (see Figure 15). Survey data provides various explanations:

- **Poor heating systems:** Indicatively more trialists found it difficult to heat their home to a comfortable temperature even when the heating was on at the endline compared to the baseline (15% versus 7%).
- **Rising energy costs:** Indicatively more trialists found it too expensive to heat their home to a comfortable temperature at the endline compared to the baseline (37% versus 20%).

Figure 75: Agreement / disagreement with the statement: “During the winter, I am usually able to keep my home at a comfortable temperature”.



Base: Baseline: 41, Endline: 41.

There was weak evidence to suggest that the SENS IDEAS intervention made it easier for trialists to heat their home to a comfortable level since starting to engage with the tool. One in four (24%) of trialists that has used the product agreed with the statement “I have found it easier to heat my home to a comfortable level since I started to engage with the tool”, while 35% disagreed with the statement and 35% neither agreed nor disagreed.

4.5.3 Improved engagement and trust with Together Energy / Bristol Energy

Trust in the app was expected to lead to a reduction in overall energy consumption, as well as to further improve both customer engagement and trust towards Together Energy / Bristol Energy.

At the outset, this evaluation intended to assess this outcome. However, due to the acquisition of Bristol Energy by Together Energy Limited and subsequent liquidation of Together Energy Limited (towards the end of the trial) there were likely challenges around consumer / supplier relations external to SENS. Furthermore, especially given the timings of the end-line survey and qualitative interviews with trialists (conducted subsequent to Together Energy going into administration), it was deemed not possible to reliably or meaningfully assess this.

5 Conclusions

This section discusses the results of the SENS IDEAS trial and highlights the implications of its findings, along with considerations about its limitations and lesson learnt.

The results of the comparative before-and-in-trial analysis of trialists' energy consumption data indicatively found that energy consumption was lower over the trial period compared to before the trial. Further indicative evidence from the interview and survey data also showed that trialists had attempted to reduce their energy consumption over the trial period. However, taken together, the evidence gathered, analysed and triangulated for this evaluation showed no causal relationship between the IDEAS intervention and the observed reduction in energy consumption. This was due to the following reasons:

- **IDEAS feature product not delivered as intended:** The IDEAS feature was an additional element of the Be Connected app, intended to offer tailored advice (referred to as 'tips') to trialists to help them reduce their energy consumption over time. As trialists engaged with the IDEAS feature, data would be gathered on the types of interactions that would lead to increased personalisation of the tips. As a result of COVID-19 and wider retail context, there was an insufficient number of trialists and a delayed rollout of the IDEAS feature (delayed by five months), it was not possible to provide the more personalised tips. Similarly, and related to the trial length, there were limited interactions between trialists and the IDEAS feature. This had further impacted on the personalisation of the tips and the overall number of tips given, meaning that only generalised, impersonal, and infrequent tips were provided to trialists.
- **Extraneous factors influencing energy consumption:** The 2021/ 2022 heating season was considerably warmer than the previous year,¹⁶ which may have contributed to smaller energy consumption in December 2021 compared to December 2020. Similar trends were also seen among the 13,000 households tracked through the SERL observatory panel¹⁷.

Here, the trial was unable to deliver SENS product functionality and to the number of trialists as initially intended. In this context, the evidence base available for the evaluation has limited internal validity, and this trial cannot be seen as providing definitive evidence of impacts (or lack of impact) of SENS IDEAS upon energy consumption.

The findings of this evaluation suggested that any descriptive changes in energy consumption seen over the trial period were a result of improved trialist knowledge of what consumed energy in the home, as provided through the core Be Connected app functionality.

¹⁶ https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/summaries/uk_monthly_climate_summary_winter_2022.pdf

¹⁷ Smart Energy Research Lab: Energy use in Great Britain's domestic buildings 2021. Statistical Reports: Volume 1. April 2022. Available at: <https://discovery.ucl.ac.uk/id/eprint/10148066/1/SERL%20Stats%20Report%201.pdf>

More widely, findings from the evaluation showed that trialists used the core Be Connected App more often than the IDEAS feature. Trialists found Be Connected app's core (non-IDEAS) features (in particular, viewing half-hourly consumption) to be useful in raising their awareness of what types of appliances/behaviours consume the most amount of energy in the home. Moreover, the ability to monitor the present week's energy consumption levels and compare against past weeks made trialists more mindful of their energy consumption and helped to reduce bill shocks.

In addition to enhanced knowledge and understanding of what consumed energy in the home, the new IDEAS feature was intended to encourage trialists to adopt more energy efficient behaviours and invest in additional energy saving measures.

Survey data indicatively showed that trialists adopted more energy efficient behaviours, including switching off appliances, air-drying clothes and adopting more efficient heating practices. However, low base sizes reduce the reliability of these findings. By triangulating findings from the survey data and the energy consumption analysis, it cannot be concluded that the IDEAS feature lead to any meaningful changes in energy saving behaviours for a majority of trialists, though it may have helped a small minority adopt more energy efficient behaviours. Interview data showed that this was largely due to the IDEAS feature not being delivered as originally planned (with delivery of generic advice and tips, rather than the intended tailored and personalised tips), resulting in a perceived lack of novel advice coupled with infrequent advice.

The evaluation was not able to reliably assess trialists' investments in energy saving measures over the trial period, given these were suggested quite late in the trial (and with little time to act on these). Furthermore, due to Together Energy's acquisition of Bristol Energy, and Together Energy's subsequent entering into administration (towards the end of the trial period), it was not deemed appropriate to assess trialists' trust in their energy supplier.

Overall, the core Be Connected app was well received by trialists and it may have led to positive effects in terms of increased knowledge of home energy consumption. Trialists were generally supportive of receiving IDEAS tips and advice to help them reduce their energy consumption, and there was a clear appetite to receive more novel and personalised tips.

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
CO ₂ e	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

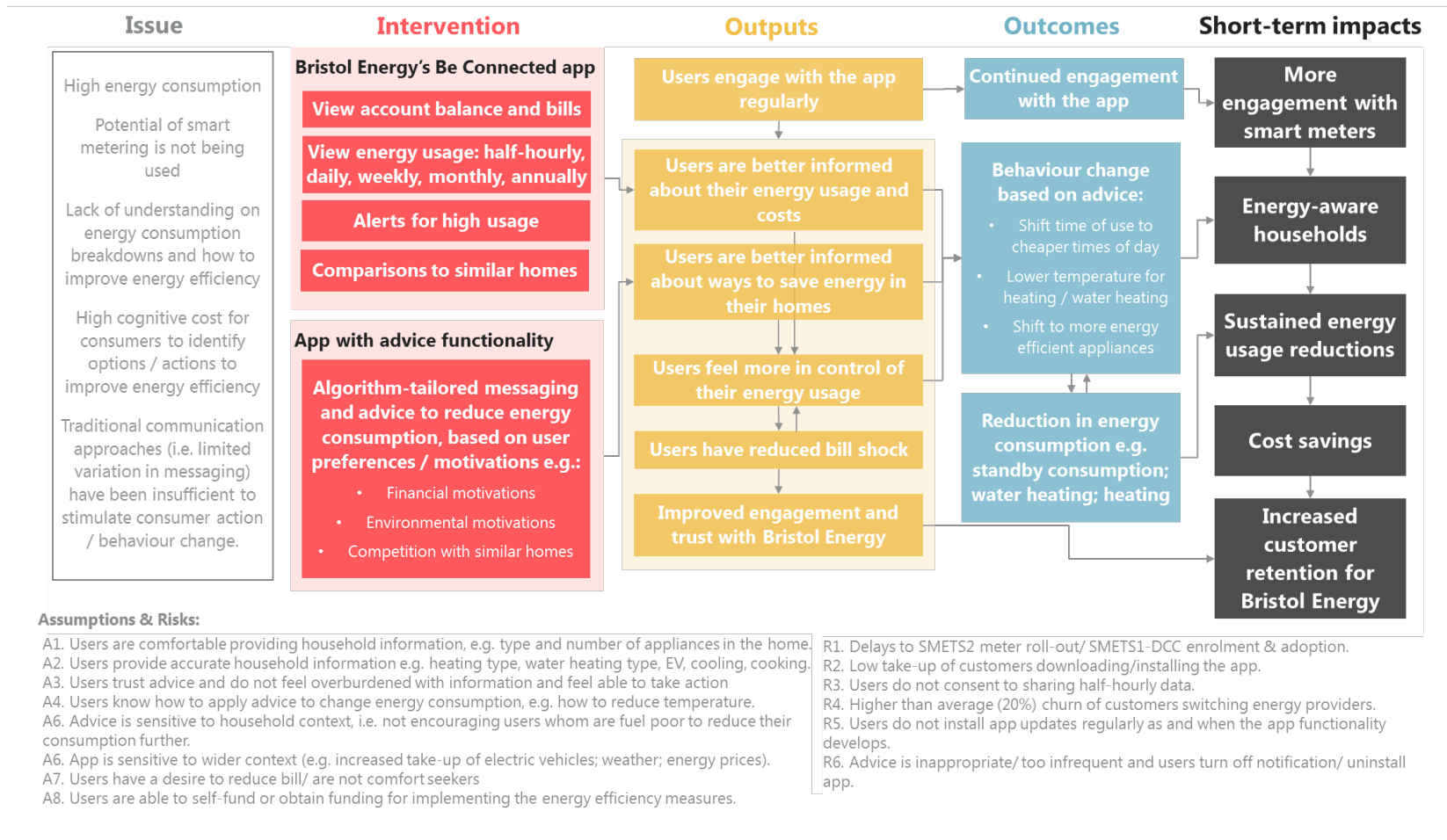
EPC	Energy Performance Certificate
GDPR	General Data Protection Regulation
GEO	Green Energy Options Ltd.
HAN	Home Area Network
HDD	Heating Degree Day
ICE	Igloo Customer Engine
IDEAS	Intelligent Digital Energy Advisory (SENS project)
IHD	In-Home Display
IMD	Index of Multiple Deprivation
ITT	Intention 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 A – SENS IDEAS intervention Theory of Change

This section presents the SENS IDEAS Theory of Change, which sets out the issues the intervention was trying to solve, the core components of the intervention itself, the outputs it was expected to deliver, the outcomes which the intervention hoped to achieve, and ultimately, the impacts of the intervention.

Figure 86: SENS IDEAS Theory of Change



Annex B – SENS IDEAS Trial Overview

This section presents an overview of the trial and shows the number of trialists involved in each step of the intervention delivery and analysis.

Table 3: SENS IDEAS trial overview

Milestone / stage / sample	Number / count (households)	Date (where applicable, and including start and end date as needed)
Number of households / trialists contacted to participate in trial	4288	April 2021 – November 2021
Number of households / trialists that agreed to participate	250	April 2021 – November 2021
Number of households / trialists providing consents to be contacted for TDEL research	250	April 2021 – November 2021
Number of households / trialists providing consents for collection/ provision of energy consumption data via SERL	250	April 2021 – November 2021
Number of households onboarded to SERL ¹⁸	250	April 2021 – November 2021

¹⁸ Onboarded is the term used where property details are securely connected to the SERL environment to give access to smart meter and other data.

SENS Intelligent Digital Energy Advisory (IDEAS): evaluation report

Number of households / trialists who went on to download the IDEAS feature of the app		250	April 2021 – November 2021
Number of withdrawals over trial period (up to end March 2022)	Change of tenancy	1	April 2021 – March 2022
	Other (On Hold)	4	
Final achieved sample (Sample at the end of the trial period, accounting for churn of trialists)		245	N/A
Final achieved sample for quantitative analysis (i.e. less records excluded for data issues outlined below)		114	N/A
Number of households excluded and reasons:	Smart meter data could not be linked to MPANs	94	N/A
	Less than 50% of smart meter data available for required period	37	N/A

SENS Intelligent Digital Energy Advisory (IDEAS): evaluation report

Baseline survey issued / response rate (treatment group)	No. of contacts available to be contacted ¹⁹	190	July 2021 – December 2021
	No. of completed interviews	87	
	Completion rate	46%	
Endline survey issued / response rate (treatment group)	No. of contacts available to be contacted	86	March 2022
	No. of completed interviews	41	
	Completion rate	48%	
Qualitative interviews completed		15	February 2022 – March 2022

¹⁹ Note that due to not all trialists having provided a valid telephone number to their energy supplier, the total number of contacts available for contact was lower than the total number of trialists that had consented to take part in the trial.

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

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