SMART-UP

CONSUMER EMPOWERMENT IN A SMART METER WORLD

NEA

Action for Warm Homes

SMART-UP

Vulnerable consumer empowerment in a smart meter world

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SMART-UP: Vulnerable consumer empowerment in a smart meter world

Executive Summary

SMART-UP in the UK: An introduction

SMART-UP is a cross-European research project funded by the European Commission's Horizon 2020 grant fund. Running from March 2015 to July 2018, it took place in five European countries and was delivered through a consortium of five partner organisations: Alpheeis in France, Aisfor in Italy, Projects in Motion in Malta, Ecoserveis in Spain, and NEA in the UK.

The overarching aim of the project was to understand the impact that tailored energy advice can have on the active use of a smart meter and in-home display to manage energy consumption in vulnerable households.

It did so by developing a training program for installers, social workers and other frontline workers in contact with vulnerable consumers that would enable them to inform their service users about the benefits of smart metering, and to advise them on how to get the most out of their smart meter and IHD. By evaluating the impact of subsequent advice delivery, the project aimed to gather feedback on the ways in which different methods of delivering advice might act to address the specific needs of vulnerable consumers, empower them to engage with their smart meter, and become more energy efficient.

Training

In the first stage of the project, NEA applied learnings from the consortium's collective experience of advice delivery to vulnerable households and insights from the evidence base to update its existing training guidelines for installers and frontline staff. Each consortium partner then adapted the training guidelines to fit with their own country's context.

SMART-UP was delivered in the UK through partnerships with Housing Associations and third sector organisations. The majority of those trained were already delivering energy advice and had a good understanding of energy efficiency. Therefore the priority was to ensure that they also understood how to use smart meters and the accompanying IHD effectively in order to communicate this to the householder.

Following the training, attendees' ranking of their knowledge of the subject increased from 2.6 out of 5 to 4.5 out of 5, and their confidence in passing on knowledge increased from 2.3 to 4.3 out of 5.

Developing resources

In a review of existing resources, we were unable to identify any generically applicable material which combines information on using an IHD along with more general energy advice; nor with a focus on getting users to interact with the smart meter. Housing Associations, in particular, expressed a need for smart-meter specific information that they could provide to tenants.

We developed a SMART-UP Information Pack for participants. Each pack contained:

- An A5 booklet that provided households with six simple steps on using their IHD to better manage their energy use and make savings.
- A diary where householders could record information from their IHD on how much they were spending weekly and monthly on electricity and gas.
- An energy efficiency advice leaflet that provided households with advice on how to act on information they see on their IHD to make behavioural changes in order to save energy.
- A photo competition postcard promoting the photography competition that NEA ran to encourage households to stay engaged with SMART-UP and their smart meter. The winner is shown on screen and was the person who took the best picture showing how they were being SMART with their energy. They received a £225 high street gift voucher to put towards their next purchase of an energy efficiency appliance.
- The packs also included a participant information sheet, informed consent form and a copy of a pre-advice questionnaire.

Engaging and recruiting households

The project originally intended to engage around 1000 vulnerable energy consumers as part of the standard, SMART-UP intervention. It was then intended that the pilot would be delivered to a target sub-sample of 60-65 households. However, due to significant issues regarding the nature of the smart meter roll out in the UK, the project faced complex barriers in being able to engage this number of households.

This resulted in a total of 105 vulnerable households being engaged by the project. Of these, 82 were allocated to the experimental pilot and control groups. To allow for more effective comparison of results and analysis of impact, it was therefore decided that the remaining 23 households in receipt of the standard intervention would be treated as a fifth experimental group within the pilot.

Households participating in the pilot received a combination of standard and enhanced face-to-face advice, a printed information pack, and a telephone aftercare service providing 3 follow-up calls at the 2-week, 3-month and 6-month mark to enquire if households need further information on using their smart meter and advice on saving energy.

To engage and recruit households NEA signed agreements to work with housing associations and third sector organisations.

To recruit households, stakeholders carried out:

- Tenant mail outs
- Briefed front-line staff to refer any customers identified with smart meters to SMART- UP
- Advertised the project on social media and websites and provided leaflets and posters in offices
- They promoted the project at household events and in rent statements sent to 30,000 households
- It was advertised in city-wide magazines, and articles were published in tenant newsletters
- Others used data-matching where possible to promote SMART-UP to households known to have smart meters installed

We estimate that the project was promoted to over 40,000 UK households through our partners.

The smart meter roll out in the UK

When the SMART-UP project bid was submitted to the European Commission in mid-2014, the smart meter roll-out in the UK was expected to commence in autumn 2015. However, the first date for the roll out was pushed back by government to September 2016. Then the date was delayed further until end October 2016. Essentially, however, larger suppliers were not required to begin to roll-out smart meters to their customers until end of May 2017 at the earliest, and currently have until the end of 2020 to complete their roll-out.

The delay to the smart meter roll-out had an adverse impact on NEA's ability to deliver SMART-UP in the UK. Specifically, because the majority of energy customers do not yet have a smart meter installed in their home, our national stakeholders struggled to find enough vulnerable households with smart meters.

UK suppliers are free to choose their roll-out strategies, including the areas where they begin to install smart meters. There is no publicly available data on where (at a local authority level) domestic smart meters to date have been fitted.

Based on NEA's calculations, the housing stock of Housing Associations with whom we were working on SMART-UP had approximately a 6-8% penetration of smart meters relative to traditional meters. Taking into account that not all of those households with smart meters would agree to take part in SMART-UP, it is possible to conclude that NEA and our partners were effectively working with a pool of around 1% of households within the vulnerable target group.

NEA also sought to work with suppliers on SMART-UP. This engagement was unsuccessful for a number of reasons:

- Smart meter installers already had a number of safety, installation and consumer issues to focus on during installation appointments, which typically take around 2 hours. Based on feedback provided to NEA, there was no appetite (or commercial incentive) to add to the complexity, duration and resources of this already lengthy
- Suppliers are not yet installing smart meters to vulnerable customers in large numbers.
- Suppliers who had gone early on the smart meter roll-out and could have therefore potentially supported NEA to deliver SMART-UP already had specific training programmes for their installers on smart metering, energy efficiency and vulnerability in place.
- Data protection laws prevent suppliers from sharing data on their customers with smart meters with NEA or our housing association partners.

Evaluation Methodology

The first stage of the evaluation involved frontline advisors administering a face-to-face, pre-advice questionnaire with households at point of intervention. This allowed for the collection of baseline data on energy consumption and behaviours, and for the demographic characteristics of the sample to be identified.

Between 6 and 12 months after receiving an advice intervention, a second, postal questionnaire was administered to households in order to gather insights on any changes that had occurred with

regards to household energy consumption and energy behaviours, and to understand the extent to which participants felt their SMART-UP intervention had been beneficial to them. In total, we received 64 responses to the post-intervention questionnaire (representing a 61% response rate).

A sub-sample of participants from each of the pilot and standard intervention groups were then invited to participate in a semi-structured, qualitative telephone interview in order to discuss their experience of participating in SMART-UP, how they use and manage their energy at home, and the extent to which they engage and benefit from their smart meter in more detail.

Data gathered from pilot aftercare trackers which were completed and returned to NEA by partner organisations on a monthly basis during delivery was used to supplement insights gathered from households with the perspective of the advisors themselves. The trackers contained reflections and feedback from the advisors as to the outcomes of an intervention with particular households, noting any beneficial impacts or challenges along the way.

The evaluation also included a formative element, during which a sub-sample of key stakeholders involved in delivering the SMART-UP were invited to participate in a semi-structured, qualitative telephone interview. Interviews discussed the extent to which SMART-UP aligned with their own organisational objectives, their experience of delivering the project and engaging households, the extent to which they felt the project had had an impact upon households, and any recommendations they had for delivery going forward

Sample Characteristics

The project was effectively targeted at vulnerable households at risk of energy poverty, likely to be digitally excluded and in need of additional support to be able to fully engage with their smart meter and IHD. Identified risk factors include:

- 89% lived in social rented housing
- 46% of households had at least one child living with them
- 31% of households containing at least person aged 65 or older
- 75% of participant households living on incomes of less than £16,000 per year
- 89.5% in receipt of means-tested benefits
- 51% of households had at least one member of working age that was unemployed or unable to work
- Only 14% of households had at least one person in the household in paid full or part-time work
- 73% of participating households had at least one person with a long-standing physical or mental health condition or disability
- 23% of participants had no formal qualifications, and only 11% had a higher education or undergraduate qualification
- 52% of households had someone at home all the time every day

Delivering Advice effectively

The most effective format of advice delivered through SMART-UP was the combination of enhanced face-to-face advice, the provision of written information resources, and the telephone aftercare

service. Offering advice in multiple formats meant participants with varying needs and vulnerabilities could find the best way of accessing information to suit them.

Frontline advisors did, however, have a number of recommendations through which the intervention could be improved upon. This included delivering the intervention as close to the time when households received a smart meter as possible, and providing a more holistic intervention that could cover multiple aspects of a household's relationship with energy and the energy market (not just smart meters). At other times, advisors felt that the inclusion of additional advice delivery formats would allow even more households to be engaged by the project (such as producing digital content that could be viewed online or on the television). Finally, we were reminded by stakeholders that although the combination of multiple and tailored advice delivery formats was most beneficial to households, this brought with it a corresponding cost in terms of staff time invested. This could be difficult for partners to replicate and to continue to deliver going into the future without adequate resources.

Receiving advice from suppliers

Just over half (56%) respondents agreed that they were satisfied with the advice and information given to them about how to use the IHD from their supplier, and a third disagreed. Our interviews with respondents revealed that some households are being left without the additional support and guidance that they require from their energy suppliers with regards to how to use and get the most out of their smart meter. This is particularly the case for households with needs requiring a more tailored and detailed approach

Impact on smart metering behaviours

Following the SMART-UP intervention, respondents were more likely to:

- Check how much electricity they are using right now
- Use the traffic light system to monitor their electricity use
- Check how much an appliance costs to run
- Check how much electricity they had used in the previous day, week or month
- Set a budget or target for how much electricity they want to spend in a day, week or month
- Feel that they understood how to use their IHD
- Find the IHD useful to help monitor and manage electricity use in their home

Households were less likely to use their IHD/app once a day or more *after* their SMART-UP intervention than they were before.

This could relate to the fact that once households understand their energy practices, usage and the running costs of appliances (and they have taken steps to address anything they feel needs to be addressed), they may no longer feel the need to check their IHD or app as frequently as they did previously. However, there was also an increase in the number of households who said that they do not have an IHD or app post-intervention. This was possibly a result of having changed suppliers during the lifetime of the project and losing the 'smart' functionality of their meters. Some households, however, were genuinely dissatisfied after their smart meters were installed, and this tended to relate to customers on a PPM function experiencing difficulties in switching to emergency credit when needed.

Impact on energy efficient behaviours

A high proportion of participants paid for their electricity via PPM (63.5%), suggesting an increased risk to fuel poverty, self-disconnection, and disengagement from the competitive energy market.

The primary reasons for which households were using electricity in the home indicate that the areas with the most scope for potentially reducing domestic electricity use: 68% of households used electricity for cooking, and 54% used it to heat water

However, it is essential to note that the primary uses of electricity for some households - such as primary space and water heating (12% and 54% respectively) - put them at a greater use of energy poverty due to the fact that they were likely to be paying more for their energy. Those who were using electricity as their primary method of secondary heating (25% households) were potentially suffering from an additional expense in order to achieve adequate warmth at home. The fact that such secondary appliances were required in the first place indicates that their primary heating systems were either inefficient at providing adequate levels of warm, and/or cost too much to run. In either case, such participants were at risk of under-heating their homes (reducing the potential for them to decrease their energy use further), or could have faced barriers to being able to save energy that were not related to behaviour (inefficient properties/heating systems).

Where there was scope to reduce electricity consumption within the sample, this was most likely to occur across those activities and appliances that could be described as common 'essentials' like television, food storage, washing machines and chargers.

Following the SMART-UP intervention there were increases in the percentage of households carrying out at least one (from 74 to 84%), two (from 62 to 81%) or three (from 42 to 70%) actions to manage energy in the home, compared to before receiving SMART-UP advice. It is therefore possible that households were enabled to take more action to manage their energy use at home through the project, either through accessing hints and tips around how to do so, or having the benefits of doing so demonstrated to them.

Post-intervention, households were most likely to be turning off appliances and plugs (59%), or taking action around their lighting practises (41%). Almost a third were engaging in clothes washing practices such as washing with a full load, at low temperatures or on eco short cycles (30%), and just over a quarter were carrying out actions relating to their water practices (such as only filling a kettle with the amount of water needed). Around a fifth were using energy efficient products (22%). A third of households were also controlling, monitoring or reducing the time and temperature of their central heating systems (30%).

This is in keeping with the main uses of electricity and electrical appliances in the home identified by the project, and suggests that SMART-UP advice was able to resonate with households' everyday practices of electricity use in the home.

However, the post-intervention questionnaire also revealed indicators that some respondents were still resorting to harmful rationing practices, especially in relation to their central heating. 7% of respondents were either staying in bed or going out in order to avoid turning on the heating, and 7% were also turning off their central heating altogether, or occupying a reduced number of rooms in order to avoid heating a full house.

This suggests that, whilst the project did enable and encourage respondents to take actions that would enable them to manage their energy use efficiently, some respondents were still in a state of heightened vulnerability when it came to affording to comfortably heat their home, and were engaging in practices that could be harmful to both their physical and mental health and wellbeing.

Impact on affordable warmth

We also examined how far households were concerned with being able to keep warm and comfortable at home (and their ability to achieve affordable warmth) prior to the SMART-UP interventions taking place, as well as how far they were worrying about their energy bills both pre- and post-intervention.

We found that households were likely to be regularly weighing up decisions to turn the heating on or off, and making complex compromises in their everyday lives with regards how to they managed their heating and energy needs. Indeed, in such cases, advice may not be enough to enable households to save energy to the extent that they would be able to take the savings as increased levels of warmth at home.

Whilst SMART-UP might have enabled some households to take action to manage their energy use, it did not necessarily resolve the precariousness of their financial situation, or improve the efficiency of their properties/heating systems (only their behaviours). This therefore could act to limit the extent to which their worries about being able to afford to meet the cost of their energy, even for their basic needs, could be alleviated.

Impact on electricity consumption

Frontline workers were asked to record electricity consumption data (in the form of annual consumption (in kWh) or a current meter reading for each household to which they delivered a SMART UP intervention. Consumption data was recorded on the first, pre-intervention questionnaire by the frontline advisors themselves. However, advisors faced difficulties in accessing full electricity consumption data of the majority of households participated in the sample. This was due a variety of reasons, such as:

- Lost or missing paper bills
- Utility companies unable to provide the data upon request
- Recent smart meter installation meant annual consumption data was not yet available
- Household unwilling to provide the data

This meant that, of a sample of 105 households, valid and comparable data on annual electricity consumption was only available for 12 households.

Average consumption had dropped following the SMART UP intervention from 3,757kWh to 3,586kWh. This represents a saving of 171kWh, and 5% reduction in electricity consumption within the sample. However, given the extremely small sample size, these findings cannot be taken as being representative of the UK SMART UP sample more generally, nor were we able to determine the statistical significance of a 5% drop in average consumption.

As a result of this, we explored current estimates around average household consumption in the UK, as well as estimating the likely energy savings (in kWh) that could result from implementing sustainable energy behaviours.

Conclusions

Despite encountering significant difficulties in being able to target and recruit sufficient numbers of households, those households that were engaged by SMART-UP were likely to be vulnerable to energy poverty, digital exclusion, and to require additional support in being able to use, understand and make the most of their smart meter and IHD.

The project was able to encourage participating households to engage in more (and more positive) energy efficient behaviours.

Advice delivered through SMART-UP was successful in enabling vulnerable households to understand and engage with their smart meter and IHD, increasing the range of purposes for which they used them, as well as the frequencies with which such tasks were carried out.

The positive impact of SMART-UP advice on smart metering behaviours of households revealed that providing tailored and enhanced advice in a variety of formats can enable and empower vulnerable households to take control of their energy use.

The project did however highlight the need to combine behaviour change advice alongside other measures (such as the provision energy efficiency measures, income maximisation advice and fuel debt alleviation). This would ensure energy poor households are able meet their energy needs for comfort and warmth whilst carrying out positive energy saving behaviours that would not be detrimental to their health and wellbeing.

UK Recommendations

For frontline workers looking to support vulnerable households in engaging with and understanding their smart meter and IHD

Trusted intermediaries are well equipped with the necessary knowledge and skills to reassure, educate, advise and guide householders, and without this here is a risk that vulnerable consumers will miss out on the benefits that smart meters and IHDs can prompt.

Frontline workers looking to effectively deliver advice on smart metering and energy efficiency to vulnerable households should look to provide advice in multiple formats and to tailor it to the particular needs and requirements of the household in question. This can include a mixture of face-to-face and paper-based advice, as well as offering the possibility of follow-up checks via the telephone.

Feedback from frontline workers involved in delivering smart up indicated that this package of advice could be further improved upon by delivering the intervention as close to the time when households received a smart meter as possible, and providing a more holistic intervention that could cover multiple aspects of a household's relationship with energy and the energy market (not just smart meters). Furthermore, including additional "leave behind" advice delivery formats following the face to face interaction would amplify the this form of 1-1 engagement.

At the same time, frontline workers they raised concerns around the promotion of smart meters to vulnerable households at a time when smart meter functionality may not allow them to switch suppliers in order to access the best deals. Importantly, they also picked up on changes that energy suppliers should implement in order to better meet the needs of vulnerable energy consumers - including delivering more detailed, tailored and effective advice at point of installation. Future advice delivery would need to take this into account.

For policymakers to enable effective advice delivery and evaluation of impact

To enable frontline workers to deliver effective advice to households post installation, additional grant funding should be made available to support intermediary organisations interested in delivering post-installation smart meter and energy efficiency advice to vulnerable households. There is also currently little information about how or when individual suppliers are rolling smart meter technology or the approaches they are already taking to engage vulnerable consumers to ensure they too capture the benefits of more accurate billing and greater control of their energy use. By developing a GIS based map of where smart meters have been installed, this would support external organisations to follow up installations to amplify the benefits by providing more extensive behaviour change advice and support.

There must also be more effective mechanisms for identifying and targeting vulnerable consumers who may require additional support with using and understanding their smart meter/IHD on a long-term basis. For example, some poorer households may take gains from positive energy saving behaviours as increased thermal comfort at home (and therefore increase consumption elsewhere). Outcome measurements of such interventions would need to take improvements to health, wellbeing and reductions in overall energy vulnerability into account. Outcome measurement and reporting requirements would also need to be updated accordingly.

Behaviour change interventions to reduce consumption in energy poor households are also likely to be more effective when delivered alongside fabric improvements to dwellings and the provision of energy efficiency measures, as well as income maximisation advice and fuel debt alleviation measures in order to avoid the negative outcomes of under-consumption and ensure maximum gains from positive, energy efficient behavioural changes can be made.

Energy suppliers and network companies must make the most of their current obligations to identify customers in vulnerable situations (via the Priority Services Register) and providing them with necessary assistance. *The UK* Government could also consider how possibilities presented by the new Digital Economy Act which could enable data sharing agreements (between suppliers, households and trusted local intermediaries) to provide historic and on-going consumption data of households in receipt of interventions to enable impact of behaviour change and energy efficiency interventions to be more effectively demonstrated.

For suppliers and policy makers to improve the vulnerable consumer journey from point of installation

Installing an electricity or gas smart meter requires the utmost safety standards. These must be universally applied. No household, especially the most vulnerable, should suffer detriment from the

installation process, including inhibiting a customer's on-going ability to switch supplier. Policy makers and smart meter installers must therefore ensure there is a consistent, safe, customer journey at the point of installation. Any risks about the quality of smart meter installations can be considerably lessened by setting, monitoring and enforcing minimum installation standards.

The interoperability of smart meters between different suppliers must also be addressed. The latter issue is not just relevant to households; the variation in the type of smart meters currently available in the UK could also complicate the extent to which some advisors could practically apply the knowledge they had gained during SMART-UP training. This suggests that training courses might benefit from an inclusion of a broader range of smart meter types, explain the different product types, technical capabilities and the implications this may have on consumers.

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Section 1: Introduction

1.1 Project aims

SMART-UP is a cross-European research project funded by the European Commission's Horizon 2020 grant fund. Running from March 2015 to July 2018, it took place in five European countries and was delivered through a consortium of five partner organisations: France (Alpheeis), Italy (Aisfor), Malta (Projects in Motion Ltd), Spain (Ecoserveis) and the UK (NEA).

The overarching aim of the project was to understand the impact that tailored energy advice can have on the active use of a smart meter and in-home display (IHD) to manage energy consumption in vulnerable households.

It did so by developing a training program for installers, social workers and other frontline workers in contact with vulnerable consumers that would enable them to inform their service users about the benefits of smart metering, and to advise them on how to get the most out of their smart meter and IHD. By evaluating the impact of subsequent advice delivery, the project aimed to gather feedback on the ways in which different methods of delivering advice might act to address the specific needs of vulnerable consumers, empower them to engage with their smart meter, and become more energy efficient.

1.2 Background

1.2.1 EU policy context

In 2012, the EU took action to address limited progress on the target to reduce primary energy consumption in the region by 20% by 2020. It did so by adopting the Energy Efficiency directive, along with other policies. The Energy Efficiency Directive requires that member states:

- Establish strategies for retrofitting the buildings stock
- Establish energy efficiency obligation scheme for suppliers and/or distributors
- **Introduce smart metering** (if feasible and cost-effective to do so)
- **Base billing on actual consumption data**
- Identify where there is potential for cogeneration or the establishment of district heating and cooling schemes
- Ensure that energy regulators encourage programmes of demand-response and that network tariffs take the cost and benefit of energy efficiency measures into account [1]

In addition, the Directive on Security of Supply encourages real-time demand management to be implemented. Meanwhile, the Directive on End-Use Energy Services calls for the introduction of

[1] EEA, 2013, Achieving energy efficiency through behaviour change: what does it take?

smart meters, as does the Third Liberalisation Package. This also requires that the information provided in energy billing be transparent. [2]

1.2.2 Smart metering and energy efficiency

It has been argued that consumers can be enabled to better manage their energy use in the home through the provision of clear and continuous feedback. Eventually, this may lead to long term behaviour change. [3] [4] [5] Research has found that providing consumers with Home Energy Reports which provide comparative consumption information and give energy efficiency advice can result in changes to behaviour and energy savings of between 1 and 3% per household. [6] [7]

Indeed, smart meters have the potential to bring an end to estimated bills, allow consumers to switch energy suppliers more easily, and encourage energy efficient behaviours at home. [8] The provision of near real-time feedback on energy consumption and costs via an In-Home Display (IHD) means customers could be better able to control and manage the energy that they use, reducing both costs and emissions. [9] [10] They also mean that prepayment customers have the opportunity to monitor their credit and to top-up remotely. [11] [12]

Studies from the UK have found that 44% of consumers had reduced energy bills following the installation of a smart meter in their home, and 43% were more likely to turn down the heating or switch off their lights. [13] Indeed, of consumers who have chosen to have a smart meter installed, 32% did so to stop estimated bills and manual meter readings. Meanwhile, over half did so in order to save money (51%). A smaller percentage (15%) did so to make their homes more sustainable. [14]

However, in order for such benefits to be realised, consumers need to engage with their IHDs - something which may involve varying levels of interest, motivation (whether financial or environmental), and which requires the ability to interpret and understand the information being viewed. [15] Vulnerable groups may therefore require greater support to be able to engage with, and

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[2] EEA, 2013, Achieving energy efficiency through behaviour change: what does it take?

[3] EEA, 2013, Achieving energy efficiency through behaviour change: what does it take?

[4] Darby, S. Energy Advice, What is it worth? Panel 3, University of Oxford (Environmental Change Unit)

[5] Nilsson A., Beregstad C.J., Thuvander L., Andersson D., Andersson K., and Meiling P., 2014, Effects of continuous feedback on households' electricty consumption: potentials and barriers. *IN Applied Energy 122:17-23*

[6] DECC, 2012, What works in changing energy-using behaviours in the home? A rapid evidence assessment

[7] Darby, S. Energy Advice, What is it worth? Panel 3, University of Oxford (Environmental Change Unit)

[8] ECTA, 2017, Smart meters: the consumer view

[9] BEIS, 2017, Smart meters: quarterly report to end September 2017

[10] Sovacool, B., Kivimaa, P., Hielscher, S., and Jenkins, K. 2017, Vulnerability and resistance in the United Kingdom's smart meter transition. *IN Energy Policy 109: 767-781*

[11] DECC, 2015, Smart metering implementation programme. DECC's policy conclusions: Early learning project and small-scale behaviour trials

[12] Ofgem, 2017, Vulnerable consumers in the retail energy market: 2017

[13] ECTA, 2017, Smart meters: the consumer view

[14] ECTA, 2017, Smart meters: the consumer view

[15] Buchanan, K., Russo, R., and Anderson, B. 2015, The question of energy reduction: The problem(s) with feedback. *IN Energy Policy 77: 89-96*

realise the benefits of, their smart meter.[16] [17] [18] [19] Otherwise, they could be prevented from accessing certain benefits of smart metering (such as dynamic pricing mechanisms).[20]

It is important to note that energy use itself is carried out and transformed within a set of social practices that are influenced by (but not limited to) the material arrangements in which they occur.[21] In this way, behaviour change requires more than the mere provision of information. It is influenced by ""(i) our tendency to 'discount the future'; (ii) the power of social norms; (iii) the use of defaults."[22] [23] Information needs to be tailored (rather than generic), situated within (and not separate to) social practices, comparative, and presented in different formats if it is to engage different types of consumer. [24] [25] [26] Furthermore, it needs to focus on tasks over which people feel they have control, that are simple, and that can be carried out in the short term. [27] Targeting methods should similarly be tailored to the needs of different groups. [28] [29] [30] [31] [32] Actions to encourage household engagement with smart meters also need to recognise that household energy use forms part of a collective group practice and are affected by the intersections of different and complex social relations. Behaviour change interventions therefore need to engage entire households, rather than just one individual within them. [33]

Groups that are likely to require additional support to engage with their smart meter and IHD are those with low levels of literacy; long-term ill health or a disability; older age; tenants; those on low incomes; and customers with prepayment meters. [34] At the same time, it is important to view vulnerability in the context of energy as being transitory, rather than category-based. As such, it tends to reflect a combination of structural influences and individual characteristics.[35]

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[16] EEA, 2013, Achieving energy efficiency through behaviour change: what does it take?

[17] DECC, 2015, Smart metering implementation programme. DECC's policy conclusions: Early learning project and small-scale behaviour trials

[18] Darby, S. Energy Advice, What is it worth? Panel 3, University of Oxford (Environmental Change Unit)

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[23] Shove E., and Walker, G., 2014, What is energy for? Social practice and energy demand. *IN Energy & Society 31(5): 41-58*

[24] Cabinet Office, DECC and CLG, 2011, Behaviour change and energy use

[25] DECC, 2012, What works in changing energy-using behaviours in the home? A rapid evidence assessment

[26] Citizen's Advice, 2014, Smart meter extra help: ensuring all consumers benefit from the rollout of smart meters

[27] Cabinet Office, DECC and CLG, 2011, Behaviour change and energy use

[28] DECC, 2012, What works in changing energy-using behaviours in the home? A rapid evidence assessment

[29] Citizen's Advice, 2014, Smart meter extra help: ensuring all consumers benefit from the rollout of smart meters

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[35] Citizen's Advice, 2014, Smart meter extra help: ensuring all consumers benefit from the rollout of smart meters

1.2.3 Smart meter roll out in the UK

The UK Government has made a pledge to install a target of around 53 million smart meters in 30 million homes by 2020.[36] It has introduced new policies and a regulatory and legal framework – the Smart Meter Implementation Program (SMIP) - for engaging consumers. This includes the obligation for suppliers to provide an in-home display (IHD) when installing a smart meter, and a centralised engagement campaign being coordinated by Smart Energy GB.[37] [38]

It is estimated that the total cost of the roll out will be in the region of £11billion (over £200 per household). Indeed, it is the most significant energy transition carried out within the UK since converting to natural gas from the North Sea. It is the biggest behaviour change programme seen in the UK to date, and the largest information technology project to be run by a government in history.[39]

Energy suppliers have been charged with the responsibility of planning and delivering the roll out of smart meters to their customers. They have been granted license to do so in a way that most suits their business needs and those of their customers (as long as the roll-out is complete by 2020). This means there is variation between suppliers in their approaches to delivery.[40] All domestic consumers are being offered an In-Home Display (IHD) which will allow households to view how much energy they are using and their energy costs.[41]

Smart meters must be compliant with the Smart Meter Equipment Technical Specification (SMETS), and suppliers report the number of SMETS compliant smart meters that have been installed (and that are operating in smart mode) to the Department for Business, Energy and Industrial Strategy (BEIS) either quarterly (for large suppliers) or annually (for smaller suppliers). This figure also includes those meters that they expect to upgrade to become SMETS compliant. Only those that are SMETS compliant count towards supplier obligations under the roll out. Following the establishment of a national data and communications infrastructure through the Data and Communications Company (DCC), a new generation of smart meters have been introduced under SMETS2. It is intended that SMETS1 meters will eventually be incorporated into this network.[42]

The Smart Metering Installation Code of Practice (SMICoP) sets out the minimum standards to be followed when providing customers with a smart meter. It requires that suppliers and installers:

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[36] ECTA, 2017, Smart meters: the consumer view

[37] DECC, 2015, Smart metering implementation programme. DECC's policy conclusions: Early learning project and small-scale behaviour trials

[38] Sovacool, B., Kivimaa, P., Hielscher, S., and Jenkins, K. 2017, Vulnerability and resistance in the United Kingdom's smart meter transition. *IN Energy Policy 109: 767-781*

[39] Sovacool, B., Kivimaa, P., Hielscher, S., and Jenkins, K. 2017, Vulnerability and resistance in the United Kingdom's smart meter transition. *IN Energy Policy 109: 767-781*

[40] BEIS, 2017, Smart meters: quarterly report to end September 2017

[41] BEIS, 2017, Smart meters: quarterly report to end September 2017

[42] BEIS, 2017, Smart meters: quarterly report to end September 2017

- Clearly and accurately demonstrate to customers access and use of their smart meter and IHD in ways that are accessible and easy to understand
- Demonstrate pre-payment functions to customers when the smart meter is to be operated in prepayment mode (including where to find information on tariffs, debt, emergency credit and re-enabling supply). They should also receive guidance and demonstrations on the process of getting credit and topping up
- Provide the customer with written instructions (or in other suitable formats) on how to use their smart meter and IHD
- Provide customers with guidance around energy efficiency at point of installation
- All of the above should be delivered in a way that is sensitive to, and tailored for, specific needs or vulnerabilities of the customer (visual impairment, hearing impairment, low literacy levels, and known Vulnerabilities[43]

By the end of September 2017, over 8.61 million smart and advanced meters had been installed in homes and businesses in Great Britain. [44] More electricity smart meters have been installed than gas smart meters to date, relating to the fact that some properties are off-gas, and that some suppliers have chosen to only install electricity smart meters at present. [45]

However, the roll out has in fact experienced significant delays and is behind schedule. Such delays have been attributed to "rising costs, the rapid pace of technological change, data security, and efficiency of delivery issues." [46] It was estimated in 2017 that around 40,000 smart meters would need to be installed by suppliers each day in order to meet the program target. [47] Furthermore, there is a skills gap within the UK engineering sector which means an extra 6,500 new engineers would be needed to meet the 2020 target. [48] Indeed, around 20% of consumers have experienced delays in being able to have a smart meter installed due to a lack of suitable engineers. [49] At the same time, technological challenges have further blocked progress of the roll-out. In 2014, the meters that were available would not in fact work in a third of homes in the UK (such as high-rise and basement flats or in rural areas) due to communications and network control issues. Indeed, 10% (or 1.3 million) of the smart meters installed up to early 2015 were in fact functioning as traditional meters for which customers had to take manual readings. Some suppliers reported faults with their meters (6% of meters installed by OVO Energy and 0.5% of those installed by EDF). In addition, incompatibility between the meters being installed by different suppliers meant that switching could, in some cases, lead to customers losing the 'smart' functions of their smart meter.[50]

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[43] Ofgem, 2013, Smart Metering Installation Code of Practice

[44] BEIS, 2017, Smart meters: quarterly report to end September 2017

[45] BEIS, 2017, Smart meters: quarterly report to end September 2017

[46] Sovacool, B., Kivimaa, P., Hielscher, S., and Jenkins, K. 2017, Vulnerability and resistance in the United Kingdom's smart meter transition. *IN Energy Policy 109: 767-781*

[47] Sovacool, B., Kivimaa, P., Hielscher, S., and Jenkins, K. 2017, Vulnerability and resistance in the United Kingdom's smart meter transition. *IN Energy Policy 109: 767-781*

[48] ECTA, 2017, Smart meters: the consumer view

[49] ECTA, 2017, Smart meters: the consumer view

[50] Sovacool, B., Kivimaa, P., Hielscher, S., and Jenkins, K. 2017, Vulnerability and resistance in the United Kingdom's smart meter transition. *IN Energy Policy 109: 767-781*

There are also barriers to the roll out of smart meters due to low awareness and understanding of smart meters by consumers[51] (44% of consumers claim that they do not understand the benefits of having a smart meter and therefore would not want to have one installed). [52] In addition to this, 29% of people do not like the thought of energy companies being able to monitor their behaviours in the home, and 44% claim they do not see the benefits of smart meters at all. Meanwhile, 13% think they wouldn't be able to have one due to the fact they have a pre-payment meter, 6% of consumers believe smart meters could represent a health risk, and 8% fear it may prevent them from being able to switch supplier. [53]

Furthermore, research carried out by Citizens Advice found that there is little innovation being carried out by suppliers when it comes to providing vulnerable consumers with extra, tailored support. Citizens Advice argues that, "due to the pressure that is now on suppliers to install smart meters at a high daily rate, the risk that vulnerable consumers are left feeling confused, distressed or unable to use the information has increased." Whilst all suppliers said that they were tailoring their approach to advice delivery, "the interpretation of tailoring varies significantly." [54] The most common form of post-installation contact by suppliers was follow-up information provided in written format. Only 3 suppliers offered face-to-face follow-up contact. [55] Some suppliers, however, were demonstrating good practice in terms of recognising multiple vulnerability indicators, working with local partners and third sector organisations to further understand vulnerability, and carrying out gap analyses to understand where they can take further action. [56]

Overall, the research by Citizens Advice found that: "suppliers diverge greatly on how they tailor the approach and for whom. For some, this means a basic approach that offers alternative formats for communication, general sensitivity on the part of the installer and a helpline for further queries. Good practice goes a step further, looking at all the circumstances of the consumer and providing a more personalised service. This involves one-to-one contact before the installation, advice based on circumstances and property characteristics, as well as monitoring and follow-up to ensure they are getting the best from the technology. Our research shows that the above level of support is not provided consistently across the industry and that more needs to be done to give vulnerable consumers assurance that they will get the extra help they need." [57]

Section 2: Methodology

The following section describes the methods used to deliver SMART-UP interventions to both frontline workers and vulnerable households, and the methods used to evaluate the effectiveness of the advice provided. It begins by providing a summary of project activities, before going on to describe the process of developing training materials and delivering them to frontline workers. It

[51] Buchanan, k. Banks, N., Preston, I., Russo, R. 2016, The British public's perception of the UK smart metering initiative: threats and opportunities. *IN Energy Policy 91:87-97*

[52] ECTA, 2017, Smart meters: the consumer view

[53] ECTA, 2017, Smart meters: the consumer view

[54] Citizen's Advice, 2017, Smart support: support for vulnerable consumers in the smart roll-out

[55] Citizen's Advice, 2017, Smart support: support for vulnerable consumers in the smart roll-out

[56] Citizen's Advice, 2017, Smart support: support for vulnerable consumers in the smart roll-out

[57] Citizen's Advice, 2017, Smart support: support for vulnerable consumers in the smart roll-out

then moves on to discuss the process of developing tools for advice delivery, and of recruiting and engaging households. Barriers to being able to successfully identify and recruit target numbers of vulnerable households into the project are then discussed. Finally, the methods used to evaluate the impact of SMART-UP are described.

2.1 Summary of project activities

A brief outline of the activities carried out through SMART-UP is as follows:

1. Engage key stakeholders (e.g. housing associations) to support project delivery
2. Refine training package for frontline workers and installers, and develop an energy monitoring tool (energy diary) and information resource for use by participants
3. Deliver training to frontline staff in contact with households to offer tailored advice on using a smart meter and managing household energy use
4. Support key stakeholders to recruit a target of 1000 vulnerable households with smart meters to receive the advice from trained staff in a face-to-face setting (e.g. in the home)
5. Deliver a small-scale pilot with a target sub-sample of 60-65 participating vulnerable households in order to assess different versions of the SMART-UP advice intervention (with three experimental groups and one control group)
6. Frontline advisors to complete a pre-advice questionnaire with households to collect baseline data on their energy consumption and behaviours, along with demographic information
7. Send a follow-up questionnaire six to twelve months after the advice intervention, to collect post-intervention data on household energy consumption and behaviours
8. A photography competition was also administered to encourage household engagement with SMART-UP
9. Upon completion of the post-intervention questionnaire, a sub-sample of 9 vulnerable households were invited to participate in a semi-structured, qualitative telephone interview (of around 30 minutes in duration) in order to discuss their responses and experiences in more detail
10. A sub-sample of frontline workers and managers were invited to participate in 5 semi-structured, qualitative telephone interviews to discuss project delivery from the perspective of key stakeholders
11. Quantitative data from the pre- and post-intervention questionnaires analysed using the statistical software package SPSS, whilst qualitative data from telephone interviews with households and frontline workers were thematically coded and analysed using the software package NVivo.

2.2 Development of training resources

In the first stage of the project, NEA applied learnings from the consortium's collective experience of advice delivery to vulnerable households and insights from the evidence base to update its existing training guidelines for installers and frontline staff. Each consortium partner then adapted the training guidelines to fit with their own country's context.

SMART-UP was delivered in the UK through partnerships with Housing Associations (HAs). The training packages were developed to equip staff with the knowledge they would need to provide the SMART-UP intervention. The majority of those trained were already delivering energy advice and had a good understanding of energy efficiency. Therefore the priority was to ensure that they also understood how to use smart meters and the accompanying IHD effectively in order to communicate this to the householder. The training also needed to ensure that participants were briefed on the project, although they received additional guidance and support on the project following the initial intervention.

Broadly, the courses included the following:

- Explanation of the project and how we would like to work with participants to fulfil the project objectives, including details such as the questionnaire; gaining consent; the photography competition; and the paper-based tool (energy diary in the UK);
- Information on smart meters, the benefits to the householder, and the policy context;
- Information on identifying vulnerability;
- Information on fuel poverty / energy poverty;
- Information on energy running costs and how to alter behaviour to reduce costs;
- Information on how to use the IHD effectively
- Additional sources of advice and assistance.

Participants received a course booklet on the day, as well as additional packs following the training. These included a guidance sheet on how to complete each visit.

All participants completed an evaluation form to capture improvements in knowledge and confidence, satisfaction with the course, and suggestions for improvements. A summary of the key results are shown below. All scores were ranked 1 (lowest) to 5 (highest):

Knowledge of the subject **before** completing the course	2.6
Knowledge of the subject **after** completing the course	4.5
Confidence in passing on knowledge **before** completing course	2.3
Confidence in passing on knowledge **after** completing course	4.3
How well the course met participant's needs	4.3
Quality of materials provided	4.5
Total number of people participants estimate they will provide advice to **per week**	157

Participants were also asked which parts of the course they found most useful. Of those that answered the question, most said 'all', but other useful aspects were noted as information on the

roll out; information on how to use the IHDs; information on switching; and details of roles and responsibilities.

The course evaluation also captured information on the key areas of concern for participants. Of these, high fuel bills were by far the most significant. Also important were: understanding bills; dealing with mould and condensation; advising on benefits; and using heating controls. It is interesting to note that most of the participants were already fairly energy literate and still found the training useful, implying that understanding of smart meters is fairly low even amongst those who have a good understanding of energy issues.

There was a clear need amongst delegates for more information about the technicalities of smart meters, and in particular an interest in learning more about how to use in home displays correctly. Unfortunately we were not able to secure 'dummy IHDs' for them to practice on as these are all supplier-specific. However, we hope that the resources developed which include a 'getting the most out of your smart meter/IHD' brochure will help address this knowledge gap.

2.3 Developing tools for advice delivery

Whilst all smart meter customers in the UK will receive an In-Home Energy Display (IHD) as part of the installation process, discussions with stakeholders indicated that there is still a need to provide paper-based information that will support the proper use of the IHD, accompanied by a more simplistic energy diary for those who want to take information from the IHD and write this down.

Currently, the only information available on using smart meters is the printed guide provided by UK installers on how to use the IHD. In a review of existing resources including available literature (such as the online and paper-based IHD guides provided by suppliers, as well as a study by the former Department of Energy and Climate Change into how to deliver energy advice as part of the smart meter roll out), no generically applicable material was identified which combines information on using the IHD along with more general energy advice; nor with a focus on getting users to interact with the smart meter. Housing Associations, in particular, expressed a need for smart-meter specific information to be able to provide to tenants. From these discussions, NEA customised an energy diary tool that would engage customers in using their IHD, and produced a guide to support households in using their smart meter/IHD and become more energy efficient.

The guide was sent to three key stakeholders for feedback (British Gas, Utilita and Gentoo Housing). The feedback helped to further refine the resource, before design and print.

Feedback on the main tool included:

- Highlighting night consumption: in the UK some consumers may be on electric storage heaters, for example, and would deliberately want to have higher usage at night when the tariff is cheaper.
- Making it explicit that the diary is for electricity consumption and not energy

- If as in the UK there are likely to be two meters - gas and electricity – making it explicit that they are to read their smart electricity meter
- Ensuring the font size is large enough to make it easy to read

NEA also received feedback on the IHD guidance from stakeholders (British Gas and Utilita). This included:

- Placing greater emphasis on the need to ensure that customers don't reduce their energy use to the extent that it becomes detrimental to their health and wellbeing
- Changing some of the wording used to make it more easy to understand
- Ensuring that any images used of IHDs are either generic (i.e. not from one particular supplier), or that there is a selection to represent different suppliers.

Following these discussions, NEA developed a SMART-UP Information Pack for participants. Each pack contained:

- *SMART-UP & take control of your energy use: A guide to using your smart meter to manage your energy use.* This was an A5 booklet that provided households with six simple steps on using their IHD to better manage their energy use and make savings.

- *My SMART-UP Energy Diary.* This was a diary where householders could record information from their IHD on how much they were spending weekly and monthly on electricity and gas.

- Energy efficiency advice leaflet. This was either NEA's *Top 10 tips to stay warm and healthy in your home* leaflet, or the Housing Association's s own energy efficiency resource, if they prefer. This provided households with advice on how to act on information they see on their IHD to make behavioural changes in order to save energy.

- Photo competition postcard. This was a postcard promoting the photography competition that NEA is ran to encourage households to stay engaged with SMART-UP and their smart meter. The winner (the person who took the best picture showing how they were being SMART with their energy) received a £225 high street gift voucher to put towards their next purchase of an energy efficiency appliance.

- Participant information sheet. This was a double-sided A4 sheet providing householders with all necessary information about SMART-UP, allowing them to make an informed choice to participate.

- Informed consent form. This form was to be signed by householders before they receive a SMART-UP intervention and returned to NEA.

- Pre-advice questionnaire. This questionnaire was to be completed by front-line staff with the householder at the point of the face-to-face advice session, before they received the advice. The aim was to collect baseline data on the household's energy consumption and behaviours.

2.4 Household engagement and recruitment

The standard SMART-UP intervention aimed to engage directly with vulnerable consumers through frontline staff (trained by the project) to encourage them to actively take-up smart meters, and to provide them with information and advice so that they will be in the best position possible to use smart meters to save energy and money.

The project also included a small pilot that was delivered to a sub-sample of householders, including a control group. The aim of the pilot was to assess in more depth the value and impact of varying combinations of the main intervention in order to understand which was most successful in enabling households to achieve energy and financial savings, and which were most appropriate to the needs of vulnerable energy consumers.

The project originally intended to engage around 1000 vulnerable energy consumers as part of the standard, SMART-UP intervention. It was then intended that the pilot would be delivered to a target sub-sample of 60-65 households. However, due to significant issues regarding the nature of the smart meter roll out in the UK, the project faced complex barriers in being able to engage this number of households. This resulted in a total of 105 vulnerable households being engaged by the project. Of these, 82 were allocated to the experimental pilot and control groups. To allow for more effective comparison of results and analysis of impact, it was therefore decided that the remaining 23 households in receipt of the standard intervention would be treated as a fifth experimental group within the pilot (receiving a standard SMART-UP advice visit and information pack).

A break-down of the final organisation of the pilot groups was as follows:

Group	Number of participating households	Intervention
Experimental group 1	27	– SMART-UP information pack – Enhanced advice visit – Aftercare service (follow-up calls)
Experimental group 2	18	- SMART-UP information pack - Enhanced advice visit
Experimental group 3	17	- SMART-UP information pack - Aftercare service (follow-up calls)
Control Group (Experimental group 4)	20	No intervention
Experimental group 5	23	- SMART-UP standard advice visit - SMART-UP information pack

The enhanced advice was delivered to households together with the information pack, talking households through exercises and information about how to get the most out of their smart meter to control their energy and save money. The aftercare service (delivered to Experimental Groups 1 and 3) consisted of 3 follow-up calls at the 2-week, 3-month and 6-month mark to enquire if households need further information on using their smart meter and advice on saving energy.

These calls were delivered by the Housing Association advisors who delivered the original intervention.

To be eligible to receive the enhanced intervention, tenants had to meet the following criteria:

- Smart meter installed in the home; and
- In Home Display fitted in the home or equivalent (e.g. a smart phone app); and
- Member of the household responsible for paying the electricity bill; and
- At least one member of the household displays one or more of the following vulnerability characteristics:
- Children 15 and under ; and / or
- Adults 65 or over ; and / or
- Receipt of one or more means tested benefits; and / or
- Low household income (under £25K per year) ; and / or
- A mental or physical health condition/disability and / or
- Low literacy or numeracy or English as a second language , defined as GCSE / O-level / CSE; and / or
- No formal qualifications and / or
- English as a second language

To compensate participants for their time and participation, those taking part in the SMART - UP pilot project in the UK received up three vouchers:

- £30 High Street shopping voucher at the point of the first SMART-UP intervention and after the household has completed the first questionnaire
- £20 High Street shopping voucher at the end of the monitoring period and after the household has completed and returned the follow - up questionnaire.
- £20 voucher for participating in a 30 minute, qualitative telephone interview

To engage and recruit households NEA signed agreements to work with the following organisations:

- Gentoo Group (Housing Association)
- Riverside (Housing Association)
- Freebridge (Housing Association)
- WM Housing Group (Housing Association)
- Ground Work Leeds (Charity)

To recruit households, stakeholders undertook the following activities:

- Letters promoting SMART-UP sent out to households targeting areas known to have concentration of smart meters, and wider tenant mail outs
- Front-line staff briefings to refer any customers identified with smart meters to SMART- UP
- Staff undertaking energy advice visits screening customers for smart meters to refer into SMART- UP
- Advertising on social media and website
- Leaflets and posters in offices
- Promoting project at household events
- SMART-UP promoted in rent statements (sent to 30,000 households)
- Advertising SMART-UP in Coventry City Council's city-wide magazine, Citivision

- Using data-matching to promote SMART-UP to households known to have smart meters installed
- Articles published in the tenant newsletter
- PPT slides about SMART-UP shown on TV screens in housing offices
- Data-matching to promote SMART-UP pilot project

Staff delivering interventions were briefed on the process and provided with:

- Process for SMART-UP pilot document, outlining all steps to implement the pilot (e.g. from screening tenants for eligibility to assigning participants to intervention groups to delivering interventions)
- SMART-UP pilot tracker to record details of potential participants, assess eligibility and book visits (this is an excel document)
- Household visit guide, providing trained staff with a list of handy tips on how to carry out SMART-UP pilot visits
- SMART-UP aftercare protocol outlining the process to follow for follow-up phone calls (to Experimental Groups 1 and 3)
- SMART-UP aftercare tracker to record details of follow-up phone calls (to Experimental Groups 1 and 3) (this is an excel document)
- Reporting template partners provided back to NEA every month to track progress on delivery of the pilot, raise issues and discuss in detail at monthly phone meetings between the partner and NEA

2.5 Barriers to household recruitment in the UK

When the SMART-UP project bid was submitted to the European Commission in mid-2014, the smart meter roll-out in the UK was expected to commence in autumn 2015. Prior to this date, some energy suppliers had been choosing to install smart meters in small numbers in what the UK Government calls the Foundation Stage.

However, the first date for the roll out was pushed back by government to September 2016. Then the date was delayed further until end October 2016. This is the date when the Data and Communications Company (DCC), which put in place communications networks to send and receive information from smart meters to energy suppliers, went live for both credit and pre-payment meter customers across Great Britain. All suppliers needed to be DCC users by DCC live +12 months (November 2017), while larger suppliers (who hold the majority of the market share in Great Britain) had to be DCC users by DCC live + 6 months (May 2017). Essentially, this means that larger suppliers were not required to begin to roll-out smart meters to their customers until end of May 2017 at the earliest, and currently have until the end of 2020 to complete their roll-out.

The delay to the smart meter roll-out had an adverse impact on NEA's ability to deliver SMART-UP in the UK. Specifically, because the large majority of energy customers (over 90%) do not yet have a smart meter installed in their home, our national stakeholders -who were responsible for identifying vulnerable households and delivering the enhanced energy and smart metering advice to those households - struggled to find enough vulnerable households with smart meters. This in turn meant

that we were not able to meet our initial target of engaging 1000 vulnerable households through the SMART-UP standard intervention.

Furthermore, because the roll-out of smart meters is being delivered in the UK by energy suppliers, this means it is not happening on a region by region basis. Instead, suppliers are free to choose their roll-out strategies, including the areas where they begin to install smart meters. Some suppliers have started rolling out smart meters on a small scale in selected regions. Other suppliers have not yet started rolling them out. One region may be prioritised by Supplier A (for example, because they have customer density in that area) and a household contracted to receive their energy from that supplier may have received a smart meter. That same area may not be prioritised by Supplier B and therefore a customer contracted to receive their energy from that supplier will not have received a smart meter. Furthermore, there is no publicly available data on where (at a local authority level) domestic smart meters to date (4 million, representing 8% of domestic meters) have been fitted.

Because of this model, it was not possible to replicate the French approach in the UK and select a region in which to deliver SMART-UP. Instead – and based on NEA's calculations - the housing stock of Housing Associations with whom we were working on SMART-UP, had approximately a 6-8% penetration of smart meters relative to traditional meters. Taking into account that not all of those households with smart meters would agree to take part in SMART-UP, it is possible to conclude that NEA and its partners were effectively working with a pool of around 1% of households within the vulnerable target group.

One strategy that we used to find households with smart meters was data matching between addresses of some of our HA partners' housing stock (WM Housing and Freebridge properties) and electric smart meter serial numbers through the meter administration point database. One 500 address sample matched from WM Housing stock found 43/500 addresses had electric smart meters, a return rate of 8.6%. Another 500 address sample matched from Freebridge housing stock found 0 addresses had electric smart meters, a return rate of 0.0%.

We estimate that the project was promoted to over 40,000 UK households through our HA partners. However, despite this extensive recruitment effort, only 105 participants received a SMART-UP intervention (i.e. signed the consent form, completed the questionnaire and received the advice).

NEA also sought to work with suppliers on SMART-UP. This engagement was unsuccessful for 5 main reasons:

A) Suppliers were not willing to deliver a SMART-UP intervention (i.e. the enhanced advice and data collection) through their installation journey. Specifically, smart meter installers already had a number of safety, installation and consumer issues to focus on during installation appointments, which typically take around 2 hours. Based on feedback provided to NEA, there was no appetite (or commercial incentive) to add to the complexity, duration and resources of this already lengthy visit by delivering a SMART-UP intervention.
B) Suppliers are not yet installing smart meters to vulnerable customers in large numbers. Of suppliers who have begun to install smart meters, feedback to NEA has found many are still testing their customer installation journeys and want to learn lessons and improve the

customer experience before targeting a cohort where any problems pre-, during or post-installation could increase detriment. As such, the vulnerable customers targeted by SMART-UP did not necessarily match the smart meter customers targeted by suppliers, something which both decreased the overall pool of vulnerable customers to target for SMART-UP and made identifying and recruiting vulnerable households through suppliers more difficult. This was because their vulnerable customer bases (e.g. customers registered on suppliers Priority Services Registers) have mainly been avoided to date for smart meter installation. .

C) Suppliers who had gone early on the smart meter roll-out and could have therefore potentially supported NEA to deliver SMART-UP already had specific training programmes for their installers on smart metering, energy efficiency and vulnerability in place. These programmes had been designed to align with the Smart Metering Installation Code of Practice (SMICOP). As a result, suppliers were less willing to integrate the SMART-UP model into their business planning and delivery.

D) Suppliers do not operate on a regional basis. As such they do not install smart meters in one exclusive pocket of the country that NEA could target to deliver SMART-UP. Even where a supplier does have customer density in that region and may be promoting smart meter installations, there will still be many thousands of customers with different suppliers who are not installing smart meters. This makes pinpointing an area for delivery difficult, even with data from suppliers.

E) Data protection laws prevent suppliers from sharing data on their customers with smart meters with NEA or our housing association partners. Likewise, housing association property addresses cannot be shared with suppliers. This made using suppliers to recruit households for SMART-UP and then delivering the intervention through third parties such as housing associations difficult.

2.6 Evaluation methods

The first stage of the evaluation involved frontline advisors administering a face-to-face, pre-advice questionnaire with households at point of intervention. This allowed for the collection of baseline data on energy consumption and behaviours, and for the demographic characteristics of the sample to be identified. In total, 105 responses to the pre-advice questionnaire were received (out of 105 participating households).

Between 6 and 12 months after receiving an advice intervention, a second, postal questionnaire was administered to households in order to gather insights on any changes that had occurred with regards to household energy consumption and energy behaviours, and to understand the extent to which participants felt their SMART-UP intervention had been beneficial to them. In total, we received 64 responses to the post-intervention questionnaire (representing a 61% response rate).

A sub-sample of participants from each of the pilot and standard intervention groups were then invited to participate in a semi-structured, qualitative telephone interview in order to discuss their experience of participating in SMART-UP, how they use and manage their energy at home, and the extent to which they engage and benefit from their smart meter in more detail. In total, 10 telephone interviews were conducted, and lasted for around 30 minutes each. Interviews were audio-recorded and transcribed.

Furthermore, data gathered from the pilot aftercare trackers (completed and returned to NEA by partner organisations on a monthly basis during delivery) was used to supplement insights gathered from households with the perspective of the advisors themselves. The trackers contained reflections and feedback from the advisors as to the outcomes of an intervention with particular households, noting any beneficial impacts or challenges along the way.

The evaluation also included a formative element, during which a sub-sample of key stakeholders involved in delivering the SMART-UP intervention to households (representing a mix of frontline workers and managers) were invited to participate in a semi-structured, qualitative telephone interview. In total, 5 interviews were conducted, each one of up to an hour's duration. Interviews discussed the extent to which SMART-UP aligned with their own organisational objectives, their experience of delivering the project and engaging households, the extent to which they felt the project had had an impact upon households, and any recommendations they had for delivery going forward. Again, interviews were audio-recorded and transcribed.

Data collected in the pre- and post-intervention questionnaires was analysed using the statistical software package SPSS in order to provide quantitative insights as to the breadth and extent of impact across the sample. SPSS was used to run basic frequencies of the data, but the sample size meant that we were unable to test for statistical significance. Meanwhile, data from household and stakeholder interviews, and from the pilot trackers, was coded and thematically analysed using the software package NVivo. This allowed for experiences that might be explain patterns within the quantitative data to be identified and for a greater understanding of the depth of participant experience to be understood.

Section 3: Sample characteristics

The following section looks at the sample characteristics of households that participated in SMART-UP in order to demonstrate that the project was effectively targeted at vulnerable households at risk of energy poverty and who were likely to require additional support to fully access the benefits of their smart meter and IHD.

The EU Energy Poverty Observatory defines energy poverty as "inadequate levels of essential services (adequate warmth, cooling, lighting, and the energy to power appliances) due to a combination of high energy expenditure, low household incomes, inefficient buildings and appliances, and specific household energy needs." It is "a distinct form of poverty associated with a range of adverse consequences for people's health and wellbeing."[58] [59] [60] In England, official bodies refer to fuel poverty rather than energy poverty. This is measured using the Low Income High Costs (LIHC) indicator. Here, a household is said to be in fuel poverty if they have required fuel costs that are above the national median level and, were they to spend that amount, they would be left with a

[58] EU Energy Poverty Observatory, 2018, What is energy poverty? Available: https://www.energypoverty.eu/about/what-energy-poverty [Accessed 13/02/2018]

[59] Thomson, H., Snell, C., and Bouzarovski, S., 2017, Health, well-being and energy poverty in Europe: A comparative study of 32 European countries IN *International Journal of Environmental Research and Public Health. Vol.14: 584 - 604*

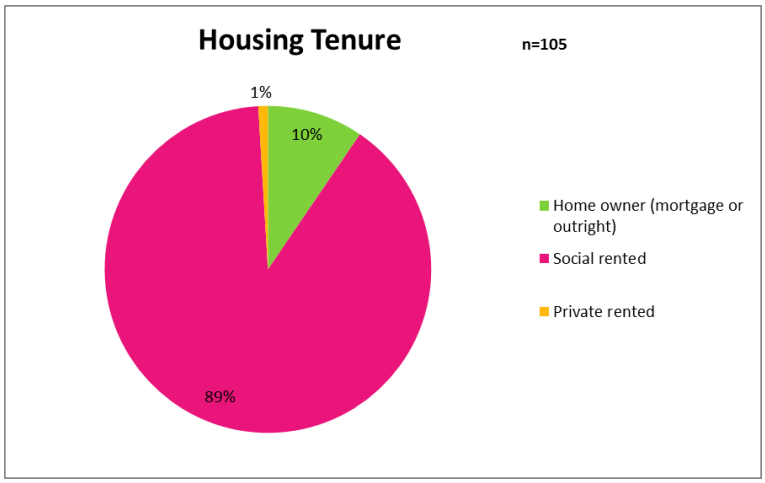
[60] Thomson, H. Bouzarovski, S. and Snell, C. 2017, Rethinking the measurement of energy poverty in Europe: a critical analysis of indicators and data IN Indoor and Built Environment Vol. 26(7): 879-901

residual income below the official poverty line. This is affected by household income, energy requirements and fuel prices.[61]

The SMART-UP questionnaires looked to identify energy vulnerability using a variety of indicators. These included: property type (housing tenure, dwelling type and number of bedrooms); household composition (number of residents, number of older people aged 65 years or older, number with children aged 15 years or under); and household characteristics (household income; receipt of means-tested benefits and the type of benefit, employment status, presence of long-standing physical or mental health conditions or disabilities, nature of health conditions present, highest educational or professional qualifications obtained, level of confidence in speaking English, time spent in the home).

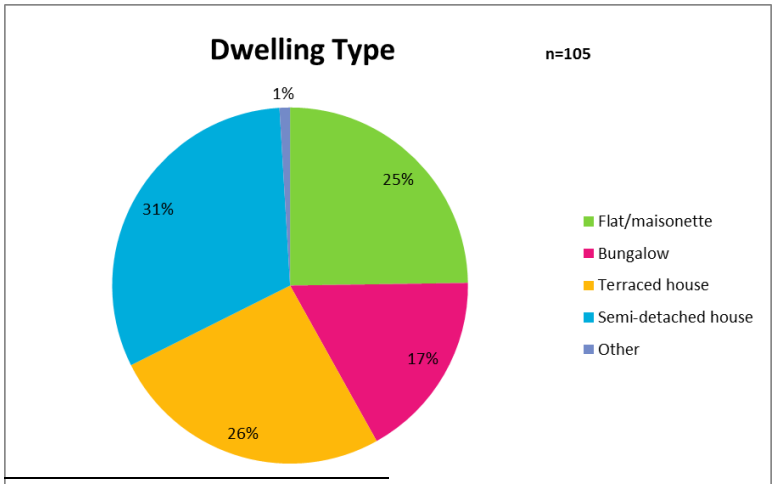
3.1.2 Property Type

Chart 1: Housing Tenure



The majority households participating in SMART-UP lived in the social rented sector (89%). Only 10% were home owners, and 1% lived in the private rented sector. This means that, based on tenure alone, the majority of SMART-UP participants were at risk of persistent poverty[62] and digital exclusion.[63] [64]

Chart 2: Dwelling Type



Almost a third of SMART-UP households lived in semi-detached houses (31%), whilst around a quarter lived in flat/maisonette's (25%) or terraced housing (26%). 17% of households lived in bungalows.

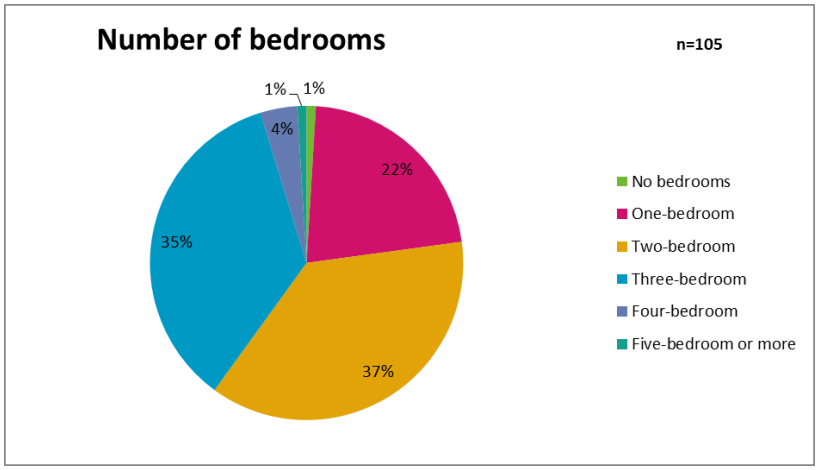
[61] BEIS, 2017, Fuel Poverty Statistics. Available at: https://www.gov.uk/government/collections/fuel-poverty-statistics [Accessed 13.02.2018]

[62] IFS. 2017. Living standards, poverty and inequality in the UK: 2017

[63] Low Incomes Tax Reform Group (2012) Digital Exclusion: A research report by the Low Incomes Tax Reform Group of The Chartered Institute of Taxation

[64] Ofcom (March 2017) Access and Inclusion in 2016: Outcomes for consumers in vulnerable circumstances

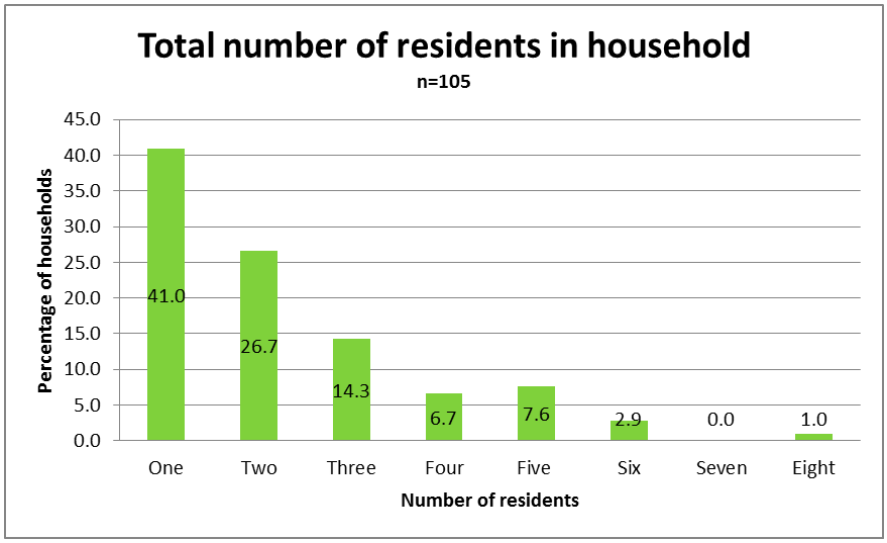
Chart 3: Number of bedrooms



Most SMART-UP households lived in either two-bed (37%) or three-bed (35%) properties. Around a fifth lived in one-bed properties (22%). A small proportion (5%) lived in a house with 4 bedrooms or more, whilst 1% had no bedrooms.

3.1.3 Household composition

Chart 4: Total number of residents in household



The majority of households had only one resident (41%), whilst around a quarter had two (27%). Fewer households had three residents (14%), with 7% and 8% of households having four and five residents respectively. Around 3% had six residents, whilst 1% had eight.

Chart 5: Number of older people aged 65 years or older in household

A quarter of households had one person aged 65 years or over in residence, and 6% had two older people. In total, just under a third of SMART-UP households had one or more older person living in them.

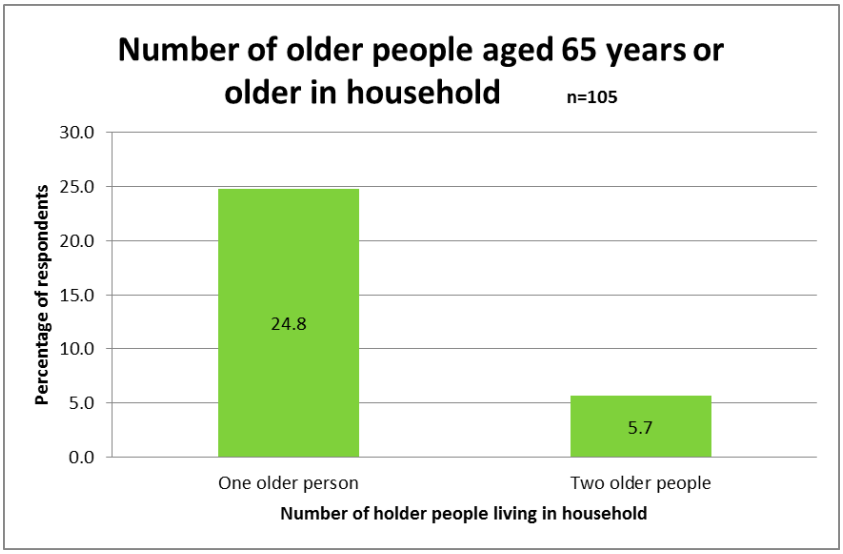
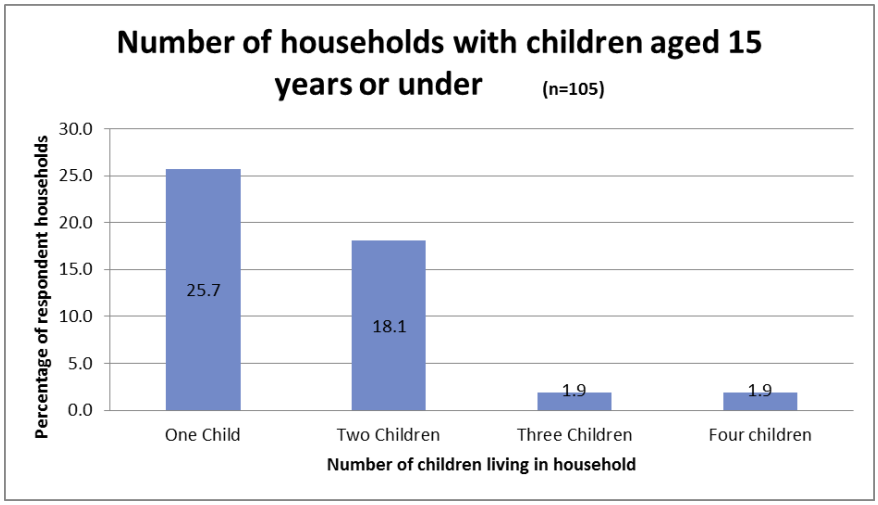


Chart 6: Number of households with children aged 15 years or under



Around a quarter of SMART-UP households had one child (26%), and just under a fifth had two (18%). Around 2% had three or four children respectively. In total, almost half of SMART-UP households had at least one child living with them.

Overall, households participating in SMART-UP were likely to be older person households or young families. Households containing at least one person aged 65 or over, or families with young children, have been identified as at-risk groups requiring further support to engage with smart metering. [65] The composition of SMART-UP households indicates an increased risk of fuel poverty (more likely in households with young children). In addition, pensioners, households with more than 3 children and single parents are more at risk of persistent poverty[66]. This suggests that, in terms of property type and household composition, SMART-UP was well targeted at households likely to need additional support in using and understanding their smart meters and IHD.

It is also possible that SMART-UP households were at a risk of suffering from digital exclusion. This refers to being unable to access the internet, or lacking the motivation and/or digital literacy to be able to use it appropriately/effectively.[67] In the UK, groups most likely to be digitally excluded are: older people, those who have a mental and/or physical disability, those who chronically sick, those who live in a rural area, and those living in particular tenures (especially social rented housing). Other at risks groups are those who do not have the education or skills to develop their capacity for earning an income or connecting with society, including single parents, children in low-income households, ethnic minorities, and those who cannot obtain paid employment due to other responsibilities (such as full-time carers). Not only do forms of digital and social exclusion overlap, but households who are digitally excluded face a higher risk of energy vulnerability. This is because they can be excluded from engaging with the competitive energy market, unable to deal with market complexity, and prevented from accessing the best deals or appropriate services.[68] [69] They are also

[65] DECC, 2015, Smart metering implementation programme. DECC's policy conclusions: Early learning project and small-scale behaviour trials

[66] IFS. 2017. Living standards, poverty and inequality in the UK: 2017

[67] Low Incomes Tax Reform Group (2012) Digital Exclusion: A research report by the Low Incomes Tax Reform Group of The Chartered Institute of Taxation

[68] Low Incomes Tax Reform Group (2012) Digital Exclusion: A research report by the Low Incomes Tax Reform Group of The Chartered Institute of Taxation

[69] Ofcom (March 2017) Access and Inclusion in 2016: Outcomes for consumers in vulnerable circumstances

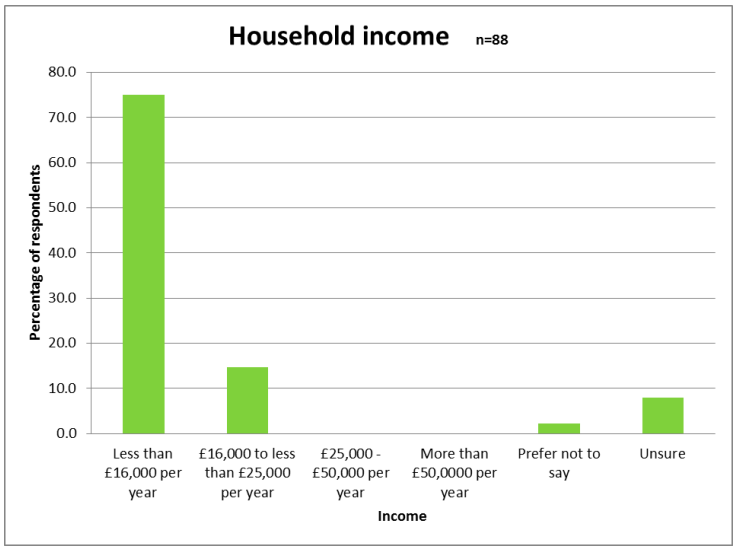
more likely to require additional support when it comes to using and understanding their smart meter and IHD. [70]

Indeed, the digital exclusion of some respondents became apparent during our interviews with households. One elderly participant explained: **"the thing with smart, yeah, it doesn't help older people or they still will never understand it. To save money and stuff it's not really good for any aged person 'cause it's just for certain aged people. A lot of us don't really get involved in the computer stuff and we're not…that's why some people don't want it 'cause I think sometimes when you change, you can change your meter these days but you've got to pay like online and stuff. People don't know how to do it, old people."**

Quotes like this display the vulnerability of participants who felt unable to participate in the energy market, and to understand and engage with technologies such as a computer or a smart meter. This in turn heightened their risk of a) paying more for the energy and b) being excluded from accessing the benefits of their smart meter due to digital literacy barriers.

3.2 Household characteristics

Chart 7: Household income



The majority of SMART-UP households had a household income of less than £16,000 per year (75%). 15% were earning between £16,000 and £25,000 a year. This shows that the project reached households who were living on extremely low incomes. Indeed, the majority of SMART-UP households were likely to be living below or on the brink of the poverty line. According to the Department for Work and Pensions (DWP)[71], households can be classed as living in relative poverty if their income is 60% of the national median income of £25,100. This calculation sets the poverty line at around £15,000 (before housing costs). However, if we look at the Minimum Income Standard (MIS) developed by the Joseph Rowntree Foundation (JRF), we can see that the minimum income required in order for a household to achieve a socially acceptable standard of living shifts according to different households types. In 2017 a single person had to be earning at least £17,900 a year (pre-tax) in order to meet the MIS, and a couple with two children had to be earning at least £20,400 each. Meanwhile, inflation and the freeze to working-age benefits means that a single person of working age in receipt of benefits has only 36% of what they need to meet the MIS, and a couple with two children has 59% of what they need. A single person in full time work and earning the

[70] DECC, 2015, Smart metering implementation programme. DECC's policy conclusions: Early learning project and small-scale behaviour trials

[71] Department for Work and Pensions, 2017, Households Below Average Income: An Analysis of the UK income distribution 1994/95 – 2015/16. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/600091/households-below-average-income-1994-1995-2015-2016.pdf [accessed 19th December 2017]

National Living Wage (£7.50 per hour) falls short of meeting the MIS by 22%. Therefore, by this measure, the majority of SMART-UP households would be struggling to make ends meet on extremely low incomes, unable to achieve the MIS for a socially acceptable standard of living in the UK[72].

For example, one interview respondent told us: **"What I usually do is, get a couple of food banks in from Church and that near Christmas, so that I can buy my son like birthday presents and that."** This quote suggests an inability to access basic, essential needs (such as food), as well as a lack of power to purchase items without which UK households are considered to be living in relative poverty (such as being able to buy Christmas and birthday presents for children).

Given that 85% of fuel poor households in England can be found within the two lowest income deciles[73], this suggests SMART-UP households were also at an increased risk of suffering from fuel poverty. Indeed, it has been calculated that low income households pay a fuel poverty premium within the UK: they pay around 6% more for their household energy expenditure in comparison to higher income households in order to achieve the same level of warmth. They are more likely to be an expensive tariff, such as a Standard Variable Tariff (SVT)[74] (paying up to £300 more per year than households on a cheaper tariff)[75], and can experience higher fuel costs as a result of living in properties which are energy inefficient[76]. Low income households have further been identified as requiring additional support to be able to benefit from having a smart meter and IHD. [77]

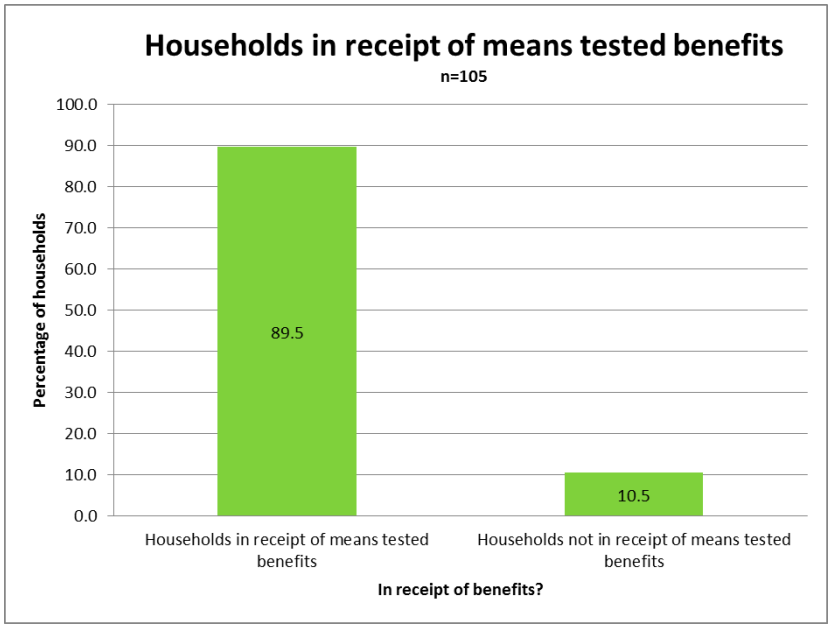


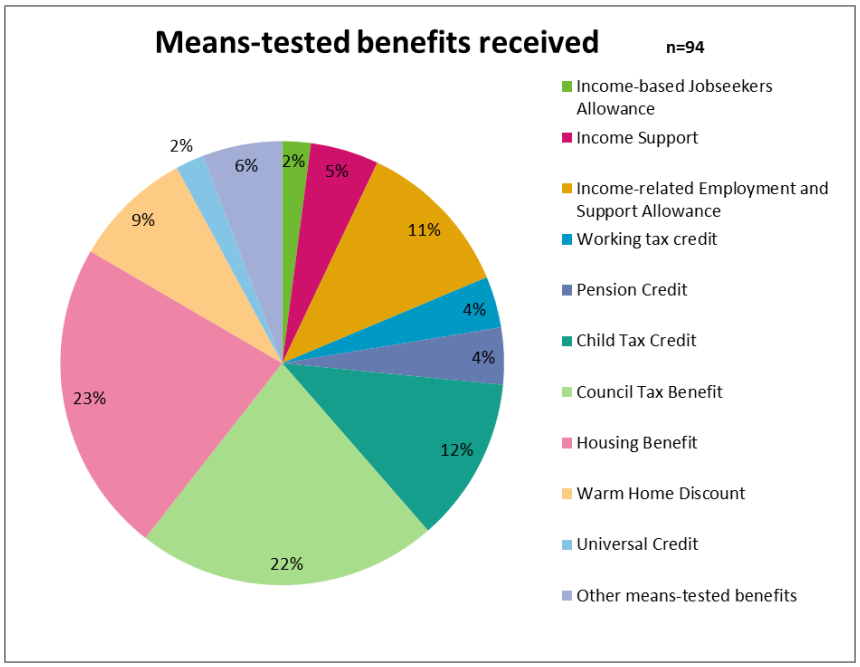
Chart 8: Households in receipt of means-tested benefits

The majority of SMART-UP households were in receipt of means-tested benefits (89.5%), again giving an indication of the low incomes on which such households were surviving. Transformational reforms to the UK welfare system in 2010 and 2015 have eroded its capacity to act as an

[72] JRF, 2017, A Minimum Income Standard for the UK in 2017. Available at: file:///C:/Users/jruse/Downloads/mis_2017_final_report_0%20(1).pdf [Accessed 19th December 2017]
[73] BEIS. 2017. Fuel poverty detailed tables 2015 data.
[74] CMA. 2016. Energy market investigation: Final report.
[75] NEA, 2017, Bridging the Gap: addressing the cost of living facing UK households this winter. Available at: https://www.nea.org.uk/wp-content/uploads/2017/11/Bridging-the-Gap-NEA.pdf [Accessed 19th December 2017]
[76] NEA, 2017, Bridging the Gap: addressing the cost of living facing UK households this winter. Available at: https://www.nea.org.uk/wp-content/uploads/2017/11/Bridging-the-Gap-NEA.pdf [Accessed 19th December 2017]
[77] DECC, 2015, Smart metering implementation programme. DECC's policy conclusions: Early learning project and small-scale behaviour trials

adequate safety net for working-age households. Reforms around the uprating of benefits and tax credits, the introduction of a household benefit cap, cuts to housing benefits, child tax credit and working tax credit, reductions in disability benefits, freezes on certain benefits, the abolishment of crisis loans, stricter sanctions and qualifying tests plus reductions in council tax payments to local authorities all made it more difficult for households in receipt of benefits to survive.[78] The impact of these reforms has been compounded by the introduction of Universal Credit in some areas. Not only will many households be financially worse off under Universal Credit, but the 5-6 week waiting time for a claim to be processed is seeing many already vulnerable households fall into destitution.[79] [80]

Chart 9: Means-tested benefits received



Of the households that told us which means-tested benefits they received, we can see that 23% received housing benefit, and 22% received council-tax benefit. In other benefits, 12% of households were in receipt of child tax credit, and 11% were receiving income-related employment and support allowance. Less than 9% of households were in receipt of the Warm Home Discount (WHD)[81].

The low numbers of households in receipt of the WHD could relate to low awareness, lack of take-up, or result from particular supplier eligibility or provision requirements. Interviews with respondents also indicated that regulation within the energy industry regarding which suppliers are required to pay the WHD, and which allows individual suppliers to decide upon allocation for their Broader Group, could act to compound the energy vulnerability of low income households by obliging them to stay with the suppliers that will offer it to them. For example, one respondent explained that **"Warm Heat [WHD], that definitely helps you but the only problem is if I want my gas and electric to be cheaper some of them energy people [suppliers] they don't do Warm Heat [WHD]. That's the problem. So if I want the gas cheap I'm not going to get my Warm Heat [WHD].**

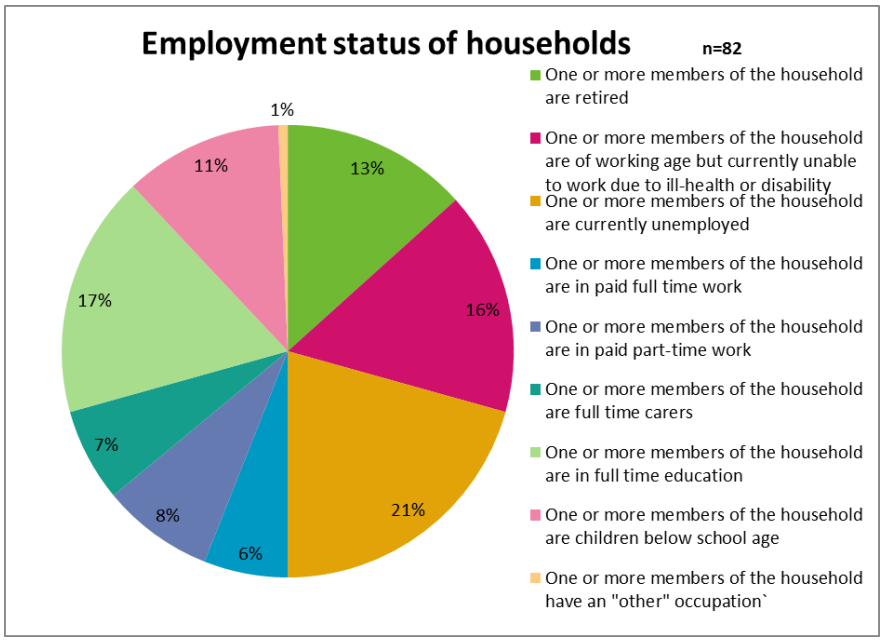
[78] Beatty and Fothergill. 2016. The uneven impact of welfare reform: The financial losses to places and people
[79] CA. 2017. Delivering on Universal Credit

[80] Second Reading. Welfare reform: impact of changes this Thursday, 4 April 2017

[81] The Warm Home Discount is a £140 discount on electricity bills, paid between September and March to eligible households by energy suppliers. All households in receipt of the Guarantee Credit element of Pension Credit (the "Core Group") are eligible to receive the discount. For the "Wider Group", certain households may be eligible to receive a discount if they are on a low income and meet individual suppliers' eligibility criteria

This suggests that, in some cases, the vulnerability of low income households in receipt of certain benefits could be compounded when their concerns to continue to maximise the income available (i.e. through applying to receive the WHD from a supplier) conflicted with opportunities to access the best deals and tariffs (and potentially switching to a supplier that would not offer them the WHD).

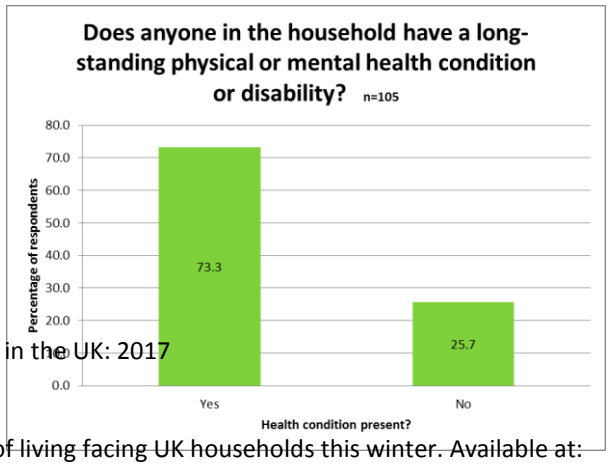
Chart 10: Employment status of households



Across SMART-UP participating households, 21% had at least one member of the household currently unemployed. 16% had at least one household member of working age but unable to work due to ill-health or disability. 13% had one or more household members who were retired. This means that 51% of SMART-UP households had at least one member of working age that was unemployed or unable to work, or retired. Only 14% of SMART-UP households had at least one person in the household who was in paid full or part-time work. 7% were full time carers. In addition, 28% of households had members who were either in full time education or below school age.

Given the low incomes of SMART-UP households, it is likely that even those that had at least one person in the household in paid full or part time work would have been struggling to make ends meet. In 2017, a large proportion of those living in poverty in the UK were also in work[82] [83]. Indeed, 47% of fuel poor households were also working households.[84] For people in low paid work, both living standards and wages have been falling in real terms.[85]

The low incomes of SMART-UP households indicates heightened vulnerability to fuel poverty and digital exclusion, and suggests that they may require additional support to derive benefits from their smart meter and IHD. [86] [87] [88]



[82] IFS. 2017. Living standards, poverty and inequality in the UK: 2017

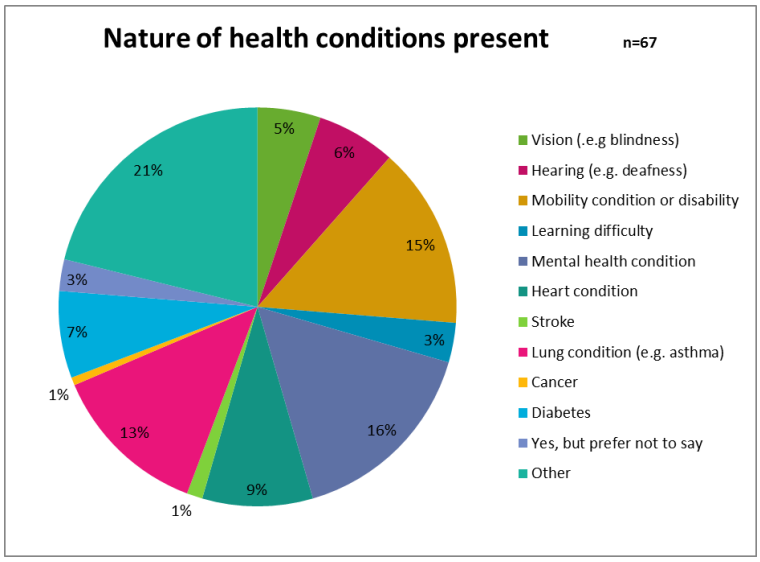
[84] BEIS. 2017. Fuel poverty detailed tables 2015 data

[85] NEA, 2017, Bridging the Gap: addressing the cost of living facing UK households this winter. Available at: https://www.nea.org.uk/wp-content/uploads/2017/11/Bridging-the-Gap-NEA.pdf [Accessed 19th December 2017]

Chart 11: Presence of long-standing physical or mental health conditions or disabilities

Overall, 73% of SMART-UP households told us that at least one person in the household had a long-standing physical or mental health condition or disability.

Chart 12: Nature of health conditions present



Of the participants that told us about the nature of health conditions present in the household, 21% had a heart condition and 16% had a mental health condition. 15% had a mobility condition or disability, whilst 13% had a lung condition (such as asthma). 11% of households had at least one member with a vision or hearing impairment, such as blindness or deafness. Those suffering from mobility conditions, blindness or deafness can be at a greater risk of suffering from digital exclusion, and have a need for tailored equipment and interventions that meet their particular needs. [89] [90] [91]

Living with cold indoor temperatures can increase the risk of heart attacks and strokes, as well as causing or worsening respiratory illnesses.[92] [93] [94] [95] [96] [97] They can worsen arthritic and rheumatic

[86] DECC, 2015, Smart metering implementation programme. DECC's policy conclusions: Early learning project and small-scale behaviour trials

[87] Low Incomes Tax Reform Group (2012) Digital Exclusion: A research report by the Low Incomes Tax Reform Group of The Chartered Institute of Taxation

[88] Ofcom (March 2017) Access and Inclusion in 2016: Outcomes for consumers in vulnerable circumstances

[89] DECC, 2015, Smart metering implementation programme. DECC's policy conclusions: Early learning project and small-scale behaviour trials

[90] Low Incomes Tax Reform Group (2012) Digital Exclusion: A research report by the Low Incomes Tax Reform Group of The Chartered Institute of Taxation

[91] Ofcom (March 2017) Access and Inclusion in 2016: Outcomes for consumers in vulnerable circumstances

[92] Mason, V., Roys, M., 2011. The Health Costs of cold dwellings. Building Research Establishment, Watford

[93] Pierse, N., Arnold, R., Keall, M., Howden-Chapman, P., Crane, J., Cunningham, M., 2013: Modelling the effects of low indoor temperatures on the lung function of children with asthma. In: J Epidemiol Community Health. 2013 Nov 1;67(11):918-25

[94] Osman LM, Ayres JG, Garden C, Reglitz K, Lyon J, Douglas JG. 2008 Home warmth and health status of COPD patients. *European Journal of Public Health* 18(4): 399-405

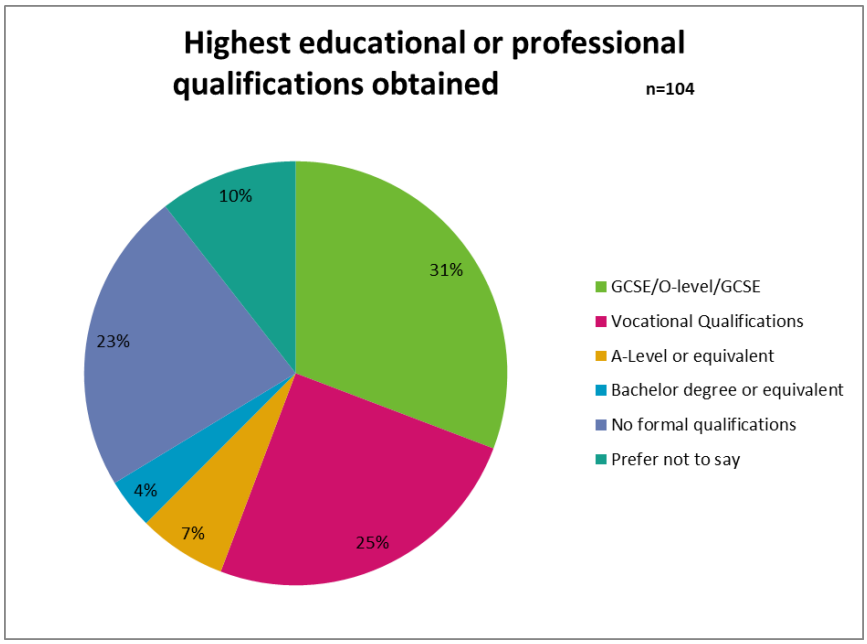
[95] Collins, K. (2000) Cold, cold housing and respiratory illness. In Rudge, J., Nicol, F. (Eds.), Cutting the Cost of Cold: Affordable warmth for healthier homes. Taylor & Francis, London

[96] Friends of the Earth and Marmot Review Team, 2011, The Health Impacts of Cold Homes and Fuel Poverty. Available at: http://www.foe.co.uk/sites/default/files/downloads/cold_homes_health.pdf [Accessed 06/03/2017]

[97] Barnes, M. et al., (2008). *The Dynamics of Bad Housing : The Impacts of Bad Housing on the Living Standards of Children.* London : National Centre for Social Research.

conditions, as well as leading to increased falls and increased cases of influenza. [98] [99] Studies have also consistently shown that cold and damp homes can impact upon mental health and wellbeing more generally.[100] [101] [102] [103] [104] Importantly, Harris et al. found that people with health conditions linked to the cold were more likely to have limited their use of fuel at home during the past year, and were more likely to be living in a cold and mouldy home. [105] Given the low income and presence of cold-related health conditions amongst the SMART-UP sample, then, it is likely that respondent households were at a higher risk of being in or on the brink of fuel poverty. Households with chronic ill health or disabilities have also been identified as requiring greater levels of support to engage with their smart meter and IHD. [106]

Chart 13: Educational attainment



As Chart 13 shows, 31% of SMART-UP participants had a GCSE or O-Level qualification, whilst 25% had a vocational qualification. Almost a quarter had no formal qualifications. Only 7% had an A-Level or equivalent, and 4% had a Bachelor degree or equivalent. This indicates that SMART-UP households tended to have either no or low educational qualifications. Not only does this put

[98] Public Health England, 2014b. *Cold weather Plan for England. Making the case: why long-term strategic planning for cold weather is essential to health and wellbeing.* Crown Copyright.

[99] Shortt, N. and Rugkåsa, J. 2007. "*The walls were so damp and cold" Fuel Poverty and Ill Health in Northern Ireland: Results from a housing intervention.* Health and Place. 13 (1) pp. 99-110.

[100] Evidence Review & Economic Analysis of Excess Winter Deaths for the National Institute for Health and Care Excellence (NICE). Review 1: Factors determining vulnerability to winter- and cold-related mortality/morbidity. London School of Hygiene & Tropical Medicine, Public Health England, University College London

[101] Press, V. (2003) Fuel poverty + health: A guide for primary care organisations, and public health and primary care professionals. National heart Forum: London

[102] Friends of the Earth and Marmot Review Team, 2011, The Health Impacts of Cold Homes and Fuel Poverty. Available at: http://www.foe.co.uk/sites/default/files/downloads/cold_homes_health.pdf [Accessed 06/03/2017]

[103] Biermann, P. (2016), "How fuel poverty affects subjective well-being: Panel evidence from Germany". Oldenburg Discussion Papers in Economics. University of Oldenburg

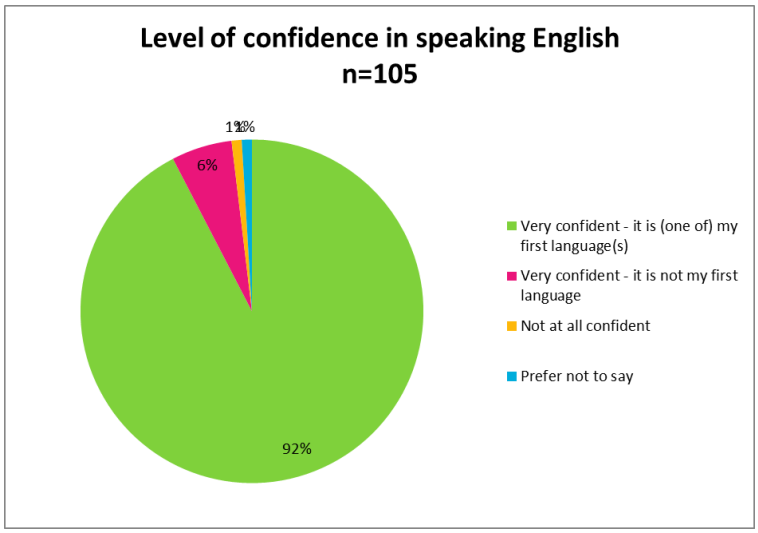
[104] Grey, C., Jiang, S., Nascimento, C., Rodgers, S., Johnson, R., Lyons, R. and Poortinga, W. (2017) The short-term health and psychosocial impacts of domestic energy efficiency investments in low-income areas: a controlled before and after study. In MBC Public Health 17(140)

[105] Harris, J. Hall, J. Meltzer, H. Jenkins, R. Oreszczyn, T. and McManus, S. 2010. *Health, mental health and housing conditions in England.* National Centre for Social Research: London.

[106] DECC, 2015, Smart metering implementation programme. DECC's policy conclusions: Early learning project and small-scale behaviour trials

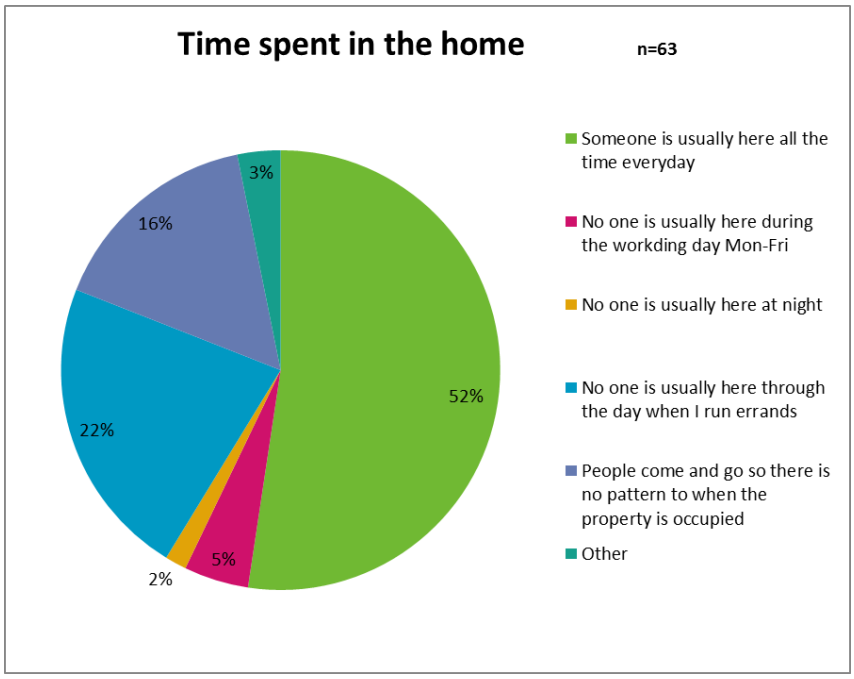
them at risk of digital exclusion and being unable to access the best tariffs through switching, it also puts them at a greater risk of being unable to adequately engage with their smart meter and IHD.[107]

Chart 14: Level of confidence in speaking English



The majority of SMART-UP households said that English was (one of) their first languages, and therefore felt very confident in speaking the language. A further 6% were very confident in speaking English, even though it was not their first language. Only 1% were not at all confident. This therefore means that, whilst demonstrating a wider range of other vulnerabilities, an inability to comprehend spoken English was not likely to be a barrier for participating households (though written English could still be problematic for those with lower educational attainment due to potential lower rates of literacy).

Chart 15: Time spent in the home



In terms how much time SMART-UP participants were spending in the home, 52% said that there was usually someone at home all the time every day. Around a fifth (22%) said that no-one was usually at home through the day when the participant was running errands. Meanwhile, 16% said that there was no pattern as to when the property is occupied. This meant that a large number of SMART-UP households were likely to have at least one person who spend large periods of the day in the home. This could result in

[107] DECC, 2015, Smart metering implementation programme. DECC's policy conclusions: Early learning project and small-scale behaviour trials

elevated needs for heating and energy use throughout the day, and the high prevalence of chronic health conditions could further increase those energy requirements. However, given that participants were on extremely low incomes, at risk of fuel poverty, and showed characteristics which suggest vulnerability to digital and market exclusion, they would be less likely to be able to afford to meet their basic energy needs at home.

3.3 Summary

This section has explored the sample characteristics of households participating in SMART-UP interventions in order to understand how far the project was effectively targeted at vulnerable households at risk of energy poverty and who were less likely to be able to fully engage with their smart meter and IHD. Identified risk factors include:

- 89% prevalence of housing in the social rented sector
- 46% of households had at least one child living with them
- 31% of households containing at least person aged 65 or older
- 75% of participant households living on incomes of less than £16,000 per year
- 89.5% in receipt of means-tested benefits
- 51% of households had at least one member of working age that was unemployed or unable to work
- Only 14% of households had at least one person in the household in paid full or part-time work
- 73% of participating households had at least one person with a long-standing physical or mental health condition or disability
- 23% of participants had no formal qualifications, and only 11% had a higher education or undergraduate qualification
- 52% of households had someone at home all the time every day

These results show that SMART-UP households were at a greater risk of being in energy poverty, suffering from digital exclusion and of requiring additional support to engage with their smart meter and IHD.

Section 4: Energy behaviours

This section looks at energy use, market engagement and energy behaviours amongst SMART-UP participants, both pre- and post-intervention. It does so in order to understand how far households were actively engaging with the energy market, the extent to which factors indicating heightened energy vulnerability were present across the sample, and the extent to which households were engaging in energy saving behaviours (and why).

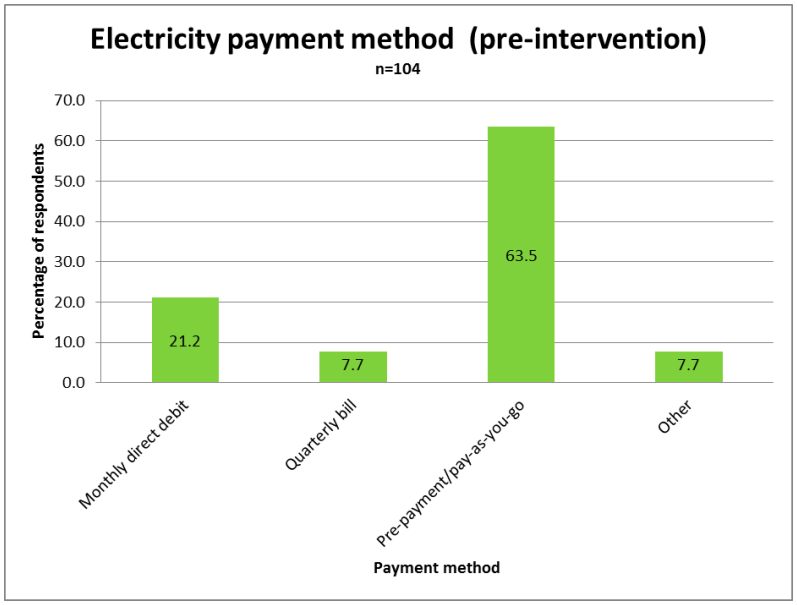
The first part of the section looks at: electricity payment methods, market engagement (switching supplier) and primary uses for electricity in the home in order to understand where participants may have been at an increased risk of suffering from energy poverty, and whether such risk factors might have affected their ability to engage in particular behaviours (such as switching supplier or reducing electricity use through behavioural changes).

The section then moves on to look at how far households were concerned with being able to keep warm and comfortable at home (and their ability to achieve affordable warmth at home) prior to the SMART-UP interventions taking place. We look at the extent to which households were worried about their energy bills both pre- and post- intervention, and whether the project impacted upon the likelihood and nature of energy-saving behaviours being enacted. It looks at the reasons why households had prioritised actions to reduce their energy use in the home, and whether the project had affected the level of thought given to electricity and gas use by participants.

4.1 Energy use, payment methods and market engagement

4.1.2 Paying for electricity

Chart 16: Electricity payment method



The most common means of paying for electricity amongst participating households was via pre-payment meter (PPM)(63.5%). Around a fifth paid for their energy by monthly direct debit (21%) and a smaller proportion (8%) paid via quarterly bill.

Households that pay for their energy via a PPM are more likely to financially vulnerable and are at an increased risk of being in fuel poverty, fuel debt, and of

self-disconnecting from their energy supply.[108] Evidence to date also suggests that households on a pre-payment meter may require additional support in accessing and understanding the certain functionalities of their smart meter and IHD. [109] Households on pre-payment meters are often prevented from accessing the cheapest deal on the markets and are less likely to switch supplier. Furthermore, households often have specific reasons for which they prefer to be on a PPM, such as budget management, risk avoidance, and reluctance to expose themselves to debt or credit checks. This further limits the likelihood of such households from switching supplier. [110]

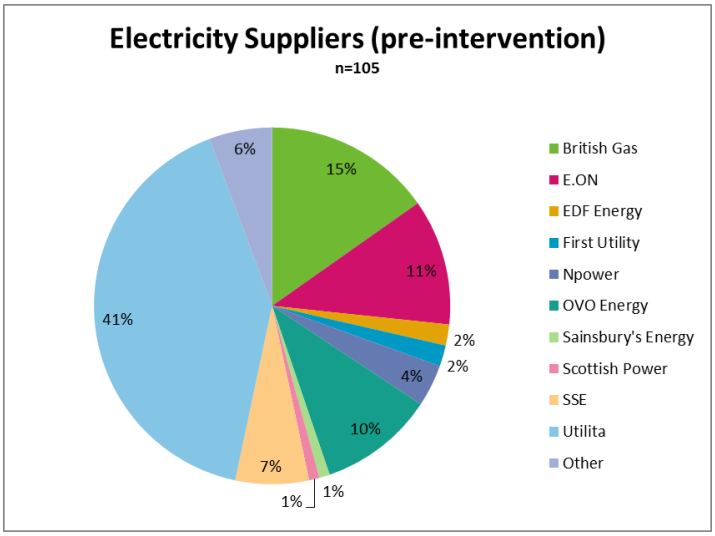
For example, one interviewee explained: **"I hate direct debit. I like to put like 50 quid and 60 quid on. What it is, is it's just like when you know, you've got extra money one week you'll put a bit on the electric and gas sort of thing, but you don't know when that comes. And that's how it is, it's like I might get my benefits for my child tax or something that I get monthly, and because I've got that much money on that month I'll put it on gas and electric. For me I like to be in front so it makes it more normal."**

In 2017 the UK Government drafted a bill[111] to cap energy prices, and Ofgem introduced plans to extend the PPM safeguard tariff to a further 1 million vulnerable customers in receipt of the Warm Home Discount (WHD) from 2018[112]. Despite this, it is anticipated that a large number of low income, working age households will not benefit from this move, given that the majority of WHD recipients are pensioners belonging to the Core Group.[113]

The large proportion of SMART-UP households on PPMs indicates a heightened vulnerability to energy poverty and reduced market engagement across the SMART-UP sample prior to any interventions taking place.

4.1.3 Engaging with the competitive energy market

Chart 17: Electricity suppliers

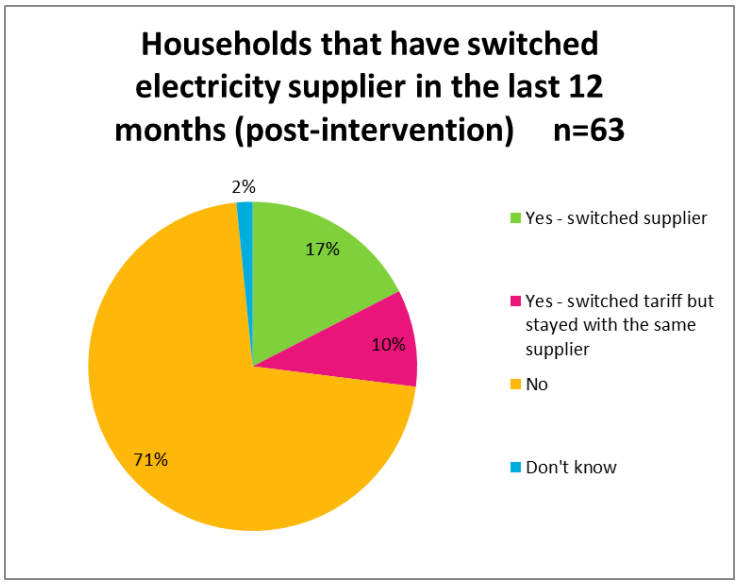


A large proportion of SMART-UP households were with the same electricity supplier (Utilita) (41%), reflecting the large number of households using PPM. After Utilita, the most popular suppliers were British Gas, E.ON and OVO Energy. The chart below shows how many of these households went on to switch supplier following the SMART-UP

[108] CMA. 2016. Energy market investigation: Final report.
[109] DECC, 2015, Smart metering implementation programme. DECC's policy conclusions: Early learning project and small-scale behaviour trials
[110] CMA. 2016. Energy market investigation: Final report.
[111] BEIS. 2017. Draft Domestic Gas and Electricity (Tariffs Cap) Bill
[112] Ofgem. 2017. Statutory consultation for a vulnerable customer safeguard tariff
[113] Ofgem. 2017. Financial protections for vulnerable consumers.

intervention.

Chart 18: Households switching electricity supplier in the last 12 months



Following the SMART-UP intervention, we asked participants whether they had switched electricity supplier in the last 12 months. Almost three quarters said that they had not switched supplier (71%), and 10% said that they had stayed with the same supplier but switched tariff. 17% of participants said that they had switched supplier.

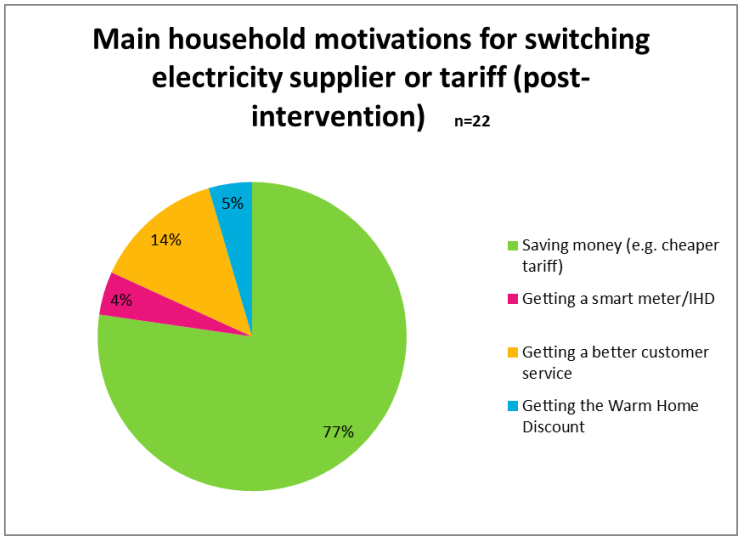
For some that had not switched, it became apparent in interviews that this was often a result of participants being comfortable with what they already had. One respondent told us **"I was happy with what I've got."** Another explained **"I checked with my energy people and asked them what I had to do and all that, and he says well actually you're on the lowest we can. So that satisfied me quite a bit. I haven't gone about in moving and, because I'm so stick in the mud, you know? Like most old people I think, better the devil you know than the, you know? So I think that's why they don't swap and change and they told me this was the lowest tariff then I'm happy."** Given that the SMART-UP sample displayed characteristics that meant they were more likely to be digitally excluded, on PPMs, and less likely to be willing or able to engage with the competitive energy market, this suggests that more needs to be done to either enable such households to engage, and ensure that those that do not are still protected. [114]

During our conversations with frontline workers it also emerged that some households may have been unwilling to switch supplier if it meant that they would lose the smart functionality of their smart meter, demonstrating how the nature of the roll out within the UK could have a detrimental impact on the ability of a household to engage with the competitive energy market, therefore potentially acting to increase energy vulnerability: **"He is considering switching but wants to keep his smart meter - many companies say they cannot offer this if he switches."**

The low numbers of households that had switched supplier following the intervention suggests that SMART-UP was not successful in encouraging participants to switch suppliers, and to engage with the competitive energy market in order to access the best tariff and deals. This indicates that more work needs to be done to overcome wider barriers such as digital exclusion and risk aversion amongst low income households on PPMs in order to ensure such customers can engage in activities like switching.

[114] In February 2018 the UK launched a consultation on amending the Digital Economy Act to bring in data-sharing measures between public authorities and energy suppliers so that consumers in receipt of certain benefits would be automatically moved onto a safeguard tariff.

Chart 19: Household motivations for switching electricity supplier or tariff



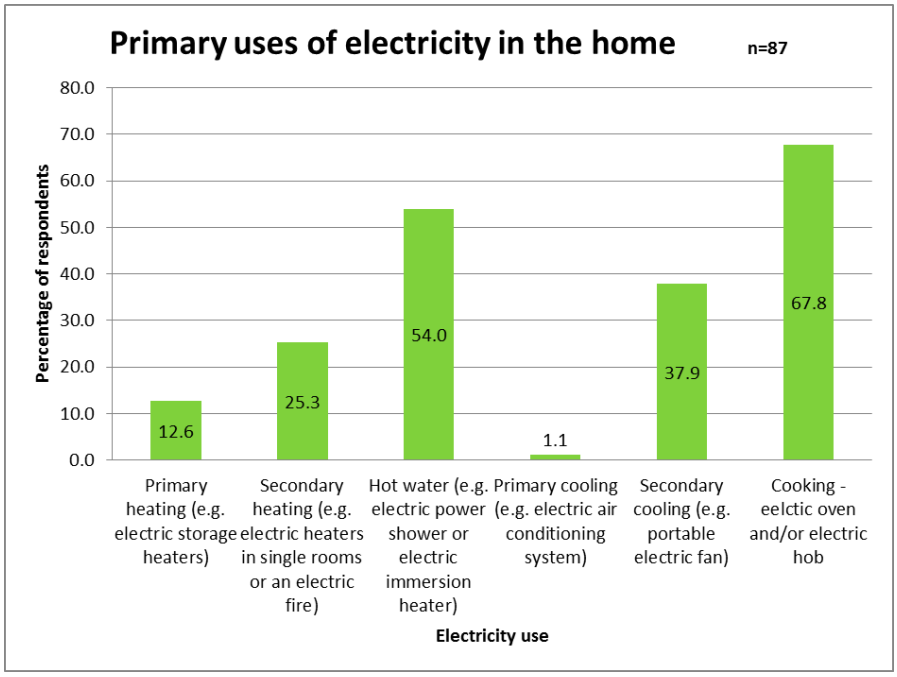
Of those households that had switched supplier, the overriding reason was to save money (71%). A smaller number of participants had done so in order to get better customer service (14%), to get the Warm Home Discount (5%) or to get a smart meter/IHD (4%). This suggests that the main reason for households within the sample to switch supplier related to financial concerns.

This can be seen in the comments from interviewee respondents. One participant explained: **"I do it every year or two. I looked into everyone else and OVO was the cheapest, and they gave me the Warm Homes Discount as well so obviously I've already got that now, so there's no point switching across. Obviously it's easy just to keep with the same company until the prices go up and I'm hopeful, well, they normally send us an email or a letter."** The fact that this respondent told us that they already switched every year or two, however, implies that they were already engaged with the competitive energy market prior to the SMART-UP intervention taking place. More work therefore needs to be done to understand why the project was unable to enable participants at greater risk of digital exclusion to take up switching behaviours and to incorporate methods of enhanced advice delivery to address such barriers in future. It is possible that with the rollout of SMETS2, at least one disincentive to switching supplier would be removed (households would no longer risk losing the 'smart' functionality of their meter by switching).

4.1.4 Electricity use in the home

As part of the intervention we wanted to understand the reasons for which households were using electricity in the home, both in terms of being able to identify where reductions in electricity usage might be likely to occur, and whether the fuels used for particular activities might suggest vulnerability to energy poverty.

Chat 20: Primary use of electricity in the home



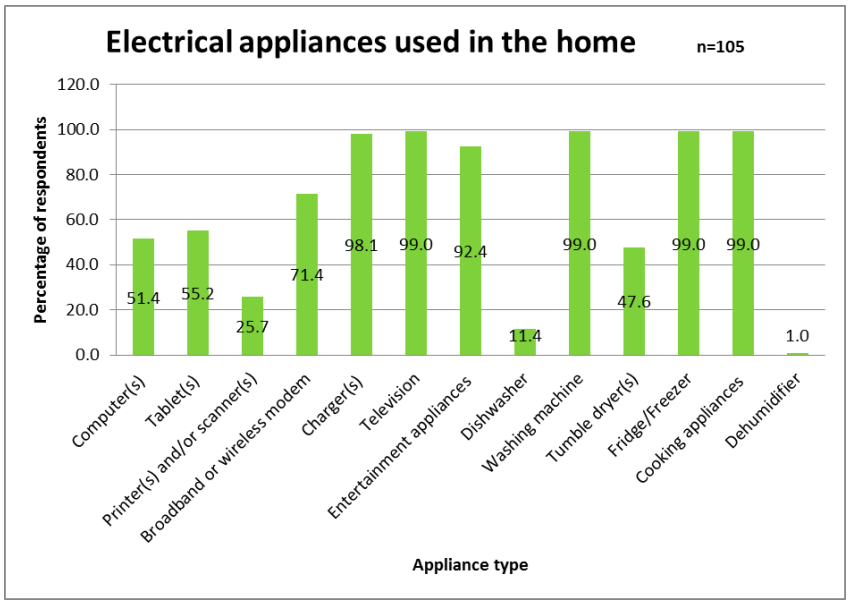
A majority of SMART-UP households used electricity for cooking in an electric oven and/or electric hob (68%), whilst over half used it for their hot water (54%). Over a third used electricity for secondary cooling (38%), and a quarter used it for secondary heating (25%). Only 12% of households used electricity as their primary heating source. Areas with the most scope for reducing electricity use in the home as part of the project, then, related to cooking and water heating practices.

However, it is important to note that households that use electricity for space and water heating in the UK are more likely to be paying more for their energy than households that use gas, and face higher fuel poverty gaps, suggesting a greater vulnerability to energy poverty.[115] Furthermore, the high percentage of households within the sample that were using electricity for secondary heating (a quarter of participants) suggests both an additional expense when it comes to heating their home, and that their primary heating systems and/or properties were either inefficient at providing an adequate level of thermal comfort and/or were too expensive to run. Whilst this again indicates that the project targeted households that displayed an increased risk of being vulnerable to energy poverty, it also suggests that such households may have had fewer possibilities for reducing their electricity use further should they already be engaging in practices of energy rationing or under-heating as a survival mechanism, or experiencing high energy costs/usage for reasons that were not behavioural (such as inefficient properties or heating systems). Indeed, studies have shown that "households with more scope to reduce energy use (i.e. those with higher baseline energy consumption) experience larger savings in energy use within interventions." [116] [117] Where households could already be under-consuming or engaging in energy rationing, further reducing consumption could have negative outcomes for health and wellbeing. [118]

[115] Ofgem. 2015. Insights Paper on Households with Electric and other Non-Gas Heating
[116] DECC, 2012, What works in changing energy-using behaviours in the home? A rapid evidence assessment
[117] Fischer, C. 2008, Feedback on household electricity consumption: a tool for saving energy? *IN Energy Efficiency 1:79-104*
[118] Buchanan, K., Russo, R., and Anderson, B. 2015, The question of energy reduction: The problem(s) with feedback. *IN Energy Policy 77: 89-96*

It is also important to note that the focus of the project on electricity use could have been problematic for those households who were not using electricity as their primary heating sources. During interviews with households, it emerged that many were worried about managing and controlling the use of gas in the home, and in meeting the cost of their gas bills.

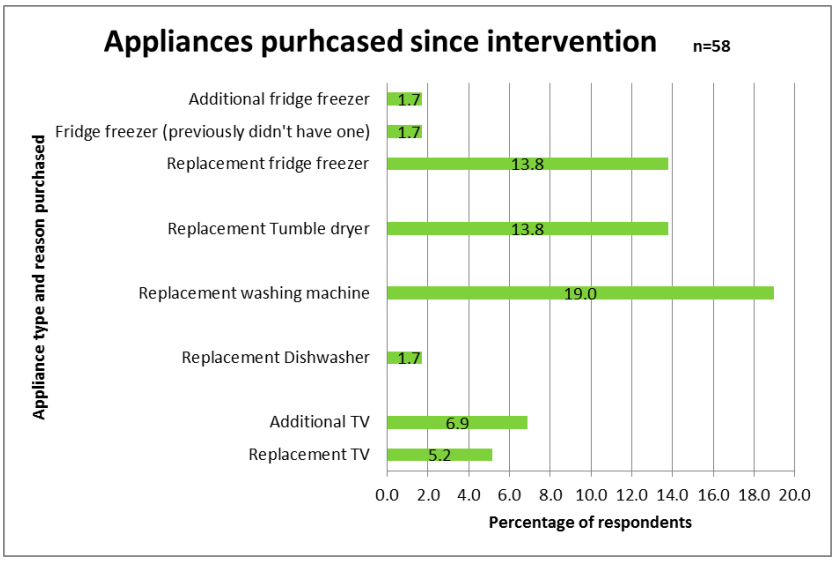
Chart 21: Electrical appliances used in the home



The appliances most commonly used by SMART-UP households were: televisions, fridge/freezers and cooking appliances (all 99%, respectively). 98% of respondents also used electricity for chargers, and 92% used it for entertainment appliances. Fewer households used it for broadband or wireless modems (71%), and around half used it for a computer (51%), tablet (52%) or tumble dryer (47%). Just over a quarter used it for printers and/or scanners, and only 11% used it for dishwashers. 1% used electricity for a dehumidifier. This shows that households were more likely to use electricity for common 'essentials' like television, food storage, washing machines and chargers and were less likely to use it for 'additional' purposes like the internet, computers and tables (which correlates with the higher chance of digital exclusion within the sample) or more 'luxury' or non-essential items like tumble driers (which correlates with low household income). Activities to reduce electricity consumption were therefore more likely to revolve around every day and common essentials, given their higher prevalence and usage across the sample.

Chart 22: Appliances purchased since intervention

Following the SMART-UP intervention, there was relatively little change in the number and type of appliances used by participating households. Less than 2% of households had replaced a dishwasher, purchased an additional fridge/freezer, or purchased a fridge/freezer



after previously not having one. Around 7% of households had purchased an additional television, and 5% had replaced one. Around 14% of households had replaced a tumble dryer, and 19% had replaced a washing machine. Whilst we did not capture reasons for purchasing additional appliances in the questionnaire, given the substantial presence of younger families in the sample, this could relate to a need to cater for the energy needs of larger households. Whilst remaining relatively stable both before and after the project in terms of the number and type of appliances in the home, if replacement appliances had higher energy efficiency ratings than those they replaced, this could have representing an energy saving for that household. Unfortunately, however, data on the energy efficiency of those appliances was not collected as part of the project. The relative constancy in appliances present in households suggests however that their requirements in terms of the practices and appliances for which electricity was needed by participants were unlikely to have changed over the lifetime of the project.

4.1.5 Summary

This section has examined the electricity payment methods used by participants, the most common uses for electricity within the sample, and the extent of market engagement amongst sample households, both pre- and post-intervention. In doing so, it has revealed the presence of significant indicators of vulnerability to energy poverty, and the existence of barriers that could potentially prevent households from engaging in the competitive energy market, and from being able to reduce their electricity usage to the extent that it would not compromise wellbeing.

The high proportion of participants that paid for their electricity via PPM (63.5%) suggests an increased risk to fuel poverty, self-disconnection, and disengagement from the competitive energy market. Indeed, the fact that the majority of SMART-UP households had not switched energy supplier following their intervention (71%) indicates that further work needs to be done to enable vulnerable households (on PPMs and at risk of digital exclusion) to engage with the competitive energy market as part of advice delivered on smart metering and energy efficiency. Further measures need to be put in place to ensure that households with smart meters will not suffer detriment from switching (by losing the smart functionality of their meters).

The primary reasons for which households were using electricity in the home indicate that the areas with the most scope for potentially reducing domestic electricity use related to cooking (68% of households) and water heating practices (54% households). However, it is essential to note that the primary uses of electricity for some households - such as primary space (12%) and water (54%) heating - put them at a greater use of energy poverty due to the fact that they were likely to be paying more for their energy. Those who were using electricity as their primary method of secondary heating (25% households) were potentially suffering from an additional expense in order to achieve adequate warmth at home. The fact that such secondary appliances were required in the first place indicates that their primary heating systems were either inefficient at providing adequate levels of warm, and/or cost too much to run. In either case, such participants were at risk of under-heating their homes (reducing the potential for them to decrease their energy use further), or could have faced barriers to being able to save energy that were not related to behaviour (inefficient properties/heating systems). It is also important to note that the focus of the project on electricity

use could have been problematic for those households who were not using electricity as their primary heating sources.

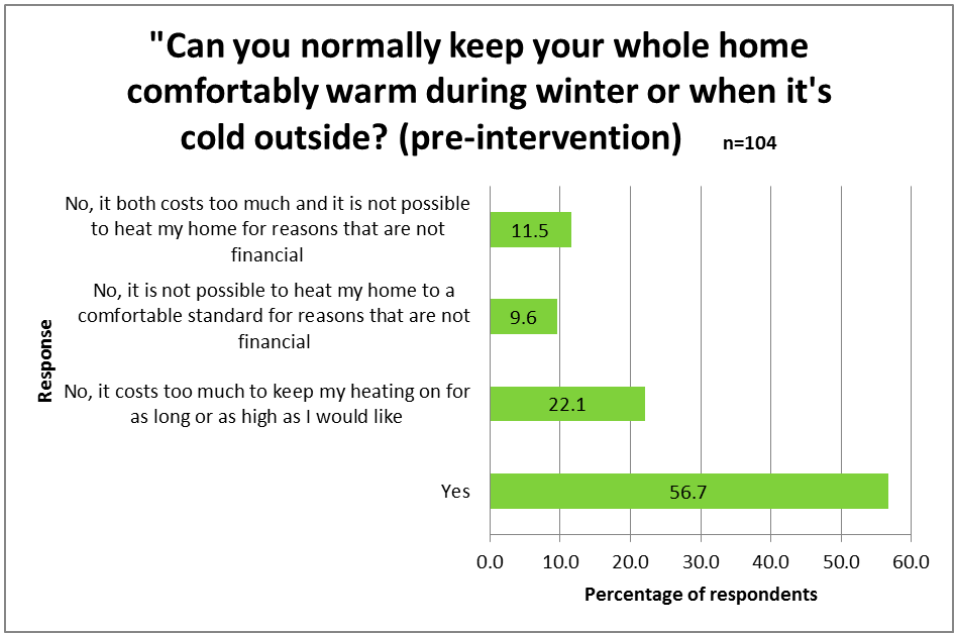
Where there was scope to reduce electricity consumption within the sample, this was most likely to occur across those activities and appliances that could be described as common 'essentials' like television, food storage, washing machines and chargers.

4.2 Thoughts and concerns around energy use

In this section we look at how far households were concerned with being able to keep warm and comfortable at home (and their ability to achieve affordable warmth at home) prior to the SMART-UP interventions taking place. We look at the extent to which households were worried about their energy bills both pre- and post- intervention, and whether the project impacted upon the likelihood and nature of energy-saving behaviours being enacted. It looks at the reasons why households had prioritised actions to reduce their energy use in the home, and whether the project had affected the level of thought given to electricity and gas use by participants. Throughout the section, the complex interplay between reduced consumption through experiences of energy poverty and reduced consumption for carbon savings becomes apparent, as do the contradictions between actions needed to address energy poverty amongst participants (potentially increasing consumption) and advice to further encourage reductions in energy usage. The question here becomes one of looking to encouraging positive energy efficient behaviours to reduce consumption whilst at the same time enabling an increase in consumption in areas where harmful or negative rationing practices are being enacted.

4.2.2 Concerns with keeping warm and comfortable at home

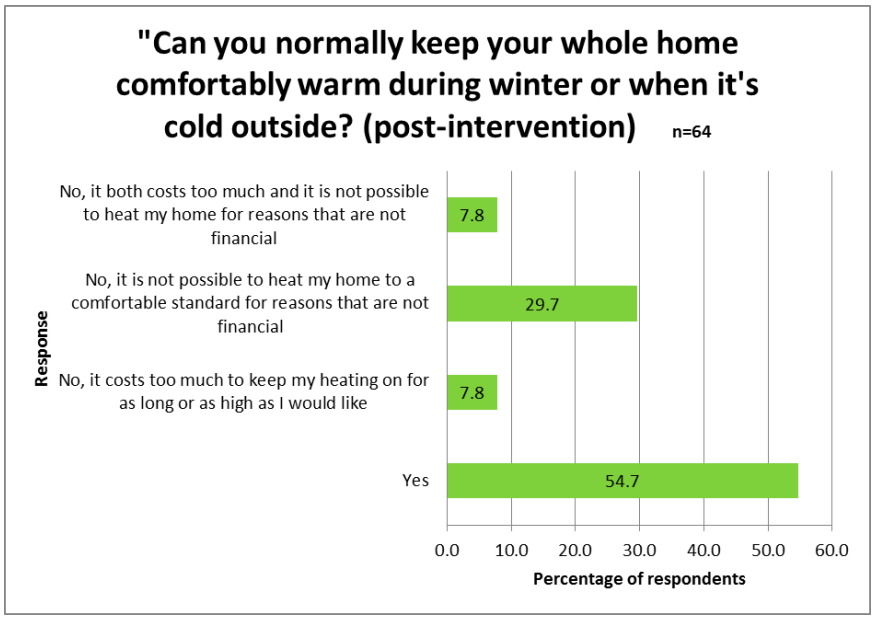
Chart 23: Extent to which households can normally keep their home warm in the winter or when it's cold outside (pre-intervention)



The potential for SMART-UP households to be in or at risk of energy poverty can be seen in the fact that, prior to the intervention, almost half did not feel that they could keep their home comfortably warm during winter or when it's cold outside (43%). For 10%, this was due

to reasons that were not financial, such as inadequate or inefficient heating systems, but 22% felt this was due to the cost. Around 12% attributed their inability to keep warm at home to both cost and non-financial factors.

Chart 24: Extent to which households can normally keep their whole home comfortably warm during winter or when it's cold outside? (post-intervention)



After the SMART-UP intervention, we see a slight percentage increase in the number of households unable to keep their home comfortably warm (45%). Almost a third (30%) attributed this to reasons that are not financial, such as inadequate, inefficient or non-existent heating systems. Meanwhile, 8% felt that it cost too much to keep their heating on for as long or as high as they would like. Another 8% felt that it was due to both cost and reasons that were not financial.

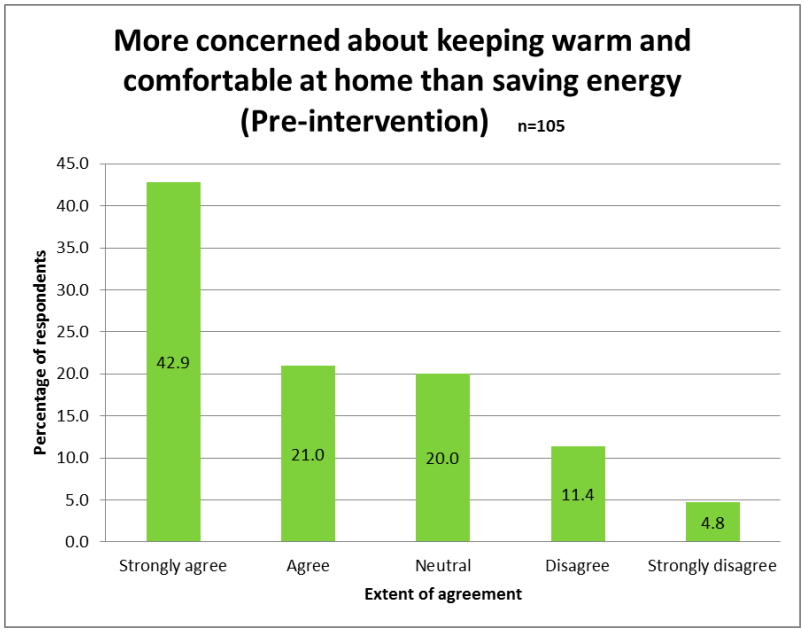
This indicates that some households living with costly, non-existent or inefficient heating systems may be unable to use the levels of energy required to meet their basic needs for comfort and warmth at home prior to a behaviour change intervention taking place. It also suggests that such advice may not be enough to enable them to save energy elsewhere to the extent that they can take the gains from such savings as increases in energy use in other areas (such as allowing for adequate warmth to be achieved). Indeed, one of the key reasons for variations in fuel bills amongst UK households comes down to energy inefficient properties forcing low income households (who cannot afford to upgrade their heating system or insulate their homes) to pay more for their energy).[119] Similarly, those properties that are off-gas tend to fall in the worst EPC bands (F or G), and households relying on electricity for space and water heating often pay more for their energy.[120]

For example, one interview respondent explained: **"Well, this was a problem you see. The problem being is that our boiler is not through the kitchen like everybody else's round here. Our boiler is in the outhouse. Now say like if it drops below 15, it automatically comes on. But we found the first year we were here that the energy bills through the winter were excessive compared to the last property we were living in. It was a struggle. I mean, you know…but we had to just keep the heat on, do you know what I mean. We were keeping warm but the bills were higher than what it was at the other home."** In this scenario, it would appear that actions first need to be taken to enable

[119] Hills. 2012. Getting the measure of fuel poverty: Final Report of the Fuel Poverty Review.
[120] Energy & Utilities Alliance, Jan 2017, Fuel Poverty – A Connected Solution. Available at http://eua.org.uk/uploads/587C9C8C18F22.pdf [Accessed 19th December 2017]

households to achieve affordable and adequate warmth at home to a standard necessary for comfort and wellbeing (which may mean increasing the amount of energy used), before they can be enabled to reduce energy use out of choice (and not necessity).

Chart 25: More concerned about keeping warm and comfortable at home than saving energy



Before the SMART-UP intervention, around two thirds (64%) of respondents either strongly agreed or agreed that they were more concerned about keeping warm and comfortable at home than saving energy, and around 16% either disagreed or strongly disagreed. As we know, many households were surviving on low incomes, showed enhanced vulnerability to energy poverty, and many were suffering from cold-related health conditions (and likely to have higher heating needs as a result). Interviews with householders showed that parents tended to prioritise turning on the central heating when their children were at home, and that energy rationing was a common practice. This implies that households were likely to be regularly weighing up decisions to turn the heating on or off, and making complex compromises in their everyday lives with regards how to they managed their heating and energy needs.

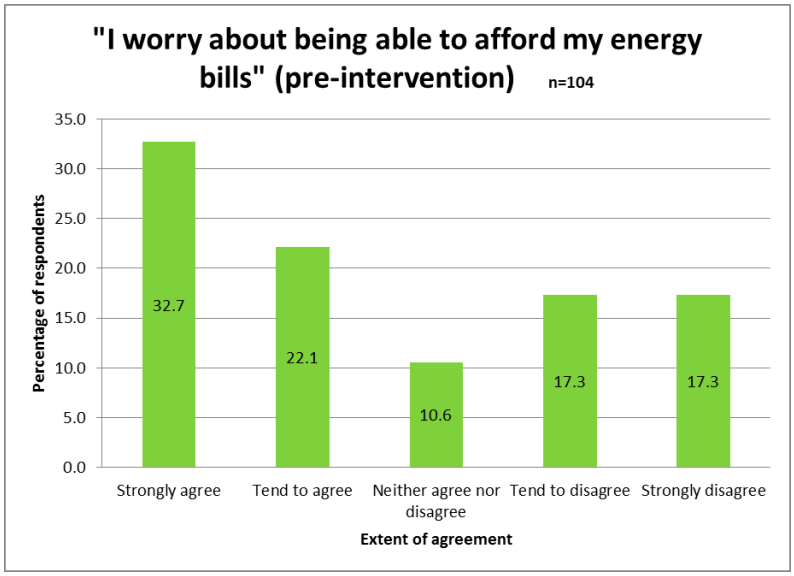
For example, one interview participant explained that: **"It's a bit difficult when you've got a child, 'cause you always have to have the heating on for them. So if it was me on my own I just won't put it on or I'd hide under a blanket but you can't really do that. The other thing is me going out all day, you know, spending money or I've got a car and I go out sometimes. What I do try and do is put an hour or two when he does to school, the heating, then I just take it off and I put it on a bit at lunchtime and then leave it off until the evening like in bits."**

Indeed, existing studies have argued that "the internal temperature of the home is the main determinant of the amount of benefit from energy efficiency measures that will be taken as an increase in comfort – a 'takeback' – rather than as an energy saving. At 16.5oC (the average temperature of housing in Great Britain) about 30% of the benefit of an energy efficiency improvement would be taken as a temperature increase and the rest as an energy saving; at temperatures as low as 14oC - still frequently found in low-income households - only half of the energy saving would be achieved. Only once the internal temperature reaches around 20oC are further improvements in efficiency likely to achieve the full energy saving." [121] It is therefore important to note that households within the sample who were cold at home may have been likely

[121] Darby, S. Energy Advice, What is it worth? Panel 3, University of Oxford (Environmental Change Unit)

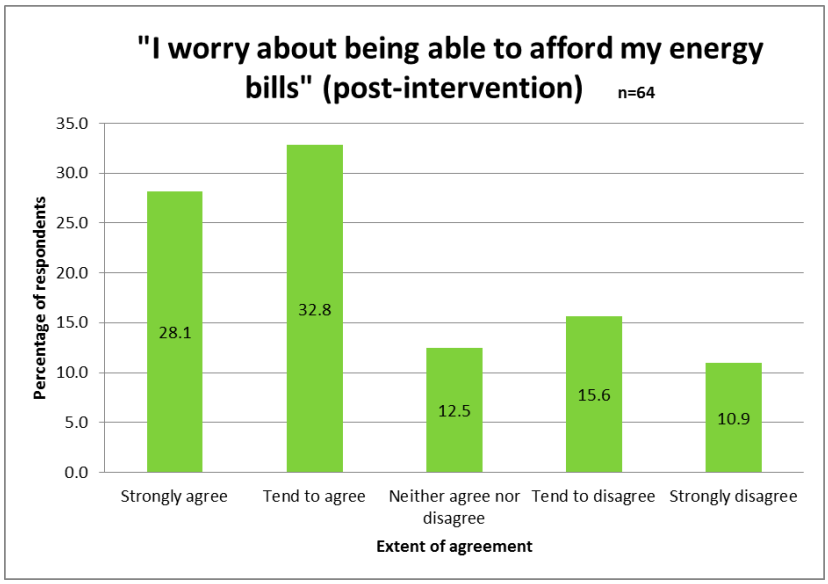
to take any benefit from energy savings as increased comfort and warmth at home (i.e. as an increase in consumption elsewhere).

Chart 26: Extent to which households worried about being able to afford their energy bills (pre-intervention)



We can see here that around 55% of households were worried about being able to afford their energy bills prior to the SMART-UP intervention, and around a third (34%) were not.

Chart 27: Extent to which households worried about being able to afford their energy bills (post-intervention)



Following the SMART-UP intervention that the percentage of households that were worrying about being able to afford their energy bills had increased (61%), and the percentage that disagreed with this decreased (28%). This is perhaps not surprising when we consider the characteristics of the sample. SMART-UP households were predominantly low income with a high proportion on means-tested benefits. They were also likely to have higher heating needs due to ill health. Life is becoming harder for vulnerable households in the UK as a result of a combination of inflation and low wages, and especially as a result of the introduction of universal credit.[122] Therefore, whilst SMART-UP might have enabled households to take action to manage their energy use, it did not necessarily resolve the precariousness of their financial situation, or improve the efficiency of their properties/heating systems (only their behaviours). This therefore could act to limit the extent to which their worries about being able to afford to meet the cost of

[122] NEA, 2017, Bridging the Gap: Addressing the Cost of Living Facing UK Households this Winter.

their energy, even for their basic needs, could be alleviated. As has been noted, "for many low-income households, energy advice is no *substitute* for improving inadequate insulation and heating arrangements: the coldest homes need physical measures (and therefore grants) before anything else….This does not mean, though, that advice in these circumstances is worthless: this would only be true where nothing remained to be achieved in terms of understanding energy use and acting on that understanding." [123]

4.2.3 Changes to behaviour

Chart 28: Extent to which households felt that they had already taken actions to reduce the amount of energy used at home (pre-intervention)

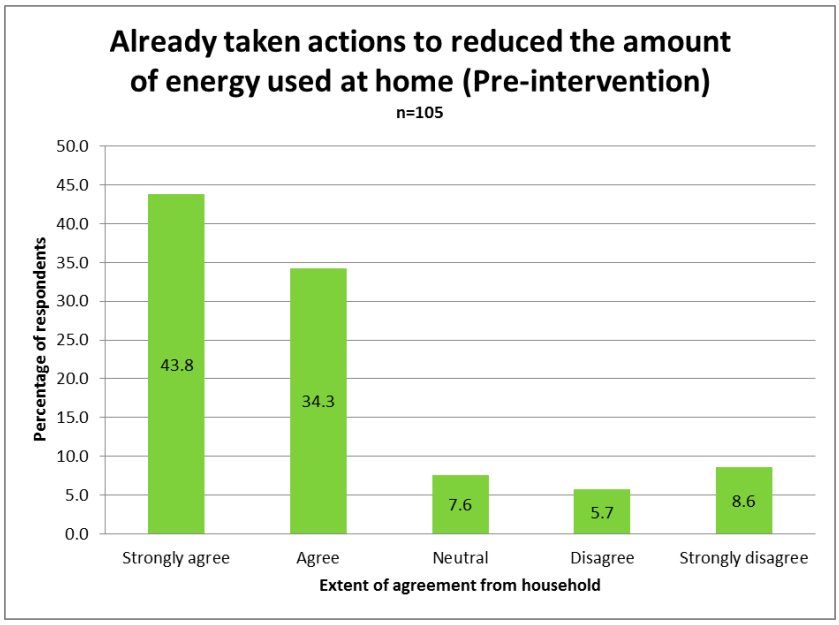


Chart 28 shows that the majority of SMART-UP households felt that they were already taking actions to reduce the amount of energy used at home before their intervention (44% strongly agreed that they were, and 34% agreed – 78% in total). In contrast, only 15% felt that they were not already taking action. Given that households were already worrying about their energy bills and indicating a heightened inability to maintain adequate levels of comfort and warmth at home, as well as demonstrating risk factors for energy poverty, the fact that households would be taking steps to reduce the amount of energy they were using at home is perhaps not surprising. This does not however mean that such behaviours were 'positive' behaviours to encourage energy efficiency as opposed to more harmful energy rationing or survival practices.

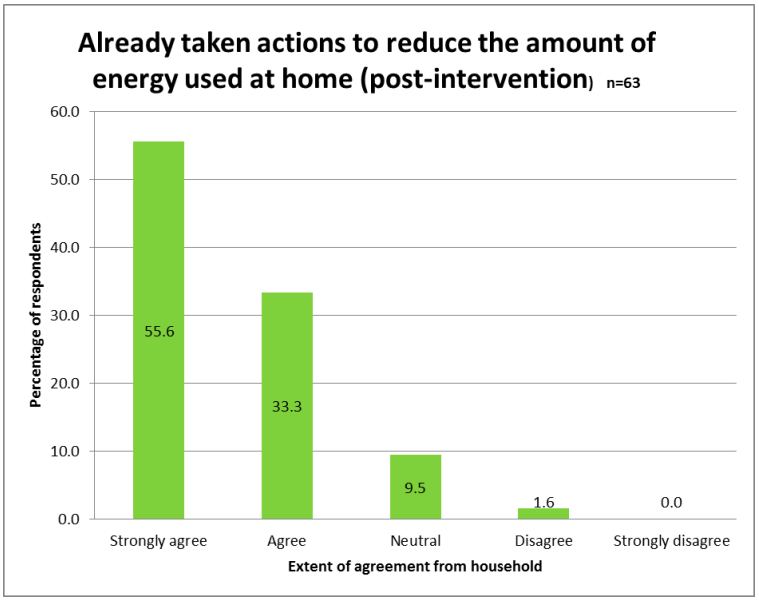
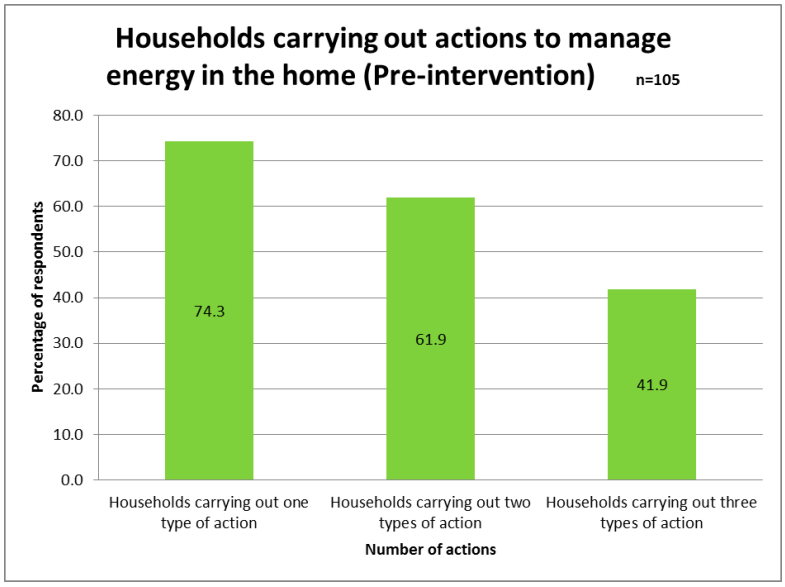


Chart 29: Extent to which households felt that they had taken actions to reduce the amount of energy used at home (post-intervention)

[123] Darby, S. Energy Advice, What is it worth? Panel 3, University of Oxford (Environmental Change Unit)

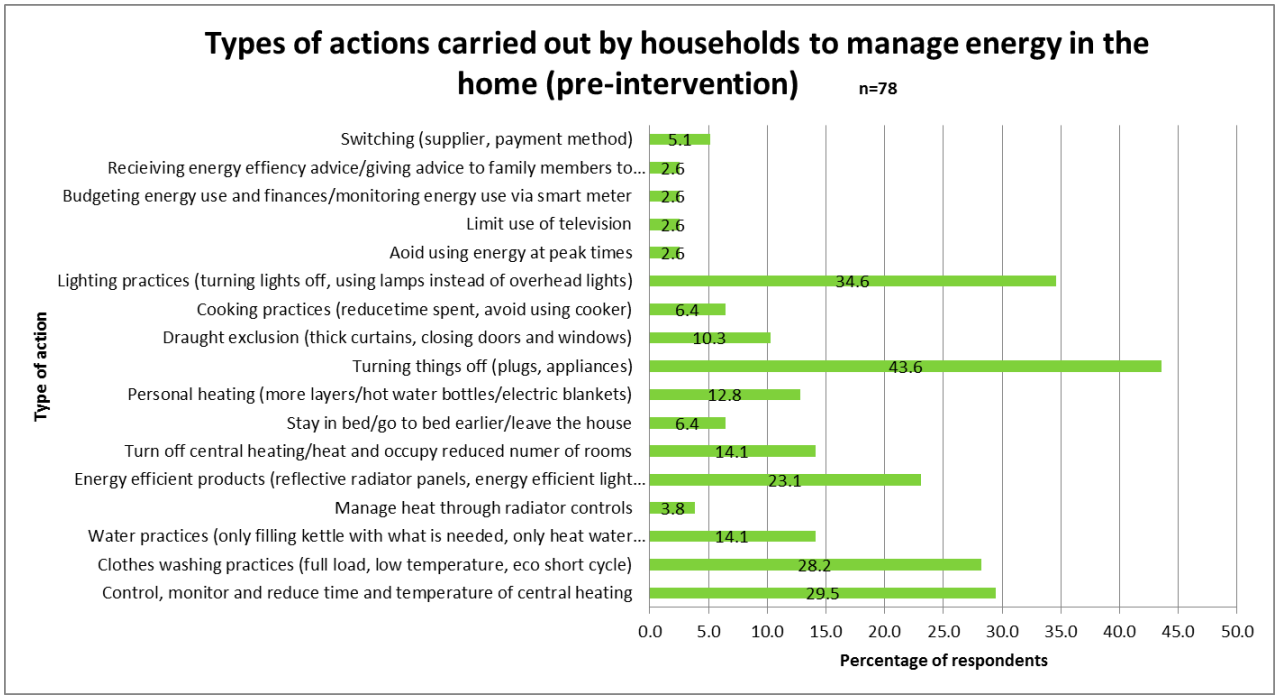
Following the SMART-UP interventions, we can see an increase in the number of respondents who felt that they were taking actions to reduce the amount of energy they were using at home. Overall, 89% of respondents agreed that they were doing something to reduce their energy use, and only 2% disagreed. This suggests that SMART-UP encouraged some households to take actions to reduce or further reduce the energy that they were using at home in a more efficient manner.

Chart 30: Households carrying out actions to save energy at home (pre-intervention).



Overall, 74% of respondents said that they were carrying out at least one type of action to manage energy in the home. 62% were carrying out at least two types of action, and 42% were carrying out three. Therefore, households were almost a third less likely to be carrying out a few energy saving behaviours than they were to be just doing one thing around the house to manage their energy, prior to the SMART-UP intervention.

Chart 31 : Types of actions carried out by households to manage energy in the home (pre-intervention)

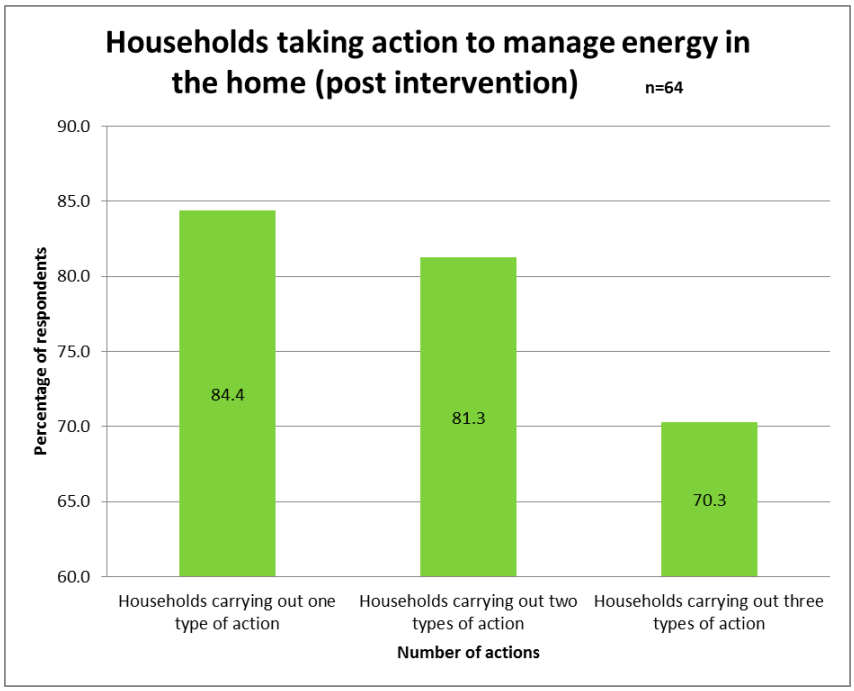


Of the actions that households were carrying out prior to the SMART-UP intervention, households were most likely to turn off appliances or plugs (44%). Around a third of respondents were engaging in actions related to lighting practices (turning lights off, using lamps instead of overhead lights), and 30% were controlling, monitoring and reducing the time their central heating was turned on, or the temperature at which they had it set. 20% would carry out actions around clothes washing practices (only washing clothes on a full load, washing clothes at a lower temperature or on an eco-short cycle). Just over a fifth of households were using energy efficient products, such as reflective radiator panels or energy efficient light bulbs.

Less than 10% of households said that they were engaging in behaviours such as switching energy suppliers or payment methods (5%). 10% were carrying out draught exclusion activities (such as using thick curtains, or closing doors and windows). Less than 5% of households said that they were budgeting and monitoring their energy use through their smart meter (3%), avoiding using energy at peak times (3%); using radiator controls (4%) or limiting their use of the television (3%).

Some households were engaging in practices that would suggest they were either in or at risk of fuel poverty, such as staying in bed for longer or going to bed earlier in order to stay warm, or simply leaving the house to avoid having to put the heating on (6%). This indicates that some respondents were resorting to harmful coping strategies, including those which can lead to increased social isolation (like staying in bed or avoiding being at home).[124]

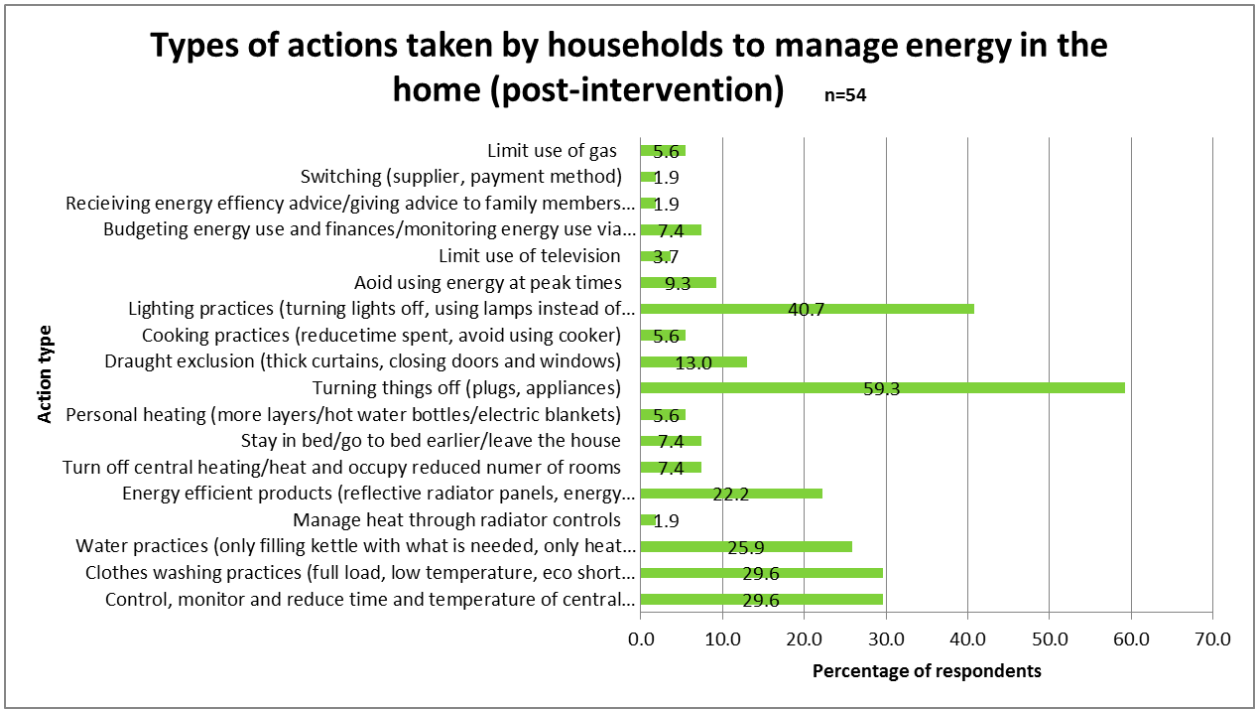
Chart 32: Households taking action to manage energy in the home (post intervention)



Following the SMART-UP intervention there were increases in the percentage of households carrying out at least one (84%), two (81%) or three (70%) actions to manage energy in the home, compared to before receiving SMART-UP advice. It is therefore possible that households were enabled to take more action to manage their energy use at home through the project, either through accessing hints and tips around how to do so, or having the benefits of doing so demonstrated to them.

[124] NEA and the Children's Society, 2015, Making a House a Home: Providing affordable warmth solutions to families living in fuel poverty

Chart 33: Types of actions taken by households to manage energy in the home (post-intervention)



Post-intervention, we can see that households were still most likely to be turning off appliances and plugs (59%), or taking action around their lighting practises (41%). Almost a third were engaging in clothes washing practices such as washing with a full load, at low temperatures or on eco short cycles (30%), and just over a quarter were carrying out actions relating to their water practices (such as only filling a kettle with the amount of water needed). Around a fifth were using energy efficient products (22%). A third of households were also controlling, monitoring or reducing the time and temperature of their central heating systems (30%). This is in keeping with the main uses of electricity and electrical appliances in the home already identified, and suggests that SMART-UP advice was able to resonate with households' everyday practices of electricity use in the home.

One interview participant explained how the project had allowed her to save energy: **"I think we've done really, really well regarding electricity you know. It was like, I've been trying to double up on things. If I'm cooking, when I've got the oven on I'll do something else with it apart from just cooking the roast. You know, if I need a batch of buns I'll do some buns or things like that. So I'm not putting the oven on at another time in the week or anything like that do you know what I mean?** In addition, they described how: **"apart from towels and things like that, I put that on an hour wash, but a lot of my washing now is done on a half hour wash, because I've had some good energy saving tips, haven't I?**

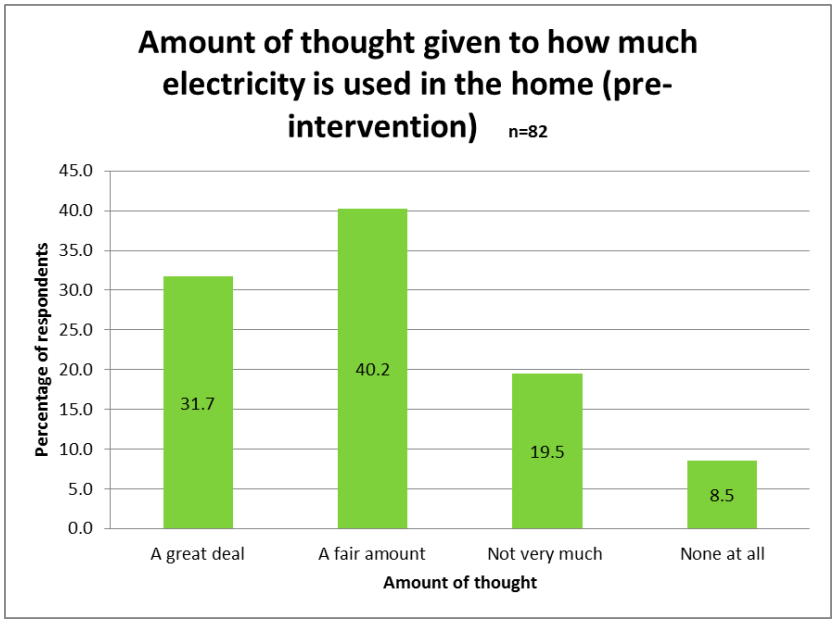
There had been a slight increase in the number of households who were avoiding using energy at peak times (9%), and a decrease in those that were saying they had switched supplier or payment method (2%). However, given that respondents had already told us whether they had changed supplier or tariff in the last 12 months, some may not have felt the need to mention this as an "action" to manage energy in the home in an open-ended question.

Feedback recorded by frontline advisors in phone calls with households also indicated that some were engaging in more energy saving behaviours as a result of the project: **"IHD is useful for the participant as it helps them keep track of how much energy they are using. The tips in the booklet were also useful and as a result of the intervention and the materials, the participant is trying to reduce their energy use by turning off lights in the home and adjusting TRVs in rooms where heat isn't needed."**

However, the post-intervention questionnaire also revealed indicators that some respondents were still resorting to harmful rationing practices, especially in relation to their central heating. 7% of respondents were either staying in bed or going out in order to avoid turning on the heating, and 7% were also turning off their central heating altogether, or occupying a reduced number of rooms in order to avoid heating a full house. This suggests that, whilst the project did enable and encourage respondents to take actions that would enable them to manage their energy use efficiently, some respondents were still in a state of heightened vulnerability when it came to affording to comfortably heat their home, and were engaging in practices that could be harmful to both their physical and mental health and wellbeing. Whilst these practices meant that households were not actually using energy for their central heating, the response was a survival mechanism to coping with energy vulnerability, and one that should not be encouraged. Indeed, "under-consumption of domestic energy coexists with over-consumption and, therefore, reducing energy use of those who already under-consume may be inconsistent with the policy of eliminating fuel poverty….together these policies may generate contradictory messages and prescriptions." [125]

4.2.4 Thinking about electricity and gas usage at home

Chart 34: Amount of thought given to how much electricity is used in the home (pre-intervention)

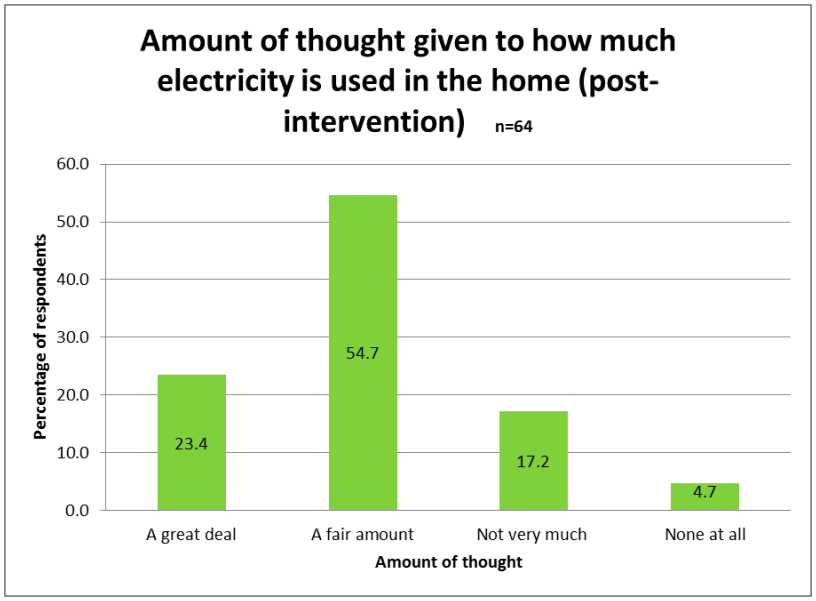


Prior to the SMART-UP intervention, around 32% of households said that they gave a great deal of thought to the amount of electricity they used at home, and two fifths said that they gave it a fair amount of thought (40%). Meanwhile, almost a fifth (19.5%) said they gave

[125] Barnicoat G., and Danson M.,2015, The ageing population and smart metering: a field study of householders' attitudes and behaviours towards energy use in Scotland. *IN Energy Research & Social Science 9: 107-115*

it not very much thought, and 8.5% said they gave it no thought at all. Therefore, prior to the intervention, around 72% of households were already thinking about their electricity in the home on some level.

Chart 35: Amount of thought given to how much electricity is used in the home (post-intervention)



From Chart 35 we can see that there was a slight increase in terms of the number of households giving either a great deal or fair amount of thought to how much electricity they used in the home following their SMART-UP intervention (78% of respondents), and a slight decrease in the proportion of households giving it little or no thought to how much electricity they use (21% of respondents).

These changes may be attributable to the SMART-UP intervention (i.e. encouraging some people to think more about their energy use). At the same time, it could be that after feeling they knew more about their smart meter and how to control their energy use, some households consciously thought about their electricity use less. Another explanation could relate to household experiences of energy vulnerability, and the fact that they were generally worrying about meeting the cost of their energy before SMART-UP, and engaging in practices of energy rationing. The limited scope some households may have had to reduce their energy use could have meant the intervention was unable to alleviate worries around their energy use, and that they therefore continued to give greater levels of thought to how much electricity they were using at home. Given the small sample size and the potential impact of confounding variables, it is not possible to determine whether these results/patterns are statistically significant, or identify the main determining variables.

This complexity around reasons for thinking more or less about the energy being used at home (in terms of electricity) became apparent in interviews with households. One respondent explained that her smart meter app had allowed her to manage her energy better, resulting in less worry: **"it's very important because I'm disabled and I do use a lot of my electricity. It's normal. I tend to budget on my phone to know how much I'm spending, but I've got problems remembering things. My husband won't let me have a gas cooker because if I forget to turn it off….it can be quite challenging. If I didn't have the smart phone, I'd be totally lost."** This in turn, might mean that she needed to give less thought to how much electricity she was using due to more effective management through her app.

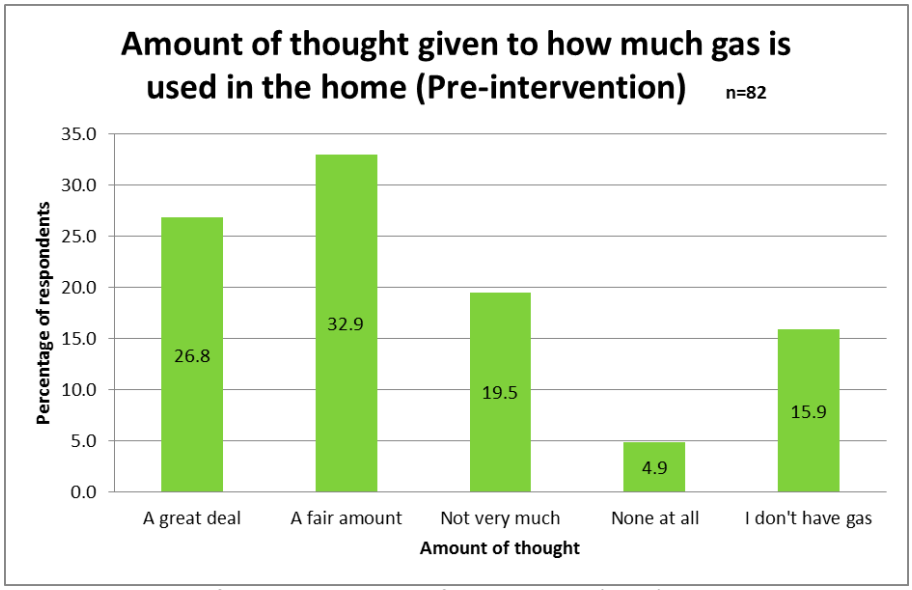
In contrast, another interviewee who tended to worry more about her gas than her electricity noted that, after SMART-UP: **"now I've started checking the electricity as well. I haven't really checked the kilowatts, but you know, I go by what I'm spending. I do a daily you know, amount that I'm**

using." In this case, the project had resulted in her thinking about her electricity more by highlighting it as something that could be managed. We were also told: **"[Before the advice visit] I didn't realise, I thought it was just normal to be spending that high amount. [I've cut back on] using the lights at night time. I make sure they're all off rather than on. Because obviously being on my own it's quite scary really at night. But obviously I cut back with my lights and stuff, make sure I've turned everything off."** Highlighting electricity as something that could be managed meant that the amount of thought given to electricity use at home did not change for this participant, but the nature of the thought given to it did.

The level of thought given to the amount of electricity being used could also change according to the time of year, and the particular social context in which participants find themselves. The same respondent went on to say: **"obviously I've got Christmas lights back on just obviously it's Christmas, that's the worst time that people are going to try and get in, isn't it, so I do leave lights on now to make sure they come up."** This implies that enabling households to save energy isn't necessarily about cost or environmental savings, but depends upon a complex array of social concerns that affect how households think and feel about their energy (in this case social customs – i.e. Christmas – and how they worry about other things going on their neighbourhood – i.e. a heightened risk of crime's such as burglary over the Christmas period).

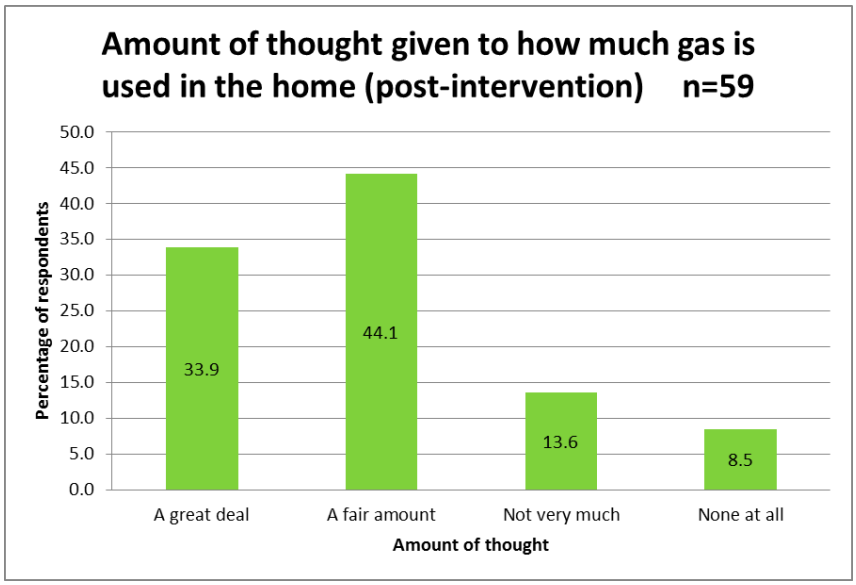
It is important to note at this stage that some households received energy efficiency measures from housing association partners at the same or similar time to their SMART-UP visit – ranging from small measures like energy saving light bulbs to larger measures such as boiler replacement. We were unable to capture the exact measures installed in SMART-UP properties, or the effect they had, but it could be that corresponding increases in energy efficiency of properties and potential bill savings meant that some households thought or worried less about their electricity use.

Chart 36: Amount of thought given to how much gas is used in the home (pre-intervention)



Around a quarter of SMART-UP respondents were giving a great deal of thought to the amount of gas they used at home prior to the intervention (27%), and a third were giving it a fair amount of thought (33%). Around a fifth were giving the issue not very much thought (19.5), and 5% none at all. Therefore the majority of households (60%) were giving at least some level of thought to how much gas they were using.

Chart 37: Amount of thought given to how much gas is used in the home (post-intervention)



From Chart 37, we can see that there was an increase in the proportion of respondents giving either a great deal (34%) or fair amount (44%) of thought to how much gas they used in the home. Around 23% gave not very much or no thought to the issue.

This is perhaps not surprising when we look at the level of worry displayed by interview participants in relation to how much gas they were using to heat their homes. For example, one respondent explained: **"I just don't understand gas, why that's very high and electric's always cheap. Even that you don't use a lot of heating as well but it costs a lot of money. It doesn't make sense to me. And I'll be honest, heating you need constantly but you can't afford it. In winter you need it on all day because if you put it on in bits your house is still cold because you've got to give it a few days to warm up. So, if you do it like in a cheap way and just do it a couple of hours it doesn't work really. Your house isn't warm, it goes back to cold."** This quote suggests that the participant was finding it hard to pay for the energy (gas) required to heat her home to an adequate standard, especially in winter.

Another told us: **"I just think that we need more help on the gas. Definitely on the gas. Gas is too expensive. Personally…I've been….a child or old people there should be a law or something where they need gas all the time in winter. It is a cold country so when it comes to stuff like that with the weather and that, it should be free really. There should be something there for that certain month, but you think, there isn't."** Again, this indicates that some households were worried about being able to keep their homes warm enough when it was cold outside due to the cost of paying for their gas central heating.

The increase in how much households were thinking about the gas they used at home post intervention could be related to an increase in the use of their smart meter acting to make respondents more aware of the energy they were using. The prominence of gas rationing and monitoring in their pre-intervention behaviours suggest an already existing importance was attached to their gas use, and using a (gas) smart meter could have enabled households to try to take more control of the energy they were using at home in order to better afford to pay for their gas (enabling them to give greater thought to the issue). One householder explained how her smart meter had enabled her to manager her gas usage: **"I'm quite good at, you know sort of economising on things. So I try my best to cut back on whatever. I minimise myself to so much a day and you know, if I have to go above that I do but I try not to. Now I just have smart energy, I sort of know how much I'm using. But what I do sort of is switch the radiator – the central heating on, the boiler on – and**

then I put it on a certain level and it heats up quite quickly. So once it's heated up I just switch it off and its warm for quite a couple of hours, you know? And then I switch it on again when it's getting cold. So it seems as if it's you know, it's alright." Whilst the practice of turning off the central heating due to financial worries and a need to economise still implies energy vulnerability, having the smart meter allowed this respondent to give more thought to how she managed and monitored her energy usage, particularly in relation to her spending on central heating.

However, given the extent to which households appeared to be struggling to meet the cost of heating their homes, it is likely that the level of thought given to their gas usage could be related to the fact that households had been worried about their usage (and in cases rationing it) in the first place, and that this situation had not changed as a result of SMART-UP. For example, one respondent indicated that to "**cut the energy bills down a bit, we had the fire on low, just on low. You know, when it was really cold. We just have a gas fire you see and you just manage with that."** Another told us that: **"it was very important because it makes you aware of how much you need to budget, and in the cold days and nights you need to know how much gas you have left and how are you saving energy and money at the same time. I had to cut back on the winter shoes and clothes, didn't do anything. Didn't refresh the wardrobe or get a new wardrobe, now. Just kept on putting more money into the gas."** This can also be seen in the response of another participant: **"when they came out to see me, they did say that the electricity was I think more important…that you know, the energy and that seemed to be more important than the gas in a way. But I find that because I'm using more gas, because I don't really use a lot of electricity, just the lights and the television, I really don't use anything else electric apart from the kettle. So I didn't think I was really using much that way, you know?** Given that such households were already low income, and potentially living in energy inefficient properties with expensive or inefficient heating systems, it is understandable that they would continue to give thought to (and worry about) how much gas they were using, even after SMART-UP. This is especially the case given the focus of SMART-UP on electricity use.

4.2.5 Priorities for reducing the amount of energy used at home

Chart 38: Interested in doing more to reduce the amount of energy used in the home in order to save money (pre-intervention)

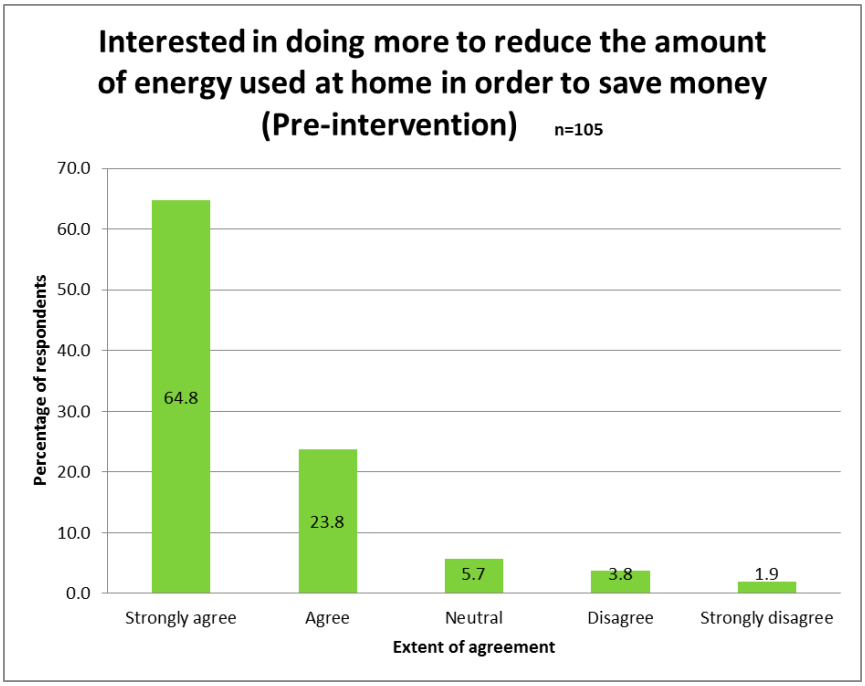
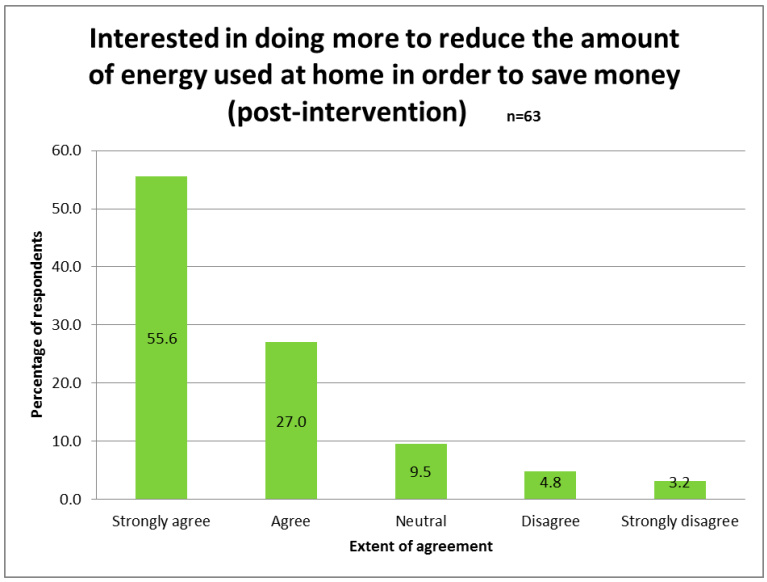


Chart 38 shows that 65% of SMART-UP respondents strongly agreed that they wanted to use less energy in order to save money prior to the intervention, and 24% agreed (89% agreement overall). Around 6% either disagreed or strongly agreed with the statement.

Chart 39: Interested in doing more to reduce the amount of energy used in the home in order to save money (post-intervention)

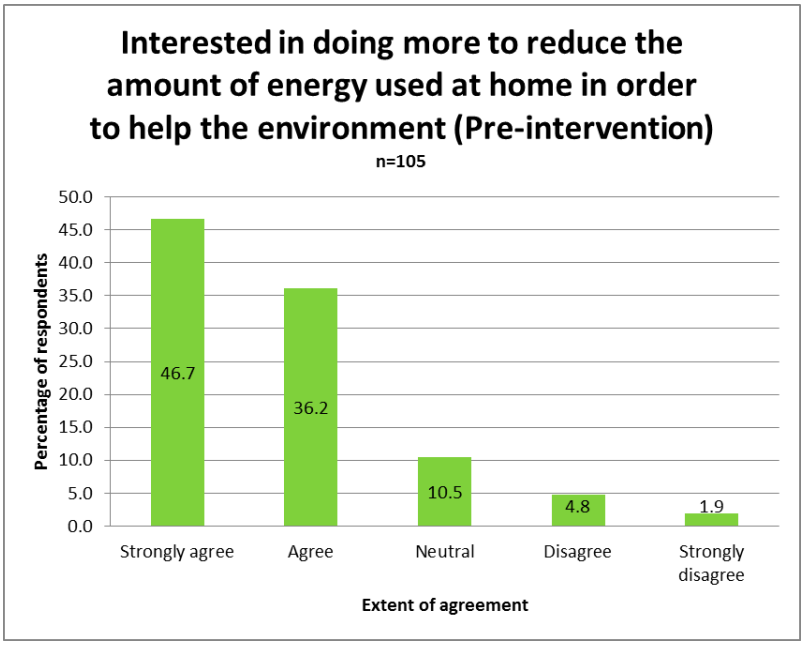


Following the intervention, the number of households looking to save energy in order to save money reduced slightly to 83% in agreement, and 8% in disagreement. The slight change in households' concern with using less energy in order to save money could be related to the fact that project did not look to address other forms of deprivation (such as low income) via complementary actions like benefit entitlement checks or income maximisation advice, or increase the energy efficiency of properties via the provision of large or small energy efficiency measures. Whilst the project could enable people to manage (and potentially reduce) their energy use via their smart meter, this does not necessarily imply a corresponding significant increase in household disposable income through energy savings for people who are already struggling to make ends meet, to the extent that they would worry less about needing to save money. Therefore, given that households were already low income and energy vulnerable, it is not surprising that they would continue to value the ability to save money through managing their energy.

At the same time, the fact that there was a decrease (albeit slight) in the number of respondents looking to do more to reduce the amount of energy used at home in order to save money could relate to the fact that they felt more enabled to act upon the need to save money through energy use management after participating in the project.

What this does also show is that, when looking to engage vulnerable households around energy management through a smart meter, messaging that focuses on potential cost savings could be effective in securing that engagement in ways that are meaningful and important to those households.

Chart 40: Interested in doing more to reduce the amount of energy used at home in order to help the environment (pre-intervention)



Prior to the SMART-UP intervention, around 83% of SMART-UP respondents were interested in saving more energy in order to help the environment, whilst around 7% were not.

Chart 41: Interested in doing more to reduce the amount of energy used at home in order to help the environment (post-intervention)

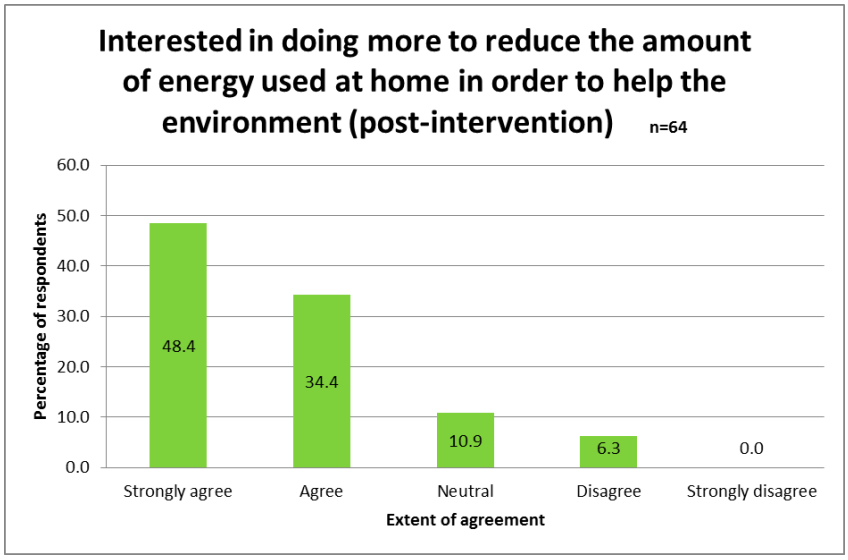


Chart 41 shows that the proportion of households saying that they are interested in reducing energy used at home to help the environment remained relatively constant following the SMART-UP intervention (82% agreed, and 6% disagreed). This implies that households were not only interested in reducing their energy use for the sake of saving money, but also for wider concerns around sustainability. However, this is not a theme that emerged during telephone interviews with participants, for whom managing their energy use in order to avoid high energy bills emerged as an overriding concern. Whilst the contradiction between survey responses and interview data could be due to differences in sample size, it is possible that households were more likely to choose an affirmative answer within the questionnaire either for reasons of social acceptance or because it is something they say they would be interested in when asked directly, but not something they would raise as an issue of importance if not asked directly, or for which they would take direct steps to reduce consumption. [126]

4.2.6 Summary

This section has examined how far households were concerned with being able to keep warm and comfortable at home (and their ability to achieve affordable warmth at home) prior to the SMART-UP interventions taking place, as well as how far they were worrying about their energy bills both pre- and post-intervention. It has also explored the extent to which the project impacted upon the likelihood and nature of energy-saving behaviours being enacted by households, as well as how much thought households were giving to their energy use.

It was possible that some households were living with costly, non-existent or inefficient heating systems and might have been unable to use the levels of energy required to meet their basic needs for comfort and warmth at home prior to the behaviour change intervention taking place. Households were likely to be regularly weighing up decisions to turn the heating on or off, and making complex compromises in their everyday lives with regards how to they managed their heating and energy needs. Indeed, in such cases, advice may not be enough to enable households to

[126] Cabinet Office, DECC and CLG, 2011, Behaviour change and energy use

save energy to the extent that they would be able to take the savings as increased levels of warmth at home. Whilst SMART-UP might have enabled some households to take action to manage their energy use, it did not necessarily resolve the precariousness of their financial situation, or improve the efficiency of their properties/heating systems (only their behaviours). This therefore could act to limit the extent to which their worries about being able to afford to meet the cost of their energy, even for their basic needs, could be alleviated.

Following the SMART-UP intervention, there was an increase in the proportion of respondents who felt that they were taking actions to reduce the amount of energy they were using at home, and in the number of behaviours being carried out. This suggests that the project enabled households to take more action to manage their energy use at home, either through accessing hints and tips around how to do so, or having the benefits of doing so demonstrated to them. The fact that most energy saving behaviours post-intervention centred around turning off appliances, lighting, clothes-washing and water practices indicates that SMART-UP advice was able to resonate with households' everyday practices of electricity use in the home.

However, the post-intervention questionnaire also revealed indications that some respondents were resorting to harmful rationing practices, especially in relation to their central heating. Whilst these practices meant that households were not actually using energy for their central heating, the response was a survival mechanism to coping with energy vulnerability, and one that should not be encouraged as a means for reducing energy consumption.

This tension between energy efficient behaviours and the practice of harmful rationing to reduce consumption was perhaps reflected in the fact that the proportion of participants giving a great deal or fair amount of thought to how much electricity or gas they used at home actually increased following the SMART-UP intervention. Whilst advice delivered the SMART-UP might have enabled some households to give more thought to how they used and managed energy in the home, the limited scope some households may have had to further reduce their energy use in the first place could have meant the intervention was unable to alleviate escalating worries about paying for energy or meeting their energy needs for comfort and warmth at home. In some cases, it may have exacerbated existing worries.

This is supported by the limited change seen in household's concern with using less energy to save money post-intervention. Whilst the project could enable people to manage (and potentially reduce) their energy use via their smart meter, this does not necessarily imply a corresponding significant increase in household disposable income (that could be achieved through receiving income maximisation advice or providing energy efficiency improvements in the form of hard measures or fabric improvements to properties, for example). At the same time, the fact that there was a still decrease in the proportion of households concerned with using less energy to save money following the intervention (albeit a small one) does suggest that the project could have helped some participants to feel more able to manage their energy use and therefore act upon the need to save money more effectively. What this does also show is that, when looking to engage vulnerable households around energy management through a smart meter, messaging that focuses on potential cost savings could be effective in securing that engagement in ways that are meaningful and important to those households.

Throughout this section, we have seen the complex interplay between energy poverty (that sees energy rationing and potentially harmful rationing behaviours being carried out) and energy efficient behaviours (that encourage more positive actions to reduce unnecessary energy expenditure). Rather than looking to encourage vulnerable households to reduce their energy consumption as a whole, it therefore becomes important to encourage positive energy efficient behaviours to reduce consumption whilst at the same time increasing consumption in areas where harmful or negative rationing practices are being enacted. Indeed, research has argued that low-income households should be supported by a combination of energy efficiency measures (provided through grants or other financial aid), behavioural changes in energy use, the alleviation of fuel debt and exploring alternative supply tariff and payment options. The benefits of such interventions should not be measured in the amount of energy saved or reductions in consumption alone, but also in improvements to health and wellbeing, awareness of energy and reduced fuel debt. Importantly, "for people in such a situation the priority is not to save fuel: it is to find the resources to keep warm as inexpensively as possible. Monitoring and evaluation of advice would need to take the importance of increased and affordable comfort into account." [127]

[127] Darby, S. Energy Advice, What is it worth? Panel 3, University of Oxford (Environmental Change Unit)

Section 5: Smart meter behaviours

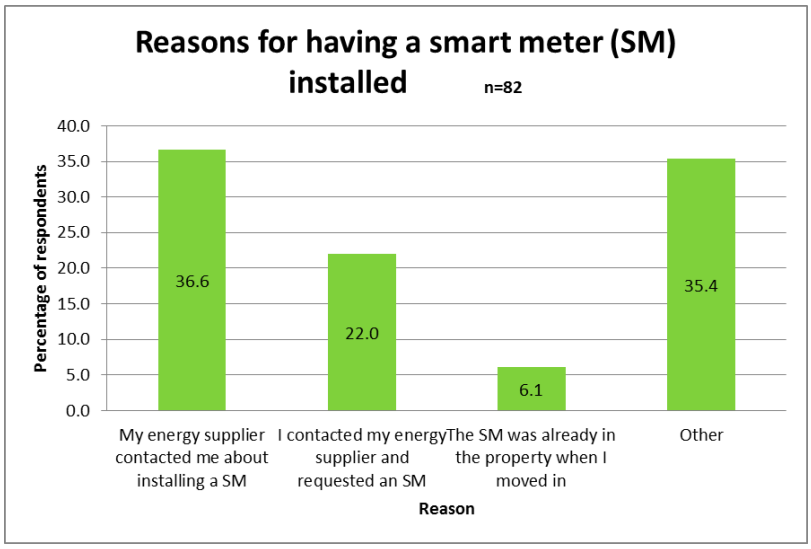
This section looks at the smart meter behaviours of households (both pre- and post-intervention) in order to understand the extent to which they were impacted by SMART-UP advice. It begins by exploring why households decided to get a smart meter in the first place, as well as how useful they found the advice that had been provided by their energy supplier at point of installation.

It then moves on to look at how households were using their smart meters and IHDs/apps, including how often they: checked how much electricity they were using in real time; used the traffic light system to monitor their electricity usage; checked how much an electrical appliance cost to run; checked how much electricity they had used in the past day, week or month; and the frequency with which they set a budget to control how much electricity they want to spend in a day, week or month. The section also explores how far participants: felt they understood how to use their IHD; found the IHD useful to monitor and manage their electricity use; and felt they were getting the most out of their IHD.

As such, it looks at the impact of SMART-UP in terms of the extent to which it enabled vulnerable households to understand and engage with their smart meter and IHD, and how far it increased their ability to manage and control their electricity use within the home. By filtering results according to pilot group, the section also looks to identify which formats of advice delivery were most effective in being able to achieve the desired outcomes for participants.

5.2 Smart meter installation

Chart 42: Reasons for having a Smart Meter installed



Just over a fifth of households (22%) had contacted their energy supplier to request a smart meter, whilst almost two fifths had been contacted by their supplier about installing a smart meter (37%). Meanwhile, 6% said that their smart meter was already in the property when they moved in.

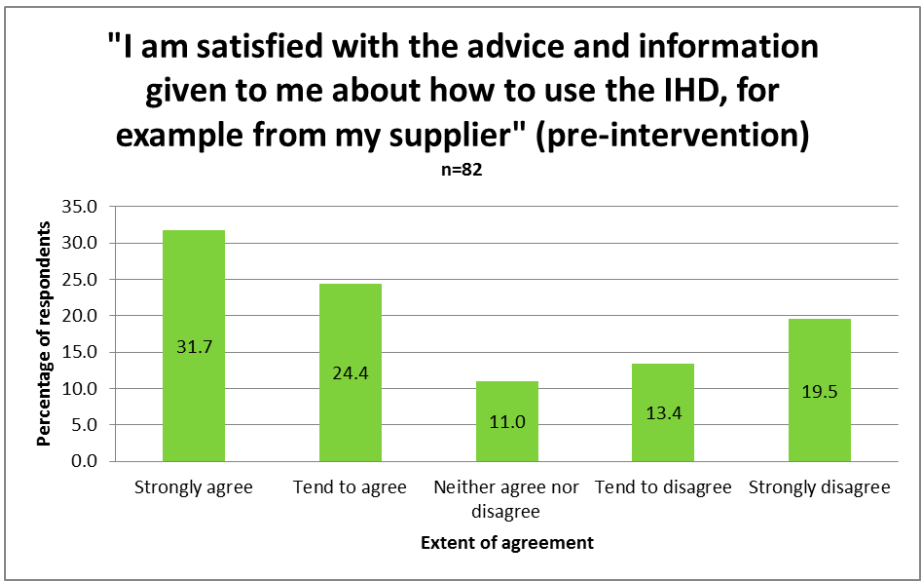
In interviews with households, there was some difference between those who had proactively signed up for a smart meter, and those for whom the decision was more reactive. In terms of those who proactively decided to get one, a major attraction of smart meters was the ease in being able to top up that they offered. For example, we were told: **"It was easy to top up and stuff because I've got two small children, it was easier to get a smart meter so I could top up via my phone, because you have to go out and drag them out with me. You go in the rain and it's just,**

you don't get home properly because you're just jumping in puddles constantly and they are soaked." Similarly, another participant said: **"Mainly it's because the smart meter was to continue to be able to top up whenever you felt because also my energy company was the ones where you could just top up using the app which I felt was quite easy, instead of going down to the local shop and having two split cards. One card is a lot easier than having two split cards.**

In terms of those for whom the decision was more reactive: **"well I just had the information sent through and I agreed to have it. I think the, you know, from my energy supplier, they just rang me and said that you know, this is happening and I was interested so I said yes."** Another explained: **"Well I moved home about 15 months ago and they came. They were going to do whatever they had to do with the gas and the man who came recommended that I go in for the smart meter and go with this gas company."** Similarly: **"What decided me to get one is because my meters have to get changed, that's what it was. Meaning that everyone has to have one at a certain stage, I think."**

Some frontline workers had already been seeing positive attitudes towards getting a smart meter installed amongst the households they worked with on the ground: **"Yeah, because we've got certain blocks that contain maybe between 15 to 20 apartments, because they've got communal cupboards for gas and electric and they don't have access to them. They request meter readings, so they get those meter readings by a third party every quarter. Now obviously if a meter reading is taken sometimes there could be an error. Whoever was taking the reading could be taking the reading fault off the meter reading, to give to the customer. So you could accidentally make a mistake in the meter reading and that could give the customer incorrect meter reading. It was an advantage for me to give them advice that it's better to go onto a smart meter and then give them the benefit side of having a smart meter. I'm actually working on that particular project right now, which is more to do with smart meters. I'm getting a lot of positive feedback and people are being put on to the waiting list, some have already been booked, some have already been changed."**

Chart 43: Extent of household satisfaction with the advice and information given to them about how to use the IHD, for example from their supplier (pre-intervention)



From Chart 43, we can see that just over half (56%) respondents were satisfied with the advice and information given to them about how to use the IHD from their supplier, and a third disagreed.

In our interviews with respondents, they explained why they had been dissatisfied with the advice and information received from their supplier around how to

use their smart meter and IHD. One respondent said: "**he just left it and went."** Another told us: **"They left me a booklet. It just goes back in the drawer. They only fitted the meter and more or less said 'that's it', it's set up'. That's it and left a booklet."** Again, we were told: **"Not particularly. You know, they installed it and I think I had, you know, they gave me some information, written information."** This suggests that some households are being left without the additional support and guidance that they require from their energy suppliers with regards to how to use and get the most out of their smart meter. This is particularly the case for households with needs requiring a more tailored and detailed approach. Another participant explained: **"He just left a leaflet and I just sort of had to read through it myself. And, I'm not a reader. Not really."** Similarly, an elderly participant explained how she felt advice given to her by her installer wouldn't be very helpful **"because I'm 82 next birthday and it baffles me with science, everything. Whether it be telephone or gas meters or whatever. It really does go over my head."** Again, this suggests that for households at risk of digital exclusion may require more in-depth and face-to-face advice than is currently provided, if they are to feel comfortable in using and understanding new technologies within the home.

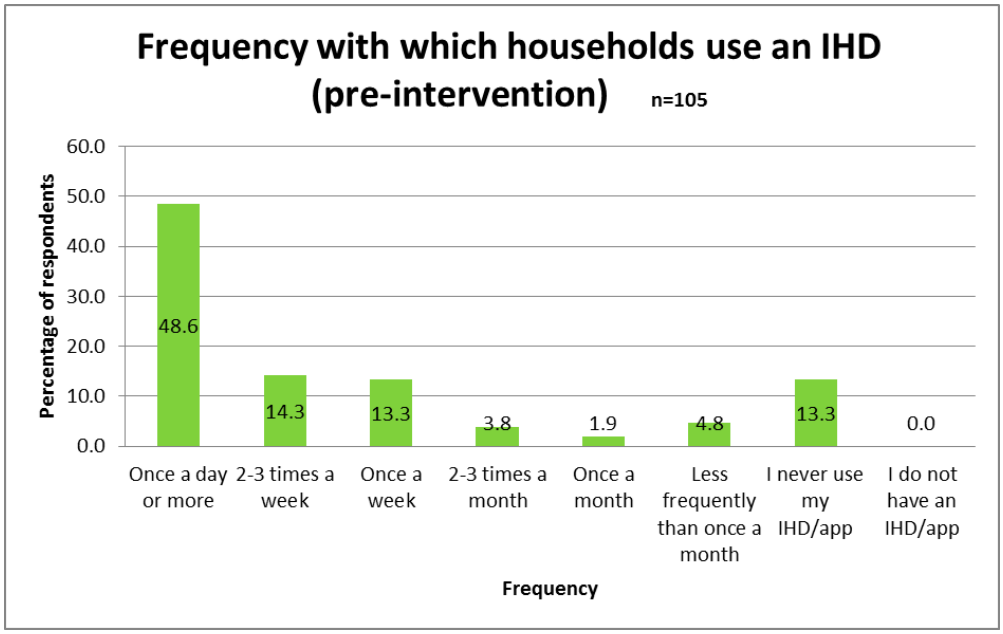
Others were left wanting by the customer service and attitude displayed be installers during the installation of their smart meter. One participant explained: **"It was quite limited really. It was like, the guy that fitted it, it was like he didn't even want to be here. I've never seen someone doing something so quick."** Another told us: **"it's not really helpful at all to be honest with you, because you're like, the person who installed was like 'right, you do this, you do that, you do that. It's all in our booklet'. Right, okay mate, yeah fine."** Such households felt that they might have benefitted from more tailored advice around using their smart meter according to their own particular needs.

Others had actually received incorrect and inappropriate information from their energy supplier: **"they sent us a booklet saying 'this is your in-home display'. Okay, where's my in-home display then? I did ring once about that they said 'you're on pay as you go? You don't have one then'. So why send me a booklet? 'Oh, it's just standard'. They send us all the gumpf but they won't tell us what all the gumpf actually is."**

Some households, however, who felt more confident about using their smart meter said that they had felt satisfied with the information given by their energy supplier: **"Yeah he showed me a brief introduction, how to do it, and you just learn it as you go along after that."**

5.3 Using a smart meter and IHD/app

Chart 44: Frequency with which households use their smart meter (pre-intervention)



Prior to the intervention, 49% of respondents said that they used their IHD once a day or more, and 14% did so two to three times a week. 13% used it once a week, whilst 4% used it 2-3 times a month, and 2% did so once a month. Around 5% used it less frequently that once a month, and 13% said that they never used their IHD. No households said that they did not have an IHD or app. In general, then, it appears that some households were already relatively engaged with their smart meters prior to the SMART-UP intervention.

Some of the frontline advisors we spoke with felt that a large number of households did not necessarily understand how to use their smart meter prior to SMART-UP: **"Do you know what, to be honest with you, most of the ones that I went to didn't know nothing about smart meters, or in-house display unit. There were only two amongst the customers that I visited, that knew how to use the in-house display units and that was because they wanted every penny that would go out and to know exactly what they were spending per day, so they regularly checked that and then obviously it was okay."**

Others felt that some households who were already monitoring and managing their energy use prior to SMART-UP in order to keep track of their household budget and potentially reduce bills were more likely to already be using their smart meter and trying different functions. One aftercare tracker entry noted: **"Had a little look through the materials I gave her but already feels pretty confident with the IHD. Participant said they would have another look through the materials for a refresher"**

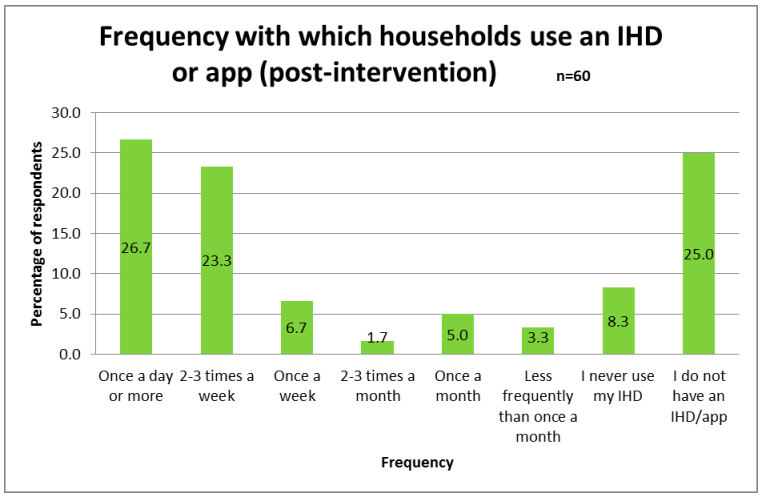


Chart 45: Frequency with which households use an IHD (post-intervention)

In Chart 45 we see a decrease in the percentage of households using their IHD/app once a day or more (27%), and an increase in the percentage of households using it 2-3 times a week (23%). We also see a decrease in the percentage of households saying that they never use their IHD (8%). One possible explanation for the decrease in the number of households using their IHD or app once a day or more and increase in those using it 2-3 times a week, could relate to households using or checking their IHD/app less frequently the longer they have it, and the more accustomed they become to the information it gave them. In other words, once households understand their energy practices, usage and the running costs of appliances and they have taken steps to address anything they feel needs to be addressed, they may no longer feel the need to check their IHD or app as frequently as they did previously. Whilst this is an assumption that cannot be proven from the data, existing studies have found that smart monitors can gradually fall into the background of domestic routines. [128]

For example, one interview respondent described how: **"Whenever I pass by I just press the button and it says so many days, so many days and I think fine. I know what I'm doing then." T**his was also observed in feedback recorded in the aftercare tracker by frontline advisors after their phone conversations with households: **"Participant using their IHD much more often including; checking the light system, tracking usage over time and looking at real-time electricity usage."** Some participants, however, while feeling more enabled to use the IHD, were not necessarily doing so often: **"The participant felt more confident in using the IHD since the intervention but had not got into the habit of using it. It was still turned off most of the time."**

We also see that a quarter of households now told us that they do not have an IHD/app, whereas previously all households participating in the study had at least one of them. This could be a result of having changed suppliers during the lifetime of the project, and potentially losing the 'smart' functionality of their meters. Or, it could be a result of respondents misunderstanding either the question or what was meant by IHD/app, or faults with their smart meter and IHD. Indeed, instances of this kind were recorded multiple times by frontline workers during their phone conversations with households: **" IHD display has been delivered but it had a fault and he is waiting for a new one to be delivered."** Another noted: **"Spoke to tenant she had issues with her smart meter going offline, she called her supplier and they told her to take it nearer to the meter, and it has since reset but it has gone offline again, has been advised by her supplier to switch off the IHD and she has been added to the list to receive a next generation IHD which has a better range"** In another case: **"The participant was still unable to get to grips with her very old smart meter and has been requesting a new one from her new suppliers, White Rose Energy, as she finds it difficult to read her meters due to limited mobility. She will keep the materials and resources for future reference i.e. when she gets a more up-to-date IHD."** Finally, we were told how: **"The IHD was slightly damaged meaning the top-right corner of the screen didn't work, and switching supplier had caused it to lose even more functions. Participant had looked through the guide etc. but didn't find it too useful as they weren't really using their IHD anymore."** This indicates that wider problems with how suppliers are handling the roll out of smart meters within the UK could impact upon the project's ability to help households engage with their smart meter and IHD.

[128] Hargreaves, T., Nye, M. and Burgess, J. 2013, Keeping energy visible? Exploring how householders interact with feedback from smart energy monitors in the longer term

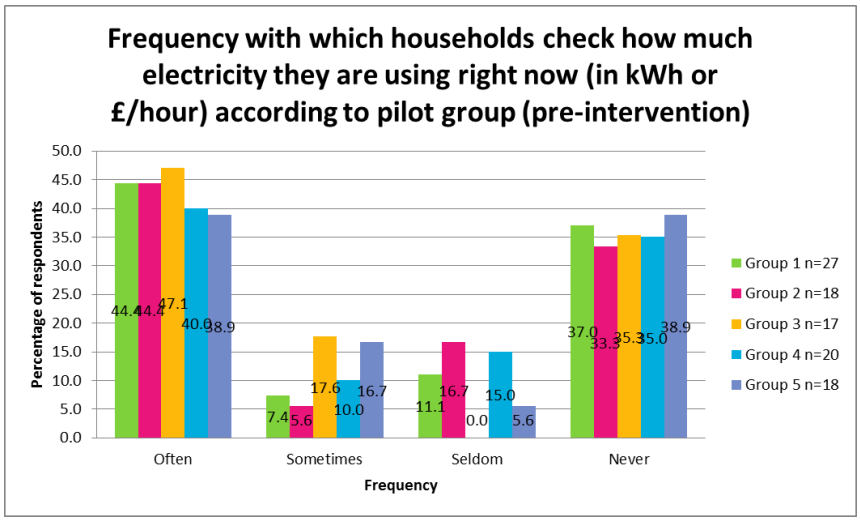
It is important to note that some households were genuinely dissatisfied after their smart meters were installed. For example, one interviewee explained how frustrating she found the time delay in switching from credit to emergency in the pre-payment function: **"especially when you run out of gas and electric and you disconnect it and it takes bloody ages to get back on the meter. If you were without a smart meter, just the normal key card, it did it simultaneously, it comes all back on. But know you've got to wait literally ten minutes before it kicks back in. Ten minutes is not that great to be fair. It is a nuisance especially when you get a text message about four or five times saying that your meter's been disconnected. You need to key in this code and you've put the money in already or already onto your balance but you've still got to wait until that kicks in or you've got to do it manually and it's like back on the phone to OVO and then they say "Oh yeah by the way yeah, it's the meters not reading each other through the wifi you have to input this code and then it's easier." Okay fair enough. Then you get another code come through saying that "Oh…" on text or an email, they'll give you another code. Well about five minutes ago you could have texted me that because I've just been on the phone OVO. That's why I tend to try to keep as much money as I can to top it all up in the meter, without it being disconnected."**

Others had had similar experiences: "**Challenging because the disconnection. If you want electricity and say if you're a single parent and you've got no data on your phone right? Once that goes off, that shuts off everything, so you've got no wifi, you've got no telephone you know? You've got…if you've got no money going out there, how are you going to get it on you see? If you are on a key meter you can go right okay I'll quickly go and put on some money for the month. Put it in, put on the key, put it in, boom. You're back on instantaneously. Everything's all funnelled up but because it's discon…and the word 'disconnect' it disconnects and you've got to sit there for up to five, ten minutes, especially if your electric goes at least it's just your electric gone. But with a smart meter that electric and your gas and if you've got young children, it's freezing cold, you've got to wait ten minutes, that's not good. Not a good sign at all."**

Another participant told us: **"I would say but I'm going to say no because the home display is completely different to my next door neighbour who's actually with the same company as me. Her in-home display is constantly on. It also gives her the kilowatt per hour and the energy consumption and the cost of how much she's using as compared to mine. Mine goes into statement and takes about half an hour to wake up and actually connect to the service of the smart meter to actually show anything. It's dreadful…. Like I said my next door neighbour's with the same company as me. She's also on pre pay meter. I've just got a smart meter but her in-display, it's completely different to my in-home display, and so maybe like I said, they need to invest more on their own in home display and they really should send you out how much energy you use and like say every month kind of thing, so you know how much money you're putting in to your meter you know, overall."**

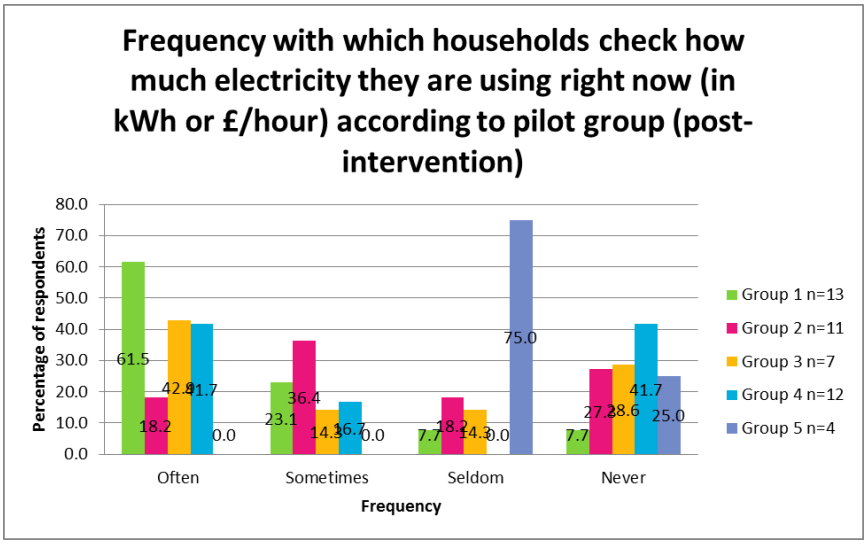
This suggests that more needs to be done by certain energy suppliers to ensure that customers on a pre-payment functionality are not put at increased risk of vulnerability by their processes should they need to run into their emergency credit, and also that the quality of services and products delivered to all customers is consistent.

Chart 46: Frequency with which households check how much electricity they are using right now, according to pilot group (pre-intervention)



Prior to the SMART-UP intervention, 44% of respondents in Groups 1 and 2 were often checking how much electricity they were using at that moment, as were 47% of respondents in group 3, 40% of those in the control group, and 39% in group 5. In contrast, 37% of respondents in group 1, 33% in group 2, 35% in group 3, 35% in group 4, and 39% in group 5 said that they never did so.[129]

Chart 47: Frequency with which households check how much electricity they are using right now, according to pilot group (post intervention)



Following the SMART-UP intervention, the number of respondents who often checked how much

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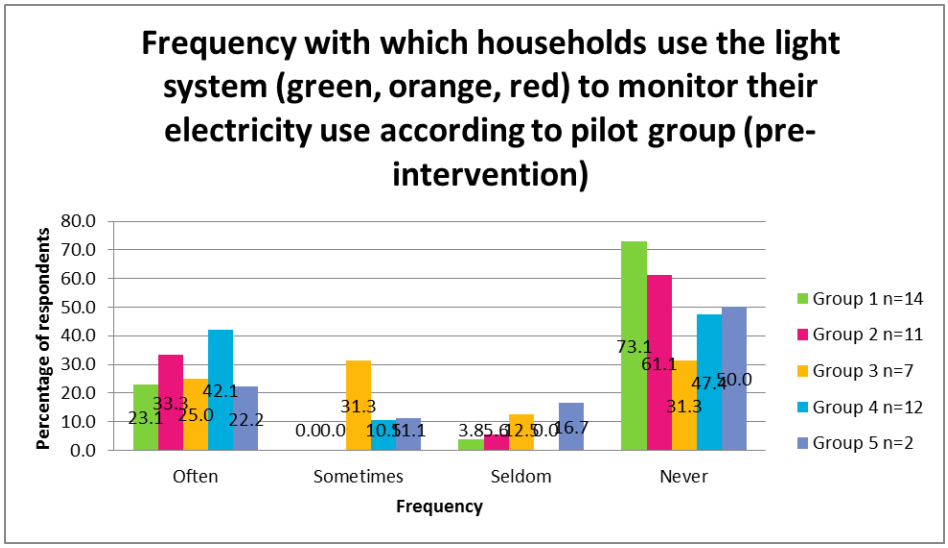
Group	Number of participating households	Intervention
Experimental group 1	27	– SMART-UP information pack – Enhanced advice visit – Aftercare service (follow-up calls)
Experimental group 2	18	- SMART-UP information pack - Enhanced advice visit
Experimental group 3	17	- SMART-UP information pack - Aftercare service (follow-up calls)
Control Group (Experimental group 4)	20	No intervention
Experimental group 5	23	- SMART-UP standard advice visit - SMART-UP information pack

electricity they are using right now increased to 62% in Group 1. Whilst the number of respondents who often checked it fell to 18% in group 2, the number of respondents who were sometimes doing so increased to 36%. The percentages of people in group 3 decreased across all frequencies, apart from an increase in those that seldom checked their current usage (14%). Within the control group, there was a decrease in the percentage of respondents often checking their current usage (42%), an increase in those that sometimes did though (17%), and increase in those that never did so (42%). This would suggest that the most successful combination of advice delivery to encourage households to regularly check how much electricity they are using right now was in Group 1.

An interview participant explained that: **"I think before I had the smart meter, because I couldn't see how much I was spending, I sort of did not know, I didn't manage it as good as what I do now because I can see how much I'm spending. I try to reduce the amount, you know, rather than spending it. I think you see, because I can see how much I'm using, I'm more dedicated to make sure that I don't just keep it on all the time for the sake of doing it. I sort of manage it that way you know. I find that since I've got the smart meter it's helping me to do that because I can see how much I'm spending all the time, you know?"**

Frontline workers also recorded positive examples of this in their phone conversations with participants: **"Found the intervention and resources useful, particularly the functions she wasn't aware of e.g. checking energy use by the hour. It has encouraged her to do smaller actions such as turning devices off standby as she can now see the difference it makes. Participant has managed to decrease their electricity use since the intervention."**

Chart 48: Frequency with which households use the light system to monitor their electricity use according to pilot group (pre-intervention)



Prior to the SMART-UP intervention, we can see that around a quarter of households in groups 1 (23%), 3 (25%) and 5 (22%) were often using the light system to monitor their energy use. Meanwhile, a third of those in group 2 were doing so, as were 42% in the control group. This suggests that some respondents within the control group were already quite engaged with certain functions of their smart meter and IHD prior to their involvement in SMART-UP. In contrast, 73% of respondents in group 1, and 61% of those in group 2 never used the light system to monitor their usage. This was the same for around a third of those in group 3 (31%) and around half of those in groups 4 (47%) and 5 (50%).

Chart 49: Frequency with which households use the light system to monitor their electricity use according to pilot group (post intervention)

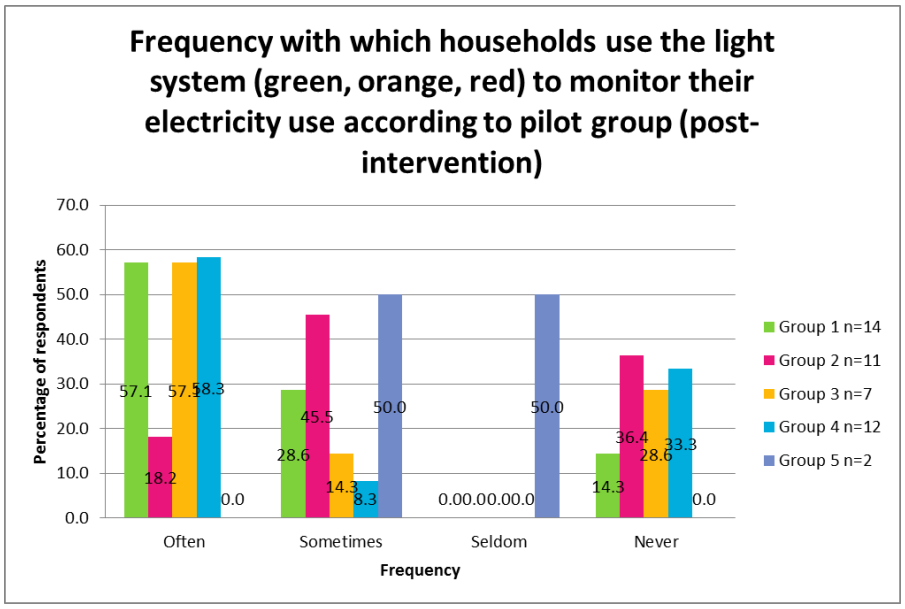
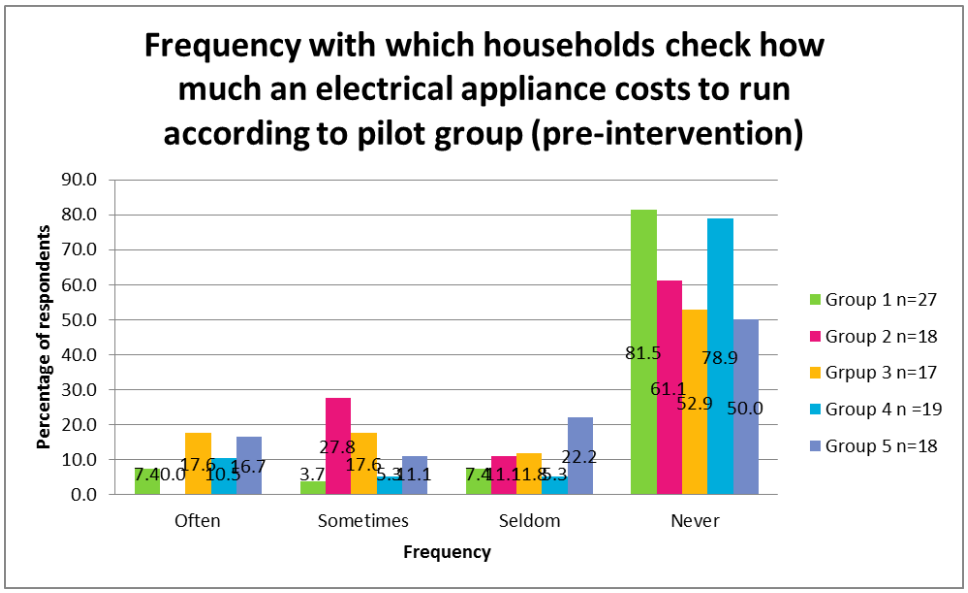


Chart 49 indicates that the percentage of respondents in Group 1 who often used the light system to monitor their electricity use increased to 57%, and the percentage of those who never did so decreased dramatically to 14%. Similarly, the number of respondents in group 2 who sometimes did so increased to 46%, and the percentage of those who never did so decreased to 36%. There was also an increase in those in group 3 who often did so (to 57%), and a decrease in those that said they did not (29%). Whilst this would suggest that advice delivered through SMART-UP (particularly to those in Group 1) was very effective in encouraging and enabling households to use the light system to monitor their energy usage, the fact that the percentage of respondents on the control group often doing so also increased (to 58%) over the course of the project suggests that this may be a smart meter functionality that households might be likely to understand and use independently.

One interview respondent explained that: **"I use it quite a lot. I know if there's a sudden, with the meter if the red light goes on. My husband tells me when the red lights on you can see because I'm partially blind."**

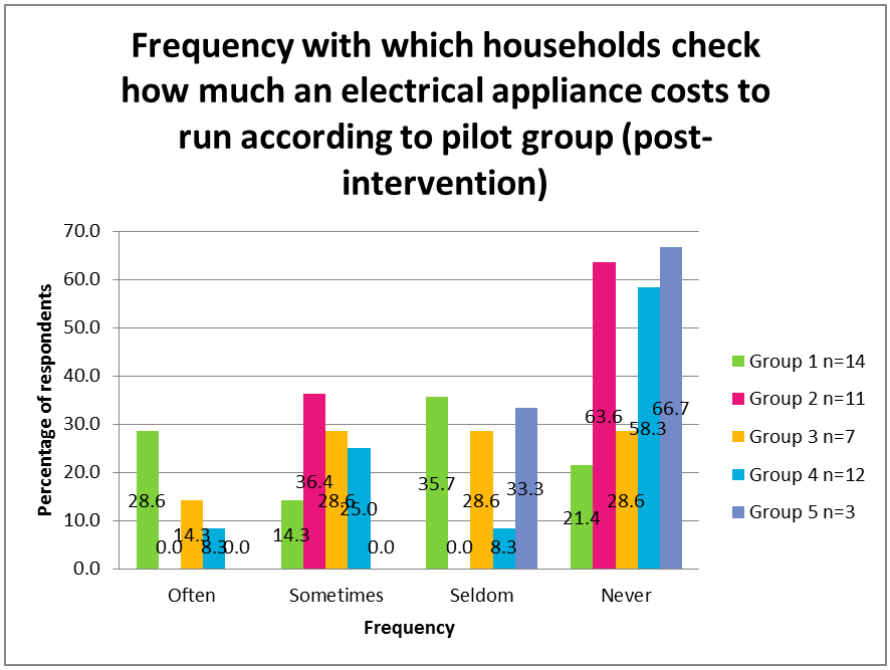
Feedback recorded by frontline advisors on the impact of the intervention also showed that some participants were now more likely to use features such as the traffic light system: **"Informed me that they were more aware of the IHD now. By this they meant that rather than just glancing at it occasionally, they were engaging with it and checking specific functions such as how much electricity they are using at that moment in time and also paying attention to the light system."** Another said: **"the participant found the resources interesting, particularly the information about the light system (Red, orange, green)."**

Chart 50: Frequency with which households check how much an electrical appliance costs to run, according to pilot group (pre-intervention)



Before SMART-UP, only 7% of households in Group 1 were often checking how much an appliance costs to run, and only 4% were sometimes doing so. Over 80% never did so. Whilst 28% of those in group 2 sometimes did so, 61% never did. Over a third of households in group 3 either often or sometimes checked appliance running costs (36%), but over half still never did so (53%). Around 17% of households in group 5 often did so, but 22% seldom did, and half of them never. 79% of control households never used their smart meter to check appliance running costs.

Chart 51: Frequency with which households check how much an electrical appliance costs to run, according to pilot group (post intervention)

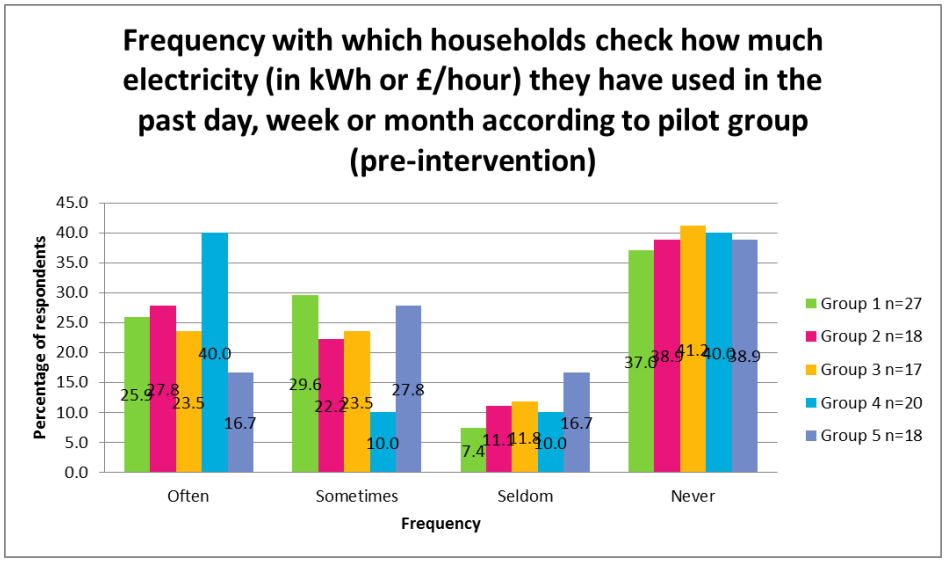


From Chart 51 we can see that the percentage of respondents in group 1 that often checked appliance running costs increased to 29%, and those who never did so dropped to 21%. The percentage of households in group 2 that sometimes did so increased to 36%, and in group 3 it increased to 29%. Similarly, the percentage of those that never did so in group 3 decreased to 29%, although there was a slight increase for those in group 2(64%). This suggests that the advice delivery combinations of group 1 and 3 were the most successful in encouraging households to check the running costs of their appliances. However, the fact that the percentage respondents in the control group who sometimes did so increased (25%), and those that never did

decreased (to 58%) again suggests that, whilst SMART-UP advice was extremely effective in encouraging households to use this functionality of their smart meter, some households still arrived at this usage naturally.

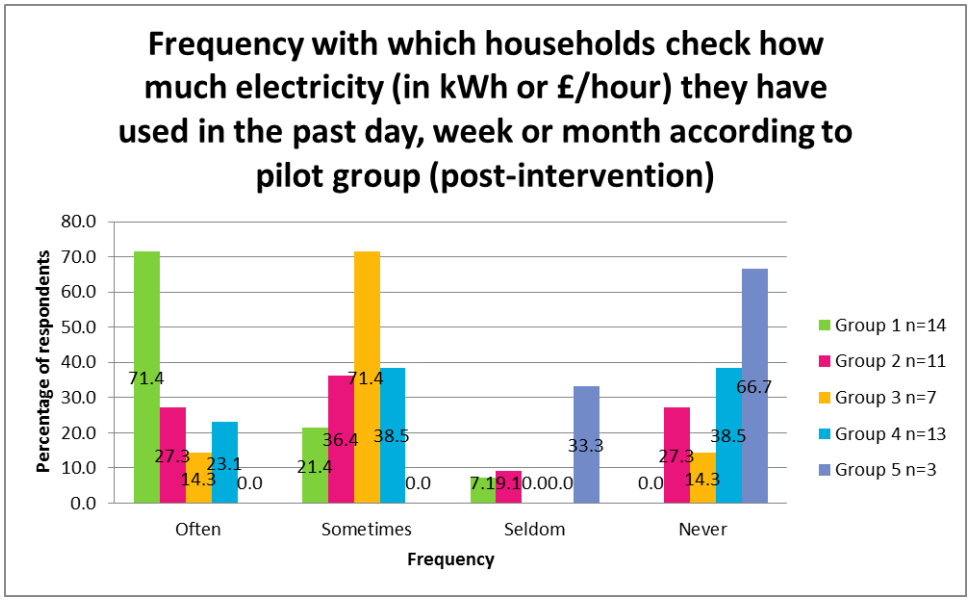
One interview participant told us: **"I think this smart meter helps, you know, to save a bit. [I use it] for just checking when we put the immersion heater on and the, such things like ironing, washing, you know, check how much it's using."** Similarly, feedback recorded by frontline advisors when speaking with participants on the phone revealed that one participant: **"Has recently received a letter from her suppliers where her estimated annual projection is lower than the previous year which she finds encouraging because it means she is being more energy efficient. Participant found the intervention really useful, in particular because she can now check the running costs of electrical appliances - this has made her much more aware of some devices such as the dryer. The participant feels like they are doing well in terms of lowering her energy usage and hopes to see some savings eventually."**

Chart 52: Frequency with which households check how much electricity they have used in the past day, week or month according to pilot group (pre-intervention)



Prior to SMART-UP, 51% of respondents in group 1 either often or sometimes checked how much electricity they had used in the past day, week or month, whilst 37% never did so. For those in group 2, 40% often or sometimes did so, and 40% never. In group 3, 48% sometimes or often did, 41% never. In the control group, half did so often or sometimes, and 40% never did.

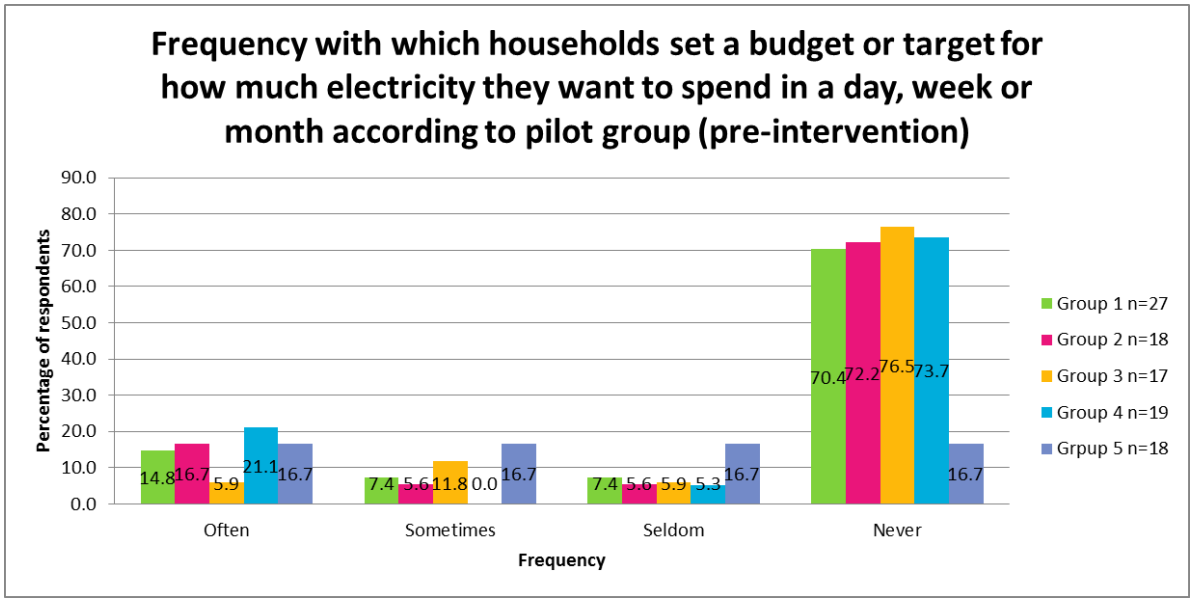
Chart 53: Frequency with which households check how much electricity they have used in the past day, week or month according to pilot group (post-intervention)



From Chart 53 we can see that, after SMART-UP, the percentage of households in group 1 that either often or sometimes checked how much electricity they used in the past day, week or month increased to 92%, and no respondents said that they never did so. In group 2, 63% did so often or sometimes, and 27% never did so. Meanwhile, the percentage of those in group 3 that often did so increased to 85%, and those that never did decreased to 14%. In contrast, those in group 4 that often checked their electricity usage in the past day, week or month decreased to 23%. This would suggest that SMART-UP advice delivery, especially in groups 1 and 3, was extremely effective in encouraging households to check how much electricity they had used in the previous day, week or month.

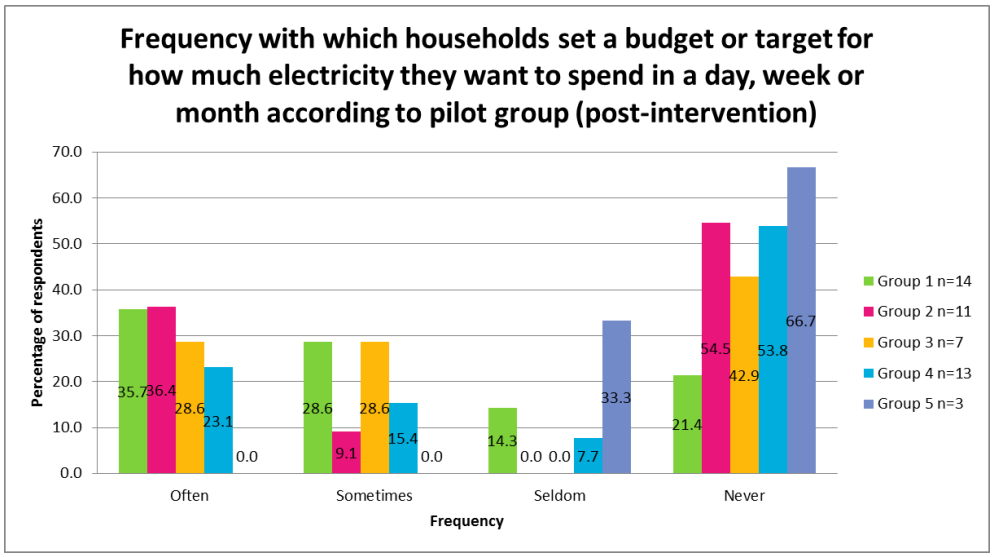
One interview participant told us that, since the advice visit: **"I use it every day. In fact, I use it more than every day. I keep going up to it, looking at the date and then pressing it to see what the gas is and what electric is and of course, I take a check. I love to see it and see what the gas is like and then the first thing in the morning, first thing I do before I put the kettle on for breakfast is find out how much is the standard chart, what it says there and then and then the total for the day before, you know what I mean? I mean it's like everything else, if you keep doing it, you find yourself into a habit don't you. It becomes part of the routine day."**

Chart 54: Frequency with which households set a budget or target for how much electricity they want to spend in a day, week or month according to pilot group (pre-intervention)



Before SMART-UP, only 15% of households in group 1 often set a budget or target for how much electricity they want to spend in a day, week or month, and 7% sometimes did so. However, 70% said that they never did so. In group 2, 17% often did so, and 6% only sometimes. Overall, 72% never did so. In group 3, 6% were doing so often, 12% sometimes, and 77% never. Within the control group 4, over a fifth of respondents were already setting a budget often, and 73% never did so.

Chart 55: Frequency with which households set a budget or target for how much electricity they want to spend in a day, week or month according to pilot group (post-intervention)



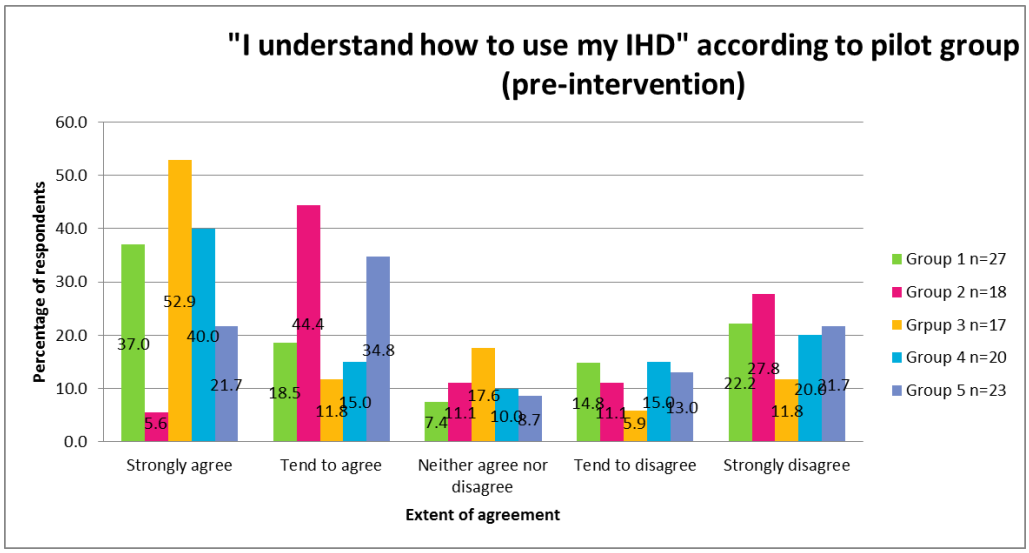
Following SMART-UP, we can see that the percentage of respondents in group 1 that often set a budget or target for how much electricity they want to spend increased to 36%, and the percentage of those that sometimes did so increased to 29%. Meanwhile, the percentage of those that never did so decreased to 21%. Similarly, the percentage of those in group 2 who often set a budget or target often or sometimes increased to 36% and 9% respectively. For group 3 to 29% and 28%, respectively. In both groups 2 and 3, the percentage of those that never did so decreased to 55% (group 2) and 43% (group 3). The percentage of those in the control group that often did so increased marginally to 23%, though those who sometimes did so increased to 15%. Those that never did so decreased to 54%. This indicated that, whilst some households may naturally have acquired the habit either

independently or through other information sources (like in the control group), by far the most effective means of enabling or encouraging households to engage in such behaviour seems to be the advice package delivered in group 1, and secondly in group 3. Whilst the methods used in group 2 did also encourage this behaviour, the methods do not appear to have been as successful as the more in-depth, face-to-face advice.

One interview respondent told us: **"I checked how much it was costing me every fortnight and then you work out a routine and what you can put in. It was just more budgeting."**

Feedback recorded by frontline workers following phone calls with households also revealed the potential for knowledge they had gained through SMART-UP to be passed on to friends and family: **"Participant said they're fully confident with using the IHD - primarily they had just been checking their energy usage but have started setting a target/budget too. They have now demonstrated how to use them to a couple of different friends. One thing she has realised, with the help of the IHD, is that it is cheaper for her to leave her thermostat on a minimum of 15°C and keep a base level of warmth rather than turning the heating on and off again often."**

Chart 56: Households that felt they understood how to use their IHD, according to pilot group (pre-intervention)



Prior to the intervention, 56% of respondents in group 1 agreed to some extent that they understood how to use their IHD, and 37% disagreed. In group 2, 50% agreed to some extent, and 38% disagreed. In group 3, 65% agreed, and 18% disagreed. In the control group, 55% agreed that they understood how to use their IHD, and 36% disagreed.

Chart 57: Households that felt they understood how to use their IHD, according to pilot group (post-intervention)

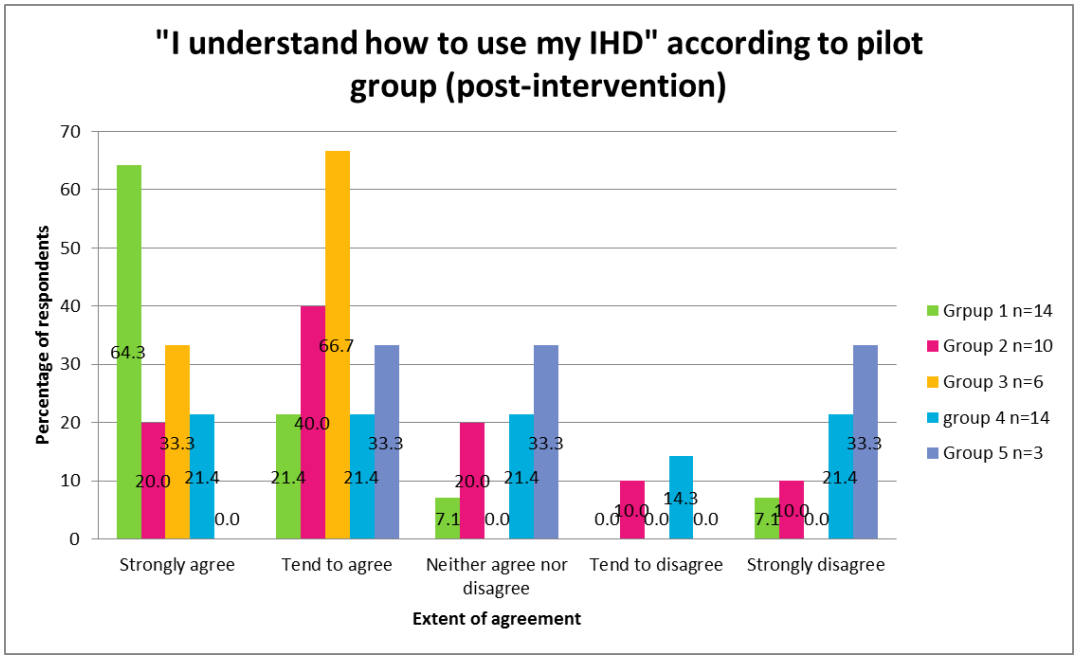
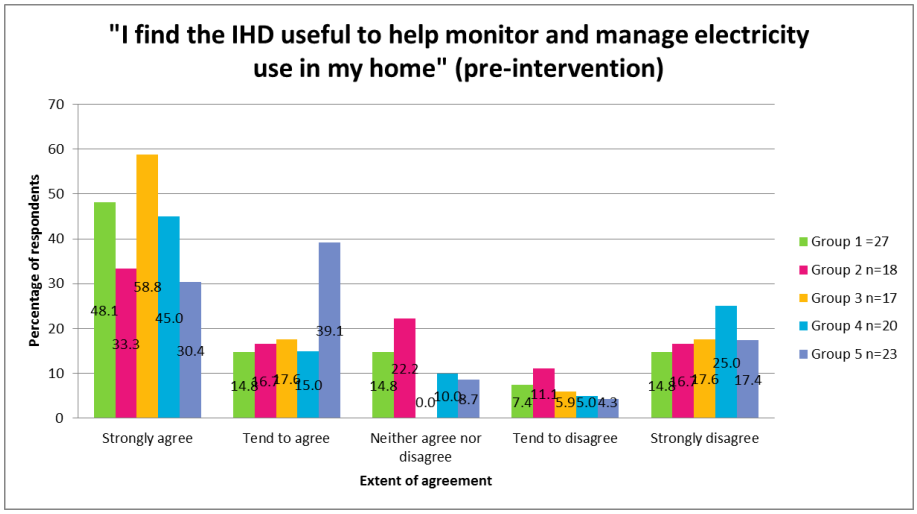


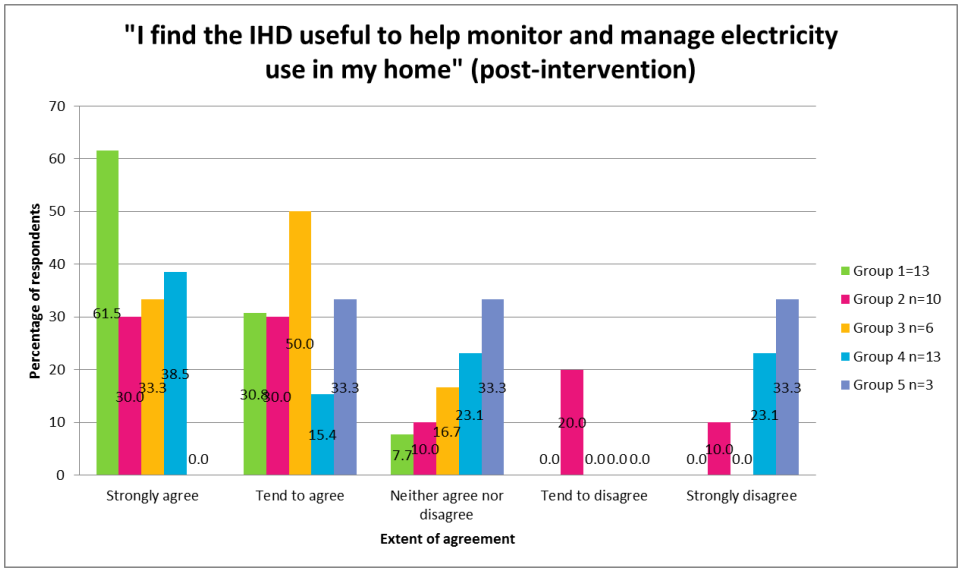
Chart 57 shows that, following their SMART-UP intervention, 85% of respondents in group 1 now agreed that they understood how to use their IHD, and only 7% disagreed. In group 2, 60% now agreed, and only 10% disagreed. In group 3, those in agreement increased to 90%, and no respondents disagreed. Around two fifths of those in control group 4 agreed, and a fifth disagreed. Again, this suggests that SMART-UP interventions were effective in helping households to understand how to use their IHD, with the most effective advice combinations being those delivered to groups 1 and 3.

Chart 58: Households that said they found the IHD useful to monitor and manage electricity use in the home (pre-intervention)



Prior to the SMART-UP intervention, 63% of respondents in group 1 agreed that they found their IHD useful to monitor and manage electricity use in their home. In groups 2 and 3, 50% and 77% did so respectively, as did 60% in group 4. Meanwhile, 22% of respondents in group 1 disagreed, as did 28% in group 2, 24% in group 3, and 30% in group 4.

Chart 59: Households that said they found the IHD useful to monitor and manage electricity use in the home (post-intervention)



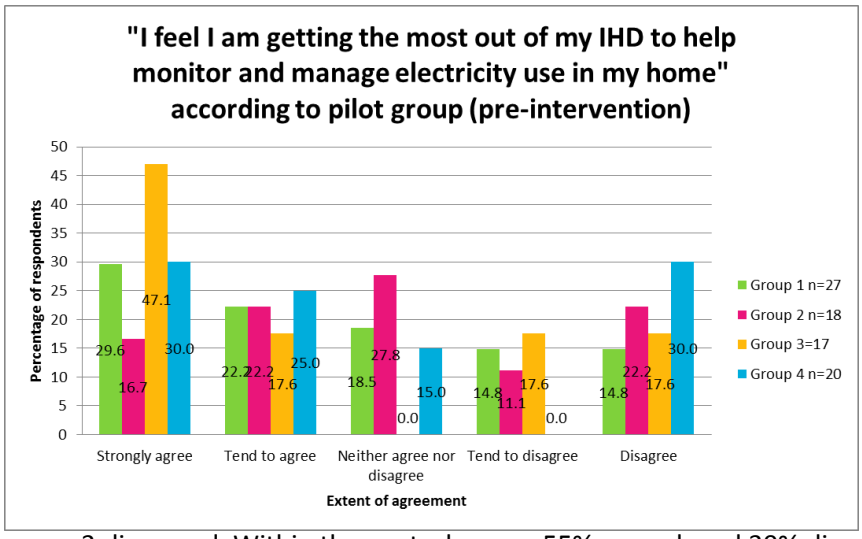
Following the SMART-UP intervention, 93% of respondents in group 1 now found the IHD useful to help monitor and manage electricity use in their home, as did 60% in group 2 and 83% in group 3. 55% of households in control 4 agreed. In addition, there were now no respondents in groups 1 and 3 that disagreed. In group 2, 30% of respondents disagreed, as did 23% in control group 4. This indicates once again that, whilst some households were already finding their IHD useful to help and monitor and manage electricity use in the home prior to SMART-UP, the project was successful in enabling more households to use their IHD to monitor and manage their electricity use. The most effective methods of advice delivery where those used in groups 1 and 3.

One interviewee told us: **"Years ago, I'm speaking like years back when I didn't know or have a smart meter, I always used to run out of electricity and the gas and just wake up in the morning and nothing comes on, like or the money is gone, it's finished. But since the smart meter came into our lives, it makes it so much easier. Now I can check what I'm…how many kilowatts I'm using. I can check how many days is left. I don't need to wait till the money is completely running out then to just wake up in the morning cold. That's not a nice feeling. But with the smart meter, I can't even remember the last time I ran out of electricity or gas since I've been using it."**

Another said: **It's a massive, massive, massive saving that I've made with the smart meter, because the smart meter gives me an accurate reading of what I'm using. And, when I'm trying to save, to cut back on energy, at least the smart meter is there. It's there to remind me and is there to tell me what I'm doing right or wrong. So yeah, definitely a massive difference."**

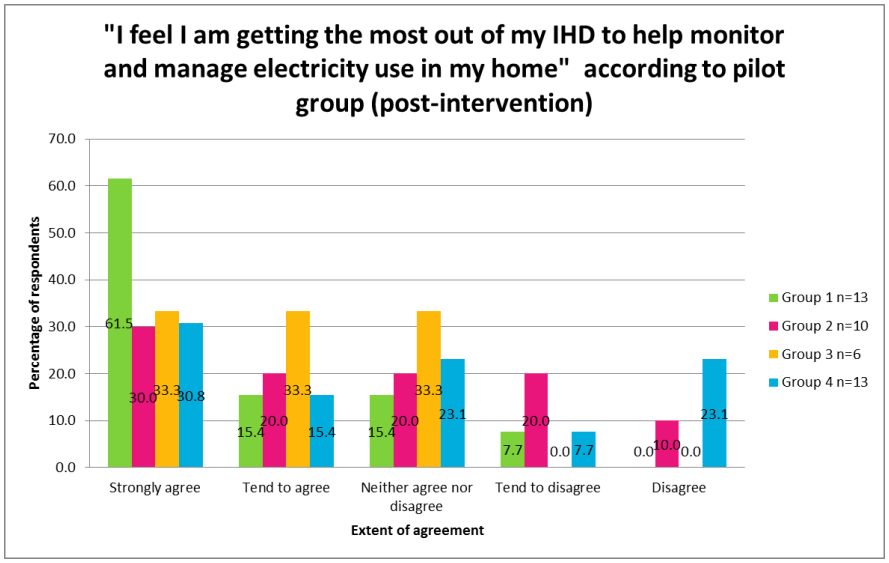
In terms of those that still did not find their IHD and smart meter useful, we were told by one interviewee: **"I don't even use it because I'm the type of person who already knows how to look after my electric and has in a different way, do you know what I mean. I don't put the heating on 'til about five o'clock, and then I switch it off at nine at night and my water we don't really use it much because there's only two of us in the house. That's why I've got a water meter. But last year I saved about six hundred pounds on my electric, and plus now I'm getting that warm heat [Warm Home Discount] under £140. That gives me a couple of months free so then I can top up my heating for winter, 'cause that costs more, and that then gets me through Christmas."**

Chart 60: Extent to which households feel they are getting the most out of their IHD to monitor and manage electricity use in their home (pre-intervention)



Prior to SMART-UP, 52% of participants in group 1, 39% in group 2 and 65% in group 3 agreed that they were getting the most out of their IHD to help monitor and manage electricity use in the home. Meanwhile, 30% of respondents in group 1, 33 in group 2, and 36% in group 3 disagreed. Within the control group, 55% agreed, and 30% disagreed.

Chart 61: Extent to which households feel they are getting the most out of their IHD to monitor and manage electricity use in their home (post intervention)



Following the SMART-UP intervention, 77% of households in Group 1 felt that they were getting the most out of their IHD to help monitor and manage electricity use in the home, as did 50% of respondents in group 2, and 66% in group 3. There were no households in groups 1 or 2 that disagreed, with 30% of households in group 2 disagreeing. In the control group, 46% of respondents agreed with the statement, an 31% disagreed. Once again, this suggests that the most effective means of enabling households to feel that they were getting the most out of their IHD was through the methods used in groups 1 and 3.

Feedback from frontline advisors around the impact of the project on households demonstrated just how much households could get out of their smart meter: **"Participant feels that they really benefit from the smart meter with perks such as topping up online and being able to easily view the available credit. Never has to worry about running out of gas or electric because the 'friendly credit' system with her supplier is very generous and has improved further recently in terms of the amount given and the duration of the credit. The participant recently looked on their history to see how much gas and electric they are using when nobody is home or everyone is asleep and was surprised by how high the amount with, so the household is currently investigating potential ways**

of reducing this e.g. not leaving the TV on standby."

5.4 Summary

This section has assessed the extent to which the smart meter behaviours of participant households were affected by SMART-UP. As such, it has explored the impact of SMART-UP in terms of its ability to enable vulnerable households to understand and engage with their smart meter and IHD. It has also identified which advice delivery formats were most effective in enabling such engagement to take place.

Around a fifth of SMART-UP households had proactively requested a smart meter from their suppliers, whilst almost two fifths (37%) had reacted to an approach from their energy supplier. A major attraction for some households on PPMs was the increased ease in being able to top-up without needing to leave the house that was offered by smart meters. Household experiences of supplier advice at point of installation showed that a third were dissatisfied with the information given to them. This suggests that some households are being left without the additional support and guidance that they require from their energy suppliers with regards to how to use and get the most out of their smart meter. This is particularly the case for households with needs requiring a more tailored and detailed approach.

An interesting finding is the fact that households were less likely to use their IHD/app once a day or more *after* their SMART-UP intervention than they were before. This could relate to the fact that once households understand their energy practices, usage and the running costs of appliances (and they have taken steps to address anything they feel needs to be addressed), they may no longer feel the need to check their IHD or app as frequently as they did previously. However, there was also an increase in the number of households who said that they do not have an IHD or app post-intervention. This could be a result of having changed suppliers during the lifetime of the project, and potentially losing the 'smart' functionality of their meters. Or, it could be a result of respondents misunderstanding either the question or what was meant by IHD/app, or faults with their smart meter and IHD. It is however important to note that some households were genuinely dissatisfied after their smart meters were installed, especially with regards to the time delays in switching from credit to emergency in the pre-payment function. Others were dissatisfied with the performance and functionality of their IHD in comparison to those of their neighbours – in some cases when those neighbours were with the same supplier. This suggests that more needs to be done by certain energy suppliers to ensure that customers on a pre-payment functionality are not put at increased risk of vulnerability by their processes should they need to run into their emergency credit, and also that the quality of services and products delivered to all customers is consistent.

Following the SMART-UP intervention, respondents (particularly in Groups 1 and 3)[130] were more likely to:

130

Group	Number of participating households	Intervention

- Check how much electricity they are using right now more often
- Use the traffic light system to monitor their electricity use
- Check how much an appliance costs to run
- Check how much electricity they had used in the previous day, week or month
- Set a budget or target for how much electricity they want to spend in a day, week or month
- Feel that they understood how to use their IHD
- Find the IHD useful to help monitor and manage electricity use in their home
- Feel that they were getting the most out of their IHD to help monitor and manage electricity use in the home

However, there were also increases for certain behaviours amongst the control group, where participants were more likely to:

- Use the traffic light system to monitor their electricity use
- Check how much an appliance costs to run
- Set a budget or target for how much electricity they want to spend in a day, week or month
- Find the IHD useful to help monitor and manage electricity use in their home

This indicates that, whilst SMART-UP advice was extremely effective in encouraging vulnerable households to use such functionalities of their smart meter, some households still acquired the habit either independently or through other information sources. Nevertheless, the most effective means of enabling or encouraging households to engage in such behaviour seems to be the advice package delivered in group 1, and secondly in group 3. Whilst the methods used in group 2 did also encourage this behaviour, the methods do not appear to have been as successful as the more in-depth, face-to-face advice (though it is important to note that findings are likely to be affected here by the small overall sample size).

In terms of impact upon smart metering behaviours, this section has shown that the most effective formats of advice delivery include the provision of a SMART-UP information pack alongside enhanced and tailored advice that can either be delivered face to face or over the phone with participants.

Experimental group 1	27	– SMART-UP information pack – Enhanced advice visit – Aftercare service (follow-up calls)
Experimental group 2	18	- SMART-UP information pack - Enhanced advice visit
Experimental group 3	17	- SMART-UP information pack - Aftercare service (follow-up calls)
Control Group (Experimental group 4)	20	No intervention
Experimental group 5	23	- SMART-UP standard advice visit - SMART-UP information pack

Section 6: SMART-UP Intervention

The following section looks at the impact of the different types of SMART-UP advice delivery upon the understanding and behaviours of participants in relation to their smart meter and IHD. In particular, it looks at the impact of enhanced and standard advice, the SMART-UP information pack and energy diary, and the aftercare telephone service in relation to:

- Whether they improved participant understandings of their smart meter and IHD
- Whether they use their smart meter and IHD more often
- Whether they have taken actions to become more energy efficient

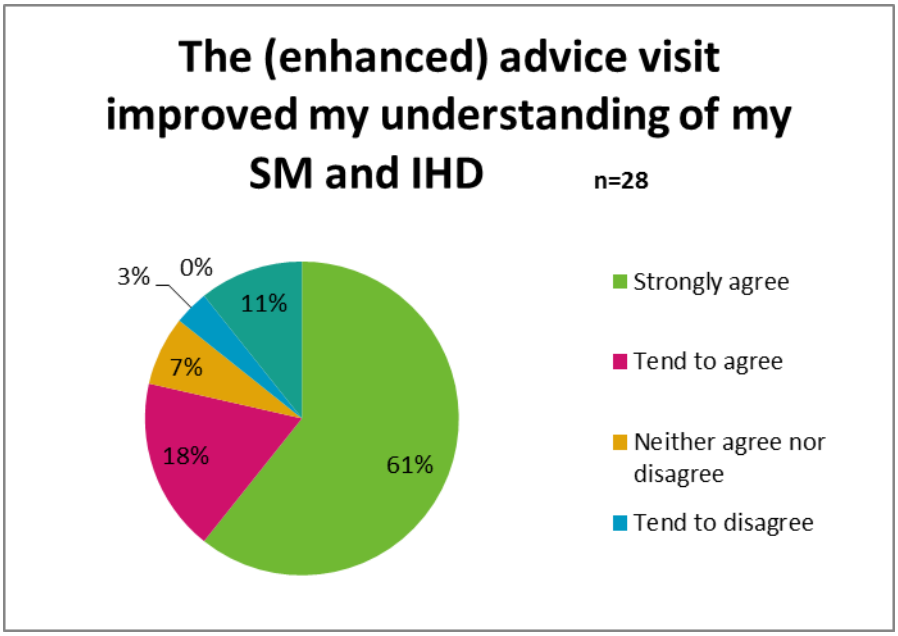
It also explores the extent to which different advice formats were able to meet the needs of participants. It does by looking at:

- How participants rated advisors' knowledge of the subject, the quality of their communication and the extent to which the advice visits met their needs
- Overall participant satisfaction with their advice visit
- How useful participants found the SMART-UP and take control of your energy use pamphlet
- How likely households were to use the SMART-UP energy diary and why
- How useful participants found the telephone aftercare service

Ultimately, it looks at the advice formats that were found to be most helpful by participants, and why.

6.2 Impact of enhanced and standard advice

Chart 60: Extent to which the enhanced advice visit improved participant understandings of their smart meter and IHD (pilot groups 1 and 2)



From Chart 60, we can see that the majority of households that received an enhanced advice visit agreed that it had improved their understanding of their smart meter and IHD (79%). 11% of households said that they did not remember the advice visit, and 7% were neutral. Only 3% tended to disagree.

One interviewee explained that **"Well we had a struggle at first trying to work it all out, and he showed me how to do it. It's been a lot better. It's positive."** Another explained that the project **"gave me information that I didn't know easily."** This suggests that advice provided was able to help households understand how their smart meter and IHD worked, and the kind of information that they could access through it. For example, another respondent went on to tell us that: **"After the visit, the smart meter made sense. At least I could know how many days are left in my readings, what I'm paying, is it worth what I'm using and all that. Day by day you can read it every day. You can know how much spend even if you are away on holiday. With the conventional meter all this information wouldn't come up. You wouldn't know. You would just not know, but with the smart meter you can see the date, how much you spent every day, it's fantastic.**

Importantly, participants felt that they had learnt something as a result of participating in the project: **"I've learnt a lot. I mean, even regarding the, what do they call it? The…just a minute…the kilowatt hour, do you know what I mean? I didn't know much about that at all but I know quite a lot more now….That were good. I've learnt something."**

Similar themes emerged during interviews with frontline workers: **"I don't wish to over generalise but it was the case of what I found perhaps and the older tenants that we had, had previously been quite nervous about touching the in-home display and not really understanding how it worked and being shown how to carry out different operations on it and the information that they could access on it gave them a big more confidence. I don't think they would have done that if they'd just been left with the booklet."** This suggests that the project provided some households who previously lacked the confidence and knowledge to be able to use their smart meter and IHD with the skills they needed.

Chart 61: Extent to which the standard advice visit improved understanding of smart meter and IHD (group 5)

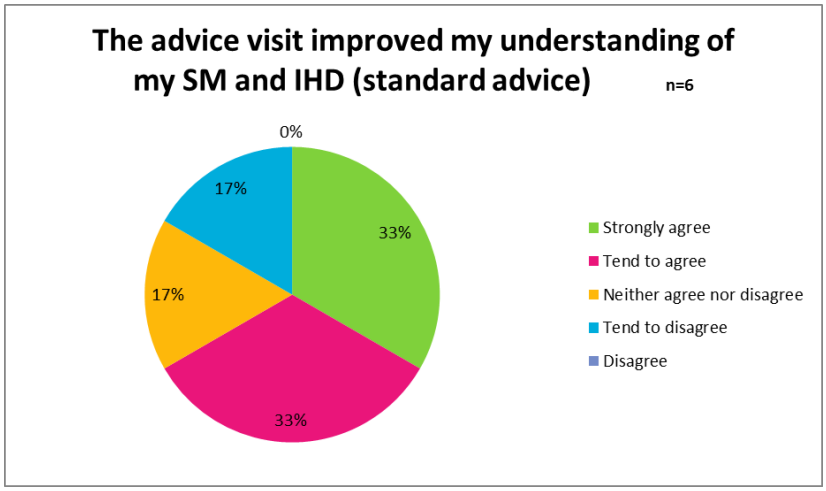
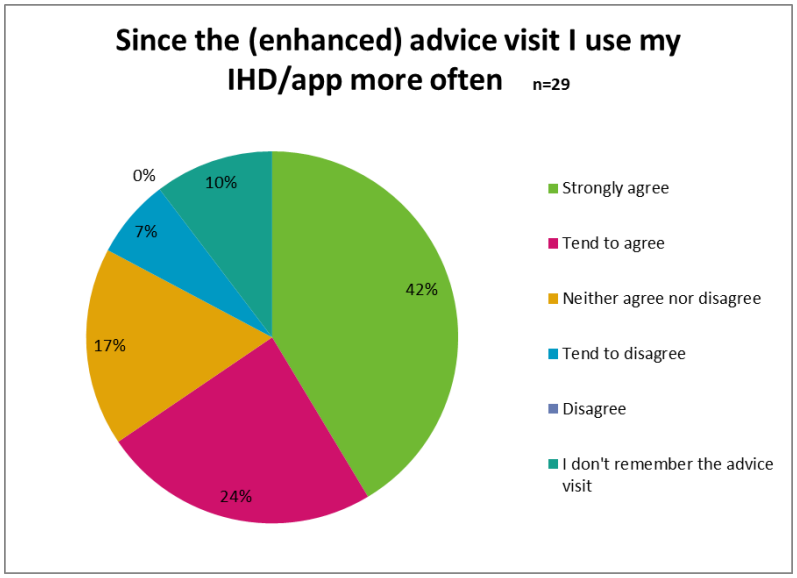


Chart 61 showed that 66% of respondents in group 5 agreed that their standard advice visit had improved their understanding of the smart meter and IHD, and 17% neither agreed nor disagreed. 17% tended to disagree, indicating that respondents did not find the advice visit as useful as those in groups 1 and 3. A note of caution here however needs to be made with regards to the extremely small sample size – especially in relation to group 5 - which prevents the identification of statistical significance within the results.

Chart 62: Extent to which households used their IHD/app more often following their enhanced advice visit



From Chart 62, we can see that 66% of participants agreed that they used their IHD/app more often since the enhanced advice visit, and 17% neither agreed nor disagreed. 10% of households again claimed that they did not remember the advice visit. 7% disagreed. This also suggests that those households who had received an enhanced advice visit might have been more likely to use their IHD more often, potentially contradicting the earlier identified trend of IHD usage being reduced after an intervention has taken place.

One interview respondent told us: **"I never really checked the display thing, I've never used it. Then like now I'm proper on the ball with it, I know exactly what it is now and how much I'm spending."** Similarly, a respondent who had never used their app before explained that they now used it for **"topping up, checking my usage and checking how much I've got left for when I need to top up again."** They found it especially beneficial to use because **"it's easier to enlarge the writing."** Another interviewee explained: **I know exactly what I'm using so I know how to keep on top of things."** We were also told: **"I use it more. Because I feel less left out really. At least I know what I'm using and I might be…am I being careful or not, you know. So I use it that way really.** These quotes demonstrate how advice received through the project meant that some households used their IHD more often and for reasons that they previously hadn't. For some, the information had become more accessible, and they felt more in control of their energy usage.

The potential of the advice visit to improve a participant's ability to use their IHD, and the frequency with which they did so, was reflected in feedback recorded by frontline workers. In one particular example, the beneficial way in which multiple advice formats could reinforce one another in order to meet the particular requirements of a participant was evident: **"Participant found the enhanced advice very useful and was now very conscious of managing their electricity use - they had already noticed their money going further when they topped up. Specifically, the participant had found it useful to check how much electricity particular appliances used e.g. the kettle. The guide book for the IHD that we left was useful as a reference point for the participant because they often struggle to remember things."**

Chart 63: Extent to which respondents used their IHD/app more often following their standard advice visit (group 5)

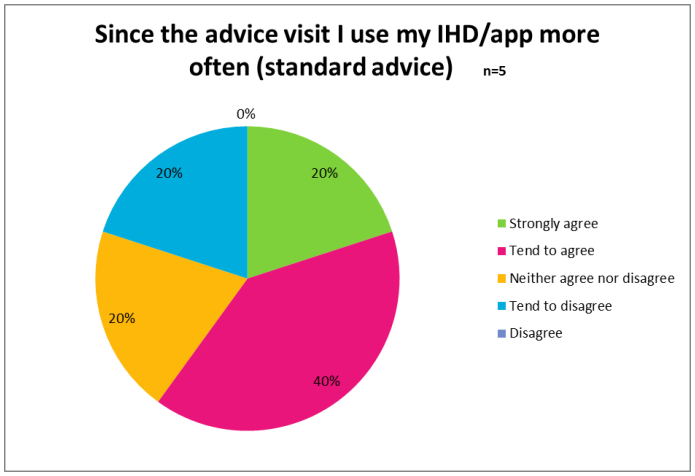


Chart 63 shows that 60% of respondents in group 5 felt that they used their IHD/app more often following their standard advice visit. A fifth neither

agreed nor disagreed, and a fifth tended to disagree. Whilst this would indicate that the enhanced advice delivered to groups 1 and 2 was more effective in encouraging households to use their IHD/app more often, the small sample size prevents valid comparison between the intervention types.

Chart 64: Extent to which households had taken more action to become more energy efficient since the enhanced advice visit

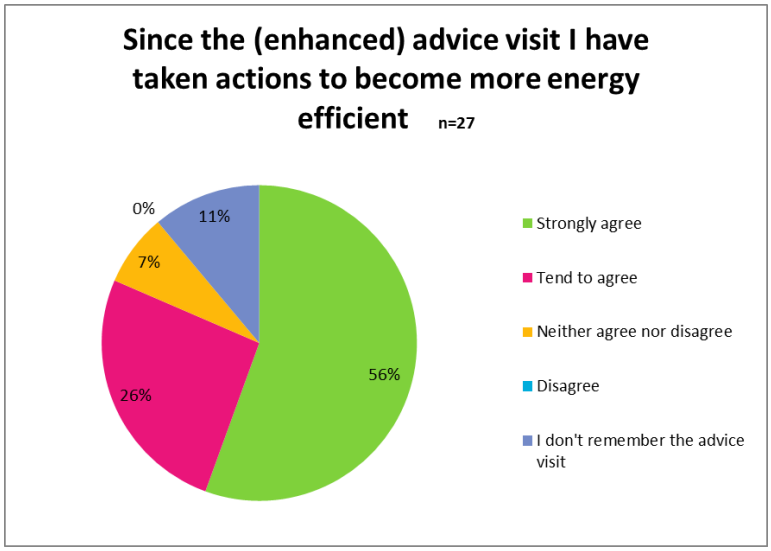
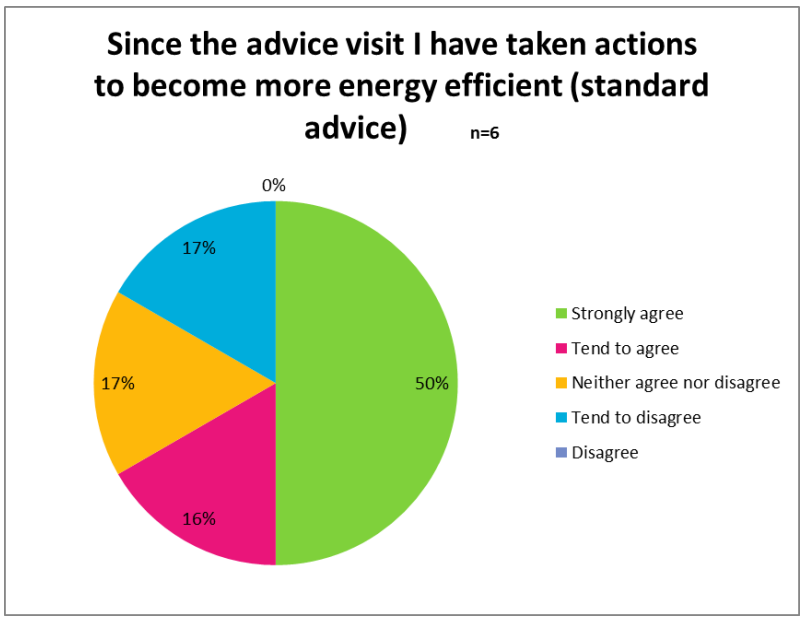


Chart 64 shows that 82% of respondents in groups 1 and 2 felt that they had taken actions to become more energy efficient since their enhanced advice visit. 7% of households neither agreed nor disagreed, and no respondents disagreed. Again, 11% said that they did not remember the advice visit.

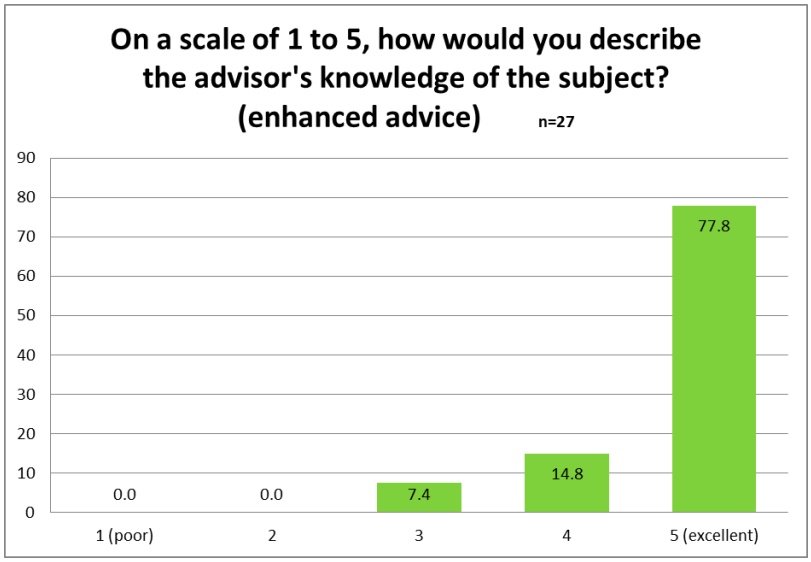
One interviewee respondent noted that **"it's made me aware of what I'm using. A bit more conscious on what I use."** Another told us: **"the advice was about, you know, sort of the kettle and things you know, do you fill the kettle up or do you just boil the amount of water that you want at the time….and you know, things like you know, I think that it's taught me really you know, to switch the heater up. I think it's taught me that bit. To keep it at a higher level and then switch it off when you don't need it. Before, I was just using it and putting the setting at a low level. But when it was at low level, I wasn't really reaping any benefit for that and you seem to need to have it on all the time."** Another interview participant explained that: **"Well when I had the advice session you know, it was like putting the what do you call it? You know the foil at the back of the heaters and that, so that helps to generate the heat, you know? So that sort of thing was quite useful."** Quotes such as these show how the advice had acted to increase awareness amongst some participants with regards to the kind of actions they could take to save energy at home and be more energy efficient. Importantly, however, the advice provided had also encouraged households to move away from more harmful practices of reducing consumption, so that their energy use was managed in ways from which households could derive more personal benefit.

Chart 65: Extent to which households had taken more action to become more energy efficient since the standard advice visit



Since receiving the standard advice visit, 66% of respondents in group 5 said that they had taken actions to become more energy efficient, whilst 17% neither agreed nor disagreed. A further 17% disagreed. Again, whilst this might suggest that the enhanced advice delivered to groups 1 and 2 was more successful in encouraging households to take action to become more energy efficient than the standard advice, the sample sizes involved do not allow for valid comparisons to be made.

Chart 66: Advisor knowledge of the subject (enhanced advice)



Overall, 78% of respondents in groups 1 and 2 rated the advisor's knowledge of the subject as excellent, and 15% rated it as 4 (very good). No respondents rated it as poor.

Chart 67: Advisor knowledge of the subject (standard advice)

From Chart 67, we can see that two thirds of respondents in group 5 rated the advisor's knowledge as excellent, and a third rated it as very good.

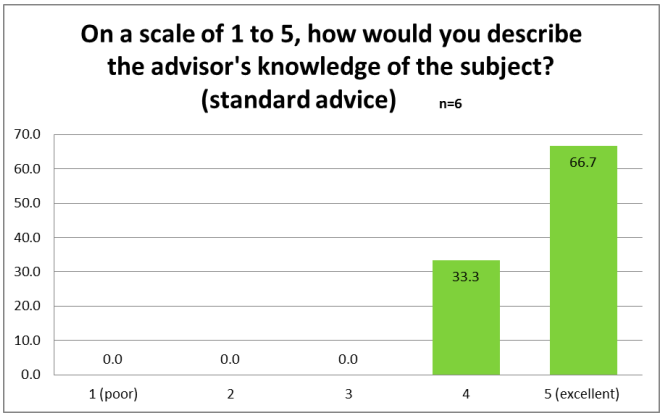
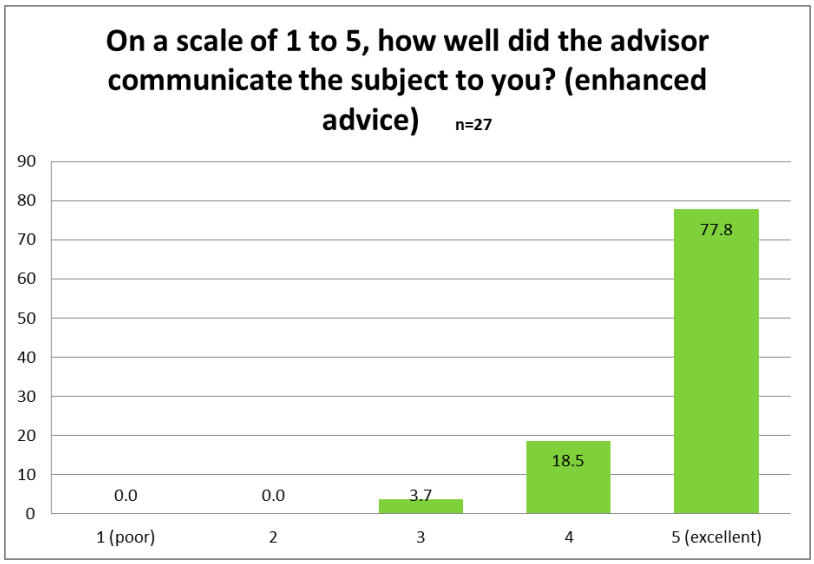


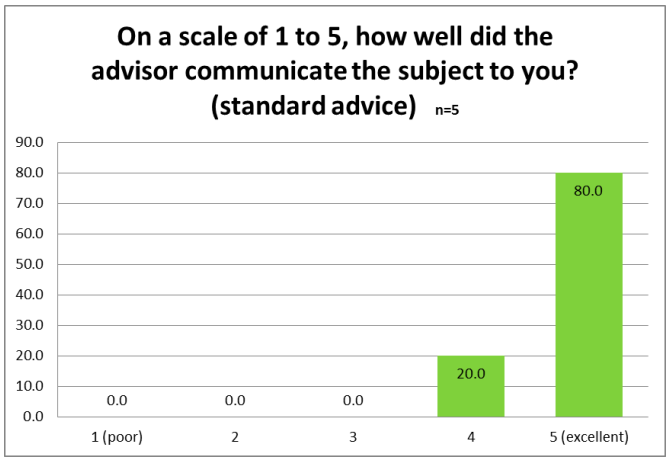
Chart 68: How well households felt the advisor communicated the subject to them (enhanced advice)



Similarly, 78% of respondents in groups 1 and 2 felt that the way in which the advisor communicated the subject to them was excellent, and 19% felt it was very good. No respondents felt that the advisor's communication was poor.

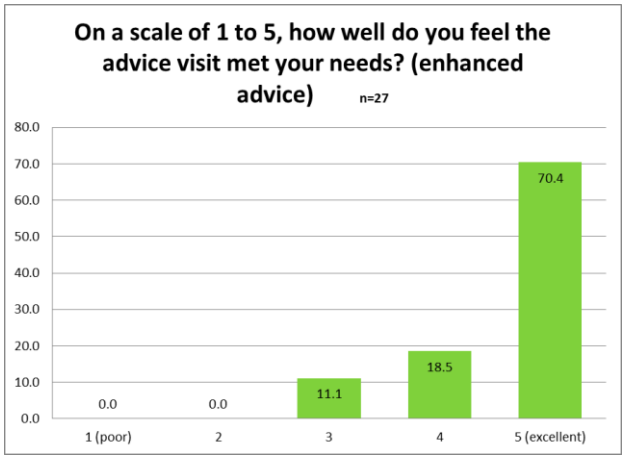
One interview respondent described how: **"he came and he sat down and I was sat to the side of him, and he had this smart phone…no, the smart meter guide or pamphlet, a big one. It were an A4 one in a big folder, and he went through it, you know? He went through things. He was very, very good."** This suggest that participants appreciated the fact that advisors had 'taken the time' to go through the information with them and explain it in ways that were accessible.

Chart 69: How well households felt the advisor communicated the subject to them (standard advice)



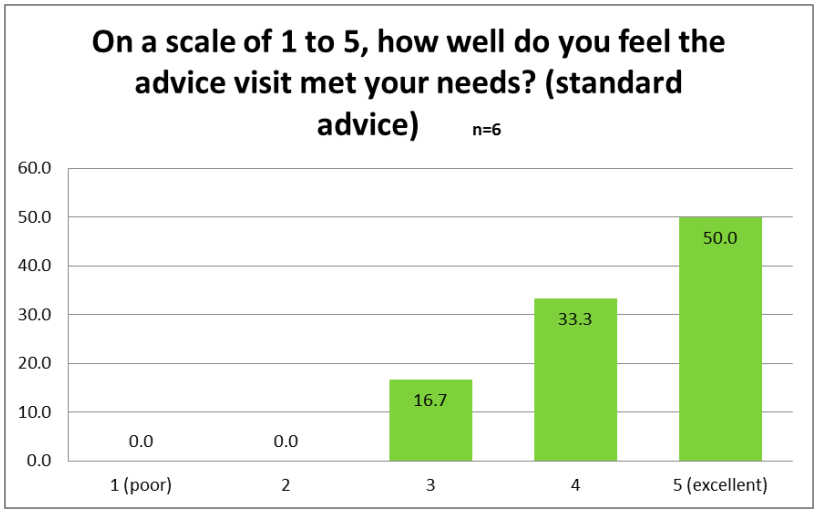
We can see here that 80% of respondents in group 5 felt that their advisor had an excellent ability to communicate the subject to them, and 20% felt they had a very good ability to do so.

Chart 70: Extent to which respondents felt the enhanced advice visit met their needs



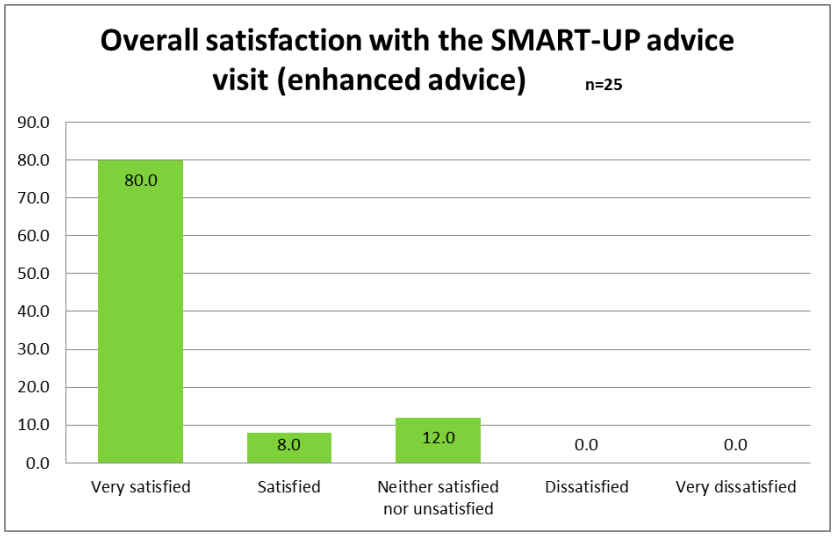
In Chart 70, we can see that 70% of respondents in groups 1 and 2 rated the advice visit's ability to meet their needs as excellent, and 19% rated it at very good. No respondents rated it as poor.

Chart 71: Extent to which respondents felt the standard advice visit met their needs



In Chart 71 we can see that half of the respondents in group 5 rated the ability of their standard advice visit to meet their needs as excellent, and a third rated it as very good. No respondents rated it as poor.

Chart 72: Overall satisfaction with the enhanced advice visit (groups 1 and 2)



Overall, 80% of respondents in groups 1 and 2 were very satisfied with their SMART-UP advice visit, and 8% were satisfied. No respondents were dissatisfied.

For example, one interviewee respondent told us that they felt that they cut back on their energy and other essentials such as food and clothes **"a little bit less"** following their advice visit, and that their direct debit had **"gone down by ten pound a month."** This suggests that some participants derived significant and tangible benefits from their SMART-UP intervention.

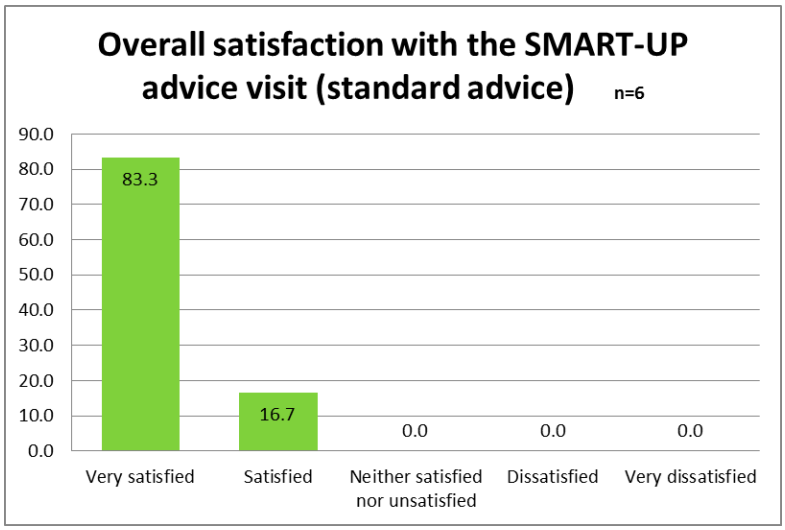
We can see the enormously positive impact that receiving smart meter advice had upon one interview respondent: **"Looking back, the smart meter really came at the right moment. At least now I'm not afraid. I'm more confident to switch, to shop around. When it comes to energy suppliers, I'm more confident to speak to them, to phone them, to switch and at least now I'm more confident to know where my money is going. How much am I using? Am I being ripped off? Am I using the right amount of electricity and gas at the same time? Is it really worth me staying with this utility? With the Smart meter, it makes…things make more sense. It really makes sense. Things make more sense. It definitely makes life better. At least you don't have to stress about 'oh, I don't know how much I'm using' or 'I don't know how many days are left. Let's just hope for the best'. No. The smart meter is there for a reason….I think it's paying off."** Because 'things now made sense' for this household as a result of the advice they had received through SMART-UP, they not only felt more knowledgeable but had increased confidence to engage with energy suppliers and

the energy market. In some cases, then, the knowledge gained through SMART-UP could empower participants to take control of their relationship with energy.

Reflecting on how receptive households were to the advice delivered through the project, frontline workers felt that those with particular concerns or worries would have been most engaged by the intervention: **"I think they were reasonably receptive, I think those who had more concerns about the financial costs of heating were perhaps more receptive and therefore took more action."** Once engaged, the usefulness of such advice became apparent: "**the people who actually had the advice seemed to find it really useful. And some people had had the smart meter for a while and they had been handed a manual but had never really used it, or were scared to try and touch it and things, and weren't quite sure what it did, so I think people generally were quite receptive to the advice."** Another noted that: **"I feel like people who have had the advice, the enhanced advice, were... I mean there's one lady who we do the follow up phone calls with and she's like... at first she was like I don't know how to use it, she's bit of a technophobe and now she says she's like taught her friends and family how to us it and all that. She's dead proud of herself, been nice for her."**

One benefit of delivering advice face to face to households meant that advisors could tailor their approach, and adapt it to the requirements and interests of each household: **"Everybody's different. Some people just want you to get on with it and get it over and done with. Some are in need are desperate to make savings, so they want all the information possible in relation to gas, electric and water, and if there's any funding schemes out there that can really benefit them. Some obviously based [actions] on behavioural changes side of things. For example, if I say to them that between 14 to 20% of your electric bill comes from the lighting, what you need to do is go from fluorescent to LEDs. And then recommend them where they can go, for example Poundland, get a bulb for a Pound. So they see that for value for money…they can actually work out how long it will take to recoup that investment. And then obviously how long it will take to make the savings."** This suggests that a significant factor in high levels of overall satisfaction with the SMART-UP advice visit related to the fact that households could receive advice and information that was tailored to their particular needs and requirements, and took their priorities into account.

Chart 73: Overall satisfaction with the standard advice visit (group 5)

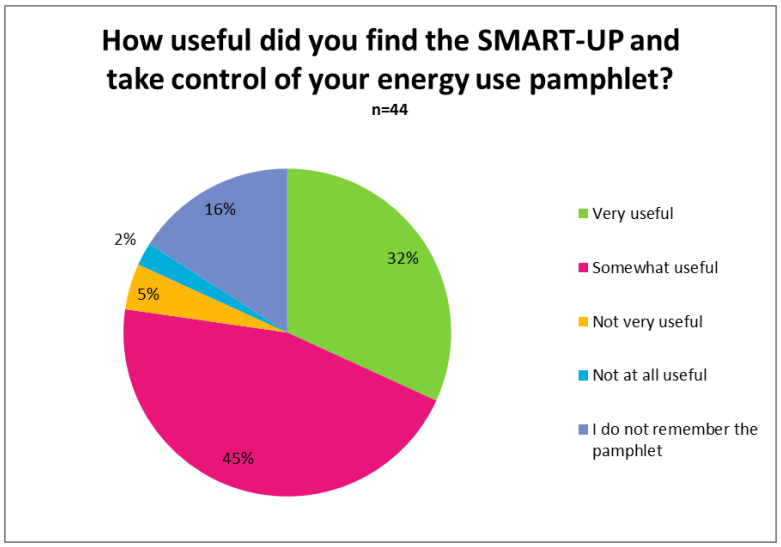


Overall, 100% of respondents in group 5 were either very satisfied or satisfied with their standard advice visit.

One interview participant told us: **"I've had no issues. I think it's been a very positive experience and I think a lot of other people should try it and go for it."**

6.3 Paper-based tools

Chart 74: Usefulness of the SMART-UP and take control of your energy use pamphlet



Across groups 1-3 and 5, 77% of respondents found the SMART-UP and take control of your energy use pamphlet either very useful or somewhat useful. 16% did not remember having seen it, and 7% found it either not very useful or not at all useful. Overall, therefore, respondents did find the pamphlet useful to an extent.

We were told by one interview respondent: **"At first it [the IHD] was confusing - overwhelming – because it's a tool that you've never seen before. It's not a cell phone, it's not the laptop. It's a tool that is quite technical, not at first glance but it just takes you a few minutes to realise the buttons here you go back, next, coming back, resent, all that. It comes quite quickly really. At first, yes, you're like kind of wondering what to do or how to read it, but once you, there's a booklet and it's….I don't even look at the booklet now."** This quote implies that having written information to hand could enable households to better understand their IHD over time until they felt confident enough to use it without resorting to guidance. This respondent went on to state that: **"Yes, the project is…I mean I….I'm glad it came along. I'm glad that they….it's working and I wish in so many parts of the world they have it as well because this is giving you accurate information. It's nothing that has been created out of a book or out of the blue. So the smart meter is something that I'm gladly using and I'll gladly recommend it to anyone who doesn't have it. I don't wake up in the cold no more."** Hence, being able to use the tools provided to her by the project in order to better understand and use her smart meter meant that she was able to see the benefits of the technology in a wider sense, as well as seeing a positive and direct impact on her everyday life.

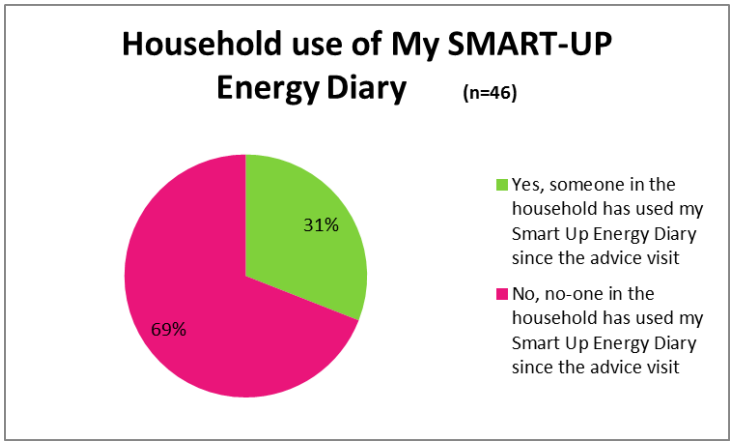
Others also found the information pamphlet useful: **"He did leave some information pamphlets. It tells us to think about what I'm spending and you know, whether I'm wasting energy or whatever you know. It was good because sometimes you don't always take too much information in at once, so sometimes it's better to get it in smaller doses. I tend to turn off if I'm…I tend not to listen if it's too much."** Similarly, another participant described how: **"the leaflet is handy if you forget and you can check it. Because I couldn't remember, I didn't know how to put the emergency gas on, so I went to the leaflet and figured it out. That helped quite a lot."** Having information in written form that could be reviewed in a participant's own time and at their own pace increased their ability to take that information in and apply it to their own energy practices. Not having to rely on the memory of what had been told to them in a face to face visit meant households had the security of knowing they had resources to consult should they forget something at a later date. Overall, advisors felt that the written information was most effective when combined with a face-to-

face advice visit, so that households could use it as a tool to refer back to, rather than being their main source of information: **"I think it meant more as a reference point to people who'd had the demonstration so... or already had the demonstration, I thought they were really comfortable in referring back to that."**

Feedback from frontline advisors showed that the written information provided by SMART-UP could be used by households in a variety of ways, including giving onward advice to friends and relatives: **"Participant did go through the materials/resources that I left and found them informative. She also used these to give a tutorial to her mother who lives in another property."** Another frontline advisor noted: **"In terms of materials, the guide booklet is useful particularly if they get a bit stuck on something or can't remember how to access a function."**

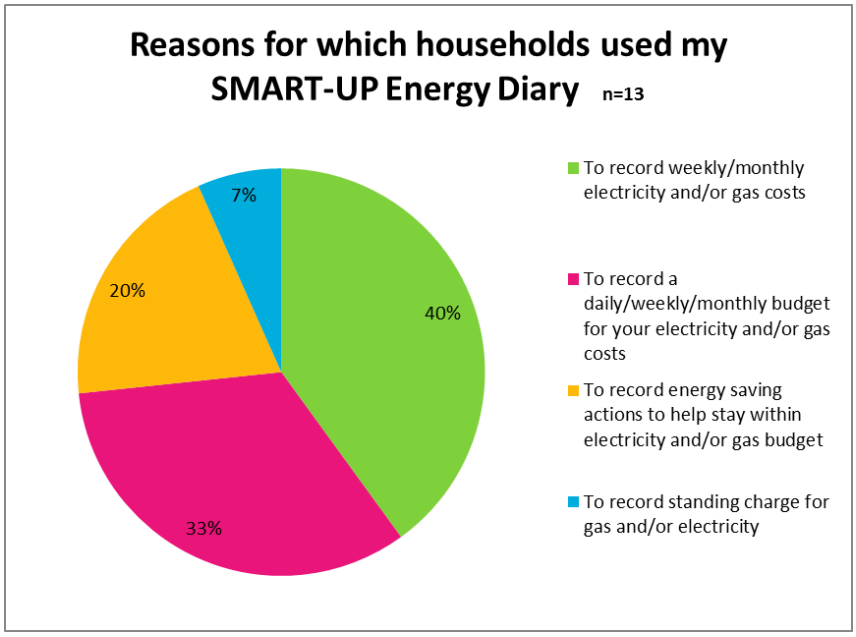
An important observation from the frontline workers that we spoke with, however, was the fact that different suppliers have different smart meters. Going forward, therefore, they felt it would be beneficial to have written information that could be tailored to different types of smart meter in order to make it easier for households to access and apply that information: **"I think ideally you'd almost want to use a more specific booklet for each in-home display but then you get into the realm of what the suppliers are already providing. I don't think what the suppliers are supplying is as user friendly as NEA guide was, but then the NEA guide was generalised so I don't know how you overcome that barrier I'm afraid."** This was picked up by another advisor, who told us: **"it's just a massive shame that they didn't standardise smart meters and the in-house displays across all the suppliers because you then would have had neighbours or friends or family being able to show one another how to use the equipment."** Whilst the general information received by the project was felt to have had a positive impact on households by frontline workers, then, there were still concerns that having different IHDs in different households might not only affect the applicability of certain guidance for particular displays, but limited the possibilities for the knowledge to be cascaded by participants themselves within their community.

Chart 75: Households using my SMART-UP Energy Diary



Overall, just under a third of respondents said that someone in their household had used the SMART-UP Energy Diary since the advice visit (31%).

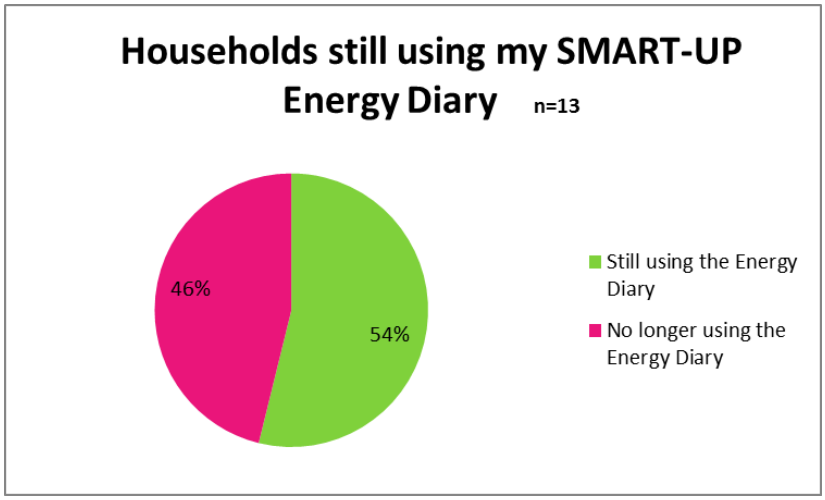
Chart 76: Reasons for using the SMART-UP Energy Diary



Households that did use the diary were most likely to do so in order to record their weekly/monthly gas and/or electricity costs (40%). Meanwhile, a third (33%) said that they used it to record a daily/weekly/monthly budget for their electricity and/or gas costs. A fifth said that they used it to record energy saving actions to help them stay within their budget, whilst 7% used it to record their standing charge for gas and/or electricity.

As one respondent described: **"At the end of the week from the little book, I tot it all up, and I see what I've spent. Now that's only a guide really isn't it? It isn't an accurate account, but it's very, very, close when the bill comes. Well, I don't get a bill now, I get it on my iPad, but it's very close to what more or less I've worked out. I mean it's really a relief, you know. There's no pressure on you. If you know what energy you're using and you know what you're paying into the system, and then you've got no worries. Whereas if you didn't have a smart meter and you were using your energy without thinking, and then of course at the end of the quarter you get a bill and think 'goodness me, I used all that?' No that is worry and of course worry causes stress doesn't it? But it's done away with all that. It's peace of mind."** Whilst only a third of households had used the energy diary provided by the project, this quote suggests that those who did use it found relief in being able to do their own calculations and to some extent validate what they were seeing on screen. At other times, seeing the information on paper could make patterns in energy use more clear for some participants. For example, one aftercare tracker noted: **"The participant has still been recording their energy usage in a diary since 07/11/2017 and it has helped her realise the impact of the seasons on energy use e.g. the amount of gas they use in summer is tiny compared to winter. This has been particularly useful as this period covered their first winter in their new home so they now feel a bit more prepared to deal with the upcoming winter as elderly people who need to keep warm. The participant keeps the materials we gave out nearby and sometimes uses them as a point of reference."** Whilst not used by everyone, then, the diaries could be of great use to those who felt more comfortable with this method of recording information.

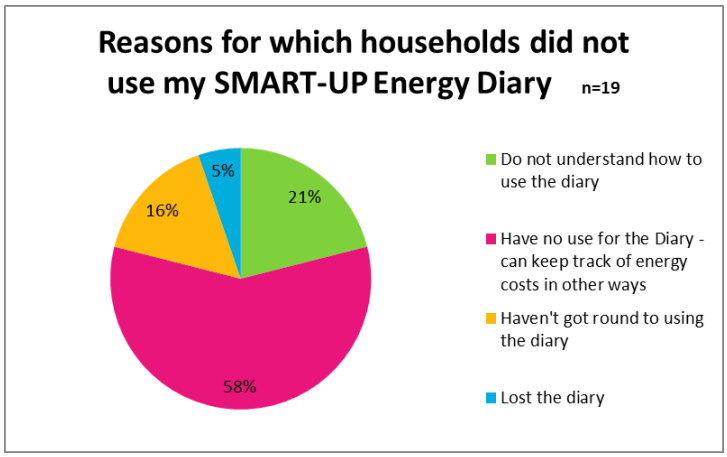
Chart 77: Households still using my SMART-UP Energy Diary



Of those that had used the SMART-UP Energy Diary, over half were still doing so at the time of the post-intervention questionnaire, again suggesting that it was a useful tool for certain respondents, though it was not necessarily the right tool for everyone.

One possible adjustment to the Energy Diary recommended by the frontline workers we spoke with included making it bigger to allow households to record consumption over a greater length of time: **"Well I know one of the things that we were kind of saying was to fill it in pencil and they can kind of use it time and time again, but I think perhaps if more sheets were provided then it would allow them to do better comparisons over the weeks and months."**

Chart 78: Reasons for which households did not use their SMART-UP Energy Diary



Of the households that did not use the Energy Diary, 58% said that they had no use for it and that they could keep track of energy costs in other ways. Just over a fifth however said that they did not understand how to use the diary (21%), suggesting that in some cases households may need further support to understand how to get the most out of the tool, and whether it is appropriate to their needs. 16% had simply not gotten round to using the diary, and 5% had lost it.

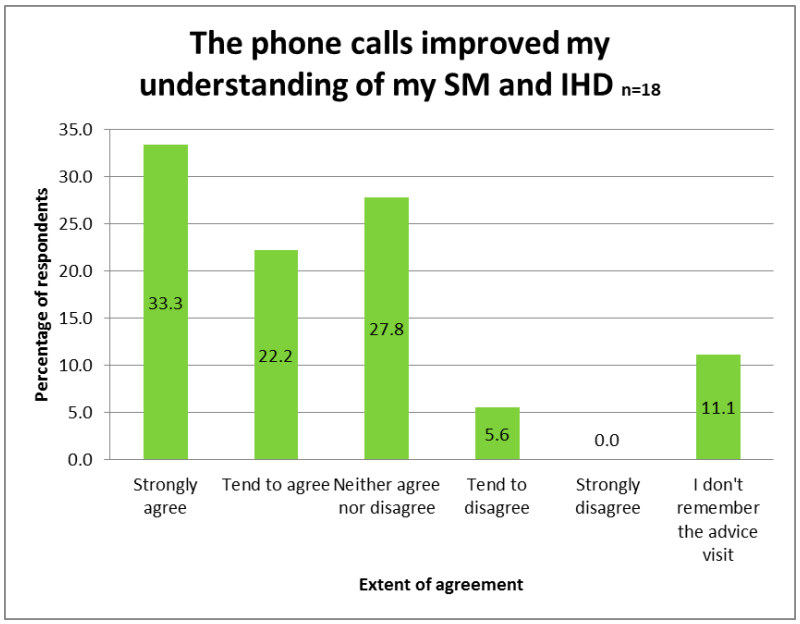
Feedback from frontline advisors illustrated why some households may not have used the Energy Diary itself, but did use similar techniques for recording and monitoring their energy use: **[Participant] still recording usage in a notebook every day so had no use for the Energy Diary, but participant does look through the guide every now and then for tips. Loves the ability to budget that the IHD and noting usage down gives them."**

In general, frontline advisors who spoke to us did not feel that the diary was the most appropriate resource for everyone: **"I don't think many people were interested in picking up the energy diary particularly. I feel like... for a lot of people lived way too hectic lives to keep up with that especially like young families."** This was also highlighted by other advisors, who felt the combination of paper-based and digital recording may have been too incongruent for certain

households: **"The diaries like I say, no, I don't think one person was interested in using them, I think we did talk them through with people, but as I said, 'cause it's a paper based exercise, asking them to have follow up it just seems a bit clunky, when what they wanted to do is crack on and use their new gadget, rather than writing things down. So I like the idea of it in terms of helping people, steer people, how to measure their energy, but in reality I don't think it was really used."**

6.4 Telephone aftercare service

Chart 79: Extent to which households felt the telephone call aftercare services improved their understanding of their smart meter and IHD



Across groups 1 and 3, 55% of respondents agreed that the telephone calls had improved their understanding of their Smart Meter and IHD, whilst over a quarter (28%) neither agreed nor disagreed. 6% tended to disagree, and 11% did not remember the advice visit. Whilst useful to more than half of the respondents then, the larger proportion of households who felt neutral towards the impact of the calls on their understanding suggests they were not perceived by respondents as being as effective as the enhanced advice, despite the fact that both groups 1 and 3 performed better across multiple indicators in section 5.

One interview participant explained why they had found the ability to speak with an advisor over the phone useful: **"I mean, if we did have a problem, I've got some, you know, get in touch with him, ring him up and just say that I've got a problem and say 'how do I do this on the smart meter?' Do you know what I mean? Things like that you know. He was very good.** As such, the calls offered households security in terms of being able to clarify points with advisors and request further information (hence ensuring they were able to continue to engage with and use their smart meter and IHD). The calls also helped to make sure households could receive prompts from advisors, who were able to understand where participants might have been continued difficulties in using their IHD: **"Tenant is finding the IHD useful, looks at her daily costs and makes her more aware of costs. Not confident she is making the most of the various features so referred [her] to [the] guides. Tenant is not using the energy diary but may give it a try."**

Chart 80: Extent to which households were more likely to use their IHD/app more often following the telephone calls/aftercare service

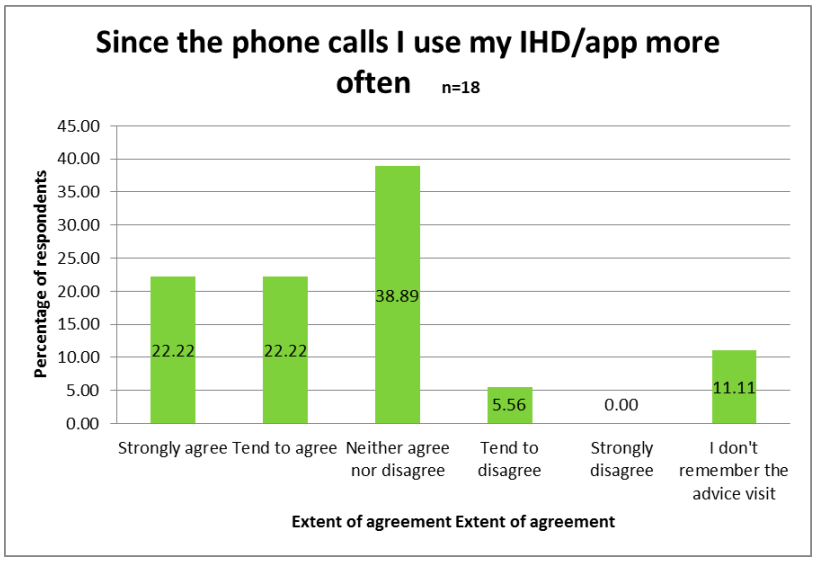
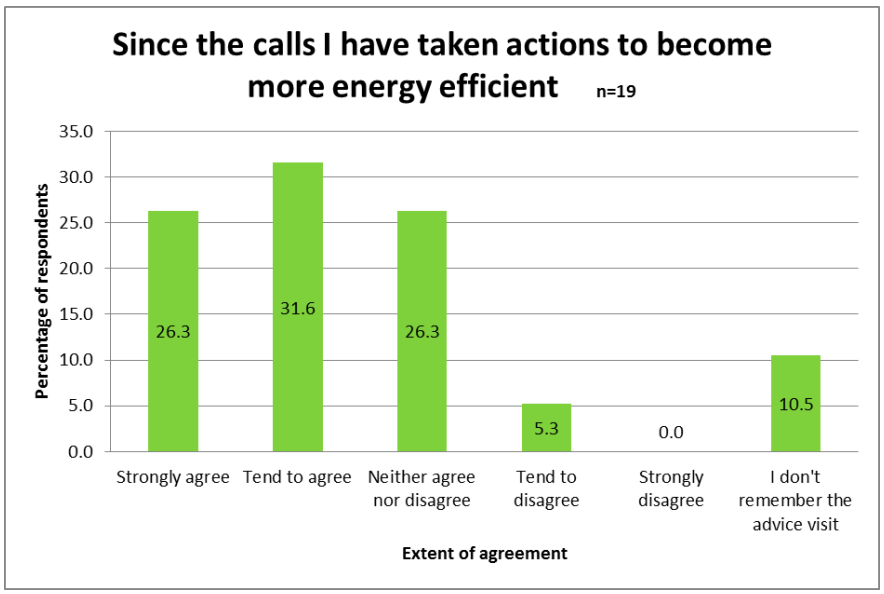


Chart 80 shows that just over two fifths of households in groups 1 and 3 (42%) said that they used their IHD/app more often after the telephone calls, and 6% tended to disagree. Almost two fifths (39%) neither agreed nor disagreed. This again suggests that respondents perceived the telephone calls as having less of an impact than the enhanced, face to face advice (despite group 3 performing better than group 2 in multiple indicators - see section 5).

Feedback recorded by frontline advisors following phone calls with households did allow for the positive impact that SMART-UP had had on their behaviours to become visible: **"Tenant regularly checks her IHD to check how much she is spending daily. Reports feeling more confident."** Another aftercare tracker entry noted: **"Tenant reports checking smart meter for her balance and how much appliances cost on a regular basis. Is finding smart meter helpful, no questions from tenant."** A similar entry described: **"Tenant is now finding it easy to manage her budget and is no longer using her emergency credit. Now using less hot water, much easier to top up and finds it helpful receiving messages on the IHD. Using more of the IHD display, much more confident with the smart meter now."** In terms of on-going monitoring, then, the phone calls could be useful from the perspective of advisors in that they allowed them to assess the extent to which households were taking the advice on board.

Chart 81: Extent to which respondents were more likely to take action to become more energy efficient following the telephone calls/aftercare service



Over half of the respondents in groups 1 and 3 felt that they had taken actions to become more energy efficient since receiving the SMART-UP telephone calls (58%), and only 5%

disagreed. Around a quarter neither agreed nor disagreed.

Feedback recorded by frontline advisors following phone calls with tenants shows that some of them were changing their behaviour as a result of SMART-UP: **"Tenant finds it really useful to see how much she is spending on energy, and tenant is making more of an effort to turn appliances off."** Similarly, a frontline advisor described in an interview how: "**One lady said since intervention her direct debits have been reduced and her estimated usage for the next year had been reduced. There were a few people that said... this is all in the phone call, this will all be in the follow up phone call notes. There's a couple who said they've started to notice the savings a little bit which is good coming up to wintertime now of course. I'd say there's a difference and it's made me sort of confident enough to show the other… you know recipe for the team on how to deliver this advice so they can go and do it to other people as well, with other people."** As such, by making the positive impact of advice visible to advisors, the aftercare services also acted to give them greater confidence in promoting the intervention to their colleagues.

This was reinforced by advisors describing how useful the aftercare service could be in providing prompts and on-going advice to households following their initial visit: **"The participant found the interventions useful and now feels more confident in using the smart meter for various functions. In particular, she is thankful for the advice booklets as a point of reference as she does forget things often. Her combined gas and electricity cost had not previously gone above £2 per day very often, but more recently she noticed the cost is already at around 80p when she wakes up in the morning and regularly exceeds £2 by the end of the day. I informed her that part of this figure is accounted for by the daily standing charge and also recommended that she switch her electrical devices off standby overnight to see if the figure in the morning starts to get smaller. She is also getting a more energy-efficient fridge on the advice of her son."**

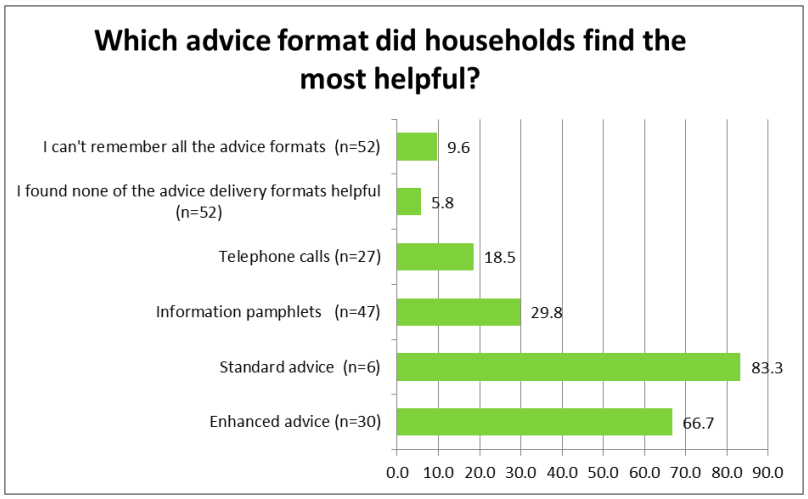
It also meant households could be encouraged to continue to change behaviours that had perhaps not been picked up upon during the initial intervention: "**Participant has a daily budget of £2 for gas and electricity combined which she tries to stick to and did so absolutely fine throughout summer but has exceeded it a couple of times recently now that the temperature has dropped. Uses the light system and likes the activity guide but doesn't use the energy diary as there is similar information available on her online portal through the supplier's website. They asked me if it is cheaper to turn off radiators in rooms they are not using, to which I told them 'yes'. Also mentioned that they had started to notice that clothes still seemed a bit damp after being left to dry on a clothes horse - the participant wondered if that meant there was a damp problem in the house but I advised it is likely because the house is cold and to ensure they're heating the home to at least 18°C."**

However, advisors did encounter some issues in terms of delivering multiple follow-up phone calls to households. For example, they often lost contact with them: **"In terms of the follow up phone calls one problem I did encounter, which we often encounter, was in vulnerable households is just losing contact with them because they change numbers all the time, they don't update everyone with the new number so some people we just completely lost contact with but we do find with vulnerable households especially, pay as you go or like a burner or they get into debt on the phone bill that sort of thing, happens quite a lot we find. We ask them for email addresses but... the amount of people that don't have one or don't know what it is, don't use it... I'd say probably**

very, very few people gave us one and lots of people didn't have one at all and then the rest of them, I could give it you but to be honest I never get on there. That wasn't reliable either." Whilst effective for many households, then, this suggests that a telephone aftercare service was not suitable for some households suffering from particular vulnerabilities. However, this does reinforce the benefit of simultaneously providing written information that can be consulted by participants at their own leisure and pace.

6.5 Most effective advice formats

Chart 82: Which advice format did households find the most helpful?



Of the households that received the telephone call aftercare service, only 19% felt that this was the most helpful format of advice delivery. Of those that received an information pamphlet, almost a third (30%) felt that this was the most helpful. Overall, the majority of participants who received either an enhanced or a standard advice visit felt that this was the most helpful advice delivery format (67% and 83% respectively). This is in line with findings from the UK Government's Early Learning Programme and small-scale Behaviour Trials, which found that face-to-face advice delivered in-home was the most effective format for delivering advice to encourage changes in energy behaviour. [131]

As one interviewee told us, **"phone's alright but I'd rather sit and talk to someone. When you face someone and talk to someone the understanding is different from the phone. It's like, you know, you don't know but it's alright. Depends what it is. If you have to show me something and do something then I need to see you, don't I. But if it's nowt to do then it's just questions the phone's alright. But show me tariffs and show me how it goes on and then it's better to see someone. A lot of old people they can't understand on the phone."** Speaking to someone in person, then, and having particular actions demonstrated to them, meant some participants felt better able to understand the information being provided. Face to face was also preferable for those who found it difficult to access other forms of communication: **"face to face or written, because I don't have email or anything so…"**

Others, however, preferred to receive advice other the phone because **"I think it's easier to speak to someone."** Or: **"I think it's alright over the phone. It's nice just to sort of do it straight away and it's done. If I get paperwork. I might put it down and say 'I'll do it later', but sometimes it never comes later. I have to deal with things straight away. If I don't deal with it straight away that's**

[131] DECC, 2015, Smart metering implementation programme. DECC's policy conclusions: Early learning project and small-scale behaviour trials

when I don't do it." Phone calls, then, offered a direct means of speaking with someone without needing to invest extra time in a face-to-face visit or the inconvenience of looking for the information on paper.

For others still, their preferred advice format for the future was influenced by their own particular needs and requirements: **"I'm not one for sitting down and reading something, but if you've got an email I'm more likely to read it because I can enlarge the writing if I need to and stuff like that."** And in another case, **"I prefer to see somebody face to face. That's probably with being deaf, slightly deaf in one ear, I don't always pick things up from the telephone. And then you're always asking 'I'm sorry, I didn't get that question'. I prefer to see someone face to face."** This suggests that offer of advice in multiple formats meant participants with varying needs and vulnerabilities could find the best way of accessing information to suit them.

Indeed, interviews with frontline workers revealed that the most effective form of advice delivery was felt to be that delivered to group 1 (a combination of all 3 three formats): **"As a combination service, in terms of having everything, I think it's actually quite positive and I think there would be positive impacts in terms of their energy usage going down."** However, whilst this was felt to be the most effective combination of advice, we were told that it should be delivered as close to the time when households received a smart meter as possible, in order to ensure a greater impact: **"It's not going to make it worse, but because they've had the smart meters for a while, this additional part of it may not have had as much impact as it would have if we had come in straight away."** Indeed, studies have shown that there is "value in energy suppliers and third parties providing follow-up advice soon after installation to help people further understand how to use their IHDs" given that "there are limits as to what consumers can learn about the IHD during a single installation visit, even in ideal conditions." [132]

Importantly, it was felt that households would derive the most benefit from holistic advice that covered multiple aspects of their relationship with energy and the energy market: **"I think, if you took it more holistically, a holistic approach to it, I think that's when you could get more outcomes – with smart meters being just part of that advice aspect. So, it's looking that…it's giving them advice about changing tariffs, discounts, price service registers, all of that as well as looking at their attitude towards actual usage and how they used to like having a smart meter as well. So, I think it has the most impact when you're doing it all, more than just telling them about a smart meter, which they may have, or they should have had, information about a smart meter already."** This resonates with the findings in section 4 that found a limited impact of SMART-UP on the likelihood of a household switching supplier.

Other advisors felt that the advice package could be improved by introducing additional delivery formats, which would enable households that have particular needs to engage with the project: **"Sometimes just information isn't enough, I think that a good way of maybe increasing popularity in the project is if you have something that's visual. Some projects just have a small, short video that explain the project and they can see visually what a smart meter is, and how it can benefit a customer. So they show a smart meter, what a smart meter does, how it works and how it operates. And then they show the in-house display unit and how that works. Some people are**

[132] DECC, 2015, Smart metering implementation programme. DECC's policy conclusions: Early learning project and small-scale behaviour trials

not so literate, some people obviously won't really understand what they read. They might read the information but when it comes to the understanding it might not be as good, but if they watch something that is basic, obviously they might understand more."

In addition to the inclusion of other formats of advice, the frontline advisors that we spoke to felt that the information provided to households around informed consent at the start of the project could act as barrier to engagement to some with lower literacy skills and/or poor concentration. They felt that this would need to be something that was addressed in the future: **"The only thing that I would say, is that literature is a bit heavy, for people to read through all of that. It's a bit long for our customer base, some of it, I think, would just go over their head. So, I think it would be good to have an even shorter summary of it, and have that information sheet as something towards the back. I think that is probably a more of an issue for those we didn't see face to face, for them to really grasp what was going on, and what their involvement would be. I think they just needed short, sharp sentences really. Just say this is what it is, this is what you can do, this is what you will need to do to be able to take part."**

Importantly, some frontline works raised concerns around the additional time and resource required of them to deliver the aftercare phone call service. Whilst useful, this could be felt as an extra burden for some: **"I think if I was to deliver the project again, if, everything being the same, I would want to negotiate for any active phone calls. Only because we didn't have the resource to do as many of the phone calls as we would have liked to."**

6.6 Summary

This section has examined the impact of the different types of SMART-UP advice delivery upon the understanding and behaviours of participants in relation to their smart meter and IHD. In particular, it has looked at the impact of enhanced and standard advice, the SMART-UP information pack and energy diary, and the aftercare telephone service. It has explored the extent to which different advice formats were able to meet the needs of participants, and ultimately assesses which advice delivery formats were the most effective from the perspective of both participating households and frontline advisors.

It found that the enhanced advice delivered through the project improved participant understandings of their smart meter and IHD, helped them to understand how they worked and the kind of information they could access through it. Households were likely to use their IHD more often and for reasons that they previously hadn't, following the advice. The information was felt to be more accessible, and participants felt more in control of their energy usage. It also acted to increase awareness with regards to the kind of actions that could be taken to save energy at home, and become more energy efficient. In some cases, the advice provided had encouraged households to move away from more harmful practices intended to reduce consumption. This meant that their energy use could be managed in more positive ways from which households could derive energy savings *and* personal benefit.

Whilst responses from participants in receipt of the standard advice intervention mirrored the positive trend of the enhanced visit, a valid comparison between the two intervention types was not possible due to the small sample size in group 5.

Overall, recipients of both the standard and enhanced advice interventions were happy with advisor's knowledge of the subject and the way in which the information was communicated to them. They felt that the visits had met their needs, and were generally satisfied or very satisfied with their advice visit. Findings from this section suggest that some participants derived significant and tangible benefits from their SMART-UP intervention. In some cases, then, the knowledge gained through SMART-UP could empower participants to take control of their relationship with energy.

One benefit of delivering advice face to face to households meant that advisors could tailor their approach, and adapt it to the requirements and interests of each household.

With regards to the 'SMART-UP and take control of your energy use' pamphlet, respondents found it useful to an extent. Having information in written form that could be reviewed in a participant's own time and at their own pace increased their ability to take that information in and apply it to their own energy practices. Not having to rely on the memory of what had been told to them in a face to face visit meant households had the security of knowing they had resources to consult should they forget something at a later date. Overall, however, advisors felt that the written information was most effective when combined with a face-to-face advice visit, so that households could use it as a tool to refer back to, rather than being their main source of information.

Whilst the general information received by the project was felt to have had a positive impact on households by frontline workers, they were still concerned that having different IHDs in different households might not only affect the applicability of certain guidance for particular displays, but limited the possibilities for the knowledge to be cascaded by participants themselves to other members of their community.

Whilst only a third of respondents said that they used the SMART-UP Energy Diary, those who did use it found relief in being able to do their own calculations and to some extent validate what they were seeing on screen. At other times, seeing the information on paper could make patterns in energy use more clear for some participants. Whilst not the most appropriate tool for everyone, then, the diaries could be of great use to those who felt more comfortable with this method of recording information. There was a suggestion from frontline workers that the tool could be improved by including more pages, to allow households to track their energy use over a greater period of time.

Whilst the aftercare telephone service was felt to have been useful by participants, households tended not to perceive them as being as effective as the enhanced advice visit, despite the fact that both groups 1 and 3 performed better across multiple indicators in section 5. Nevertheless, they offered households security in terms of being able to clarify points with advisors and request further information (hence ensuring they were able to continue to engage with and use their smart meter and IHD). The calls also helped to make sure households could receive prompts from advisors, who were able to understand where participants might have been continued difficulties in using their IHD.

The calls could also be useful for frontline advisors in terms of being able to monitor the on-going impact of the project, and to assess which households were taking the information on board. This facility for on-going monitoring then provided advisors with the confidence needed for them to feel comfortable in recommending the intervention to their colleagues. However, advisors did

encounter some issues in terms of delivering multiple follow-up phone calls to households. For example, they often lost contact with particularly vulnerable households. This suggests that a telephone aftercare service was not suitable for some households suffering from particular vulnerabilities. However, this does reinforce the benefit of simultaneously providing written information that can be consulted by participants at their own leisure and pace.

Overall, the most helpful format of advice delivery from the perspective of frontline advisors and households themselves was the combination of enhanced face-to-face advice, the provision of written information resources, and the telephone aftercare service (delivered to group 1). Offering advice in multiple formats meant participants with varying needs and vulnerabilities could find the best way of accessing information to suit them.

Frontline advisors did, however, have a number of recommendations through which the intervention delivered to group 1 could be improved upon. This included delivering the intervention as close to the time when households received a smart meter as possible, and providing a more holistic intervention that could cover multiple aspects of a household's relationship with energy and the energy market (not just smart meters). This resonates with the findings in section 4 that found a limited impact of SMART-UP on the likelihood of a household switching supplier. At other times, advisors felt that the inclusion of additional advice delivery formats would allow even more households to be engaged by the project (such as producing digital content that could be viewed online or on the television). At the same time, the information that was included in the participant information sheet at the start of the project could have been further simplified to ensure households were fully aware of the nature of their involvement. Finally, we were reminded by stakeholders that although the combination of multiple and tailored advice delivery formats was most beneficial to households, this brought with it a corresponding cost in terms of staff time invested. This could be difficult for partners to replicate and to continue to deliver going into the future without adequate resources.

6.7 Household consumption

6.7.1 Collecting consumption data from households

Frontline workers were asked to record electricity consumption data (in the form of annual consumption (in kWh) or a current meter reading for each household to which they delivered a SMART UP intervention. Consumption data was recorded on the first, pre-intervention questionnaire by the frontline advisors themselves. However, advisors faced difficulties in accessing full electricity consumption data of the majority of households participated in the sample. This was due a variety of reasons, such as:

- Lost or missing paper bills
- Utility companies unable to provide the data upon request
- Recent smart meter installation meant annual consumption data was not yet available
- Household unwilling to provide the data

In total, frontline workers were able to record pre-intervention annual electricity consumption data for 12 households. They were also able to provide pre-intervention electricity meter readings for 57 households. However, they were unable to capture consumption data for the previous year for those households.

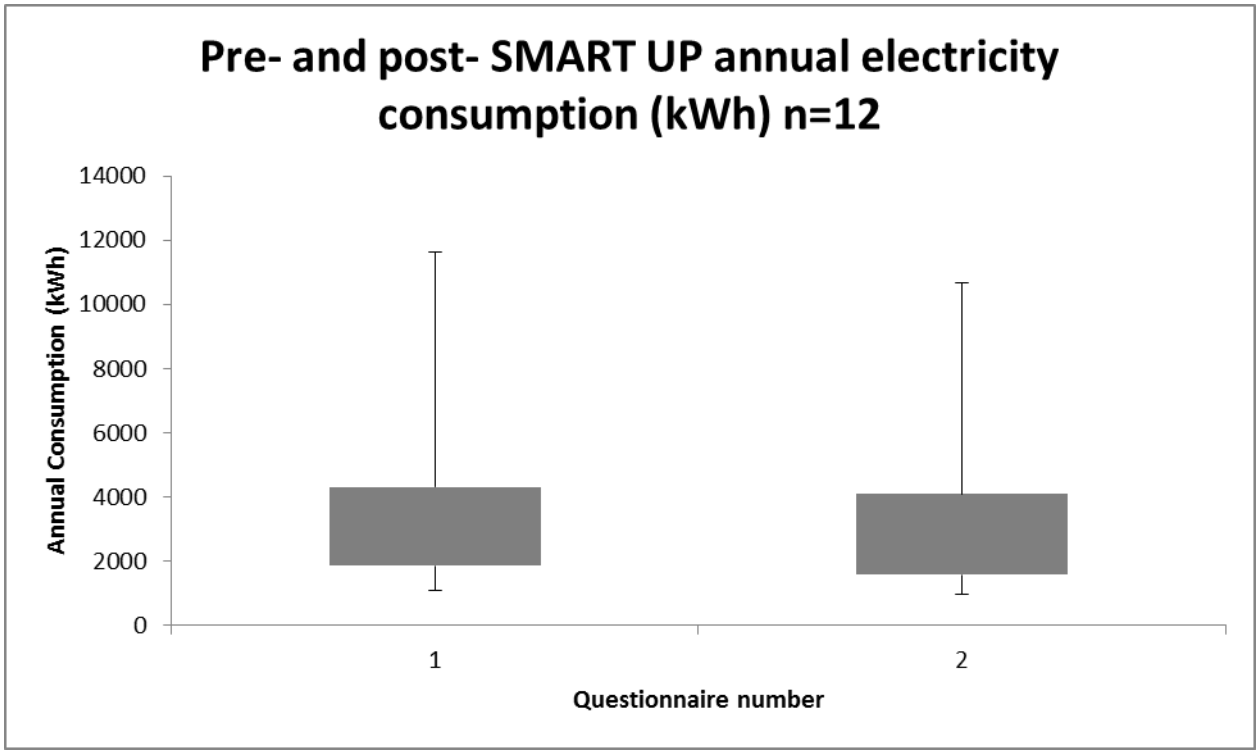
In the post intervention questionnaire, households were requested to provide annual consumption data and/or an electricity meter reading. However, only 12 respondents provided data on their annual electricity consumption for the previous year. 13 respondents provided an electricity meter reading. However, this meant that, of a sample of 105 households, valid and comparable data on annual electricity consumption was only available for 12 households.

6.7.2 Consumption data collected

The table below and Fig 1 show the maximum, minimum and median annual consumption for these households (in kWh) pre- and post-intervention. It also shows the average consumption for the sample over this period.

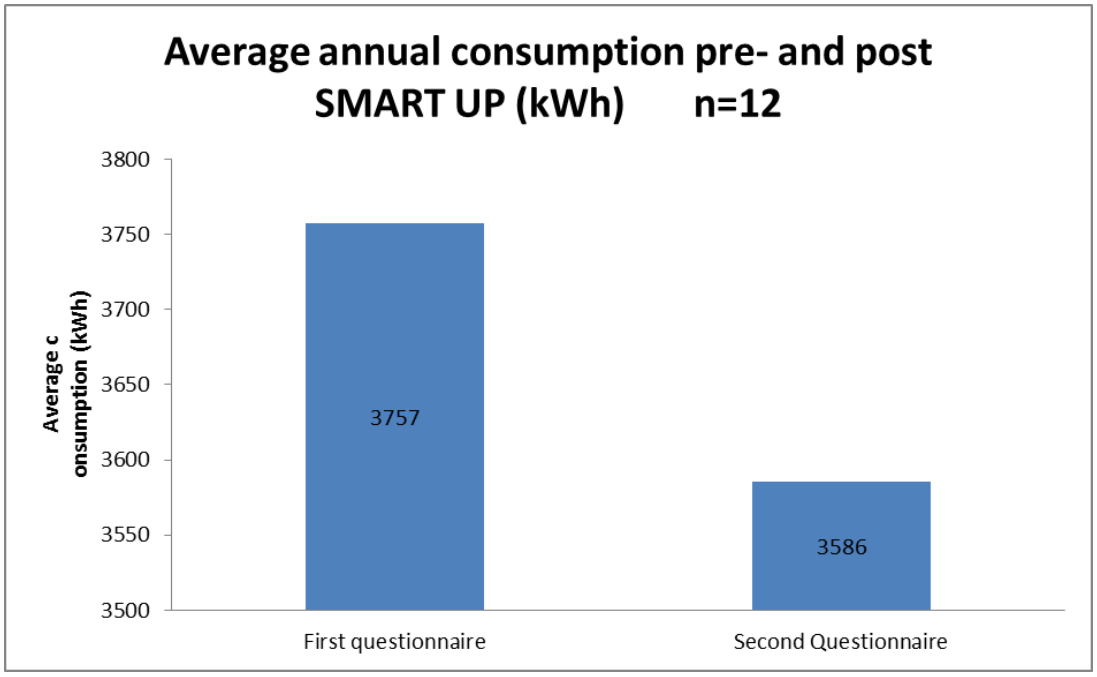
	First questionnaire	Second Questionnaire
Min	1072	968
Q1	1853	1570
Median	2704	2628
Q3	4309	4092
Max	11652	10674
Mean	3757	3586

Fig. 1 Pre- and post- SMART UP annual electricity consumption (kWh)



From this chart we can see that the lowest recorded annual consumption prior to the intervention was 1,072kWh. After SMART UP, it was 968kWh (for the same household). The highest recorded consumption pre-intervention was 11,652kWh; whilst post-intervention it was 10,674 (again, for the same household). The median consumption prior to SMART UP was 2,704kWh, whilst after it was 2,628kWh.

Fig 2. Below shows the average annual electricity consumption for the sample, both pre- and post-intervention.



This shows that average consumption had dropped following the SMART UP intervention from 3,757kWh to 3,586kWh. This represents a saving of 171kWh, and 5% reduction in electricity consumption within the sample.

However, given the extremely small sample size, these findings cannot be taken as being representative of the UK SMART UP sample more generally, nor are we able to determine the statistical significance of a 5% drop in average consumption.

6.7.3 Estimating baseline electricity consumption in the UK

As a result of this, we explored current estimates around average household consumption in the UK, as well as estimating the likely energy savings (in kWh) that could result from implementing sustainable energy behaviours.

The tables below show average consumption for UK households according to property type, household size and household characteristics:

Average consumption of UK households according to:

1. **Property Type**

Tenure	Electricity kWh (England and Wales)
Owner-occupied	4,100
Social rented	4,500
Private rented	3,900

Property type	Electricity kWh (England and Wales)
Flat/Maisonette	3,500
Bungalow	3,800
Terraced house	3,700 (mid-terrace) 3,900 (end-terrace)
Semi-Detached house	4,100

2. **Household Size**

Number of bedrooms	Electricity kWh (England and Wales)
1	3,000
2	3,600
3	4,000
4	5,000
5+	6,600

Number of residents	Electricity kWh (England and Wales)
1	3,200
2	4,100
3	4,700
4	5,200
5+	5,800

3. **Household Characteristics**

Income	Electricity kWh (England and Wales)
Less than £15,000	3,300
£15,000 - £19,999	3,500
£20,000 - £29,000	3,700
£30,000 - £39,999	3,900
£40,000 - £49,999	4,200

Meanwhile, the table below shows average annual consumption according to different consumer groups:

Household	Number of households in GB	Mean annual electric consumption (kWh)	Mean annual gas consumption (kWh)	Overview of household type
Low-income electrically heated	881,000 (4%)	5,130		Largely single adults with no children, retired, or not working. 50% over the age of 60, 33% over the age of 75. Annual income lower than £11,000, average household disposable income is £6,900. 31% use PPMs and are less likely to switch supplier.

All other electrically-heated households	1.69m (7%)	7,674		Majority contain couples, 20% have children. 25% under the age of 35. Mean annual disposable income of £25,800. 55$ are owner-occupied, 25% private-renters with majority of properties 2 bedrooms or less.
Low-income non-metered fuel-heated households	548,000 (2%)	3,634		Mostly single adults and couples living in medium sized properties (50% owner-occupied, 65% in rural areas). Mean annual household disposable income of £11,000
Low-income, out of work single adults in rented flats	950,000 (4%)	2,018	8,553	Largely young single adults without children although, 13% single-parents and 34% retired. 82% social-rented properties, 28% in London. Mean annual household disposable income of £6,500, approx. 42% are not working.
Young working adults in rented flats (London)	1.1m (4%)	2,672	11,256	42% under the age of 35, work full-time and without children. 55% are social-rented, 43% private-rented
Low-income	1.2m (5%)	2,474	11,515	77% consist of

single adults (lone parents or elderly) in social rented houses				single adults with 33% over the age of 60. 42% are not working and 36% are retired. 100% are rented-properties, with 73% social.
Younger working families in medium-sized rented houses	2.5m (10%)	3,450	14,452	54% social-rented and 42% private-rented. Majority are young couples with children, 45% work full-time, 15% part-time. Mean annual household disposable income of £27,000.
'Average' mains gas-heated households	8.2m (34%)	3,588	16,386	Owner-occupied. 47% in full-time employment, 29% retired.

*https://www.ofgem.gov.uk/sites/default/files/docs/2013/06/beyond-average-consumption-summary-doc_updated-june13_0.pdf

Households vulnerable to energy poverty however are likely to be under-spending on their fuel, and therefore under-consuming. The table below shows typical under-consumption rates for different consumer types in the Uk.

Household characteristic	Characteristic category	% of group underspending
Tenure	Owner-occupied	67
	Private-rented	72
	Social-rented	58
Number of residents	1	70
	2	69
	3	61
	4	68
	5+	57
Resident at pension age	At least one	68
	None	66
Children present	At least one	63
	None	68
Age of Household Reference Person	16-34	68
	35-44	66
	45-54	63

	55-64	69
	65-74	68
	75+	68
Household employment status	1 or more work full-time	67
	1 or more work part-time	62
	None working, one or more retired	68
	None working and none retired	68
Income quartile	1st (lowest)	69
	2nd	69
	3rd	67
	4th	62
	5th (highest)	67
Someone in house throughout day during weekday	No	66
	Yes	68
Household in under-occupancy	No	68
	Yes	66
In fuel poverty under LIHC definition	No	65
	Yes	80
Dwelling type	End terrace	61
	Mid terrace	65
	Semi-detached	69
	Bungalow	73
	Flat	64

*https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/274779/10_Underspend.pdf

In contrast, some vulnerable households with inefficient properties or heating systems, or with existing medical conditions that require higher indoor temperatures for comfort and wellbeing, might be over-consuming on their energy. Indeed, in the UK there are 1.14m low income households with above average electricity consumption; 1.0m low income households with above average gas consumption and 1.22m low income households with above average combined fuel consumption.[133]

Taking these figures into account, it becomes clear that households with the lowest consumption recorded within the UK SMART UP sample (968kWh) had recorded extremely low levels of electricity consumption when compared to national baseline estimates of average consumption. This could be a result of such households living in extreme energy poverty and hence practicing extreme rationing

[133] https://www.cse.org.uk/downloads/reports-and-publications/policy/energy-justice/understanding_high_use_low_income_energy_consumers.pdf

of their fuel use. Or, it could be due to an error in the way in which their consumption data was first recorded. Similarly, the highest recorded consumption within the sample is extremely high in comparison to national averages of over-consumption (11,652kWh). Whilst this could be a result of households over-consuming due to inefficient properties or heating systems, or due to specific health requirements, the fact that this number is more similar to typical annual gas consumption for a UK household suggests the respondent may have mistakenly recorded their gas consumption when reporting to the project.

6.7.4 Estimating annual savings through behaviour change

We also wanted to understand what savings a household can expect to make, on average, by implementing different types of energy saving behaviours at home.

Behaviour	Extreme low estimate	Extreme high estimate	Most likely
Switch TV off	16	100	50
Turn lights off	27	540	130
Sensors to turn lights off	-61	520	100
Sensors in hallway to turn lights off	-24	165	13
Fill oven when on	16	142	64
Using dishwasher on eco settings	0	780	180
Putting lids on saucepans	13	580	124
Refitting old and damaged seals on refrigerator	52	260	130
Defrost freezer regularly	14	260	68
Cook with microwave not oven	1	133	18
Maintain fridge well	8	100	37
Simmer rather than boil food	1.7	139	28
Avoid leaving fridge empty	1.7	53	6.9
Avoid cooling hot food in the fridge	0.4	11.9	1.9
Defrost food in the fridge	0.6	16.9	3.4
Put cold items back in fridge asap	0.6	6.8	1.4
Check oven seals and replace if necessary	1.3	34	9.6
Close bedroom window at night	350	490	420
Wear a thick jumper	760	3,090	1,530

during the heating season			
Install cylinder thermostat to control temperature	310	460	370
Use radiator valves to turn off heating in unused rooms	150	1,650	530
Install water efficient shower head and use 2x a day	410	4,530	810
Take 2 showers lasting 7 minutes each instead of 2 baths per week	-130	500	160
Take showers lasting 5 minutes 4x a week	47	350	130
Only fill kettle to the level required	20	350	83
Air dry laundry instead of using tumble drier	21	2,700	360
Wash clothes at 40 degrees or less	21	364	70
Turn thermostat down by 2 degrees from 20 to 18	2,630	3,900	3,090
Turn thermostat don by 1 degree from 19 to 18	1,300	1,930	1,530

*https://cambridgeenergy.org.uk/wp-content/uploads/2013/11/CAR-Behaviours-Final-Report-Revision-3-060812.pdf

Similar studies[134] have shown average annual energy saving per household such as:

- Washing clothes at 40 or less = 24kWh
- Not overfilling kettle = 39kWh
- Turning off standby appliances = 64kWh
- Not leaving PC's on = 80kWh
- Replacing remaining traditional (incandescent and halogen) bulbs with low energy bulbs = 230kWh

This represents a potential annual saving of 437kWh per household, should they implement the 6 energy saving behaviours.

134 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/325741/Powering_the_Nation_2_260614.pdf

Section 7: Reflections from stakeholders

This section focuses on the feedback received from stakeholders during our interviews with frontline workers and managers.

It looks at why stakeholders decided to participate in SMART-UP in the first place, and the extent to which the project aligned with their organisational objectives. As a result, it explores whether such partners might be well placed to continue to deliver similar interventions in the future (and whether there are other groups that may need to be engaged).

The section then moves on to examine stakeholder experiences of data collection during the project. It looks at barriers around accessing household consumption data, and whether there were any ways in which the pre-intervention household questionnaire could be improved.

After this, it goes on to explore the SMART-UP legacy, and the extent to which stakeholders had felt the project to be worthwhile. It also looks at whether stakeholders felt delivering the project in the future would be of value, and why. Finally, it looks at the impact of training provided through the project on stakeholders and their organisations, and assesses the possibilities for future and on-going training delivery.

7.2 Why stakeholders decided to participate in SMART-UP: alignment with organisational objectives

Overall, the stakeholders that participated in the project felt that SMART-UP was closely aligned with the objectives of their organisations in terms of fuel poverty, energy efficiency, sustainability, and enabling tenants to remain comfortable and debt free in their homes.

For example, the project could help tenants to become more energy efficient and to therefore enjoy greater wellbeing at home: **"We want our tenants to be happy, warm and healthy in their homes, and we feel that tackling fuel poverty and helping people be more aware of energy efficiency and improving their energy efficiencies is vital."** As such, it aligned with the sustainability approaches taken by housing association partners: **"The other half of our sustainability approach is looking at fuel poverty and trying to help residents save money…because people's costs are going up in terms of energy bills, in terms of other pressures from benefit issues, with government policy and things, so we want people to be able to afford to live in their home. We want people to be able to afford to pay their rent, so saving them money on any topic is useful, so yeah fuel poverty is actually key in our priorities."** Another interviewee further reflected this theme: **"One of our key objectives, and in the team that I manage, it's about sustaining tenancies, and it's also helping to…trying to get people…maximising people's income, and also working with the most vulnerable people as well, and alleviating the amount of fuel poverty…. making sure just that they are comfortable in their own home… and can access affordable warmth."**

For charity partners, the project represented an opportunity to align carbon reduction and fuel poverty alleviation objectives: **"There's the carbon reduction and energy efficiency strand running**

through what we do. But our work more specifically is geared more towards fuel poverty reduction, probably because that's where a lot of our funding is for."

Stakeholders felt that smart meters were particularly relevant in helping them to achieve certain objectives. Some continued to emphasise desires to ensure residents were happy and comfortable at home: **"We encourage tenants to keep nice and warm and healthy in their homes and if they're aware of how much they're spending then I think it helps us be aware more about energy awareness and also potential savings that they might be able to get from other suppliers when switching for instance."** Another interviewee explained: **"We wanted to encourage our tenants to benefit from the technology that's available. We do have tenants that are on pay as you go meters that might live out in rural areas, so being on a smart meter and being able to top up remotely makes a massive difference for those tenants."** For others, there was a clear business case in being able to help tenants become more energy efficient: **"Obviously if tenants aren't heating their homes adequately the potential for disrepair, condensation and mould growth, so from our point of view if the tenants are heating homes they're looking after our assets I guess you could see it like that as well."**

As the first point of call for tenants in relation to changes to their properties, partners also felt that the project would enable them to better anticipate and respond to queries and requests for support from tenants: **"Yes, in a sense that, as a social home provider, as a landlord, residents will tend to come to us as a first point of call for most queries on most subjects, even though with their energy meter they're more likely to talk to their energy supplier, if it was a big change, they would normally come to us, either to ask permission for something to be changed in the property, or just that they're very confused about what was happening. So yes it did align with us needing to know what was happening in order to keep people informed."** Another interviewee further reiterated tis point: **"I think NEA has highlighted the fact that, potentially suppliers or their subcontractors who are fitting the meters, was going to fit a meter and then not maybe deliver the energy advice that they're supposed to, or in not enough detail, or perhaps not tailor it to households in the same visit that we would be able to if we were trying to give advice to people. And I guess, we haven't maybe thought about that in as much detail, since we went on the training course we realised that actually we do need to be able to support our vulnerable…not just vulnerable households, any households really to explain the in home display, and the energy saving capabilities through using that from having a smart meter, rather than just having a meter fitted and then ignoring it, and actually getting proper use of that in-home display. So yeah, that was why we wanted to have the training and deliver it ourselves as well."**

The alignment between stakeholder objectives and those of SMART-UP across multiple avenues suggests that Housing Associations could be well placed to deliver similar interventions in future to social housing tenants. Whilst charity partners may be well placed to engage and deliver interventions to private sector households (rented and owner occupier), there is the potential for other partners who might look to deliver interventions for similar reasons to those of the housing association partners (fuel poverty alleviation, asset management and maintenance, improving staff ability to provide support and advice) to be engaged. Involving organisations such as local authorities and Private Landlord Associations could maximise opportunities to reach this target group.

7.3 Data Collection

The frontline workers that we spoke with felt that it had been extremely difficult to access the consumption data of households as part of the project: **"I think one of the more difficult bits was the data consumption information, collecting that because a lot of our tenants perhaps didn't know where their last bill was, that you had to call the energy company, that could then mean waiting on hold for half an hour, by which point the tenant was saying "Now I've got to get to work" or "collect the kids" or what have you. So that was perhaps the hardest bit. The other thing was silly things like meter cupboards being blocked because they've got a piece of furniture in front of it and I had one where there was a massive Christmas tree in front and you can't really ask a tenant to move all those things out just to get the meter read."** This suggests that expecting households to provide meter readings as part of the data collection for projects such as these could lead to difficulties that prevent insights into changes in consumption patterns being identified. Indeed, the low percentage of respondents that actually provided accurate or any meter readings pre- and/or post-intervention indicates that relying on this level of household participation is not an efficient or effective way to collect such data.

One consideration for future monitoring would be to work with households and energy suppliers to access historic and on-going usage data.

In addition to difficulties in accessing meter readings and consumption data of households, some frontline advisors felt that there were issues with the questionnaires used to collect data. Some advisors felt that the questionnaires should have included more simple language: **"There were a couple of questions where I just felt some participants struggled to understand the questions, maybe it was a bit long winded for some people, for most it was fine but there were a few people where I felt myself having to sort of reword it because they were struggling to understand what I meant by it. But that was maybe one question, maybe two, I wish I could tell you which ones but I've forgot."**

Other households had expressed concerns about the nature of the questions they were being asked, and did not understand their relevance to the project: **"Sometimes the question about their health felt a bit intrusive for what might be your first phone call ever with them"** Similarly, we were told: "**There were questions regarding their education. They found, what's this got to do with the SMART-UP, how is this information gonna benefit the project, when it's to do with smart metering and in-house display unit? Where's the link?" So there were certain questions that they found irrelevant that they shouldn't be asking. Some customers they wouldn't answer that. And I think there was also to do with their health. There was health question as well, they found that they don't need to answer these questions. I'm not sure if there was another one, I'm just trying to picture it off the top of my head. They were looking at data protection. They were asking me, "Why do you want to know what my annual usage is, why do you need to take meter readings down?" They wanted to know why, so there were certain questions where I think the language could be simplified. And obviously shortened questions**." This therefore suggests that the reasons why particular questions were being asked needed to be better explained to households within the questionnaire, and that the questionnaire text itself could have been further simplified into plain English in order to make it more accessible.

Comments from another stakeholder showed that there are also ethical issues around participants who may not wish to divulge what they consider to be sensitive information, but who may feel obliged to do so in order to receive an incentive (though they were not required to answer all questions, and were given the option to state 'prefer not to say'):"**I did come across those, "Why do you need this information for?" What you want. Even though obviously after explaining the SMART-UP project, "Why should I give you this information? Smart meters already obviously data protection and so forth, and now you're asking me that information that I don't really wanna give." But because obviously the reason they were then willing to give it is because they knew that they were getting the vouchers. The High Street vouchers is the only reason why they've gone ahead and given that information and they were very upfront about it as well."** This suggests that the fact participants were not obliged to provide sensitive data as part of the project needed to be better explained.

Another observation from frontline workers was that the questionnaire itself had some issues in terms of repetition and accessibility, especially with regards to the introductory explanation provided around the project, data protection and the right to withdraw, again reinforcing the suggestion that this could be presented in a more user-friendly format. For example, one interviewee told us: "**I did find the kind of blurb at the beginning a bit time-consuming and sometimes a bit repetitive as well. You constantly felt like you were saying "You don't have to continue if you don't want to, let me know at any stage" and then you do that first of all and then you go on to the next form and it would more or less say a similar thing but in a different way. I appreciate you have to ask those things in order to cover any regulations or what have you**." Another explained: "**It was a really good questionnaire. I thought it was good…but there were a couple of questions where I just felt some participants struggled to understand the questions, maybe it was a bit long winded for some people, for most it was fine but there were a few people where I felt myself having to sort of reword it because they were struggling to understand what I meant by it. But that was maybe one question, maybe two."**

The length and wording of the questions was also highlighted as an issue by another frontline worker: "**Some of the questions were long. And some questions like obviously multi choice where you'd select the answers. But even those answers again that was confusing for them**." Similarly: **"They've got confused on page one in terms of what they're meant to fill out, and as far as what we're meant to fill out as well. In terms of the rest of the form, it is quite straightforward, but some of the terminology, I think, will probably go over some of the residents' heads. So, I think this form is okay for someone, like an officer, going in, filling out this form. I think it's quite okay, but I think, for the residents, they might think it's a bit "information overload".**

Others noted that the length of the questionnaire was problematic for the frontline workers themselves: **"I know that the Energy Advisor that was doing most of the surveys for us did find that quite time consuming, quite detailed, so perhaps a shorter version of it might have been a bit better. So that possibly did put other staff off delivering it as well, with them being on the training, and then saw the survey, and thought, "We haven't got time to do that." And actually you could make it relatively quick if the person answered the questions quickly, but if everything is done face to face it can take longer than you think, once you start going through bit by bit and you go off on a tangent in the conversation or what have you, and to actually fill in took quite a long time, so yeah I think a shorter survey could have helped."**

Some, however, felt that the length of the questionnaire was reasonable, given the extent of incentives that households were receiving: **"Yeah, I felt it was... considering the length of it it was a very reasonable length considering for someone to get... it was 20 or 30 pound vouchers, I think everyone who participated was sort of happy to sit there and listen to questions that amount of time considering it was quite a nice thank you they were getting for it if that makes sense. There was enough motivation to sort of sit and be patient through it, it wasn't like they were getting impatient or like ratty or can you hurry up, they thought it was quite a fair trade off I think."**

7.4 Delivery Challenges

A major challenge for stakeholders in being able to identify and recruit households was linked with the progress of the smart meter roll out in the UK: **"The difficulties for us were really finding enough smart meters in our area. I don't think the roll-out was advanced in this area as we had perhaps hoped."** Another told us: **"Although we had the training ready to go, actually the numbers who have got smart meters in the early stages were very, very low. And not only that we really struggled to identify where smart meters were fitted in order to deliver the advice as a retrospective thing after they've had a meter fitted, so that was what we found the most difficult, recruiting households, and having the numbers there that are actually all willing to engage, and understood what was happening, and who had got a smart meter."**

Some experienced difficulties in promoting the project to suitable households. For example, "**We used our tenant magazine called 'Streets Ahead' to promote the project but we had a lot of tenants calling in saying they wanted to be involved, but they turned out not to have a smart meter. And they thought that the housing association was providing smart meters, so it was that sort of frustration of having to explain to tenants that that was done through a supplier and perhaps tenants not fully reading or comprehending the message that we were trying to put out there."** This created further frustrations for social housing providers: **"If a tenant is calling up saying that they want a smart meter, we can then encourage them to call the supplier, but if the supplier's not yet rolling out in this area there's not a lot more we can do, but in effect we've raised tenants hopes of having one I guess by promoting the benefits of them. I'm sure others would agree we're all keen to help people remove themselves from fuel poverty and it's frustrating when you've got someone actively wanting a smart meter and be more aware and you can't go that next step to actually help them get the smart meter."**

However, stakeholders did take a varied and persistent approach in attempting to identify and recruit customers: **"In terms of trying to identify people we have a first contact centre that take all our calls for any repairs and things like that. So when they have time they were asking people whether they have a smart meter and letting me know if they did. We also had a little advert on the TV screens that are displayed in our reception about it. There were leaflets in our main office reception and also in our community centre building. We did an advert in our tenant forum, an article in our 'Streets Ahead' tenant magazine. If surveyors went into any empty properties or saw whilst they were visiting tenants any smart meters again they would let me know and I'd make contact with the tenants, but by far the best way of identifying smart meters was NEA liaised with an organisation called 'Money Angels'. To look at the national database of meters and identify**

which ones were smart meters for us. We basically provided them with a list of postcodes we weren't providing them with any tenancy data or anything like that. It was literally just postcodes where we had properties. That worked but even so sometimes you send over 100 or whatever and it would come back that there were only 2 in that area."

For others, more success was had in recruiting households into the project by integrating it into their everyday service delivery: **"We've actually got a sustainability coordinator for our group. She actually sent out letters to people who we've already identified as having smart meters, asking them if they were interested in participating in the project. That was one route, so we got the sales that way, but then, also, through doing home energy advice anyway, if we came across someone who may be suited to the project, we would flag it up to them. See if they want to be participators. There was some proactive stuff, but some of it, also, went into what we were doing anyway, and flagged up some of the options if they wanted to go via SMART-UP instead."**

At the same time, the target group themselves - due to the nature of the vulnerabilities they represent - were difficult to engage even after they had been identified: "**By contacting those households directly who we knew for sure had a smart meter, they still then didn't really want to engage in a lot of cases. So the numbers were quite small, and then from those small numbers people weren't as interested in having a visit as we thought they would be, so a combination of things really. But yes, I think struggling to recruit households was the biggest challenge."**

Some found the additional administrative activities required by the problem to be a burden, especially in light of the fact their participation in the project was voluntary: **"A lot of the *admin* aspects to it all seem to be, not onerous, but there was quite a lot of different fiddly stuff that we had to go through and process and to update these spreadsheets. I wouldn't normally expect to do all of that level if we're not getting paid. So, I did find some of the admin part a bit tedious."** However, the potential benefits to their tenants of participating in the project meant that they were willing to continue to participate, and complete the administrative reporting requirements: **"I'm being completely honest, but we did recognise that the customer was getting an additional benefit, which is why we just continued with it, because the customer was getting that additional benefit. So, that was the main reason why. Normally, for projects that require some form of admin, we would expect to be getting paid for, or some form of funding to do it directly to us. I did think that could be an issue and I could see why other organisations might not want to do that, would put people off, because we still have to find resource internally to get all of that work done."**

7.5 SMART-UP Legacy

Overall, stakeholders felt that the project had been worthwhile: **"I thought it was worthwhile scheme. It was well organised."** When asked if they thought it would be beneficial to continue delivering SMART-UP in the future, however, both managers and frontline workers felt that other pressures on their organisation might impede their ability to do so: **"I think it's a sort of ideal world question that. If we had the capacity and the resource to do it then yes, but I think it's unlikely due to the fact that we've got one energy advisor, we're in peak kind of referral for energy advice**

season at the moment with other people being concerned about the cost of heating and there isn't really the time to sort it. There's no additional workflow I'm afraid."

In addition, it was felt that the way the smart meter roll-out was being delivered in the UK could prevent their ability to continue delivering the project: **"I think we have to acknowledge whether there is much value in offering that as a service if there aren't that many smart meters present at the moment."** This was reflected in the comments of another frontline worker: **"We would like to deliver it, again, the problem has been, to an extent, the roll out speed seems to be still fairly slow and I think at some point when that kicks off we would definitely be needing to deliver this advice far more than we are at the moment. The numbers are still pretty low and if suddenly hundreds of households were getting, in our areas, suddenly getting smart meters fitted I think we'd have a lot more contacts from tenants that would then provoke the conversation again that we'd have to be able to support them more. But this is, the timing of the whole project, it's just a shame really that the roll out didn't match up with that, in terms of how quickly it's being delivered UK wide. If the training had happened and then suddenly we were inundated with requests from tenants for advice then that would have worked perfectly, but it didn't quite work in terms of the timing that way."** We were also told: **"The fact that it's not that prevalent, so if you've got a smart meter, and your neighbour has, and your family has, and everyone's talking about it, that might get you more engaged in actually using it, which again is nothing to do with NEA or this project really. But if the roll out had been a bit quicker, or more prevalent, I think that would naturally get people talking about it a bit more, but it might be a while off before people start getting, engaging in it a bit more, you know with the media, there was quite a lot of media coverage at the time about smart meters, and that sides died off a little bit now. If that starts to step up again, perhaps people might talk about it a bit more and engage more with it."**

Indeed, when asked how they thought we could build on the impacts of the projects, we were told that key would be to wait for smart meters to have a greater penetration amongst the target group: **"I think it's possibly about waiting until there is more areas with greater density of smart meters. Better understanding perhaps from the public as a whole about what a smart meter is and what it does, and whether by removing the option of a voucher you then get better engagement for the right reasons as well."**

Other frontline workers had issues with promoting smart meters as an option for vulnerable households at a point when smart meter functionality might not allow them to switch suppliers in order to access the best deal for them: "**I would say the smart meter roll out is sort of at odds with current... obviously a lot of current government energy policy and intervention is based around generating competition and ensuring people can make savings by making a really competitive energy market so that if vulnerable households as well can save money by such... through this provider or doing this and doing that this whole competition element is sort of at odds with the way in which the smart meter roll out has happened. Because trying to increase competition by switching between suppliers but instead you've got a lot of the most vulnerable customers trapped with one provider so if you want to try to get some off a Utilita smart meter at the moment it's so difficult because of different technologies and that sort of thing. You've got to get them to put it into credit mode which can take up to three months of doing all this and that, so I think you get mixed messages, it's difficult to sort of promote competition in the energy market**

but then not have the technology which actually allows for that to happen." They further explained: **"And it does put people off getting smart meters, as part of what we've been doing recently when we've gone and talked to groups of like, today I went to an elderly peoples, sheltered accommodation we're trying to make sure we give smart meter advice, just inform people about smart meters and a lot of people are saying we've heard it's difficult to switch supplier, is this true and I just have to stand there in front of a group of people and say, that is true, yeah, it is. If you get a smart meter it could potentially be really difficult for you to change supplier at the moment and it does put a lot of people... you see everyone's face sort of go oooh! But it's true unfortunately. Especially for elderly people who are a bit sceptical of technological change, it can really put them off."**

Frontline workers also picked up on changes that energy suppliers and smart meter installers could implement, in order to better meet the needs of vulnerable energy consumers: **"The energy companies need to be ensuring the people who are installing these smart meters and the home displays are actually delivering some advice there and then or just how to, how to use it because there's quite a big disparity between that delivery, it seems like some people have received really good advice straight away and some people had not received any. So I think a better effort at the early stage of intervention from the energy companies I think would be good."** We were also told: "**the smart meter roll out I don't know, I assume the energy companies are supposed to provide some sort of advice when they install a smart meter but I feel like they are just... well I know on certain occasions they just... this is your in home display here is a booklet, see you later and classing that as advice rather than actual... maybe the people who are delivering the advice at that level aren't aware of the wider aims of the smart meter roll out, the potential benefits, maybe they're just installers who've been given a brief to tick this box and fit the installation, give out the material, get gone. I feel like if the energy companies aren't making sure that those installers are briefed on the wider aims."**

At other times, stakeholders discussed wider changes that they would like to see in order to better address the experience of energy poverty amongst their tenants. **"One of the things that I've often thought of is whether it would make sense for the energy suppliers to have a shared priority service register. So if tenants are moved across different suppliers they're not perhaps losing their access to being on that register. And it just ensures that for instance if they had an energy advisor that remembered to ask those key questions that they don't slip off the register by switching supplier. And I think the movement towards the sort of default cheapest fixed tariff will be great. A lot of our tenants are vulnerable or perhaps don't understand how the world of energy works so they're put off from switching by the different terminologies."**

Others noted on-going issues around the tariffs and tariff information that are available for vulnerable energy customers, suggesting a need for wider changes within the energy market itself, beyond the availability of smart meters: **"I think work around getting basic tariff information to customers, and even different suppliers just having basic tariff information, instead of having loads of different tariffs. People can't decide which one's the right one for them. I think it's just, probably, doing…automatically being…if a tariff ends, then it's automatically put on the next best tariff, which in all, doesn't happen a lot and sometimes you'll get put on a tariff which is a lot more, depends…which means they're paying a lot more for their fuel. So, I think it's things around**

ensuring that people are getting the right information about tariffs, discount, and when they're not penalised for not renewing or switching. Especially if you haven't got access to the internet as well, seems like they penalise it even more, because a lot of the best deals are on the internet or it's a lot easier to do. I think it should just be a lot easier for people to be put on the best tariffs, without them having to call up as such, by default, they shouldn't be put on to a high tariff, as such, if they're deemed to be vulnerable."

However, stakeholders did describe the ways in which participating in SMART-UP had a positive and productive influence on their organisational practices: **"Well we came across a couple of instances where the energy company had refused to fit a smart meter for instance because there wasn't enough space on the board or because the tails needed to be extended for instance. And then the tenant would be querying with us who takes the cost for that. Now in effect that's for us as a housing association, it isn't something that we would expect to budget for. I definitely think there are kind of areas that haven't been explored or that we weren't aware of prior to going into the trial or pilot."** Others had continued to deliver SMART-UP advice, even after their participation in the pilot had ended: **"We've incorporated into our service a little bit, I know I have, in that sense it's definitely worthwhile 'cause I help people out using that advice outside of the project now."**

Some were keen to see a continuation of SMART-UP training going into the future, in order to ensure a continuation of advice provision to households: **"Yeah I mean if there was funding, if there was resources available to do it, I think rolling out the training element again at some point in the future, 'cause staff will have changed and/or forgotten, and/or rolls will have changed in terms of housing association, so yeah doing the training again definitely. Possibly having it as a half day workshop 'cause actually four hours is, that was really good, but also just like a small bite sized version of it, overall that might be quite helpful, do it like a…so advisors giving detailed advice for over an hour that training is great for them, but front line staff they might be going into to maybe do a gas service or a repair or whatever it might be, just the general awareness… if you have that sort of shorter training element as well. And then it could always be followed up by the more detailed, face to face energy advice showing you how to use the meter. But actually that wouldn't necessarily be needed in every case it's more just a general awareness, which might get the message out to more people."** This desire arose from the fact the frontline advisors that we spoke with had found the information so useful to integrate to their existing services: **"I enjoyed doing it, it was a good project, it was well designed and it was useful to have also... following from the project I've been able to give the rest of our team a little bit of training on how to sort of tailor smart meter, in home display related energy efficiency advice. We sort of do give energy efficiency advice, we occasionally help people with their smart meters but I think what particularly helps is to link the two together and tailor it to an individual."**

7.6 Training

Stakeholders that we spoke with had found real value in the training they received through SMART-UP, and gave examples of how this had benefitted them to delivery services to vulnerable tenants: **"I've had examples recently of people who hadn't been living in properties for very long and had moved into housing associations, there's one this week actually, she'd been moved into a housing association house and she'd been charged like eight hundred odd pounds in the first couple of**

months and realised after a lot trouble shooting that when the change of tenancy happened, it's happened a couple of times now, when the change of tenancy happens the housing provider provides the energy company with a meter reading, nobody knows how to read the smart meter so they're just pressing a button getting whatever number it is on the actual meter box and then giving that to the energy companies, no knows the figure meter reading... that's where training is really useful I think on that. These people just don't know, it's causing a lot of difficulty with stuff like that. It was like a single mum with a eight hundred pound bill for two months. It can really traumatise people. That's a good example of why it helps to train the trainers." Another told us:**"On average I do about five visits per day, I do about 25 to 30 plus a week. You can imagine I'm always promoting smart meters, there's never a house that I go to that I don't. So since SMART-UP, obviously since the training I received from NEA, the SMART-UP project, I've really been pushing it. Especially with the government and now that they've got the smart tariffs available, so it just makes it a lot easier."**

At the same time, the variation in the type of smart meters currently available in the UK could complicate the extent to which some advisors could practically apply the knowledge they had gained during their training: **"It was useful, yeah. It sort of gave me a bit of confidence going in but I think there's only so much training you can do with smart metres, a lot of it you have to sort of get the feel of it for yourself I find. It was useful in giving me a bit more confidence going into the project but I think... especially when you've got different kinds of displays, different brands, you sort of have to pick up the differences and sort of get a feel for it, yeah."** Another explained: **"With the different smart meter types that are out there at the moment that was a little bit of a challenge, it just reminded me with us talking about SMETS2 and stuff, I visited a couple of people whose smart meters were just like three or four years old, just so difficult to use and it was just really difficult to give advice about them because it didn't correspond to any training I'd had."** Similarly, we were told: **"What I think it difficult for somebody like myself that's going into a property to speak to somebody about smart meters is that there are so many different smart meters and in-home displays, so to practically show someone how to use them, it's a matter of being familiar with all the different devices and it's not like e-on have one device, they might have three different generations of device."** This suggests that training courses might benefit from an inclusion of a broader range of smart meter types. At the same time, there is also an implication that the energy regulator needs to consider the implications of an inconsistent roll out in terms of the type of smart meters being provided to customers (and their capabilities).

Overall, however, stakeholders considered that the training they received through SMART-UP was useful: **"Yeah I think it sort of consolidated my understanding. It did give me a bit more information about the smart meter protocol and what the suppliers were and weren't allowed to do."** Another described how: **"my manager is quite keen for me to share what I've learnt with the rest of the team and as far as I'm aware they found it quite useful as well."** We were also told: **"the training was really good, and very detailed, and in depth, and really informative."** Similarly: **"Because of my job role I actually did find the actual course useful. It just meant that it's maybe a bit more easier for me to go out and to give them advice regarding smart meters, what the benefits are of having these smart meters. Which kind of made things a bit more clear for them."** There was also evidence to suggest that advisors could benefit from on-going training to make sure they're able to keep abreast of developments regarding smart meters and their roll out: **"The smart**

meters training was effective and I do try and keep up to date with what's going on with smart meters, there's news coming out all the time about changes and various bits and bobs of information so I think I try and make sure I stay up to date with it 'cause people will ask me, if someone's not sure about something to do with smart meters they'll ask me because they'll know that I worked more with it than they have so they're able to come to me for advice basically."

At the same time, whilst the training was considered to be useful, stakeholders reminded us that the ability of their staff to deliver advice to households could be limited due to the time and resources pressures placed upon them: **"The challenges that we had where we did get quite a number of staff trained up in the early days to deliver the advice, but actually when it came down to doing that, they had roles that were quite busy in terms of their main housing roles and they struggled then to fit in delivering smart meter advice as well. So really there was a lot less staff actually delivering advice in the end than were training. But everyone found it useful, it was interesting and it really helped expand people's knowledge. I think it was a combination of the timing, in terms of as I've said before, smart meters and things, and also finding staff that would have the time, 'cause actually the visits themselves were quite time consuming. So if it had been tying it in with something else, but it was quite a short survey, that might have worked a bit better, or if we'd had more internal energy advisors who were doing that sort of work anyway, it'd tie in exactly with what they doing, which was the, the one advisor advice that we did have. We didn't have enough people in that sort of a role that could spend that much time with people around one particular issue. So yeah, a combination of things really, but the training course in itself was genuinely really good."**

7.7 Summary

This section has focused on the feedback received from stakeholders during our interviews with frontline workers and managers.

Overall, the stakeholders that participated in the project felt that SMART-UP was closely aligned with the objectives of their organisations in terms of fuel poverty, energy efficiency, sustainability, and enabling tenants to remain comfortable and debt free in their homes. For some, there was a clear business case in being able to help tenants become more energy efficient (in terms of maintenance of the housing stock). As the first point of call for tenants in relation to changes to their properties, partners also felt that the project would enable them to better anticipate and respond to queries and requests for support. The alignment between stakeholder objectives and those of SMART-UP across multiple avenues suggests that Housing Associations could be well placed to deliver similar interventions in future to social housing tenants. Whilst charity partners may be well placed to engage and deliver interventions to private sector households (rented and owner occupier), there is the potential for other partners who might look to deliver interventions for similar reasons to those of the housing association partners (fuel poverty alleviation, asset maintenance, improving ability to provide support and advice) to be engaged. Involving organisations such as local authorities and Private Landlord Associations could maximise opportunities to reach this target group.

Stakeholders also provided insights around areas in which the process of data collection could be refined and improved upon. A major difficulty for all partners was in access the consumption data of households. Expecting households to provide meter readings as part of the data collection process led to low numbers of participants providing accurate (or any) meter readings. Future attempts to collect such data should assess possibilities around accessing smart meter data on historic and on-going household consumption. This would require the establishment of data sharing agreements between the delivery organisation, the energy supplier and households. Whilst the new Digital Economy Bill may provide opportunities for data sharing, this will need to be monitored and assessed in more detail going forward.

In addition to difficulties in accessing meter readings and consumption data of households, some frontline advisors felt that there were issues with the questionnaires used to collect data. Some felt the language used was too complex, and that the reasons for asking certain sensitive questions had not been explained well enough to households. There are therefore areas in which future data collection tools could be improved, especially in relation to the simplification of language into plain English and clearer explanations for the reasoning behind particular questions. In order to avoid ethical issues around participants feeling obliged to divulge sensitive information in order to receive an incentive, the fact that they are not obliged to answer any questions could be reiterated more clearly throughout the questionnaire.

Stakeholders also noted that the length of the questionnaire was problematic for the frontline workers, especially when they have a limited time in which to visit a household. This may have affected the willingness of other advisors to deliver SMART-UP interventions, and this should be taken into account for future delivery of similar interventions. This theme repeatedly emerged in conversations with stakeholders, where the administrative activities associated with participating in the project were found to be overly burdensome, especially in the light of such participation being voluntary.

As discussed in Section 2, a major challenge for stakeholders in being able to identify and recruit households was linked with the progress of the smart meter roll out in the UK, and the limited number of vulnerable households with smart meters. Nevertheless, stakeholders continued to take a varied and persistent approach in attempting to identify and recruit customers throughout project delivery. Overall, stakeholders felt that the project had been worthwhile. When asked if they thought it would be beneficial to continue delivering SMART-UP in the future, however, both managers and frontline workers felt that other pressures on their organisation might impede their capacity and ability to do so.

Stakeholders also had recommendations for how advice delivery could be improved in future. This included a need to make sure advice delivered on smart meters and energy efficiency included wider issues such as switching suppliers and accessing further help. At the same time, they raised concerns around the promotion of smart meters to vulnerable households at a time when smart meter functionality may not allow them to switch suppliers in order to access the best deals. Importantly, they also picked up on changes that energy suppliers should implement in order to better meet the needs of vulnerable energy consumers - including delivering more detailed, tailored and effective advice at point of installation.

Overall, SMART-UP had had a positive and productive influence on the organisational practices of stakeholders, in terms of allowing them to deliver (and anticipating need to deliver) wider and previously unexpected forms of support to households. Some had continued to deliver SMART-UP advice, even after their participation in the pilot had ended. They were keen to see a continuation of SMART-UP training going into the future, in order to ensure a continuation of advice provision to households. Indeed, stakeholders had found real value in the training they received through SMART-UP, and gave examples of how this had benefitted them to delivery services to vulnerable tenants.

At the same time, the variation in the type of smart meters currently available in the UK could complicate the extent to which some advisors could practically apply the knowledge they had gained during their training. This suggests that training courses might benefit from an inclusion of a broader range of smart meter types. Additionally, the energy regulator needs to consider the implications of an inconsistent roll out in terms of the type of smart meters being provided to customers (and their capabilities) going forward.

Section 8: Conclusions and Recommendations

8.1 Conclusion and key learnings

The aim of SMART-UP was to understand the impact that tailored energy advice can have on the active use of a smart meter and in-home display (IHD) to manage energy consumption in vulnerable households. It developed a training program for installers, social workers and other frontline workers in contact with vulnerable consumers that would enable them to inform their service users about the benefits of smart metering, and to advise them on how to get the most out of their smart meter and IHD. The project was then able to gather feedback on the ways in which different methods of delivering advice were able address the specific needs of vulnerable consumers, empower them to engage with their smart meter, and become more energy efficient.

8.1.1 Targeting and recruitment

As a result of the project, NEA was able to develop and customise a number of new tools for providing information to consumers. These included the *SMART-UP & take control of your energy use: A guide to u sing your smart meter to manage your energy use* and the *My SMART-UP Energy Diary.* The standard SMART-UP intervention aimed to engage directly with vulnerable consumers through frontline staff (trained by the project) to encourage them to actively take-up smart meters, and to provide them with information and advice so that they will be in the best position possible to use smart meters to save energy and money. The project also included a small pilot that was delivered to a sub-sample of householders, including a control group. The aim of the pilot was to assess in more depth the value and impact of varying combinations of the main intervention in order to understand which was most successful in enabling households to achieve energy and financial savings, and which were most appropriate to the needs of vulnerable energy consumers.

Due to significant issues regarding the nature of the smart meter roll out in the UK, the project faced complex barriers in being able to engage the target number of households for the standard intervention. This resulted in a total of 105 vulnerable households (out of a target 1000) being engaged by the project. Of these, 82 (out of a target of 60-65) were allocated to the experimental pilot and control groups. To allow for more effective comparison of results and analysis of impact, it was therefore decided that the remaining 23 households in receipt of the standard intervention would be treated as a fifth experimental group within the pilot (receiving a standard SMART-UP advice visit and information pack). Enhanced (Groups 1 and 2) and standard advice (Group 5) was delivered to households together with the information pack, talking households through exercises and information about how to get the most out of their smart meter to control their energy and save money. The aftercare service (delivered to Experimental Groups 1 and 3) consisted of 3 follow-up calls at the 2-week, 3-month and 6-month mark to enquire if households need further information on using their smart meter and advice on saving energy. These calls were delivered by the Housing Association advisors who delivered the original intervention.

Barrier's to the project's ability to identify and recruit suitable households included:

- The delay to the start of the roll-out of smart meters in the UK (from autumn 2015 to Spring 2017, for some suppliers)
- Smart meters not being roll-out on a regional basis
- Lack of appetite amongst suppliers to add to the complexity, duration and resources needed during an installation visit by incorporating SMART-UP resources
- Limited pool of vulnerable consumers with a smart meter installed given that suppliers are not yet targeting such customers in large numbers
- Suppliers who were rolling out smart meters already had specific training programmes in place that met SMICoP requirements
- Data protection laws preventing data on customers with smart meters being shared by suppliers with NEA or housing association partners

Despite such barriers, NEA's delivery partners took significant steps to promote the project to tenants and to recruit eligible households into the project. Indeed, partners were successfully able to target and engage households that were likely to be vulnerable to energy poverty or to need additional support in using and understanding their smart meter and IHD in order to become more energy efficient. Within the total sample of households recruited into the project:

- 89% lived in housing in the social rented sector
- 46% had at least one child living with them
- 31% had at least person aged 65 or older
- 75% were living on incomes of less than £16,000 per year
- 89.5% were receipt of means-tested benefits
- 51% had at least one household member of working age that was unemployed or unable to work
- Only 14% had at least one household member in paid full or part-time work
- 73% had at least one person in the household with a long-standing physical or mental health condition or disability
- 23% had no formal qualifications, and only 11% had a higher education or undergraduate qualification
- 52% of households had someone at home all the time every day

Overall, SMART-UP households were at a greater risk of being in energy poverty, suffering from digital exclusion and of requiring additional support to engage with their smart meter and IHD. This indicates that the project was well targeted at those who were in most need of support.

Stakeholders that participated in the project felt that SMART-UP was closely aligned with the objectives of their organisations in relation to addressing fuel poverty and helping tenants to remain comfortable and debt free in their homes. For some, there was a clear business case in being able to help tenants become more energy efficient (in terms of maintenance of the housing stock). As the first point of call for tenants in relation to changes to their properties, partners also felt that the project would enable them to better anticipate and respond to queries and requests for support. The alignment between stakeholder objectives and those of SMART-UP across multiple avenues suggests that Housing Associations could be well placed to deliver similar interventions in future to social housing tenants. Whilst charity partners may be well placed to engage and deliver

interventions to private sector households (rented and owner occupier), there is the potential for other partners who might look to deliver interventions for similar reasons to those of the housing association partners (fuel poverty alleviation, asset maintenance, improving ability to provide support and advice) to be engaged. Involving organisations such as local authorities and Private Landlord Associations could maximise opportunities to reach this target group.

8.1.2. Impact on energy vulnerability

Analysis of the electricity payment methods used by participants, the most common uses for electricity within the sample, and the extent of market engagement amongst sample households revealed the presence of significant indicators of vulnerability to energy poverty and the existence of barriers that could potentially prevent households from engaging in the competitive energy market, or from being able to reduce their electricity usage to the extent that it would not compromise wellbeing.

The high proportion of participants that paid for their electricity via PPM (63.5%) suggests an increased risk to fuel poverty, self-disconnection, and disengagement from the competitive energy market. Indeed, the fact that the majority of SMART-UP households had not switched energy supplier following their intervention (71%) indicates that further work needs to be done to enable vulnerable households (on PPMs and at risk of digital exclusion) to engage with the competitive energy market as part of advice delivered on smart metering and energy efficiency. Further measures need to be put in place to ensure that households with smart meters will not suffer detriment from switching (by losing the smart functionality of their meters).

The primary reasons for which households were using electricity in the home indicate that the areas with the most scope for potentially reducing domestic electricity use related to cooking (68% of households) and water heating practices (54% households). However, it is essential to note that the primary uses of electricity for some households - such as primary space (12%) and water (54%) heating - put them at a greater use of energy poverty due to the fact that they were likely to be paying more for their energy. Those who were using electricity as their primary method of secondary heating (25% households) were potentially suffering from an additional expense in order to achieve adequate warmth at home. The fact that such secondary appliances were required in the first place indicates that their primary heating systems were either inefficient at providing adequate levels of warm, and/or cost too much to run. In either case, such participants were at risk of under-heating their homes (reducing the potential for them to decrease their energy use further), or could have faced barriers to being able to save energy that were not related to behaviour (inefficient properties/heating systems). It is also important to note that the focus of the project on electricity use could have been problematic for those households who were not using electricity as their primary heating sources.

Some households were living with costly, non-existent or inefficient heating systems and might have been unable to use the levels of energy required to meet their basic needs for comfort and warmth at home, prior to the behaviour change intervention taking place. Households were likely to be regularly weighing up decisions to turn the heating on or off, and making complex compromises in

their everyday lives with regards how to they managed their heating and energy needs. Indeed, in such cases, behaviour change and smart metering advice may not be enough to enable households to save energy to the extent that they would be able to take the savings as increased levels of warmth at home. Whilst SMART-UP might have enabled some households to take action to manage their energy use, it did not necessarily resolve the precariousness of their financial situation, or improve the efficiency of their properties/heating systems (only their behaviours). This therefore could act to limit the extent to which their worries about being able to afford to meet the cost of their energy, even for their basic needs, could be alleviated.

Following the SMART-UP intervention, there was an increase in the proportion of respondents who felt that they were taking actions to reduce the amount of energy they were using at home, and in the number of behaviours being carried out. This suggests that the project did enable households to take more action to manage their energy use at home, either through accessing hints and tips around how to do so, or having the benefits of doing so demonstrated to them. The fact that most energy saving behaviours post-intervention centred around turning off appliances, lighting, clothes-washing and water practices indicates that SMART-UP advice was able to resonate with households' everyday practices of electricity use in the home. However, there continued to be indications that some respondents were resorting to harmful rationing practices, especially in relation to their central heating. Whilst these practices meant that households were not actually using energy for their central heating, the response was a survival mechanism to coping with energy vulnerability, and one that should not be encouraged as a means for reducing energy consumption.

This tension between energy efficient behaviours and the practice of harmful rationing to reduce consumption was perhaps reflected in the fact that the proportion of participants giving a great deal or fair amount of thought to how much electricity or gas they used at home actually increased following the SMART-UP intervention. Whilst advice delivered the SMART-UP might have enabled some households to give more thought to how they used and managed energy in the home, the limited scope some households may have had to further reduce their energy use in the first place could have meant the intervention was unable to alleviate escalating worries about paying for energy or meeting their energy needs for comfort and warmth at home.

This is supported by the limited change seen in household's concern with using less energy to save money post-intervention. Whilst the project could enable people to manage (and potentially reduce) their energy use via their smart meter, this does not necessarily imply a corresponding significant increase in household disposable income (that could be achieved through receiving income maximisation advice or providing energy efficiency improvements in the form of hard measures or fabric improvements to properties, for example). At the same time, the fact that there was a still decrease in the proportion of households concerned with using less energy to save money following the intervention (albeit a small one) does suggest that the project could have helped some participants to feel more able to manage their energy use and therefore act upon the need to save money more effectively. What this does also show is that, when looking to engage vulnerable households around energy management through a smart meter, messaging that focuses on potential cost savings could be effective in securing that engagement in ways that are meaningful and important to those households.

Insights from the wider energy behaviours and practices of SMART-UP households revealed a complex interplay between energy poverty (that sees energy rationing and potentially harmful rationing behaviours being carried out) and energy efficient behaviours (that encourage more positive actions to reduce unnecessary energy expenditure). Rather than looking to encourage vulnerable households to reduce their energy consumption as a whole, analysis of household thoughts and behaviours highlights the importance of delivering advice that can encourage positive energy efficient behaviours to reduce consumption and also support households in increasing their consumption in areas where harmful or negative rationing practices are being enacted. Indeed, data from participants did show that they were engaging in more energy efficient behaviours after the intervention, and ones which were targeted at those areas where they were likely to be using more electricity. However, whilst behaviour change advice can enable some positive behaviours to be carried out, if carbon savings are to be aligned with energy poverty alleviation then interventions should include a range of measures and activities that could enable households to use the energy required for comfort and wellbeing without unnecessarily over-consuming. Ideally, such intervention packages would include: behaviour change advice, energy efficiency measures (installed through grants or financial aid), income maximisation advice and fuel debt alleviation, and further advice around supplier/tariff switching and payment options. It is also essential to note that measuring such interventions by energy savings achieved alone could act to cloud the complex relationship between carbon-saving and fuel poverty reduction, and necessitates an acknowledgement of additional, positive outcomes such as increased comfort, warmth and wellbeing in vulnerable households.

8.1.3. Impact on smart metering behaviours

Whilst the effectiveness of the project in enabling households to overcome energy vulnerability in itself was unclear, feedback from both participants and frontline workers indicated that it was successful in enabling vulnerable households to understand and engage with their smart meter and IHD.

Household experiences of supplier advice at point of installation showed that a third were dissatisfied with the information given to them. This suggests that some households are being left without the additional support and guidance that they require from their energy suppliers with regards to how to use and get the most out of their smart meter. This is particularly the case for households with needs requiring a more tailored and detailed approach.

However, following the SMART-UP intervention, respondents (particularly in Groups 1 and 3) were more likely to:

- Check how much electricity they are using right now more often
- Use the traffic light system to monitor their electricity use
- Check how much an appliance costs to run
- Check how much electricity they had used in the previous day, week or month
- Set a budget or target for how much electricity they want to spend in a day, week or month
- Feel that they understood how to use their IHD
- Find the IHD useful to help monitor and manage electricity use in their home

- Feel that they were getting the most out of their IHD to help monitor and manage electricity use in the home

However, there were also increases for certain behaviours amongst the control group, where participants were more likely to:

- Use the traffic light system to monitor their electricity use
- Check how much an appliance costs to run
- Set a budget or target for how much electricity they want to spend in a day, week or month
- Find the IHD useful to help monitor and manage electricity use in their home

This indicates that, whilst SMART-UP advice was extremely effective in encouraging vulnerable households to use such functionalities of their smart meter, some households still acquired the habit either independently or through other information sources. Nevertheless, the most effective means of enabling or encouraging households to engage in such behaviour seems to be the advice package delivered in group 1, and secondly in group 3. Whilst the methods used in group 2 did also encourage this behaviour, the methods do not appear to have been as successful as the more in-depth, face-to-face advice (though it is important to note that findings are likely to be affected here by the small overall sample size).

In terms of overall impact upon smart metering behaviours, the most effective formats of advice delivery included the provision of a SMART-UP information pack alongside enhanced and tailored advice that was either be delivered face to face or over the phone with participants.

Households were less likely to use their IHD/app once a day or more *after* their SMART-UP intervention than they were before. This could however relate to the fact that once households understand their energy practices, usage and the running costs of appliances (and they have taken steps to address anything they feel needs to be addressed), they may no longer feel the need to check their IHD or app as frequently as they did previously – a finding which resonates with other, existing studies. However, there was also an increase in the number of households who said that they do not have an IHD or app post-intervention (possibly a result of having changed suppliers during the lifetime of the project and losing the 'smart' functionality of their meters. Or, it could be a result of respondents misunderstanding either the question or what was meant by IHD/app, or faults with their smart meter and IHD preventing their active use). Some households, however, were genuinely dissatisfied after their smart meters were installed, especially with regards to the time delays in switching from credit to emergency in the pre-payment function. Others were dissatisfied with the performance and functionality of their IHD in comparison to those of their neighbours – in some cases when those neighbours were with the same supplier. This suggests that more needs to be done by certain energy suppliers to ensure that customers on a pre-payment functionality are not put at increased risk of vulnerability by their processes should they need to run into their emergency credit, and also that the quality of services and products delivered to all customers is consistent.

8.1.4. Methods of advice delivery

8.1.4.1 Enhanced advice

The enhanced advice delivered through the project improved participant understandings of their smart meter and IHD, and the kind of information they could access through it. Households were likely to use their IHD more often and for reasons that they previously hadn't. The information was felt to be more accessible, and participants felt more in control of their energy usage. Households were also more aware of the actions that could be taken to save energy at home. In some cases, the advice provided had encouraged households to move away from more harmful energy rationing practices intended to reduce consumption, and meant that their energy use could be managed in more positive ways from which households could derive energy savings *and* personal benefit. Whilst responses from participants in receipt of the standard advice intervention mirrored the positive trend of the enhanced visit, a valid comparison between the two intervention types was not possible due to the small sample size in group 5.

Delivering advice face-to-face to households meant that advisors could tailor their approach, and adapt it to the requirements and interests of each household. Overall, recipients of both the standard and enhanced advice interventions were happy with advisor's knowledge of the subject and the way in which the information was communicated to them. They felt that the visits had met their needs, and were generally satisfied or very satisfied with their advice visit.

8.1.4.2 Paper-based resources

With regards to the 'SMART-UP and take control of your energy use' pamphlet, respondents found it useful to an extent. Having information in written form that could be reviewed in a participant's own time and at their own pace increased their ability to take that information in and apply it to their own energy practices. Not having to rely on the memory of what had been told to them in a face to face visit meant households had the security of knowing they had resources to consult should they forget something at a later date. Overall, however, advisors felt that the written information was most effective when combined with a face-to-face advice visit, so that households could use it as a tool to refer back to, rather than being their main source of information. They were also still concerned that having different IHDs in different households might not only affect the applicability of certain guidance for particular displays, but limited the possibilities for the knowledge to be cascaded by participants themselves to other members of their community.

Only 33% of respondents said that they used the SMART-UP Energy Diary. Whilst take-up of the tool was somewhat limited, then, those who did use it found relief in being able to do their own calculations and validate what they were seeing on screen. Seeing the information on paper could make patterns in energy use more clear for some participants who were uncomfortable with digital tools. Whilst not the most appropriate tool for everyone, the diaries could be of great use to those who had particular needs and requirements. There was a suggestion from frontline workers that the tool could be improved by including more pages, to allow households to track their energy use over a greater period of time.

8.1.4.3 Telephone advice

The aftercare telephone service was felt to have been useful by participants, though they were perceived as being less effective as the enhanced advice visit. Nevertheless, they offered households

security in terms of being able to clarify points with advisors and request further information (hence ensuring they were able to continue to engage with and use their smart meter and IHD). The calls also helped to make sure households could receive prompts from advisors, who were able to understand where participants might have been continued difficulties in using their IHD. Some vulnerable households who did not respond to calls and who were therefore unreachable by the aftercare services remind us however that such a method of delivering advice would not be suitable for all households. Nevertheless, this does reinforce the benefit of simultaneously providing written information that can be consulted by participants at their own leisure and pace.

The calls were also useful for frontline advisors in terms of being able to monitor the on-going impact of the project, and to assess which households were taking the information on board. This facility for on-going monitoring provided advisors with the confidence that they could recommend delivering the SMART-UP intervention to colleagues. Although the visibility of impact could act to expand delivery going forward, tensions developed between the desire to deliver advice and the capacity of partner organisations to dedicate so much staff time to one intervention.

8.1.4.3 Effective advice delivery

The most effective format of advice delivered through SMART-UP was the combination of enhanced face-to-face advice, the provision of written information resources, and the telephone aftercare service (delivered to group 1). Offering advice in multiple formats meant participants with varying needs and vulnerabilities could find the best way of accessing information to suit them.

Ways in which advice could be further improved for future delivery include:

- Timing: ensuring advice is delivered as close to the date on which a smart meter is installed in a household as possible
- Wider advice: providing more holistic interventions that give guidance on switching suppliers/tariffs and payment methods, as well as fuel debt and income maximisation advice (or ensuring that referrals into services that offer such advice can be made)
- New formats: Presenting advice in additional ways (such as via digital or online video content) in order to ensure the maximum number of households can be engaged by an intervention
- Capacity: acknowledging that enhanced and tailored advice delivered in a variety of formats requires organisations to invest additional staff time and resources into delivery

8.1.5 Future SMART-UP delivery

A major difficulty for all partners was in accessing the consumption data of households. Expecting households to provide meter readings as part of the data collection process led to low numbers of participants providing accurate (or any) meter readings. Future attempts to collect such data should assess possibilities around accessing smart meter data on historic and on-going household consumption. This would require the establishment of data sharing agreements between the delivery organisation, the energy supplier and households. Whilst the new Digital Economy Bill may

provide opportunities for data sharing, this will need to be monitored and assessed in more detail going forward.

In addition to difficulties in accessing meter readings and consumption data of households, some frontline advisors felt that there would be benefit in simplifying evaluation and monitoring information. Specifically, this should ensure that the language used is simple and accessible, and that participant rights or reasoning behind questions are explained in ways that make sense to participants with limited literacy skills. Furthermore, lengthy monitoring questionnaires could reduce the willingness of frontline advisors to deliver SMART-UP interventions due to limited staff capacity and resource and increased administrative burdens.

Overall, stakeholders felt that the project had been worthwhile. When asked if they thought it would be beneficial to continue delivering SMART-UP in the future, however, both managers and frontline workers felt that other pressures on their organisation might impede their capacity and ability to do so (especially if future delivery was to be voluntary). Similarly, the low penetration of smart meters amongst their target base to date decreased the likelihood that they would choose to invest additional resources in such activity at the minute. They also raised concerns around the promotion of smart meters to vulnerable households at a time when smart meter functionality may not allow them to switch suppliers in order to access the best deals. Importantly, they also picked up on changes that energy suppliers should implement in order to better meet the needs of vulnerable energy consumers - including delivering more detailed, tailored and effective advice at point of installation.

Overall, SMART-UP had had a positive and productive influence on the organisational practices of stakeholders, in terms of allowing them to deliver (and anticipating need to deliver) wider and previously unexpected forms of support to households. Some had continued to deliver SMART-UP advice, even after their participation in the pilot had ended. They were keen to see a continuation of SMART-UP training going into the future, in order to ensure a continuation of advice provision to households. Indeed, stakeholders had found real value in the training they received through SMART-UP, and gave examples of how this had benefitted them to deliver services to vulnerable tenants.

But, the variation in the type of smart meters currently available in the UK could complicate the extent to which some advisors could practically apply the knowledge they had gained during their training. This suggests that training courses might benefit from an inclusion of a broader range of smart meter types. Additionally, the energy regulator needs to consider the implications of an inconsistent roll out in terms of the type of smart meters being provided to customers (and their capabilities) going forward.

8.1.6 Concluding remarks

Despite encountering significant difficulties in being able to target and recruit sufficient numbers of households, those households that were engaged by SMART-UP were likely to be vulnerable to energy poverty, digital exclusion, and to require additional support in being able to use, understand and make the most of their smart meter and IHD. The project was able to encourage participating households to engage in more (and more positive) energy efficient behaviours. However, it also made visible the complexities and tensions inherent in encouraging carbon reduction through

energy savings within an already vulnerable population likely to be living in energy poverty. As a result, the project highlighted the need to combine behaviour change advice alongside other measures (such as the provision energy efficiency measures, income maximisation advice and fuel debt alleviation). This would ensure energy poor households are able meet their energy needs for comfort and warmth whilst carrying out positive energy saving behaviours that would not be detrimental to their health and wellbeing. Nevertheless, advice delivered through SMART-UP was successful in enabling vulnerable households to understand and engage with their smart meter and IHD, increasing the range of purposes for which they used them, as well as the frequencies with which such tasks were carried out. The positive impact of SMART-UP advice on smart metering behaviours of households revealed that providing tailored and enhanced advice in a variety of formats can enable and empower vulnerable households to take control of their energy use.

8.2 Recommendations

8.2.1 For frontline workers looking to support vulnerable households in engaging with and understanding their smart meter and IHD

Trusted intermediaries are well equipped with the necessary knowledge and skills to reassure, educate, advise and guide householders, and without this here is a risk that vulnerable consumers will miss out on the benefits that smart meters and IHDs can prompt.

Frontline workers looking to effectively deliver advice on smart metering and energy efficiency to vulnerable households should look to provide advice in multiple formats and to tailor it to the particular needs and requirements of the household in question. This can include a mixture of face-to-face and paper-based advice, as well as offering the possibility of follow-up checks via the telephone.

Feedback from frontline workers involved in delivering smart up indicated that this package of advice could be further improved upon by delivering the intervention as close to the time when households received a smart meter as possible, and providing a more holistic intervention that could cover multiple aspects of a household's relationship with energy and the energy market (not just smart meters). Furthermore, including additional "leave behind" advice delivery formats following the face to face interaction would amplify the this form of 1-1 engagement.

At the same time, frontline workers they raised concerns around the promotion of smart meters to vulnerable households at a time when smart meter functionality may not allow them to switch suppliers in order to access the best deals. Importantly, they also picked up on changes that energy suppliers should implement in order to better meet the needs of vulnerable energy consumers - including delivering more detailed, tailored and effective advice at point of installation. Future advice delivery would need to take this into account.

8.2.2 For policymakers to enable effective advice delivery and evaluation of impact

To enable frontline workers to deliver effective advice to households post installation, additional grant funding should be made available to support intermediary organisations interested in delivering post-installation smart meter and energy efficiency advice to vulnerable households. There is also currently little information about how or when individual suppliers are rolling smart meter technology or the approaches they are already taking to engage vulnerable consumers to ensure they too capture the benefits of more accurate billing and greater control of their energy use. By developing a GIS based map of where smart meters have been installed, this would support external organisations to follow up installations to amplify the benefits by providing more extensive behaviour change advice and support.

There must also be more effective mechanisms for identifying and targeting vulnerable consumers who may require additional support with using and understanding their smart meter/IHD on a long-term basis. For example, some poorer households may take gains from positive energy saving behaviours as increased thermal comfort at home (and therefore increase consumption elsewhere). Outcome measurements of such interventions would need to take improvements to health, wellbeing and reductions in overall energy vulnerability into account. Outcome measurement and reporting requirements would also need to be updated accordingly. Behaviour change interventions to reduce consumption in energy poor households are also likely to be more effective when delivered alongside fabric improvements to dwellings and the provision of energy efficiency measures, as well as income maximisation advice and fuel debt alleviation measures in order to avoid the negative outcomes of under-consumption and ensure maximum gains from positive, energy efficient behavioural changes can be made.

Energy suppliers and network companies must make the most of their current obligations to identify customers in vulnerable situations (via the Priority Services Register) and providing them with necessary assistance. *The UK* Government could also consider how possibilities presented by the new Digital Economy Act which could enable data sharing agreements (between suppliers, households and trusted local intermediaries) to provide historic and on-going consumption data of households in receipt of interventions to enable impact of behaviour change and energy efficiency interventions to be more effectively demonstrated.

8.2.3 For suppliers and policy makers to improve the vulnerable consumer journey from point of installation

Installing an electricity or gas smart meter requires the utmost safety standards. These must be universally applied. No household, especially the most vulnerable, should suffer detriment from the installation process, including inhibiting a customer's on-going ability to switch supplier. Policy makers and smart meter installers must therefore ensure there is a consistent, safe, customer journey at the point of installation. Any risks about the quality of smart meter installations can be considerably lessened by setting, monitoring and enforcing minimum installation standards.

The interoperability of smart meters between different suppliers must also be addressed. The latter issue is not just relevant to households; the variation in the type of smart meters currently available in the UK could also complicate the extent to which some advisors could practically apply the

knowledge they had gained during SMART-UP training. This suggests that training courses might benefit from an inclusion of a broader range of smart meter types, explain the different product types, technical capabilities and the implications this may have on consumers.