Department of Energy & Climate Change

Smart Metering Early Learning Project:

Consumer survey and qualitative research

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Contents

Executive summary

Research background

Smart meters are the next generation of gas and electricity meters. The Government's vision is for every home and smaller business in Great Britain to have smart electricity and gas meters by 2020. Domestic consumers will also be offered an in-home display (IHD) which shows current and past energy usage and cost information. Some energy suppliers have already started installing smart meters in what this report refers to as the 'early roll-out stage'.

DECC's Early Learning Project (ELP) was set-up to explore the experiences of domestic consumers involved in this early roll-out stage and to investigate the outcomes they have experienced. DECC commissioned Ipsos MORI to undertake research which forms one part of the ELP. This research has involved a national quantitative survey (within Great Britain) with 2,037 domestic smart meter[1] customers and a matched sample of 1,979 legacy (traditional) meter customers. Follow-up in-depth interviews were also conducted with 79 survey respondents who had received a smart meter and IHD. The smart meter customers had received a smart meter between 1st April 2011 and 28th February 2013.

The analysis phase of the research involved using a number of statistical techniques to explore the survey findings in greater depth. This included matching techniques[2] to enable comparisons between smart and legacy (traditional) meter customers, and Key Drivers Analysis (KDA) to examine the extent to which different elements of the smart meter customer journey are related to subsequent behavioural and attitudinal outcomes.

The surveyed sample of smart meter customers was selected to be representative of the early recipients of 'smart-type' meters during the 'early roll-out stage'. The emphasis on this project was to gather learning from the experiences of these customers. However, it should be remembered that the customers who have received a smart meter during the early roll-out stage may not be typical of the wider population. There are also a number of other differences between the early roll-out stage and the main stage such as the introduction of the Smart Metering Installation

[1] On the whole, customers included in the smart meter sample would have had a 'smart-type' meter rather than a smart meter. Smart-type meters offer some, but not all, of the functionalities included in the Smart Metering Equipment Technical Specifications (SMETS). Some suppliers rolled out smart-type meters before smart meters were available.

[2] Propensity Score Matching was used to control, as far as possible, for all differences between smart and legacy meter customers apart from the presence of a smart meter. For further information, see section 5.1

Code of Practice (SMICoP)[3] and Smart Energy GB[4] alongside a common communications platform managed by the Data Communications Company (DCC) allowing for interoperability across suppliers and smart facilitated switching. This means that while the findings enable us to understand and learn from the experiences of early recipients of smart meters, they cannot be generalised to reflect the likely experiences, attitudes and behaviours of the future smart meter population during the main roll-out phase.

Satisfaction towards smart meters and in-home displays

The majority of smart meter customers surveyed were satisfied with their smart meter (including the IHD) (72%). Only a small minority (4%) said they were dissatisfied. It was apparent in the in-depth interviews that many respondents were focusing on the IHD provided with their smart meter when discussing levels of satisfaction. However, some did attribute their satisfaction directly to their smart meter. This was normally because of the appeal of the greater convenience and billing accuracy associated with automated metering.

Customers who proactively requested to have a smart meter installed, or actively responded to an offer for one, were more likely to be satisfied than those who had a smart meter installed after being told their meter needed replacing (84% and 79% respectively compared to 64%). The more active recipients were also more likely to speak highly about their smart meter (for example, 71% of proactive requesters would speak highly and 26% would be neutral; in comparison 38% of those who were told their current meter needed replacing would speak highly and 54% would be neutral).

Most customers did not have any concerns about their smart meter (82%), did not feel there were any disadvantages to having a smart meter installed (76%) and did not desire any changes to their smart meter and IHD (71%). The most frequently mentioned concern and disadvantage was finding the IHD difficult to understand (mentioned by 4% and 7% respectively), and when asked what they would change about the equipment they received, the most frequently mentioned change customers were interested in was just further information on how to use the IHD (7%).

Experiences of, and levels of satisfaction with, smart meter customer journey

The majority (84%) of those surveyed who were aware that a smart meter had been installed in their property stated that contact about the installation was initiated by their supplier. One in twenty (5%) had contacted their energy supplier first, and had requested a smart meter.

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[3] The Smart Metering Installation Code of Practice (SMICoP) provides guidelines for smart meter installers with the aim to make sure that the customer receives a high standard of service throughout the installation process, and knows how to use, and benefit from, the smart metering equipment. The SMICoP was approved by Ofgem in April 2013

[4] Smart Energy GB has been set up to be responsible for centralised engagement with consumers during the nationwide roll-out. It is an organisation which is funded by the larger suppliers, with smaller suppliers contributing to fixed operating costs.

Nine in ten (89%) of the surveyed smart meter customers who were at home for the installation said they were satisfied with the installation, with over half “very satisfied” (55%). Most in-depth interview respondents said that the process was relatively quick and hassle free. Satisfaction was also high among survey respondents with the various pieces of information received before and during the installation.

Only three in ten (30%) smart meter customers recalled receiving any of the different types of follow up communication covered by the survey after the installation of their smart meter. The in-depth interviews confirmed this with only a minority saying they received a phone-call to check that the installation had taken place and the smart meter was working, rather than to offer support or check if they understood how to use the IHD. Most in-depth interview respondents were satisfied with the amount of information they had received, but a small number said they would have benefited from more written information or a follow-up phone call to ask how they were finding the IHD and whether they needed any further guidance on using it.

Customers’ appetite for additional tailored information and advice on their energy usage, based on smart meter data, was explored during the in-depth interviews. Most respondents would be interested in comparisons with similar households, or with similar usage periods from previous years. The preferred format for this information was highly dependent on the respondent, ranging from smart phone apps among frequent users of these devices, to online information among internet-users but also paper-based information among those offline. Most respondents did not feel it was necessary to receive this type of information through face-to-face contact although a few would have welcomed further face-to-face contact to provide further guidance on using the IHD instead.

Customer and household interactions with in-home displays

More than nine in ten (96%) of all smart meter customers surveyed who received an IHD had plugged it in at some point since the installation visit. Around six in ten (61%) reported that they generally still had their IHD plugged in while two in five (39%) did not. The survey results show that smart meter customers who received their installation more recently were no more likely than those who did so around two years ago to still have their IHD plugged in. The in-depth interviews suggested that those who had unplugged their IHD had done so for a number of reasons. For example, some had felt they had already learned sufficient information about their energy use in the first few weeks or months of having the IHD plugged in, others mentioned a general lack of interest in the information shown.

The majority (71%) of smart meter customers who had an IHD that had been plugged in agreed that they found the IHD easy to use. In the in-depth interviews, levels of reported and observed engagement with, and understanding of, the IHD varied greatly. Some who described the IHD as easy to use were using only the traffic light function, while others were more adept with it and made use of a range of the data available.

Around a quarter (26%) of those surveyed from multi-person households with an IHD that had been plugged in reported that they at least sometimes discussed information displayed on their IHD with other household members. Approaching two in five (37%) of those who personally looked at an IHD had used it to work out what a normal level of energy use was for their household. Almost three in ten (28%) had

used it to check that they had left nothing on in their home. Just over one in five (22%) had used their IHD to estimate what their energy bill might be.

Among customers who personally looked at an IHD which was still plugged in, more had looked at information related to electricity (85%) than gas (81%)[5]. Similarly, more of these customers had looked at current, rather than historic information on their IHD.

Experiences of the smart meter customer journey among more vulnerable households

The key difference in the experiences reported by different groups of smart meter customers surveyed was in their level of engagement with their IHD. Older smart meter customers, those from lower social grades, those with the lowest total annual household incomes (below £16,000), those with no formal qualifications and those who lived with someone who had a long-term health condition or disability were less likely to say the IHD was easy to use or to understand how to operate its different functions.

These groups still had similar levels of satisfaction with their smart meters and IHDs overall, however they tended to be less satisfied with specific elements of the installation process such as the explanations provided on the IHD. They were also less likely than other groups to have had their IHD plugged in and more likely to have stopped using it because they did not understand how to use it.

The in-depth interviews suggested the reasons for these differences in engagement included: lower levels of familiarity with, and confidence in, technology; concerns about seeing information about how much money they were spending on energy; and a view that the IHD was not useful to these households as they felt they were already using as little energy as possible. The lower levels of engagement with the IHD among older smart meter customers is also likely to be related to their greater likelihood of either living alone or in smaller households and with no children. During the in-depth interviews, respondents living in these types of household, including those who were older, felt the IHD was less useful for them as, being the sole occupant or member of a household of fewer people, they already felt in control of how much energy they used.

Impact of smart meters and in-home displays

One of the objectives for this study was to assess the extent to which the installation of a smart meter and/or IHD could be linked to the adoption of certain energy-related attitudes and behaviours. A comparison[6] of the survey results between smart and legacy meter customers showed whether or not smart meter customers were more likely to be energy-conscious and energy efficient.

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[5] All smart meter customers had electricity smart meters, but some did not also have a gas smart meter. Questions relating to gas information displayed on the IHD were only asked of those smart meter customers who had a gas smart meter.

[6] This comparison was done using a statistical method called Propensity Score Matching. This controlled, as far as possible, for all differences between smart and legacy meter customers apart from the presence of a smart meter. For more information, see section 5.1.

This analysis found smart meter customers to be more likely than legacy meter customers to have done each of the following things:

- to have tried to reduce their energy usage;
- to feel in control of their *gas* use;
- to feel they knew what used the most electricity in their home;
- to have recently installed loft or top-up loft insulation;
- to say they frequently purchased more energy efficient appliances;
- to be satisfied with their energy supplier; and
- to have recently changed tariff.

Smart and legacy meter customers were consistent, however, in their sense of control over their *electricity* use and energy bills. They were also consistent in the amount of thought they gave to their energy use, their perception of how their energy use had changed over the last couple of years as well as the frequency with which they practised various energy efficiency behaviours.

However, respondents in the in-depth interviews highlighted the fact that the IHD made energy use 'visible' to them, particularly electricity, and especially through the traffic light signals. Some respondents in the in-depth interviews reported changes they had made which were specifically linked to the smart meter, including ceasing to use inefficient or 'expensive' appliances, and increasing their consistency in energy saving actions, such as turning off lights and plug sockets.

Some respondents in the in-depth interviews felt that the changes they had made to their behaviour over recent years should have brought bills down, but that any reduction would have been masked by the increase in energy prices. Indeed, smart and legacy meter customers were similarly likely to feel the amount they paid for their gas and electricity had increased over the last couple of years. However, the majority of smart meter customers reported that their first bill after the smart meter installation was around what they expected (72%). A minority had contacted their supplier in the last couple of years to query an estimated bill (17% among those with a single supplier, and a similar proportion for those with two separate suppliers). Smart meter customers were less likely to have done so within this time period than legacy meter customers.

Maximising the potential impact of a smart meter and in-home display

The in-depth interviews and survey analysis suggested there may have been points along the smart meter customer journey during the early roll-out stage where potential opportunities existed to enhance the customer experience and potentially maximise the impact of having a smart meter and IHD. This research captured the experiences of those receiving very early roll-out installations, prior to the Smart Metering Installation Code of Practice (SMICoP) and prior to SMETS compliant versions of the IHD being introduced. Indeed, some suppliers have already modified their customer journeys for the main stage of the smart meter roll-out and, as such, some of the suggestions provided below on the basis of this research may already be covered by these modifications.

Pre-installation stage

During the in-depth interviews it was apparent that discussions within social networks may provide an opportunity for informal learning around the smart meter and IHD. Respondents who had discussed smart meters in this way reported these conversations to have been positive. Customer expectations of smart meters and IHDs were also found to play a clear role in their willingness to engage. An increase in wider awareness of the potential benefits of smart meters may increase the potential for informal learning and have a positive impact on engagement and subsequent use of IHDs.

Some in-depth interview respondents felt they would have benefited from further information about the benefits of a smart meter, and particularly the IHD, between the appointment booking and the installation visit. Such preparation may help householders go on to make better use of the IHD after the installer has left.

Installation stage

Analysis of the in-depth interviews highlighted how information given by installers on the day of installation seemed, for some, to be formative of their subsequent ability and propensity to use the IHD.

Helping customers to understand a range of different ways in which they could use the IHD, for example using it to help budget and control energy use, might encourage longer-term and deeper engagement with the IHD. This would be in contrast to the 'information driven' approach to using the IHD witnessed in many in-depth interviews, where respondents focused on using the IHD to find out how much energy different appliances used. This type of ‘information driven’ approach appears to have increased their likelihood of stopping using the IHD after a while once they felt they had 'learnt all they could'.

Although most in-depth interview respondents were satisfied with their IHD, some suggested improvements to the appearance and format of the information displayed, such as a more modern display, and the ability to unpick energy use by specific appliances more easily. A more advanced IHD may have encouraged a greater level of engagement with the information for a few respondents.

The installation visit also presents an opportunity to provide energy-related advice. Whilst many customers surveyed did not express an interest in receiving this type of information, the in-depth interviews revealed that while customers may not have expected to receive advice they would not have been resistant to receiving it either. The delivery of energy-related advice may be aided by managing customer expectations in advance about the information they are likely to receive.

Post-installation

Follow-up contact by energy suppliers, post installation, may help encourage more extensive and effective use of the IHD. Respondents who expressed a desire for further follow-up from suppliers were particularly interested in further demonstrations of the IHD, and in personalised information, advice, and trouble-shooting. Follow-up contact may also help to boost engagement with the IHD in general, by providing an opportunity to check that customers understand how to use it.

Some in-depth interview respondents were interested in receiving the sort of personalised information which smart meter ownership might facilitate, including recommendations on the best tariff, based on their usage.

This research report is one of five which have been published concurrently[7], containing the findings of DECC's programme of 'early learning' smart meter research and small-scale trials. This was based on research with early recipients of smart and smart-type meters. It was aimed at extending the Government's and stakeholders' understanding of how best to deliver consumer benefits, and providing evidence from which to assess the need for any changes to the policy and regulatory framework.

A further Policy Conclusions report summarises DECC's view of the key findings, and sets them in the context of further progress, since the research was conducted, to establish the delivery framework for smart metering. This report also provides the Government's conclusions about future consumer engagement policy and delivery priorities, and the steps to implement them, working with Ofgem, Smart Energy GB, suppliers and other parties.

[7] https://www.gov.uk/government/publications/smart-metering-early-learning-project-and-small-scale-behaviour-trials

1. Introduction

1.1 Background to the research

Smart meters are the next generation of gas and electricity meters. The Government's vision is for every home and smaller business in Great Britain to have smart electricity and gas meters. Domestic consumers will also be offered an In-Home Display (IHD).

The aim is to replace 53 million meters with smart electricity and gas meters in all domestic properties, and smart or advanced meters in smaller non-domestic sites by 2020, impacting approximately 30 million premises. The roll-out of smart meters is expected to play an important role in Britain's transition to a low carbon economy and help meet long-term challenges faced in ensuring an affordable, secure and sustainable energy supply.

The Government expects smart meters to deliver a range of benefits to consumers. For example, smart meters will bring an end to estimated billing and will provide consumers with near-real time information on their energy consumption. It is expected that this will provide consumers with better control over their energy use and help make switching between suppliers smoother and faster.

Some energy suppliers have already started installing smart meters in, what this report refers to as, the 'early roll-out stage'.

DECC's Smart Metering Early Learning Project (ELP) was set-up to explore the experiences of domestic consumers involved in this early roll-out stage and to investigate the outcomes they have experienced. The design of the ELP was informed by recommendations made during the construction of a Smart Metering Evaluation Data-Framework (SMED). This involved developing data sources and methods for evaluating the consumer impacts of smart metering. It also meets the Smart Metering Monitoring and Evaluation strategy commitment to assess the consumer benefits from smart metering.

The main parts to DECC's ELP are:

1. Energy consumption analysis using a difference-in-difference approach to compare energy consumption across smart and legacy meter groups;[8]
2. The Smart Meter Early Learning survey of smart and legacy meter customers and follow-up qualitative research with smart meter customers (this phase of the ELP is the subject of this report);

[8] This analysis compared annual energy consumption levels between a treatment group (who received a smart-type meter) and a control group (who did not). The extent to which energy consumption within the treatment group fell by more than that of the control group provides an estimate of the impact of the installation of smart-type meters on energy consumption during this period

3. Qualitative research to explore the potential and experienced benefits of smart meter enabled energy prepayment;
4. A Synthesis study led by Oxford ECI Institute bringing together the findings from across the ELP using a realist synthesis approach.

The specific focus of the Smart Meter Early Learning Survey and the follow-up qualitative research was to enable DECC to:

- Assess the consumer experience of the early roll-out of smart meters;
- Assess consumers' understanding and use of smart meters and IHDs;
- Identify levels of benefits being attained during the early roll-out;
- Assess the wider consumer impacts of smart meters;
- Assess whether the consumer experience, level of benefits or wider impacts differs for different groups (with a specific interest on vulnerable consumers)[9];
- Broaden the evidence base and develop indicators to monitor consumer benefits and wider impacts over time;
- Identify relationships between different aspects of the smart meter roll-out and levels of consumer engagement, consumer experience and the benefits and wider impacts;
- Identify any relationships between smart meters and/or IHDs and take-up of other energy efficiency policies or initiatives; and to
- Develop a base questionnaire that can be used for future smart meter monitoring and evaluation.

1.2 Research methodology

DECC commissioned Ipsos MORI to undertake research among domestic smart and legacy meter customers in order to meet the research objectives stated above. This research has involved a national (Great Britain) quantitative survey as well as follow-up in-depth qualitative interviews. Further details are provided below.

1.2.1 Quantitative survey with smart and legacy meter customers

The main stage of this research was a quantitative face-to-face survey conducted in-home among 4,000 customers aged 18 and over across Great Britain. These interviews took place between 4th October 2013 and 1st February 2014 with customers pre-selected from datasets provided by two energy suppliers[10]. In total, 4,016 customers were interviewed; 2,037 of these were smart credit meter customers and 1,979 were legacy credit meter customers. Each survey lasted approximately 40 minutes and was conducted by a trained Ipsos MORI interviewer.

[9] Defined according to DECC's Smart Metering Consumer Engagement Strategy. Please see the glossary in Appendix 1 for further details

[10] DECC also provided an annualised energy consumption figure for each electricity meter in the sampling frame

The smart meter customer sample was drawn to be representative of the smart meter customer base of two energy suppliers as of February 2013, rather than the general population. All customers in this sample had received a smart (type) meter between 1st April 2011 and 28th February 2013. The profile of the legacy meter customer sample was matched to that of the smart meter sample[11]. The legacy meter sample was not therefore representative of any current population, but was selected to resemble the smart meter sample as far as possible in order to create a 'treatment' and 'control' group.

The survey was designed by DECC, Ipsos MORI and Sarah Darby from the Environmental Change Institute at the University of Oxford. Before the survey was finalised it was tested through cognitive interviewing and a pilot fieldwork stage. Further details on the survey development phase are included in the Technical Report. The survey covered the following topics with each respondent:

- Their attitudes towards a range of broad environment and energy-related statements;
- Self-reported changes to their energy use, energy spend and practice of energy efficient behaviours;
- Their level of satisfaction, and engagement, with their energy supplier;
- Among smart meter customers, the key stages of their customer journey covering the information received pre and post-installation and their experiences of the installation visit;
- Among smart meter customers, their overall level of satisfaction with their smart meter and the installation visit, and any concerns or disadvantages they perceive there to be;
- Among smart meter customers with an IHD[12], their level of engagement with the display and how it has been used; and
- Among all with a smart meter or IHD, the impacts they perceive it to have had on their energy-related attitudes and behaviours.

The full questionnaire is provided in the Technical Report.

[11] At the sampling stage, the legacy meter sample was matched to the smart meter sample on the basis of available data which included: energy supplier; fuel type; payment type; energy consumption data; region; and the social grade profile of the area. The approach to matching differed to that used by DECC for the Energy Consumption Analysis (ECA). For example, the ECA took into account factors such as the timing and availability of actual meter readings which was not required for the survey. In addition, while the ECA included a wide range of variables (which were not readily available from the data held by suppliers) such as residence type, property size and age it was not possible to incorporate as many variables for the survey as this would have created cell sizes which were too small given the survey sample size and the sampling approach required for a face to face survey.

[12] Legacy meter customers with a standalone 'clip on' type display were also asked questions about their level of engagement with the display and how it had been used to allow for additional comparisons between this group of customers and smart meter customers with an associated display. IHD related findings included in this report refer to smart meter customers with an associated display unless otherwise specified.

Following completion of the fieldwork non-response weighting was applied to ensure the final achieved sample was representative of the profile of the original smart meter population in the supplier databases. Ipsos MORI then analysed the survey findings. The results of this analysis are presented in this report. The analysis phase involved a number of statistical techniques to explore the survey findings in greater depth, including:

- Propensity Score Matching[13] was used to enable robust estimations of the impacts of the smart meter and IHD installation on energy-related attitudes and behaviours compared to non-smart meter customers. The results of analysis using the matched data are discussed in section 5. Further detail on the methodology is included in the Technical Report.
- Key Drivers Analysis (KDA)[14] was used to understand how important, if at all, different elements of the smart meter customer journey were in leading to key outcomes. The results of this analysis are discussed in section 6. Further detail on the methodology is included in the Technical Report.

1.2.2 Qualitative follow-up in-depth interviews with smart meter customers

DECC also commissioned an additional qualitative research element to follow the survey, conducted with smart meter customers only. A key objective of the qualitative research was to understand in more detail the experiences of these customers throughout the different stages of their customer journeys. Since individual household members had experienced the smart meter and IHD in ways that were personal to them and their circumstances, it was felt that qualitative research to explore their experiences and circumstances further would provide valuable depth to the study findings. Another objective of the qualitative research was to address questions not covered in-depth in the survey, for example around the level of appetite among customers for further information, and their preferences around how to receive this. This has enabled the research to be usefully extended into other relevant areas.

The qualitative research consisted of 79 in-depth interviews conducted face-to-face in the homes of smart meter customers, between 5th and 28th February 2014. Each interview lasted for around 90-120 minutes, depending on how many members of the household participated.

The in-depth interviews were conducted with a sub-set of the pre-selected named customers who took part in the quantitative research. Only those who said they were happy to be re-contacted (81% of smart meter survey respondents indicated this) were included in the initial sample. The sampling structure for the in-depth interviews

[13] This controlled, as far as possible, for all differences between smart and legacy meter customers apart from the presence of a smart meter. This improves the validity of the conclusion that any differences observed in the attitudinal or behavioural statements are attributable to the smart meter rather than any demographic or other factor.

[14] KDA is a statistical technique which aims to understand which factors most influence a given outcome and the dependence of one variable on another. In this research, it examines the relative importance of different elements of the smart meter customer journey in influencing outcomes, including energy-related attitudes and behaviours.

was designed to ensure good coverage of different installation experiences and levels of engagement and also to provide sufficient coverage across a range of demographic groups and consumer attitudes to allow exploration of issues raised by the survey in greater depth. Quotas were agreed for a range of demographics, attitudes and reported behaviours, based on the findings from the quantitative survey. Full details of the final quotas achieved are provided in Appendix 2. Customers were invited to take part in the follow-up interviews by Ipsos MORI's specialist qualitative recruitment team.

The in-depth interviews covered in detail each aspect of the customer journey, from when respondents first heard about smart meters, and took a decision to have one installed, through to their experience of the installation process and their subsequent engagement with the smart meter and IHD. Respondents were probed on the impact of the smart meter and IHD on various aspects of their day-to-day life, their awareness of energy use and their behaviour. The full discussion guide is included in the Technical Report. A children's guide was also developed for interviews where under-16s were present. This is included in the Technical Report.

As part of the in-depth interview, respondents were shown stimulus materials to test the kinds of additional information they might be interested in receiving, for example, comparisons of energy use between their household and other households[15]. The stimulus materials are described, along with a link to examples of the sorts of materials used, in Section 6.2 of the Technical Report.

Where possible, customers who still had their IHD plugged in were asked to complete a diary during the week before the in-depth interview. Diaries allowed respondents to record the times when they looked at the IHD, the kind of information they were looking for, and what they found out. The diary template is included in the Technical Report.

1.3 Factors to consider when interpreting the findings from this research

Generalising the results to the main roll-out phase

The surveyed sample of smart meter customers was selected to be representative of the early recipients of smart meters during the 'early roll-out stage'. The emphasis on this project was to gather learning from the experiences of these customers. However, it should be remembered that the customers who have received a smart meter during the early roll-out stage may not be typical of the wider population. The profile of the population of early smart meter customers comes from two suppliers only and will have been influenced by the targeting and engagement approaches suppliers were testing and refining over this period. For example, this sometimes focused on specific geographical areas and housing types. There are also a number of other differences between the early roll-out stage and the main stage such as the introduction of the Smart Metering Installation Code of Practice (SMICoP)[16] and

[15] In-depth interview respondents were shown mock-up comparative energy reports using the 'Compare My Energy' site (http://www.comparemyenergy.org.uk/) and also examples taken from an online tool available to customers of one energy supplier.

[16] The Smart Metering Installation Code of Practice (SMICoP) provides guidelines for smart meter installers with the aim to make sure that the customer receives a high standard of service throughout

Smart Energy GB[17] alongside a common communications platform managed by the Data Communications Company (DCC) allowing for interoperability across suppliers and smart facilitated switching. This means that while the findings enable us to understand and learn from the experiences of early recipients of smart meters, they cannot be generalised to reflect the likely experiences, attitudes and behaviours of the future smart meter population under mass roll-out.

Generally speaking, smart meter customer households in the early roll-out were more likely, compared to the Great British population, to be connected to mains gas, to live in a house or bungalow as opposed to a flat, to have lived in their current property for a longer period of time and to pay their energy bills via direct debit, rather than by credit or pre-payment methods. A brief attitudinal comparison suggests that smart meter customers surveyed during the early roll-out did not appear more likely to hold 'early adopter' attitudes than the general population. They were no more likely than the general population to feel they were struggling with their energy bills, and less likely to consider the environment a priority or to like having the newest gadgets in their home. More information on the profile of smart meter customers surveyed, and comparisons to national data can be found in Appendix 4.

Defining smart meter customers

Throughout this report, smart meter customers have been defined as those the energy suppliers identified as having had a smart meter installed in their home. On the whole, this would have been a 'smart-type' meter[18]. The survey revealed that the vast majority (94%) of these respondents were aware that they had a smart meter. Among those who were unaware, most knew that a new meter of some kind had been recently installed. During the survey these respondents were asked the same questions about their customer journey as those who were aware they had a smart meter, but in relation to their 'new meter' rather than about their smart meter. Further information on how the survey was designed to deal with these different groups of respondents is provided in the Technical Report.. Smart meter customers are defined in this report as those known by their supplier to have had just an electricity or both electricity and gas smart meters installed.[19]

Timing of research

The smart meter customer sample was drawn from customers who had an installation between April 2011 and February 2013. Sampling customers across the

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the installation process, and knows how to use, and benefit from, the smart metering equipment. The SMICoP was approved by Ofgem in April 2013

[17] Smart Energy GB has been set up to be responsible for centralised engagement with consumers during the nationwide roll-out. It is an organisation which is funded by the larger suppliers, with smaller suppliers contributing to fixed operating costs.

[18] Some suppliers rolled out smart-type meters before smart meters were available. Smart-type meters offer some, but not all, of the functionalities included in the Smart Metering Equipment Technical Specifications (SMETS) published in April 2012.

[19] It was not possible for suppliers to install just a gas smart meter during the installation period in question for technical reasons.

period allowed the research to investigate how the length of time a smart meter had been installed affected a household's use of it and its associated impact on their attitudes and behaviours. Smart meter customers with an installation more recent than February 2013 were not included in the research in order to ensure the respondents had sufficient time to interact with their smart meter prior to the survey. The time period used does mean however that some respondents had their smart meter installed over two years before the research took place. This may have affected levels of recall about the detail of the customer journey.

Exploring the impacts of the smart meter and/or IHD on energy-related attitudes and behaviours

The findings presented in this report rely on self-reported changes to attitudes and behaviours rather an analysis of actual energy consumption data.

Impact of participation in research on findings

Most respondents from the in-depth interviews said that participation in the survey or interview had not affected their behaviour. However, in some cases, it seems to have prompted customers to think more about their energy use, or interact differently with their smart meters or IHDs. For example, some respondents said the survey caused them to become more aware of their energy use or renew their interest in using the IHD.

Statistical significance for survey findings

Findings from any survey have a confidence interval, or margin of error, when a sample of the population is interviewed, as opposed to the entire population (a census). Approximate confidence intervals for various sample sizes related to this survey are shown in Appendix 3.

Where views varied either between the quantitative and qualitative research strands, or between different groups of customers, this is clearly stated. This report only highlights differences in the behaviours and attitudes recorded in the survey between specific groups of customers where the difference between the findings is statistically significant, taking account of their confidence intervals. Any differences quoted within this report are significant at the 95% confidence level.

Sub-group analysis

It has not been possible to include all statistically significant differences due to the volume of data. It should be noted that while subgroup differences have been quoted throughout, correlations between overlapping subgroups have not been analysed (for example, respondents with higher qualifications are also likely to be respondents who report a higher level of annual income.)

Rounding

Where figures do not sum to 100%, this is due to computer rounding or multiple response answers and an asterisk (*) denotes a figure less than 0.5% but greater than zero.

1.4. Reporting the findings

This report draws on the survey and in-depth interviews to answer the research questions stated in section 1.1. The evidence is clearly referenced to the appropriate

phase of the research throughout (either in reference to ‘smart meter customers surveyed’ or ‘respondents in the in-depth interviews’). All charts and percentages quoted refer to the quantitative survey.

The main body of the report consists of the following sections:

Section 2: Overall perceptions of smart meters and in-home displays – Examines overall levels of satisfaction with, and advocacy for, smart meters and IHDs.

Section 3: Installation experience – Examines experiences of the smart meter customer journey, including reasons for having a smart meter installed and satisfaction with information received throughout the process.

Section 4: Use of in-home display – Examines whether and how smart meter households are using an IHD, what information they have learned from the IHD and what uses this is being applied to.

Section 5: Impacts of smart metering – Analyses the extent to which smart meters and/or IHDs have had an impact on customers’ energy-related attitudes and behaviours.

Section 6: Exploring the key drivers of positive energy-related outcomes – this section introduces the Key Drivers Analysis and triangulates findings from different types of survey analysis and the qualitative interviews.

Section 7: Summary and implications – provides a summary of research findings and associated implications based on triangulating findings from the qualitative interviews and different forms of analysis conducted on the survey data.

2. Overall perceptions of smart meters and in-home displays

This section explores the overall views of smart meter customers[20] toward their smart meters[21] and in-home displays[22] (IHDs).

Key findings

The majority of smart meter customers were satisfied with their smart meter, including their IHD if they recalled receiving one[23] (72%). Only a small minority (4%) said they were dissatisfied.

In the in-depth interviews it emerged that many respondents were focusing on the IHD rather than the smart meter when discussing levels of satisfaction. Some respondents did attribute their satisfaction directly to smart meters. This was normally because of the greater convenience and accuracy associated with automated metering.

Almost half of all customers in the survey would have spoken highly of their smart meter, including their IHD if they recalled receiving one (47%). Most of the remaining smart meter customers surveyed said they would be neutral if asked (45%) and only a small minority said they would be critical (5%).

Customers who proactively requested to have a smart meter installed, or actively responded to an offer for one, were more likely to be satisfied than those who were told their meter needed replacing (84% and 79% respectively compared to 64%). The more active recipients were also more likely to speak highly about their smart meter and IHD (for example, 71% of proactive requesters compared to 38% of those who were told their current meter needed replacing).

Most customers did not have any concerns about their smart meter and IHD (82%), did not feel there were any disadvantages to having one installed (76%) or did not desire any changes to their smart meter and IHD (71%).

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[20] Smart meter customers were defined as those known by their supplier to have had an electricity or electricity and gas smart meter installed.

[21] Smart meters were defined to respondents in the survey as: "*Smart meters are the next generation of gas and electricity meters. Smart meters are able to communicate directly with energy suppliers by sending and receiving information about the amount of energy being used. Smart meters are installed by a professional engineer from your company".* In most cases these respondents will have received a 'smart-type' meter, as described in section 1.3.

[22] In-home displays were defined to respondents in the survey as: *"An in-home energy display is a portable device that displays current and past energy usage and how much it is costing or will cost. You may also know these as Real Time Displays."* A range of IHDs can be purchased and used independently of a smart meter but as part of the early roll-out customers were offered – free of charge – an IHD to accompany their smart meter.

[23] Most (87%) smart meter customers recalled receiving an IHD.

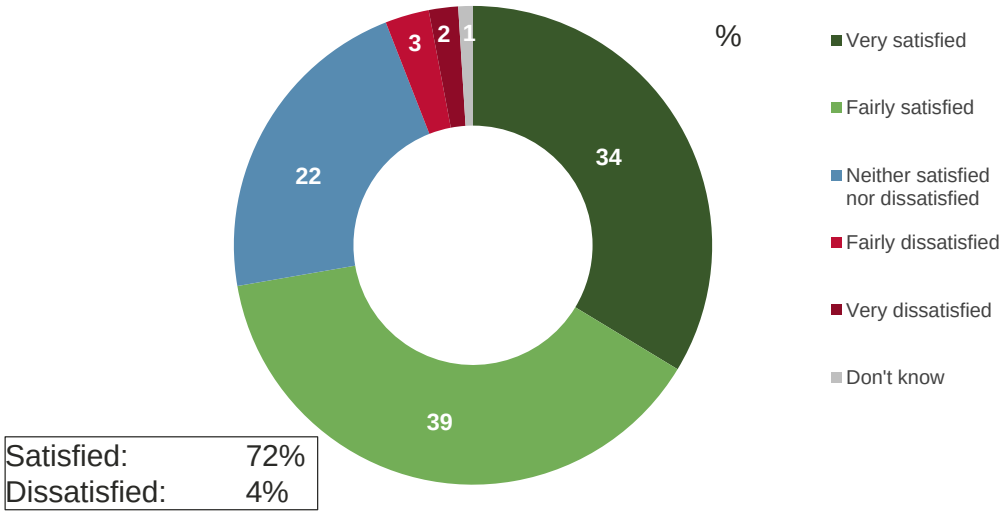
The most frequently mentioned concern and disadvantage was finding the IHD difficult to understand (mentioned by 4% and 7% respectively), and when asked what they would change about the equipment they received, the most frequently mentioned change customers were interested in was just further information on how to use the IHD (7%).

2.1 Satisfaction towards smart meters and IHDs

The majority (72%) of smart meter customers were satisfied with their smart meter, including their IHD if they recalled receiving one[24] (see Figure 1). Nearly nine in ten (87%) recalled receiving an IHD at the time of their smart meter installation.

Figure 1: Overall satisfaction with smart meter and IHD

Overall how satisfied or dissatisfied are you with your smart/new meter(s), including the in-home display if you received one?



Base: All smart meter customers who knew they had a smart meter or who are believed to be a smart meter customer but only recall having a meter replaced (1,959), 4th October 2013 – 1st February 2014

Source: Ipsos MORI

During the in-depth interviews, many respondents considered their IHD to be their 'smart meter', so tended to focus on that when talking about how satisfied they were. They commonly expressed satisfaction with the IHD in terms of:

- Increasing their awareness of, and control over, energy use in the home;
- Improving their ability to plan and budget for bills; and
- Providing a personal, engaging and user-friendly interface.

[24] A small number (30) of those believed to be smart meter customers (on the basis of sample provided by suppliers) said that they did not have a smart meter but that their electricity and/or gas meter had been replaced since April 2011. As supplier information confirmed these customers had a smart meter installed they were asked the same questions as those who knew that their new meter was a smart meter. However, the survey questions were adjusted for these respondents to ask about their 'new meter' rather than smart meter.

The interaction of smart meter customers with their IHD is discussed in more detail in section 4.

Some respondents attributed their satisfaction directly to their smart meters, often because of the greater convenience associated with automated meter readings.

"The smart meter is more convenient for us and the energy company. We don't need to let people in to read the meter; we were arranging days off to be in for meter readings [before]. It's also better security for us; it could be anybody at the door."

Household interview, Middle income, 18-34, Children in HH, IHD plugged in

Several respondents also highlighted the advantages of smart meters for budgeting purposes, now that they received accurate, rather than estimated, bills.

In the survey, customers who proactively requested[25] a smart meter (84%) or actively responded to an offer for one[26] (79%) were more likely to be satisfied than those who were told that their meter needed replacing[27] (64%). Those who proactively requested a smart meter (45%) were also more likely to be very satisfied than those who were told that their meter needed replacing (26%).

In the survey, smart meter customers who still had their IHD plugged in were also more likely to say they were satisfied (83%) than smart meter customers overall (72%).

Levels of satisfaction also varied according to how long ago customers received their smart meter (and IHD if they received one). Customers who had their smart meter and IHD installed for a longer period of time were more likely to be satisfied, and less likely to be dissatisfied, than those who had had it for a shorter space of time. For instance, 3% of those whose smart meter and IHD had been installed for between 19 and 24 months said that they were dissatisfied compared to 6% of those who have had their smart meter and IHD installed for less than 12 months. The profile of customers receiving their smart meter in different periods of the early roll-out has been analysed. This shows there was a fairly even spread of different types of customer across the full period. For example, those of different social grades and ages were similarly likely to have received their installation at any point over the early roll-out. Similarly, proactive requesters, active responders, passive agree-ers and meter replacement customers were all just as likely to have had a smart meter installed at any point over the early roll-out. There did not appear to be any major differences in the pattern of responses to more detailed questions about installation

[25] Smart meter customers were classified as 'proactive' if they had done either of the following in order to have a smart meter installed: 'I contacted by energy supplier first stating I would like to receive a smart meter'; 'I changed energy supplier so that I could sign up to a package that included having a smart meter installed'.

[26] Smart meter customers were classified as having 'actively responded' if they said either that 'My energy supplier contacted me / wrote to me to tell me about smart meters and I requested to have one installed' or that 'I contacted my energy supplier to discuss my account and they offered me a smart meter'.

[27] This refers to smart meter customers who said that the following action had led them to have a smart meter installed: 'My energy supplier contacted me / wrote to me to say that my meter needed replacing and arranged a time to install a new one'.

experiences across different time periods either. Although there may have been other differences in the profile or experience of customers not captured by the survey, this suggests that the differences observed here could potentially be related to how long the smart meter has been installed in a home rather than any other demographic factor.

2.2 Advocacy towards smart meters and IHDs

Nearly half (47%) of smart meter customers said they would speak highly about their smart meter, including their IHD if they received one, while only a small minority said they would be critical (5%). One in eight (12%) would be spontaneous advocates, that is they would speak highly of their smart meter and IHD without being asked. About four in ten (45%) stated they would be neutral if someone asked their opinion (see Figure 2).

The survey found that the customers who were most likely to speak highly of their smart meter were those who proactively requested one and those who still had their IHD plugged in. For example, those who proactively requested a smart meter (71%) or actively responded to an offer for one (57%), were more likely to be advocates than those who passively agreed[28] to have a smart meter (50%) and those who were contacted by their supplier to say their meter needed replacing (38%).

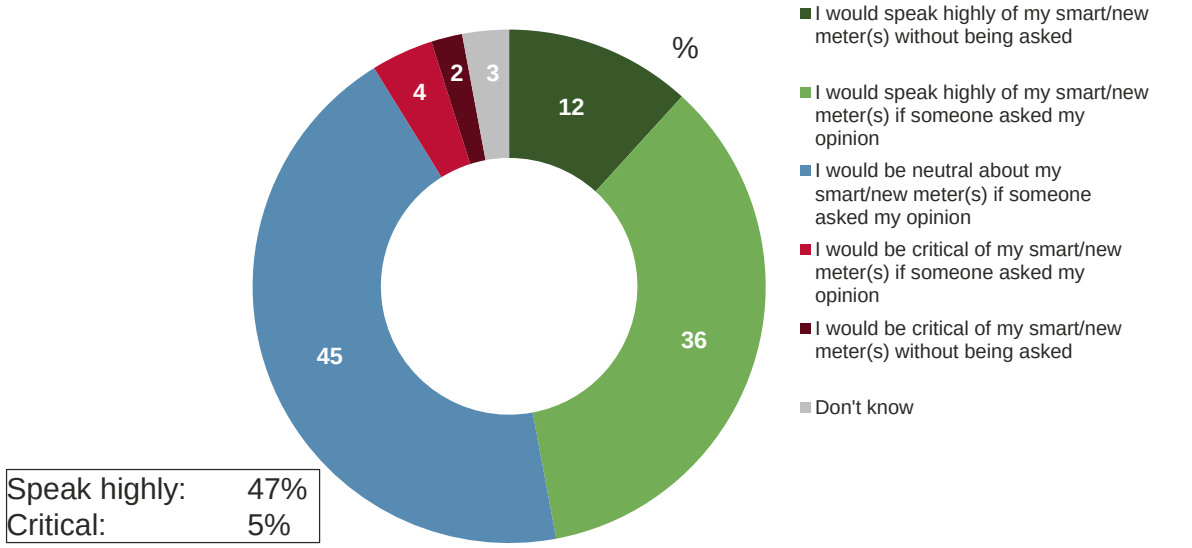
Smart meter customers from social grade[29] A or B were also more likely to be advocates (52%) than those in social grade D or E (37%).

[28] Refers to smart meter customers who agreed to have a smart meter installed after being contacted by their supplier and asked if they would like to have one as opposed to 'active responders' who received information from their supplier about smart meters and subsequently contacted the supplier themselves to request one.

[29] Please see the 'Glossary of key terms' in Appendix 1 for a definition of the social grade categories.

Figure 2: Advocacy towards smart meter and IHD

Which of these statements best describes your experience of your smart/new meter(s), including the in-home display if you received one.



Base: All smart meter customers who knew they had a smart meter or who are believed to be a smart meter customer but only recall having a meter replaced (1,959), 4th October 2013 – 1st February 2014

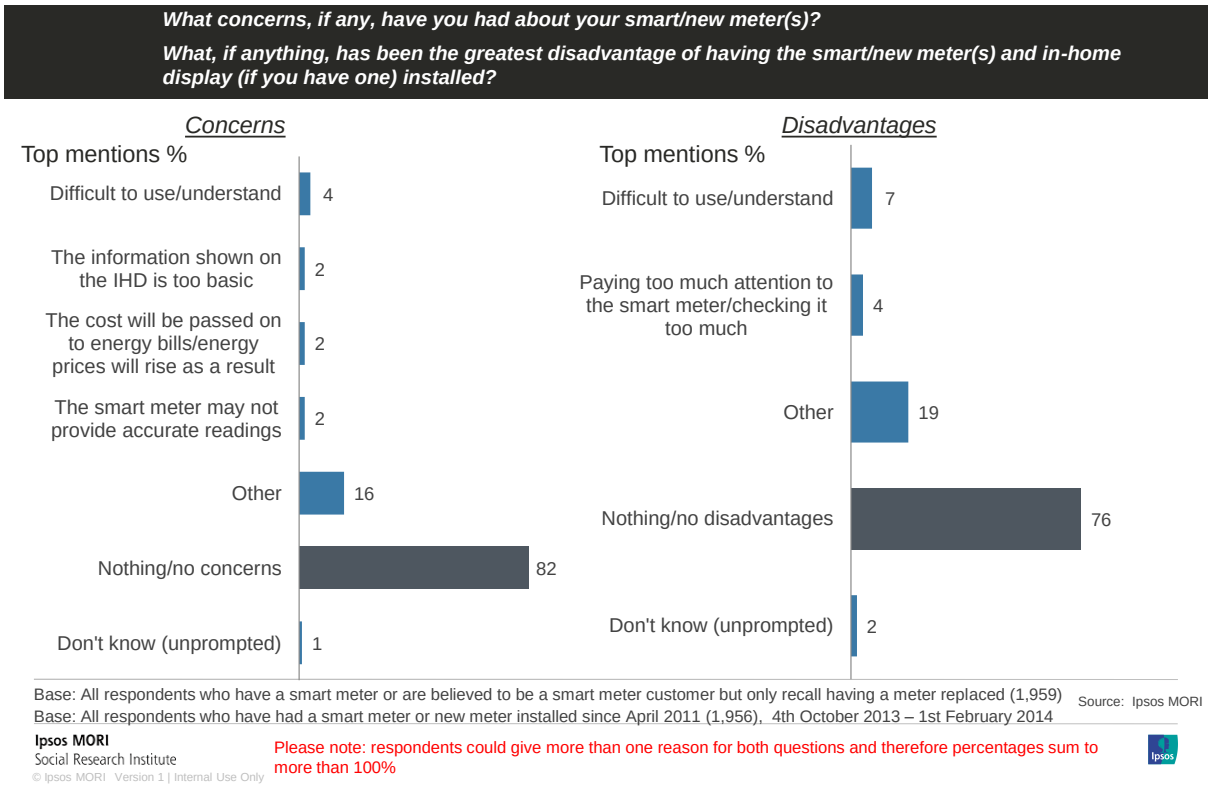
Source: Ipsos MORI

2.3 Concerns, disadvantages and desired changes to smart meters and IHDs

The majority of smart meter customers had no concerns (82%) about their smart meter and did not perceive there to be any disadvantages to having a smart meter (and for some an IHD) installed (76%). A majority (71%) also said there was nothing they would like to change about their smart meter and/or IHD.

The most frequently mentioned concern and disadvantage was finding the IHD difficult to understand (mentioned by 4% and 7% respectively), and when asked what they would change about the equipment they received, the most frequently mentioned change customers were interested in was just further information on how to use the IHD (7%) (as shown in Figure 3: Concerns and perceived disadvantages about smart meters and in-home displays).

Figure 3: Concerns and perceived disadvantages about smart meters and in-home displays



Opinions on how IHDs could be improved came through more strongly during the in-depth interviews. This is discussed in further detail in section 6 where the report examines how the potential impact of smart metering could be maximised.

Only a very small minority of smart meter customers surveyed mentioned any concern related to data privacy. This amounted to 36 smart meter customers. Of these 12 said they were not given any information about how their energy supplier used or stored data from their meter, but that they would have liked to receive this information. A further 12 said they had received information from their supplier, of which 8 thought that this answered most or all of the questions they had. The remaining customers in this group either did not think they needed any further information or said they did not know.

This finding was supported by the in-depth interviews, with only one or two respondents raising concerns about safeguarding their data. These respondents expressed mild reservations about data access more generally, usually couched as a dislike of 'big brother' type surveillance. None of these concerns had been sufficiently salient to put the respondent off getting a smart meter, or using their IHD once they had the smart meter installed. However, the smart meter sample had by definition already accepted a smart meter installation. During the survey, legacy meter customers were also asked whether they had been offered a smart meter, and if so their reasons for not having one installed. Only a handful of respondents in this

situation cited a concern around data privacy as their reason for not accepting an installation.[30] For example, three respondents felt the data could get into the wrong hands. The most common reasons given related to a general lack of interest or awareness of smart meters or thinking the installation would be too much hassle.

A few respondents in the in-depth interviews also expressed mild concerns about the following issues:

- Whether meter readers would be made redundant;
- How the roll-out was being funded;
- Whether their bills might increase;
- Whether they could switch energy supplier;
- Whether there were any adverse health impacts from smart meters; and
- Energy used by the IHD itself.

None of these concerns were reported to be a real worry for respondents in the in-depth interviews, and most were a matter of mild curiosity.

[30] During the survey, 214 legacy meter customers said they had been offered a smart meter but had not had one installed.

3. Installation experience

This section explores the level of customer engagement with, and motivations for, having a smart meter installed. It also explores customer experiences of the installation process, including levels of satisfaction with any information received.

Key findings

The majority (62%) of those aware that a smart meter had been installed in their property had heard of smart meters before they had any contact with their energy supplier about having one installed. However, only 14% stated that they knew a great deal or a fair amount about smart meters at this time.

The majority of smart meter customers who were aware that they had a smart meter said that they were contacted by their supplier about having one installed (84%). One in twenty (5%) said they contacted their energy supplier first stating they would like to receive a smart meter and 2% said they contacted their supplier to discuss their account and were offered a smart meter.

In both the survey and the in-depth interviews, the vast majority of smart meter customers who were at home for the installation were satisfied with their overall experience of the installation visit (89% of those surveyed said they were satisfied).This included satisfaction with advice and information received. In the in-depth interviews most respondents said they were given an IHD demonstration by the installer.

A minority of smart meter customers received more general energy-related advice from the installer. Customers who had not received this tended to be more likely to say that they would not have been interested in receiving it than would have been interested (for instance, among those who had not received advice about energy efficiency measures, 81% said they would not have been interested in this). In the in-depth interviews few said they would have expressed any resistance to receiving such information during the installation, however.

The research showed relatively limited recall of any follow-up contact after the installation visit for smart meter customers (30% of those living in the property at the time of installation recalled receiving any of the types of communication that they were asked about from their supplier post-installation). Among those surveyed who did receive some further communication, just over half (54%) were satisfied (8% were dissatisfied and the remainder had no opinion either way).

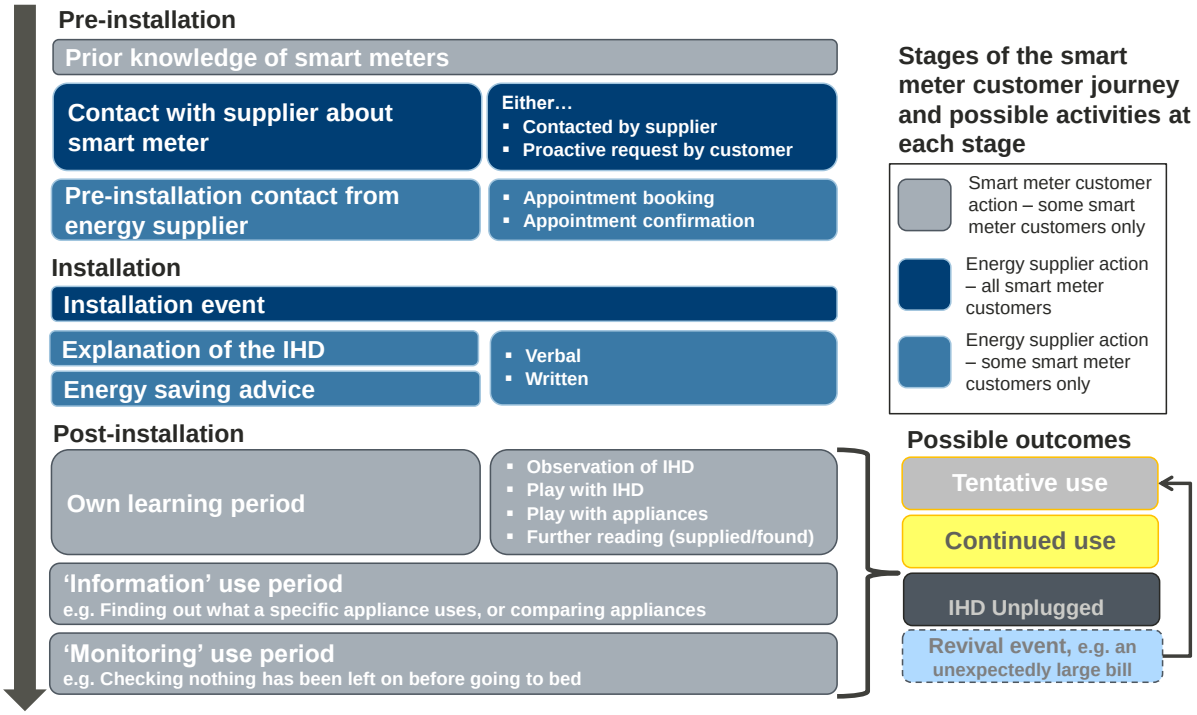
When reading, and interpreting, the findings presented in this section it is worth remembering that the smart meter installation visits may have taken place up to around two years prior to the survey being conducted[31]. It should also be noted that

[31] The time period between the smart meter installation date and the survey date was as follows across the sample of smart meter customers surveyed: 15% had their smart meter installed within 12 months of the survey date, 40% between 12-18 months before, 28% between 18-24 months before and 17% between 24-32 months before the survey date.

the installation phase being explored through this research (April 2011 - February 2013) was prior to the introduction of the regulatory requirements for installation set out in the Smart Meter Installation Code of Practice (SMICoP). These include the responsibility to demonstrate the use of the smart meter and display clearly and accurately, and to provide supporting material, taking account of any customer vulnerabilities or special needs.

Figure 4: The smart meter customer journey - summarises the customer journey. It sets out the actions taken by the energy supplier, those taken by smart meter customers themselves, and the target outcomes. This section discusses the various stages of this customer journey in more detail.

Figure 4: The smart meter customer journey



3.1 Initial motivations, and triggers, for installing a smart meter

The majority (62%) of those aware that a smart meter had been installed in their property had heard of smart meters before they had any contact with their energy supplier about having one installed. One in seven (14%) reported they knew at least a fair amount about smart meters prior to having contact about them with their supplier. However, almost four in ten (37%) said they had never heard of smart meters at this time.

The research showed that most customers had been contacted by their supplier about having a smart meter installed rather than the customers themselves initiating this discussion.

The majority of smart meter customers who were aware that they had a smart meter

said that they were contacted by their supplier about having one installed (84%)[32]. As shown in Figure 5, one in five (19%) said that their supplier wrote to them to say that their meter needed replacing and arranged a time to install a new smart meter. This was also the most common reason given for agreeing to have a smart meter installed (see Figure **6**)[33].

A minority of smart meter customers were more actively involved in getting a smart meter. One in twenty (5%) respondents reported that they had contacted their energy supplier first and requested a smart meter. Another 2% said they contacted their supplier to discuss their account and were offered a smart meter.

Customers who were more active in their request for a smart meter were no different in their demographic profile to those who had been approached by their supplier.

There were differences in the reasons for agreeing to have a smart meter installed across some subgroups of customer[34]. Those who were active in their request for one were more likely than smart meter customers overall to say they were motivated by wanting to see how much electricity and/or gas they were using (for example, 40% of 'proactive requesters'[35] compared to 22% of customers overall).

The 25 to 34 age group were more likely than older age groups to say that they agreed to have a smart meter installed in order to receive an accurate bill (34%, compared to 19% of those aged 65 or over). They were also more likely to say that they agreed because they thought that it would help them budget (21% compared to 9% of those aged 65 or over).

The older age groups were more likely to say that they agreed to have their smart meter installed because they were told that they needed a new one (36% of those aged 60 or over gave this as a reason compared to 22% of 25-34 year olds).

Some of the in-depth interview respondents who were told their meter required upgrading did not believe they had a choice as to whether they accepted the meter or not. These respondents simply viewed it as part of a modernisation process and thought that the upgrade would be more beneficial to the energy suppliers than to them.

[32] These customers gave one of the following three responses: 'My energy supplier contacted me/wrote to me to tell me about smart meters and I agreed to have one installed'; 'My energy supplier contacted me/wrote to me to tell me about smart meters and I requested to have one installed'; 'My energy supplier contacted me/wrote to me to say that my meter needed replacing and arranged a time to install a new one'.

[33] Figure 5 shows fewer respondents offering this response than in the question displayed in Figure 6. This is probably because the question displayed in Figure 5 captures the main approach to receiving a smart meter. However, in practice suppliers probably mentioned different reasons for the installation in their communications with customers which are then picked up in the later question shown in Figure 6. It may also reflect the fact that Figure 5 shows a single-code question where respondents were only able to give one answer, whereas in reality there is likely to have been a degree of overlap between some of the response categories.

[34] These results are all based on smart meter customers who were aware that they had a smart meter and who were living in the property when it was installed.

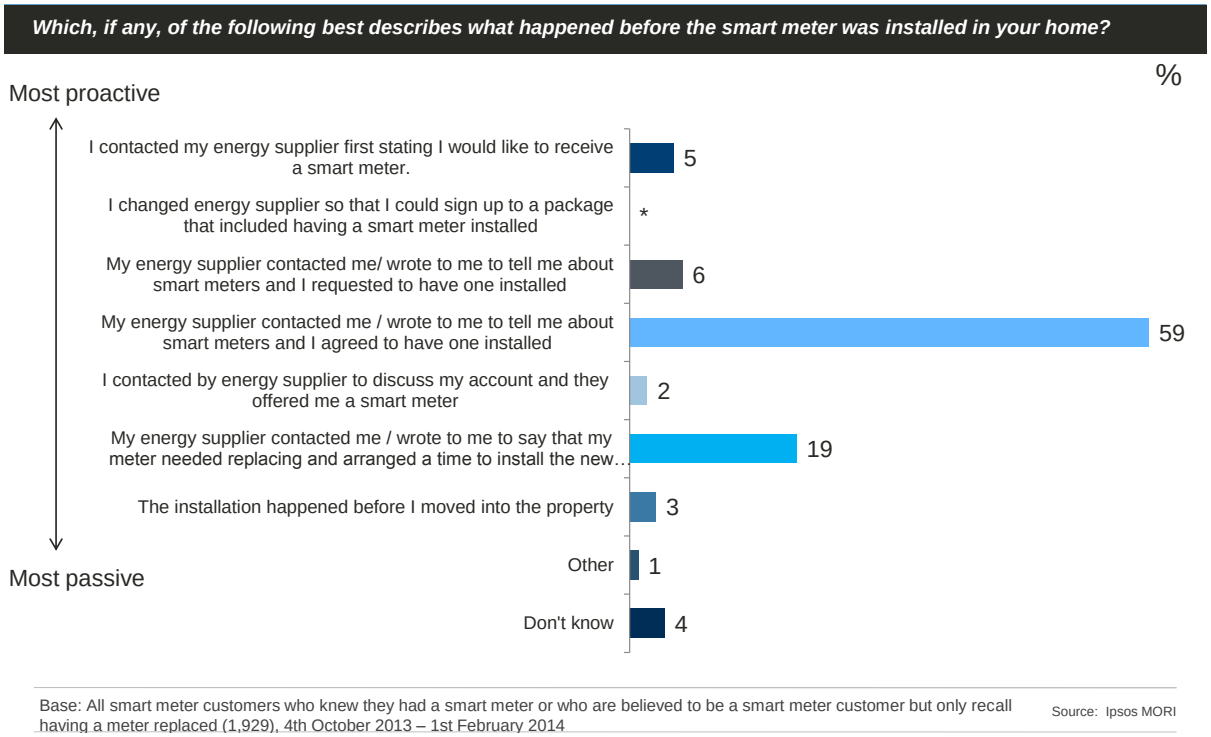
"I think it's more for them [the energy companies]."

Middle income, 35-64, Children in HH, IHD now unplugged

"I thought it was their property anyway, and just being modernised: getting rid of the old, bringing in new technology."

Household interview, Middle income, 35-64, IHD plugged in

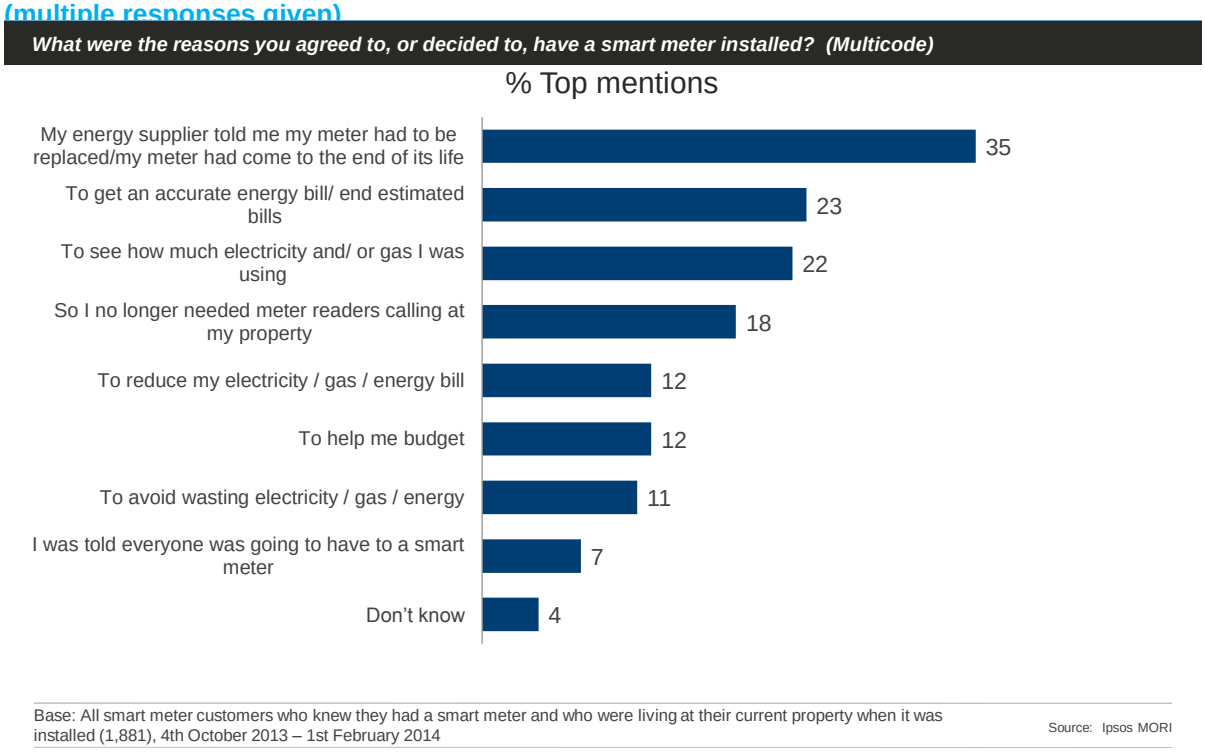
Figure 5: Ways in which smart meter customers were first contacted, or first requested, to have a smart meter installed



Base: All smart meter customers who knew they had a smart meter or who are believed to be a smart meter customer but only recall having a meter replaced (1,929), 4th October 2013 – 1st February 2014

Source: Ipsos MORI

Figure 6: Reasons for agreeing to, or deciding to, have a smart meter installed (multiple responses given)



Base: All smart meter customers who knew they had a smart meter and who were living at their current property when it was installed (1,881), 4th October 2013 – 1st February 2014

Source: Ipsos MORI

3.2 Overall satisfaction with the smart meter installation visit

The survey showed that the vast majority of smart meter customers who were at home for the installation were satisfied with their overall experience of the installation visit. Nine in ten (89%) of those surveyed were satisfied with the installation, with 55% 'very satisfied'. They tended to be most satisfied with the 'practical' aspects relating to the installation (see Figure 7), the installer arriving on time (91%), the installation taking place without any major difficulty (93%) and the way the property was left after the installation (95%). Furthermore, nearly nine in ten (88%) were satisfied with the ease of arranging the appointment. In general, satisfaction was uniformly high across different subgroups of the surveyed smart meter customers.

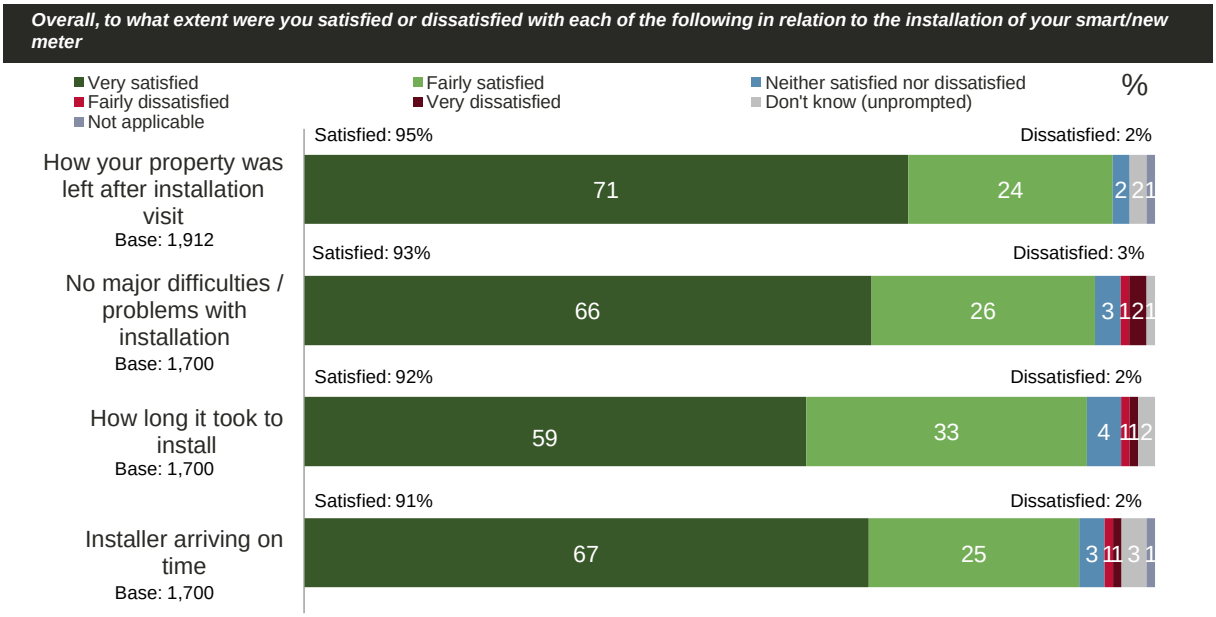
This finding was mirrored in the qualitative research; in the in-depth interviews most respondents said they were satisfied as the process was relatively quick and hassle-free. Although the duration ranged from around 20 minutes to all day, the typical length of time was around 1-2 hours (including the installation of the IHD and any subsequent demonstrations). The majority of respondents thought the installers were friendly, helpful, tidy, professional and punctual.

"They showed me the smart meter [display]; it was straightforward, they were in and out. There were no problems, no mess, no interruption."

Household interview, Middle income, 35-64, IHD plugged in

Any problems encountered by the in-depth interview respondents tended to be distinctive to each case, rather than any common issues emerging across the in-depth interviews. An example of this was one respondent's experience of a delay in re-connection of the gas supply to his property.

Figure 7: Satisfaction with different elements of smart meter installation visit



Base: All smart meter customers who knew they had a smart meter or who are believed to be a smart meter customer but only recall having a meter replaced, and who were living at their current property when the smart meter/new meter was installed (1,912 for 1st statement). Other three statements additionally based on only those present for the installation (1,700), 4th October 2013 – 1st February 2014

Source: Ipsos MORI

This section has focussed on the experiences of those who were present for the smart meter installation. However, 48 of the survey respondents reported that the smart meter had been installed before they moved into the property. A further 192 survey respondents were living in their property at the time but were not the member of the household present for the installation visit. The experiences of these respondents are discussed further in Appendix 5.

3.3 Information received during smart meter customer journey

It should be noted that recall was often an issue here: in some cases, the installation process had been around two years ago and so trying to remember the details of what information was received, and at what stage of the process, was very difficult.

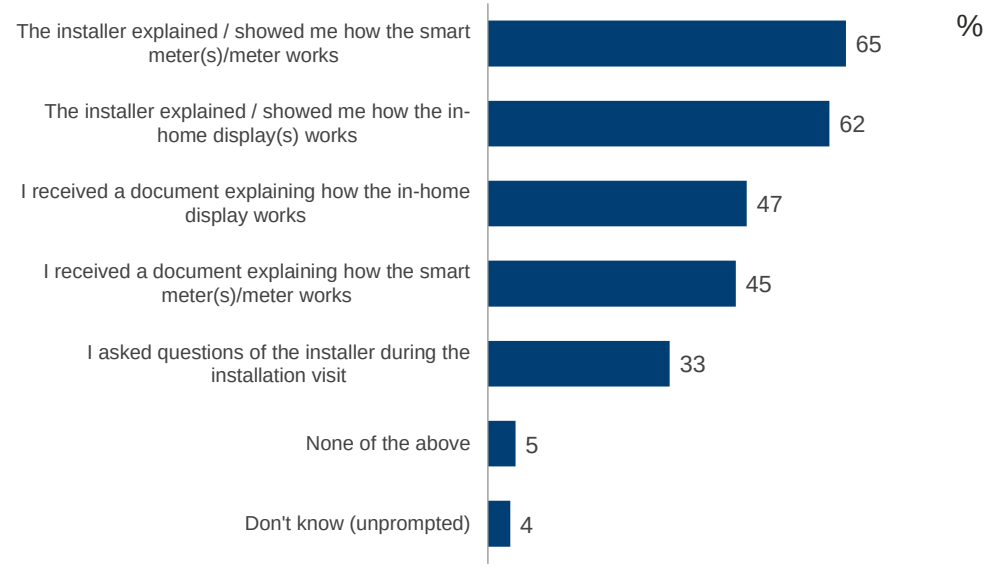
Pre-installation

Four in five (81%[36]) smart meter customers recalled receiving some form of communication prior to their installation visit. The most commonly received was a letter confirming the date and time of the installation visit (51%) (see Figure 8).

[36] This excludes the 48 smart meter customers who said that they moved into their property after the smart meter had been installed.

Figure 8: Information and communication received prior to the smart meter installation (multiple responses given)

Which, if any, of the following happened during the installation? (Multicode)



Base: All smart meter customers who knew they had a smart meter or who are believed to be a smart meter customer but only recall having a meter replaced, and who were present for the installation (1,700), 4th October 2013 – 1st February 2014

Source: Ipsos MORI

During installation visit

Nine in ten (90%) smart meter customers who were at home for the installation recalled receiving some form of information, either verbal or written, from the installer. One in ten (10%) said they either did not know what information, if any, they had received or said that they had not received any of the types of information asked about.

Overall, most smart meter customers who were at home for the installation recalled that the installer had explained or showed them how the smart meter worked (65%)[37], and how the IHD worked (62%). In the in-depth interviews most respondents described a demonstration they were given of the IHD by the installer. Just under half (47%) reported receiving a document explaining how the IHD worked, and a similar proportion (45%) reported receiving a document explaining how the smart meter worked. Between seven and eight in ten were satisfied with each of these aspects of the installation visit (see Figure 9). While high, these levels of satisfaction with the 'information elements' of the installation visit are still lower than levels of satisfaction with the 'practical elements', such as how the property was left and whether the installer arrived on time (see Figure 7).

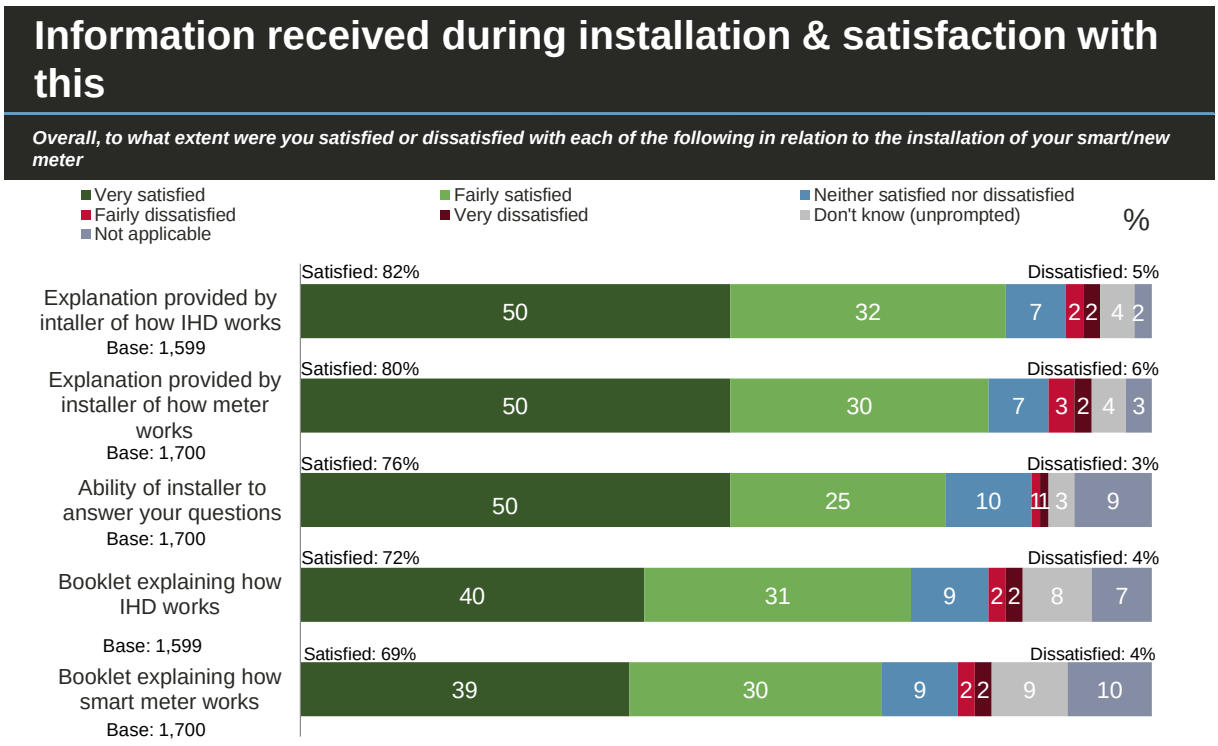
[37] However, further probing during the in-depth interviews suggests that survey respondents might have been thinking about the IHD when they said the installer showed them how the 'smart meter' worked.

One third (33%) of those surveyed said they asked questions of the installer during the visit. Most in-depth interview respondents who asked the installers any questions about the IHD found their responses helpful. Generally, those who did not ask the installer any questions said this was either because they were satisfied with the information received already, or they were not sufficiently interested, rather than feeling as though the installers were unapproachable or lacking in knowledge.

"I did feel able to ask questions of the installer, but I don't think I did ask any. I just had a discussion about how it [the display] works. He was a friendly type of guy, so I could have asked him anything [but] I knew everything I needed to know"

Middle income, 35-64, Single person HH, IHD plugged in

Figure 9: Satisfaction with information received during smart meter installation



Base: All smart meter customers who knew they had a smart meter or who are believed to be a smart meter customer but only recall having a meter replaced, and who were present for the installation (1,700). IHD statements additionally based on those who received an IHD (1,599), 4th October 2013 – 1st February 2014

Source: Ipsos MORI

Older smart meter customers (aged 65 and over) were consistently less likely to say they were satisfied with any of the information listed in Figure 9. However, the survey did find that many older respondents could not remember whether or not they had received the information listed in Figure 9. While only those who recalled receiving information were asked to rate their satisfaction with it during the survey, the in-depth interviews suggested this group may have experienced greater difficulty with comprehension of information. Some interview respondents in these age groups reported finding the information difficult to take in, or being overwhelmed, while others felt they were not good at understanding technology, and would need further time or support to become familiar with it. Similarly, while smart meter customers in

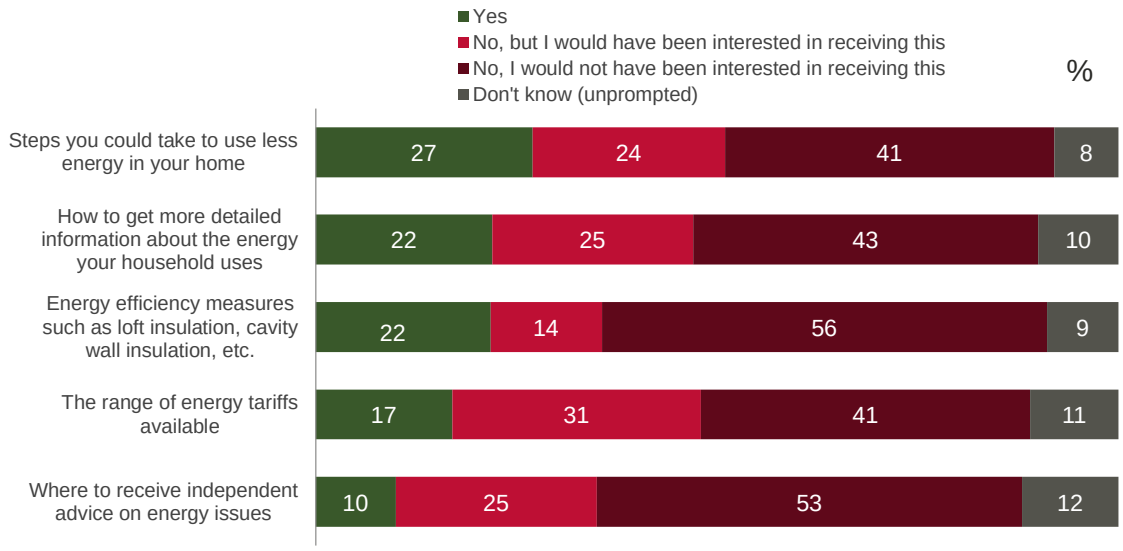
social grade A or B were consistently more likely to be satisfied with the information they received, this may reflect higher levels of recall about this information.

Smart meter customers who were present for the installation were also asked if they had received advice or information on a range of topics from the installer. Just over half (52%) said they had received information on how to use the IHD to identify how much energy different appliances were using. For all the other types of information asked about, only between one in ten (where to receive independent advice on energy issues; 10%) and one in four (steps you could take to use less energy in your home; 27%) reported receiving it (see Figure 10, 11). The majority of in-depth interview respondents did not perceive the absence of this information to be an issue, however.

For each type of information, smart meter customers who had not received it tended to be more likely to say that they would not have been interested in receiving it than would have been interested. The proportion saying this was particularly high in relation to information or advice about energy efficiency measures such as loft insulation or cavity wall insulation (81% of those who had not received this information said they would not be interested). During the qualitative research, however, few of the in-depth interview respondents said they would have expressed any resistance to receiving such information during the installation.

Figure 10: Advice and information received from installer about energy use

Which, if any, of the following did you receive advice or information about from the installer who fitted your smart meter(s)? IF NO: Would you have been interested in receiving this information?

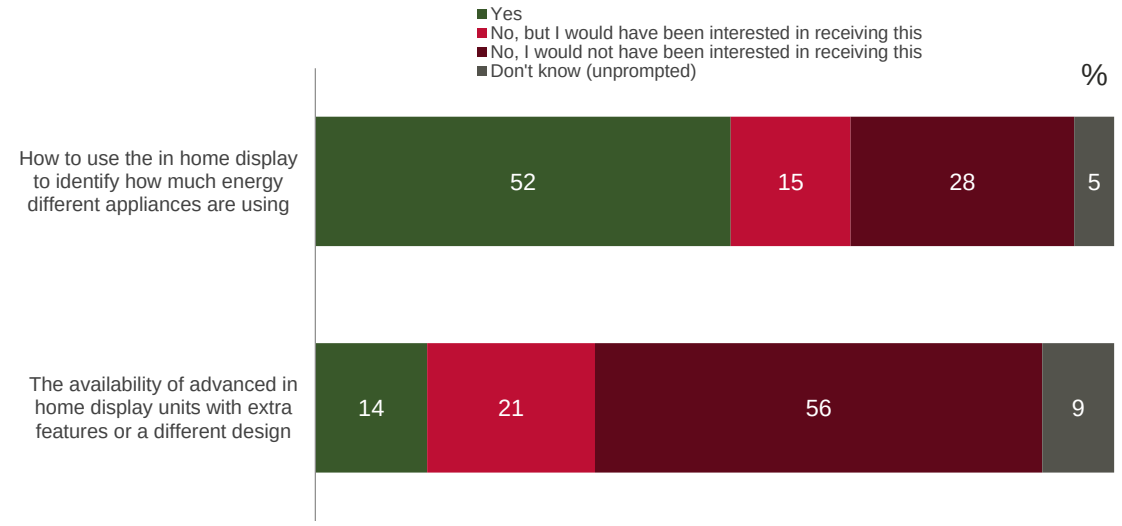


Base: All smart meter customers who knew they had a smart meter or who are believed to be a smart meter customer but only recall having a meter replaced, and who were present for the installation (1,700), 4th October 2013 – 1st February 2014

Source: Ipsos MORI

Figure 11: Advice/information received from installer about how to use the IHD

Which, if any, of the following did you receive advice or information about from the installer who fitted your smart meter(s)? IF NO: Would you have been interested in receiving this information?



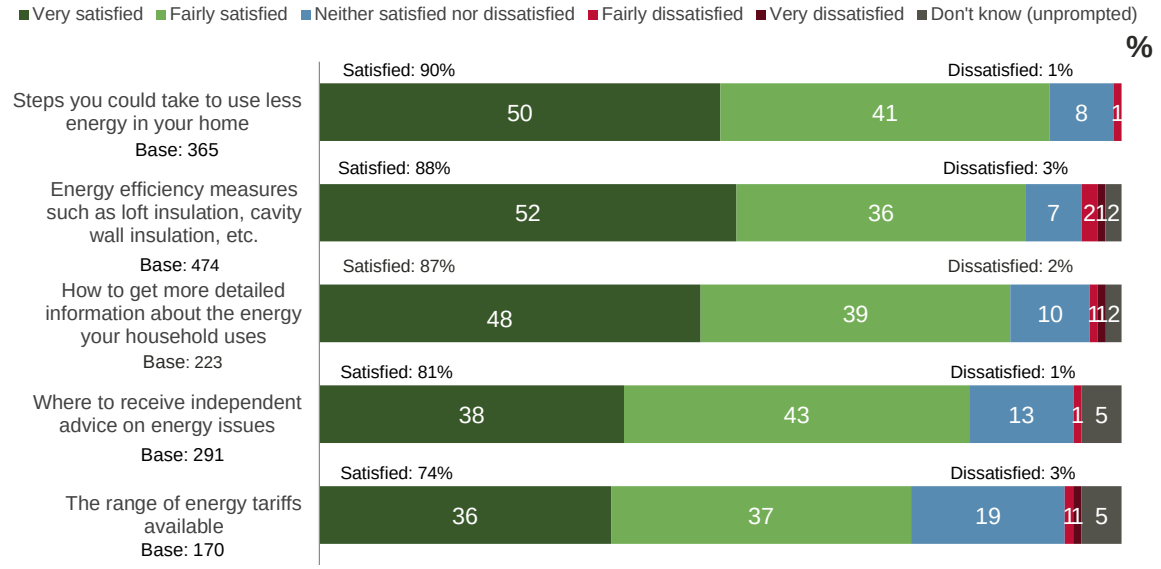
Base: All smart meter customers who knew they had a smart meter or who are believed to be a smart meter customer but only recall having a meter replaced, and who were present for the installation and who received an IHD (1,599), 4th October 2013 – 1st February 2014

Source: Ipsos MORI

Satisfaction among recipients of energy-related information and advice was high, ranging from three quarters (74%) satisfied with information received about the range of energy tariffs available, to more than nine in ten (95%) satisfied with information received on how to use the IHD (see Figure 12 and Figure 13).

Figure 12: Satisfaction with information or advice received from installer about energy use

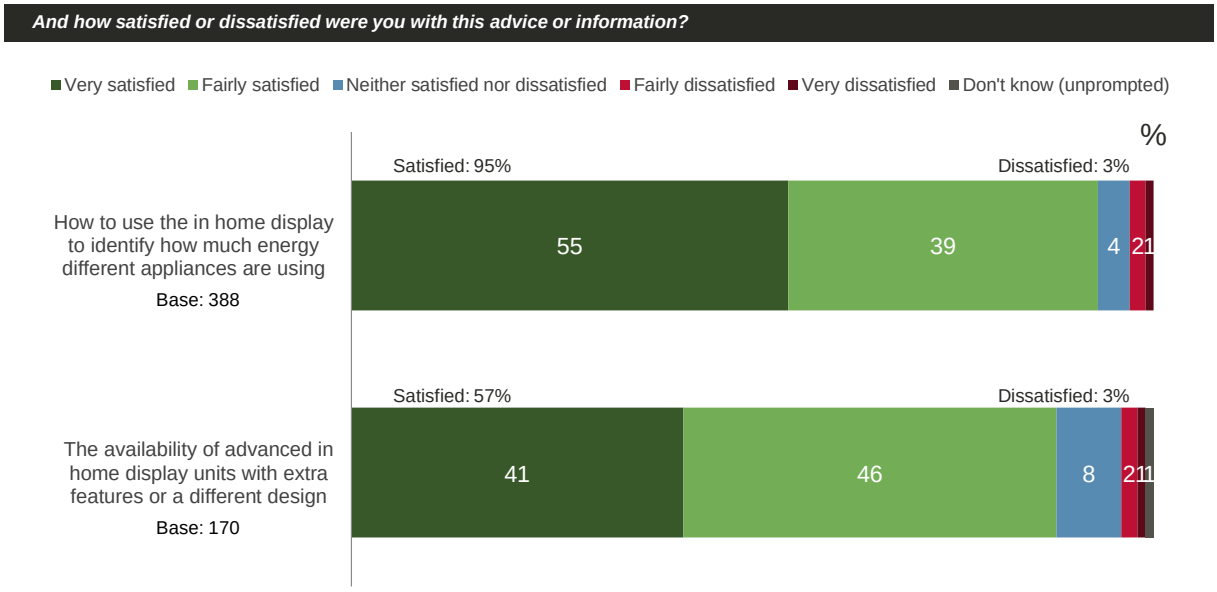
And how satisfied or dissatisfied were you with this advice or information?



Base: All smart meter customers who knew they had a smart meter or who are believed to be a smart meter customer but only recall having a meter replaced, and who were present for the installation and received this information at the installation visit (bases stated on chart), 4th October 2013 – 1st February 2014

Source: Ipsos MORI

Figure 13: Satisfaction with information or advice received about how to use the IHD



Base: All smart meter customers who knew they had a smart meter or who are believed to be a smart meter customer but only recall having a meter replaced, and who were present for the installation, received an IHD and received this information at the installation visit (bases stated on chart), 4th October 2013 – 1st February 2014

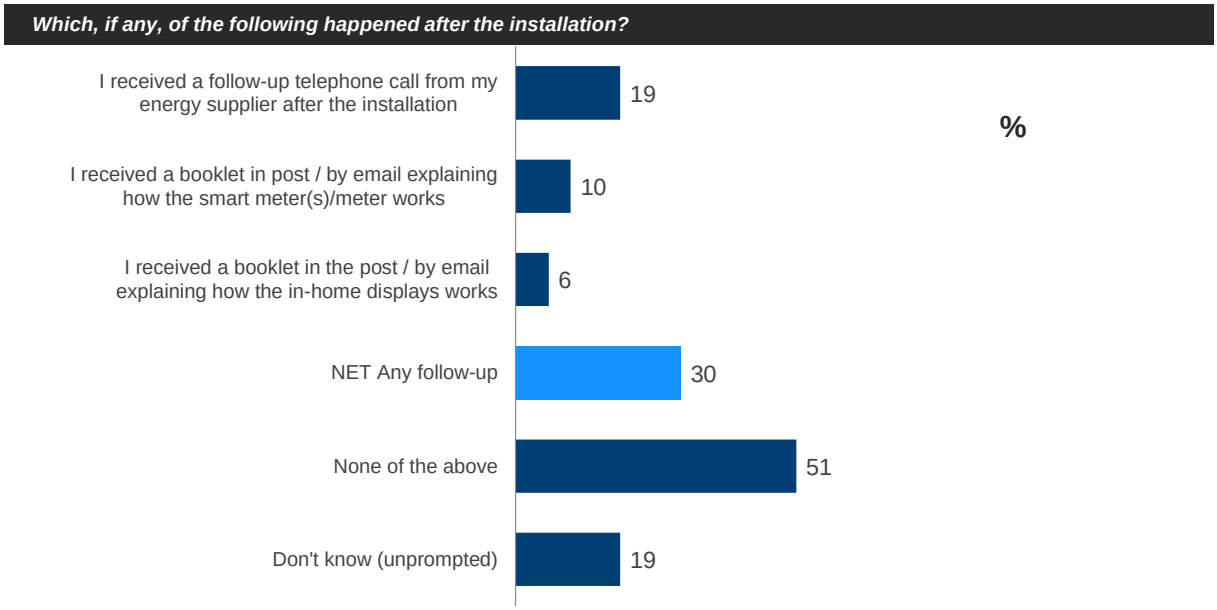
Source: Ipsos MORI

Post-installation

The research shows limited recall of any follow-up contact for smart meter customers[38]. Three in ten (30%) surveyed recalled receiving any communication from their energy supplier after the installation of their smart meter (as shown in Figure 14, 19% recalled receiving a telephone call, 10% a booklet explaining how the smart meter worked and 6% a booklet explaining how the IHD worked). The in-depth interviews confirmed that only a few customers recalled receiving any communication and that this tended to be a quick phone-call to check that the installation had taken place and the smart meter was working.

[38] This was explored amongst smart meter customers who lived in the property when the smart meter was installed (that is they had not moved into a property that already had one installed).

Figure 14: Information received after the smart meter installation visit (multiple responses given)



Base: All smart meter customers who knew they had a smart meter or who are believed to be a smart meter customer but only recall having a meter replaced, and who were living at their current property when the smart meter/new meter was installed (1,912), 4th October 2013 – 1st February 2014

Source: Ipsos MORI

In the survey, around half of those who recalled receiving follow-up contact expressed satisfaction with it (54% satisfied, 8% dissatisfied with the remainder having no opinion either way, see Figure 15). This is lower than levels of satisfaction with information provided during the visit, as shown in Figures 9, 12 and 13. A small number of in-depth interview respondents felt that more written information or a follow-up phone call would have been useful. In particular to ask how they were finding the IHD.

"They should be asking us if we've used it to full potential; do we understand it? There hasn't been anything asking are we pleased with it."

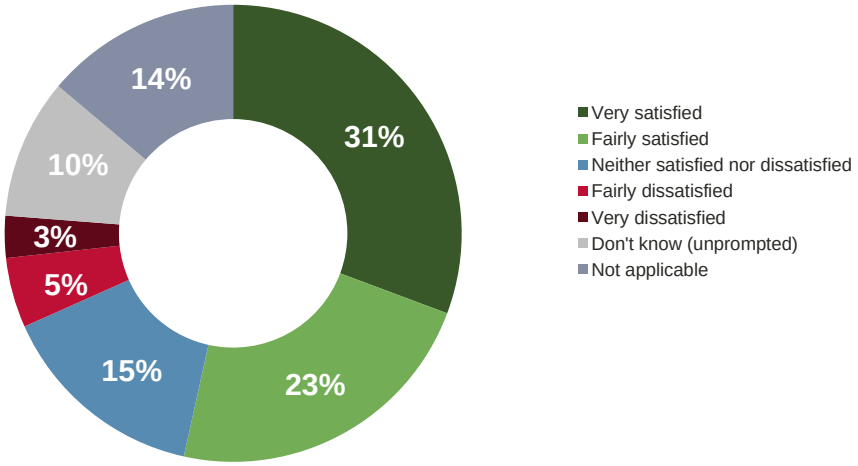
Household interview, Middle income, 35-64, IHD plugged in

Most respondents did not feel it was necessary to receive further information through face-to-face contact although a few would have welcomed this to receive further guidance on using the IHD.

Figure 15: Satisfaction with follow-up contact received after smart meter installation visit

Overall, to what extent were you satisfied or dissatisfied with each of the following in relation to the installation of your smart meter?

Any follow-up contact (e.g. telephone call) you received from the energy supplier after installation



Base: All smart meter customers who knew they had a smart meter or who are believed to be a smart meter customer but only recall having a meter replaced, and who were living at their current property when the smart meter/new meter was installed, and who received follow-up contact (276), 4th October 2013 – 1st February 2014

Source: Ipsos MORI

Reactions to proposed examples of further information

Respondents in the in-depth interviews were shown examples of the sort of personalised or comparative information based on smart meter data which is, or may in future be, available from energy suppliers or third parties in addition to the information they would receive via the IHD. Indeed, in the period since these customers had their smart meters installed, some suppliers may have already started to provide this type of information. The information shown during the in-depth interviews included:

- An example of a home energy report showing a breakdown of energy use across heating and electricity;
- Benchmarking data against similar homes; and
- Benchmarking against homes in the local area;

Many were positive about the way the information was presented – the examples shown were generally felt to be in a colourful and engaging, graphically rich format. Some respondents contrasted this with their black and white IHD display (earlier IHD models of this variety were present in the majority of homes at the time of the research – in comparison to the updated models now being installed). Some felt that they already accessed this type of information online, through their online accounts with energy suppliers.

Some felt that the information was too detailed, and that they were already 'bombarded' with information, so would be unlikely to make use of anything further. Others wondered if summaries in paper or online form might replace the information

they got from the IHD, presenting it to them in a simple, engaging form, already calculated and interpreted by the energy company, rather than needing to be 'worked out' from the IHD.

"I'd rather have it written down – I understand that a lot more than understanding that [the smart meter / IHD]. Once you're older you don't go in for these gadgets."

Individual, Low income, 65 and over, IHD plugged in

A few suggested that a smartphone app might, rather than supplementing the information from the IHD, instead replace the need for it. Those that suggested this tended to want it to be tied in with other smart functions, such as the ability to control heating and even lighting remotely.

"I might want to put light on for security reasons when I'm out; or put the heating on just before I get home; or stop the heating coming on if I'm back later than planned."

Individual, Middle income, 35-64, Children in HH, IHD now unplugged

Of the few who did think the IHD could in theory be replaced by a smart phone app, some pointed out that they would still like to have the IHD in their home also, in order to flag the energy they were using day to day.

"It would still be useful as a visual stimulus to have [the IHD] there."

Household, Middle income, 18-34, Children in HH, IHD plugged in

Comparison with other households

Some respondents were particularly interested in comparisons with other households, something they expressed curiosity or 'nosiness' about. Many of those who were interested in comparisons added the proviso that such comparisons would need to be 'like for like' with respect to the house, installed energy saving measures, and the household composition and habits. A few had seen a comparison of their house against others before, but none indicated this had been a spur for change, or that this information had been of use to them in changing their own energy behaviour.

"My house isn't the same as everyone else's house. My house is my house. I do what I can."

Low income, 35-64, Children in HH, IHD plugged in

Influence of the IHD

In general, appetite for other types of information did seem to be related to prior engagement with the IHD. For example, for some, having the IHD made them aware of the type of information they could access, or be provided with, and this increased their appetite for additional information. However, this was not necessarily always the case. For example, some respondents who were not engaged with their IHD felt they would be more interested in receiving information from their supplier in a printed or online format. This was true of respondents who felt they did not have the time, or interest, in regularly looking at the IHD, but had some interest in seeing a summary of the information alongside their bill.

Other respondents who may not have been engaged with their IHD, but had an appetite for other types of information, were those who found their own displays too basic and wanted to be able to access more detailed, sophisticated breakdowns. There were also some respondents who felt the IHD already satisfied, or had the potential to satisfy any need for information, and so were not interested in any further information. This was true for some of those who were very engaged with the IHD, but also for some of those who were unengaged, but aware of the information the IHD could provide, were they to seek it from this source.

Channels for proposed example information

Respondents' interest in and receptiveness to receiving additional information through different channels appeared to be related to general levels of proficiency using these channels.

Some, mostly those who still received paper bills, said that they would prefer to receive information of this type by post, in 'hard copy'. Some, mostly those who already made good use of the IHD, pointed out that the IHD was a dedicated 'go to' point for such information, which they could easily glance at, which was salient – being in the home, and which they were accustomed to using in this way. Going online or using an app, for some of these people, would require additional effort which some felt they would be unwilling to make.

"I wouldn't bother with it as much if it was online – I probably only go on the computer once a day, and it's handier as it is now. I wouldn't make a special point of going on the computer just to look at that every day. [The IHD] has all you need to know really."

Individual, Middle income, 65 and over, IHD plugged in

Some respondents in the in-depth interviews, usually those who were more technologically 'savvy,' liked the idea of receiving this information through apps, email, or an online portal. Many pointed out that information delivered particularly through apps, would need to be concise and engaging in format, something which they saw as desirable.

4. Use of in-home display

This section explores personal and household use of IHDs by smart meter customers.

Key findings

Usage of IHD since its installation: Nearly nine in ten (87%) customers recalled receiving an IHD alongside their smart meter at the installation visit. More than nine in ten (96%) of these customers had plugged their IHD in at some point since the installation visit. Around six in ten (61%) reported that they generally still had their IHD plugged in, while two in five (39%) did not. The survey results show that smart meter customers who received their installation more recently were no more likely than those who did so around two years ago to still have their IHD plugged in.

Amongst those whose IHD was unplugged, nearly seven in ten (69%) had unplugged it within the first few months. The in-home interviews indicated that length of time plugged in may not always be a clear indicator of the length of time for which the IHD was in use, as some respondents reported ceasing to use their IHD, then unplugging it sometime later, because they realised they had ceased to use it, or because they needed the plug for another appliance.

The majority (89%) of smart meter customers with an IHD that was still plugged in reported that they personally looked at the IHD. Among these customers a majority (73%) looked at it at least once a week. For some in the in-depth interviews, use of the IHD was an habitual action, and sometimes a constant background awareness.

Knowledge and proficiency at using the IHD: The majority (71%) of smart meter customers who had an IHD that had ever been plugged in, agreed that they found the IHD easy to use. Just one in ten (11%) disagreed. Around six in ten reported to know how to: access information on current household energy usage (64%); switch between the spending and energy use displays (62%); and access information on past household energy usage (57%). In the in-depth interviews, levels of reported and observed engagement with, and understanding of the IHD, varied greatly. Some who described the IHD as easy to use were using only the traffic light function, while other ‘super users’ were adept with and making use of all of the data available.

Customers who looked personally at their IHD, and who still had it plugged in, were asked whether they looked at nine particular information features on the display. Overall, nearly nine in ten (86%) of these customers had looked at one of the information features on their IHD. Customers were more likely to have looked at information related to electricity (85%) rather than gas (81%). In general, customers were also more likely to look at current, rather than historic information (electricity - 83%, gas – 80%; compared to 75% for both respectively). In all, just a quarter (25%) had looked at information on how much carbon they had emitted.

The in-depth interviews revealed that even if a customer was engaging with the information on the IHD, this did not necessarily mean that they fully understood how to interpret it or had the right behavioural strategies to know how to apply it.

Reasons for using IHD: Approaching two in five (37%) of those who personally looked at an IHD that had ever been plugged in had used it to work out what a normal level of energy use was for their household. Almost three in ten (28%) had used it to check that they had left nothing on in their home.

Just over one in five (22%) of these smart meter customers had used their IHD to estimate what their energy bill might be. The majority of those who had done this found it easy (80%). Just one in nine (11%) found it difficult.

Smart meter customers who personally looked at an IHD that had ever been plugged in were more likely to have been shown that they were using *more*, rather than less, energy than they expected (45% vs. 19%).

Respondent's focus on the IHD and understanding of it could be categorised in two main ways:

- Information driven approach – a primary interest in knowing how much energy a specific appliance uses, which appliances 'make it go red' or 'cause a spike'.
- Monitoring approach – a primary interest in monitoring the state of things in the house, or keeping a general overall eye on energy use day-to-day (e.g. checking everything is off when they leave the house).

Household members using the IHD: In nearly four in ten (37%) multi-person households, more than one household member looked at the IHD (based on those with an IHD that was still plugged in). Around a quarter (26%) of those with an IHD that had ever been plugged in reported that they at least sometimes discussed information displayed on their IHD with other household members.

4.1 Introduction to IHD ownership and usage

The majority (87%) of smart meter customers in the survey recalled receiving an IHD at the time of their smart meter installation. A small proportion also owned a clip-on IHD before their smart meter was installed[39]. Around six in ten (61%) smart meter customers reported that they generally still had their IHD plugged in. In the survey, smart meter customers whose IHD was not generally still plugged in and in use, were asked how long it was plugged in for after the smart meter installation visit. As shown in Figure 16, most reported they had unplugged it after the first few days (28%) or weeks (26%). Just over one in ten (11%) stated they had never plugged it in (4% of all those who had received an IHD).

Figure 17 provides a summary of the types of smart meter customer who tended to be still using their IHD compared to those who have either stopped using it or who never plugged it in. The percentages are drawn from the survey findings; the "Who?" section combines findings from both strands, and the "Why?" section is drawn from analysis of the in-depth interviews. The latter section also provides a broad summary

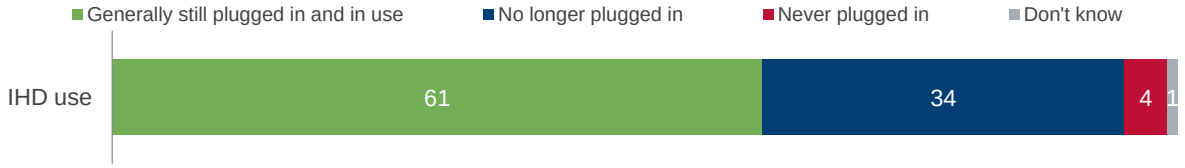
[39] One in ten (10%) smart meter customers in the survey reported that they had owned a standalone clip-on IHD before their smart meter was installed. These customers were asked to think about their most recent IHD associated with the smart meter when answering survey questions around their IHD usage.

of the reasons that different groups of customers fell into these categories. The rest of this section discusses these findings in more detail.

Figure 16: Length of time in-home display was in use

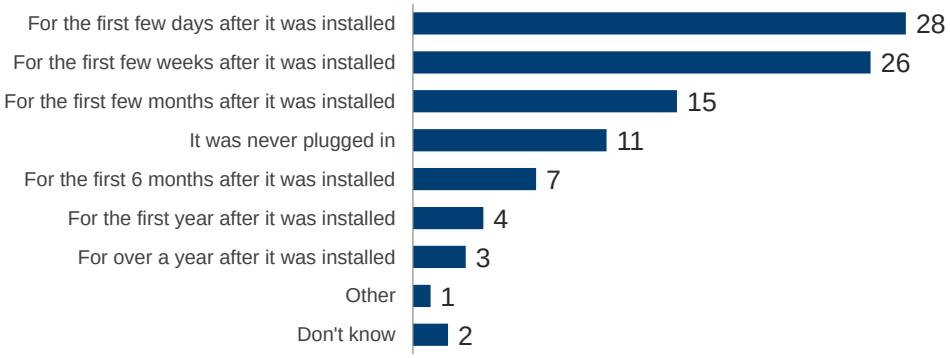
How long did you have your in-home display generally turned on and in use for before you unplugged it?

Overall:



Base: All smart meter customers with an IHD (1,801), 4th October 2013 – 1st February 2014

Of those with an IHD no longer plugged in (top % mentions):



Base: All smart meter customers with an IHD which was not generally still plugged in and in use (625), 4th October 2013 – 1st February 2014

Source: Ipsos MORI

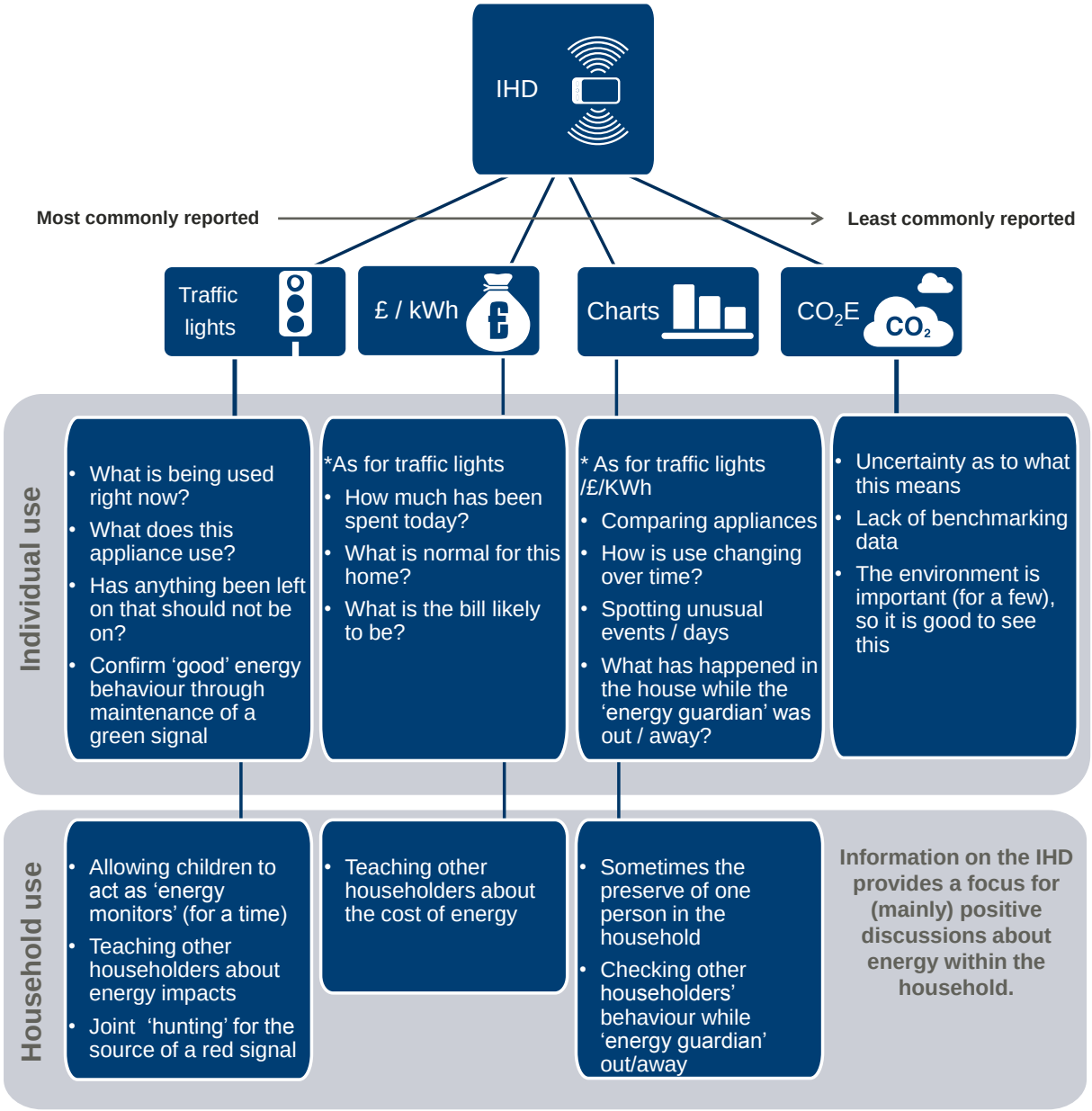
Figure 17: Summary of IHD usage

	Still plugged in and in use (61%)	No longer plugged in (34%)	Never plugged in (4%)
Who?	• Proactive requesters or active responders • Owners of clip-on IHDs prior to smart meter installation • Family households with children aged 15 and under • Those who recalled receiving information from their supplier before, during or after installation • Those with formal qualifications	• Older customers aged 65+ • Customers with no formal qualifications *N.B The differences for these individuals are less clearly defined than for those who still or never plugged their IHD in.*	• Older customers aged 65+ • Lower social grade households • Customers with no formal qualifications • Customers in single person households • Households where someone lives with a long-term health condition

Why?	• Continued to find the IHD useful, to control energy use or budget
	• After using the IHD to gain information about energy use, went on to use the IHD to maintain awareness day-to-day
	• Had specific uses for the IHD as a 'help' around the house, e.g.
	  ○ Checking everything is switched off before bed
	  ○ Signalling washing is done
	• Enjoyed ongoing confirmation that energy use was 'low' (green)
		• IHD not / no-longer useful
		• Learned about household / appliance energy use early on, then could see no further use for the IHD
		• General tapering of interest in IHD as novelty wore off
		• Information on IHD display was too limited, difficult to interpret, or did not meet requirements
		• IHD led to feelings of anxiety
		• Needed space or plug socket for another purpose
			• Expectation or assumption that the IHD would not be useful, sometimes due to:
			  ○ Lack of concern over energy bills
			  ○ Sense there was little scope to change
			  ○ Assumption that they would be unable to interpret the data shown, or technophobia
			• Did not understand the installer's explanation of the IHD
			• Found the IHD unattractive

Figure 18 provides a summary of the main ways in which smart meter customers have interacted with the different types of information shown on their IHD. These interactions are discussed in more detail throughout this section.

Figure 18: Summary of information used on IHD



4.2 Personal usage of IHDs

4.2.1 Smart meter customers most likely to still have their IHD plugged in

Overall, around six in ten (61%) smart meter customers in the survey reported that they generally still had their IHD plugged in. Customers who proactively requested a smart meter or actively responded to an offer for one were more likely to have their IHD generally plugged in at the time of the survey (70% compared to 59% of those who more passively agreed to have one installed after being contacted by their supplier).

This was also true of those in the survey who had a clip-on IHD before their smart meter was installed (76% compared to 59% of those whose first IHD was with their smart meter). Those who recalled receiving information before, during or after the installation visit were also more likely to still have their IHD plugged in (62% compared to 52% who did not). However, this may reflect a more engaged group of customers who were more likely to recall receiving information about the smart meter and IHD.

Households in the survey with children aged 15 and under were also more likely to still have their IHD plugged in (67% compared to 61% of all households that had an IHD that had ever been plugged in). The view that IHDs might be seen as more useful by those with children was reflected in the in-depth interviews. Families with children often reported that the IHD was useful for both monitoring of children's behaviour and helping them learn about energy use. Respondents in single person households often stated that the IHD would be of more use to a family, as they felt they were solely responsible for household usage.

"I think smart meters are more for when you've got families… when the kids are on the computer; you can see what they're doing. It's alright for me. I know what I'm using."

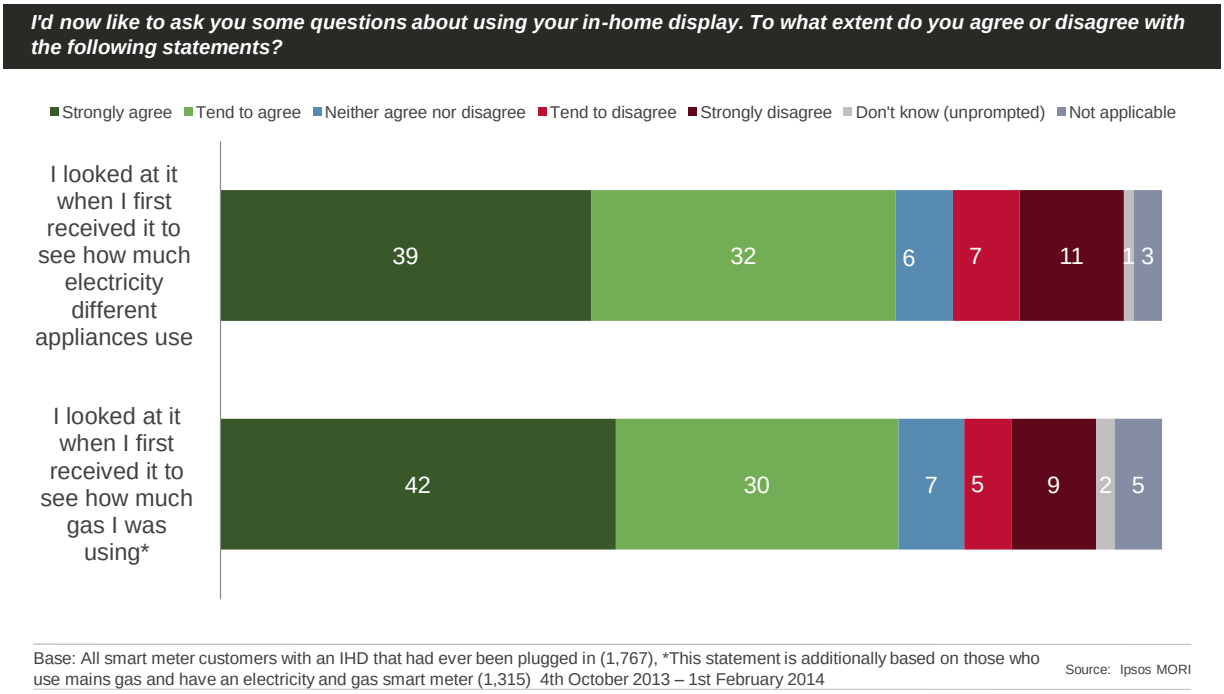
Middle income, 65 and over, IHD plugged in

4.2.2 Initial usage of IHD

Overall, of those smart meter customers in the survey who had an IHD that had ever been plugged in, most agreed (71%) they looked at their IHD when they first received it to see how much electricity different appliances used (Figure 19).

Similarly, amongst smart meter customers with an electricity *and* gas smart meter who had an IHD that had ever been plugged in, most agreed (72%) they looked at their IHD when they first received it to see how much gas they were using.

Figure 19: Initial use of in-home display to check energy usage



Base: All smart meter customers with an IHD that had ever been plugged in (1,767), *This statement is additionally based on those who use mains gas and have an electricity and gas smart meter (1,315) 4th October 2013 – 1st February 2014

Source: Ipsos MORI

Customers who proactively requested their smart meter were among the most likely to state in the survey that they had used their IHD to see how much electricity or gas different appliances used when they first received it. For example, 85% of those who proactively requested their smart meter, or actively responded to an offer for one, had looked at their electrical appliance use when they first received their IHD compared to 65% of those who were told they needed a meter replacement. Three quarters (75%) of those who still had their IHD plugged in had done the same when they first received it compared to 63% of those who only had the IHD plugged in for a few days or weeks.

In the survey, younger households were also more likely to have used their IHD initially to check how much energy different appliances used (75% of those in households where all members were younger than 65 had looked at this for electricity compared to 64% of those in households where all members were aged 65 and over).

A similar pattern of differences between customer groups was found in relation to looking at the information on gas use at the qualitative stage.

In the in-depth interviews, many respondents reported ‘playing’ with the IHD when they first received it. Some played only with the IHD itself, while others reported having switched appliances on and off to learn how much energy they used. A few reported that the booklet that came with the IHD had suggested they 'play' with appliances and the IHD in this way. Others reported learning what energy appliances used through observation of the IHD when appliances were in normal use.

Some who described themselves as technophobes or stated a dislike of technology or computers cited this as a barrier to using the IHD. Such respondents sometimes reported that they had not ‘played’ with the IHD for fear of breaking it.

"I wouldn't want to try messing with it, or trying any buttons, I don't want to disrupt it."

Household interview, Middle income, 35-64, IHD plugged in

Others who reported a general lack of technical ability, however, said that the IHD 'did not bother them' and they were happy to use it and play with it.

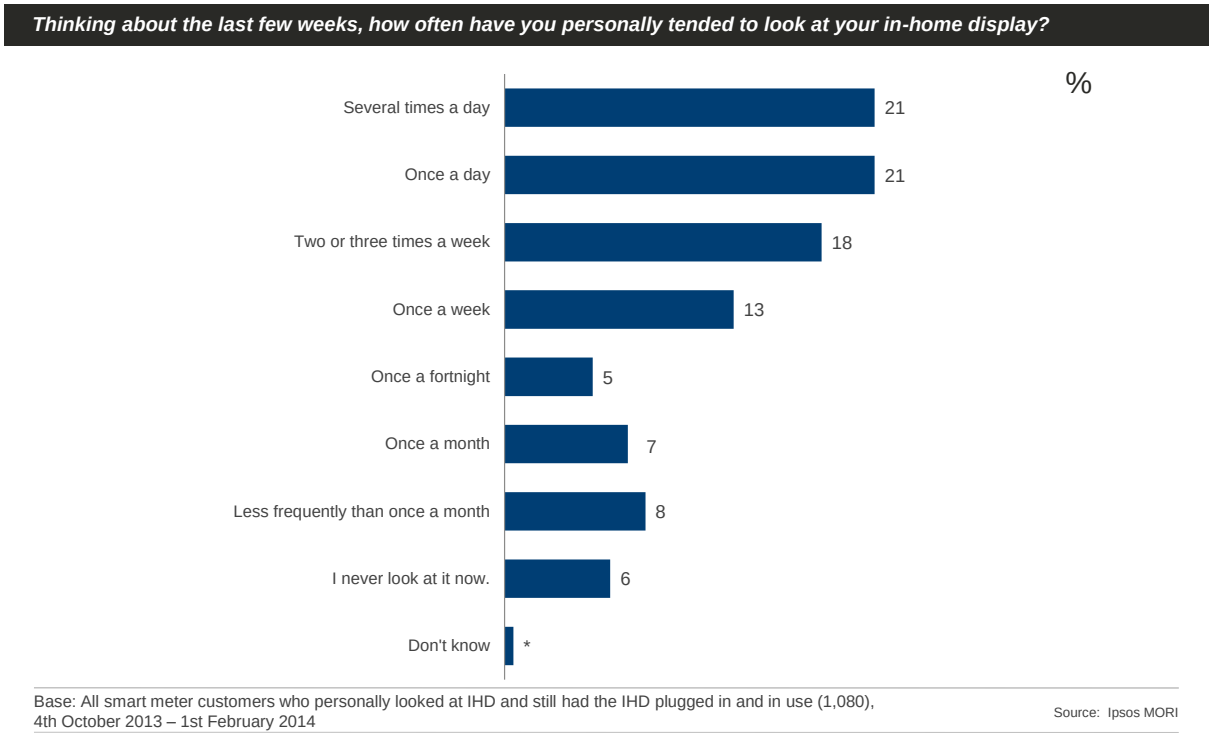
"If that's not simple [the IHD], I don't know what is … that machine doesn't frighten me."

Middle income, 65 and over, IHD plugged in

4.2.3 Current frequency of IHD usage

Among smart meter customers who personally looked at their IHD and still had it plugged in, the majority (73%) looked at it at least once a week while 42% looked at it at least once a day (Figure 20).

Figure 20: Frequency of looking at in-home display



Base: All smart meter customers who personally looked at IHD and still had the IHD plugged in and in use (1,080), 4th October 2013 – 1st February 2014

Source: Ipsos MORI

Responses were consistent across different groups of smart meter customer in the survey. No particular patterns existed by customer journey either.

In the in-depth interviews, those who stated that they tended to use the traffic lights and who kept the IHD in a visible place, also reported that they tended to notice changes in the IHD every day, as they happened. In such cases, changes to the IHD sometimes became 'background noise' to some extent.

Some tended to note unusual activity: for example, the IHD being red when nothing appeared to be switched on. This sometimes prompted action, such as 'hunting' for the source of the red signal. Others, however, simply noted changes but did not tend to act on them.

"I know there's nothing else switched on, so there's no point investigating or changing anything if it's unexpectedly red. It's normally in the amber and I don't quite

know why. I don't know why it's in the red now because we have four lights on in the kitchen. There's nothing using power."

Middle income, 35-64, IHD plugged in

Checking the IHD kWh display or cost display on a daily basis had become a habit for some in-depth interview respondents. Checks might occur before leaving the house, or before going to bed, but were often at a specific time of day.

"I glance at it every day. Sometimes I look just before I go to bed; to see how much has been spent in a day."

Middle income, 65 and over, IHD plugged in

Some respondents in the in-depth interviews reported looking at the traffic lights or hourly reading regularly, then looking at the IHD in more detail every so often. Some reported that they would write down data from the smart meter to keep track of what they were using over time. This data was used by some to predict what bills might be, to cross-check bills against IHD data, or to, more simply, sense-check their bills against the IHD.

The in-depth interviews also revealed a small number of individuals who reported using the IHD frequently, and were very adept at accessing and interpreting most of the available data.

4.2.4 Knowledge and proficiency at using IHDs

Of smart meter customers surveyed who had used an IHD, the majority (71%) agreed that they found the IHD easy to use. Just one in nine (11%) disagreed.

Smart meter customers who only had their IHD plugged in for a few days or weeks were more likely to disagree that it was easy to use (20%) compared to those who still had it plugged in (7%).

Older smart meter customers, those from lower social grades, those with no formal qualification and those who lived with someone who had a long-term health condition were also more likely to disagree that the IHD was easy to use. For example, 13% of those from social grade D or E said this compared to 8% of those from social grade A or B[40]. This applied to 13% of those aged 65 and over compared to 9% of those aged 18 to 64.

In terms of customer journeys, those who proactively requested a smart meter (86%) or actively responded to a request (79%), were more likely to agree their IHD was easy to use than those who had their meter replaced (66%). Those who recalled receiving information before, during or after the installation were also more likely to agree the IHD was easy to use than those who did not (75% compared to 51%). Those who were 'very satisfied' with their overall experience of their smart meter installation were again more likely to agree with this (80% compared to 71% overall).

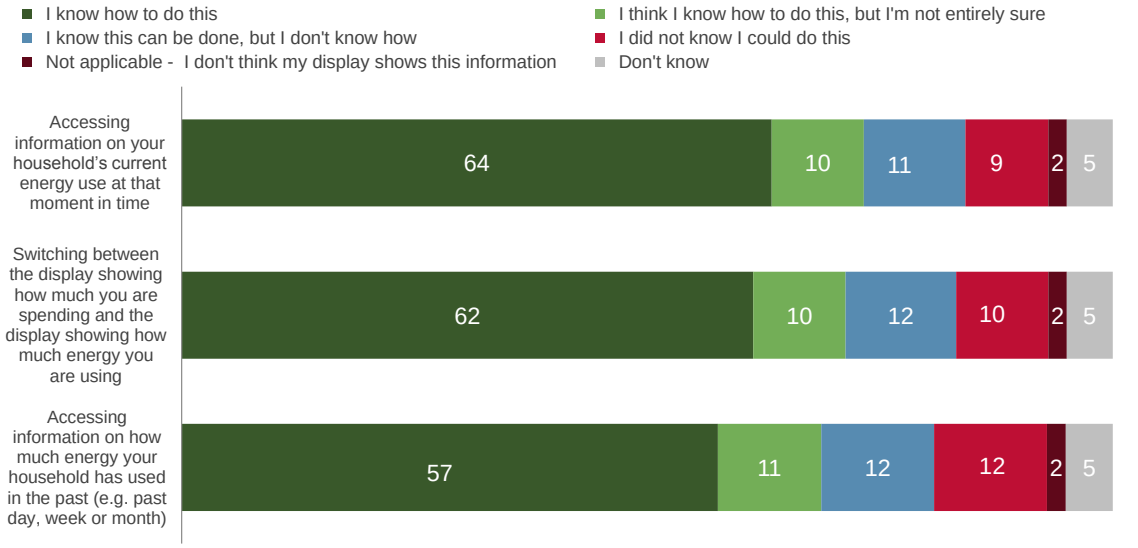
[40] These figures are based on smart meter customers who had an IHD that had ever been plugged in

As discussed in section 2.3 only a small minority of smart meter customers in the survey expressed concerns or disadvantages with their smart meter and/or IHD[41]. However, the most commonly mentioned, albeit by a very small minority, was that it was 'difficult to use/understand' (4% mentioned this as a concern and 7% as a disadvantage). It was again smart meter customers from older, low income households[42] and those with no formal qualifications who were most likely to cite these concerns.

Smart meter customers with an IHD that had ever been plugged in were asked about their level of confidence using the display to access different types of information. As shown in Figure 21, around six in ten reported to know how to access a range of information features although around one in ten did not know their IHDs could access this type of information.

Figure 21: Knowledge and proficiency of using in-home display

Thinking about your in-home display, which of the following best describes how you feel about doing each of the following?



Base: All smart meter customers with an IHD that had ever been plugged in (1,767), 4th October 2013 – 1st February 2014 Source: Ipsos MORI

Similar to perceptions around the ease of use of an IHD overall, older smart meter customers in the survey, those from lower social grades, those with no formal qualification and those who lived with someone who had a long-term health condition[43] were less likely to say they knew how to operate the different functions of the IHD listed in Figure 21[44].

[41] As mentioned in section 2.1, the in-depth interviews found that most respondents talked about their IHD as being their 'smart meter', suggesting that this concern is likely to relate primarily to the IHD rather than the actual meter(s).

[42] Older, low income households were defined as those where all inhabitants were aged 65 or over and which had a total annual household income of less than £16,000.

[43] As part of the survey all customers were asked if they or someone in their household had a long-term illness, disability or infirmity. Long-term was defined to customers as being anything that had

The survey also showed the following groups of customers were less likely to say they knew how to operate the different functions of the IHD: those who received a smart meter as they were told their current meter needed replacing; those who were not present at the installation; those who were less satisfied overall with their experience of the smart meter installation; and those who did not recall receiving any information from their supplier during the customer journey process.

Respondents in the in-depth interviews were asked to demonstrate the IHD to the interviewer. The demonstrations which the interviewers observed revealed a great deal of variation in knowledge of and proficiency at using the IHD.

There did not seem to be a strong connection between frequency of use and degree of proficiency at using the IHD. Some of those who used the IHD very regularly only used the traffic lights or particular information features, while some of those who had unplugged the IHD were able to plug it in and demonstrate how to find each feature, and what it showed. The survey data confirmed this finding as similar proportions of customers who looked at their IHD several times a day or said that they never looked at it now, reported knowing how to switch between the different types of information display and agreed that they find the IHD easy to use.

Understanding of the traffic lights

Almost all of those in the in-depth interviews who had used the IHD agreed that the traffic lights signals were simple and intuitive. Most noted that green was desirable, or 'good' and that red was 'bad'. Some respondents enjoyed trying to keep the IHD on green, and made something of a game of this.

Frustration or confusion with the traffic lights sometimes set in if the display was often amber or red, and a respondent did not understand why this should be the case. This was exacerbated where respondents were under financial pressure. Some expressed a desire to understand the thresholds of green, amber and red, or to have the IHD calibrated to their household, so that green would become an 'achievable' goal.[45]

"We'd like to change the point at which it changes as that would give us a target. At the moment we feel that green is not achievable. I notice the colour every time I walk past it."

Low income, 18-34, IHD plugged in

"It's rare for it to go onto green. I would need to go around switching off things I really want on, panel heaters, clocks… I'm not going to do that just to get a green light."

High income, 65 and over, IHD now unplugged

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troubled or in some way affected that person or other members of the household over a period of time.

[44] The data presented in this section is based on smart meter customers who had an IHD that had ever been plugged in.

[45] For SMETS compliant IHDs, it will be possible for the supplier, and possibly householders themselves, to amend these thresholds

Many respondents in the in-depth interviews were unclear, when asked, as to whether the traffic lights showed electricity use only, or electricity and gas combined. Some wondered if the traffic lights referred to the display that was ‘up’ at the time, that is, to electricity use when the display was showing electricity and gas when the gas button was pressed.

Understanding buttons and information features

In the in-depth interviews, some respondents reported that the display was easy and intuitive, while others voiced confusion or concern about the IHD buttons and the information they gave.

Some respondents confidently demonstrated all the buttons and information features of the IHD. The exception to this, in most cases, was the buttons underneath a clear plastic guard on some IHD models, which many said they assumed were ‘off limits’.

By contrast, other respondents reported that they were afraid of breaking or 'upsetting' the IHD by pressing buttons. For many of these respondents, their explanations of the IHD buttons and information features were characterised by uncertainty, for example 'I think it does this,' 'I don't think it shows gas...' When asked to demonstrate the IHD several respondents found new functions in the course of doing so, suggesting that their past exploration of the device had been limited. A few stated that they had used the menu buttons for the first time in anticipation of the interview.

Many of those who had a deeper understanding of the IHD reported that this was self-taught. Some recalled the initial demonstration by the installer, but felt that self-taught things 'stuck better'.

“Most of what I know is self-taught. Lots of things don't stick with me, so I'm better at teaching myself.”

Low income, 65 and over, IHD plugged in

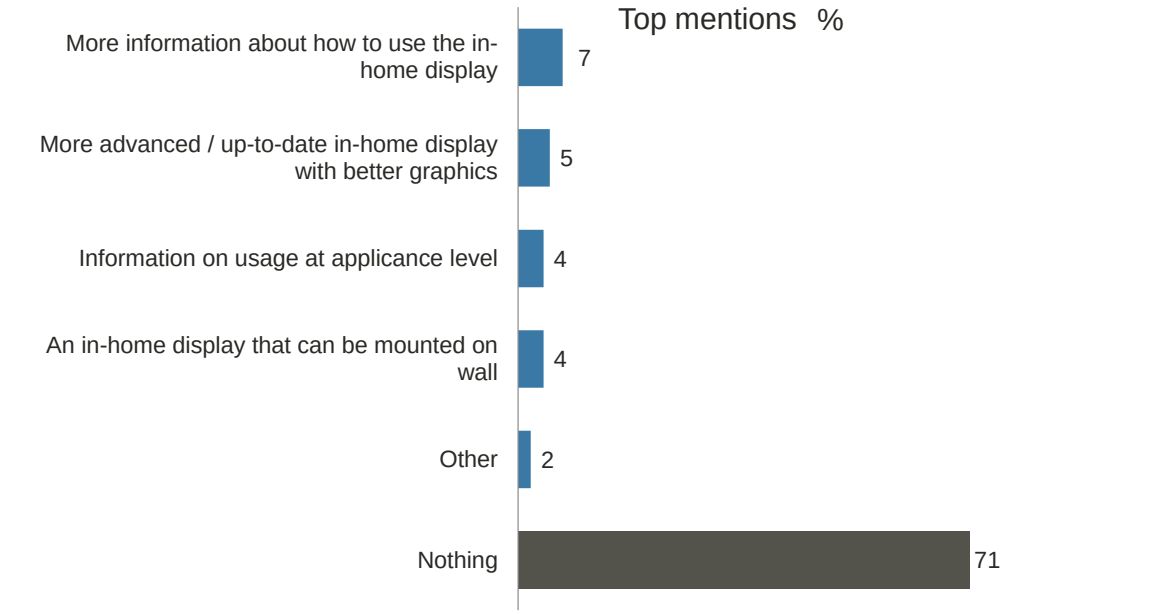
A few respondents reported how they had learned to interpret the charts and explain unexpected peaks, for example a peak when a central heating system pump kicked in, or a time lag on the IHD display which had initially been confusing but was now accounted for.

4.2.5 Desire for more information regarding use of IHD

As discussed in section 2.3 only a small minority of smart meter customers in the survey suggested any changes to their smart meter and/or IHD. Among the smart meter customers who suggested changes, the most commonly mentioned was a desire to have more information about how to use the IHD (7% - see Figure 22).

Figure 22: Desired changes to smart meter and in-home display

What, if anything would you like to change about your smart/new meter(s) or in-home display if you have one?



Base: All smart meter customers who knew they had a smart meter, or who knew their meter(s) had been replaced, or who did not know but said they had an IHD (1,963), 4th October 2013 – 1st February 2014

Source: Ipsos MORI

During the in-depth interviews, some respondents aged 65 and over said that they had been unable to take in information on the day of installation. This may explain their greater propensity to have described the IHD as difficult to use and understand. Some also expressed a desire for written information when responding in the in-depth interviews, suggesting that they might have benefited from additional support in this form.

"Some went in one ear and out the other."

Low income, 65 and over, IHD plugged in

"I'd like to have read up on it."

Low income, 65 and over, IHD now unplugged

Conversely, many of those in younger age groups said they got all the information they needed from the installer, or had known it beforehand anyway.

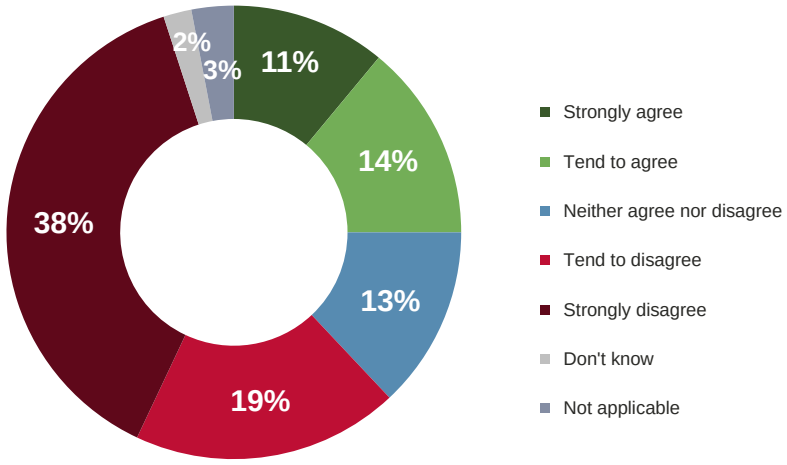
The in-depth interviews confirmed generally greater satisfaction with information received from installers among respondents who still had their IHDs plugged in than among those who had unplugged them. In-depth interviewers felt that the perceived quality of information received could therefore, for some, be driving continued use of the IHD. Some of those who had stopped using their IHD reported that having further information or help in using the IHD might make them start to use it again in future.

In the in-depth interviews respondents with low levels of internet usage or technical proficiency commonly expressed a desire for more information about how the IHD worked, and how it might be useful to them. This group also tended to report wanting information both in oral and written forms. Some also felt information could have been framed differently, for example in terms of cost savings.

Smart meter customers who had ever plugged in their IHD were also explicitly asked in the survey to what extent they would like more information on how to use the IHD *to manage their energy use*. More than one in four (26%) agreed that they wanted this, while just under six in ten (57%) disagreed (see Figure 23).

Figure 23: Desire for more information regarding use of IHD to manage energy use

I'd now like to ask you some questions about using your in-home display. To what extent do you agree or disagree with the following statements? I'd like further information about how to use it to manage how much energy I use



Base: All smart meter customers with an IHD that had ever been plugged in (1,767), 4th October 2013 – 1st February 2014 Source: Ipsos MORI

In the survey, the following groups were more likely to agree they would like further information to understand how to use the IHD to manage their energy use: those who proactively requested their smart meter; those who still had their IHD plugged in; those who lived in younger households; and those with children. For example, more than a third (35%) of those who proactively requested their smart meter wanted this compared to one in five (21%) of those who were told they need their meter replaced.[46]

4.2.6 Frequency of looking at specific IHD information

Smart meter customers in the survey who personally looked at an IHD which was still plugged in were asked how often, if at all, they now looked at nine different information features. The discussion below refers to these statements both individually and combined together into similar statements. Figure 24 provides an overview of this information.

Overall, nearly nine in ten (86%) of these customers had looked at one of the information features on their IHD. Customers were more likely to have looked at information features related to electricity (85%) rather than gas (81%) information. In

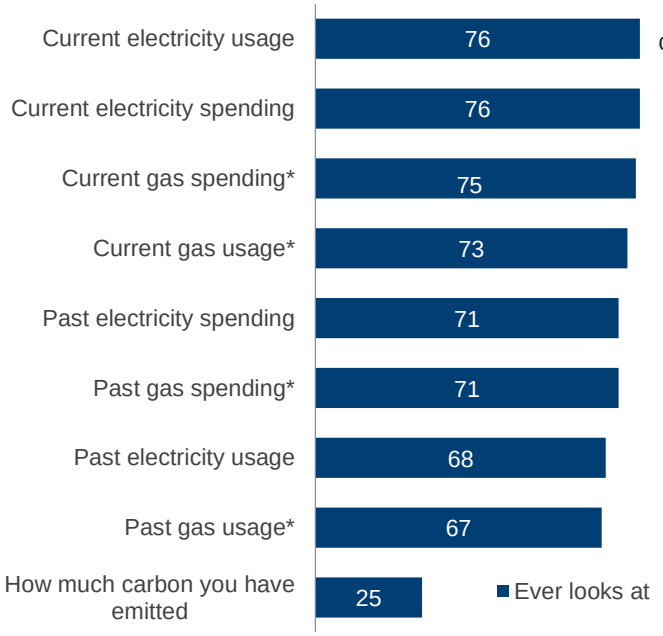
[46] These findings are all based on smart meter customers who had an IHD that had ever been plugged in and looked at it personally.

general, customers were also more likely to look at current, rather than historic information (current electricity - 83%, current gas – 80%; compared to 75% both for historic electricity and historic gas).

Similar proportions looked at information features about their *spending* on electricity (79%) and gas (78%), with customers more likely to look at current (76%), rather than historic spending (71%). Correspondingly, similar proportions had looked at electricity (79%) and gas (76%) *usage*. However, more customers had looked at current, rather than historic usage for *both* electricity (76% and 68% respectively) and gas (73% and 67% respectively). There were particular groups of smart meter customers[47] who were more likely to have looked at least once at any of the information features discussed here. They were those: with formal qualifications; aged under 65; living in larger households; those who recalled receiving information from their supplier or installer during or after smart meter installation; and those who proactively requested their smart meter.

Figure 24: Use of specific IHD information

How often, if at all, do you now look at the following features on your in-home display?



Statements combined, looks at…	Ever looks at
Any electricity information	**85%**
Any gas information*	**81%**
Any current electricity information	**83%**
Any historic electricity information	**75%**
Any current gas information*	**80%**
Any historic gas information*	**75%**
Any electricity usage information	**79%**
Any gas usage information *	**76%**
Any electricity spend information	**79%**
Any gas spend information*	**78%**
Any information feature	**86%**

Base: All smart meter customers with an IHD that was still plugged in and looked at it personally (1,080) *gas statements additionally based on those who use mains gas and have a electricity and gas smart meter (811) 4th October 2013 – 1st February 2014

Source: Ipsos MORI

A similar narrative appears when looking at the frequency of use of the different information features (Table 1: Frequency of looking at specific IHD information: please note that the columns overlap). This confirms that customers looked at current information more on a daily basis than historic information and that use of information on carbon emissions was low and infrequent. While the survey findings suggest that customers looked more frequently at usage rather than spending

[47] These findings are based on smart meter customers who personally looked at an IHD and have their IHD still plugged in and in general use (and where applicable, use mains gas and have both an electricity and gas smart meter).

information, the in-depth interviews found that respondents were primarily interested in how much their energy use was costing them. The terms 'usage' and 'spend' were often used interchangeably by interview respondents and it is likely that some of the references to 'usage information' in the survey relate to usage expressed in pounds and pence rather than in kilowatt hours.

Many of the in-depth interview respondents who spoke about the carbon emissions data found it meaningless. They explained this was because they did not have a benchmark, that is, an idea of what was normal, or the grounding of affordability which came with bills.

"I don't think I've ever looked at the CO2 thing. I wouldn't know if it's good, bad or indifferent."

Household interview, Middle income, 65 and over, IHD now unplugged

Particular groups of smart meter customers[48] were more likely to have looked at any of the nine information features at least once a week or at least once a month, those: with formal qualifications; aged under 65; living in larger households; those who recalled receiving information from their supplier or installer during or after smart meter installation[49]; and those who proactively requested their smart meter. It should be noted that these differences are not seen when changing the timeframe of interest from at least once a week to once a day. In other words, there are no evident differences between groups of smart meter customers when it comes to daily usage of the IHD.

[48] These findings are based on smart meter customers who personally looked at an IHD and have their IHD still plugged in and in general use (and for questions about gas information, use mains gas and have a gas smart meter).

[49] Those less likely to recall receiving information tended to be from lower social grades and to be aged 65 and over.

Table 1: Frequency of looking at specific IHD information

How often, if at all, do you now look at the following features on your in-home display? Information on your past / current electricity usage (the kilo-watts measure) how much electricity you have used over the last week or month

Statement	At least once a day	At least once a week	At least once a month
Current electricity usage	17%	44%	61%
Current gas usage*	16%	39%	58%
Current electricity spending	13%	39%	59%
Current gas spending*	12%	38%	59%
Past electricity spending	9%	32%	52%
Past gas spending*	9%	33%	51%
Past electricity usage	8%	31%	49%
Past gas usage*	8%	29%	48%
How much carbon you have emitted	2%	8%	15%

Base: All smart meter customers with an IHD that was still plugged in and looked at it personally (1,080) *gas statements additionally based on those who use mains gas and have a electricity and gas smart meter (811) 4th October 2013 – 1st February 2014

Source: Ipsos MORI

4.3 The information learnt from IHDs and how this information was used

It was evident in the interviews that smart meter customers put information gained from the IHD to use in different ways, and to greater and lesser extents. Ability to gather information from the IHD was also not always closely tied to likelihood of taking action on the basis of that information, suggesting an information-action gap exists for some smart meter customers.

The in-depth interviews suggested that this gap could occur for a number of reasons:

- The customer felt unwilling to act on the information they received from the IHD. This was sometimes because the customer felt making a change to their level of energy use was unnecessary as they were not struggling to pay their bills, or in other instances, was because a customer was unwilling to make what they perceived to be a sacrifice, cutting back on either a luxury or what was considered a necessary behaviour. For example, a few older customers would not consider turning their heating down as keeping warm was a large priority for them.
- Information shown on the IHD was not meaningful in the eyes of the customer. In particular, in-depth interview respondents picked up on kilowatt hour and carbon emission information or labels printed on the devices stating ‘for demonstration purposes only’. Some respondents in the in-depth interviews also expressed doubts about the validity of the information, for example whether it had been updated to take account of a change in tariff.
- Some customers who reported that their IHD showed their household to have a high base load felt this identified too general a problem, and did not help them to identify the more specific issue and the reasons for this reading. In

some cases, customers said they were left feeling unsure how they could improve the situation.

- Information shown on the IHD indicated problems but not solutions. For example, a customer might be able to see that showering used a lot of energy, but was offered no information about how they might shower differently and use less energy. This was particularly relevant for household activities customers felt to be 'essential', such as washing, cooking and heating the home.

The in-depth interviews revealed that smart meter customers focus on the IHD and understanding of it might be categorised in two ways:

- **Information driven approach** – customers primarily interested in knowing how much energy different appliances and household activities use, and understanding which appliances 'make it go red' or 'cause a spike'.
- **Monitoring approach** – customers primarily interested in monitoring the state of things in the house (e.g. checking IHD to see that appliances are turned off before they leave the house, or keeping an eye on energy use day-to-day).

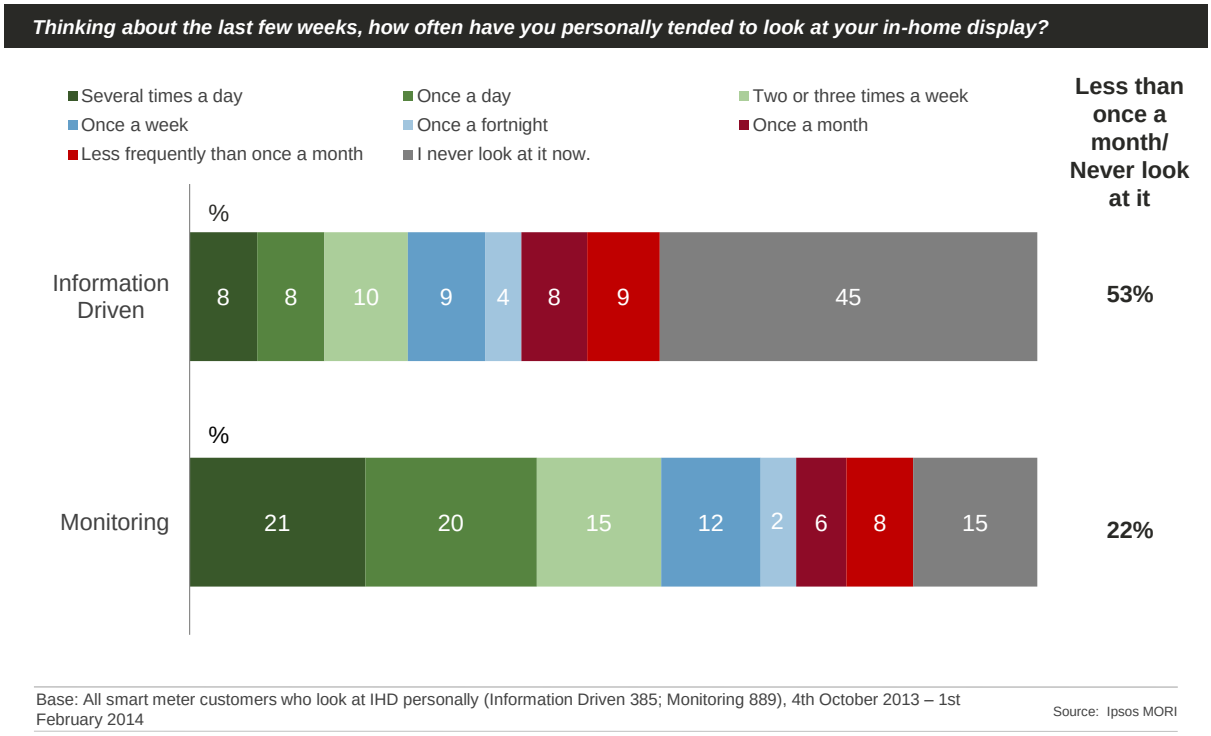
Those with an exclusively 'information driven' approach to the IHD appear to have more often found the IHD redundant after an initial learning period, and so ceased to use it. Many of those who adopted a 'monitoring approach' began by taking an 'information driven approach' and moved on to take a 'monitoring approach' once they had learned what they felt they could about the appliances in their home. Those who did adopt a 'monitoring' approach were more likely to continue to use the IHD, and might even increase use over time, as they found new ways to monitor and control their energy use. This said, many respondents could be seen to take a mixture of the two approaches, and some of those who adopted a 'monitoring approach' became less interested in the IHD after a time, describing the 'novelty' as wearing off.

The survey data backs up this finding from the in-depth interviews, that those who took an exclusively 'information driven' approach were less likely to be using their IHD in the long-term. Using the survey data, customers have been defined as having an 'information driven' approach to using the IHD if they agreed that they used it when it was first installed to check the energy usage of different appliances but if they went on to say that they had not used it in ways which could be considered examples of a 'monitoring approach': to work out a normal level of household usage; to check that nothing has been left on unintentionally in the house; to encourage others to reduce their usage; or to estimate their energy bills. Customers who agreed they had used their IHD for any of these purposes were defined as having a 'monitoring approach'.

The 'information driven' group were found to be far more likely to not have their IHD plugged in at the time of the survey (53% compared to 20% for the 'monitoring' group), to say they personally look at the IHD less frequently than once a month or

not at all (53% compared to 22%) and to say that their household looks at the IHD a lot less than when it was first installed (55% compared to 29%).[50]

Figure 25a: Differences between Information Driven and Monitoring groups in their personal engagement with IHD



Base: All smart meter customers who look at IHD personally (Information Driven 385; Monitoring 889), 4th October 2013 – 1st February 2014

Source: Ipsos MORI

What was clear from the in-depth interviews was that many householders had been encouraged to take an 'information driven' approach in the first instance, as the installer suggested they 'play' with the IHD in order to work out what appliance in their house used what amount of energy. Once they had gained what information they could about household appliances, some respondents reported that they no-longer saw a use for the IHD, and so ceased to use it. Others, however, moved on to take a monitoring approach to the IHD, after an initial 'information driven' phase.

The rest of this section goes on to consider in more detail the types of information learned from the IHD and the ways in which this information has been applied within smart meter households. Section 4.4 then explores how households have interacted with their IHD and whether the frequency and intensity of their usage has changed over time.

4.3.1 Ways in which IHD information had been applied to different uses within households

Smart meter customers with an IHD that had ever been plugged in were asked in the survey whether they had used the information the IHD provided for specific tasks.

[50] Customers defined as having a monitoring approach were also more likely to believe their smart meter and/or IHD had encouraged them to change certain energy-related behaviours. See chapter 5 for further details.

The tasks asked about are those that might constitute a ‘monitoring approach’ to using the IHD.

Amongst smart meter customers in multi-person households who personally looked at an IHD that had ever been plugged in, nearly four in ten in the survey (38%) agreed they used it to encourage other household members to reduce their energy use. In all households, a similar proportion agreed they used it to work out what a normal level of energy use was in their household (37%). Just under three in ten had used it to check that they had left nothing on in their home when they went out or went to sleep (28%) (see Figure 25b: Ways in which IHD information has been used).

Some respondents in the qualitative research reported that using cost or kWh data to understand what was 'normal' for the household helped them to identify if they were using more than they should. This could be the case where appliances had been accidentally left on, or where appliances were malfunctioning.

Figure 25b: Ways in which IHD information has been used

Thinking about your in-home display, which of the following best describes how you feel about doing each of the following?

Base: All respondents with an IHD that had ever been plugged in and looked at IHD personally (1,494). *This statement additionally based on those in multi-person households (1,112) 4th October 2013 – 1st February 2014

Source: Ipsos MORI

In the survey households with children aged 15 and under were more likely to have used their IHD for the purposes listed in Figure 25b. While half (49%) of respondents living in a household with children agreed they had used their IHD to encourage others to reduce their energy use, this applied to less than two in five (38%) smart meter customers overall.[51]

[51] These findings are all based on smart meter customers who had an IHD that had ever been plugged in and had looked at it personally. The first statement (encouraging other household members) is additionally based on just those in households of two or more people

Customers who recalled receiving information from their supplier about their smart meter and IHD during the customer journey, were more likely than those who did not recall receiving this, to agree that they had used their IHD to work out a normal level of usage and to check nothing was left on in the home.

4.3.2 Using the IHD to estimate energy bills

Of smart meter customers surveyed who had an IHD that had ever been plugged in and looked at it personally, just over one in five (22%) had used their IHD to estimate what their energy bill might be.

Lower income smart meter customers and those who still had their IHD plugged in were more likely to have used their IHD to estimate their energy bills. For instance, 29% of customers with a total household income of £16,000 or lower had done so compared to 20% of those with household incomes of above £16,000.

The majority (80%) of those who had used their IHD to estimate their energy bills found it easy. Just one in nine (11%) found it difficult.

Smart meter customers from lower social grades or from households where someone lived with a long-term health condition were more likely to state that they found it difficult to estimate their energy bills from their IHD. For example, more than one in five (22%) of those in social grades D or E said this compared to one in ten (11%) smart meter customers overall[52].

Some respondents in the in-depth interviews reported having used the IHD to gain a better or more granular understanding of how daily or weekly usage contributed towards the bills that they received monthly or quarterly. A few respondents reported confidence in using the IHD to check the accuracy of bills they received. Some stated that they used the IHD to predict what their next bill would be, though this was not common. Many were on fixed direct debits which accrued credit when they used less than expected, or incurred charges if they used more, meaning there was little or no difference in the bills they received, regardless of what they used. Some were simply not concerned about their bills or managing payments, so felt no need to predict what bills might be.

"You've still got electric and you've still got bills, that's why I didn't bother with it. To me, it don't mean nothing."

High income, 65 and over, IHD now unplugged

"If you were that pedantic you could write down what it cost you according to them and check your bill – but we haven't done that, have we?"

Household, Middle income, 65 and over, IHD plugged in

[52] These findings are based on smart meter customers who had an IHD that had ever been plugged in, looked at it personally and had used their IHD to estimate their bills.

A small number of those who had tried to use the IHD to understand or predict their bill were confused by apparent discrepancies between the IHD and their bills. Some respondents, for example, reported having changed tariff, and being unsure as to whether the IHD had been updated to take this change into account. Others simply could not relate the spend shown on their IHD to the figure on their bill, and had no idea why they should be different. None reported difficulties in obtaining the information to cross check their bills from the IHD, if they wanted to obtain this information.

The in-depth interviews also found that a few respondents tried to use the daily spend to budget, either by writing down the daily spend amount each day, or by putting aside the amount shown on the IHD on a daily or weekly basis.

A few respondents reported being more interested in monitoring one fuel type over another, because they felt that use of this fuel was more in their control. There were examples of gas and of electricity being favoured.

"I thought at the time it would be good to have the traffic light for the gas [as well as for the electricity], but I don't have much control over that in the long term."

Individual, Middle income, 35-64, Single person HH, IHD plugged in

"You can control gas more, and that really chews up your money if you don't keep an eye on it."

Individual, Middle income, 35-64, IHD plugged in

4.3.3 Information gained from IHD

Smart meter customers taking part in the survey who indicated their energy use had changed were shown a list of types of information that might have informed their understanding of whether, and how, their energy use had changed in the last couple of years. The findings show that the bill remains the key channel through which customers had learned about their energy use (73% for gas, 72% for electricity). However, a substantial minority said they knew about an increase in their usage from information on their IHD (16% for gas and 20% for electricity).

Customers in the survey were prompted specifically to consider what they had learned from the information they had seen on their IHD. The results presented in this section are based on smart meter customers who personally looked at an IHD that had ever been plugged in.[53]

In all, six in ten (60%) mentioned that their IHD had taught them something about their energy use. Just under half (45%) mentioned that the IHD had shown them something that indicated they were using more energy than they expected. This included the fact that particular appliances used more energy than they expected (33%) or that their household was using more electricity (17%) or gas (13%) than expected (Figure 25c).

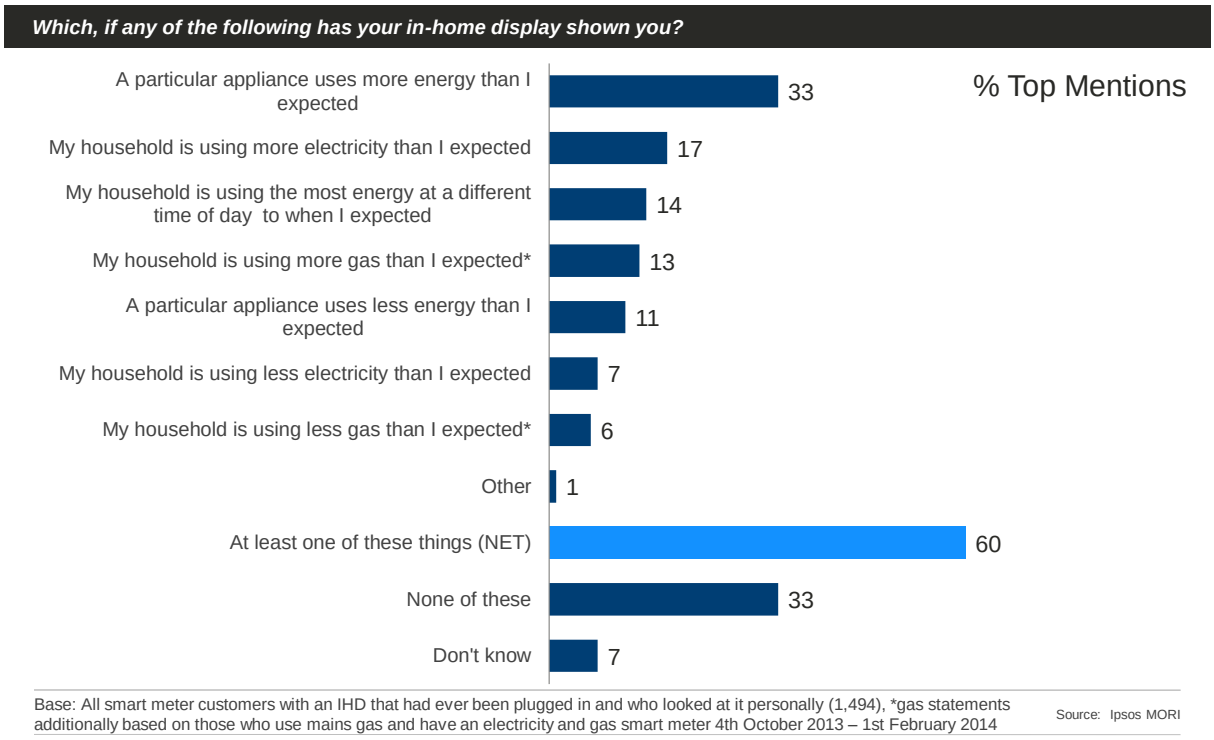
Less than one in five (19%) mentioned that the IHD had shown them they used less energy than they expected. Examples of this included finding a particular appliance

[53] Gas statements are additionally based on those who use mains gas and have a gas smart meter

used less energy than expected (11%) followed by their household using either less electricity (7%) or gas (6%) than they expected.

Around one in seven (14%) mentioned that the IHD had taught them something about when in the day they used most energy.

Figure 25c: What smart meter customers have learned from information seen on their in-home display



Base: All smart meter customers with an IHD that had ever been plugged in and who looked at it personally (1,494), *gas statements additionally based on those who use mains gas and have an electricity and gas smart meter 4th October 2013 – 1st February 2014

Source: Ipsos MORI

Two groups of customer were specifically more likely to say that they were using *more* energy than they expected: those in social grade A or B (51% compared to 37% of those in social grade D or E) and those in larger households (62% of those with five or more members compared to 37% of single-person households).

Some respondents in the in-depth interviews reported having been surprised by what specific appliances or activities used when they first began to use the IHD. Examples of this included an electric fan heater, cookers, kettles, and halogen ceiling lights.

Many respondents in the in-depth interviews mention ‘spikes’ or ‘red lights’ on the IHD in connection with, for example, use of the kettle, as something that they noticed in the immediate aftermath of the smart meter installation. Some, however, particularly those who later ceased to use the IHD, caveated this by pointing out that they already knew that the appliances which caused such spikes used a lot of energy.

Other respondents in the in-depth interviews reported that they felt there were things they wanted to learn from the IHD, but that they could not access the data they felt would be helpful to them. Some, for example, expressed a desire to see more, different, or more granular information from their IHD (e.g. information on the amount of energy individual appliances were using). A few of these, particularly those with displays that were primarily showing amber, expressed a desire to have energy use broken down by appliance, so that they could understand what was causing this high

base load. Others wanted to better understand energy 'trade-offs.' An example of this was whether heating water quickly in the kettle at a high rate of consumption used more energy than heating water slowly on the gas hob at a lower rate of consumption.

4.4 Household level interaction with IHDs

4.4.1 Household members' usage of the IHD

Both research strands show evidence that in many households, an individual or 'bill guardian' takes primary ownership of the IHD, but that wider use is made within a household. Sometimes the primary user of the IHD reports using it to inform and educate others in the household.

Survey respondents were asked about their household's use of the IHD[54]. In nearly four in ten (37%) multi-person households more than one household member looked at the IHD (based on households where the IHD was still plugged in and in use). The majority of survey respondents (73%) thought they were the person who tended to look at the IHD the most often, however. In households with children aged 15 or under, around one in six (16%) reported their children looked at the IHD, although very few (3%) said it was the children who looked at the display the most often.

In the in-depth interviews, it was often reported that the 'bill guardian' tended to take most interest in the IHD. In some cases, however, one member of the household was reported to take an interest in 'the graphs' or other more technical data from the IHD, while the other tended to look only at the traffic light signals or real-time costs.

"I just use the colours. [My husband] would have looked at the graphs in the beginning."

Household interview, Middle income, 18-34, Children in HH, IHD now unplugged (6)

Other householders' lack of interest in the IHD was sometimes qualified with 'they don't pay the bills'. This reasoning was often (although not exclusively) used with children, particularly teenagers. Teenagers' lack of interest was sometimes explained by the fact that they 'are teenagers' and so are too busy or preoccupied with other things. In the case of a few householders, however, teenagers did take an active interest in the IHD.

"I tend to be the one who thinks about it, the light turner offer in the house, the only one who looks at the smart meter. I'm the energy conscious person. The teenager has his head in the clouds, and my wife is too busy."

Middle income, 35-64, IHD plugged in

Children were sometimes reported to be interested in the IHD, and a few parents reported their children acting as 'energy monitors' by alerting their parents when the IHD was red.

[54] It should be noted therefore that the responses reflect their perception of usage of the IHD by other household members.

There were also some explicit examples in the in-depth interviews of the IHD being used in a targeted way to try to 'teach' other householders about the impact of their behaviour on energy consumption:

- A mother used the IHD to teach her son about the value of energy;
- A son-in-law gave the IHD to his father-in-law, who lived in the annex of his house, in the hope that he would reduce his use of an oil-filled radiator for heating; and
- Parents encouraging their teenage daughters to have shorter showers by demonstrating how the shower made the IHD light red.

4.4.2 Relative household usage of the IHD since it was installed

Most (41%) of the smart meter customers surveyed who still had their IHD plugged in thought their household looked at the display less frequently than when it was first installed. Around one in ten (11%) reported the household looked at it more often now, however.

Some groups of smart meter customers surveyed were more likely to have stated that their household looked at the IHD less often than when it was first installed. The findings below are all based on smart meter customers where anyone had looked at the IHD and the IHD was still plugged in and in use.

- Those with a formal qualification (44%) compared to those with no formal qualifications (32%); and
- Households with children aged 15 and under (50%) compared to customers overall (41%).

There were no differences in the responses of customers who had different experiences of the smart meter customer journey.

Findings from the in-depth interviews supported the survey findings, in that children, particularly non-teenage children, were reported to have been excited by and interested in the IHD at first, but that this interest tended to taper over time.

"When it went red the older girls would be like 'Mum! It's gone red!' It was a bit of a novelty at first, then over time, you don't look at it as much. The girls were interested for the first 3-4 months."

Household interview, Middle income, 18-34, Children in HH, IHD now unplugged

A similar tapering of interest in the IHD was also reported by many adults.

"When it was first installed it was a novelty. It's like when you first get the dog. At first you can't stop stroking it. And then you walk downstairs and think … did I see the dog this morning?"

Household interview, Middle income, 65 and over, IHD plugged in

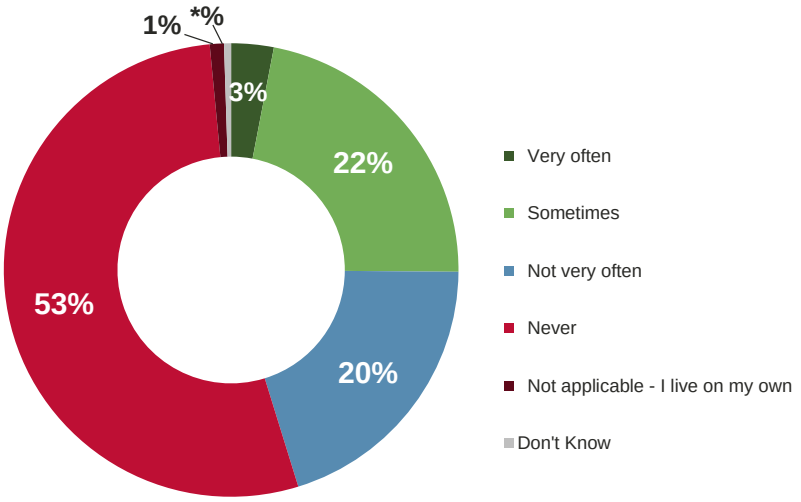
4.4.3 Discussion of information on IHDs within households

In the survey, amongst smart meter customers in multi-person households who had an IHD that had ever been plugged in, around a quarter (26%) reported that members of their household either very often or sometimes discussed information displayed on their IHD (Figure 26). More than one in two (53%) reported that they

and members of their household had never discussed information displayed and one in five (20%) stated they did not do so very often.

Figure 26: Frequency with which household members discussed information shown on in-home display

How often, if at all, do you and the members of your household discuss the following…? Any of the information displayed on your in-home display (e.g. Energy use/costs etc.)



Base: All smar t meter customers with an IHD that had ever been plugged in and lived in a multi-person household (1,387), 4th October 2013 – 1st February 2014

Source: Ipsos MORI

There were a number of groups in the survey who were more likely to have stated that they either never or not very often discuss information displayed on the IHD. The findings below are all based on smart meter customers who had an IHD that had ever been plugged in and lived in multi-person households.

- Customers aged 75 and above (81%) compared to overall (73%);
- Those who had their first IHD with their smart meter (74%) compared to those who had a clip-on IHD before they had their smart meter installed (62%); and
- Those who were told they needed their meter replaced (79%) compared to those who proactively requested a smart meter (64%).

In the survey, smart meter customers in multi-person households, who had an IHD that had ever been plugged in, and who discussed the information it showed with other members of their household, were asked about their perceptions of these discussions. Three quarters (75%) considered the discussions about the information shown on their IHD with other household members as positive.

Accounts in the in-home interviews reveal that discussions about the IHD often centred on the traffic light signal. Some reported talking about why a red signal might have occurred, sometimes followed by ‘hunting’ for the source of the signal, if this was not obvious. Others spoke of using the IHD to challenge the behaviour of other household members because of a red signal, for example, in the case of teenagers taking long showers, children playing on the Xbox and an example of what was considered to be over use of an electric heater.

A few 'bill guardians' in the in-home interviews reported that they had become more vigilant, or 'hard line' with other household members since the smart meter was installed, as the IHD made energy use, and wastage, more visible.

"I'm probably a bit more hard line on getting people to switch lights off because of the smart meter… because I can see how much energy we're using at a glance."

Middle income, 35-64, IHD plugged in

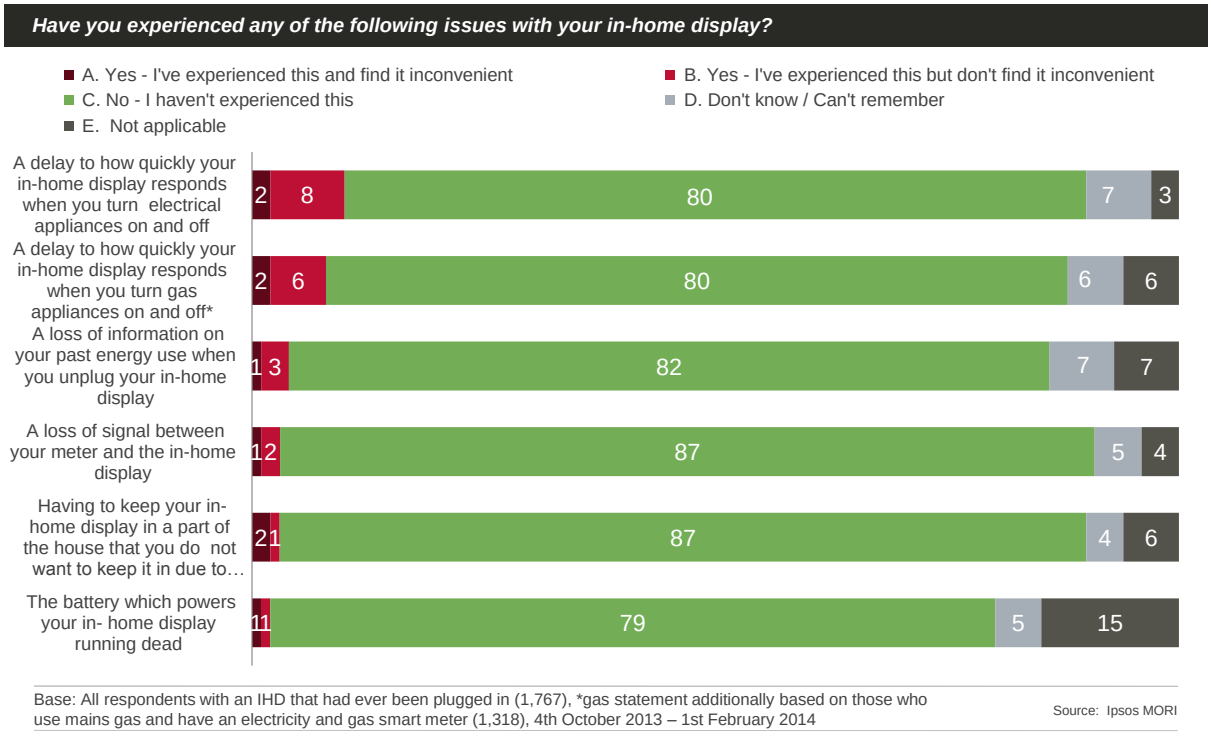
4.5 Issues experienced with IHDs

4.5.1 Prevalence of issues with IHDs

Smart meter customers with an IHD were asked whether they had ever experienced a number of specific issues with the display, and if so whether this was something they had found inconvenient. Few among those who had ever plugged in their IHD had experienced any of the listed issues (14% - see Figure 27).Of those that had experienced a particular issue, very few found it inconvenient.

The most common issue noticed was a delay in how quickly the IHD responded to turning electrical appliances on and off (10% had noticed this)[55]. Fewer than one in ten reported they had experienced a range of other potential issues, including a delay reacting to gas appliances (8%), loss of signal between the IHD and the smart meter (4%) and loss of information on past energy use when the IHD was unplugged (4%).

Figure 27: Prevalence of issues with in-home display



Base: All respondents with an IHD that had ever been plugged in (1,767), *gas statement additionally based on those who use mains gas and have an electricity and gas smart meter (1,318), 4th October 2013 – 1st February 2014

Source: Ipsos MORI

[55] Under SMETS, the IHD will update in less than 10 seconds for electricity, but every 30 minutes for gas

There was little evidence of the IHD being inconvenient for smart meter customers in relation to any of the specific issues asked about. Just one in twenty (5%) of those who had ever plugged in their IHD said they had experienced one of these issues and found it inconvenient.

Few respondents in the in-home interviews reported experiencing any issues with their IHD. A few had noticed a few seconds' delay in the IHD responding to a change in how appliances were being used. Occasionally this caused confusion at first, but respondents reported that once they had realised there was a short delay, this was not a problem for them.

4.6 Reasons for no longer engaging with IHD

Overall, two in five (39%) of the smart meter customers surveyed who had received an IHD reported that they no longer had it plugged in. In total, 4% of all smart meter customers who received an IHD had never plugged it in. The reasons given for never having plugged in the IHD were very varied with no one reason mentioned by more than a handful of people. As summarised in Figure 17 in section 4.1, older, lower income smart meter customers, those with no formal qualifications and those from a household where someone lives with a long-term health condition, were among the most likely to have never plugged in their IHD. For example, 7% of those in social grade D or E had never plugged their IHD in compared to 2% of those in social grade A or B.

Smart meter customers who no longer had their IHD plugged in, including those who had never plugged it in at all, were asked their reasons for not using the display. Among those who had never plugged in their IHD, 31% gave the reason that they did not understand how to use it, while 18% gave the reason of not believing the IHD would be useful for them. Looking across the smart meter customer groups the survey data showed that those who had unplugged their IHD after a few days as opposed to after a few weeks or after a few months were relatively similar to one another in their demographic profile. Mostly due to small base sizes, it is difficult to consider differences by customer journey. However, those who were told they needed their meter replacing were more likely to unplug their IHD in the first few days or weeks (71% compared to 54% of smart meter customers overall who received an IHD).

In the survey, smart meter customers who had received an IHD but reported that it was not generally still plugged in and used, were asked their reasons for unplugging the device. These customers were not prompted with specific response options and were able to freely describe their reasons. In the in-depth interviews, respondents were asked to build a 'customer journey' which took them from first hearing of smart meters, up to the day of the interview, and explored in-depth the reasons why some had stopped using their IHD.

Both strands of the research revealed a range of reasons for customers not using the IHD. Whilst the in-depth interviews found no predominant reason for unplugging the IHD, some broad categorisations were possible, and these are outlined below. It is important to note that only some customers were selected for the depth interviews who had unplugged their IHD; and a larger sample would have been required to enable any firm conclusions to be drawn about the relative prevalence of these explanations.

These reasons are outlined here and explored in more detail below. It should be noted that some respondents fit under more than one of these headings:

1. Those who immediately rejected the device as something that did not interest them, and never would.

   “I had the impression they came together with the display, but assumed I would never use the little display, but would take it as part of the package. I didn't have a play with it. There would have been no point. I wasn't interested.”

   Middle income, 35-64, Single person HH, IHD never plugged in

2. Those who unplugged the device as soon as it ceased to seem useful to them.

   "It was just showing us the same things."

   High income, 35-64, IHD now unplugged

3. Those who unplugged the device because at some point in the past it has ceased to be of use.

   “It was sitting on that unit over there and you could see this black line going up and down and it kept distracting you. So I thought, ‘I can’t be bothered with it anymore.”

   Low income, 65 and over, IHD now unplugged

4. Those who unplugged the device circumstantially, for example, to plug in something else, and then failed to plug it in again, resulting in a passive decision to keep the device unplugged long-term.

   “About a year ago, we were redecorating in the hallway, and my husband unplugged it and put it in the cupboard, and we haven't had it out since then.”

   Household interview, Middle income, 18-34, Children in HH, IHD now unplugged

Experiences three and four were often combined for in-depth interview respondents. For these respondents, survey answers on the length of time for which the IHD had been plugged in did not necessarily correlate with how long they had been using it for. Respondents had frequently stopped using it before they eventually unplugged it. Only with experiences one and two did their survey answer on the length of time for which the IHD was plugged in give a clear indication of the length of time for which the IHD was in use.

Motivations for immediately rejecting/resisting the IHD

In-depth interview respondents who reported immediate rejection of the IHD, tended to report a preconception, before or at the point of receiving the IHD, that the IHD would never be used in their household.

This was the second most common reason given for not using the IHD by respondents in the survey, with a quarter (25%) of those not using the IHD stating that this was the reason why. This was more common amongst those from social grade A or B who were not using their IHD (33%) than those in social grade D or E (21%). As one respondent noted in the in-depth interviews:

"They wanted to give me instructions on how to use the smart meter, but I wasn't particularly receptive… I knew I wasn't going to use it; that was the main thing."

Middle income, 35-64, IHD plugged in

Some respondents attributed their lack of interest to a lack of concern about bills or energy use. Some did not feel they had anything to learn from the IHD, as they were happy with what they used and what they paid. Some reported that they had little scope to change or were already using the minimum necessary to maintain a standard of living that was acceptable to them.

A few respondents in the in-depth interviews spoke of not liking technology or not feeling capable of interpreting data from the IHD. Similarly, the third most common reason given by survey respondents for not using the IHD was that the respondent did not understand how to use it (13%). This was more common amongst those from lower social grades, those with no formal qualifications or who lived in a household where someone had a long-term health condition. For example, 22% of those not using the IHD from social grade D or E said this, compared to 5% of those from social grade A or B. This also applied to 19% of those aged 65 and over who were not using the IHD (and up to 25% of those aged 75 and over) compared to just 8% of those aged 18 to 64.

Motivations for unplugging the IHD

The most common reason given in the survey for unplugging the IHD was that customers felt they no longer needed the IHD after they had initially looked at how much energy their appliances used (29%). The in-depth interviews found many examples of respondents whose initial interest in the IHD tailed off in this way (see section 4.4.2) as they felt they already understood the actions they could take to reduce their energy use, with some carrying these actions out if they found them appropriate and possible to do so.

"I'd seen what it did, seen the effect it had when I was using things and when I wasn't."

Middle income, 35-64, Children in HH, IHD now unplugged

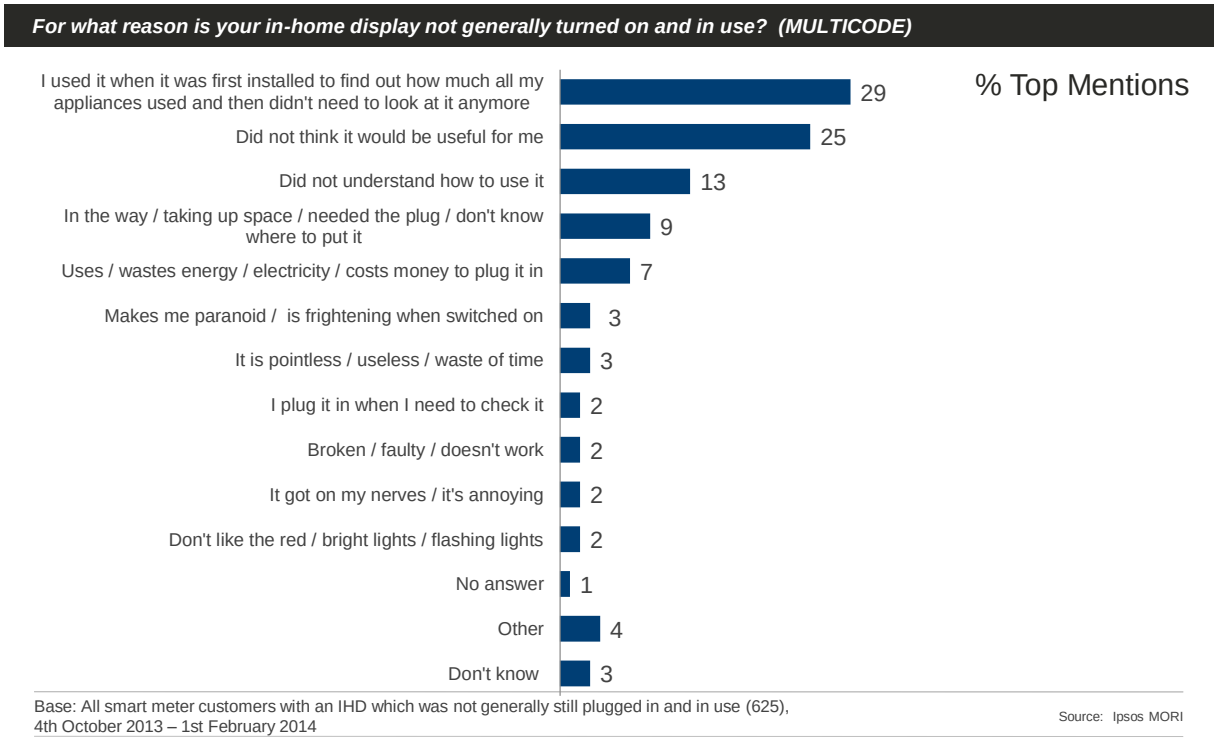
In the survey, younger smart meter customers, those from higher social grades and from households where no-one lives with a long-term health condition were more likely to say they had stopped using their IHD as they no longer needed it. A third (34%) of those living in younger households (where all members were under the age of 65) said this compared to just over one in five (23%) from older households (where all members were aged 65 or over).

Respondents in both strands of research also cited a number of concerns or aggravating factors about the IHD itself, which often contributed to the decision to unplug. In the survey, the fourth most common reason given for not having the IHD turned on and in use was that it was 'In the way / taking up space / needed the plug / don't know where to put it' (9%), and fifth was that it 'uses / wastes energy / electricity / costs money to plug it in' (7%) (see Figure 28). In the in-depth interviews these factors were generally of concern to those who had already decided that the IHD would never be, or was no-longer useful to them.

"As soon as the installer left I moved it to where the radio was, then left it there for about six weeks, then I decided it was using electricity too, so unplugged it and put it in the cupboard."

Household interview, Middle income, 35-64, IHD plugged in

Figure 28: Reasons for unplugging in-home display



Concerns about consumption information

A few respondents in the in-depth interviews reported finding the information shown on the IHD aggravating or concerning, and stated that they would rather not see what energy they were using. This was exacerbated where energy use was seen to be unavoidable, or where householders did not know how to use the information they were getting from the IHD to reduce their energy use.

"The colours it shows up especially with the oven… I was in the kitchen especially on a weekend and I noticed it changed right to red and it would stay there, and I'm thinking I am using a lot of electricity. [That made me feel] fairly agitated; I didn't want to know how much I was spending because I'm thinking, 'Gosh is that much I'm spending?'"

Low income, 35-64, IHD now unplugged

A small minority in the survey (4%) felt they were 'paying too much attention to the smart meter/checking it too much' and some in-depth interview respondents agreed they found the information on the IHD concerning.

A few individuals stated that the traffic lights were usually amber, and almost never went to green, which some were concerned about, and one cited as a reason for

unplugging[56]. For others who still had their IHDs plugged in, this was still a source of concern and a cause for alienation from the display.

"We have wondered if the display being on is enough to make the traffic lights go orange. We'd like to change the point at which it changes [colour, from green to orange] as that would give us a target."

Low income, 18-34, IHD plugged in

[56] Under the SMETs, IHDs will have energy consumption thresholds that are configurable by the energy supplier and potentially by customers themselves

5. Impacts of smart metering

This section explores the impacts that smart meters and/or in-home displays have had on customers' energy-related attitudes and behaviours.

Key findings

Energy-related attitudes

A majority of smart meter customers surveyed agreed it is important to save as much energy as possible (93%). A majority (85%) also agreed they had tried to reduce their energy use at home. Of those who expressed these views, more than three in ten felt the smart meter and/or IHD had encouraged this attitude and self-reported behaviour. Smart meter customers were more likely than legacy meter customers[57] to agree they had tried to reduce their usage, although no difference was seen in terms of the amount of thought the two groups of customers said they were giving to either their gas or electricity use. In-depth interviews revealed that concern over energy use among smart meter customers was predominantly financially motivated, and that for a few, the smart meter had increased the importance or attention they give to energy saving action.

Changes in energy use and energy-related behaviours

Around half of smart meter customers surveyed believed their gas (52%) and electricity use (54%) had stayed the same over the last couple of years, with the remainder more likely to say it had increased than decreased. This was consistent with legacy meter customers.

Smart meter customers were more likely than legacy meter customers, however, to have recently installed loft or top-up loft insulation and to say they frequently purchased more energy efficient appliances. Smart meter customers were consistent with legacy meter customers on their likelihood of installing other energy efficiency measures. They were also unlikely to link the installation of any energy efficiency measure over the last couple of years to having their smart meter and/or IHD installed (fewer than one in ten did so).

A similar, and small, proportion of smart and legacy meter customers reported that they were more frequently carrying out a range of energy efficient behaviours now compared to two years ago. Between a quarter and a third of these smart meter customers linked this shift to having a smart meter and/or IHD. Some respondents in

[57] Legacy meter customers were defined as those listed by their supplier as having a conventional electricity meter/ conventional electricity and gas meters.

the in-depth interviews reported changes they had made which they specifically linked to the smart meter, including ceasing to use inefficient or 'expensive' appliances, and increasing their consistency in energy saving actions, such as turning off lights and plug sockets.

Feeling in control of energy use

The majority of smart meter customers surveyed said they felt in control of their gas and electricity use (80% for both) and a smaller proportion felt in control of their energy bills (59%). Between a quarter and a third of those who agreed, reported that their smart meter and/or IHD had encouraged them to feel in control. In the in-depth interviews, respondents highlighted the fact that the IHD made energy use 'visible' to them, particularly electricity, as a result of the traffic light signals.

Smart meter customers in the survey were more likely to feel in control of their gas use than legacy meter customers, and also to feel they knew what used the most electricity in their home. However, smart meter and legacy meter customers were as likely as one another to say they felt in control of their electricity use or in control of their energy bills. This suggests that smart meters have not affected these perceptions. Indeed, respondents in the in-depth interviews felt that fluctuations in their bills were more likely to be a result of changing energy prices, than of their own changing usage[58]. Despite the additional information available to them, many smart meter customers still struggled to unpick the interrelation between the two.

Energy bills

Smart and legacy meter customers gave similar responses when asked whether they felt the overall amount they paid for their gas and electricity had increased, decreased or stayed the same over the last couple of years. In general smart meter customers felt their bills had increased (77% of smart meter customers in relation to electricity and 85% in relation to gas, among those connected to mains gas). However, the majority reported that their first bill after the smart meter installation was around what they expected (72%). A minority had contacted their supplier in the last couple of years to query an estimated bill (17% among those with a single supplier, and a similar proportion for those with two separate suppliers). However, the analysis also showed that smart meter customers were less likely than legacy meter customers to say that they had queried an estimated bill within this time period.

Engagement with suppliers and the energy market

The majority of smart meter customers were satisfied with their energy supplier (69% for dual fuel customers and similar among those with two separate suppliers). Smart meter customers were more likely to be satisfied than legacy meter customers.

Smart meter customers were more likely than legacy meter customers to have recently changed tariff, whilst legacy meter customers were more likely to have changed supplier. Both groups were equally likely to have researched tariffs or switched payment method. A minority of the smart meter customers who had done

[58] This finding should be interpreted in the context of the timing of this research. The survey was conducted at the same time as the major energy suppliers announced price rises Autumn 2013.

each of these things felt their smart meter and/or IHD had encouraged them to take these actions (between 6-15%).

Some respondents in the in-depth interviews expressed a desire to have help from their smart meter in determining the best tariffs. Some of those who had not engaged with the IHD stated that this function would be useful to them.

Links between experiences of the smart meter customer journey and the perceived impacts experienced

Some groups of smart meter customers were more likely than others to attribute positive changes they have made to their energy-related attitudes and behaviours to their smart meter and/or IHD. These groups were: those who proactively requested to have one installed; those who recalled receiving information from their supplier during the process; and, in some cases, those who were present at the installation visit.

5.1 Assessing the impact of the early smart meter roll-out

One of the objectives for this study was to assess the extent to which smart meters and/or IHDs could be linked to the adoption of certain energy-related attitudes and behaviours. The survey therefore contained a range of statements that were designed to understand the extent to which customers were practising energy efficient behaviours or adopting energy-conscious attitudes. For example, the survey asked customers to what extent they agreed that they had tried to reduce their energy usage, how much they thought about their energy use, whether they turned lights off in unused rooms, whether they purchased energy efficient appliances, and so on. This section presents the survey data collected for these statements. A full list of the statements included in the survey, which were designed to assess the potential impacts of having a smart meter, is provided in the Technical Report. The in-depth interviews explored the detail of changes made, alongside the reasons behind the changes, in more depth. They also looked at changes that were made for other reasons, and cases in which no change occurred.

The responses to the survey questions have been analysed in two main ways. The results to both of these are presented throughout this section.

1. **Matched comparison analysis:** The attitudinal and behavioural statements were asked of both smart and legacy meter customers. A comparison of the results between smart and legacy meter customers therefore showed whether or not smart meter customers were more likely to be energy-conscious and energy efficient. At the outset of the study, the sample of legacy meter customers was selected to match as closely as possible to the profile of the sample of smart meter customers. Following the survey, through which more detailed attitudinal and demographic information was collected, a technique called Propensity Score Matching was used to improve the quality of this matching.[59] Further detail about this approach is provided in the Technical Report.

[59] A straight forward comparison of the smart and legacy meter results would not identify, however, whether any differences observed were due to systematic differences in the profile of the two customer groups (for example, by age, gender or social grade) or whether this was due to the

2. **Self-reported impacts:** Smart meter customers, who agreed that they held certain energy-conscious attitudes or who agreed that they practised energy efficient behaviours, were subsequently asked to identify which of these they felt had been encouraged by having a smart meter and/or IHD. This provided a self-reported measure of the impact of a smart meter and/or IHD.

Although respondents across both strands of research did, in some cases, attribute recent changes in behaviour to their use of the smart meter and/or IHD, the interviewers who undertook the in-depth interviews observed that recall around specific changes, and what had prompted them, was often hazy.

The in-depth interviewers also observed there was sometimes inconsistency in respondents' reports of changes to their energy use. Some respondents in the depth interviews, for example, reported having made changes when asked directly, whereas previous responses seemed to suggest that no change had occurred. The opposite of this was also true, with respondents stating that they had not changed, but then detailing changes they had made.

It is the authors' view that these inconsistences may in part be due to the complex nature of behaviour change. Numerous interlocking factors can contribute to any single change, and it may be very difficult for a respondent to unpick in retrospect what was causal, or even influential in the change.

5.2 Household discussions around energy use

5.2.1 Matched comparison analysis of impact of smart meter and IHD on household discussions around energy use

The matched comparison analysis showed that smart and legacy meter customers had the same likelihood of discussing energy use as a household[60].

5.2.2 Self-reported impact of smart meter and IHD on household discussions around energy use

As shown in Figure 29, almost half (46%) of all smart meter customers surveyed who lived in multi-person households said that they and members of their household, sometimes or very often discussed how they could save energy. However, over a quarter (28%) said it was never discussed. Figure 29 also shows that the majority of smart meter customers surveyed were not specifically discussing who used the most energy in their household. Indeed, half (50%) said this was something they never discussed.

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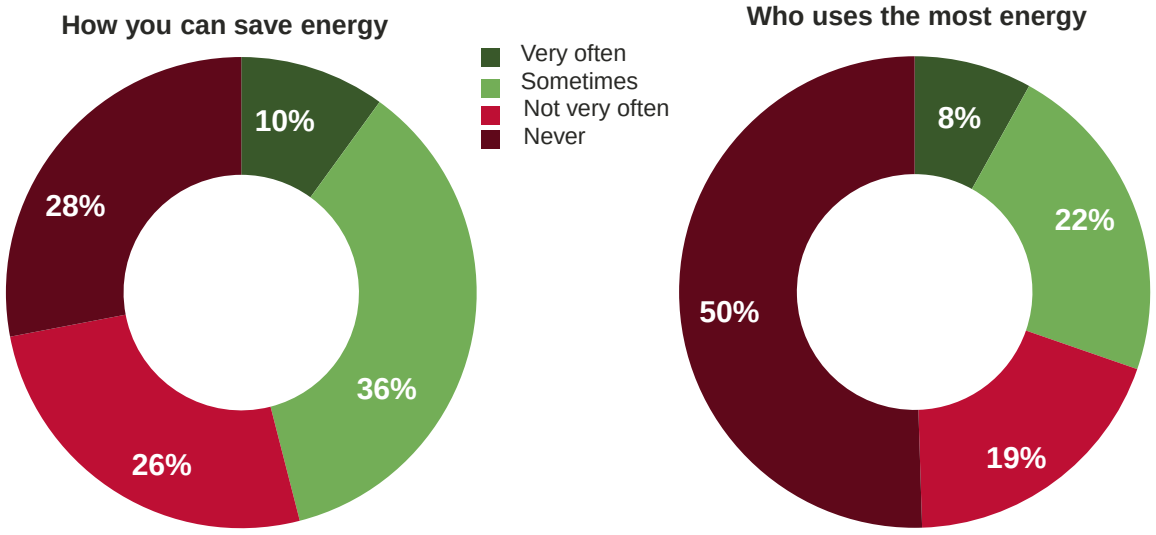
presence of a smart meter and/or IHD. Propensity score matching was therefore required to increase the likelihood that the only difference between the two groups was the smart meter and therefore to enable robust comparisons to be made.

[60] Survey respondents were asked how often, if at all, they discussed as a household how they could save energy and/or who uses the most energy in the home. The mean score for the statement about saving energy was 1.25 for both smart and legacy meter customers and for the statement on who uses the most was 0.87 and 0.83 respectively (on a binary scale where a score of 1 represents discussing the topic "Very Often" and a score of 0 represents "Never" discussing it). The difference in mean scores on either statement was not found to be statistically significant through testing (full details on the method are provided in the Technical Report).

Figure 29: Household discussions of energy use

How often, if at all, do you and the members of your household discuss the following?



Base: All smart meter customers living in a multi-person household (1,571), 4th October 2013 – 1st February 2014 Source: Ipsos MORI

In the in-depth interviews it became clear that discussions about energy use within households were usually informal. This meant that recall of the frequency and nature of discussions was often hazy. Some respondents, however, did report that they now discussed energy more since getting a smart meter. In the main they reported that these discussions were positive in nature.

By making energy visible, some respondents reported the IHD helped them to take control of their energy use, giving them concrete points for discussion. Some families reported this was useful as it enabled them to better educate their children about energy use. More detail about how household members reported discussing information seen on the IHD can be found in section 4.4.3.

"If I didn't have the display, I don't think I'd be like I am now; telling them [the children] to turn plugs and lights off, I wouldn't do it without that [the display]."

Household interview, Low income, 35-64, Children in HH, IHD plugged in

5.3 Level of importance, and effort, given to reducing energy usage

5.3.1 Matched comparison analysis of impact of smart meter and IHD on level of effort given to reducing energy usage

Following matching of the smart meter and legacy meter customers, analysis was conducted on the statement 'I have tried to reduce the energy I use at home'. It showed that smart meter customers were more likely than legacy meter customers to say that they had tried to reduce the energy they used at home[61]. However, when

[61] The mean score for this statement was 1.84 among smart meter customers and 1.95 among legacy meter customers (on a scale of 1 to 5 where a score of 1 represents "Strongly Agree" and a score of 5

the analysis explored how much thought respondents reported they gave to their energy use, smart meter customers were no more likely than legacy meter customers to say they had been thinking more about the electricity and gas they used over the last couple of years.[62].

5.3.2 Self-reported impact of smart meter and IHD on level of importance, and effort, given to reducing energy usage

A majority of smart meter customers surveyed agreed 'it is important to save as much energy as possible' (93%). A majority (85%) also agreed with the statement 'I have tried to reduce the amount of energy I use at home' (see Figure 30). Respondents were consistent in these attitudes by age, income, social grade and education.

Nearly seven in ten (67%) of smart meter customers surveyed who strongly agreed that they had tried to reduce their energy usage also strongly agreed that they were constantly looking for ways to save money. Indeed, respondents in the in-depth interviews often stated that the rising cost of energy was core to the importance they placed on reducing energy use.

"Energy is on the mind since they put our direct debit up. I think it was in September last year; they put it up from £112 per month to £181 per month, and they didn't even let us know. It came as a shock as I was on maternity leave and we don't have much income."

Household interview, Middle income, 18-34, Children in HH, IHD plugged in

Respondents who agreed they felt it was important to save energy and who had tried to reduce their usage, were later asked whether or not these attitudes had been encouraged by the smart meter and/or IHD. The following findings are based on all those who agreed with the original statements.

Three in ten (31%) who believed it is important to save as much energy as possible, felt this had been encouraged by their smart meter and/or IHD, Similarly, nearly four in ten (38%) felt this had encouraged them to try to reduce the amount of energy they used. A few respondents in the in-depth interviews stated explicitly that the smart meter, and specifically the IHD, had increased the importance or attention they give to energy use. Most of these, however, stated that it was something they were aware of before.

"It's an issue that's been brought to a head by looking at that meter."

Low income, 65 and over, IHD plugged in

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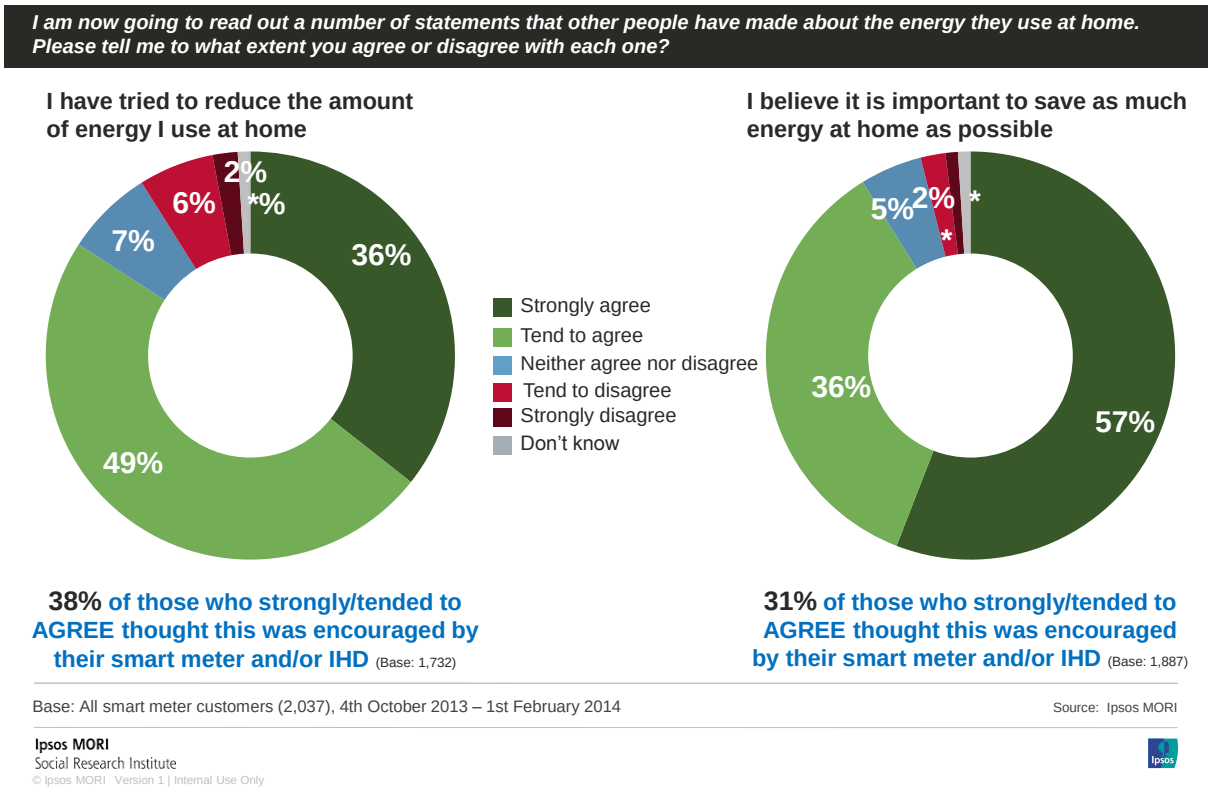
represents "Strongly Disagree"). The difference in mean scores was found to be statistically significant through testing.

[62] The mean scores for the gas statement were 2.00 for both smart and legacy meter customers and for the electricity statement were 1.98 and 2.03 (on a scale of 1 to 5 where a score of 1 represents "Strongly Agree" and a score of 5 represents "Strongly Disagree"). The difference in mean scores was not found to be statistically significant through testing.

Figure 30: Level of importance and effort given to reducing energy usage



Customers defined as having a monitoring approach were more likely to believe their smart meter and/or IHD had encouraged them to change their energy-related behaviours. Almost half (49%) of these customers who had tried to reduce the amount of energy they used believed their smart meter/IHD had encouraged this, compared to 23% of those with a solely 'information driven approach'.

Customers who obtained a smart meter through a proactive approach were more likely, during the survey, to attribute their belief that it is important to save energy and their attempts to reduce their usage to their smart meter and/or IHD: for example, half (50%) of "proactive requesters" who had tried to reduce their usage compared to a third (32%) of those receiving a "meter replacement" who had tried to reduce their usage.

Customers who recalled receiving information from their supplier either before, during or after the smart meter installation were also more likely to feel they had been encouraged to 'believe it is important to save as much energy at home as possible' by their smart meter and/or IHD (33% of those who held this belief compared to 19% of smart meter customers who held this belief but did not recall receiving any information). These customers were also more likely to say the installation of their smart meter and/or IHD had encouraged them to try to reduce the amount of energy they use at home (41% of these customers who had tried to reduce, compared to 28% of those who had tried and did not recall receiving any information).

Among those smart meter customers who held these attitudes, those surveyed with an IHD that was still plugged in were also more likely than those who only had it plugged in for a few days or weeks to attribute these attitudes to the smart meter

and/or IHD (47% compared to 23% for trying to reduce usage, falling to only 12% among those who never plugged the IHD in).

The survey results showed that younger smart meter customers and those living in larger households were also more likely to feel the smart meter and/or IHD had encouraged them to believe it was important to save as much energy as possible and to try to reduce their energy usage. For example, among those who agreed they had tried to reduce their usage, 50% of those living in households with five or more members felt this had been encouraged by the smart meter and/or IHD compared to 26% in single person homes.

5.4 Perceptions around change in energy use

5.4.1 Matched comparison analysis of impact of smart meter and IHD on perceived energy use change

Smart and legacy meter customers were asked in the survey whether they felt their gas and electricity use had increased, decreased or stayed the same over the last couple of years[63]. The matched comparison analysis did not find any differences between smart and legacy meter customers in terms of perceptions of how their gas or electricity use had changed over the last couple of years[64].

5.4.2 Self-reported reasons for change in energy use and what informed customers

Around half of smart meter customers believed their energy use had stayed the same over the last couple of years (54% in relation to electricity and 52% in relation to gas, among those with a connection to mains gas). As shown in Figure 31 the remainder were more likely to say it had increased than decreased. While the survey indicated some reductions in self-reported energy use (15% for electricity and 21% for gas), the in-depth interviews highlighted some of the challenges respondents faced in providing accurate assessments of their energy use. They often felt changes in usage were obscured by changes in energy prices[65].

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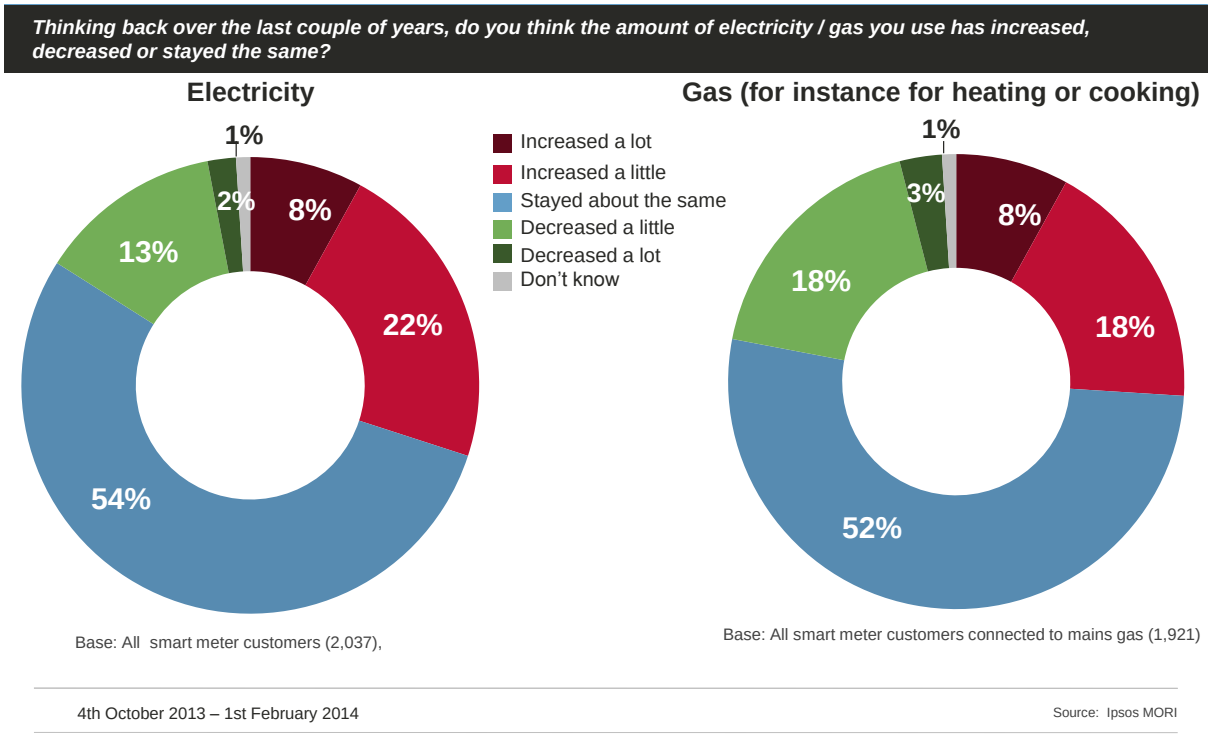
[63] Respondents were asked to consider this time period as, for smart meter customers, it broadly covered the period over which smart meters had been installed. The aim of this question was therefore to understand the extent to which smart meter customers perceived their energy use to have changed since the installation of the smart meter in their home. The smart meter customers included in this survey had all had their smart meter installed between 1st April 2011 and 28th February 2013. Some of the survey questions referred to the "last couple of years" as a way of referring to the period over which all the respondents would have received their smart meter. The time period was not made more specific than this as it would have needed to be different for every respondent. The question wording also did not refer explicitly to the smart meter installation as, at this stage in the survey, it was seeking to understand the attitudes and perceptions of customers without any bias introduced by considering their smart meter.

[64] The mean scores for the gas statement were 2.89 for smart meter customers and 2.93 for legacy meter customers, and for the electricity statement were 2.80 and 2.82 (on a scale of 1 to 5 where a score of 5 represents "Decreased a lot" and a score of 1 represents "Increased a lot"). The difference in mean scores was not found to be statistically significant through testing.

[65] It is important to be aware of the context of the timing of this research. The survey was conducted at the same time as the major energy suppliers announced price rises in Autumn 2013.

Figure 31: Perceived change in energy use



5.5 Practising energy efficient behaviours

5.5.1 Matched comparison analysis of impact of smart meter and IHD on energy-related behaviours

Smart meter customers were asked in the survey how often they practised a range of energy-related behaviours in the home and whether or not the frequency with which they conducted these actions had changed over the last couple of years. As explained in the footnote on the previous page, customers were asked to consider this time period as it broadly covered the period over which smart meters have been installed. Changes in behaviour were also explored in the in-depth interviews.

The matched comparison analysis showed that smart and legacy meter customers were similarly likely to be practising energy efficient behaviours, or to be practicing these more frequently than a couple of years ago[66].

5.5.2 Recent change to energy-related behaviours

The extent to which smart meter customers surveyed carried out energy efficient behaviours in their home varied. While many controlled the temperature of different rooms in the house, or ensured lights were switched off in unused rooms, fewer were likely to wash clothes at low temperatures or ensure they only boiled the kettle with

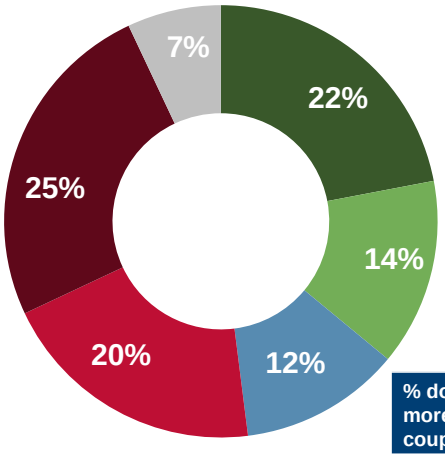
[66] For example, there was no significant difference in the mean scores for smart and legacy meter customers for the statement about leaving the heating on when they left the home (2.78 vs. 2.77 on a scale of 0 to 4, where a score of 0 indicated this "Never" occurred and a score of 4 indicated this "Always" occurred). The results of the analysis conducted on a range of statements about energy-related behaviours showed the same finding.

the necessary amount of water. The majority of smart meter customers in the survey reported that they had not changed the frequency of these behaviours over the last couple of years. See Figures 32 and 33 for further detail.

Figure 32: Frequency of (positive) energy-related behaviours

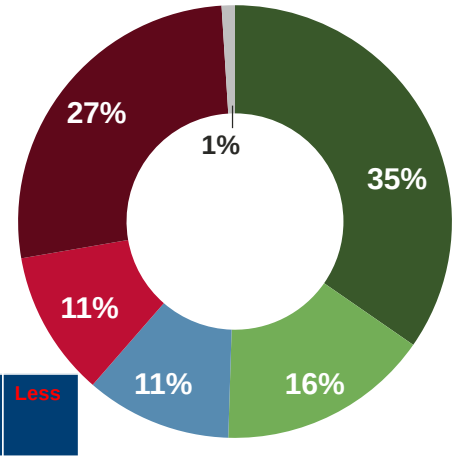
Thinking back over the last couple of years how often, if at all, do you personally tend to do each of the following things?

Wash clothes at 30 degrees or lower



Always
Very often
Quite often
Occasionally
Never
Don't know

Try to keep rooms that you are not using at a colder temperature than those you are using



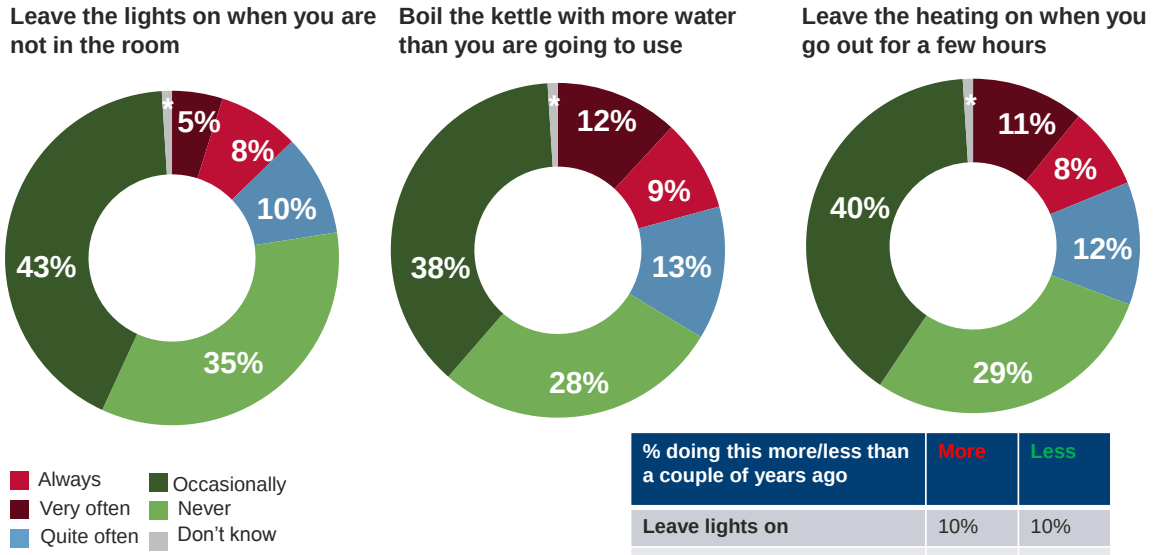
% doing this more/less than a couple of years ago	More	Less
Cool wash clothes	20%	4%
Adjust room heating	16%	3%

Base: All smart meter customers (2,037), 4th October 2013 – 1st February 2014

Source: Ipsos MORI

Figure 33: Frequency of (negative) energy-related behaviours

Thinking back over the last couple of years how often, if at all, do you personally tend to do each of the following things?



% doing this more/less than a couple of years ago	More	Less
Leave lights on	10%	10%
Overfill kettle	11%	12%
Leave heating on	8%	9%

Base: All smart meter customers (2,037), 4th October 2013 – 1st February 2014

Source: Ipsos MORI

Few respondents in the in-depth interviews reported that they had made changes to their heating because of the IHD. Of those who had made changes, a few reported that they had installed thermostatic radiator valves, and one had installed a new boiler. Other respondents described themselves as having become 'more disciplined' with heating in the last couple of years. A few reported having changed the automatic timers on their thermostats to make their heating more efficient.

Some in-depth interview respondents reported making changes to their laundry habits in the last couple of years. The most common change was to wash fewer, fuller loads, rather than many small loads. Using a lower temperature and shorter cycle for washes was also mentioned by some. Tumble driers were used less by a few, or shunned completely by others because of the amount of energy they used.

Turning off lights when not in use was mentioned by some respondents in the in-depth interviews as something they had started to do, or had done more consistently, than they had in previous years. A few also reported changing to lower energy bulbs or avoiding using energy-intensive lights (sometimes prompted by information learned from the IHD).

Changes to use of the kettle were amongst those most commonly reported by respondents in the in-depth interviews. The most common change reported was reducing the amount of water boiled. A few respondents also spoke of ceasing to re-boil the kettle once it had already boiled.

Respondents in the in-depth interviews also reported making a range of other changes in recent years. Some reported turning off appliances, plugs, chargers, and not leaving things on standby. A few respondents mentioned 'substituting' a more energy efficient appliance where they had two appliances which would do the same job. Examples of this were using the microwave rather than the cooker or using one

gaming device over another. Another replacement mentioned by a few was having showers rather than baths.

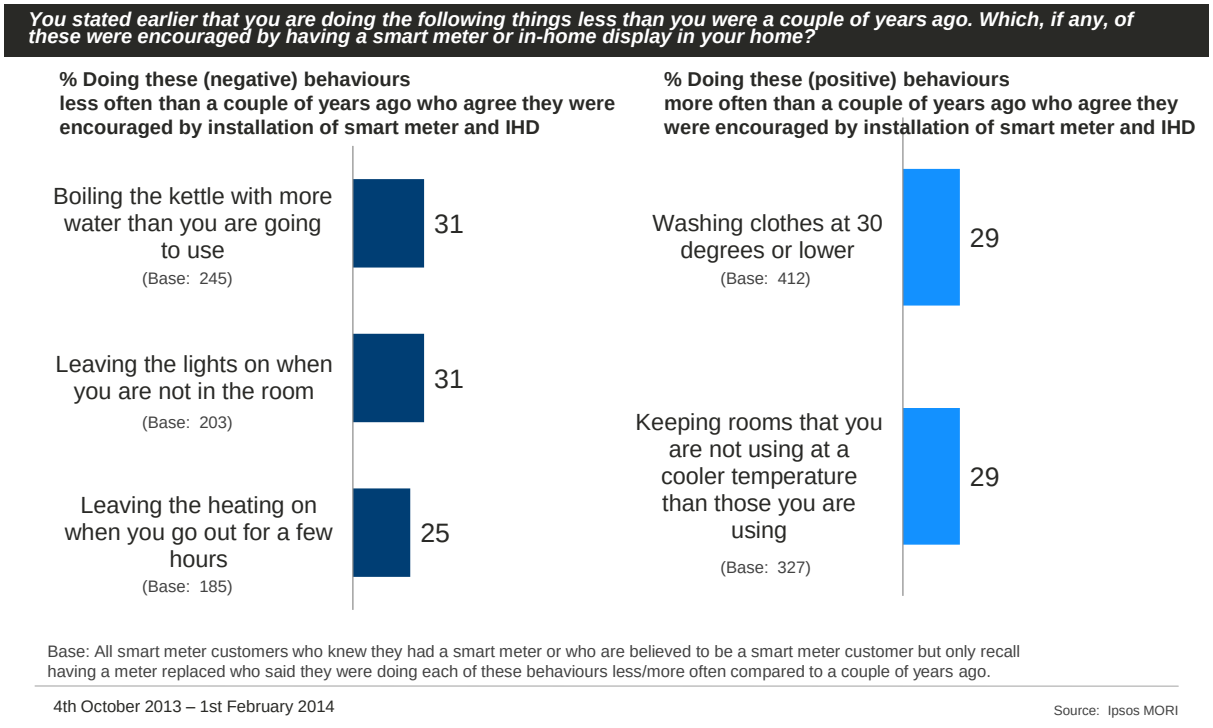
Most of the changes described were considered 'easy wins' by respondents. No-one described suffering hardship as a result of changes.

5.5.3 Relating recent change in behaviour to the smart meter and IHD

Smart meter customers surveyed were asked whether any change they reported in the frequency of these energy-related behaviours had been encouraged by having a smart meter and/or IHD. The survey findings were mixed, with the smart meter and /or IHD being linked to both an increase and decrease in the frequency of some energy efficient behaviours. Responses in the in-depth interviews gave a more positive picture of behaviour change with smart meter customers believing they could attribute, at least in part, more energy efficient behaviours to their smart meter and/or IHD.

A quarter of customers who had said they were leaving the heating on less often when they went out for a few hours attributed this to the smart meter and/or IHD. Around three in ten customers who had previously reported an increase in the frequency of other energy efficiency behaviours also reported that the smart meter and/or IHD had encouraged the increase (e.g. 29% in relation to both washing clothes at 30 degrees or lower and in relation to keeping rooms that were not in use at a cooler temperature) (see Figure 34).

Figure 34: Change in frequency of energy-related behaviours encouraged by smart meter or IHD



Some smart meter customers also linked a reduction in inefficient behaviours to having a smart meter and/or IHD. Out of the customers that had already indicated they were practicing the behaviour in question less often, three in ten thought the smart meter and/or IHD had encouraged them to overfill the kettle less often (31%) or to less frequently leave lights on in unused rooms (31%). A quarter (25%) who

said they were less frequently leaving the heating on when they went out for a few hours reported that the smart meter and/or IHD had encouraged this behaviour.

Responses in the in-depth interviews gave a more positive picture of behaviour change which could be attributed, at least in part, to the smart meters or IHD, than might have been expected from the quantitative research.

Many respondents in the in-depth research attributed recent change to their energy behaviour, at least in part, to their use of the IHD. Some illustrative examples of this are provided below. However, some respondents stated that the changes they had made were definitely not connected to the IHD, or had happened or been planned before the smart meter was installed.

"I've cut down on baths as well; I used to be quite bad; have one every day. Now I've got used to just having a shower; that's since we got that [the IHD] put in."

Household interview, Middle income, 35-64, IHD plugged in

"At the back of your mind you know having the lights on is going to be costing you so much an hour and so much a month and all the rest of it, but really you tend to forget about it because it's a small amount. When you've got the thing in front of you telling you, you are now spending 9p an hour, 15p an hour or whatever…I think we turn off lights more now."

Household interview, Middle income, 65 and over, IHD now unplugged

"It has taught me to switch the sockets off when I'm not using them. That's the only thing it has taught me."

Middle income, 35-64, IHD now unplugged

"I tend to leave the landing and stairway light on in the evening, and the hall light on. The display prompted me to fit energy saving bulbs in those areas."

Middle income, 35-64, Single person HH, IHD plugged in

Many in-depth interview respondents stated that they had changed their behaviour with respect to the kettle because of the IHD. This finding tallies with the fact that 'spikes' caused by boiling the kettle were frequently remarked upon by respondents when they were asked what, if anything, they had learned from the IHD.

For some, changes made as a result of information gained for initial engagement with the IHD were retained after the IHD ceased to be used or was put away. For others, new behaviours reverted to old habits.

"I thought it was great at the time, I was dead excited … I thought I'd be able to see what uses most electricity and things like that. It's like anything, you get something new and it's exciting and then it wears off."

Low income, 35-64, Children in HH, IHD plugged in

In the survey, those who had received their smart meter longer ago were more likely to say they were performing certain inefficient behaviours less often than they used to, such as leaving lights on when leaving the room, filling the kettle more than they needed to, and leaving the heating on when out of the house. For instance, 14% of those who had a smart meter for two years or more before the survey stated that they were leaving their lights on less often than a few years ago in contrast to 9% of those who had had the smart meter for 13 to 24 months. As discussed in section 2.1,

although there may well be differences in the profile or experiences of customers receiving smart meters at different time intervals over the early roll-out that were not picked up in the survey, the installation experiences and profile of customers based on the data that was collected is consistent. The survey findings therefore suggest there could possibly be a lasting, and improving, impact of smart meters on energy efficient behaviours.

Smart meter customers whose IHD was still plugged in when they took part in the survey were more likely than smart meter customers overall to say the smart meter and/or IHD had encouraged them to less frequently overfill the kettle or leave lights on in unused rooms (for both behaviours, 38% of those who reported a decrease in the behaviour and still had their IHD plugged in compared to 31% of all smart meter customers who reported a decrease). They were also more likely than smart meter customers overall, or those with an IHD that was only plugged in for a few days or weeks, to say it had encouraged them to more frequently wash clothes at 30 degrees or lower (36% of those who reported an increase and had an IHD plugged in, compared to 29% of all who customers who reported an increase and 18% of those reporting an increase who had only plugged in their IHD for a few days or weeks).

Consumer approaches to keeping warm

One important area for exploration in this research was whether or not smart metering and IHDs might prompt households to use less energy than they considered they needed to keep themselves and their families warm. Findings on this point were contradictory. While in some cases smart meter customers stated in the survey that they had begun using less energy than they felt they needed to keep themselves and their families warm as a result of receiving the meter and the IHD, this was not corroborated through the in-depth interviews. In some specific cases, where a reduction in heating beyond a level needed for warmth because of the IHD had been reported in the survey, no evidence to corroborate this was found in the same respondents' in-depth interviews. Nor was evidence of this found in the in-depth interviews generally.

Where respondents reported using less energy for heating than they felt they needed in the survey, but then gave responses in the in-depth interviews which did not support this, it seems likely that these respondents may have misinterpreted the survey question. It is the view of the in-depth interviewers that this is because they were using both heating and clothing to keep themselves and their families warm, and because they did not consider it necessary for their house to be warm at all times, for example, during the night.

While many respondents in the in-depth interviews discussed making changes to heating habits, there was no indication that respondents were compromising their health or comfort as a result of these changes.

In the survey, one in four (25%) of those who had ever plugged in their IHD, and who looked at it personally, agreed that they had started to heat their home less than they needed to keep them and members of their household warm since looking at relevant information on their IHD. This includes one in five (20%) who tended to agree with this statement and the 5% who strongly agreed.

Younger households and smart meter customers aged 18 to 64 were among those most likely to agree they were heating their homes less than they need to keep themselves warm - and they were more likely to say this than smart meter customers in older age groups. Three in ten (29%) of those aged 18 to 64 said this, compared to one in five (20%) of those aged 65 and over. There were no clear differences according to the customers' level of education, income or social grade.

In the in-depth interviews, some respondents did attribute recent change to their heating habits to the IHD, but in the main these changes were seen to be positive. There were also several examples of recent changes to heating systems which respondents felt pre-dated, or were not linked to, the IHD. Changes, whether linked to the IHD or not, were usually attributed to rising heating costs, and rationalisation of previously wasteful setups.

"I changed the timer on the boiler last year, to cut out two hours [of heating] a day. We're normally out of the house at 8, so what's the point of heating the house for an hour?"

Household, Low income, 35-64, Children in HH, IHD plugged in

Most respondents who had said in the survey that they were using less energy than they needed to keep their homes warm as a result of the IHD, did report in the in-depth interviews recent changes in the way they managed their heating. However, these respondents did not report that this affected their ability to keep themselves and their family warm. Examples of changes made were:

- Turning off radiators in rooms that weren't being used;
- Stopping heating their homes during the night;
- Starting turning on the heating only when needed;
- Adjusting their thermostats; or
- Use log burners instead of central heating.

A few stated that they preferred, on balance, to use blankets or additional layers of clothing rather than turning on the heating whenever they felt cold. This behaviour usually pre-dated the smart meter.

Some respondents pointed out that heating was a priority for them. Sacrifices, they said, could be made in other areas if need be, but that they would always adequately heat their home.

"There's been no difference because we like to live comfortably and be warm."

Household interview, Low income, 65 and over, IHD plugged in

Other behaviours attributed to the smart meter

During the survey, smart meter customers who had personally looked at an IHD that had ever been plugged in were asked whether they felt they were using more energy now as a result of information they had seen on their IHD. Very few (4%) felt they had now started to use more energy because they had realised they were not spending as much on energy as they had thought. A sizeable majority (84%) disagreed.

In spite of this, some smart meter customers in the survey did attribute an increase in less efficient behaviours to having a smart meter and/or IHD. However, the in-depth interviews did not support this finding.

In the survey, around a quarter of those who reported an increase in how often they left lights on in unused rooms (25%) or overfilled the kettle (23%), said that this had been encouraged by the smart meter/IHD. Around one in eight (13%) who reported an increase in leaving the heating on when they left the home also said this had been encouraged by the smart meter/IHD. A comparison with the in-depth interview findings suggests that some respondents may have been confused by questions about the extent or frequency of inefficient behaviours. The explorative, deeper nature of the in-depth interviews, suggest that the in-depth findings give us a better indication of how and why respondents' behaviours have changed.

For a few respondents in the in-depth interviews, however, the IHD did appear to have liberated them from worry over specific behaviours. They reported that this had allowed them to focus their energy efficiency efforts where they would make more difference to energy use overall, based on information about higher consuming appliances gained using the IHD.

"It was not even registering. So actually not worrying about some of those behaviours … for our LED TV it didn't make much difference whether it was on standby or not. So you become slightly less obsessive about that. Mobile phone chargers seemed to use hardly any, so we're relaxed about that. But the kettle and toaster shoot up. It's useful to know."

Household interview, Middle income, 35-64, Children in HH, IHD plugged in

"I didn't realise the shower and things would use so much, before we had the smart meter, when it goes red, you know. I didn't realise before that those things used more than the lights. When the cooker and the washing machine are on, it just goes amber. Knowing this means we have quicker showers, we're not filling the kettle as much, only boiling it when we need it, not re-boiling it."

Household interview, Middle income, 18-34, Children in HH, IHD now unplugged

Change, but not because of the smart meter or IHD

Some respondents in the in-depth interviews stated that their energy use had changed over recent years, but that this was not due in any way to the smart meter or IHD. Changes were often attributed to attempts to bring down bills or simply 'be more careful' with energy that had preceded the smart meter.

"We do look for energy efficient appliances, but we did that before [the smart meter was installed]."

Household interview, Middle income, 65 and over, IHD plugged in

Other reasons for change included the replacement of inefficient or broken appliances, for example new boilers, and changes to household composition, such as children leaving home.

Exploring lack of recent change

The in-depth interviews explored the reasons why some respondents had not changed their energy behaviours in recent years. Many of these respondents felt

they had done all they could already to reduce their energy use; or that by making further changes, they would be compromising their standard of living. Examples of this included respondents saying they could not be expected to, or would not want to, 'walk about in the dark,' 'not shower,' or 'not do washing'.

"I know the shower is bad, but I can't not use the shower."

High income, 35-64, IHD never plugged in

Several respondents acknowledged that there were ways in which they could cut down, but stated that they could afford the bills and did not want to sacrifice the pleasure or comfort they got from using energy for certain appliances and activities.

Alongside comfort, convenience was also a barrier to change. Respondents reported that where there was no convenient alternative to a behaviour (for example, tumble drying), it was unlikely that a change would be made.

The importance of adequate heating for comfort and health was raised by several respondents, particularly where there were older or very young household members.

5.6 Take-up of energy efficiency measures

5.6.1 Matched comparison analysis of impact of smart meter and IHD on take-up of energy efficiency measures

Smart and legacy meter customers surveyed were asked whether they had installed a range of energy efficiency measures in their home within the last couple of years (that is, in the time period when they would have also had their smart meter installed).

The matched comparison analysis of survey data showed that smart meter customers were more likely than legacy meter customers to have installed loft or top-up loft insulation in the last couple of years[67]. However, no further differences were identified between smart meter and legacy meter customers in terms of their take up of other energy efficient measures in the last couple of years.

This analysis also considered whether smart meter customers were more or less likely than legacy meter customers to purchase energy efficient appliances. Customers were given the examples of a fridge and a washing machine and asked to rate how often, if at all, they chose more energy efficient models. The matched comparison analysis showed that smart meter customers were more likely than legacy meter customers to say they frequently purchased more energy efficient appliances.

[67] The mean score for this statement was 0.22 among smart meter customers and 0.18 among legacy meter customers (on a binary scale where a score of 1 represents the measure being recently installed and a score of 0 represents the measure having not been recently installed). The difference in mean scores was found to be statistically significant through testing.

5.6.2 Self-reported impact of smart meter and IHD on take-up of energy efficiency measures

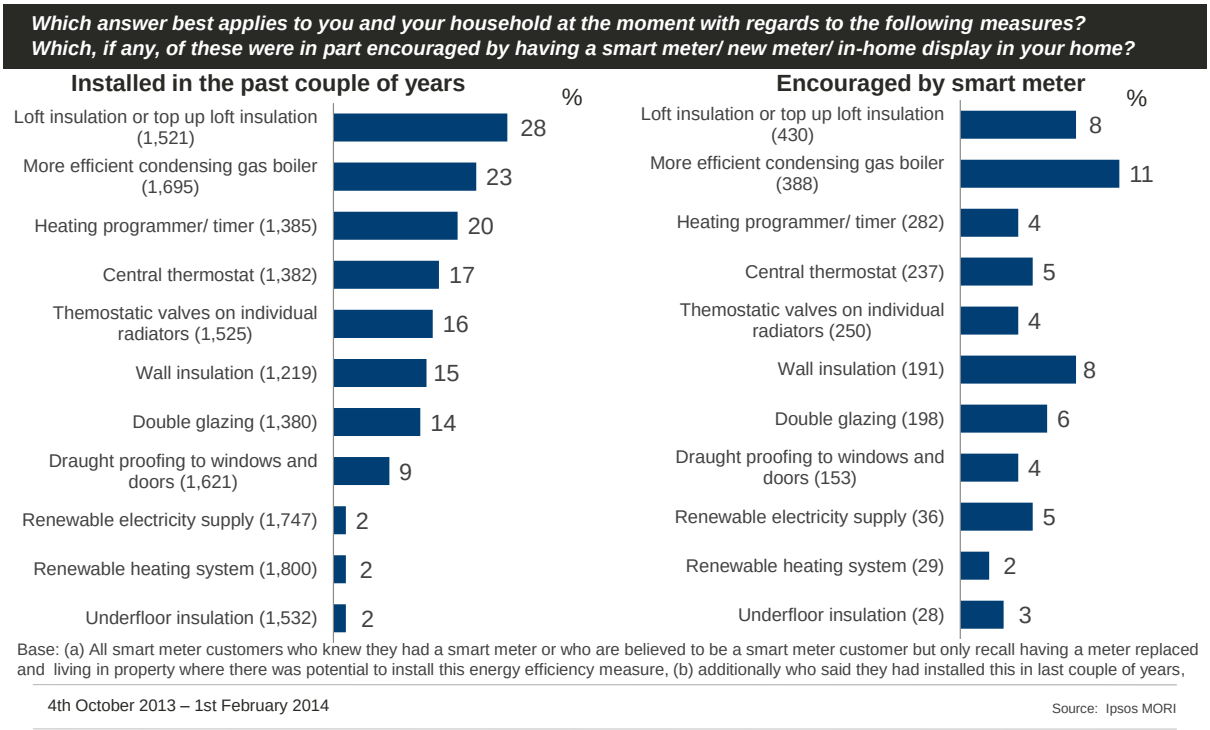
The most common measures that smart meter customers reported installing in their home within the last couple of years[68] were loft insulation or top-up loft insulation (28%), a more efficient condensing boiler to replace an older gas boiler (23%) and a heating programmer/timer (20%). The proportions installing a range of other energy efficiency measures and technologies within the last couple of years are shown in Figure 35.

Smart meter customers who had electricity and gas smart meters installed, as opposed to an electricity-only smart meter, were more likely to have installed loft or top-up loft insulation in the last couple of years (30% compared to 24%) and to have replaced an older gas boiler with a more efficient condensing boiler (25% compared to 17%). Customers who received a dual installation were also more likely to say they frequently purchased more energy efficient appliances (67% compared to 61% of those with only an electricity smart meter).

Smart meter customers who had installed an energy efficiency measure within the last two years were asked whether they felt this had been encouraged by the smart meter and/or IHD. In the survey, around one in ten who had reported a recent installation reported that their recent installation of a more efficient condensing gas boiler (11%), loft or top-up loft insulation (8%) or wall insulation (8%) had been encouraged by the smart meter and/or IHD. Smaller proportions reported that other energy efficiency installations had been encouraged by the smart meter and/or IHD, as shown in Figure 35.

[68] These results are based on smart meter customers who can be considered to live in properties that had the potential to install these measures. That is, those who said that each of these measures had not already been installed in their property and who did not say that they thought these measures were impossible to install, and were in a position to make changes to their home (that is, not renters).

Figure 35: Recent installation of energy efficiency measures in homes with the potential to do so, and extent to which encouraged by having smart meter and/or in-home display



Base: (a) All smart meter customers who knew they had a smart meter or who are believed to be a smart meter customer but only recall having a meter replaced and living in property where there was potential to install this energy efficiency measure, (b) additionally who said they had installed this in last couple of years,

4th October 2013 – 1st February 2014

Source: Ipsos MORI

Some respondents in the in-depth interviews had installed new energy efficiency measures in their home, for example insulation or double glazing, since the smart meter was installed, or in the last two years. Few, however, made an explicit link to the IHD, or suggested that this had encouraged or prompted this behaviour.

The exceptions to this were two examples of thermostatic radiator valves being installed, and one example of a new boiler. These respondents reported that the IHD had prompted or contributed to the decision to install.

Some of those who were struggling with energy bills expressed a desire to install new energy efficiency measures in their home, alongside the belief that there was 'not much more' they could do behaviourally to bring down their bills.

"One of the main things is getting double glazing, which we can't afford to do. I don't think there is a lot we can do."

Household interview, Middle income, 18-34, Children in HH, IHD plugged in

Barriers to change, where they existed, were financial or infrastructural, for example, not being able to afford energy efficiency measures, or a house being unsuitable for cavity wall insulation.

Some in-depth interview respondents stated that they had purchased more energy efficient appliances in recent years. Most of these stated that this was something they would do anyway, weighing up energy efficiency alongside other factors, including cost, functionality, and appearance. A few, however, said that a purchase had been prompted in part, or even primarily, because of the IHD.

"I look for the AA+ on appliances. I noticed it so much with the new fridge and freezer. They go on amber, and the old ones used to go on red [when 'kicking in,' as shown on the IHD]. I got the new fridge because of the red light, and the freezer; it was coming on too often. I didn't know about energy ratings before."

Low income, 65 and over, IHD plugged in

5.7 Perception of energy bills

5.7.1 Matched comparison analysis of impact of smart meter and/or IHD on perceptions of energy bill changes

Smart and legacy meter customers surveyed were asked whether they felt the overall amount they paid for their gas and electricity had increased, decreased or stayed the same over the last couple of years.

The matched comparison analysis found no differences between smart and legacy meter customers in terms of their perceptions of whether their energy bills had changed over the last couple of years[69].

Smart and legacy meter customers were also asked whether they had contacted their supplier(s) in the last couple of years to query an estimated bill. Following matching of these two groups of customers, the analysis showed that smart meter customers were less likely than legacy meter customers to say that they had needed to contact their supplier to query an estimated bill within this time period[70].

5.7.2 Self-reported changes to energy bills over the last couple of years

Both strands of the research found that in general smart meter customers felt their bills had increased (77% in relation to electricity and 85% in relation to gas, among those connected to mains gas – see Figure 36a). The majority of customers in the survey who were living in their property at the time of the installation reported that their first bill after the smart meter installation was around what they expected (72%). One in ten (9%) felt it was more (either a lot or a little), and around 5% felt it was less. Most (65%) said they did not receive any information at the time of installation about what to expect on their first bill post-installation (see Figure 36b).

However, the in-depth interviews found customers perceived this to be a result of increasing energy prices[71]. There was no clear evidence of smart meter customers having observed savings in their energy bills.

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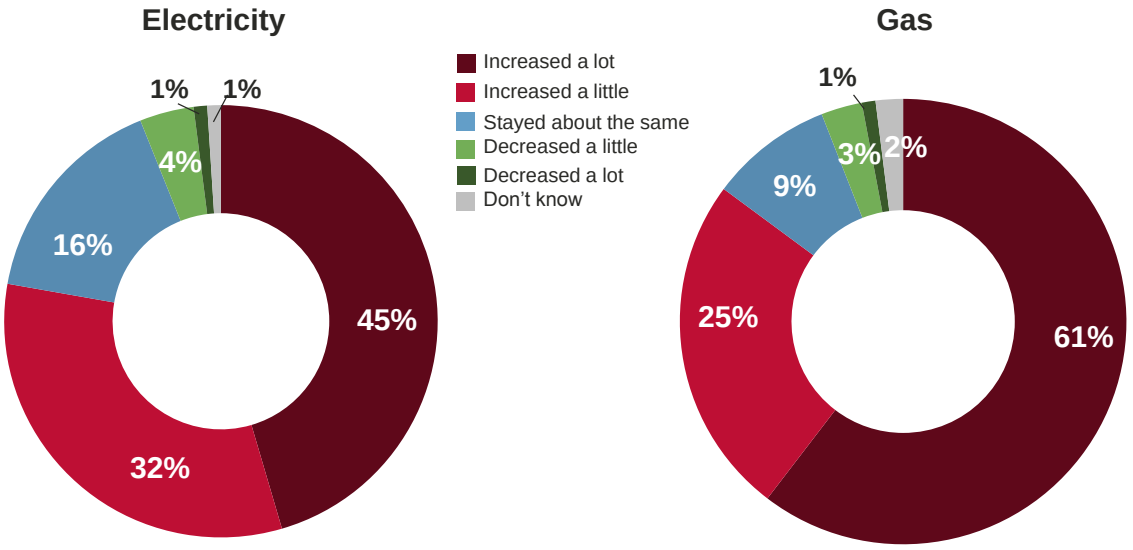
[69] In relation to gas bills, the mean score was 1.57 for smart meter customers and 1.58 for legacy meter customers, and in relation to electricity bills was 1.82 and 1.79 (on a scale of 1 to 5 where a score of 5 represents "Decreased a lot" and a score of 1 represents "Increased a lot"). The difference in mean scores was not found to be statistically significant through testing.

[70] The mean score for this statement was 0.84 among smart meter customers and 0.69 among legacy meter customers (on a binary scale where a score of 1 represents a "Yes" response and a score of 0 represents a "No" response). The difference in mean scores was found to be statistically significant through testing.

[71] It is important to be aware of the context of the timing of this research. The survey was conducted at the same time as the major energy suppliers announced price rises in Autumn 2013.

Figure 36a: Perceived changes to energy bills

Thinking back over the last couple of years, do you think the amount you pay for your electricity / gas has increased, decreased or stayed the same?

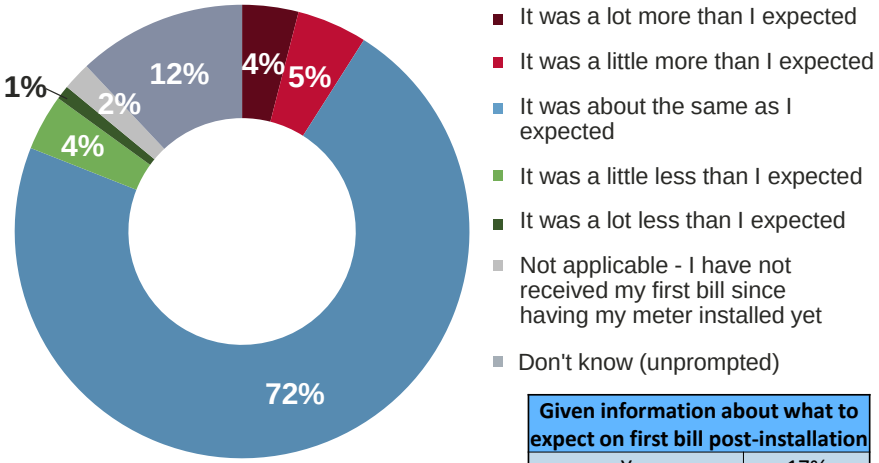


Base: [Electricity] All smart meter customers (2,037)/ [Gas] All smart meter customers connected to mains gas (1,921), 4th October 2013 – 1st February 2014

Source: Ipsos MORI

Figure 36b: Perceptions of first energy bill after smart meter installation

Which, if any, of the following best describes how you felt about the amount you were requested to pay on the first bill you received after you had your smart/new meter(s) installed?
Were you given any information at the time of the installation about what to expect on your first bill after the meter was installed?



Given information about what to expect on first bill post-installation	
Yes	17%
No	65%
Don't know	18%

Base (for chart and table): All smart meter customers who knew they had a smart meter or who are believed to be a smart meter customer but only recall having a meter replaced, and who were living at their current property when the smart meter/new meter was installed (1,912)

4th October 2013 – 1st February 2014

Source: Ipsos MORI

Some respondents in the in-depth interviews had noticed changes to their energy bills since the smart meter and IHD were installed. These changes were generally attributed to tariff changes, replacement of appliances or heating systems, or energy

saving measures to the house, which tended not to be linked by respondents to the smart meter.

Some respondents in the in-depth interviews felt that the changes they had made to their behaviour over recent years should have brought bills down, but that any reduction would have been masked by the increase in energy prices.

"We're trying to save but we can't win in one sense; what you've spent all year trying to save, they put in on one shot [by raising the bill]. You'll always be fighting your gas and electric. You've always got to watch what you're spending and that."

Household interview, Middle income, 35-64, IHD plugged in

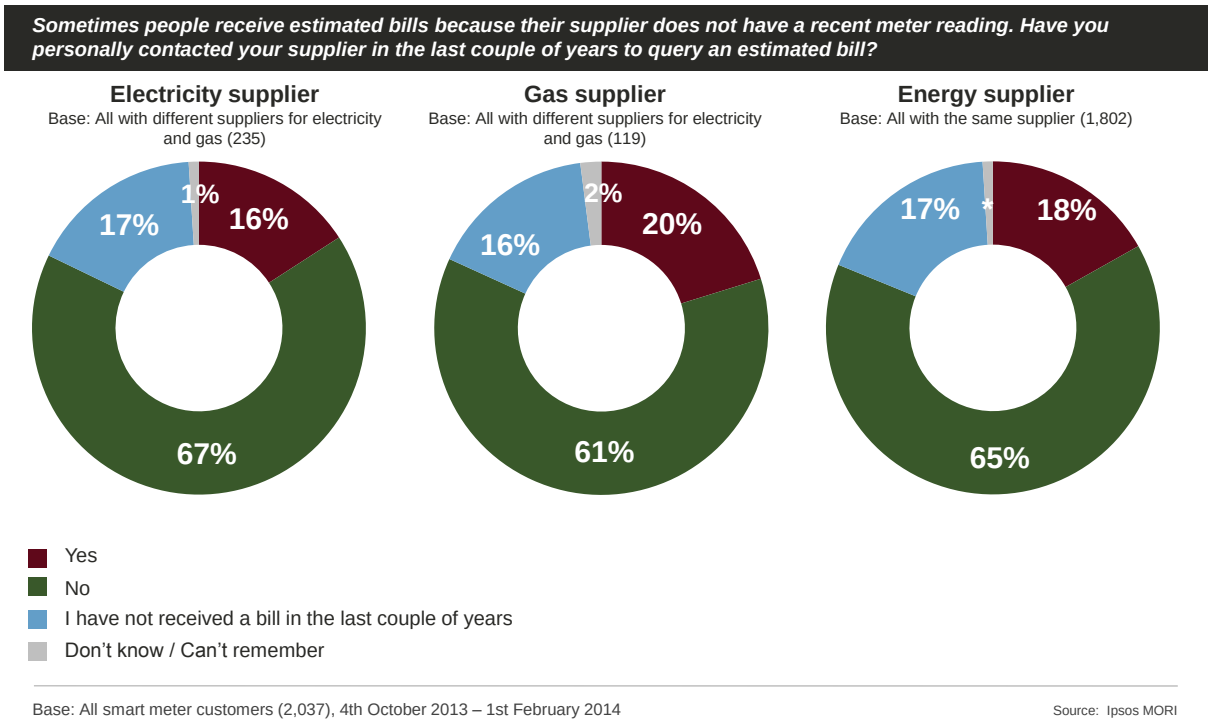
A few respondents who had used the IHD extensively felt confident that they had made savings because of it, though none was able to quantify these savings.

"I've not made any calculations or anything of how much money it's saved me, but I'm sure it's fairly considerable. People have energy saving lightbulbs which is ok when they're switched on, but if you go out and leave them on... Savings from the smart meter would be comparable to having energy saving lightbulbs, maybe."

Middle income, 35-64, Single person HH, IHD plugged in

The majority (65%) of smart meter customers who had the same supplier for electricity and gas had not contacted their supplier to query an estimated bill within the last couple of years and a further 18% explicitly said they had not received an estimated bill during this period. Approaching one in five (17%) said they had queried an estimated bill. These results were very similar for smart meter customers who had a different supplier for gas and electricity, as shown in Figure 37 below.

Figure 37: Receipt of estimated bills



Base: All smart meter customers (2,037), 4th October 2013 – 1st February 2014

Source: Ipsos MORI

In the survey, younger smart meter customers were more likely to have queried an estimated bill than older customers. For example, among those with the same

supplier for both electricity and gas, 28% of 25-34 year olds had queried a bill compared to 11% of those aged 65 and over or 8% of those aged 75 and over.

Customers who either proactively requested a smart meter or actively responded to an offer for one were also more likely to have queried an estimated bill than those who received a smart meter as part of a meter replacement programme (21% compared to 12%).

5.8 Knowledge and feeling in control

There is mixed evidence from both the survey and in-depth interviews on the extent to which the smart meter and IHD increased consumer's energy-related knowledge and sense of control over energy use and bills.

5.8.1 Matched comparison analysis of impact of smart meter and IHD on feeling in control

Smart and legacy meter customers were asked in the survey to respond to a number of statements which sought to understand how knowledgeable they felt about their energy consumption and how in control they felt of their energy use and bills. The matched comparison analysis showed that smart meter customers were more likely than legacy meter customers to agree that they felt in control of their gas use and that they knew what used the most electricity in their home[72]. However, the analysis showed there was no difference in the likelihood of smart meter customers agreeing that they felt in control of their electricity use or their energy bills[73]. This analysis also considered whether smart meter customers were more likely to say they were managing very well or quite well at keeping up with their household energy bills. However, the results showed they were consistent with legacy meter customers in their opinions on this[74].

5.8.2 Self-reported impact of smart meter and IHD on feeling in control

In the survey, the majority of smart meter customers agreed that they felt in control of their gas use (80%) and their electricity use (80%) (see Figure 38), and that they knew what used the most electricity in their home (82%). A smaller proportion of smart meter customers (59%), but still a majority, agreed that they felt in control of their energy bills (see Figure 39).

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[72] The mean scores for the gas control statement were 2.01 for smart meter customers and 2.10 for legacy meter customers, and for the knowledge statement were 1.87 and 2.21 (on a scale of 1 to 5 where a score of 1 represents "Strongly Agree" and a score of 5 represents "Strongly Disagree"). The difference in mean scores was found to be statistically significant through testing.

[73] The mean scores for the electricity control statement were 1.98 for smart meter customers and 2.04 for legacy meter customers, and for the energy bill statement were 2.58 and 2.64 (on a scale of 1 to 5 where a score of 1 represents "Strongly Agree" and a score of 5 represents "Strongly Disagree"). The difference in mean scores was not found to be statistically significant through testing.

[74] The mean score for this statement was 2.15 among smart meter customers and 2.14 among legacy meter customers (on a scale of 1 to 5 where a score of 1 represents "Managing very well" and a score of 5 represents "Severe difficulties"). The difference in mean scores was not found to be statistically significant through testing.

Some in-depth interview respondents reported that the IHD made energy more 'visible' to them, and that this helped them to feel more in control of what they were using, and to better manage their usage.

"I have got control now. The old-fashioned way is, you wait for the bill to come through the door every quarter and think 'Oh my God', but not now, it's not like that anymore."

Individual, Middle income, 65 and over, IHD plugged in

Amongst households with both gas and electricity smart meters, some reported that the increased 'visibility' of energy was particularly relevant to electricity. This was in part because the 'traffic light' symbols on the IHD relate to electricity use, and these are what the majority of respondents who used the IHD tended to look at most often.

"I probably feel more in control of the electricity because I can see it. I can't see my gas. It's in the back of the cupboard. It's there but I can't see it."

Household interview, Low income, 35-64, Children in HH, IHD plugged in (smart meter for electricity only, legacy meter for gas)

For a few respondents, the ability to check what was being spent between monthly or quarterly bills was helpful to their sense of being in control. They reported that use of the IHD helped prevent 'big surprises' when the bill came.

"I had an idea of how much energy an item would use before. Instead I thought that 'this is a heater', but not how much it would cost over a period of time. Now I'm more aware of that sort of thing… I feel more in control."

Middle income, 35-64, Single person HH, IHD plugged in

Some said they knew what appliances and behaviours used most primarily because of the smart meter, though this was normally qualified by a statement that they had 'some idea' before. Some reported discovering that one or more specific appliances used a lot since getting the smart meter.

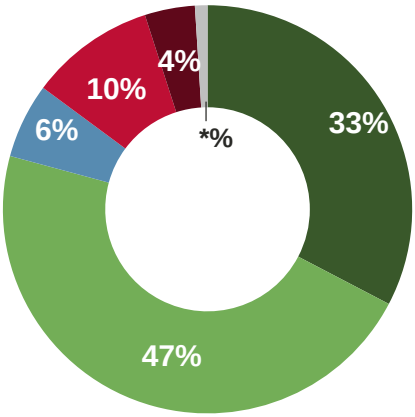
"There are some little lights over the stairs, and when you put those on it goes bright red; so we try not to put those on. We know by the smart mater, when it changes colour. We were not really aware or concerned [about the lights] before the smart meter."

Household interview, Middle income, 65 and over, IHD plugged in

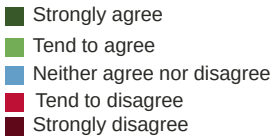
Figure 38: Feeling in control of energy usage

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

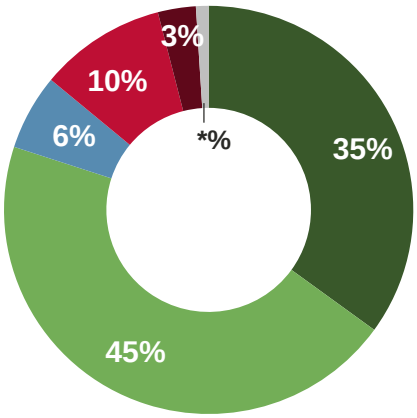
I feel in control of how much gas I personally use



25% of those who strongly/tended to AGREE thought this was encouraged by their smart meter and/or IHD (Base: 1,548)



I feel in control of how much electricity I personally use



28% of those who strongly/tended to AGREE thought this was encouraged by their smart meter and/or IHD (Base: 1,639)

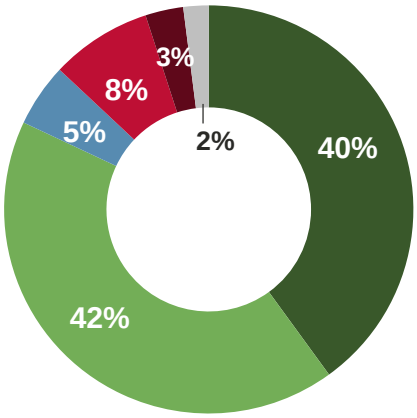
Base: (a) All smart meter customers connected to mains gas (1,921), (b) All smart meter customers (2,037)
4th October 2013 – 1st February 2014

Source: Ipsos MORI

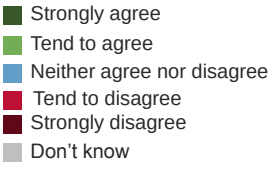
Figure 39: Feeling in control of bills and knowing what uses the most electricity in home

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

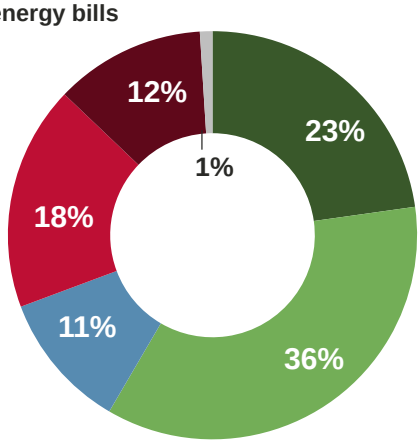
I know what uses the most electricity in my home



32% of those who strongly/tended to AGREE thought this was encouraged by their smart meter and/or IHD (Base: 1,667)



I feel in control of what I spend on my energy bills



26% of those who strongly/tended to AGREE thought this was encouraged by their smart meter and/or IHD (Base: 1,198)

Base: All smart meter customers (2,037), 4th October 2013 – 1st February 2014

Source: Ipsos MORI

As shown above in Figures 38 and 39, between a quarter and a third of smart meter customers who were surveyed and agreed with these statements around control of

their energy use, reported that the smart meter and/or IHD had encouraged them to believe this (even for those statements where the matched comparison analysis found no difference between smart and legacy meter customers).

Smart meter customers surveyed who still had their IHD plugged in were more likely to believe that the smart meter and/or IHD had encouraged them to have these feelings of control. For example, out of those who had previously agreed that they knew what used the most electricity in their home, 40% of those who still had their IHD plugged in believed this had been encouraged by their smart meter/IHD, compared to 19% of those who unplugged it within a few weeks. Similarly, out of those who had agreed they felt in control of how much gas they used, 31% of those with a plugged-in IHD felt this has been encouraged by the smart meter/IHD, compared to only 15% of those who had unplugged it within the first few weeks.

Customers defined as having a 'monitoring approach' to their IHD usage were more likely to believe their smart meter/IHD had influenced their knowledge of what uses the most electricity in their home: (39% of 'monitoring' users who knew what used the most electricity, compared to 26% of solely information driven users who knew what used the most electricity).

Among those customers who felt in control of their gas usage, customers defined as having a 'monitoring approach' to using their IHD were more likely to say this had been encouraged by the installation (29% compared to 15% of 'information' users who felt in control). The same finding emerged for those who felt in control of their electricity use (33% compared to 20% of 'information' users who felt in control), and those who felt in control of their bills (24% compared to 12% of 'information' users who felt in control).

Customers who were not present for their smart meter installation (either because they were a new occupant or because they were not present on the day) were also less likely to attribute their knowledge of what used most electricity in their home or their feeling of control over their usage or spending to their smart meter and/or IHD. For example, out of those customers who felt they knew what used the most electricity, 25% of those not present for the installation felt their smart meter and/or IHD had encouraged this compared to 32% of all smart meter customers who expressed this attitude.

5.9 Engagement with the energy market

5.9.1 Matched comparison analysis on impact of smart meter and/or IHD on engagement with the energy market

Smart and legacy meter customers were asked in the survey whether they had done a number of things related to investigating energy tariffs, suppliers and payment methods over the last couple of years. This was asked as a means of judging their level of engagement with the energy market.

The matched comparison analysis of survey data showed that smart meter customers were more likely than legacy meter customers to have changed tariff while staying with the same supplier in the last couple of years. They were, however,

less likely to have changed supplier than their matched legacy meter counterparts[75]. This further analysis found there was no difference in the likelihood of smart and legacy meter customers reporting that they had looked for information about tariffs or that they had changed their method of payment[76].

5.9.2 Self-reported changes to engagement with the energy market

More than three in ten smart meter customers surveyed had taken some action around tariffs within the last couple of years (36% had researched tariff information and 31% had changed tariff within their current supplier). A smaller proportion had changed supplier within the last couple of years (16%). Smart meter customers were also less likely to have recently changed their payment method for their electricity and gas bills (10% had done so in the last couple of years).

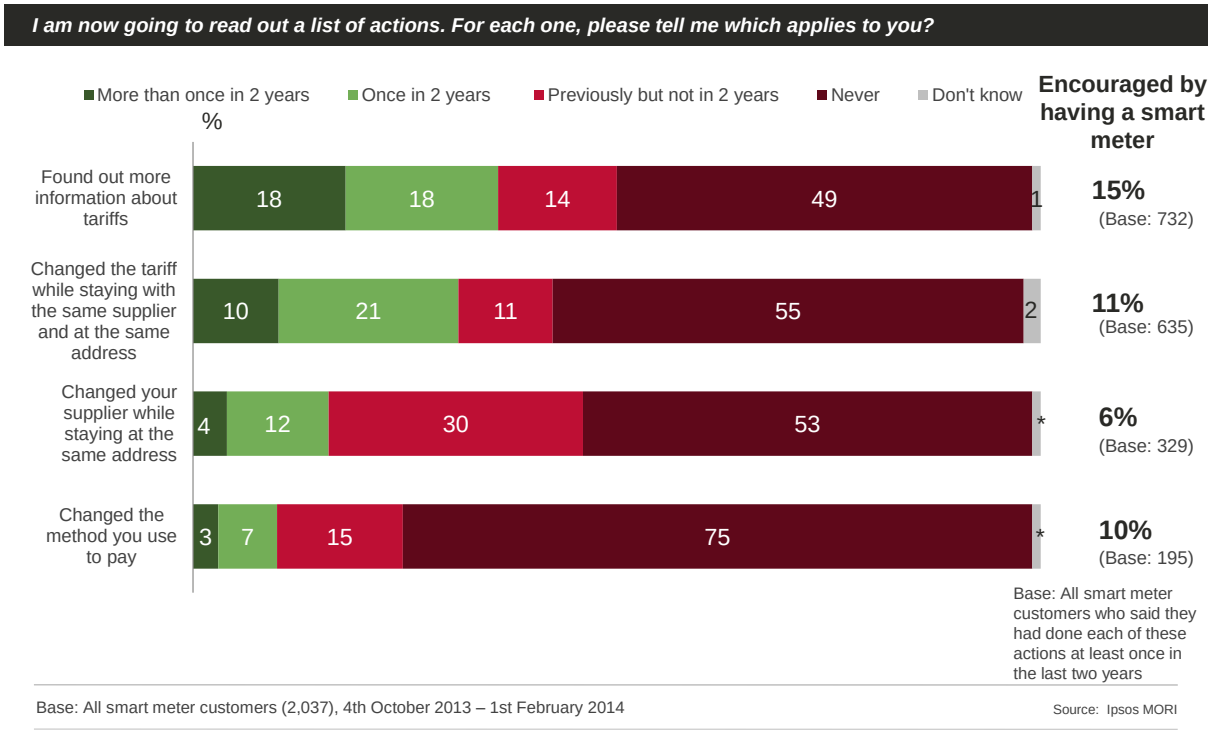
Smart meter customers who had taken any of these actions in the last couple of years were asked in the survey whether they felt they had been encouraged to do so by having a smart meter and/or IHD.

A minority of smart meter customers who had taken these actions linked the smart meter and/or IHD to finding out more information on tariffs (15%), switching tariff (11%), changing their payment method (10%) or changing their supplier (6%) (see Figure 40).

[75] The mean score for the tariff statement was 0.38 among smart meter customers and 0.35 among legacy meter customers, and was 0.16 and 0.20 for the supplier statement (on a binary scale where a score of 1 represents having recently done this and a score of 0 represents not having recently done this). The differences in these mean scores were found to be statistically significant through testing.

[76] The mean scores for these statements for smart and legacy meter customers were 0.42 and 0.43 in relation to looking for tariff information and 0.09 and 0.11 for changing payment method (using the same binary scale as above). The differences in these mean scores were not found to be statistically significant through testing.

Figure 40: Level of engagement with energy tariffs, suppliers and payment methods and extent to which this has been encouraged by the smart meter and/or in-home display



In the survey, smart meter customers living in a household where at least one of the members lived with a long-term health condition were more likely to say they were encouraged to investigate tariff information by their smart meter and/or IHD (20% of this group who had investigated tariff information compared to 13% of those who had and were living in a household where no-one lives with a long-term health condition).

Some respondents in the in-depth interviews reported having changed tariff since their smart meter was installed. A few of these had changed from an 'Economy 7' tariff, on occasion following advice from the installer. Other prompts for tariff changes included online comparison sites, and contacting the energy company on receipt of a large or shocking bill.

Some respondents in the in-depth interviews wondered why the data from their smart meters might not be used by the energy company to recommend the best tariff for them. Some who had not engaged with the IHD said that if it was possible to get tariff information or recommendations through the display then this would be of use to them.

"Not useful at all; and we don't use it. If we felt it could actually save our bills, for example by helping us switch to better tariffs or manage tariff better. But just telling us what we're using is no use, we can't really change that."

Household interview, Middle income, 65 and over, IHD now unplugged

The qualitative research did not find any evidence of respondents being put off switching by having a smart meter, although some were subsequently frustrated when they found out their smart meter was incompatible with their new supplier[77].

5.10 Satisfaction with supplier

5.10.1 Matched comparison analysis on impact of smart meter and/or IHD on engagement with the energy market

Smart meter customers in the survey were asked how satisfied or dissatisfied they were overall with their energy supplier (or suppliers if they received electricity and gas from different companies).

Matched comparison analysis of survey data showed that smart meter customers were more likely than legacy meter customers to say they were satisfied with their energy supplier[78].

5.10.2 Self-reported changes to engagement with the energy market

The majority of smart meter customers in the survey were satisfied with their energy supplier (69% of those with a single supplier, and among those with separate suppliers, 70% in relation to their electricity supplier and 64% in relation to their gas supplier).

Older and lower income smart meter customers were more likely to say they were satisfied with their supplier. For instance, among those with a single supplier, approaching four in five aged 65 and over (77%) or with a total annual household income below £16,000 (78%) were satisfied compared to 69% of smart meter customers overall.

In the in-depth interviews, some respondents displayed a mistrustful attitude towards energy suppliers throughout. This did not, however, seem to be exacerbated by smart meters and/or IHDs, and other than a few initial reservations about the extent to which the energy company could monitor their behaviour through the smart meter, hardly any respondents reported being concerned about how their supplier would use their data.

Some believed it to be ironic that the companies who sold them energy also provided them with advice and equipment to help them save energy.

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[77] In the future smart meters should be compatible across energy suppliers. Smart meters which meet the Smart Metering Equipment Technical Specifications (and thereby count towards installation targets which suppliers will need to meet during the roll-out) and are enrolled with the Data and Communications Company are fully interoperable, allowing consumers to switch supplier without any loss in required smart services.

[78] The mean score for this statement was 2.20 among smart meter customers and 2.30 among legacy meter customers (on a scale of 1 to 5 where a score of 1 represents “Very Satisfied” and a score of 5 represents “Very Dissatisfied”). The difference in mean scores was found to be statistically significant through testing.

“I think they’ve just got to be seen to be doing the right thing but really they don’t give a monkey’s … really they’re a company, they’re not in this thing to be nice, they’re in it to make money.”

Low income, 35-64, Children in HH, IHD plugged in

Some respondents also stated that installation of smart meters was more for the benefit and convenience of the energy supplier than for the benefit of customers. This also manifests itself as a concern that meter readers would lose their jobs as a result of smart meter roll-out.

“I think it’s more for them [the energy companies], so they don’t have to do meter readings.”

Middle income, 35-64, Children in HH, IHD now unplugged

6. Exploring the key drivers of positive energy-related outcomes

This section explores the points in the customer journey which may be having an impact on the energy-related attitudes and behaviours of smart meter customers. It draws on findings from Key Drivers Analysis (KDA) as well as insights from the quantitative and qualitative research elements.

Key findings

The analysis found that elements of the smart meter customer journey and customer engagement with the IHD explained a substantial amount of variation in some of the outcomes explored. Specifically, these factors made a substantial contribution to explaining customers' overall satisfaction with the smart meter installation, how easy to use they found their IHDs and whether they had used information from the IHD to understand and manage their energy use.

These factors were limited in their ability, however, to explain variation in complex attitudinal and behavioural outcomes such as whether consumers felt in control of their energy use, whether they had tried to reduce their energy use, and whether they tended to choose energy efficient appliances when making new purchases. A wide range of factors tend to affect complex attitudinal and behavioural outcomes such as these.

The ways in which customers engaged with their IHD tended to be relatively more important in explaining variation in the outcomes explored. More specifically, discussing IHD information with other household members and in-depth personal use of the IHD most commonly appeared among the more important factors.

In general, the time since the smart meter installation and whether the customer was active or passive in their receipt of a smart meter were not significantly related to the outcomes. This analysis also identified a limited number of differences in the drivers of the outcomes being explored across different customer groups.

The influence of elements of the smart meter customer journey is also likely to be affected by the specific way in which these elements are designed and delivered. Therefore the strength of these elements could potentially be altered by any changes to the way in which customer journeys are designed and delivered during the main roll-out phase.

6.1 Background to Key Drivers Analysis

Attempting to explain what influences attitudinal and behavioural outcomes is challenging given the wide range of factors that can affect how someone chooses to feel or act. During the survey smart meter customers were not asked to directly rate the importance of particular elements of the smart meter customer journey (e.g. the friendliness of the installer, the explanation given of the IHD etc.) in affecting their energy-related attitudes and behaviours. This was because of the difficulty people tend to have in unpicking the motivations or triggers that lie behind the way they act

or think. Key Drivers Analysis (KDA) was conducted on the quantitative survey data as it is a statistical technique[79] which aims to understand which factors, or "drivers", most influence a given outcome. This approach allowed an investigation of whether particular aspects of the customer experience during the early roll-out were more or less likely to contribute towards certain behavioural and attitudinal outcomes.

KDA analysis was carried out to explore drivers of the following outcomes:

1) Overall satisfaction with smart meter installation

2) Ease of using IHD[80]

3) Used IHD information to understand and manage energy use[81]

4) Feel in control of how much electricity I personally use

5) Feel in control of how much gas I personally use

6) I have tried to reduce the amount of energy I use at home

7) Often choose to buy more energy efficient appliances

KDA was also used to examine the similarities and differences in the drivers of these outcomes among specific subgroups of smart meter customers. Analysis for each outcome was replicated for different groups of customers based on age, levels of household income, the presence of someone living with a long-term health condition in the home and their interest in technology[82]. This analysis found that clear distinctions in the drivers for different subgroups of customers did not often emerge. Where specific differences were identified these are flagged in this chapter, otherwise a general description of the trends across the subgroup results is provided in section 6.4

The analysis of each outcome started with the same single list of factors[83]. However, the number and range of factors chosen for the final KDA was different for each of

[79] The statistical technique used for this KDA was Dominance analysis (Budescu 1993). Further information on this approach is contained in the Technical Report.

[80] Statements included in factor: being able to switch between spend and usage displays; being able to access information on current usage and past usage). These variables all relate to customer perceptions of how confident they feel using the IHD.

[81] Statements included in factor: using it to work out normal level of household usage; using it to check nothing left on in house when going out or to sleep; using it to encourage others in household to reduce usage; using it to estimate energy bills). This factor was created to capture smart meter customers who have applied the information they have learned from their IHD to a particular purpose.

[82] The subgroup models run were: Age: i) those aged 65 and over, ii) those aged 64 and under; Income: i) those with a total annual household income of £50,000 or more, ii) those with a total annual household income of £16,000 or less; Long-term health condition: i) those from a household where no-one lives with a long-term health condition; ii) those from a household were at least one member lives with a long-term health condition; Interest in technology: i) those who agree they are the type of person who likes to have the newest gadgets in their home, ii) those who disagree they are the type of person who likes to have the newest gadgets in their home.

[83] This list was selected by Ipsos MORI and DECC through a review of the survey to identify the factors thought most likely to have a relationship with any of the outcomes listed above.

the seven outcomes. Factors were discarded in relation to specific outcomes for the following reasons: if they were not found to have a significant relationship with that outcome; if they were not considered a potential driver of the specific outcome in question by the research team; and if there were technical challenges to their inclusion (such as a high proportion of missing values). For more details of the approach taken for the KDA, and for full lists of the factors at each stage of this process, please see the Technical Annex.

6.1.1. Interpreting the KDA results

This KDA provides preliminary evidence which shows whether there is a significant relationship between drivers and outcomes, and to what extent the different drivers can explain the outcome. However, it does not confirm the direction of these relationships and taken on its own it cannot explain the reasons why a relationship has been observed. The KDA is also only able to measure the relative importance of the elements of the customer experience that were collected during the survey. It is likely that the outcomes being explored will have been influenced by other factors and the interactions and impacts of these factors on the drivers and outcomes is unknown.

It is worth noting that this KDA has been conducted on data collected about customers' experiences of the early roll-out phase. This means that while the analysis provides valuable insight into the elements of the early roll-out customer journey which have influenced attitudes and behaviours, the relative importance of the different interactions is dependent on how these elements were designed and implementation at the time. Where the analysis finds that the smart meter intervention has not played a significant role in influencing customers attitudes and behaviours this may, in part, suggest that other extrinsic factors play a role. However, it cannot be interpreted as the smart meter intervention being *unable* to influence the desired outcomes, but rather that the current design of the interactions is not maximising this. It is possible that a change to the form, quality or timing of one or all parts of the customer journey may result in a greater influence on subsequent energy-related attitudes and behaviours.

The extent to which a particular outcome can be explained by the factors included in the analysis is shown through an R-squared value. This value indicates the extent to which a change in the value of the outcome variable (for example, the level of satisfaction with a service) can be explained by changes in the explanatory factors (for example, the friendliness of the person delivering the service). The R-squared value can range from 0% (i.e. the explanatory factors do not explain any of the variation in the outcome so it must all be being driven by something other than the explanatory factors investigated) to 100% (i.e. the explanatory factors explain the full amount of variation in the outcome).

It is highly unlikely that any KDA would manage to fully explain an outcome (i.e. an R-squared value of 100%). Instead, KDA attempts to explain as much of an outcome as possible given the information collected by the survey and selected for further analysis.. Indeed, it was expected that the analysis conducted for this research would achieve relatively low R-squared values. This was because attempting to explain attitudinal and behavioural outcomes, as is the aim of this research, is

challenging given the wide range of factors that can influence how someone chooses to feel or act. This can include intrinsic factors about their own personalities and preferences as well as external factors that may or may not be related to their experiences of the smart meter customer journey. It is therefore inevitable that the survey will not have captured all the possible drivers of the outcomes being explored, and the KDA focused on a particular sub-set of the possible influences on the outcomes i.e. some very specific aspects of the smart meter customer journey. However, the KDA still allows these specific aspects of the customer experience to be assessed for their relative importance in leading to key outcomes. When interpreting the results of the KDA the main comparison made is in the relative ranking of the factors[84].

6.2 Ability of KDA models to explain desired smart meter outcomes

The analysis showed that factors related to customer interaction pre-, during, and post-installation, and factors related to engagement with the IHD were better able to help explain the likely predictors of some of the desired outcomes of the smart meter roll-out than others[85]. These factors were shown to make a substantial contribution towards explaining the **ease of use of the IHD**, whether **information from the IHD had been used to understand and manage energy usage**, and **overall satisfaction with the installation**. These factors were found however, to be limited in their ability to explain complex attitudinal and behavioural outcomes such as **feeling in control**, **trying to reduce household energy usage**, and **often choosing to buy more energy efficient products**. This may suggest that specific nuances of the customer experience affecting these outcomes had not been captured through the survey, or that a wider range of factors extrinsic to the smart meter installation process influence these attitudes (as discussed in section 6.1.1).

However, the finding that elements of the smart meter customer journey still accounted for small amounts of variation in these outcomes indicates that these interventions have the potential to impact on feelings of control and energy efficient behaviours. As discussed in the section above, the results are conditional on the exact nature of the interventions being assessed, including their design, mode of delivery and timing. It may be therefore, that the strength of the influence for some

[84] While it is not possible to apply statistical significance testing to these results as has been done for the survey results, it is possible to compare the confidence intervals around the relative rankings. For example, a driver ranked 2nd in the final KDA for any given outcome may have a confidence interval showing it could be ranked anywhere between 1st and 5th relative to the other drivers. Where comparisons between drivers have been made in this report this has been done on the basis of the confidence ranges differing across the drivers being discussed. For example, if one driver has a range of 1-4 and another has a range of 5-7 this is considered to show that these drivers occupy different ranking positions relative to one another. It is not usually valid to compare the relative ranking positions of variables in a standard multiple regression due to the inter-relationships between the driver variables (multicollinearity) which can skew their positions relative to each other. However, it is robust to do so in this analysis as the KDA approach (using dominant weights) takes into account these inter-relationships and its results are not affected by them.

[85] Through a comparison of the variances explained by the drivers - the R-squared values - achieved in the analysis of each outcome.

elements of the smart meter customer journey, while found to be low in relation to the early roll-out, can be altered depending on the type and quality of the way in which any specific interaction is designed and delivered.

6.3 Relative importance of different aspects of the smart meter customer journey in explaining outcomes

Most of the analysis exploring the desired outcomes of the smart meter roll-out was dominated by factors related to how customers engaged with their IHD. For example, whether customers had **tried to reduce their energy usage**, **tend to buy more energy efficient products**, **find their IHD easy to use** and have **used it to understand and manage their usage**, was more influenced by aspects of their engagement with their IHD than with any element of their engagement with information received or interaction with their installer or supplier. This finding is based on data collected about customers' experiences of the early roll-out period. It would be necessary to collect data about the experiences of those receiving smart meters during the main roll-out stage in order to understand whether any differences to the design and delivery of the information have impacted on the influence these interactions have on customers' attitudes and behaviours.

The relative importance of the different IHD related factors varied across the analysis, although ***discussions within the household of the IHD information***, and ***in-depth personal use of the IHD information*** commonly appeared among the more important factors. It should be remembered however, that the ability of any of these factors to explain some of the outcomes was limited.

As might be expected, factors related to ***satisfaction with the practical aspects of the installation*** and ***information provision*** were more highly rated in the analysis explaining overall levels of **satisfaction with the installation**. It was specifically levels of satisfaction with these elements of the customer journey which were important in driving this outcome, rather than simply the receipt of information and advice.

This analysis found that, in general, the time since the smart meter installation and whether the customer was active or passive in their receipt of a smart meter, were not significantly related to the outcomes. The exceptions to this were that **satisfaction with the installation** was in part influenced by ***how a customer came to have a smart meter installed*** and that the tendency to **buy more energy efficient products** was in part influenced by the ***length of time the smart meter had been installed*** (although in both instances, the contribution made by these variables was very minimal).

6.4 Differences looking across subgroups of customers

In general, this analysis only identified limited differences in the drivers of the outcomes being explored across different customer groups. In the case of the analysis exploring **overall satisfaction with the smart meter installation** this was because the drivers were found to be very consistent across all customer groups. For the other outcomes, while there were slight shifts in emphasis in the ranking of drivers, the analysis generally found few consistent trends.

One trend suggested by the results, but which will need further investigation to verify and understand, is that ***satisfaction with energy-related advice*** and ***satisfaction***

with information received during the installation visit were slightly more important in driving positive outcomes among: older customers aged 65 and over; those living in a household with someone with a long-term health condition; and those who do not have a general level of interest in gadgets. By contrast, this initial explorative analysis suggests that the outcomes may be more driven by engagement with the IHD for younger customers (below the age of 64) and those who have a general interest in technology.

The analysis was unable to unpick whether or not there were differences in the importance of drivers for different smart meter customers when it comes to feeling in control of their energy use, trying to reduce their usage or choosing to purchase more efficient products – further research would be required to explore this. The same applies to differentiating the drivers for customers with very high and very low incomes. Again, further research would be needed to help determine whether there are ways in which the interactions around the smart meter can be tailored for these groups of customers to maximise the likely impact.

6.5 Satisfaction with smart meter installation

Explanation of the 'Satisfaction with smart meter installation' outcome variable: During the survey customers were asked to rate their level of satisfaction with specific elements of the smart meter customer journey and also specific aspects of the installation visit itself. Subsequently smart meter customers were asked to rate their overall experience of the installation of their smart meter (and for most, their IHD). Among those who had been at home for the installation visit, nine in ten (89%) were satisfied with their experience of the installation overall (see section 3 for more detail). KDA was conducted to explore which elements of the smart meter customer journey experienced during the early roll-out phase contributed more and less to this overall feeling of satisfaction.

Overall the factors included in the final analysis explained a fairly high level (47%[86]) of the variance in satisfaction with installation. The vast majority of this variance was explained by *satisfaction* with specific aspects of the installation experience[87] (44.7%), with a far lower level of variance (2.2%) explained by other aspects of the overall experience.

As shown in Figure 41, the top rated factor was ***satisfaction with the practical aspects of installation***, explaining 20.9% of the variation in the outcome. This included satisfaction with the ease of arranging the appointment, the installer arriving on time, how long the installation took to conduct, whether it was completed without any major difficulties, and the state of the property following the visit. The in-depth interviews found that these basic 'mechanics' of a trade visit to the home were often

[86] R-squared value of 47%.

[87] Some of the drivers used in the KDA for overall satisfaction with the smart meter installation included survey variables measuring customer satisfaction with particular elements of the installation process (such as the installer arriving on time, the quality of the advice given by the installer etc.). These drivers were felt to be useful to include as they help to identify which elements of the installation visit are most critical to get right in terms of customer satisfaction, in order to leave the customer with an overall feeling of satisfaction.

cited by smart meter customers when they recalled their experiences of the installation. The installation visit was commonly described by in-depth interview respondents as ‘quick and hassle-free’ and this was frequently cited as a reason for their high level of satisfaction (see section 3.2 for further discussion of this). The implication of this analysis, and the in-depth interviews, is that if the basics of the installation process do not meet customer expectations this may have a negative impact on whether or not they perceive the installation visit as a positive experience. Satisfaction with the practical aspects of the installation was also the top-ranked factor in the analysis conducted with different subgroups of customers.[88]

[88] An inspection of confidence intervals indicated that for respondents with total annual household incomes above £50,000, the variable ‘satisfaction with the practical aspects of the installation’ was in the top three ranked variables but a distinct ranking amongst these three variables was not apparent. For all the other subgroups, ‘satisfaction with the practical aspects of the installation’ was clearly the top-ranking factor.

Figure 41: Overall KDA model for "overall satisfaction with installation of smart meter (and IHD)"

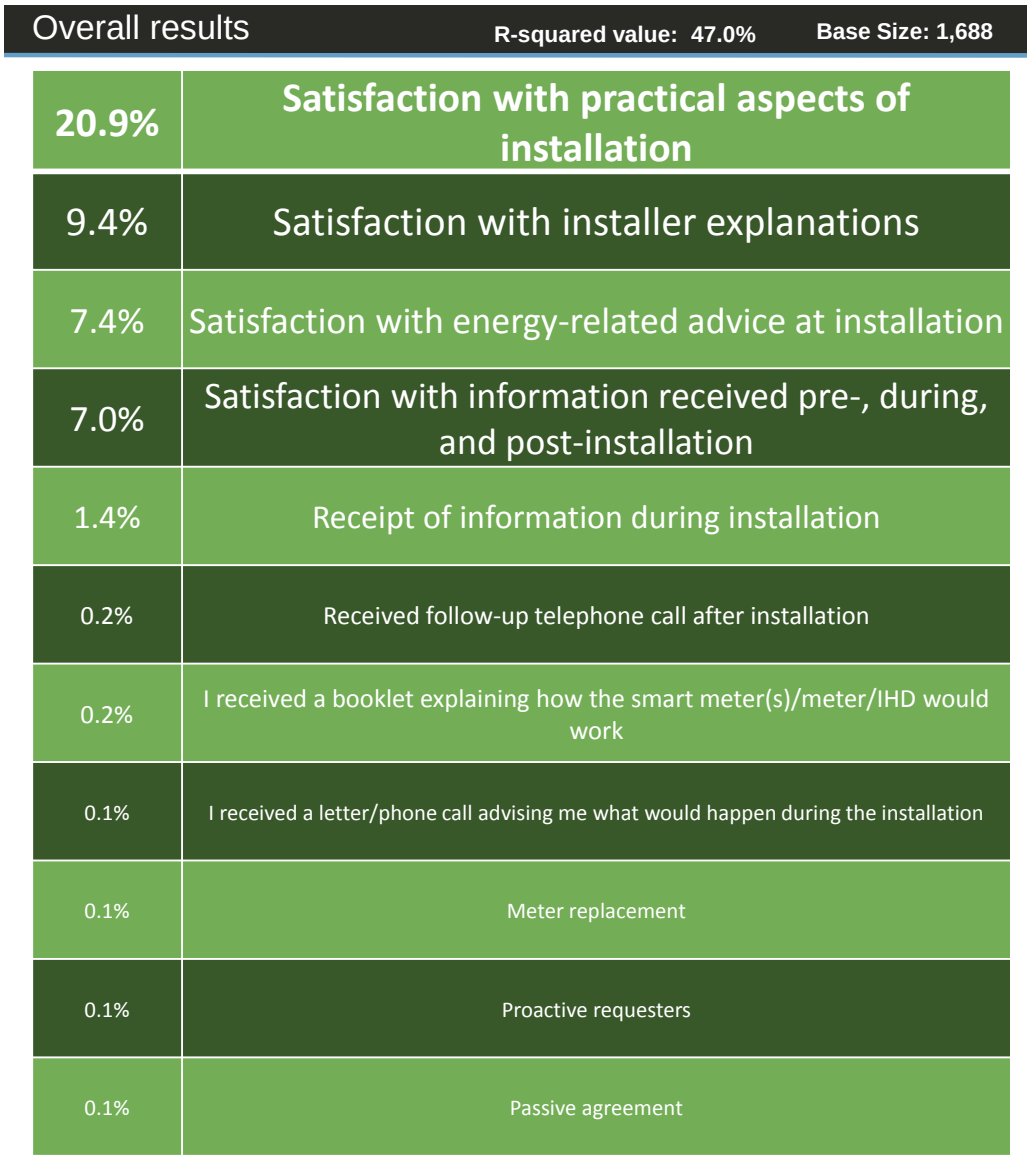

Figure 41 shows that satisfaction with practical aspects of the installation explained twice as much of the variation in overall satisfaction (20.9%) as the next variable, ***satisfaction with installer explanations***[89] (contributing 9.4% in the overall model). It is possible, especially given the length of time since the installation for some customers, that customers may have had better recall of the practical elements of the installation, or were able to recall not being dissatisfied with these aspects at the time, than they were to recall the interaction they had with the installer. The survey provides evidence to suggest this may be the case as between 4-6% of customers responded with a 'don't know' or a neutral response to a question about their

[89] This may have involved being satisfied with the answers given to any questions asked of the installer and satisfaction with any explanations provided about how the smart meter and/or IHD work.

satisfaction with the practical elements, compared to between 10-30% doing so about other elements such as their satisfaction with information received or with the ability of the installer to answer any questions they had (see section 3.3 for further discussion of this).

Looking at the ranking of the factors, two other variables explained a similar proportion of the variance to satisfaction with the explanations, these were: ***satisfaction with energy-related advice received from the installer during the visit*** (for example, about energy efficiency measures and energy efficient behaviours, energy tariffs and more advanced IHDs) and ***satisfaction with information received pre-, during, and post-installation*** (contributing 7.4% and 7.0% respectively). The ranking of these factors was also similar when this analysis was replicated for particular subgroups of customers.

As shown in Figure 41, the ***receipt of information during the installation***, as opposed to levels of satisfaction with what has been received, made a minimal contribution (1.4%) to the explanation of overall satisfaction with installation. Other aspects of the customer journey such as the ***way in which customers were initially approached*****,** or themselves requested, to have a smart meter installed were found to have a very minimal (but still statistically significant) relationship with overall levels of satisfaction with the installation (0.1% in each case for 'proactive requesters', 'passive agreement' and 'meter replacement').

6.6 Ease of use of IHD

Explanation of the 'Ease of use of IHD' outcome variable: This variable was created to cover various aspects of IHD usage: being able to switch between spend and usage displays; being able to access information on current usage and past usage and finding the IHD easy to use. These variables all relate to customer perceptions of how confident they feel using the IHD and accessing different types of information through it.

The KDA conducted on the **Ease of use of IHD** explained a reasonable amount of the variation in this outcome (37.0%). The analysis found the most important factor contributing to this outcome was the ***level of in-depth personal use of the IHD*** (as shown in Figure 42 for smart meter customers overall). This factor reflects the frequency with which customers personally looked at a number of different displays on their IHD, such as current and historic usage and spending and information based on electricity and gas usage and spend. For smart meter customers overall this factor explained 9.6% of the variation in their ease of using the IHD.

Whilst the analysis demonstrates this relationship between feeling confident using the IHD and accessing different types of information through it, it does not show which is driving the other. It may be that switching between the various displays leads a customer to believe the IHD is easy to use. However, it could also be that the IHD is felt instinctively to be easy to use which leads the customer to be inclined to look through the different information features. The in-depth interviews found examples of both of these scenarios. Indeed, the relationship between these variables and the outcome could flow in both directions with each reinforcing the other.

Figure 42: Overall KDA model for "Ease of use of IHD"

Overall results	R-squared value: 37.0% Base Size: 1,682
9.6%	**In-depth personal use of IHD**
4.5%	Used IHD information to understand and manage energy use
4.4%	Satisfaction with installer explanations
3.7%	Initially used IHD to check usage
3.7%	Satisfaction with energy-related advice received at installation
3.1%	Satisfaction with information received pre-, during and post-installation
2.7%	Amount known about smart meters before contact with supplier
1.5%	Discussed info shown on IHD with household
1.2%	Receipt of information during installation
1.1%	Recent general engagement with IHD
0.7%	Satisfaction with practical aspects of installation
0.4%	I received a booklet explaining how the smart meter(s)/meter/IHD would work
0.2%	Receipt of energy-related advice at installation
0.1%	I received a letter/phone call advising me what would happen during the installation
0.1%	Received follow-up telephone call after installation

The same challenge of interpretation is true of the other factors included in the analysis which relate to engagement with the IHD. This includes ***the use of IHD information to understand and manage energy usage***[90] (explaining 4.5% of the

[90] This factor covers uses of this information such as working out a household's normal level of usage, estimating bills, monitoring that energy is not unintentionally being used and encouraging other household members to reduce their usage.

variation in the outcome) and ***initially using the IHD to check energy usage of different household appliances*** (explaining 3.7%). The relationship between these factors and the outcome may also be in the other direction with customers more likely to use information on their IHD to understand, manage and check their usage if they find the device easy to use.

Some elements of the customer journey were also shown to have an influence on customers' perceptions of how easy or not the IHD is to use. This included ***satisfaction with the installer's explanations*** which explained 4.4% of the overall variation in the outcome. This suggests that the installers' explanation about how the IHD and smart meter worked, and their ability to answer customers' questions had some bearing on the customer's subsequent confidence using the device. ***Satisfaction with energy-related advice*** from the installer during the visit and ***satisfaction with information received pre-, during, and post-installation*** also had a limited influence on feeling the IHD is easy to use (explaining 3.7% and 3.1% respectively).

This explorative analysis suggests there may be merit in further investigation of the drivers of finding the IHD easy to use for different groups of customers as the results suggest some are more likely to be influenced by their interactions with the installer than others. Customers who proclaimed themselves to be less interested in technology were more likely, than those with a higher level of interest, to be influenced by their satisfaction with energy-related advice from the installer.

Figure 42 shows that the ***amount known by the customer about smart meters in advance*** of having contact with their supplier about having one installed also contributed a small amount (2.7%) to how easy they find their IHD to use. Factors about simply receiving some types of information, but not levels of satisfaction with them, each explained between 0.1% and 1.2% of the variance.

6.7 Using IHD information to understand and manage energy usage

Explanation of the 'Using IHD information to understand and manage energy usage' outcome variable: This variable was created to cover various uses of IHD information: using it to work out normal level of household usage; using it to check nothing left on in house when going out or to sleep; using it to encourage others in household to reduce usage; using it to estimate energy bills. This factor was created to capture smart meter customers who have applied the information they have learned from their IHD to a particular purpose. This was felt to be important to explore as in the in-depth interviews it was found that customers who took a 'monitoring approach' to using their IHD, as opposed to a solely 'information driven approach' were more likely to be interacting with the IHD in the longer term. This 'monitoring approach' incorporates the type of applications of the IHD information included in the 'using IHD information to understand and manage energy usage' factor, for example, checking that nothing has been left on unintentionally (see section 4.3 for a more detailed discussion of this).

The factors included in the analysis explained a reasonable amount of the variation in **using the IHD to understand and manage energy usage** (38.2%).

Figure 43 shows that factors related to how customers, and their households, interact with their IHD were more important, in the context of the early roll-out, in driving use of the IHD information to understand and manage energy usage than

other aspects of the customer experience captured by the survey. While factors related to the early roll-out smart meter customer journey – for example, whether and when information and advice was received, and how satisfactory this was – were found to have a significant relationship with the outcome, these variables only contributed a very small amount to explaining customers' use of the IHD to understand and manage energy usage.

Figure 43: Overall KDA model for "Using IHD information to understand and manage energy usage"

Overall results — R-squared value: 38.2% — Base Size: 1,176

8.1%	**Discussed info shown on IHD with household**
6.9%	In-depth personal use of IHD
5.8%	Initially used IHD to check usage
5.5%	Recent general engagement with IHD
3.4%	Ease of using IHD
1.9%	Using more energy than expected
1.9%	Amount known about smart meters before contact with supplier
1.7%	Receipt of energy-related advice at installation
1.4%	Using energy at different times of day
0.6%	Using less energy than expected
0.5%	Receipt of information after installation
0.2%	Satisfaction with installer explanations
0.1%	Satisfaction with information received pre-, during, post-installation
0.1%	Received follow-up telephone call after installation
0.1%	I received a booklet explaining how the smart meter(s)/meter/IHD would work
0.05%	Receipt of information during installation

Among the top rated factors in the analysis were whether or not ***household members have discussed information shown on the IHD*** (contributing 8.1% to explaining the outcome) and the ***level of in-depth personal use of the IHD***

(contributing 6.9%[91]). The importance of household discussions of the IHD is perhaps to be expected given one of the constituent statements included in the outcome variable is "I use it to encourage others in my household to reduce their energy use"[92]. However, this variable was included as a driver in the analysis to explore whether discussing the information shown on the IHD might be related to going on to use the IHD to take further action, such as encouraging the household to reduce energy usage. This analysis suggests that this relationship does exist, although it cannot confirm in which direction.

While the relative importance of the IHD-related factors differed slightly across the specific groups of customers, both ***initial usage of the IHD to check appliance energy usage*** (explaining 5.8%) and ***recent general engagement with the IHD*** (explaining 5.5%) were also among the most important factors for smart meter customers overall. Finally, in relation to IHD-use, whether or not customers felt confident using it and found the ***IHD easy to use*** was responsible for driving a small proportion of the variance in the outcome (3.4% in the overall model).

As discussed above in relation to the ease of using the IHD model, although there is a clear relationship between the various IHD related factors and using the IHD to understand and manage energy use, the direction of the relationship is not yet clear. For example, finding the IHD easy to use perhaps increases the likelihood of finding ways to use the IHD to understand and manage energy use, but it could also be that finding this type of use for the IHD may increase usage and therefore overtime increase confidence in using it.

Engagement with the different information features on the IHD, through in-depth personal use, was less important in driving the use of the IHD information to understand and manage energy usage among older customers aged 65 and over when compared with those younger than this. Among customers living in the highest earning households (total annual income of £50,000 or more) the analysis results were far less clear about the relative order of importance for the different factors influencing their use of the IHD to understand and manage their energy use.

Other factors shown to have a significant relationship with the outcome, but which contributed only a very small amount to explaining the variation in it across customers, relate to having found out some form of information about household energy usage from the IHD. The IHD showing the customer that they were ***using more energy than they expected*** contributed 1.9%;that they were ***using energy at different times of the day than they expected*** contributed1.4%; and that they were ***using less energy than expected***,0.6%.

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[91] While in Figure 44 the contribution of the variable "in-depth personal use of the IHD" (as measured by the percentage of R-squared) appears to be lower than the contribution of the variable "household members have discussed information shown on the IHD" (6.9% compared to 8.1%), the full analysis results show that the confidence intervals around these percentages mean the two variables can be considered to offer a similar amount of explanation for variation in the outcome variable.

[92] While these concepts are likely to overlap to a degree, whether the household has discussed information shown on their IHD and whether it has been used to encourage others in the household to reduce their energy usage, are taken from two separate survey questions and so the inclusion of the former statement as a driver was felt to be valid.

Figure 43 shows that the amount known by the customer about smart meters in advance of having contact with their supplier about having one installed did have a small but significant relationship with this outcome (1.9%).

The way in which customers were engaged through the smart meter customer journey did not come out strongly as a driver of using IHD information to understand and manage energy usage. Among the most highly ranked aspects of the journey was ***receipt of energy-related advice from the installer*** (explaining 1.7%). Across the factors included in the analysis about receipt of information at different stages of the customer journey, and customer satisfaction ratings with this, each contributed less than 0.5% towards explaining the outcome.

6.7 Feeling in control of electricity and gas use

Explanation of the 'Feeling in control' outcome variables: KDA was conducted separately to explain the drivers of feeling in control of electricity use and to explain feeling in control of gas use. These outcomes were considered separately as the matched comparison analysis found that while smart meter customers were more likely to feel in control of their gas use than their matched legacy meter counterparts, they were consistent in their attitude towards how in control they felt of their electricity use (see section 5.8). There was interest therefore in seeing whether there were different drivers for these two attitudes among smart meter customers.

Overall this analysis found that the factors contributing to feeling in control of either electricity or gas use were fairly similar, as shown in Figures 44 and 45. However, in both cases, the factors included in the analysis only explained a very small amount of the variation in the outcomes (4.8% for the electricity model and 4.5% for the gas model).

On the one hand this suggests that the information collected through the survey on aspects of the smart meter installation process and engagement with the IHD only explain a small amount of the influences on feeling in control. This is likely to explain, at least in part the low explanatory power of the analysis, given the complex interaction of factors likely to contribute to feeling in control (as discussed in section 6.1.1). Indeed, the in-depth interview respondents discussed factors including changing energy prices, changing seasonal weather and the challenges of living in multi-person households with varied energy needs as things that were difficult to have control over.

However, it is also possible that this result reflects the way in which the smart meter intervention was delivered during the early roll-out phase and that it is conditional on the quality and form which this intervention took. It is possible that the nature of the interactions with the customer during the smart meter installation process could be amended in a way that would see this analysis finding factors of the customer journey which have a greater influence on the customer ultimately feeling in control. The results of this analysis do not mean that the smart meter customer journey is unable to influence feelings of control, but that the way in which customers were engaged in the early roll-out, at least those aspects that were captured by the survey, did not manage to influence this to a great extent.

The factors included in the analyses of both the electricity and gas variables contributed only a small amount each in understanding the drivers of feeling in control (all explained less than 2% and all but one factor explained less than 1%).

However, it is interesting to see in Figure 44 and 45 that in both analyses it was generally factors related to the smart meter customer journey experience that were shown to be contributing something to the outcome rather than aspects related to engagement with the IHD. Indeed, nearly all of the survey variables related to using the IHD were found to have no significant relationship with the outcomes and do not appear in the final KDA[93].

The factors that have a significant relationship with the outcome, albeit only contributing tiny amounts to explaining its variation, were most commonly related to satisfaction with certain elements of the customer journey, such as ***energy-related advice***[94], ***information received pre-, during, and post-installation,*** the ***practical aspects of the installation***[95] and the ***installer's explanations***. However, other factors related to receiving some types of information, but not levels of satisfaction with them, were found to have no significant relationship with feeling in control[96].

While the factors shown in Figures 44 and 45 were those found to be significant in contributing to feelings of control, there was no clear ranking of these factors across smart meter customers overall or for any specific subgroups of customers. While all of the factors shown contributed to explaining the outcomes, none can confidently be concluded to contribute more so than the others.

In the context of early roll-out, the way in which the customer either approached, or was approached by, their supplier to have a smart meter installed was not found to have any significant relationship with their feeling of control. The length of time that the smart meter and IHD have been installed was also not found to be a predictor of feeling in control.

[93] This includes customers' recent general engagement with their IHD and whether they've used the IHD information to understand and manage their energy usage. While the initial use of the device to check how much energy different appliances use was not significant in influencing feeling in control of electricity, it was found to have an extremely minor influence on feeling in control of gas (at 0.1%).

[94] This advice may have covered a range of topics related to controlling energy use, including energy efficiency measures, steps to reduce energy use in the home, and advice on how to use the IHD to identify which appliances use the most energy.

[95] This variable includes being satisfied with the ease of arranging the appointment, the appointment going ahead as scheduled, the length of the installation visit, how the property was left afterwards and the perception that no major difficulties occurred during the installation.

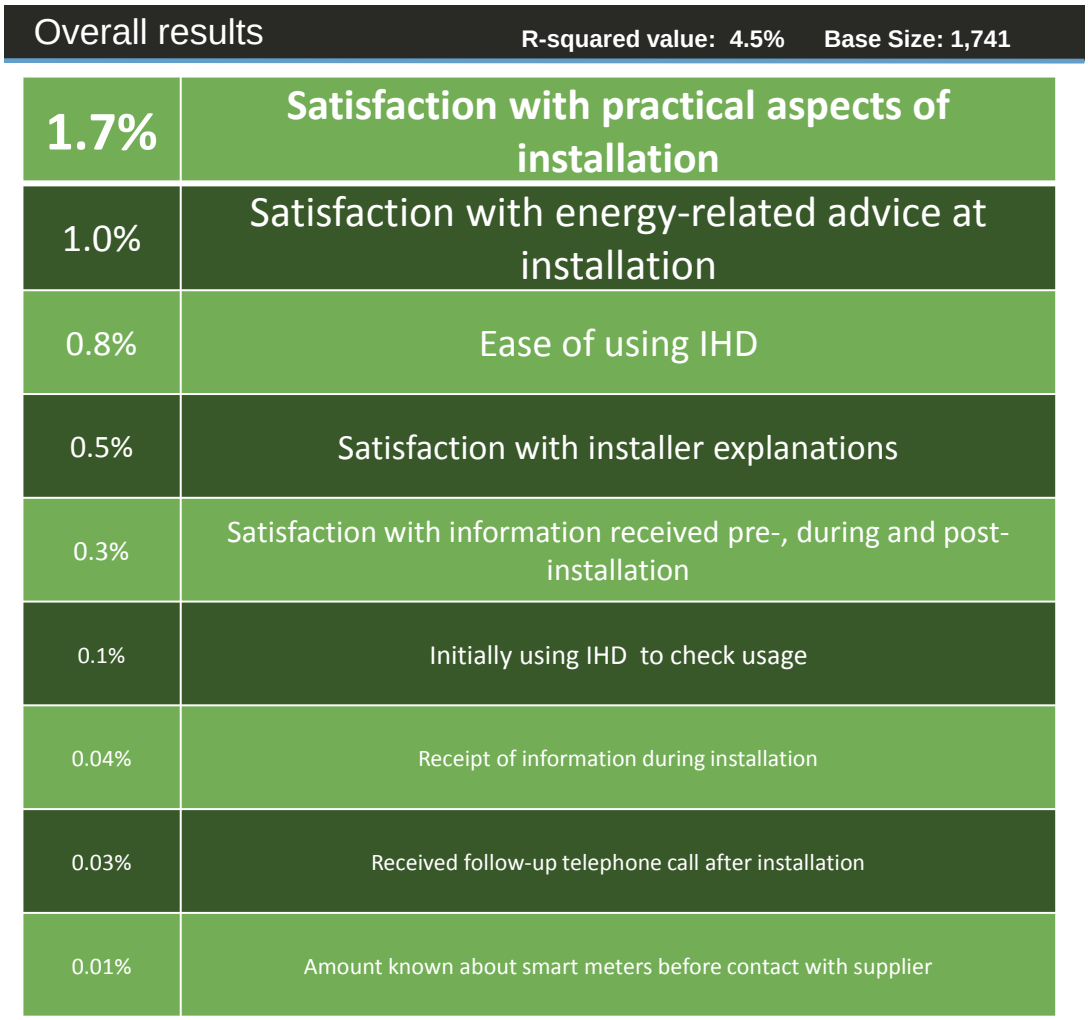
[96] This included the receipt of energy-related advice from the installer and receipt of a booklet explaining how the smart meter and/or IHD work either before or after the installation visit.

Figure 44: Overall KDA model for "I feel in control of how much electricity I personally use"

Overall results — R-squared value: 4.8% Base Size: 1,879

1.7%	**Satisfaction with energy-related advice at installation**
0.9%	Satisfaction with information received pre, during, and post-installation
0.7%	Ease of using IHD
0.7%	Satisfaction with practical aspects of installation
0.4%	Satisfaction with installer explanations
0.2%	Received follow-up telephone call after installation
0.1%	Amount known about smart meters before contact with supplier
0.04%	Receipt of information during installation

Figure 45: Overall KDA model for "I feel in control of how much gas I personally use"



6.8 Trying to reduce amount of energy usage in the home

Explanation of the 'Trying to reduce amount of energy usage in the home' outcome variable: Encouraging a reduction in household energy usage is a key aim of the smart metering programme. The matched comparison analysis found that smart meter customers were more likely to agree that they have tried to reduce their energy usage than customers with a legacy meter (see section 5.3). KDA was therefore conducted to explore how important different elements of the customer journey process, and interaction with the IHD, are in driving smart meter customers' attempts to reduce the amount of energy they use at home.

The factors included in the analysis of this outcome were very limited in their ability to explain variance in customers' likelihood of **trying to reduce the amount of energy used in the home** (4.3%). As discussed in section 6.1.1, this was to some extent expected given the complex range of factors likely to influence decisions around reducing energy usage. This analysis sought to explore the relative influence of the smart meter customer journey, rather than the full breadth and depth of possible influencers beyond this.

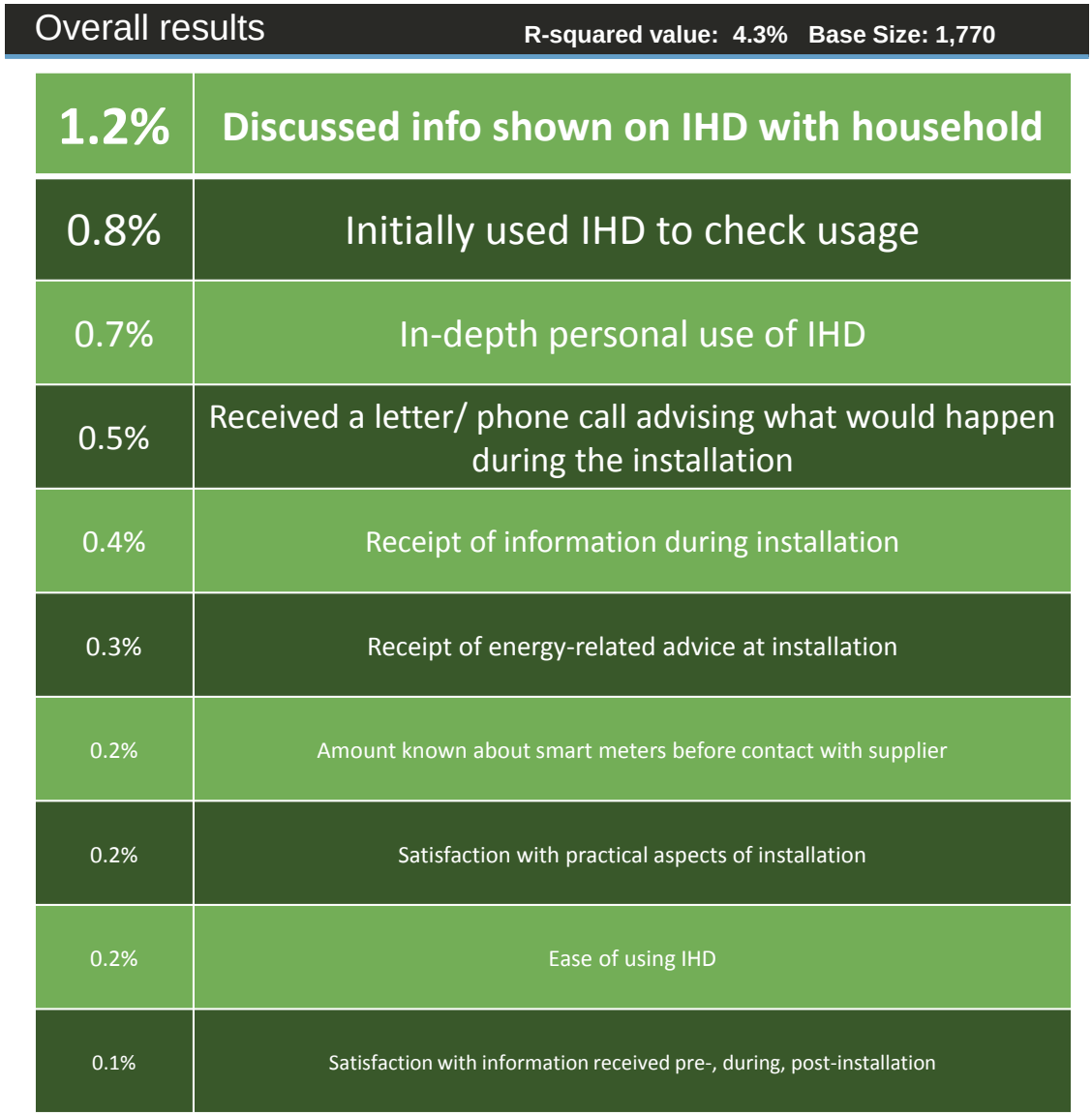
The low level of variance explained means that each factor included only explained a very small proportion of the variation in the outcome; in the overall results based on all smart meter customers all but one of the factors explained less than 1% of the outcome. An examination of the possible ranking positions of each of the factors (through looking at the confidence intervals around their rankings) also showed that there was no clear order of importance between them. It is not possible therefore to conclude too much about the relative importance of different stages of the smart meter customer journey in influencing this outcome.

It may be that the influence of the information and advice delivered during the smart meter customer journey could be increased depending on the precise form and quality it takes. For example, while the receipt of information after installation was found to have no significant relationship with trying to reduce energy usage, in-depth interview respondents confirmed that any contact they received had been minimal (usually just a quick follow-up telephone call to check the installation had taken place) and so expanding this part of the customer journey may increase its influence. The fact that smart meter customers were found to be more likely to report this behaviour than their matched legacy meter counterparts, suggests that it may also be influenced by elements of the customer experience that were too nuanced to be captured through the survey. Indeed, during the survey 38% of smart meter customers who said they had tried to reduce their energy use agreed that this had, at least in part, been encouraged by having a smart meter and/or IHD installed (see section 5.3.2).

Figure 46 shows that whether the ***household has discussed information shown on their IHD*** contributes only 1.7% to explaining the outcome. Having buy-in across the household to try to reduce energy use was certainly felt to be important among in-depth interview respondents however. Other factors included in the model related to IHD use, but again contributing only a minimal amount, were: ***initially using the IHD to check the energy usage of different household appliances*** (0.8%); and ***in-depth personal use of the IHD*** (0.7%). The direction of this relationship could be debated as it is not clear whether use of the IHD helps to encourage attempts to reduce energy use, or whether use of the IHD forms part of these attempts to reduce usage. The ***ease of using the IHD*** was also found to be related to attempts to reduce usage but only contributed 0.2% in explaining this behaviour. However, specific information learned from the IHD – for example, whether the household was using more or less energy than expected – was not found to have any significant relationship with the outcome for smart meter customers overall during early roll-out.

As shown in Figure 46, some aspects of the customer journey relating to receiving information from the supplier or installer were found to have a significant relationship with attempts to reduce energy usage and so appear in the KDA output. However, these factors each contributed only between 0.1% and 0.5%.

Figure 46: Overall KDA model for "I have tried to reduce the amount of energy I use at home"



The way in which the customer either approached, or was approached by, their supplier to have a smart meter installed was not found to have any significant relationship with their attempts to reduce usage. Although Figure 46 shows that the amount known by the customer about smart meters in advance of having contact with their supplier about having one installed did have a significant relationship with trying to reduce usage (albeit with a very small contribution of 0.2%).

The length of time that the smart meter and IHD have been installed was also not found to be a predictor of this behaviour. This is despite the survey finding that those who had their smart meter installed longest ago were more likely to say they were less often doing some things around the home which waste energy such as leaving the heating and lights on in unused rooms or overfilling the kettle (see section 5.5.3 for further discussion of this).

6.9 Often choosing to buy more energy efficient appliances

Explanation of the 'Choosing to buy more energy efficient appliances' outcome variable: During the survey customers were asked how often, if at all, they choose to buy more energy efficient appliances, such as a more efficient fridge or washing machine. The matched comparison analysis found that smart meter customers were more likely than their legacy meter counterparts to say they 'always' or 'very often' chose to purchase appliances on this basis (see section 5.6.1). KDA was therefore conducted to try to explain the drivers of choosing to purchase more energy efficient household appliances.

Despite the matched comparison analysis concluding that the smart meter and/or IHD was likely to be related to smart meter customers having a greater propensity to purchase more energy efficient appliances, the factors analysed only explained 6.9% of this behaviour. As is the case for all of the KDA, this result is based on the precise design of the smart meter intervention during the early roll-out and it may be that changes to the information delivered (for example, in terms of content, tone or delivery channel) could have a greater impact on ongoing purchasing behaviour. In relation to this outcome, as discussed in section 6.1.1, it is also very likely that factors beyond those collected in the survey about customer experiences of the smart meter customer journey and their interaction with the IHD are influential in determining whether smart meter customers are likely to buy more efficient products. Previous research conducted by Ipsos MORI for the European Commission about household appliance purchasing decisions[97] confirms that there are a very wide range of considerations when selecting the type of product to buy. This includes the brand, the aesthetics, the perceived quality and longevity of the appliance and of course the cost. The information provided during the smart meter customer journey, and the information learned from the IHD about the household's energy use, therefore needs to compete with all these factors to have an influence on final purchasing decisions.

Given the low level of variance explained overall, the relative contribution of each individual factor included was minimal. Indeed, all but one of the factors contributed less than 1% to explaining the variance in the outcome[98]. The factors presented in Figure 47 were also shown to be of relatively similar importance in influencing the purchase of more energy efficient appliances[99]. This is true for smart meter

[97] The full report can be accessed here: http://ec.europa.eu/energy/efficiency/studies/doc/2012-12-research-eu-product-label-options.pdf

[98] It should also be noted that following an initial run of this model one of the variables – recent general engagement with the IHD - which had been shown to have a significant relationship with the outcome, needed to be removed from the final output. This was because it had a very high proportion of missing values due to the survey question only being asked of a certain subset of customers. This distorted the overall model and so this variable was excluded. This variable was successfully included in other models discussed in this section as the missing values were able to be imputed. However, the imputation process did not work in the case of this model, perhaps compounded by the lower R-square value.

[99] There did not appear to be a distinct ranking of these factors when confidence intervals were inspected.

customers overall as well as for the range of specific subgroups of customers analysed.

Figure 47: Overall KDA model for "I always/very often choose to buy more energy efficient products"

Overall results — R-squared value: 6.9% Base Size: 1,797

1.1%	**Used IHD information to understand and manage energy usage**
1.0%	Ease of using IHD
0.8%	Amount known about smart meters before contact with supplier
0.8%	Receipt of energy-related advice at installation
0.7%	In-depth personal use of IHD
0.6%	Initially using IHD to check usage
0.5%	Satisfaction with information received pre-, during and post-installation
0.4%	Discussed info shown on IHD with household
0.2%	Time since installation of SM and IHD
0.2%	Receipt of information during installation
0.2%	Satisfaction with installer explanations
0.1%	Satisfaction with energy-related advice at installation
0.1%	Received follow-up telephone call after installation
0.1%	Using more than expected (response code 1, 3, 5)
0.1%	Satisfaction with practical aspects of installation

Aspects of using the IHD were found to have a significant, albeit not very important, relationship with choosing to purchase more efficient products: ***use of IHD information to understand and manage energy usage*** contributes 1.1% to explaining the outcome and ***the ease of using the IHD*** contributes 1.0%. Aspects of the smart meter customer journey related to receiving information and advice from the supplier and installer also contributed to the outcome, although again only a very

minimal amount. For example, ***receipt of energy-related advice from the installer*** (contributing 0.8%) and ***satisfaction with information received pre-, during and post-installation*** (contributing 0.5%).

Another factor which appeared in the model was the ***amount known about smart meters before initial contact was made with the supplier*** about having a smart meter installed, explaining 0.8% of the variance in the outcome. The way in which the customer either approached, or was approached by, their supplier to have a smart meter installed was not found to have any significant relationship with this outcome however.

Although the length of time that has passed since the installation visit was not found to have a significant relationship with any of the other outcomes explored through this analysis, it is found to be related to the purchasing of more energy efficient products. Although it only contributes 0.2% it is included in the model due to its significant relationship. The survey also found that customers who had their smart meter installed longer ago were more likely to agree they were purchasing more efficient products ‘always’ or ‘very often’.

7. Conclusions

This section summarises key findings from across the different strands of analysis conducted on the survey data and the in-depth interviews, and details a series of associated implications based upon these findings. These implications reflect the views of the researchers, rather than the opinions of DECC, and have only been made in relation to points where the survey findings and subsequent in-depth interview findings allow.

It should be remembered that this research captured the experiences of those receiving very early roll-out installations. Many of these would have been conducted prior to the Smart Metering Installation Code of Practice (SMICoP)[100] and prior to SMETS compliant versions of the IHD being introduced. Indeed, some suppliers have already modified their customer journeys for the main stage of the smart meter roll-out and, as such, some of the suggestions provided below on the basis of this research may be covered by these modifications.

Key findings

This research found that emphasising or enhancing the following aspects of the smart meter customer journey may help to maximise the potential impacts of the installation. Each of these points is discussed in more detail further below.

- Informal social learning and spreading general awareness of smart meters and IHDs;
- Ensuring information is provided pre-installation to help set expectations;
- Getting the basics of the installation right i.e. arriving on time, avoiding mistakes, leaving the home clean and tidy;
- Consistently delivering high quality explanations at the installation visit, but tailored to an appropriate level of detail for the individual customer;
- Always walking customers through a few simple interactions with their IHD and actively encouraging even basic use, and ideally promoting a ‘monitoring’ approach to using the IHD;
- Identifying high-using households and helping them to understand the reasons for this, and how they can be supported in meeting reduction goals through the IHD;
- Offering energy efficiency related advice at the installation visit – ideally forewarning customers so they have time set-aside;

[100] The SMICoP provides guidelines for smart meter installers with the aim to make sure that the customer receives a high standard of service throughout the installation process, and knows how to use, and benefit from, the smart metering equipment. The SMICoP came into effect in June 2013.

- Follow-up contact by energy suppliers post-installation - going beyond a simple check- up that the installation took place to answer queries about the smart meter or IHD and provide further energy efficiency advice (where appropriate);
- Receipt of personalised information from suppliers based on smart meter data, including usage comparisons and tariff information; and
- Availability of IHDs with engaging graphical displays, wall-mount option, functionality to compare usage over different periods and appliance-level data.

7.1 Pre-installation

7.1.1 Social learning

Findings from the in-depth interviews suggest that informal social learning about smart meters and IHDs, through recipients' social networks, may have had some positive benefits. Though the prevalence of such learning was limited because of the early stage of roll-out in which research occurred, it had helped shape positive expectations and sometimes give ideas about how the IHD might be used for some in-depth interview respondents. An increased number of installations and engagement overall during the wider roll-out is likely to increase the potential for social learning.

In some cases, respondents reported that discussions with social contacts gave them an idea of how the IHD might be useful to their household, in advance of the installation.

Discussions with social contacts might also help those who are less technically minded. In the in-depth interviews a few respondents, who were not technically minded, referred to how they tend to look to their social networks for support when trying to understand new technology (such as a mobile phone). In the case of the IHD, they explained that they needed someone to sit down and take their time in explaining in how it worked.

The importance of social learning should not be over-stated however, and cannot be taken as a replacement for the receipt of more formal information from the energy company. The research as a whole also indicates that the provision of information via more formal channels, for instance booklets explaining the purpose of smart meters/ IHDs and information about the installation, is still important. In-depth interview respondents often reported a lack of information from the energy company, and this meant that in some cases informal information played a more prominent role in informing expectations than it otherwise might have.

7.1.2 Wider awareness of smart meters and IHDs

An increase in wider awareness of the potential benefits of smart meters could have a positive impact on engagement and subsequent use of IHDs.

Customers who knew at least a fair amount about smart meters before being contacted by their supplier about having one installed were generally more likely to feel comfortable using their IHD to access a variety of functions. For example, 87% of those who knew at least a fair amount about smart meters prior to installation said that they knew how to switch between the money and energy usage displays on their IHD compared to 49% of those who had never heard of smart meters. Those with

prior knowledge about smart meters were more likely than those without to say their smart meter had encouraged them to try and reduce their energy usage at home (47% with prior knowledge who had tried compared to 33% of all who had tried) and to say their smart meter had helped them to know what used the most electricity in their home (41% with prior knowledge who thought they knew what used the most compared to 24% of all who thought they knew this).

Evidence from the in-depth interviews suggested that customer expectations of smart meters and IHDs play a clear role in their willingness to engage. Few respondents had clear expectations about smart meters prior to installation. A lack of information prior to the visit was, in some cases, associated with scepticism about the benefits of having a smart meter. This scepticism was in turn identified as a barrier to plugging in the IHD, or continuing to use it after an initial period of observation and / or learning.

7.1.3 Pre-installation information

The research suggests that it is important that sufficient information is provided about the installation; smart meter; and IHD. Whilst the receipt of information advising what would happen during the installation was not found to be an important factor in driving behaviours in the KDA, the in-depth interviews suggested there was potential to improve the value of this communication. Indeed, although this interaction was not found to be influential in the KDA this should not be interpreted as it being *unable* to influence the desired outcomes, but rather that the current design of the pre-installation information did not appear to be maximising this. It is possible that a change to the form, quality or timing of this may result in a greater influence on subsequent energy-related attitudes and behaviours.

Some in-depth interview respondents expressed a desire for further information between booking and the installation appointment. Further information at this stage might help respondents to know what to expect, to anticipate questions they might have for the installer during the demonstration, and so to get more from this aspect of installation.

A few respondents said they had not been aware, when they agreed to have a smart meter, that they would also receive an IHD. They felt that knowing more about this could have helped them to engage with the IHD when it came.

Moreover, whilst a majority of survey respondents (four in five – see section 3.3.3) received some form of information before the installation took place, some did not receive – or at least did not recall receiving – any information. Given that some customers (in the in-depth interviews) reported that more information pre-installation might have helped them to get more from the installation experience, ensuring that customers have information in advance could be helpful in enhancing the roll-out experience. This in turn may help to ensure that customers not only plug-in their IHD, but continue to use it past the first few days or weeks.

7.2 Installation

7.2.1 Satisfaction with smart meter installation

The research suggests that it will be important to ensure that the basics of the installation process meet customer expectations.

The KDA analysis found that levels of satisfaction with the different elements of the installation itself (arriving on time, completing the process without any major difficulties, providing explanations, etc.) were strongly correlated with overall levels of satisfaction with installation. As such, problems with these more practical basics could have a significant potential to lower overall levels of satisfaction if not done properly.

7.2.1 Consistency, quality and accessibility in installer explanations of the IHD

Further steps could be taken to ensure that the installer explanations are of a consistently high quality and are accessible for all.

Information given by installers at the point of installation appeared heavily formative, for some smart meter recipients in the in-depth interviews, of their subsequent ability and propensity to use the IHD. The KDA findings also suggest that satisfaction with information and explanations provided by the installer were important factors, relative to other parts of the consumer journey, in helping customers to understand how to use the IHD. Ensuring that the installer explanations are of a consistently high quality and are accessible for all may help to maximise their impact and reduce the observed variation in understanding of the IHD amongst specific groups of smart meter customers. Whilst being exploratory analysis requiring further research to substantiate and understand the results, the KDA findings suggested, that satisfaction with installers' explanations may be of greater importance for older and lower income customers.

7.2.2 Tailoring explanations for different audiences

Ensuring that demonstrations are tailored and appropriate to the customers involved appeared to be vital in maximising their effectiveness. Analysis of the in-depth interviews highlighted variation in the form and content of installer explanations, and variation in the extent to which installer explanations were understood by different groups. This variation suggests an opportunity to maximise the value of installer demonstrations by ensuring that they are appropriate to the audience, tailored to achieve the best outcomes, and of a consistently high quality.

In the survey, older households with lower incomes were more likely than smart meter customers overall to state that the IHD was difficult to use or understand. The same was true of those with no formal qualifications. In the in-depth interviews, some respondents aged 65 and over said that they had been unable to take in information about the IHD on the day of installation.

These findings suggest that specific groups may need further support to help them to get the most out of their IHDs. In-depth interview respondents expressed varying preferences as to how they would like this information to be delivered, including through face-to-face or telephone follow-up, or as supporting written information. This suggests that a multi-channel approach or a choice of further support may be most successful.

There may also be opportunities to continue to improve the guidance given to installers on how to explain the IHD to householders, in order to ensure explanations themselves are as effective as possible for all groups. Many respondents in the in-depth interviews reported being satisfied with the information given by the installer.

There were a few reports, however, of installer explanations of the IHD which respondents considered too short, inadequate, or poorly delivered.

7.2.3 Highlighting and understanding high 'base loads'

Installation visits may present an opportunity for installers to identify high-using households, and to help them in managing and understanding their energy use in conjunction with ongoing use of the IHD.

The in-depth interviews highlighted that installation visits may be an opportunity for installers to identify high-using households, to help these households understand why their energy use or base load is high, and to set achievable goals, to be supported by ongoing use of the IHD. During these interviews some customers reported confusion or dismay over IHDs that were usually amber or even red, and they expressed a desire for green to be an 'achievable' goal.

7.2.4 Receipt of energy efficiency related advice

There may be scope to increase the provision of energy efficiency related advice during installation (see section 3.3). Firstly, although only a minority of smart meter customers surveyed received more general energy-related advice from the installer, satisfaction with this energy-related information and advice was high, Secondly, whilst a majority of customers surveyed who had not received this information said that they would not have been interested in receiving it, the in-depth interviews revealed that few would have expressed any resistance to receiving such advice during the installation. As such, there could be an opportunity to at least offer this advice at the point of installation, perhaps forewarning customers of this in advanced communication to ensure they have the time set-aside should they wish to have a discussion with the installer.

7.2.5 Managing the provision of information

Whilst the provision of information matters, it is important to consider the need to avoid 'overloading' smart meter recipients with information at the point of installation. Avoiding this 'overload' may be easier to do if smart meter recipients are expecting to be given a run-through of the IHD (see section 6.1.3) or of more general energy-related advice. Many in the in-depth interviews reported that such explanations came as a surprise to customers.

7.3 Post-installation

The post-installation customer journey presents some opportunities to further maximise the impact of installing a smart meter, and there are some specific implications in relation to the provision of information and follow-up contact that could help to boost that impact.

7.3.1 Follow-up

Follow-up contact by energy suppliers, post installation, may help encourage more extensive and effective use of the IHD. Respondents seldom recalled receiving any follow-up from their energy supplier, with the exception of a few who had received a call to check that the installation had taken place.

Interviewers observed a great deal of variation in the extent to which households were making use of their IHD. Some respondents reported that they did not feel they were making best use of their IHD, and in other cases, while the respondent was

less interested in further engaging with the device, interviewers could see clear opportunities for them to make use of the device, in ways that would be helpful to them. Follow-up contact from energy suppliers seemed, to the researchers, to be a straightforward way to maximise benefits from smart metering for those who wanted, or could be observed to need, further help in using their IHD.

Some respondents suggested that the following types of support in the first week, or few weeks following installation could be useful to them:

- Someone coming round from the supplier to give a demonstration of the IHD, once it had collected some data;
- A follow-up call from the supplier to allow emerging queries to be answered; or
- Personalised energy saving advice (preferably based on energy use data gathered so far).

Respondents who felt unable to make changes sometimes found the IHD stressful, and may again benefit from personalised advice to help them understand and reduce their energy use. The researchers believe that these issues may be addressed follow-up contact after installation. Salient advice for these individuals would include suggestions on how to reduce energy used when performing essential tasks, such as washing clothes or showering, and how to use the IHD to support such changes.

It is also the researchers' view that those not present at installation, particularly if they are the 'bill guardian' of the household, would benefit from follow-up contact from the supplier. This would help ensure they receive an effective explanation of the smart meter and IHD, and would give them an opportunity to ask questions about both devices, rather than relying on the explanations of other householders, or written information.

7.3.2 Receiving additional personalised information based on smart meter data

The provision of personalised information from suppliers, based on smart meter data, might be useful in helping customers to manage energy use. If personalised information of this kind is already being provided by suppliers, this information could be better highlighted, as few respondents recalled seeing this. If it is not being provided, suitably accessible information of this kind may be of help and of interest to respondents.

Respondents were interested in the idea of personalised information from energy suppliers based on smart meter data. They were particularly interested in relevant comparisons of their own energy use with that of others, and suggestions for the most appropriate tariffs.

Though respondents were particularly interested in comparisons, many pointed out that these needed to be fair comparisons. This was the case for comparisons of their own energy use, month by month or year on year, which would need to be clearly adjusted for seasonality or other factors, such as the harshness of the winter in that year, in order to be credible to smart meter recipients. Similarly, comparisons to other households would need to be clear about the validity of the comparison, including reference to energy saving measures such as double-glazing and loft insulation, and the size of the household.

Respondents expressed a mixture of views on the formats and channels through which they would prefer to receive additional information for energy suppliers. This seemed to be largely down to personal preference, including interest in and access to new technologies and overall degree of technically mindedness, particularly in the case of interest in receiving information by smart phone.

One or two respondents also mentioned the importance of viewing the information they receive through their smart meters in the wider context. Smart meters were seen to be just being one part of the puzzle in terms of effecting large scale behaviour change, with media reporting, government communications and school education all having a part to play.

7.4 Engagement with the IHD

7.4.1 Increasing understanding of how to use the IHD

The in-depth interviews suggested that installers need to ensure that all respondents are walked through a few simple interactions with the display. If customers can be shown that flicking through some of the information features is relatively easy they may be more likely to look at the information provided through it after the installation visit.

7.4.2 Encouraging further use of the IHD

Encouraging even basic use of the IHD could be important in not only encouraging long-term use of the device, but also in encouraging longer term energy behaviours. Analysis of the in-depth interviews emphasised the potential importance of the installer in this role and the potential benefits of promoting a ‘monitoring approach’ to using the IHD (see section 4.3 for a more detailed discussion of this). Further analysis of the survey results supports the in-depth interview findings: those customers who use the monitoring functions on their IHD tend to look at it more frequently than those who simply use it to gather information.

7.4.3 Encouraging a ‘monitoring’ approach in smart meter customers

Installer explanations could place more emphasis on the usefulness of the IHD for monitoring purposes, in addition to explaining its use as a learning tool through which recipients can come to understand what appliances in their household use. The in-depth interviews suggested that promotion of a ‘monitoring’ approach to the IHD (in which the IHD is used for ‘monitoring’ e.g. comparing usage to previous months or keeping an eye on energy use day-to-day, rather than just to find out what appliances use what energy), including by installers, may further encourage ongoing use of the device.

Many respondents in the in-depth interviews said the installer explanation and demonstration had focused on what they could learn about household appliances from the IHD rather than how it could be used in the longer term. Suggestions about how the IHD might be used on a longer-term basis were noticeably absent from many respondents’ accounts of information given by the installer. Where this type of explanation was given, respondents found it helpful.

While information-driven learning may be very helpful to smart meter recipients, and could lead to long-term behaviour change, promotion of a ‘monitoring’ approach to the IHD may encourage ongoing use of the device, and further benefit because of this.

7.5 Suggested improvements to the IHD

IHD features will clearly vary depending upon supplier, and what is desirable will vary from customer to customer. It should also be noted that the IHD's owned by smart meter customers participating in this research will be different to the IHD's being rolled out now, and in the future[101]. Some respondents reported that the overall design of the IHD restricted its interest or usefulness to them. Some said they felt the display was unattractive, unengaging or difficult to read. This was the case for some elderly respondents, as well as for some technically minded respondents, who were used to interacting with more engaging displays.

Respondents' suggestions for improvements to the IHD included: a clearer, more up-to-date and engaging display; an IHD which could be wall mounted, rather than sitting on a stand; more or different data on the IHD, including the ability to compare usage over different periods, to forecast usage and bills more easily, or select the best energy tariffs for them.

Several, particularly those for whom the IHD was frequently amber or red, expressed a desire to understand from the IHD what different appliances were using. It is the researchers' view that such information might help them to 'unpick' their high base load and perhaps troubleshoot appliances that were using a great deal of energy.

7.6 Maximising the impacts of smart metering for more vulnerable customers

Older smart meter customers, those from lower social grades and those with the lowest total annual household incomes (below £16,000) were less likely to say in the survey that they knew about smart meters in advance of being contacted by their supplier about having one installed. As discussed in section 7.1, the research suggests it would be beneficial to raise awareness among these groups of consumers given the potential influence of prior knowledge and expectations on engagement with the IHD and subsequent changes in energy-related attitudes and behaviour.

While these more vulnerable groups were just as likely as smart meter customers overall to be satisfied with their smart meter, they were less satisfied with particular aspects of the installation visit – specifically the provision of information about how to use the IHD. These groups were also more likely to say they do not find the IHD easy to use, that they do not know how to use various functions on the display and that they unplugged their IHD as they did not understand how to use it. In the in-depth interviews, some respondents aged 65 and over said that they had been unable to take in information about the IHD on the day of installation. This highlights the importance of ensuring information is appropriately targeted and delivered to different groups of customers. For more vulnerable groups, it may be necessary to spend an extended amount of face-to-face time with the customer to help explain and work through the IHD as written information may be assumed to be too complicated and not read after the installation event. It is vulnerable groups in

[101] The IHD's being rolled-out now, and in the future, are SMETs compliant. This means they meet a series of technical specifications required by DECC. However, these types of display were not available to customers during the early roll-out phase and so would not have been used by the smart meter customers involved in this research.

particular who may benefit from a follow-up call or home visit to check they are continuing to understand how to use the IHD and how the information can be of benefit to them.

Some respondents in the in-depth interviews who may be considered vulnerable on the basis of their age, income or health status, felt unable to make changes to their energy use. As a result, these respondents sometimes found the IHD stressful as they felt it highlighted their usage but not the steps they could take to address this. These groups may benefit from personalised advice to help them understand and reduce their energy use. The researchers believe that these issues may be best addressed through follow-up contact after installation to avoid an information ‘overload’ on the day of the visit. Salient advice for these individuals would include suggestions on how to reduce energy used when performing essential tasks, such as washing clothes or showering, and how to use the IHD to support such changes.

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