ENERGY DEMAND RESEARCH PROJECT

Review of progress for period April 2008 – August 2008

March 2009

Ref: 29/09

CONTENTS

1 Summary

- *This is the second report on the Energy Demand Research Project, a large scale, Great Britain-wide trial seeking to better understand how consumers react to improved information about their energy consumption. This project is designed to measure the long term response to interventions. These interim reports provide updates on progress, but are not designed to provide any conclusions at this stage.*

- *Since the last report, there has been significant progress in installing smart meters and progressing all the trials. There are now 42,000 households taking part in trials and a further 17,000 households are included in control groups. The trials are investigating the reactions to the delivery of energy use information to customers through bills, clip on visual display units, and smart meter related interventions. Some 15,000 households have had smart meters installed, many with both gas and electricity smart meters.*

- *The oral response from customers about receiving additional feedback on their energy use has on the whole been positive. There are as yet no significant changes in energy usage recorded between the trial participants and the control groups. This is however not unexpected as the amount of data available from winter periods and from smart meters, is at this early stage still limited.*

- *Some difficulties in smart meter installation have been encountered and the lessons learned will be invaluable when planning a universal roll out of smart meters.*

2 The Energy Demand Research Project

2.1 Background

The Government allocated £9.75 million to part finance a large scale trial investigating consumer response to improved feedback on their energy use - the Energy Demand Research Project (EDRP). Ofgem agreed to manage this trial on behalf of Government (in terms of both drawing up recommendations for grant funding, and in overseeing the implementation and assessment of data arising out of the scheme).

Participating suppliers in the Energy Demand Research Project (EDRP) are required to submit reports at six-monthly intervals for the duration of the project. The EDRP is being undertaken by four different energy companies, namely EDF Energy Customers plc (EDF), E.ON UK plc (E.ON), SSE Energy Supply Limited (SSE) and ScottishPower Energy Retail Limited (SP). This report presents information from supplier reports submitted in September 2008 and is the second set of detailed reports in the EDRP.

Supplier reports are analysed by the Centre for Sustainable Energy (CSE), who support Ofgem in its evaluation and monitoring of the EDRP. CSE primarily ensures statistical reliability is maintained, interrogates the conclusions in the Suppliers' reports, and will cross analyse interventions across Supplier trials to add to the EDRP learnings.

This document provides an overview of the current state of play across the EDRP as a whole and evaluates progress since the last reporting period in April 2008 (published in June 2008[1]). This evaluation process included telephone interviews with all supplier project teams.

2.2 What is being trialled

2.2.1 Billing and information

Trials in this category include the provision of:

- additional information on past consumption, including graphs with bills.
- monthly billing
- more accurate bills by means of having smart meters
- energy efficiency information and advice

More than 12,000 households are now taking part in some form of billing trial, while over 20,000 are receiving energy efficiency information[2].

[1] See http://www.ofgem.gov.uk/Markets/RetMkts/Metrng/Smart/Documents1/EDRP_June_2008_Public_progress_report_final.pdf

[2] Note that some of these households will have more than one intervention, e.g. both historical bills and energy saving advice.

2.2.2 Clip-on visual display units

Clip-on visual display units have been given to almost 8,500 households. Visual display units measure electricity consumption and load only. They enable the household to understand how much electricity they are consuming at any point of time through an electronic display in the house. Clip on units do not communicate remotely with suppliers and do not necessarily show the same units as is being recorded by the customers' meter.

2.2.3 Smart meters

Smart meters have now been installed in about 15,000[3] homes. These are electricity and gas meters that collect meter values on a half hourly basis and transmit the data back to the supplier without the need for the consumer to manually read the meter. Several setups are being tested:

- Smart meters with a remote visual display; both electricity and gas.
- Smart meters with information sent to the households' TV
- Smart meters with information available on the internet
- Smart meters linked to heat control units
- Smart meters with an alarm which alerts the user to certain electricity consumption levels (load limiting alarm)
- Smart meters with a energy savings reward tariff which rewards the user for limiting their energy use
- Smart meters with a time of day tariff which rewards the user if they move their consumption to 'off peak' hours (for example by running the dishwasher overnight).

2.2.4 Community engagement

The effects of public schemes promoting community spirit and awareness are also being trialled. These trials include: a metered local substation to monitor the community's energy consumption; a financial reward of £20,000 for a 10% reduction in consumption at the community level; fitting smart meters in participating households in the selected communities; energy efficiency advice; various community events and energy saving incentive schemes organised at a local level.

2.2.5 Control groups

Control groups have been included to ensure the statistical robustness of the trials. The control groups consist of consumers that will not be provided with any information above their normal 'business as usual'. However, their energy

[3] Note the actual number of smart meters is greater because a proportion of households will have received both gas and electricity smart meters.

consumption is recorded to enable comparisons with the households that are part of a trial. There are more than 17,000 control households.

2.2.6 Trial Design

2.2.7

The EDRP as a whole, and for each supplier participant, consists of a large number of trials. The above trials are being tested individually, and in combinations with each other, across Great Britain. In addition to establishing the individual effects, some of the trials are designed to test the total impact when a range of interventions are used. The aim of this is to establish whether the total effect on energy demand is greater than the sum of the effects of the components. In all cases sample size has been selected to ensure statistical soundness. The supplier participants are responsible for their own trial structures, so have achieved statistical reliability and devised how to stimulate response in a number of ways. This has added to the richness of the EDRP.

3 The Report

The key findings across the major interventions are summarised in the four headings below.

3.1 Billing

Analysis of the 'graphs on bills' customer survey continues to suggest a relatively low level of interest and engagement from customers with this intervention. No significant differences have been found between households that received information on bills, and those in the control group.

Survey information has added to the knowledge about these trials.

- In one of the trials most customers did not notice that bar-charts (showing customer usage compared to the same period in the previous year) had been included. Less than 20% of respondents recalled seeing the comparison on their bills.
- Two out of the 48 individuals surveyed were prompted to take specific action. This included installing low energy light bulbs, turning off appliances on standby, lowering the hot water temperature and not filling the kettle.
- A survey by another trial team found that just over a third of the 150 customers commented that the information had prompted them to think about the energy they used. But, with no significant change in energy use evident, it was felt that responses on activities to save energy *"may be more reflective of what behaviour customers thought ought to be happening rather than actual outcome."*

3.2 Display Units (Clip on and linked to smart meters)

The trial teams experience with these devices has been mixed. This mixed feedback is evident across installation, technical and consumer issues.

One of the teams deploying clip on displays reported a 50% failure rate to install in credit customer homes and 25% for prepayment customers. In contrast, another trial team experienced very few issues with installing the devices, with failure to install almost exclusively the result of no access to the site.

One of the teams experienced battery failure problems with their devices and in addition found 4-5% of devices to be faulty. Another team found that after one year, only a quarter of the installed clip-on displays were still in active use. The trial also uncovered significant problems with battery failure on the devices. However, of the devices retrieved from customers' homes (as part of their particular trial set-up), around half had replaced the batteries themselves. The

trial team is now ''reinvigorating' prepayment customers who retain the devices, by sending letters and replacement batteries.

A sample survey by one of the trial teams indicated that over half of respondents who had been issued with a clip on device reported they used it either daily or several times a week, and over half had talked about the device to others. However, the survey was biased towards customers who had the device installed: this particular trial reported that overall 66% of devices offered to customers were actually installed, but in the sample of households that were surveyed, 80% had installed the device. Again, and in spite of what people said, there have not been significant differences in energy use between trial groups.

A detailed log of customer enquiries and comments in relation to the trials so far was submitted by one trial team. They show a range of reactions to the devices, which are mostly positive. However, some elderly customers have particular objections to accepting in-home displays, mostly on the grounds that they do not think they could operate the technology or that they are already being as frugal as possible with their energy consumption.

A number of trial teams noted that there are concerns among customers about the reliability of price information on particularly clip on in-home displays. The issue mainly relates to difficulties presenting accurate price data that reflects the standing charge, VAT and different tariffs.

3.3 Energy efficiency advice

There have been no significant differences between the pre and in-trial periods of the energy efficiency advice intervention on its own. Nonetheless, customers are claiming to be more engaged. For example, the results of one of the trial team's first survey of non-smart metered customers show that 20% of respondents receiving written energy advice claimed to have taken some action (compared with 4% in control groups). This claim, though, is not yet being borne out by changes to recorded energy use.

3.4 Smart meters

Given that smart meter trials have only recently begun, at this stage there is insufficient data to draw any concrete conclusions. As part of their scheduled reporting, though, the trial teams have provided some data and initial analysis.

Some of the trial groups with smart meter data covering the summer of 2008 have reported some early indications that customer consumption decreased relative to the same period in the previous year, whereas the comparable control group showed an increase in consumption over this same period. However we are not reporting specific details on these results as they cannot be taken as conclusive at this early stage due to limited data being available, a lack of time

and weather correction[4], and so far unverified comparability of trial groups with control groups.

One trial team's recruitment process required gaining permission to replace the meter. Feedback on their recruitment and installation progress suggested that a display device is more popular than paper feedback, with the web and wall panel trials proving the more popular interventions so far. Customers approached to take part in these interventions have seemed more inclined to arrange a meter change and take part in the trial. Consumption alerts from meters seem particularly unpopular, with customers being deterred by the suggestion of a daily alarm at a pre-set time.

Feedback indicates that some information displays are not particularly simple to operate, given that they have a number of functions, and one trial team have received feedback that many customers will only be using the default display screens rather than 'drilling down' into more detailed information on their energy consumption. Initial surveys have also shown some customers had difficulty in reading the display. This was attributed to the small size of the display, highlighting the need to develop user interfaces for use by all members of society.

Technical problems were experienced during installation. To some extent different experiences partially reflect the different trial team's choice of different hardware and software to use in their trials. For example, one team is trialling a range of different smart meter models and communication solutions, in various combinations. This has amplified the related management and software systems issues they needed to overcome.

The installation process can be split into a number of key areas: site installation approach and physical installation process; communications connection; and finally initial meter data entry into meter database. Each of these areas has caused difficulties for one or more trial teams.

3.4.1 Installation

Installation experience across the EDRP has highlighted differences in the ease of installing smart meters in different situations. For example, two trial teams carried out pre-installation visits to assess site suitably for installation. However, one encountered a limited number of problems and subsequently decided that the visits were unnecessary and discontinued them. The other team encountered significant problems with signal failures and maintained this pre-installation site survey.

[4] Time and weather correction factors allow for the analysis of data across time and control for the variation in weather. In order to ensure cross trial comparisons, CSE have been working with suppliers to agree to a uniform method of controlling for these features (as there are numerous ways of doing so). CSE expect to have this in place for the next report.

In addition to geographic location, the different experiences of suppliers during installation often related to the physical properties of the home or meter box. For example problems were encountered with:

- semi-concealed gas meter boxes
- flats/apartments with long distances between gas and electricity meters
- basements with low radio signal strength
- large houses and/or dense building fabric resulting in within-home signal range issues
- new meters needing more space and in some cases re-piping/wiring prior to installation

Housing conditions and historical meter installation practices vary from region to region. For example, trials in Scotland report some installation issues with smart meters, in particular with gas smart meters. Some dual fuel smart meter installations could not be completed, mainly due to the gas meters being located in semi-concealed meter boxes. Where gas smart meters could be installed, a significant amount of additional work was often required to accommodate the new meter (including re-piping) resulting in installation times increasing. However, indications are that such problems are being overcome and lessons can be applied in any smart meter roll-out.

3.4.2 Communications

The lessons learned through the installation process are invaluable, particularly for the trial which relies on the interoperation of multiple hardware and software systems. Challenges for this team have included problems with all communications solutions trialled, and longer than anticipated time taken to complete installations. Communications and gas smart meter issues combined resulted in failure to install dual fuel smart meters in a quarter of households in the Wales trial area.

In addition, the difficulties encountered by all suppliers in obtaining and installing the necessary equipment for the trials demonstrates the relative immaturity of the communication technologies, or at the very least, the integration of communication and metering technologies.

This relates particularly to the gas smart meter installations and smart meter-connected customer displays. There is little real world experience of different wireless, PLC communications and smart metering technologies being used in these EDRP trials. For example, while there are similar trials underway this year in North America, there has not been any mass rollout of this combination of gas smart meter, electricity smart meter and customer displays. All existing mass smart meter installation have either been carried out using hardwiring for the interconnection of gas and electricity meters, or used electricity smart meters only.

3.4.3 Customer reactions

Initial reactions of customers to the new meters and display devices have been mixed. There are some encouraging findings, for example customers contacting the supplier to request a display or smart meter, when they weren't scheduled to have one as part of the trial. However, there are also some less encouraging responses, including: fault finding by customers and general difficulties operating or reading displays, as well as complaints regarding the accuracy of price information, and the cost of operating the device. Customer anxiety about being 'spied on' by the smart meter has also surfaced from a small number of customers.

The amount of support and training required by customers when faced with new meter functions will vary. All parties should be aware of the potential need for, and cost of, customer support.

3.5 Recruitment, installation and implementation

The April 2008 reports revealed delays to the EDRP trials, primarily from technical issues with the duel fuel smart metering systems. Since that time suppliers have provided monthly updates to Ofgem detailing progress with installation by trial group and intervention type. These provided a clear picture of progress with installation. The information in these monthly updates has been combined with that in the supplier reports to give an overview of progress.

Information on bills
This intervention is nearly fully deployed, and the remaining shortfall lies with trial groups where the information on bills trials are combined with smart meters.

'Clip-on' VDUs
The trial teams utilising clip-on displays have all completed the installation of these devices. There is therefore little change to report on this intervention.

Energy efficiency advice
The implementation of this intervention is now three quarters complete, which represents significant progress since the last reporting period. The shortfall is also related to the fact that smart meter installations and some advice delivery mechanisms are not quite complete.

Smart meters
The installation of smart meters is now over 80% complete. Several trial teams do however report issues with installing gas meters, which are consequently below the intended target.

Smart meter VDUs

This technology is 90% installed across all suppliers' trials. The main issues with these devices relate to within-home connectivity problems.

Web
Progress with the implementation of this intervention is still ongoing. The trial teams using websites as a medium for communicating consumption information to customers have experienced technical issues with this element (related to transferring meter data to the web page) which have impacted significantly on this aspect of the trials.

TV, kW Alarm and Heating Controller
These interventions are all dependent on smart meters, which partially explain the lack of progress with implementation. However, in addition, the TV and heating controller interventions have proved more challenging to implement than anticipated, and progress in this area is being monitored.

Tariffs
Progress with this intervention is behind schedule following delays to the installation of smart metering.

Community trials
Due to problems with recruitment and installation, the trial team implementing these trials has reduced the target for smart metered households to 197 in each community (with a total of 322 smart meters at each location – a reduction on the intended 500). Progress has been made and installation is nearing completion. The community trials are different in nature from all the other trials in the EDRP, in that each will be allowed to evolve in its own way, according to ideas and preferences that emerge from the communities during the trial.

There have been a number of activities within each community over the last six months, including: funding the replacement of the existing oil heating system in the local primary school with a biomass system, an event to present the results of the infra-red surveys of houses, freely distributed low energy light bulbs and clip on devices, and a Green Fair and Green Picnic. In addition to this a doorstep advice service is also being trialled.

4 Next report

The next set of EDRP supplier reports is due at the end of March 2009. These will then be cross-analysed by the EDRP evaluation team and a report submitted by Ofgem to Government in May 2009.

Additional question on the EDRP can be directed to either Louise van Rensburg (email: Louise.vanRensburg@ofgem.gov.uk) or Mattias Bjornfors (email: Mattias.Bjornfors@ofgem.gov.uk) at Ofgem.