

Opportunities for Communities Through Energy Storage (OCTES)

Final Project Report – Energy Saving Trust
Final report

March 2013

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1. Executive Summary

Over the course of 2011/12 and 2012/13 the Energy Saving Trust, with funding from the Northern Periphery Programme (NPP) and from the Scottish Government, developed and delivered the Smart Metering Advice Project (SMAP). This project was part of the wider [OCTES](#) project, and aimed to:

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- Develop the tools and personalised advice provided by the Energy Saving Trust so that it can take best advantage of smart meter data to provide advice to deliver energy related behaviour change.
- Explore the extent to which these enhanced energy saving advice services, linked to smart meter data, can deliver local and national carbon and energy saving, and protect vulnerable people from fuel poverty.

In total 33 households (16 heated electrically, 11 heated by gas, and 6 heated by oil), in Dumfries and Galloway and the Highlands and Islands had smart metering equipment installed in their homes. They were given access to the data from their smart metering equipment via a new web-tool, and were also given access to specialist, tailored energy saving advice and support from their local Energy Saving Scotland advice centre (ESSac).

Key findings include:

- The project demonstrates the technical viability of integrating live metering data with the Energy Saving Trusts' existing programme of national government-funded energy saving advice.
- The majority of users reported finding the new advice service helpful and appeared to value this, and given the wider context of the roll out of smart metering from 2014, the pilot project therefore points the way towards the future of energy saving advice in Scotland.
- Due to the relatively short period of time that the householders had access to the SMAP web tool our findings at this stage are indicative rather than conclusive. However, the evaluation results show that some householders have reported an increase in the frequency with which they perform specific energy saving behaviours as a result of being involved in the project
- In addition, the project has already seen evidence of significant savings through the provision of this type of advice. For example, one participant in the project claimed as a result of the having access to oil consumption data (via the web tool) to have "discovered night usage of oil" and had since "reset the [heating control] timer [to now] save fuel", and was able to reduce their weekly oil usage by 42% as a result.

The Energy Saving Trust is seeking funding from the Scottish Government to continue with the pilot project, in particular enabling a longer term evaluation of the behaviour change and energy savings stimulated by the project.

2. Introduction

Smart meters are the next generation of utility meters, and under the UK smart meter roll-out gas and electricity meters will be offered to every home in England, Wales and Scotland by 2019 and to all homes in Northern Ireland by 2020.

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Smart meters collect information about energy use in the home electronically without the need for meter readings, and when accompanied by an in-home display unit will let householders see how much energy is being used in their home in real time. However, this increased level of information about their household energy use will only be useful to householders if they understand what this means, how to use it and can adapt their behaviours as a result. In this context accessible real energy use data should be a powerful tool for home energy saving advice: with it, it should be much easier to advise householders on how to save energy, whether that involves:

- Householders taking behavioural steps to save energy
- Householders installing new energy saving measures
- Householders gaining maximum benefit from previously installed energy saving measures

Against this background the Energy Saving Trust, with funding from the Northern Periphery Programme (NPP) and from the Scottish Government, developed and delivered the Smart Metering Advice Project (SMAP). This project was part of the wider [OCTES](#) project and aimed to:

- **Develop the tools and personalised advice provided by the Energy Saving Trust so that it can take best advantage of smart meter data to provide advice to deliver energy related behaviour change.**
- **Explore the extent to which these enhanced energy saving advice services, linked to smart meter data, can deliver local and national carbon and energy saving, and protect vulnerable people from fuel poverty.**

Smart meters for oil will not form part of the national smart meter roll out. However, oil is a widely used heating fuel in rural Scotland. The SMAP project therefore also developed a smart metering advice solution that would cover electricity, gas and oil heated homes. Oil is a comparatively expensive fuel and it is important that this group of householders are not shut out from energy saving advice.

The project began towards the end of the 2011/12 financial year and ran until March 2013.

3. Methodology

To deliver these objectives the following activities were undertaken:

- Development of a new web-tool to help people manage their real energy use, based on information from smart metering equipment in their home
- Install smart metering equipment in homes
- Piloting the web-tool (note: this necessitated installing smart metering equipment in homes)
- Development of advice content:
 - Energy Saving Trust web content on smart metering was improved and updated
 - Development and delivery of training package for Energy Saving Scotland advice centre advisors
- Provision of proactive and reactive advice to project participants
- Evaluate the outcomes of the project in terms of energy bill and carbon savings

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These activities and the methodology involved in delivering them are discussed in more detail below.

3.1 Development of a new web-tool

The Energy Saving Trust commissioned the development of a new web-tool (the SMAP web tool) that would build on the Energy Saving Trust's existing advice tool –the Home Energy Check (HEC). The [HEC](#) is an interactive online tool that lets people find out about which energy-saving improvements suit their homes. It asks a series of questions about the home's physical characteristics and the energy saving measures that have been installed. It allows householders to:

- enter as much or as little information about their home as they have available (from 10-50 questions)
- prioritise whether they want to save energy, money or carbon, and allows them to specify how much they have to spend

Using this information the software that sits behind the HEC¹ estimates home energy use and produces packages of recommended measures for improving a home and saving energy. The HEC does not measure actual energy use - in calculating energy use and energy savings, the HEC makes assumptions about:

¹ The HEC is based on SAP 2009 methodology

- Occupancy – the number of people in the home (assumes standard SAP occupancy)
- Appliance use
- Heating patterns

However, real energy use can vary significantly between homes with the same physical characteristics, as a result of householder behaviour. The HEC only recommends physical improvements (e.g. installing insulation), not behavioural changes (e.g. not overfilling the kettle).

The SMAP web tool was therefore commissioned to:

- Enable the HEC results and recommendations to be adjusted based on real energy use, occupancy and heating patterns
- Provide recommendations for measures and for behavioural changes
- Develop a reporting function to present daily, weekly and yearly energy use²

It provides householders with the following:

- **A home page**, which is the first page that householders see when they access the tool. It provides introductory information about the project and is where the householder can log on to the tool.
- **My usage**. These pages provide the householder with details of how much energy they have consumed over a given period (day, week, and month). It allows them to see which times of the day or which days of the week they are consuming the largest amounts of energy. It also alerts them to any interesting observations about their energy use. Information can be displayed by fuel and in terms of kWh or £.
- **Records**. Provides details of consumptions totals in terms of when households have used the most fuel since the metering equipment was installed. Information is displayed by day, week and month. Separate tabs are provided for each fuel type.
- **My Energy Saving Plan**. Provides a personalised energy saving plan for the householder which includes:
 - A list of recommended measures
 - Details of costs and savings (in kWh and £)
 - Recommendations for behaviour change and associated savings

It also allows the householder to model a series of energy saving and behavioural measures against their home to see how much energy and money they could potentially save. In

² Note: readings are delayed by one day (24hrs). This means that when a householder logs onto the tool the most recent data they are able to see is from the day before.

addition, the savings plan also includes a graph which shows actual recent consumption alongside a prediction of what it may have looked like had the recommended measures already been in place and operational.

Screen grabs for each of the web tool's main sections can be found in Annex 1.

In order to generate advice for householders the SMAP tool relies on two sources of information:

- The data from the smart metering equipment which feeds into the web-tool from the metering equipment installed in homes
- Information about the household and the house which needs to be manually entered into the web-tool during the user set up process.

3.2 Piloting the tool by installing smart metering equipment in homes

Recruiting householders and installing smart metering equipment

Recruiting householders

The Northern Periphery Programme (NPP), through which this project was part-funded, covers two areas of Scotland – 1) Dumfries and Galloway and 2) Highlands and Islands, and as such these were the areas where the recruitment of householders to take part in SMAP was undertaken.

Recruitment criteria, together with a set of 'frequently asked questions' and associated answers (FAQs) were developed centrally by the Energy Saving Trust. A copy of the FAQs can be found in Annex 2, the key criteria are detailed in box 1 below, and the full list of criteria can be found in Annex 3. In addition, some budget was allocated to offer households a £20 voucher and be entered into a free prize draw giving them the chance to win a further £200 voucher as an incentive to take part. And participants were advised that they would have access to the web tool for 2 years.

It is important to note that whilst households that had already installed a renewable energy system were originally recruited to take part in the project (as per the selection criteria), their participation was subsequently ruled out³. While the metering equipment used in this project could have been programmed to measure electricity export, no generation meters were installed in this project. It is important to measure both generation and export to understand what self-generated electricity is actually being used in the home. Some households (particularly those with PV) may already have had a generation meter installed. However, accessing this data would have required householders to read their generation meters and enter the data into the tool on a daily basis, and our experience from previous projects suggests that households are unlikely to do this on a consistent basis over the longer term.

³ with the exception of heat pumps as these use electricity as opposed to generate it.

- Ideally half of the meters will be installed in the Highlands and Islands and half in Dumfries and Galloway.
- Meters will be installed in **41 owner occupied properties** as follows:
 - 5 oil heated homes (oil and electricity meters will be installed)
 - 10 gas heated homes (gas and electricity meters will be installed)
 - 26 electrically heated homes (electricity meters will be installed)
- As far as possible, participants will be selected to include a range of people in different circumstances and different houses, including those in the following categories:
 - Fuel poor/non fuel poor
 - Urban/rural
 - Older, harder to heat properties
 - People who have already installed a heat pump but may not be using it correctly

Box 1: Key recruitment criteria

The Energy Saving Trust was able to use two of the existing Energy Saving Scotland advice centres (ESSacs)⁴ – the South West Scotland ESSac (which covers Dumfries and Galloway) and the Highlands and Islands ESSac, to recruit households to take part in the project. Using the key criteria and the set of FAQs as a starting point each advice centre developed a recruitment plan based on its experience and expertise of their local areas. A template recruitment letter for the ESSacs to use was developed centrally (a copy can be found in Annex 4).

The recruitment methodology used by each ESSac was as follows:

⁴ The Energy Saving Scotland advice centre network is a network of five advice centres across Scotland, and provides a “one stop shop” for people wanting to save energy, money and carbon. It acts as single point of contact for advice and support for energy efficiency, fuel poverty, sustainable transport and small scale renewables. The network is funded by the Scottish Government and managed on their behalf by the Energy Saving Trust. The network operates on a large scale, with more than 150,000 customers each year;

Highlands and Islands ESSac

The methodology used by the Highlands and Islands ESSac is summarised below:

- Letters and phone calls to all Home Renewables visit⁵ customers within specific geographic cluster⁶.

Communication with all community groups and business contacts within specific geographic clusters⁷. Each community group and each business then spoke to their members and posted through their newsletters to their extended network. Some of the largest employers in the area (NHD, Lifescan, SNH, HIE etc) posted details of the project on their extranet sites.

- Community groups contacted by the ESSac were as follows:
 - Muir of Ord Community Group
 - Transition Black Isle
 - Badenoch and Strathspey Community Group
 - Highland Environmental Network (HEN)
 - Ullapool Community Trust
 - Alness Transition Town

In addition the ESSacs outreach officer covering Orkney asked a community contact to recruit locally and also promoted the project at the Green Homes Open Day event in Orkney

- Online marketing via Changeworks⁸ and ESSac social media

South West Scotland ESSac

Recruitment was undertaken primarily via a mail out to 225 households that fitted the recruitment criteria, and were identified from the ESSacs existing customer database. In order to ensure that installation costs could be kept to a minimum the ESSac aimed to recruitment householders that were located geographically close to each other. 24 households responded saying that they were interested in taking part. However, not all fulfilled the necessary recruitment criteria. The recruitment letters were then followed up by telephone calls in an attempt to boost the number of homes taking part. This resulted in an additional 4 households registering their interest in taking part.

Recruitment of participants began in June 2013.

⁵ The Energy Saving Scotland home renewables advice service offers home visits across the whole of Scotland (including the islands) from a specialist renewables advisor. The service is delivered through the ESSac network and assists householders looking for in-depth, impartial advice and information on renewable technologies – both heat and electricity generating - to suit their circumstances and properties.

⁶ IV and PH postal addresses

⁷ Groups within the locality of Inverness – the ESSac went as far out as Ullapool and Alness (who didn't end up taking part) and down to Grantown on Spey. (apart from Orkney).

⁸ Changeworks is the organisation that manages the Highlands and Islands ESSac

The metering equipment and its installation

Metering equipment was installed in all participating properties between 8th October 2012 and 16th January 2013. As far as possible installation was geographically co-ordinated to ensure costs were kept as low as possible. Properties were fitted with smart metering equipment as follows:

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- **Electrically heated homes**
 - A smart electricity meter
 - A local data concentrator (LDC) – a communications device which securely sends the data from the smart meter to the company providing the smart metering equipment (who in turn send it to the Energy Saving Trust)

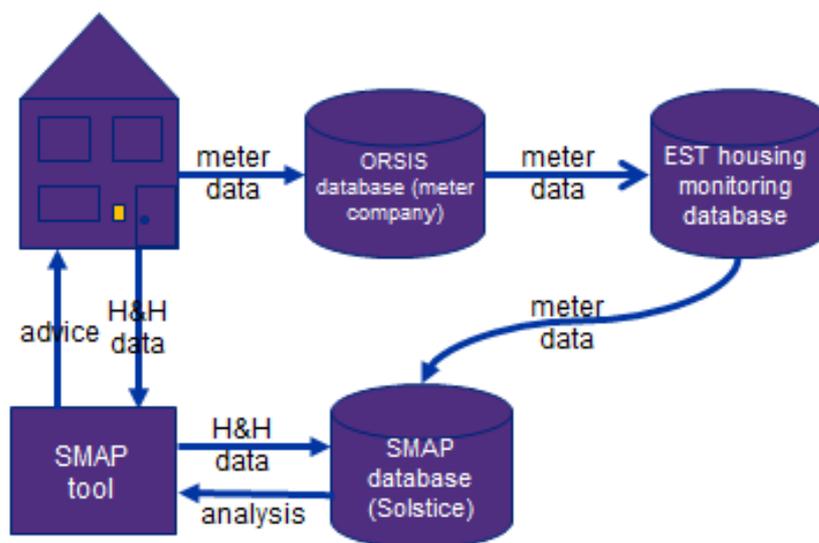
- **Gas heated homes**
 - A smart electricity meter
 - A pulse enabled gas meter (if not already present at the property) to replace the existing gas meter
 - A logger – to send information from the gas meter to the LDC
 - An LDC

- **Oil heated homes**
 - A smart electricity meter
 - A pulse enabled oil meter
 - A logger
 - An LDC
 - A box to protect the logger from the weather

For electrically heated homes all the equipment was installed in one visit. However, for gas and oil heated homes two visits were required.

The transfer of household energy data from the metering equipment to the new web-tool

Figure 1 below shows the data flows from the metering equipment to the web-tool.



H&H data: data supplied by the householder about the home (construction, installed measures etc) and household (number of occupants etc)



Diagram 1: Data flows

As can be seen in diagram 1, the metering data on actual energy use (gas/electricity/oil) from the smart metering equipment is securely sent to the company providing the smart metering equipment.

The data is then supplied to the Energy Saving Trust’s housing monitoring database. This is a powerful database that allows research and analysis of metering data from real life energy monitoring projects that EST has delivered. For the purposes of providing the advice through the SMAP tool the metering data is transferred to a separate SMAP database underpinning the web tool.

Contextual information about the home and householders was provided by the householder into the SMAP tool and this data is analysed alongside the metering data in the SMAP database.

3.3 Development of advice content

The Energy Saving Trust’s two main existing channels of advice and information provision to householders in Scotland are through:

- its website (see: <http://www.energysavingtrust.org.uk/scotland>)
- its ESSacs and the phone advice they provide (via the 0800 512 012 number)

Advice and information provision through both these channels was developed, and where it already existed, improved. Specifically:

Smart metering web content improved and updated

The existing householder facing web content on the Energy Saving Trust's website on smart metering was substantially improved and updated, and can be found at: Page | 12

<http://www.energysavingtrust.org.uk/Electricity/Smart-meters>

The site now includes the following content:

- What are smart meters?
- Why is the government recommending smart meters?
- When will I get a smart meter?
- How will my smart meter be installed?
- What if I already have a smart meter?
- How can a smart meter help me save energy?
- Are there any risks?
- Will smart meters affect Feed-in Tariffs?
- Making the most of your smart meter

Development and delivery of training package for ESSac advisors

A smart metering training package for ESSac advisors was developed centrally by the Energy Saving Trust. It provided:

- An introduction to smart metering
- An introduction to the OCTES and the Smart Metering Advice Project
- A detailed description of the SMAP web-tool and how to use it
- Consideration of possible scenarios of the types of advice the advisors might be able to give based on householder's actual energy use
- A detailed run through of the project process

Two training sessions were delivered in September 2012– one for each ESSac. Each training session was delivered by an Energy Saving Trust in-house smart metering expert, and took half a day to deliver.

3.4 Provision of proactive and reactive advice to project participants

As noted above the SW ESSac and the H&I ESSac were responsible for recruiting householders to take part in this project. They were also responsible for supporting participating householders and providing both proactive and reactive advice throughout the project. They:

- Maintained communication with householders throughout the project, including keeping them up to date with project progress and next steps.
- Set householders up on the web-tool, which included entering details about the house and the householder's heating patterns. Depending on the householders personal situation this was either done over the phone or during a home visit.
- Ran through an initial evaluation questionnaire with householders in order to establish baseline information. These questionnaires were completed during the phone calls/visits referenced in the above bullet point.
- Provided follow up support to householders – calling them for a second or third time – once they had had a chance to use the tool and familiarise themselves with it to check how they were finding it and if they had any questions.
- Provided reactive support throughout the project, answering questions about the advice provided and data shown and liaising with the Energy Saving Trust in order to ensure that any technical issues/data anomalies were promptly addressed.

4. Results

In total 33 households took part in the project – 16 from D&G and 17 from H&I. Table 1 below provides a breakdown by area and heating fuel type.

	Electricity	Gas	Oil	Total
D&G	8	5	3	16
H&I	8	6	3	17
	16	11	6	33

Table 1: Number of households taking part in the project

It proved considerably harder and required considerably more resource than originally envisaged to recruit householders to take part in the project. As a result the number of households recruited was slightly lower than originally envisaged (the original plan was to recruit 41 participants) and the recruitment process took longer than originally envisaged – which resulted in an extension of the original installation timetable – with final installations taking place during w/c 14th January. This also resulted in the proportion of homes heated by each fuel type was also slightly different than originally envisaged – with a larger proportion of oil and gas heated homes and a smaller proportion of electrically heated homes taking part in the project.

Due to the difficulties experienced with recruitment it was decided that, the project evaluation should also explore the reasons why householders did not want to take part. This could provide useful lessons for future smart metering programmes, and indeed the wider smart metering roll out.

All 33 participants received two telephone calls from an advisor and 3 of these participants (all in the D&G area) also received one home visit and a third phone call. No face to face visits were set up in the H&I area. This was because none of the participants in this area required this level of support. One householder suggested that a visit might be useful but later they contacted the advice centre to say that they'd had no trouble accessing and using the tool so a visit would not be necessary.

4.1 Analysis of energy consumption of households

33 properties in total had monitoring equipment installed in their homes recording energy consumption from as early as 11th October 2012. After the 29th January 2013 each of the householders was given access to the SMAP online tool to allow them to each monitor their household energy usage. As part of analysis we have tried, where there is sufficient data, to identify whether any households showed a significant reduction in their weekly energy consumption after they were able to monitor their energy usage.

Only two households showed a statistically significant reduction in their electricity consumption, one an oil heated property and the other an electrically heated property. The reduction in the latter household who had a meter for their night rate and day rate electricity usage saw a reduction in their day rate usage only. Most of the meters showed a decrease in energy consumption (19 out of 33 monitored sources with adequate data), however the reduction was not statistically significant.

Some of the households showed an increase in energy consumption however none showed a statistically significant increase.⁹

The participant in the oil heated property that saw a significant reduction in average weekly oil usage from 772 kWh / wk to 442 kWh / wk. Equivalent to a 42% reduction. In response to our follow up survey the respondent claimed through the monitoring to have “discovered night usage of oil” and had since “reset the [heating control] timer [to now] save fuel” – Previously the respondent did not turn their heating off when they were out, but instead kept their home at a constant temperature of 15 degrees. The respondent overall spoke very positively about all facets of the SMAP project, and reported no difficulty with using the web tool. They also reported undertaking more electricity saving behaviours such as turning lights off and switching appliances off standby more frequently and had installed wall and loft insulation.

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Data quality issues

The smart metering equipment was installed at different times across the various properties which means that different quantities of energy usage data for each property. Furthermore technical issues associated with the transfer of data to the Energy Saving Trusts housing monitoring database meant that, at the time of this analysis, not all of the data available was complete¹⁰. For two meters we were able to collect a maximum of 20 weeks of full energy data for two we were only able to collect 5 weeks of data. In this analysis we have only included meter readings where 11 or more weeks’ worth of data was available.

As households were only given access to the SMAP online tool after the 29th of January, and analysis of the data took place from the 1st of March, it was only possible to collect 4 weeks’ worth of energy data during the period that households had access to the SMAP tool.

Results

Presented in Appendix 5 are the changes in the weekly consumption of electricity, oil and gas for homes with, electric, non-electric gas and oil heating. For each home the estimated EPC rating of the property is given plus the property’s floor area. This is to give an indication for comparison between properties of their anticipated energy use. The EPC score is based on a property’s overall anticipated energy use per square meter – hence properties with lower EPC ratings (closer to G) and larger floor areas are expected to use more energy than properties with smaller floor areas and higher EPC ratings (closer to A), Properties 28 to 33 have not been included in this analysis owing to the late installation of meters, which meant that insufficient data on energy usage was gathered to warrant any analysis.

⁹ Significance was determined using a two tailed T test at a 99% confidence level.

¹⁰ The data does, however exist and has been stored. The issues relate to the data transferred to the Energy Saving Trust’s housing monitoring database and not the data collected from the households by the metering equipment.

Change in electricity consumption for non-electrically heated homes:

	EPC Band	Floor area (sqm)	Average Weekly Electricity Use (kWh / wk)	Average Weekly Electricity Use Before Monitoring (kWh / wk)	Average Weekly Electricity Use After Monitoring (kWh / wk)	Change
SMAP01	E	122	139	155	91	Significant Decrease
SMAP02	E	47	46	44	50	Non significant increase
SMAP03	D	103	46	44	50	Non significant increase
SMAP04	E	120	109	108	113	Non significant increase
SMAP05	D	75	190	198	175	Non significant decrease
SMAP07	F	122	482	491	454	Non Significant Decrease
SMAP08	E	200	203	206	199	Non significant decrease
SMAP09	C	110	111	114	105	Non significant decrease
SMAP12	D	122	74	75	72	Non significant decrease
SMAP13	D	103	45	45	46	Non significant decrease
SMAP14	C	170	114	118	101	Non significant decrease
SMAP16	D	122	126	134	104	Non significant decrease
SMAP17	C	164	77	78	74	Non significant decrease
SMAP20	D	120	586	604	535	Non significant decrease
SMAP22	E	42	540	564	599	Non Significant Increase
SMAP23	E	103	498	504	486	Non Significant Decrease
SMAP24	D	160	73	77	64	Non significant decrease
SMAP27	D	167	173	165	178	Non Significant Increase

Change in electricity consumption for electrically heated homes:

	EPC Band	Floor area (sqm)	Average Weekly Electricity Use (kWh / wk)	Average Weekly Electricity Use Before Monitoring (kWh / wk)	Average Weekly Electricity Use After Monitoring (kWh / wk)	Change
SMAP06	F	122	458	476	464	Non significant decrease
SMAP10	E	103	469	503	506	Non Significant Increase
SMAP11	F	170	561	564	552	Non Significant Decrease
SMAP15 (night rate usage)	E	90	287	289	280	Non significant decrease
SMAP15 (day rate usage)	E	90	65	75	39	Significant decrease
SMAP18	E	70	285	298	254	Non Significant Decrease
SMAP19	E	150	285	298	254	Non Significant Decrease
SMAP25	E	106	581	567	612	Non Significant Increase
SMAP26	E	106	373	373	374	Non Significant Increase

Change in gas consumption for gas heated homes:

	EPC Band	Floor area (sqm)	Average Weekly Gas Use (kWh / wk)	Average Weekly Gas Use Before Monitoring (kWh / wk)	Average Weekly Gas Use After Monitoring (kWh / wk)	Change
SMAP05	D	75	115	47	193	Non significant increase
SMAP08	E	200	474	497	510	Non significant increase
SMAP09	C	110	635	519	721	Not enough data
SMAP13	D	103	605	611	594	Not enough data
SMAP16	D	122	522	519	529	Non significant increase
SMAP17	C	164	716	720	704	Non significant decrease
SMAP20	D	120	109	108	113	Non significant increase
SMAP24	D	160	810	810	No Data	Not Applicable
SMAP27	D	167	Not enough data	Not enough data	Not enough data	Not enough data

Change in oil consumption for oil heated homes:

Oil Heated Properties	EPC Band	Floor area (sqm)	Average Weekly Oil Use (kWh / wk)	Average Weekly Oil Use Before Monitoring (kWh / wk)	Average Weekly Oil Use After Monitoring (kWh / wk)	Change
SMAP01	E	122	690	772	442	Significant Decrease
SMAP02	E	103	155	165	203	Non significant increase
SMAP03	D	103	Data missing	Data missing	Data missing	Not Applicable
SMAP07	E	49	Data missing	Data missing	Data missing	Not Applicable
SMAP12	D	122	404	410	388	Non significant decrease
SMAP14	C	170	416	419	391	Not enough data
SMAP23	E	103	Data missing	Data missing	Data missing	Not Applicable

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Energy consumption against temperature data

Given that on colder days a heating system will use more energy to heat a home to an adequate temperature than on warmer days, strictly speaking energy data for space and water heating should be normalised to account for changes in external temperature. In the graphs which can be found in Appendix 5, where available, local weekly heating degree data has been plotted against energy consumption. A heating degree day is the average number of degrees by which the external temperature is below a nominal temperature (in this case 15 degrees) at which it is deemed that space heating is required per day. As can be seen from examining these graphs there is a clear correlation between the change in degree days and space heating energy use. It is worth noting that there was no significant difference in the mean number of heating degree days per week either before or after householders were able to monitor their energy consumption.

4.2 SMAP Evaluation

The evaluation of the SMAP project involved two surveys of respondents:

- 1) The first survey was conducted prior to their 'active' participation in the project (i.e. before they had access to the web-tool and before they were provided with any advice related to their metered energy usage) and was conducted over the phone or by post. The aim of this survey was to gauge respondents' expectations of the project and to understand their current behaviour towards energy saving. A copy of this questionnaire can be found in Appendix 6.
- 2) The second survey was conducted at the end of February 2013 via an online survey. The aim of this survey was to understand how the project met their expectations and the extent to which it has made them think further about, and take actions in relation to, their energy use. A copy of this questionnaire can be found in Appendix 7.

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This section presents the findings of these two surveys.

Survey one

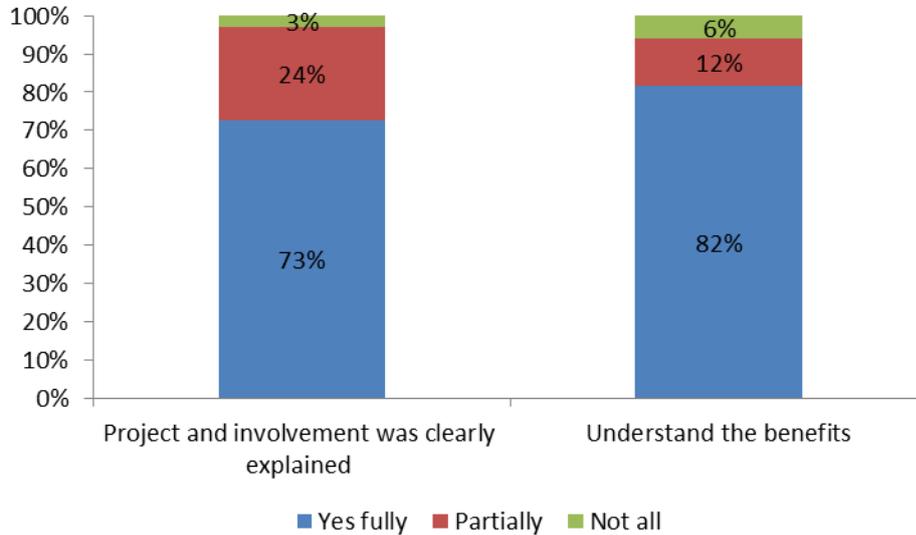
All 33 participants completed a questionnaire prior to their 'active' participation in the project. A number of background questions were asked to get an understanding of the type of people participating in the project:

- The majority of households had someone that was usually at home during week days (79%), during week nights (94%) and at weekends (94%)
- 45% of participants are retired
- 88% of participants owned their houses¹¹

Participants were asked whether they felt that the project had been clearly explained to them and whether they understood the potential benefits of having smart metering equipment installed:

¹¹ It is worthwhile noting that the intention was that all participants would be owner occupiers. Administrative errors meant that 4 people living in rented properties ended up taking part in the project.

Figure 1: Understanding of the project

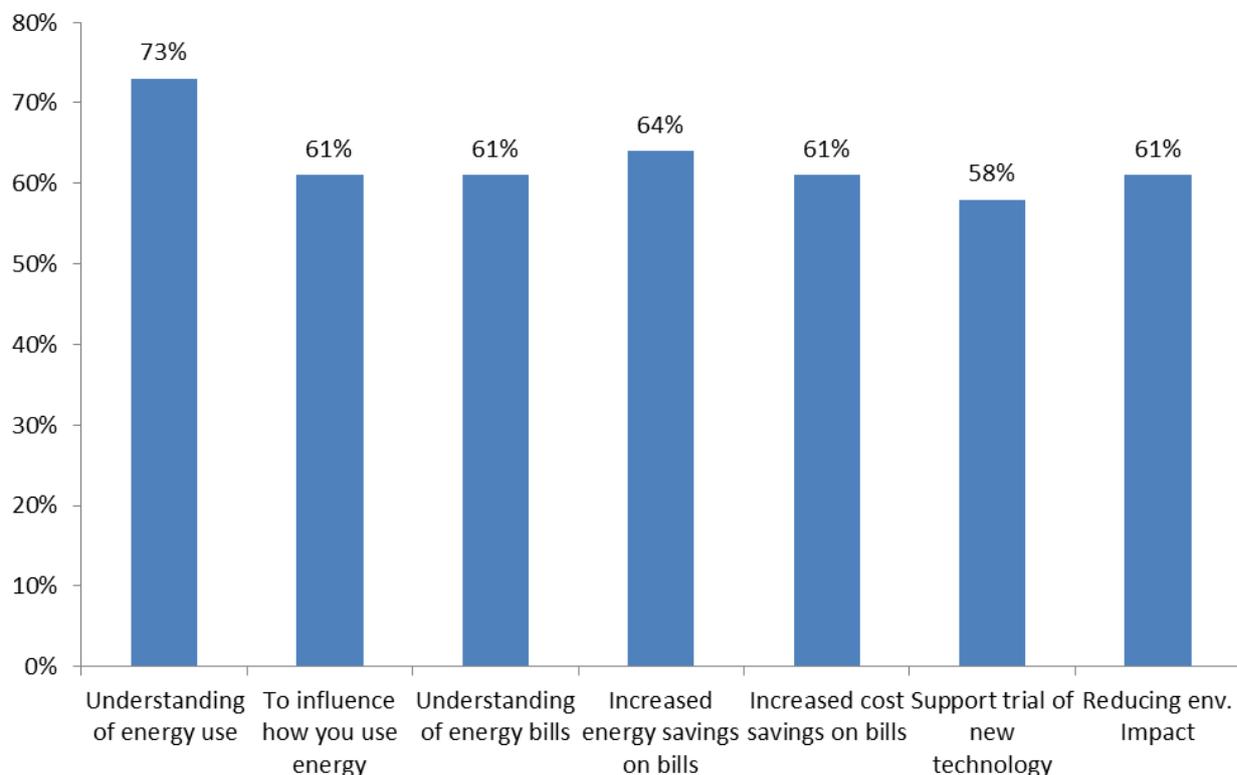


The majority of participants felt that the project had been clearly explained to them and they felt that they understood the potential benefits of having smart metering equipment installed.

94% of participants were feeling positive about having smart metering equipment installed in their homes. The remaining 6% (two respondents) were feeling indifferent about the installations.

Participants were asked what their expectations were of being involved in the project. Figure 2 shows their responses:

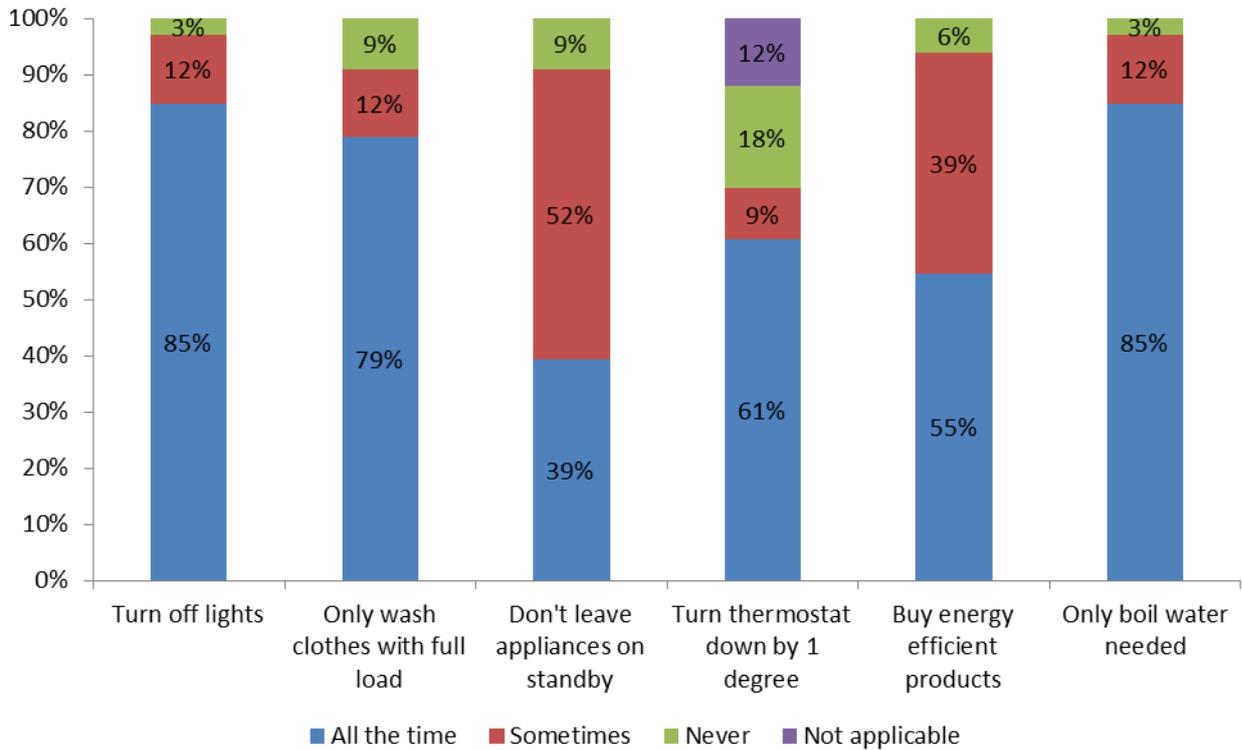
Figure 2: Expectations of the project



The majority of participants had a number of different expectations of being involved in the project with the most common expectation being that their involvement would result in an increased understanding of the amount of energy they use.

Participants were asked whether they currently performed any of the following energy efficiency behaviours:

Figure 3: Current energy efficient behaviour



The majority of householders already perform the majority of behaviours all of the time, and while some behaviours are never performed by some householders - this only represents a relatively small percentage of householders for each behaviour considered. The most common behaviours that participants are already performing are turning off the lights in unused rooms and only boiling as much water as needed.

Survey two

20 out of the 33 SMAP participants responded to the online survey – a response rate of 61%.

15 of the respondents (75%) felt positive towards smart metering systems now they were living with one, one felt negative towards them whilst the others were unsure as they didn't feel they had been using it for long enough to make an informed decision. Those that felt positive mentioned the following:

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“For the first time I was able to see how I was using energy and become aware of how I might economise.”

“It's nice to know information is being gathered. The equipment just sits on the wall doesn't bother me.”

“If the system contributes to better understanding of energy usage, then I'm for it.”

“Discovered night usage of oil, so we reset timer now saving fuel”.

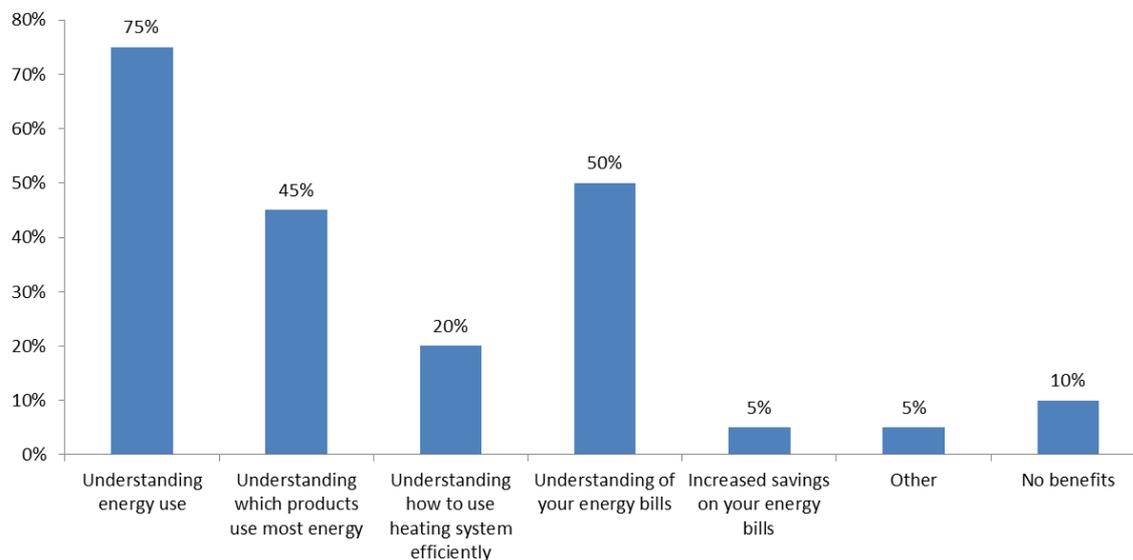
The one that was negative had had some difficulties with getting the correct readings from the web tool.

Respondents were asked whether they had seen any of the following benefits as a result of having the smart metering system and access to the web tool:

- Increased understanding in the energy you use/consume in your home
- A better understanding of what products in your home use the most energy
- A better understanding of how to use your heating system efficiently
- Increased understanding of your energy bills
- Increased savings on your energy bills
- Other benefits
- No benefits

18 respondents (90%) felt that they had seen at least one of these benefits so far. The following chart shows the percentage that reported seeing each benefit:

Figure 4: Benefits of the smart metering system and web tool

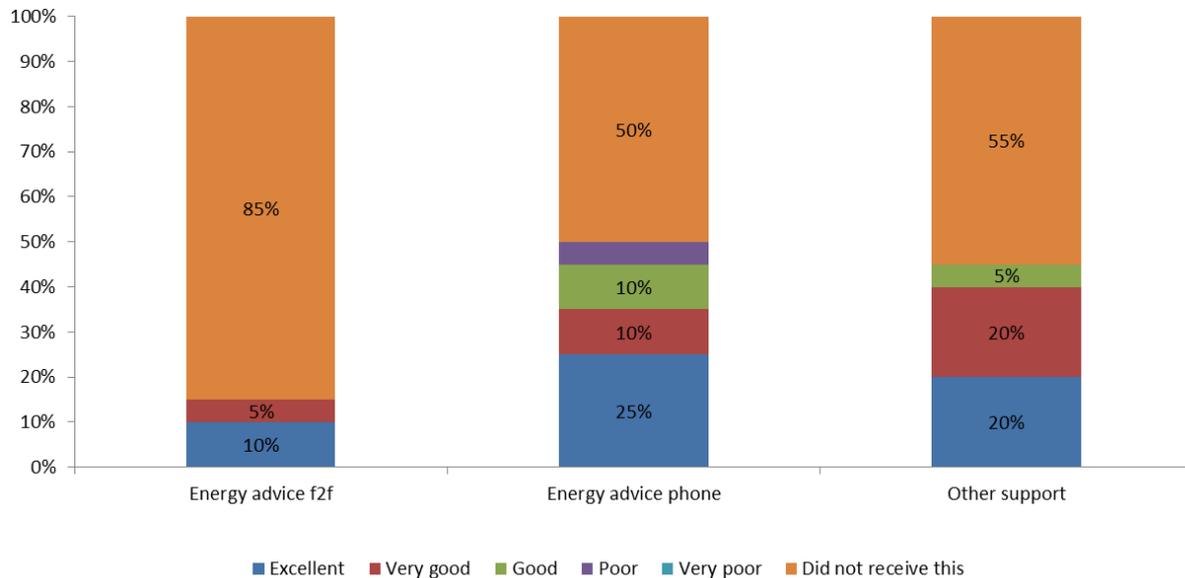


As can be seen in figure 4 an increased understanding of their energy use was the main benefit that respondents reported seeing, together with an increased understanding of their energy bills and an increased understanding of which products use the most energy.

14 respondents (70%) felt that they have now been able to track their energy use better than before the smart metering system was installed and they had access to the web-tool.

As noted earlier in this report all 33 participants received two telephone calls from an advisor; and 3 of these participants also received one home visit and a third phone call. Respondents were asked if they recalled receiving energy advice from an advisor face to face, over the phone or other advice and support in conjunction with receiving the smart metering system and web tool. Figure 5 shows the percentage of respondents that recalled receiving these different levels of support and the extent to which they rated the support provided.

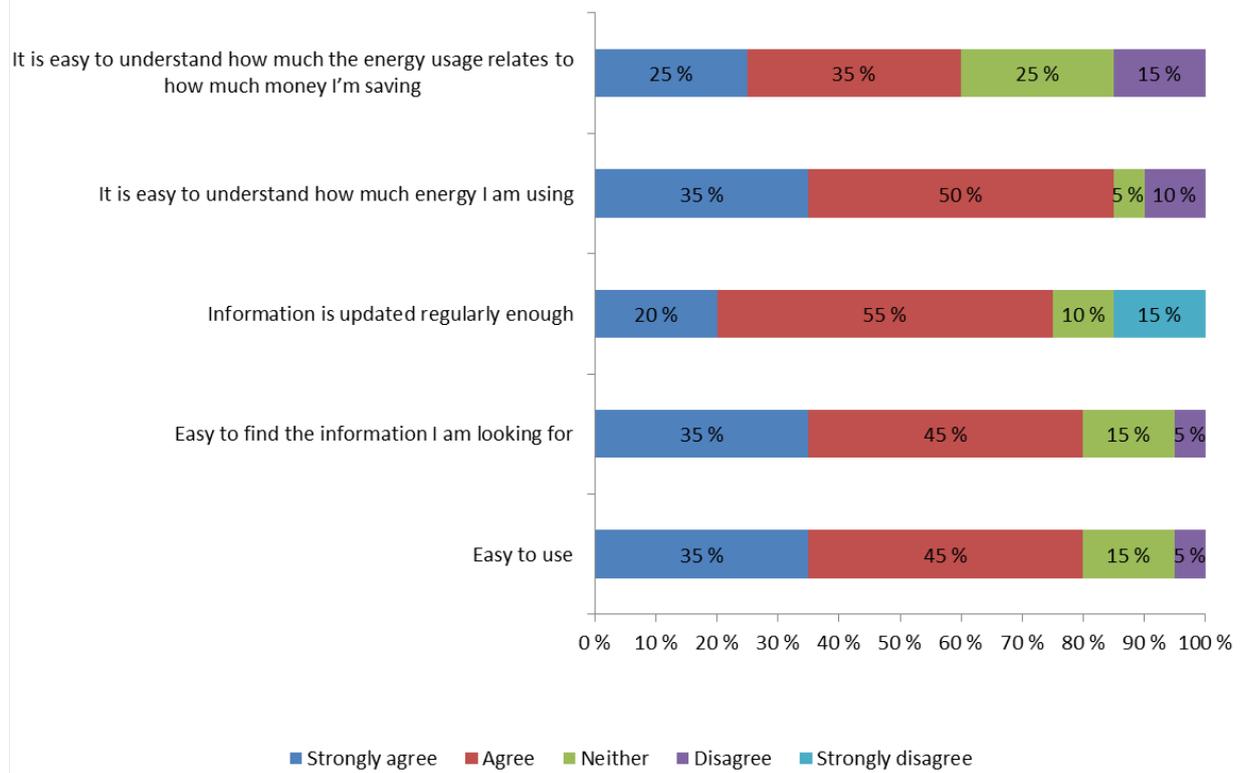
Figure 5: Advice and support received



Only three respondents (15%) had received face to face advice and all three felt that the advice had been excellent or very good. Only 10 respondents (50%) recalled receiving advice over the phone. This *could* be because participants considered that the phone call focussed on how they were getting on with using the web tool and whether they were experiencing any problems with it as opposed to providing specific pieces of energy efficiency advice. All but one of the respondents that did recall phone advice had found the advice good, very good or excellent. Where the respondent had found the advice poor this was where the web tool was not providing correct data and this was yet to be rectified. In terms of other support, most referred to the support they had been given by the advice centre on how the web tool works or the information from the installer of the smart metering equipment on how to operate the system.

Respondents were asked to rate satisfaction with the web tool:

Figure 6: Satisfaction with the web tool



The majority of respondents were happy with the web tool and felt that it is easy to understand how much energy they are using (85%), that it is easy to use (80%) and that it is easy to find the information they are looking for (80%). One respondent disagreed with all the statements and commented that *"it doesn't give me current usage up to the minute, it's a bit awkward to navigate, I can't see electricity and oil usage side by side, and it's not always clear what's going on"*.

Only six people mentioned they had problems understanding the information presented in the web tool and six had had technical problems using the web tool.

Comments from respondents that had trouble understanding the information included:

"I don't know what the effect will be of interacting with "change my behaviour plan" and "change my energy savings plan"

"Some of the behaviour suggestions I do all ready".

"On the energy savings plan it says to insulate the hot water tank but it is insulated all ready. I assumed this was known but was not enough for today's standards."

"I can't work out what the 'background usage' relates to and it doesn't seem to make sense. We have an oil-burning Rayburn which is permanently on yet the readings don't seem to show any oil consumption which there should be. Sometimes there are background readings for oil and electricity and sometimes there aren't."

"Trying to change the calendar from day to day. It does not work very well."

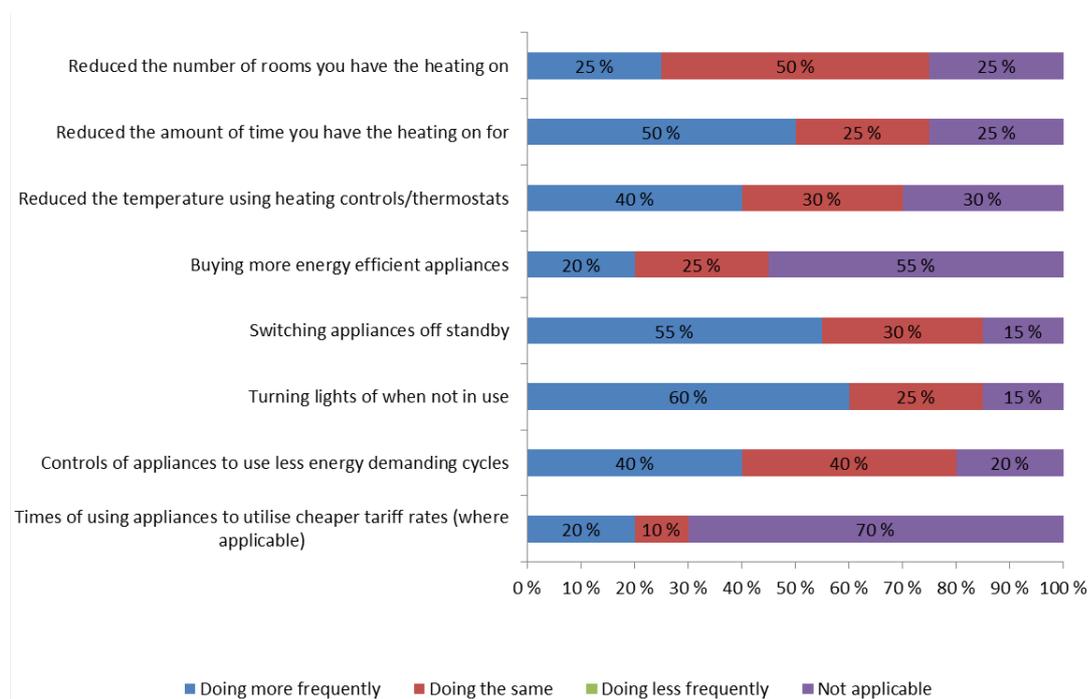
"One big error in the system leaves me uncertain about which collective figures are affected."

Where respondents reported technical problems this was mainly around not being able to log in properly or other teething problems at the start which have now been resolved.

14 respondents stated they would recommend installing smart metering equipment and using the web-tool to a friend or relative with only one actively saying they wouldn't recommend it.

Respondents were asked if they had changed any behaviour in their home towards energy use as a result of having the metering equipment installed and access to the web tool. Figure 7 highlights the changes reported.

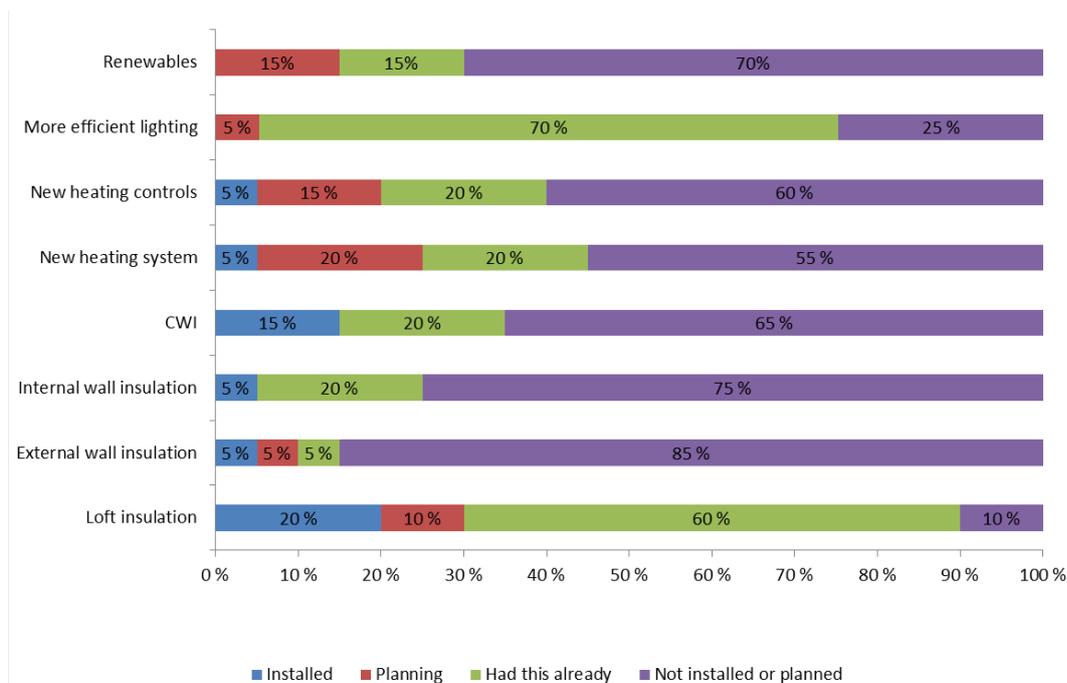
Figure 7: Behaviour change



The main behaviours that respondents reported undertaking more frequently are turning the lights off when not in use (60%), switching appliances off standby (55%) and reducing the amount of time they have the heating on for (50%).

Respondents were also asked whether they had installed, or were planning on installing any measures as a result of being involved in the project. Figure 8 shows the results of this:

Figure 8: Measures installed or planned as a result of being involved in the project



When considering the responses to this question it is important to highlight that respondents had only had access to the web tool for a few weeks before they responded to the survey.

Five respondents mentioned that they had installed measures as a result of being involved in the project. However, given the timescales it is likely that these were actually measures that they had already agreed to have installed and the project only highlighted that this was a beneficial thing to be doing. It is suggested that further evaluation work is conducted when participants have had more time to use the information and for us to get a fuller understanding of how the project may have impacted on any changes made.

Finally, respondents were asked whether there was anything that could have been done to improve the process, equipment or web tool. Most respondents did not have any comments and could not suggest any improvements:

“Not that I could say.”

“The equipment posed no problems, except the technician came to change something regarding the heating oil tank.”

"No problems really."

"So far I could not suggest any improvements."

"Quite happy with system - cannot really comment on equipment but it seems to work ok."

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"The process what very efficient, the tool is interesting and provides useful information. I would say it does what it says on the tin."

"Installation was painless, minimal involvement or disruption. Will be interesting to see how the tool is able to address seasonality issues."

Where people did have suggestions they mentioned the following:

"Yes, by explaining things to me further."

"Something to allow you to read the smart meter directly would help."

"Yes, it would be of far more use to any one if capable of telling you the previous 24 hour readings whilst what was used and when it is still fresh in the memory."

"We have two check meters, one for the domestic tariff and the other for the heating tariff which includes the immersion heaters and electric shower. To be able to monitor the use of the heating tariff is what I was hoping for."

Understanding reasons for not getting involved with the project

A small study was conducted to understand why householders that were sent the letters inviting them to participate in the project did not want to be involved.

70 households were interviewed, and asked a set of questions which can be found in Annex 8. 53 of these households could not recall receiving a letter or phone call. Many of these mentioned that they get a lot of mail about loft insulation and energy efficiency and so it may have just got caught up with all the other mail and therefore they didn't register receiving it. However, given that they would have received these letters in June 2012 it is not necessarily surprising that people may have forgotten about receiving them. Some of these householders provided additional information that may provide some understanding of why they wouldn't have taken part or why they couldn't remember. These generally fell into four categories:

- **They do not have access to internet**

"I had thought about getting one [a smart metering system] but we do not have the internet to see what we are using, I'm not very up to date - I don't even have a mobile phone. I think the only way I would get one is if I didn't need the internet for it but it would still work to keep a record of what I was using".

"Well we wouldn't have been able to do it anyway because we are not on the internet; we have not learned to use the computer because me and my wife are both over 70 now".

- **They already had been provided with an in-home display** (respondents generally mentioned being provided with smart meters but it is more likely that these are in home display units)

"But I do already have a smart meter. It was sent to me in the post, I'm not sure who it was sent by, but I haven't used it because I don't know how to fit it up, it was not installed by anyone just sent in the post."

"Well I did not install the smart meter [one they received through the post] because it seemed a bit complicated to set up really and in any case the most of our energy consumption comes from oil and we only spend about £80-£90 on the electricity per quarter. I think we possibly might have had it installed if it could have been done for free but it just came in the post and we didn't have a letter about it before."

- **They lived in a rented property**

"Well I am in a rented property so I don't have any control over the meters anyway".

- **Having previous experience of it not being possible to install**

"On the an additional property (not our residential home) we are refurbishing we did look into getting smart meters fitted, again we did not have a letter for that but it was something we looked into for updating the gas and electric meters. It turned out we could not get it for the electric meter because we could not get a signal and we could not get one for the gas because the meter was not old enough for it to be changed. For my own home address I

haven't thought of it as something that relates to me really. I think that's more because I don't fully understand what it is that smart meters do."

For the 17 householders that did recall hearing about the project, nine recalled receiving the letter, five recalled receiving a phone call and three recalled a letter and a call.

Ten said that they weren't interested in the project, mainly for four reasons:

- **They do not use very much energy and so didn't feel it was needed**
"We are spending so little on the electricity that the meter would not have saved us any money whatsoever"

"I live in a small 1 bedroom flat and so don't use much energy which meant it would not have helped me save money having a meter put in."
- **They had already installed measures to reduce energy efficiency**
"We have had solar power panels and loft insulation installed which far out-weighed the saving that a meter appliance could help with and so we didn't see any point in getting it done"
- **They did not have internet connection so wouldn't be able to take part**
"We have no signal for the internet so it was pointless to have the meter fitted."

"I am not online so I would not have been able to use it and I am also in rented property so I wouldn't have been able to have it. Also, because I keep track of my own energy use anyway, I take a meter reading every week to see how much I so I didn't see that it would add anything else to that."
- **They do not own their house**
"I did read the letter but I live in a council house so I would not have been able to have one."

Seven said that they did give some consideration to the project but that they decided against it. The main reasons given were:

- **They just didn't get round to it**
"I can't remember off hand why we decided not to take part in the service, I think we did give it some thought but it might have just been one of those things that we never got round to because we were busy and it wasn't something we necessarily needed."
- **Technical issues**
"I did go in to have one fitted but unfortunately due to a technical issue the item was never fitted to my meter, I'm not really sure what that issue was."

"I live in a remotely located property so it might not have worked and also it was not worthwhile as I don't think it would save any money."

- **Decided it was too complicated**

“After finding out a bit more, it looked a bit too complicated and too much of a bother.”

Most respondents said that there wasn't anything more that could have been done to encourage them to take part. They felt the barriers they encountered (e.g. not having internet access) and those listed above could not realistically have been overcome: Page | 32

- *“No, not at all because it was more about me deciding if it was worth it to save money but it wouldn't have done.”*
- *“No nothing at all because the decision was made on whether it would save us money not any other incentives they could have given.”*
- *No I don't think so, it was more that I lost sight of it and that I didn't follow it through. I have been trying to make my house more energy efficient such as insulating the roof and things. Maybe if someone sent me another letter or followed up with another call and then I might have remembered to do something about it.”*

One respondent felt that the information could have been simplified:

- *“The literature should be more simplified as it is easy to misunderstand what is being conveyed. There was far too much technical information which I did not understand.”*

5. Conclusions and recommendations

Due to the relatively short period of time that the householders had access to the SMAP online tool our conclusions at this stage are indicative rather than conclusive. However, the evaluation results do show that most householders valued the SMAP service and advice, and some have reported an increase in the frequency with which they perform specific energy saving behaviours as a result of being involved in the project.

Most importantly the research demonstrates the technical viability of integrating live metering data with the Energy Saving Trusts' existing programme of national government-funded energy saving advice. The majority of users reported finding the new service helpful and the pilot project therefore points the way towards the future of Energy Saving advice in Scotland.

As we move towards electricity and gas smart meter roll out the project shows how the new meters can be effectively linked to advice on behaviour change and home improvements – showing householders directly how much money can be saved, based on their real usage data.

Though oil meters are not being rolled out nationally, the project also highlights the value of smart oil metering and advice. We saw high interest in our project from oil users – perhaps reflecting the higher cost of this fuel. A policy recommendation from this project is that the Scottish Government should investigate how the benefits of smart metering can be provided for oil customers.

As noted earlier in the report as part of the incentive to take part in the project householders were advised that they would have access to the web tool for 2 years. Significant potential therefore exists to continue to make use of this data as it comes in to better understand the impact that the enhanced energy saving advice services linked to smart meter data can deliver carbon and energy saving and protect vulnerable people from fuel poverty. It would therefore be helpful to:

- Continue to provide advice and support (via the ESSacs) to householders in involved in the project.
- Evaluate the longer term impacts of households having access to the web tool and associated advice.
- Explore the impact of regular 'prompts' (e.g. by e-mail) to households reminding them to check the tool and act on relevant advice.

The Energy Saving Trust proposes to seek resources from the Scottish Government to undertake this work during 2013/14.

Feedback from householders identified a number of improvements could be made to the web-tool, and the potential to make these improvements should be further explored. Specifically, suggested improvements include:

- Making modifications to the web-tool (and the way data is communicated from the metering equipment) to allow householders with two electricity meters (one for heating and

hot water, the other for electricity use) to view the consumption of each meter separately on the web-tool. It is worthwhile noting that the existence of two electricity meters in Scottish households is not uncommon.

- Improving the web-tool's interface to ensure it is as easy to use and intuitive as possible.

It is worthwhile noting that some suggested improvements (e.g. related to frequency of data transfer to the web-tool) were made during the project as result of dealing with 'teething' problems with the web-tool.

Given the interest shown in being involved in this project by households with small scale renewables systems already installed, and the growing numbers of such systems in Scotland, it would be sensible to:

- Explore the potential to develop the web tool to allow it to take account of renewables systems installed in homes.

Finally, it is worthwhile commenting on the results of the study to understand people's reasons for not getting involved in the project. Recruitment proved considerably more difficult and more time consuming than originally envisaged and because of this the project team had some concerns that people's reluctance to take part may have been due to some underlying resistance to having smart metering equipment installed. However, this appears not to have been the case. The results of the study suggest that householder's were not necessarily reluctant to take part, but just did not see getting this equipment installed as a high priority, or felt that their particular circumstances precluded them from taking part. In the context of the wider roll out of smart meters this is perhaps reassuring. This is an important finding: householders do not appear to be resistant to smart metering (for example because of data protection concerns) but they may need persuading that they should prioritise getting a meter fitted and using the data it provides to help them save energy.

6. Contact details

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7. List of Appendices

Appendix 1 – Screen grabs for each of the web tool’s main sections:

- Home page
- My usage
- Records
- My Energy Saving Plan

Appendix 2 – Frequently asked questions

Appendix 3 – Recruitment criteria

Appendix 4 – Template recruitment letter

Appendix 5 – Energy consumption against temperature data

Appendix 6 – Evaluation – Survey 1

Appendix 7 – Evaluation – Survey 2

Appendix 8 – Evaluation – Questionnaire used to explore reasons for not getting involved in the project