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Business, Energy
& Industrial Strategy

SMART METERING NON-DOMESTIC 'EARLY LEARNING' RESEARCH

Annex 6: Cluster 8 - Offices

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School House, Norbury
Bishops Castle
Shropshire SY9 5EA
Phone: 020 8567 6974

www.creativeresearch.co.uk



Chiswick Gate
598-608 Chiswick High Road
London W4 5RT
Phone: 020 8742 2211

www.accent-mr.com/

Authors: Ros Payne and Dr. Steve Griggs, Creative Research

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Introduction

This is one of seven cluster specific annexes which, together with the main report and the technical report, sets out the findings and conclusions from research designed to provide 'early learning' in relation to the installation and use of smart meters in non-domestic premises.¹ This report focuses on Cluster 8 - a sample of organisations operating from office buildings.

Background

Smart Meters are the next generation of gas and electricity meters. They offer a range of intelligent functions and provide consumers with more accurate information, bringing an end to estimated billing. Consumers should have access to near-real time information on their energy consumption to help them control and manage their energy use, save money and reduce emissions.

The Government mandate technically defines a smart meter as one that is compliant with the Smart Meter Equipment Technical Specification (SMETS) and has a specified range of functions including being able to transmit meter readings to suppliers and receive data remotely. Energy suppliers are required to take all reasonable steps to install smart meters in domestic and smaller non-domestic sites by the end of 2020. The exception to this is in smaller non-domestic sites where advanced meters may remain in place for their lifetime if they were installed before October 2017 for larger suppliers and February 2018 for smaller suppliers.

As a minimum, an advanced meter can store half-hourly electricity and hourly gas data, to which the customer can have timely access and to which the supplier can have remote access. The vast majority of meters installed at sites included in this research were likely to be 'advanced meters' rather than SMETS compliant meters, as at the time the roll-out was still at an early stage and the majority of meters being installed in affected sites were still 'advanced meters'. These meters would have had some, but not all, of the additional functions found in a smart meter that meets the Government's technical specification. For ease of reference, the term 'smart meter' is used to refer to both 'advanced' and SMETS compliant meters in this report unless otherwise specified.

¹ A list of the full set of reports is provided in the appendices; see List of Reports, p50

The non-domestic roll-out will cover around two million sites. These sites are very varied; they include private and public sector organisations, and range from small shops to chain stores, from small industrial units to schools.

Aims and Objectives

The aim of this work was to improve the evidence base on how and why smart meter data is or is not being used for energy management in relation to non-domestic sites, as well as the pathways, enablers and barriers to energy saving using such data.

The objectives of the research were specifically to;

- explore how 'smaller non-domestic sites' use energy and make energy related decisions
- understand the ways in which smart meter data is being used for energy management in relation to 'smaller non-domestic sites', as well as the current types of benefits being realised
- develop an understanding of the (actual or potential) pathways, enablers and barriers to energy saving in smaller non-domestic sites using smart meter data; and what further action may be required to maximise benefits.

Method²

In summary, 107 organisations took part in the research. The research involved 41 case studies of sites, the majority of which had smart meters installed. The aim was to include only organisations that had had smart meters (advanced or SMETS compliant) installed and to provide breadth in terms of geography, organisational size and cluster, tenure, energy use and experiences of using information from advanced or smart meters. There is further detail on sampling below and in the Technical Report.

Each case study consisted of a site visit and one or more interviews with key individuals from, or associated with, the organisation to which the site belonged. In addition 91 organisations took part in a telephone interview to add breadth to the findings (25 of these also took part as a case study).³

² A fuller description of the research methodology can be found in the Technical Report.

³ A further interview was conducted with an energy consultant employed by a landlord whose portfolio included ports, airports, shopping/retail malls, offices, retail and studios. The interview focused on a site that provided private sector businesses with professional office-based services. The aim had been to arrange a case study visit with one or more of the tenants but this proved impossible within the timeframes of the research.

A typology of nine clusters was developed before the start of this research and this guided the case study selection. This was based on nine broad clusters of sites which are defined with respect to a number of key characteristics – those most important characteristics which help to differentiate the clusters are: public vs. private sector; relative energy intensity; independent vs. multi-site organisation; whether or not customer facing.

In designing the case studies, some clusters were grouped together where the similarities were greater than the differences (e.g. low and high energy consuming, small customer facing independents). In addition, two clusters (e.g. lower energy consuming, employee only, limited use sites, such as warehouses, and non-buildings, such as phone masts) were excluded entirely based on a combination of assumed low prevalence within the actual non-domestic population and practical considerations about ease of access, given time and budget constraints.

The research was conducted in two stages; this allowed the methodology to be refined after Stage 1 to reflect lessons learned. The phasing also helped with practical constraints around resourcing and recruitment, for example those clusters that were more difficult to recruit were covered in Stage 2 of the research. The two stages of research are illustrated in Figure 1.

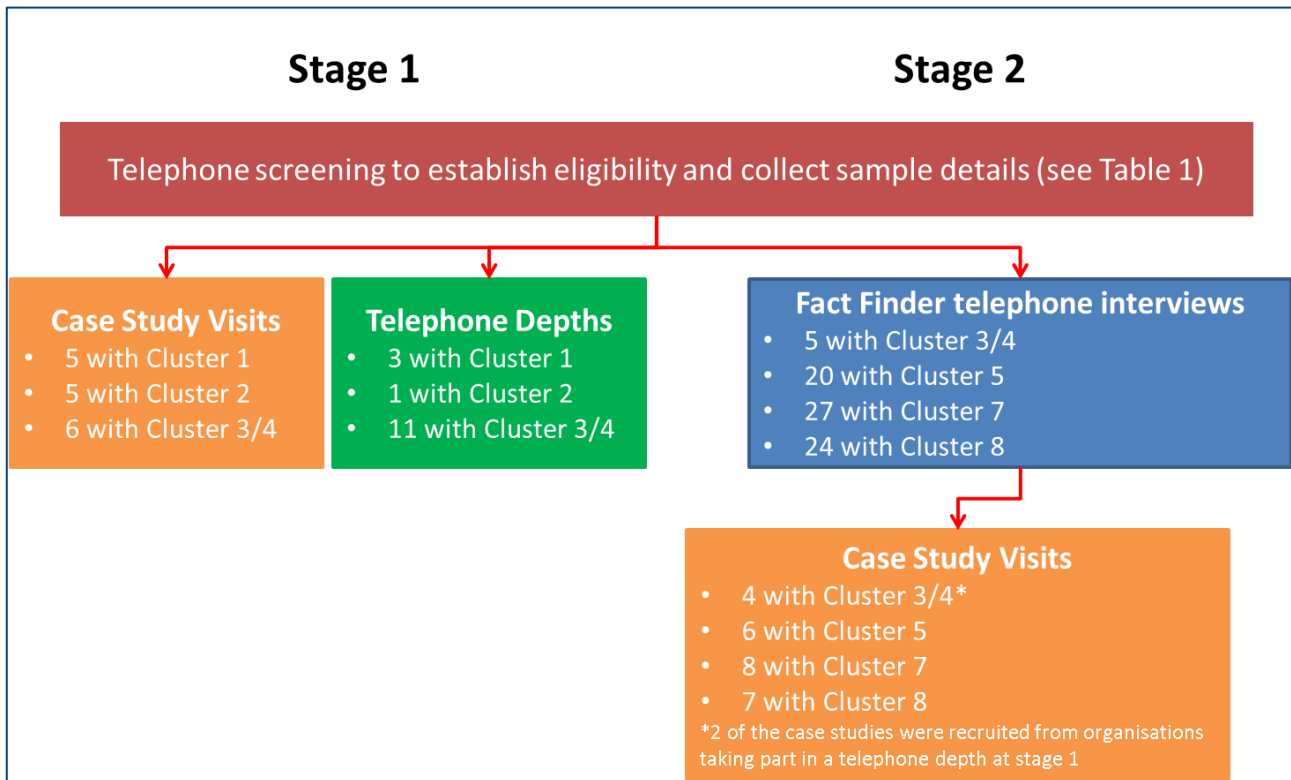


Figure 1: Flow chart of research method

Stage 1 comprised:

- initial **telephone screening** with decision-makers for an organisation's use of energy to establish their eligibility and collect basic sample details.
- **case studies** with clusters 1, 2 and 3/4. Each case study involved a visit to the case study site during which observations and interviews were carried out with a mix of internal and external actors. Internal actors included decision makers, implementers of energy management decisions, and users of energy. External actors included landlords, managing agents and energy consultants. These interviews lasted between half and two hours.
- 15 telephone **depth interviews** of 1 hour duration were conducted with energy decision makers from additional organisations spread across clusters 1, 2 and 3/4⁴. These interviews were conducted to provide additional information to support the case studies.

⁴ Cluster 1 – higher energy, customer facing chains; Cluster 2 – schools; Cluster 3/4 – Small, customer facing independents.

Stage 2 comprised:

- initial **telephone screening** with decision-makers.
- 76 **fact finder interviews** with decision-makers spread across clusters 3/4, 5, 7 and 8⁵, including some landlords; this involved a 30-40 minute telephone interview to gather factual information from a wider sample to add breadth to the findings, and to recruit sites for the case study stage.
- **case studies** with clusters 3/4, 5, 7 and 8.

The main difference between Stage 1 and Stage 2 in terms of the method was that Stage 2 began with fact finder interviews designed to gather factual information by telephone in advance of the case study depths, enabling the research team to achieve more focused case study interviews. The fact finders also had the additional benefit of allowing a wider range of organisations to be covered, providing a broader picture of each cluster targeted.

The case study approach enabled an in-depth exploration of how different organisations manage their energy and the various factors that influenced this. It involved the use of semi-structured discussions so that issues could be explored as appropriate.

Cluster 8 Sample

This cluster consisted of organisations operating out of office premises. Twenty four energy management decision makers took part in the fact finder interviews. Eleven internal actors also participated in seven case study visits; ten energy management decision makers and one implementer of such decisions. In addition to interviews with internal actors, interviews were conducted with one landlord and one property manager as part of the case studies. The former owned a single commercial property, a warehouse that had been renovated and divided into units; the latter managed mainly residential developments with some commercial premises at ground level. The case study site associated with this property manager was in one of these commercial premises.

A summary of the sample is provided in Table 1. Most of the information in the table relates to a single case study site. Where an organisation had more than one site, a single site was selected as the focus for discussion. This provided a much deeper understanding of what was happening than would have been possible if the focus had been on an entire portfolio of sites. For these multiple site organisations, figures in the table relating to 'size of organisation', 'number of sites', and 'the importance of reducing energy use', apply to the organisation as a whole.

⁵ Cluster 3/4 – Small, customer facing independents; Cluster 5 – Lower energy, customer facing chains; Cluster 7 - Higher energy, employee only sites; Cluster 8 - Offices

Table 1: Sample summary

• Region		• Locus of control	
• East	• 1	• Individual site	• 21
• E Mids	• -	• Head office	• 3
• London	• 2	• Franchise	• -
• N East	• -	• Tenure	
• N West	• 7	• Owner occupier	• 10
• S East	• 1	• Tenant	• 14
• S West	• 5	• Energy bills	
• W Mids	• 2	• Paid direct	• 24
• York & Humber	• 2	• Included in rent	• 1 (gas only)
• Scotland	• 3	• Energy types	
• Wales	• 1	• Electricity	• 24
• Size of organisation (total employee number)		• Gas	• 18
• Sole trader	• 2	• Other	• -
• Micro (<10)	• 10	• Type of meter	
• Small (<50)	• 10	• Smart/advanced electricity	• 23
• Medium (<250)	• 1	• Smart/advanced gas	• 8
• Large (250+)	• 1	• Importance of reducing energy use	
• Number of sites		• High	• 10
• Single	• 21	• Medium	• 9
• Multiple	• 3	• Low	• 5

Interpreting the Findings

The findings in this report provide insights into how different cluster 8 organisations in the sample were currently managing their use of energy, the things that get in the way of them being more energy efficient, and some of the ways of trying to overcome these barriers. As such, they are indicative of the broader picture in terms of offices. Nevertheless, care is needed when trying to generalise to the wider population.

This is a qualitative study which means the opinions of a relatively small number of people have been explored in considerable depth. Not only is the sample small, it is not designed to be representative of the full range of organisations that meet the criteria for each cluster. Some organisations were purposively selected to learn from examples of best practice, and although a range of more 'typical' organisations were also included in the research, the sample was not designed to be statistically representative of the wider population.

During the case study visits and the telephone depth and fact finder interviews, the researchers used topic guides and supporting stimulus materials to ensure that the relevant issues were covered; they also followed up particular points to ensure the point being made was understood, and they may also have explored relevant additional points that were made by the participants. In addition, they used an observational record sheet to observe how energy was being used. Each case study was written up in detail using an analysis template. The answers to the fact finder and depth interview questions were cast into a matrix with the rows as the questions and the columns as the organisations. Findings from both data sets were used to identify the key themes and issues.

The views of different actors from the same case studies and fact finder/depth interviews have been used to 'triangulate' the findings from individual case studies. A similar triangulation process was used to compare and contrast the findings both within and between the different clusters.

With a few exceptions, answers were not recorded in the form of tick boxes or head counts since the aim was to explore the range of opinions expressed and actions taken rather than to 'measure' how many participants had expressed a particular view. One reason for this is that people do not always express their answers in black and white terms. Another reason is that it is not possible to explore every issue in every interview. Some issues may only have arisen in certain interviews.

In analysing the data, one of the things that has been looked for is where there is a consensus of opinion or a similar view on an issue and this is expressed using language such as 'all', 'most', 'widespread', 'widely held', 'many people', etc. However, it is also important to look for the range and variety of opinion that is expressed; these might be opinions offered by just 'a few' participants as well as those opinions mentioned by 'some' of the sample (i.e. more than a 'few' but less than 'many'). It is also useful to report things that may only be mentioned by one or two people if these seem to offer relevant and insightful observations. This would normally be made clear by stating something along the lines 'one participant said...'

Use of terms such as 'most' or 'few', etc., relate only to the sample under consideration and should not be taken to imply 'most of members in the total population'.

Report Structure

The next chapter (Key characteristics, energy use and the role of potential influencers) provides a summary of the key characteristics of the sample, how energy was being used, and who was influencing its use. This is followed by a consideration the energy efficiency culture found within higher energy, customer facing chains, along with the range of energy efficiency measures that had been adopted. The factors that were driving energy efficiency, the potential triggers and the barriers to (greater) efficiency are also set out (Energy Management). The chapter headed Smart Meters summarises the reasons why smart meters had been installed, why some organisations were not using their smart meter data, and the experiences of those that were using their smart meter data. The reactions of non-users to a number of products and services intended to help organisations get the most from their smart meter data are considered, along with possible ways of encouraging greater engagement with smart meter data among non-users. The final chapter sets out the conclusions of the research (Conclusions). Verbatims are used to illustrate some of the findings and are shown with the cluster number, the type of organisation and the role of the individual providing it (DM: decision maker; I: implementer; U: user; LL: landlord/managing agent; EC: energy consultant).

Key characteristics, energy use and the role of potential influencers

This chapter provides a summary of the key characteristics of the sample, how energy was being used, and who was influencing its use.

The findings provide a description of what was found in the case studies and wider interviews, illustrate the diversity of different behaviours and views, and provide a more in-depth explanation compared to a quantitative survey. This information provides important context for the findings in later chapters which describe energy management activity and associated influences, and experiences of smart meters.

The research was not designed to provide answers to 'how many' type questions and the findings should not be interpreted as indicating the prevalence of such behaviours and opinions within the wider population of non-domestic energy consumers operating from smaller sites. References to the sample refer to the 24 businesses that took part in the fact finder interviews. Where findings only relate to one or more of the seven organisations that also took part in a case study, this is indicated in the text.

Nature of Business

Business type

The sample included a mix of creative practices (for example, design, marketing, architecture, exhibition), business services (for example, accountancy, business advice, technology), industry focused consultancies or offices supporting industrial operations (for example, quantity surveyor, building and planning, oil and gas, acoustics, highway maintenance), trading businesses (for example, imports, wholesale, distribution, online auction house), and health and beauty focused organisations (for example, occupational therapy, skin treatments).

Business size

Most of the organisations were micro or small in size (defined in terms of the number of employees), with a single medium and large organisation and two sole traders⁶. Three organisations had more than one site but no single site had more than 250 employees.

Business operating hours

Although the precise opening hours varied within the sample, most organisations were operating five days a week. The exception was the head office of a chain of outlets which also operated sometimes at weekends, and occasional Saturday working was also reported by a few others when workloads demanded it.

Nature and Management of Buildings

Tenure

Many of the organisations were tenants, often occupying multiple occupancy buildings; a slightly smaller number were owner occupiers.

The length of lease varied greatly for the tenants in the sample (from less than a year to up to 20 years), as well as the length of time remaining on the lease. Two case study organisations and a couple of others were on short term leases of either one month or a year (described as rolling leases in the case study interviews). Only a handful of organisations said they had full repairing and insuring leases⁷ but this might reflect their level of understanding. The general pattern seemed to be one whereby the landlord looked after the external structure and the tenant was responsible for internal repairs and contents insurance.

All tenants paid their energy bills themselves except for one where the gas bill was shared with other occupants of the building and included in the rent (they paid the electricity bill themselves).⁸ Many of the tenants reported that there were no common parts⁹ in their premises. For the other tenants, the landlord/managing agent reclaimed the cost of energy for the common parts as part of their rent or as part of a service charge.

Condition and management of buildings

A small number of the organisations were operating from new or renovated buildings which were felt to offer some advantages with respect to energy efficiency such as

⁶ Microbusinesses are defined as those that have <10 employees; small businesses have < 50 employees, medium businesses have 50 – 249 employees, large have 250+ employees.

⁷ A lease which imposes full repairing and insuring obligations on the tenant, relieving the landlord from all liability for the cost of insurance and repairs.

⁸ This may not reflect the wider situation. Attempts were made to include in the research some landlords who were managing multi-occupancy sites and where the landlord was responsible for energy bills. In the event, this proved to be very difficult.

⁹ All those parts of a property and any associated land which the lessee or occupier has a right to use in common with others.

insulation, double glazing and low ceilings. However, most were in older buildings that were not especially energy efficient due to such features as poor insulation, single glazing and high ceilings. These had often been converted from buildings such as warehouses and large houses rather than being purpose-built offices and sometimes presented challenges in terms of energy efficiency that would require investment to improve their performance.

None of the businesses had Building Management Systems (BMS).¹⁰ In most cases, facilities management was included as a very small part of a staff member's role. Otherwise there was either no active facilities management or it was the responsibility of the landlord. Only one multi-site organisation had a full-time facilities manager who operated across all their offices.

Environmental policy and energy audit

A small number of the sample reported that they had an environmental policy. When asked what this said about energy use, some commented that it included statements about reducing the consumption of resources generally, while others were more specific, referring to 'using energy wisely' or reducing, regulating or minimising usage or, in one case, using green energy suppliers. The case study visits suggested that environmental policies tended to be very basic and did not necessarily cover energy. In one case study, a creative agency had developed such a policy in response to a requirement for tendering for certain contracts but had not used or reviewed it for some time and on looking at it during the interview, it was found to focus on recycling and said nothing about energy use. Developing such policies for tendering purposes was also seen elsewhere.

It was half created before we entered into a tender but then when we entered into a tender we polished it off. I mean, to be honest, I don't even know what it says anymore. (C8; design consultants; DM)

In another case study, the director of a company providing services to local authorities, described how, during the economic downturn when contracts were very competitively priced, he decided to go for ISO 14001¹¹ to give his company a point of difference. The environmental policy had been developed with the help of an external consultant and covered energy use as well as recycling.

There was less evidence of energy audits with only a couple of organisations claiming to have had one. In one case, they described how, as a result of the audit (carried out for the Energy Saving Opportunities Scheme (ESOS)¹²), they had installed room thermostats and some double glazing. In the other, the audit had informed them that they could decrease

¹⁰ A Building Management System is a control system that controls and monitors the building's mechanical and electrical equipment such as ventilation, lighting, power systems, fire systems, and security systems.

¹¹ ISO 14000 is a family of standards related to environmental management that help organizations minimize how their operations negatively affect the environment, comply with applicable laws, regulations, and other environmentally oriented requirements, and continually improve in the above.

¹² The Energy Savings Opportunity Scheme (ESOS) is a mandatory requirement for all large businesses to undertake regular energy audits.

their usage by installing solar panels or wind turbines (although they had not acted on this).

Energy Use

Types of energy and meters

23 of the 24 organisations had at least one smart or advanced meter for electricity.¹³ Not all had a gas supply but of those that did, just under half had a smart or advanced meter.

Energy intensity and main uses of energy

All organisations considered the energy intensity of their operations to be low and had very similar uses for energy encompassing basic services like heating, lighting and communications, along with office equipment and facilities for their staff in the kitchen and washroom. The very few with an industrial operation associated with the office also used energy for powering workshop tools. The main uses of energy are summarised in Table 2. There was a lack of knowledge about which uses consumed most energy.

Table 2: Main uses of energy	
Lighting	mix of fluorescent, halogen and incandescent (some low energy), LEDs
Heating & cooling	mix of electric (e.g. air conditioning/air handling, portable heaters and fans, convection heaters, night storage heaters) and gas (heating, hot water, under floor heating)
IT	computers, servers, printers/copiers, shredders, security systems, phone systems
Staff facilities	kettle/hot water heater/'zip tap' ¹⁴ , microwave, fridge, toaster, hand driers
Other	workshop equipment/power tools
Renewables	none

It was notable that in nearly all the case studies, portable electric heaters were mentioned as being used in colder weather to supplement the background heating. Sometimes such heaters had been necessary when there were problems with the main boiler but they were also being used in an on-going way.

Quite a few of the staff have got separate convector heaters and if they come in on a Monday and it's a bit cool or whatever, they'll put the heater on. That's very inefficient for us because there's half a dozen people switching on electric heaters and then we've got the boiler going at full blast. (C8; accountants; DM)

¹³ For ease of reference, the term 'smart meter' is used to refer to both 'advanced' and SMETS compliant meters in this report unless otherwise specified (please see Background, p1 for further details).

¹⁴ A method of providing boiling hot water and filtered cold water 'on tap'.

Variation in energy consumption

The working day was generally around 9.00-6.00 with a few organisations reporting that some staff members came in earlier or sometimes needed to work on into the evening. One case study business had a flexible working policy which meant that staff could arrive from 7.00 and be in the office until 6.30pm. In some of the case studies, the number of staff who might be present in the office varied; this was because of part-time or flexible working, and the fact that their work sometimes took them off-site.

In terms of variations in energy use over the course of the day, peaks were sometimes reported around staff arriving and switching on devices, and tea breaks.

The reduction in energy used out of hours varied; some reported turning everything off that they could while others left servers/PCs/printers on to allow for updating or remote working. Some items might be left on standby. One case study organisation (also a firm of accountants) left computers and printers on overnight, in part because of the time to start up the former each morning but also because staff might wish to work remotely from home.

We have to leave the servers on because they're on all the time but all the computers are switched off, the photocopiers and there's not much else really. The television is on standby a lot so there are probably areas where we could improve but it's not on the radar. (C8; accountants; DM)

Typically, energy consumption fell in summer when the heating was switched off (unless it was controlled by a thermostat on the boiler) although air conditioning or the odd portable fan might then be used as needed. The portable heaters would not generally be used in the summer. One of the organisations with more employees said that energy use might also fall at this time as staff often took leave.

Energy as a proportion of total operating costs

Estimates of the cost of energy across the case study visit sample ranged from around £25k p.a. to £1.5k p.a. Most rated energy as a 'tiny' or 'small' proportion of their operating costs; a few rated it as 'medium' or 'high' while one did not know. Care is needed with some of the estimates; in the two case studies where respondents had rated it as high, it appeared that they were not including staff costs in their calculations.

Importance attached to reducing energy consumption and being energy efficient

While nearly the entire sample placed high or medium importance on reducing consumption, this was not reflected in the priority that they gave to it. Several claimed only to make energy efficiency a low priority. The view was sometimes voiced that while they would like to cut their energy use and bills, they were unable or unwilling to prioritise action over other tasks.

It is important, but it's one of those things that always gets pushed to the bottom of the pile in terms of importance over work and getting back to clients and workload. (C8; design consultants; I)

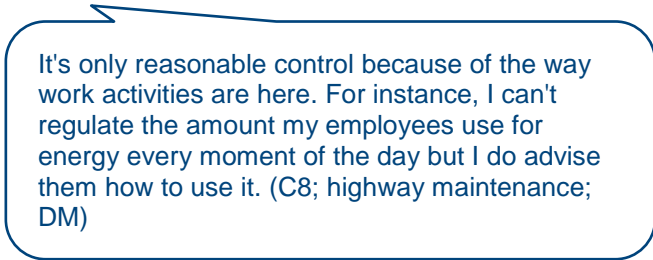
Perceived level of control over energy use

Most organisations felt that they had reasonable or complete control over their energy use. Those who felt they had complete control gave a variety of reasons for this; the fact that

they used energy efficient devices or had made improvements to their building, or they had confidence in their staff not to be wasteful. As a sole operator, they might feel that control is down to themselves entirely, or in the case of a small company, that they are able to 'see' when energy is being used and make adjustments accordingly.

Those asserting they had reasonable control based this on having some control but being unable to make all the changes they might like, or having to leave some equipment on, or feeling that they could not totally control staff behaviour.

No or limited control was put down to imposing no restrictions on the use of energy by staff, using energy as needed, and being aware that items of equipment are typically left on. Night storage heaters were viewed as both inefficient and very difficult to control because they were so unresponsive.



It's only reasonable control because of the way work activities are here. For instance, I can't regulate the amount my employees use for energy every moment of the day but I do advise them how to use it. (C8; highway maintenance; DM)

Decision Makers and Key Influencers: Internal Actors

An internal actor is anyone employed within the organisation that may influence energy management.

Role of decision makers

None of the decision makers taking part in the fact finder interviews estimated that they spent more than 5 per cent of their time on energy related matters and this included the full-time facilities manager. Participants in the fact finder interviews varied in seniority and included owners and directors, as well as staff in IT, finance (e.g. financial controller, finance manager) and in administrative roles (e.g. office manager, book keeper). Some of these staff were charged with doing the research and groundwork for decisions which were then generally ratified by someone more senior; they are deemed to be 'decision makers' because their contribution was valued and often formed the basis for the final decision. It appeared that energy was not an agenda item or even something that was regularly considered except when an energy contract was coming to an end. For some of the sample, decisions about energy were taken by the respondent alone.

Implementers

There was no formal role of implementer in any of the organisations seen in the case studies; the one participant assigned this role was a project manager in the creative agency who was charged with sorting out the energy contract. Even in the multi-site case study, there seemed to be no single person in each office who was responsible for liaising with head office on energy matters.

Users

The users of energy were staff members and occasionally, clients who might visit the offices.

Energy Management Expertise

Most respondents were happy to admit that they had little knowledge or expertise in energy management nor anyone they knew they could readily turn to. A client might be helpful or the builder who refurbished their premises but in many cases there was no clear sense of where expertise might be found.

Occasionally, case study participants described their lack of certainty about the best thing to do in terms of energy management, for example, whether to have a boiler thermostatically controlled rather than on a timed basis.

The most knowledgeable and interested respondents were probably those in the head office of the multi-site case study who had acquired or were acquiring knowledge to help them in their roles. Some years ago, one of the directors had attended and been inspired by a course about understanding energy bills to make use of the information contained in them. He had also used a plug-in device to demonstrate to staff how much energy a computer used when not switched off.

Once we've got the gas supply sorted, we'll sit down and actually work it out. I'm a bit sceptical about it that this situation of keeping the boiler on constant at say 20 degrees because then it's going for seven or eight or nine hours through the night still burning as opposed to having it on full blast for a couple of hours first thing. To me it never seems to make sense that you would probably use less if it's on constant. (C8; accountants; DM)

Degree of centralised control and standardisation of energy management

The three multi-site organisations reported that all decisions about energy were taken at head office rather than site level. Two were striving to standardise energy management in the sense of trying to bring all energy contracts under a single supplier but had not achieved this as yet. One of the reasons seemed to be that existing energy contracts at different sites expired at different times.

Energy targets

Just one organisation had set targets for energy reduction as part of its involvement in ESOS. There seemed to be some inconsistency as to what this was – both 5 and 10 per cent were mentioned. It seemed that the consultancy carrying out the energy audits for ESOS had arrived at the target reduction without discussing how it might be achieved.

Decision Makers and Key Influencers: External Actors

Energy Supplier

A single organisation (during the fact finder interview) commented on help relating to energy from their energy supplier; this took the form of general tips that they were regularly sent. Otherwise, the only contact seemed to be about whether a smart meter was to be installed.

Energy consultants

A small number of organisations had used consultants in relation to ESOS and/or ISO 14001. One of these had also brought in the Carbon Trust to advise on measures they should take to reduce their carbon footprint as part of the major refurbishment of their building; another organisation from the fact finder interviews was in the process of setting up a review that would involve the Carbon Trust.

A couple of organisations had also made use of energy brokers although one respondent questioned whether the savings made as a result merited the several hundred pounds they paid for the service (for more than one office).

In relation to the consultant used for energy audits of offices in preparation for ESOS, one of the respondents expressed some disappointment that the report did not contain costed suggestions for measures that could be taken. She was hoping this would be provided along with an idea of what impact they would have or how they would contribute to the reduction in consumption that the consultancy had proposed.

What I was hoping for was that somebody would go to the office and say, 'by installing these, you could potentially save this much' and we didn't get that piece of information and that would have been kind of the overwhelming evidence to say, 'we'd be foolish not to do this, we'd be foolish not to make the initial investments because we'll get the return'. But we didn't get that. (C8; business advice service; DM)

Trade and professional bodies

A number of organisations indicated affiliation to, or registration with, a professional organisation including the International Compliance Association (ICA), the Institute of Electrical and Electronics Engineers (IEEE), Federation of Small Businesses (FSB), the Care Quality Commission (CQC), Construction Line and the Royal Institute of British Architects (RIBA) but in the case studies, none of the bodies mentioned was engaging members in discussions about energy management.

The facilities manager attended regular meetings with others in a similar role working in her sector. Energy was occasionally discussed and she expected to put smart meters on the agenda.

Landlords

For case study organisations that were tenants, the impression given was of a distant relationship with their landlord or managing agent except for a couple of small businesses where the landlord owned a single building and the organisation knew the landlord personally. The terms of the lease was sometimes perceived as a barrier to energy efficiency (see Barriers, p25).

Government

The general view presented in the case study interviews was of a lack of awareness of messages coming from government about energy efficiency, particularly aimed at businesses.

Other influencers

Other influencers were occasionally mentioned; these included clients who might themselves operate in an area related to energy, suppliers who had carried out refurbishment work or installed equipment such as a boiler who also provided more general advice, and a tenant who specialised in electrical design.

Energy Management

‘Energy management’ is used in this report to cover the range of activities that organisations were found to be using to control energy costs, including energy procurement, installation of energy efficiency measures and equipment, control systems and the use of smart meter data to monitor performance. This chapter considers the energy efficiency culture found within cluster 8 organisations in the sample, along with the range of energy efficiency measures that had been adopted. The factors that were driving energy efficiency and the barriers to (greater) efficiency are also set out.

These issues were addressed in the fact finder interviews on both an unprompted and prompted basis using a list of items derived in part from the context map developed as part of the research framework (see Non-Domestic Smart Metering Early Learning Research: Main Report) and partly from the first stage of research. These were explored, as appropriate, in the case study visits. The findings reflect what was reported during the fact finder interviews supplemented from the case study interviews. Whilst they may not give a full picture of what was being done or why, they do provide a useful understanding of relevant issues for the organisations that took part in the research from the perspective of the interviewees.

Culture of Energy Efficiency

Across the sample, there was nothing to suggest that energy efficiency was embedded within the organisational culture.

For all the multi-site organisations, decisions about energy were taken at head office – in one case (a case study organisation), this was the site in question. This was the only large organisation in the sample with over 10 sites and the one judged by the researchers to be most likely to engage with their smart meter data. There was a business imperative to use energy efficiently driven in part by ESOS, but also needing to be seen as a role

So I think if you didn't do that as a management team, the staff would rightly say, 'well hang on a minute, you're saying one thing to your businesses you're working with but you're doing another.' It's very difficult for us to take all of our own medicine because we're a small organisation and things are complicated and need to be prioritised but I think we've done a pretty good job at choosing the more environmentally efficient choices when they've been available to us. (C8; business advice service; DM)

model; the business advised other organisations on issues relating to corporate social responsibility, including environmental issues. However, even here, energy efficiency was not fully embedded across the organisation. It was led from the head office by three members of staff, at least two of whom had a personal interest in energy efficiency. Although staff were felt to be generally supportive, there was no clear energy management role within regional offices, instead a picture was painted of certain staff members who were environmentally conscious and might be more conscientious about switching off devices, and others who were not. The view was often expressed that staff were left to use energy as needed based on the assumption they would do so responsibly in order to do their job.

I think we've got a few people in each office who are really pushy about it. So they're the ones going round turning off lights and things. We've got others who, it's probably not quite as important because their focus is on something else that the organisation does, but on the whole they all get it. (C8; business advice service; DM)

Energy Efficiency Measures

During the fact finder interviews, respondents were asked to outline the main energy efficiency actions that they had put in place. Where time allowed, these were explored further during the course of the case study visits. The responses are summarised below.

The overall picture was that most of the organisations were doing very little: several organisations said they had not taken any steps to reduce energy consumption. A considerable number commented that they turned off equipment when not in use or when they left the office in the evenings or at weekends, and some others said that they were careful with their energy use. For a number of these participants, this was the only action they said they took. Other organisations were often doing very little other than changing (some) of their light fittings and/or bulbs to low energy ones. One of the reasons cited by several participants was that they 'knew' what accounted for their energy consumption, it was largely 'common sense' and they had 'little option' but to continue using energy in the same way as their business operations required it.

We have a limited number of computers and not much else that uses energy. We can see when everything is turned on or off. (C8; accountants; DM)

Things that could be changed

A number of the things that could be changed were not mentioned by respondents and, while they cannot be ruled out as actions that were occasionally being taken, they did not appear to play any role in energy management; this included changing energy source (e.g. switching from electricity to gas), changing the things being produced or sold, changing timings (e.g. to take advantage of E7 type tariffs). This may reflect the fact that organisations in this cluster were using a small number of low energy intensive items of equipment and had little scope to change what it was they produced or sold and were mainly operating a five day week.

- **Tariff and/or supplier¹⁵**: although some respondents spoke about reviewing energy contracts particularly in response to unexpectedly high bills, there was little to suggest this was being done on a regular basis. A couple of the organisations spoke about using a broker to help find the best deal. Again, this probably reflects the fact that energy bills were not especially high due to the low energy intensity of many of the operations. For example, whereas energy price rises was typically a key trigger for action in other clusters, it was identified as a trigger by a relatively small number of organisations in cluster 8 (see **Other Drivers**, p25).
- **Production processes, e.g. change the timings of the heating system**: actions here tended to consist of manually turning things down or off during less busy periods, although there were some examples of installing/using heating controls, thermostats and timers. The measures taken by some businesses were fairly unsophisticated. In at least a couple of the case study organisations, they were not using certain rooms, radiators or appliances/lighting although this was not necessarily for energy efficiency reasons. For example, a creative agency had chosen not to use the overhead halogen lighting because it was too bright and did not provide the right ambience; they had also turned the radiators off because they made the studio too hot. Another business with its office within an industrial building, manually switched on its boiler as needed and kept the thermostat control set low at 17.5 degrees, adjusting it if staff said they were too cold. Fleeces had also been issued.

We installed a wireless thermostat for the heating, it helped reduce the bill as we were able to turn the heating down or off more easily when it isn't needed. (C8; architectural practice; DM)
- **Behaviour e.g. incentivise and/or train staff and/or customers to use energy more efficiently**: although this was described as a common method of trying to manage consumption, there were few, if any, examples of it happening. Only in one of the case study organisations was any attempt being made to discuss energy consumption with staff. The owner of this business was personally passionate about not wasting energy. He had produced a leaflet on energy efficiency measures (which covered the home as well as work environment) and told new employees about energy efficiency, as part of the firm's obligations under ISO 14001. He had also put stickers on light switches exhorting staff to turn off lights as they left an empty room and according to staff, he regularly went around switching devices off. However, he seemed to have assumed sole responsibility for energy management in terms of switching equipment off. While he tried to engage

We spent quite a lot of money putting these red switches in so everyone can turn them off and not everybody turns them off at the end of the day because they can't be bothered to wait for the computer to turn off. [] But I think if we raised awareness, which we did when we first got them, we continually went round turning off lights and how many lights were on, it reduced. But I think that's kind of stopped and we need to go back to that. (C8; business advice service; DM)

¹⁵ Strictly speaking, reviewing tariff and/or supplier is not an energy efficiency action but a cost saving action however it is included here as it was reported to be something many organisations were doing. Indeed, the primary motivation for any energy efficiency was to try and reduce energy costs (see Key Motivations).

his staff, he clearly felt he could not rely on them. He had a calendar reminder everyday on his PC to switch off the lights before leaving and even when away from the office, he monitored what was happening on the premises using his phone and gave instructions accordingly. While the staff in this company (with whom the researcher talked informally) were aware of the owner's passion for saving energy, this was as a result of observing his behaviour rather than his providing feedback about energy use on a regular basis or encouraging them to be more energy efficient.

In the head office case study, staff engagement seems to have happened at the time of refurbishment but little had been done since. A couple of respondents suggested something might be needed to refresh the learning in view of the fact that a proportion of staff were not turning off the power to their work stations before leaving at night.

Things that could be invested in

- **New and/or refurbished premises/ improved building insulation:** there were some suggestions that this was a less important trigger for action within this cluster compared to other clusters (see Other Drivers Drivers, p25). Nevertheless, there were a few examples. One decision maker commented that they had the flat roof to the premises insulated when they first moved in. Another reported insulating internal walls and ceilings. A third spoke about draught proofing some of the windows. The headquarters of the large multi-site organisation had undergone major refurbishment and the organisation had used the opportunity to install a variety of energy efficiency measures (see Box 1) but they were very much the exception. In contrast, in another case study, a sole trader running a business from premises above a garage, the insulation was so poor that she had laid carpet on top of the linoleum and put in a blind to help conserve some heat; these were the only small measures she was prepared to take as a tenant on a monthly rolling contract.

Box 1: Example of energy efficiency measures adopted by one organisation as part of a major refurbishment

Measures included:

- sensor controlled LEDs and low energy fluorescent tubes
- air handling units incorporating sensors
- zonal and room thermostats
- secondary glazing
- ‘zip taps’ and other energy efficient appliances
- smaller number of more energy efficient servers
- energy efficient office equipment such as flat screen monitors
- circuit breakers for switching off power to work stations in a single action.

As a result of ESOS energy audits in the smaller regional offices that paid their energy bills direct to suppliers, this organisation had taken steps such as putting thermostats in individual rooms and secondary glazing in a poorly insulated area, and a timer on a water heater so it was only on in working hours. They were also looking at lower cost ideas such as thermostats on radiators.

In planning the refurbished head office building, one of the directors had adopted an approach based on taking responsibility for reducing usage away from staff or, making it as easy as possible for them to conform. Sensor-controlled lighting and the single switch for work stations were part of this. He believed that actions such as stickers on light switches or computer screens did not work and that if staff worked out that what was being asked of them made little or no difference, then they would ignore all exhortations to save energy.

- **New and/or refurbished equipment:** once again, this was only identified as a trigger to action by a relatively low number of the organisations in the sample and there were very few examples provided of equipment being replaced as an energy efficiency measure. One organisation used ‘smart’ plugs with their computer monitors; one or two others had installed master switches that turned off equipment and/or lighting.

We have installed plug sockets that turn the computer monitors off at the wall when the monitor goes to standby. (C8; technology consultancy; DM)
- **Improve heating and/or cooling:** there were a few examples of organisations investing in a new boiler or air conditioning units.

We have installed low energy bulbs and a new efficient boiler. We also make sure to turn everything off when not in use. (C8; accountants; DM)
- **Improve lighting systems:** the most frequently mentioned action was to install LED lighting or energy efficient bulbs, sometimes sensor-controlled but again, this was mentioned by relatively few organisations.

We have installed motion sensors on the lights, an instant hot water boiler, make sure everything is turned off at COB and that the machines are switched off over the weekend. (C8; architects and H&S consultants and surveyors; DM)

- **Micro-generation e.g. solar panels:** there were no instances of organisations investing in micro-generation. While a couple of organisations had looked into solar panels, they had not gone ahead, in one case due to the light structure of the roof and on grounds of cost/ROI.

In the few cases where energy efficiency actions had been taken, the impact was commonly assessed by comparison of bills but this was rarely done in the purposeful way suggested by this firm of accountants.

Frustration was expressed by respondents from the head office case study who had been unable to measure the impact of measures put in place as part of the refurbishment, in part because they lacked accurate measures of energy consumption. However again, in terms of the size of their bills, one participant estimated that they had seen around a 20% reduction in their bills since before refurbishment. She was unsure whether this was because of a reduced tariff or a drop in consumption.

We were talking £5,500-6,000 in electricity at some stage, and we cut that down to nearly £5,000 which we were pleased with - a £1,200-1,400 saving in a year [sic] but obviously the introduction of the lighting, because we had some new lighting in offices, so once we needed to change them we put in these energy ones, and it's coming down, we have been seeing a reduction in our energy costs, lighting cost particularly. (C8; accountants; DM)

We have saved so I've never really been able to work out exactly whether it's because we have tendered and got a better deal or because we're reducing. (C8; business advice service; DM)

Key Motivations

The term '**key motivations**' is used to refer to the key internal motivating factors behind an organisation's energy efficiency efforts. '**Other drivers**' is used to refer to any other influence on energy management activity. '**Barriers**' refers to anything that could make it difficult for an organisation to become (more) energy efficient. '**External factors**'¹⁶ could also have an impact on approaches to energy management. (The relationship between these various forces in cluster 8 are summarised in the pathway summary maps, Figure 2, p37, and Figure 3, p38).

- The single over-riding motivation was **cost reduction** even though energy was acknowledged as representing a tiny or small proportion of total operating costs. In the quote to the right from the financial director of a business, it is clear that cost takes priority. Her colleague, a financial

The decision is always whether the money could be spent. I have a veto on control of the cash flow of the practice and to be fair, most of the decisions that are made are based on money rather than on energy or on the greenness; it's all about the money. (C8; accountants; DM)

¹⁶ A number of external factors, such as climate change, energy prices, company reputation, etc. were relevant to how an organisation manages its energy. In some cases, these factors motivated organisations to become more energy efficient (e.g. compliance with government policy initiatives) or were a trigger (e.g. increases in energy prices) but they could also be a barrier (e.g. planning restrictions).

manager who was very environmentally conscious and did much of the ground work on energy issues, claimed that if the cost differential was not large, then she could argue to take the 'greener' option. Cost reduction for them was also about the cost of staff time and helping them to work more efficiently; hence investment in a machine that gives boiling water instantly represented a saving on staff costs irrespective of energy efficiency.

- **Being seen to be a responsible organisation and doing one's bit for climate change** were considered to be important drivers by many of the organisations in the sample. While it indeed appeared important for a few of the organisations to be seen as a responsible organisation, perhaps for business reasons (e.g. tendering for public sector contracts), the desire to be responsible also sometimes reflected the personal values of the owner or other decision maker. However, as observed in the case study interviews, a personal interest in acting responsibly might not translate into the final decision taken by the business. Additionally, this may reflect the organisation's belief that they were only using the energy they needed and were thereby already 'doing their bit'.

The exception in terms of putting a commitment to the environment into action was seen in the large organisation which said it continually questioned whether it was doing enough. The target of a 10 per cent reduction in energy applied not just to those offices where the energy bill was paid directly (where they would benefit from cost savings) but also to offices where energy was paid through the service charge or rent, where there would be no financial reward. Given that their business was all about advising other organisations on issues such as corporate social responsibility, it was also important that they set a good example.

- A number of organisations, as part of the fact finding interview, said that energy management was driven in part **for strategic reasons (e.g. to provide a competitive edge)** and a similar number referred to **supply chain requirements**. However, these did not emerge as important factors for the case study organisations.
- There was a single large organisation in the sample and they were motivated in part by **government policy**, for example, in relation to ESOS.

For me, it's personally very important but not higher up in the company, or we might have set out an environmental policy. Our office staff are quite conscious of environmental issues though and are all on board with things like recycling and energy saving. (C8; accountants; DM)

I just think it's a sensible thing to do. It shouldn't be that we're actively having to do, it should be one of those things you're just doing anyway. (C8; specialist design activities; DM)

We might have something that wasn't just about how much money we're spending, but also was about, 'so are we doing as much as we can?' (C8; business advice service; DM)

It would be the bigger clients, believe it or not, the [name of supermarket]'s of this world or certainly if you're tendering for government work they want to see that you've got certain things in place to make sure you're doing the right thing. (C8; specialist design activities; DM)

Other Drivers

Although across the sample, various other drivers were identified by at least one organisation, no single trigger was identified by a large number of organisations. In other words, **there were no stand-out triggers for the organisations in this cluster** and in fact, many had not reviewed their energy use (see Figure, p37, and Figure 3, p38).

There's no particular moment I can recall, apart from generally when things have been tighter financially in the last couple of years to reduce costs somewhat. (C8; building and planning consultancy; DM)

- The main reason given by those who had reviewed their energy use was as a **response to energy price rises** and several referred to switching suppliers in response.
- A small number commented that they had been prompted into reviewing their energy use by **third party recommendations** or as part of the process of **being assessed for an environmental management policy** or **in response to an energy audit** although this had not always resulted in any action; in one case, this was in response to an energy audit carried out as part of their ESOS obligations (and actions were taken); in another, the audit informed them that they could decrease their usage by installing solar panels or wind turbines (but they had not acted upon this). Two others mentioned receiving advice in relation to ISO/Environmental Management accreditation. Yet another organisation spoke about advice they had received from a shop fitter.
- It was notable from the case studies that when **items of equipment were renewed**, this was done on a 'need to replace' basis rather than planning for periodic replacement or replacing items for a model that was more energy efficient.

Only when costing and renewing suppliers. (C8; digital marketing; DM)

A shop-fitter who renovated our buildings gave us some advice regarding servicing the boiler and replacing immersion heaters with radiators and the floor fan heating. (C8; specialist design activities; DM)

The dishwasher, our dishwasher is really old now and it's probably very inefficient but I wouldn't necessarily want to replace it. It's just because it's working – it's a 'if it's not broke, don't fix it!' scenario, I'm afraid. (C8; accountants; DM)

All other prompted triggers were identified by a small number of organisations in the sample. There was a sense that most of the cluster 8 organisations were doing the absolute minimum and often as a reaction to certain events. For example, several of them identified **an unexpected high energy bill** as something that had caused them to review their energy use.

We have received large bills in the past which caused us to look at switching and where we can make savings. (C8; accountants; DM)

Barriers

The main barriers to energy efficiency in the cluster 8 organisations in the sample are summarised below (see also Figure 2, p37, and Figure 3, p38). None of the barriers were

unique to this cluster but were found in most other organisations in the sample especially smaller organisations that were not using their smart meter data. The exception was the large, multi-site organisation where fewer of the barriers seemed to apply (see below).

- **Staff compliance:** respondents often did not identify staff compliance as a particular barrier in the fact finder interviews although in many cases, decision makers seemed to be relying on their staff using energy wisely with little real attempt to ensure that this was the case. The case study visits often identified lack of staff compliance as an issue.

It's just common sense stuff like making sure staff are turning things off when not in use. We don't have any set procedures. (C8; exhibition services; DM)
- **Condition of buildings:** as previously noted (see Condition and management of buildings, p10) a number of organisations were working out of old buildings, some of which had been converted from warehouses, manufacturing premises, a school house, church premises and even a castle. Either major investment was needed to make them energy efficient or there were planning restrictions. These buildings were often characterised by high ceilings, large open spaces, poor insulation, single glazing or the fact that they were adjacent to unheated areas such as a warehouse, garage or workshop. While newer buildings could be helpful for energy efficiency in that they had low ceilings, good insulation and double glazing, there was mention of large windows that let heat out in winter and overheated the building in hot weather. To bring such buildings up to a standard where they could become highly energy efficient would require levels of investment that businesses felt were not feasible.
- **Buildings leased, not owned:** this only applied to the tenants in the sample. A couple of organisations commented that the terms of their lease had had an impact on the use of energy. In one case, they had to buy stand-alone air conditioning units as the terms of the lease prevented them installing built-in models; in the other, the point was made that any changes had to be approved by the landlord (this was also brought up in some of the case study interviews). Tenants were reluctant to make improvements that they had to pay for; as an example, one of the case study businesses was very aware that the light bulbs they used were not energy efficient and that they should consider changing them to low energy bulbs. However, they were deterred from looking into this by the cost (assuming this to be high) which they did not think the landlord would wish to finance. Where tenants had very short agreements (e.g. rolling monthly), this reluctance was even more evident. In one of the case studies, the landlord was well known to the organisation as somebody who tried to work in the interests of his tenants as well as his own. Prompted by the research, he had offered to look at the energy bills paid by tenants and had identified for the case study business that they had been rolled over on to a disadvantageous tariff and should be paying less. While they did not think their energy bills were high, they welcomed the large reduction they were able to negotiate as a result of the landlord's advice. Where the landlord was responsible for paying energy bills, the tenants in the sample had no control over the choice of supplier or tariff.

Electricity is paid by us but the gas is paid by our landlord and is in with our rent. We control the heating and hot water ourselves but have no choice over the supplier for gas. (C8; design consultants; DM)

- **Energy costs too small/ ROI not worthwhile or takes too long:** the most frequently mentioned barriers were the perception that energy costs were not high enough to make it worthwhile investing in energy efficiency; the returns on any such investment, therefore, would not be worth having or would take too long to materialise. For example, one organisation reckoned that a saving of perhaps £100 a year would not merit the effort and potential inconvenience to switch off computers and printers at night.

Well, our electric bills are so small, I think this month our electricity bill was about £35.00 to £40.00 so you know the way we are, it wouldn't really make much sense to try and change too much. (C8; accountants; DM)

We don't notice it coming out. [] If it went up to £100.00 [per month], we probably wouldn't grumble at that either just because we'd be like, 'oh, that's that, and that's okay'. (C8; design consultants; I)

Tenants were reluctant to invest in energy efficiency measures because of the difficulty of achieving a worthwhile ROI over the course of their lease. Owner occupiers also felt that the return on investment needed to be achieved within a reasonable time span. However, it should be noted that there was little sign that ROI was being considered in any formal way especially when it came to measures such as installing LEDs; there often seemed to be a simple belief that they must be cost effective.

- **Lack of information, time and expertise:** the case studies suggested that the barrier relating to the time that would be needed for staff to undertake changes or simply to be more energy efficient was important to several organisations. Participants sometimes spoke about their focus being on running the business rather than spending time looking at ways to save small amounts of money - greater success in the business more than offset the cost of the energy used to accomplish this.
- **Lack of funds/funding:** this was a constraining factor for many of the businesses within the sample and it goes some way to explain why they had not undertaken more energy efficiency measures.
- **Lack of reliable information about energy use and lack of awareness of smart meter data/ability to access it/know how to use it** compounded the situation (see Non-users of Smart Meter Data, p30).
- **Scepticism about achievable savings:** this was often linked to respondents' distrust of external expertise (see below).
- **Distrust of advisors and reluctance to pay for advice:** one of the barriers to effective energy management was not knowing how to go about finding a service provider and concerns that even if they did find one, they would end up paying for advice which either related to actions they had already considered and rejected, or actions that would be costly to implement.

Looking at the operation side of the business is just a very small part of my job. I also have 50 clients and lots of other things that to me are more important because, when a client asks me to do something for them, I would do that above something for our own business. So I think we've always been a busy small office where you know we are running everything quite tight on the number of hands that we have, because of cost. But I suppose things like that, you just sort of think, 'well, it looks reasonable, it's not breaking the bank, leave it alone, because it's not broke, don't fix it' type attitude. (C8; accountants; DM)

- **Planning restrictions:** a number of organisations in the sample spoke about the impact of planning restrictions.

As noted above, the large multi-site organisation identified fewer barriers compared to other organisations in cluster 8 (see Figure 3, p38). Some of these were shared with other organisations in the sample, namely: issues with staff compliance, energy costs were not a large proportion of their overall operating costs which can make it difficult to achieve worthwhile savings, a lack of funds to make all the changes they might otherwise make and a lack of information about their current use of energy. Two further barriers were identified that were specific to this organisation, namely, although there was a facilities manager, this individual was not an expert in energy management, and in some of their offices, the cost of their energy was rolled in with a service charge.

Smart Meters

With a couple of possible exceptions, none of the organisations in the sample were using their smart meter data to manage their energy. The main reason was a lack of awareness that the data existed or how it could be used for energy management. Response to information about the data that was available was largely lukewarm with pockets of enthusiasm. Expressions of interest were tempered by a reluctance to make an on-going effort to engage with the data except by a larger organisation involved in ESOS.

Motivation for Installing

For several organisations, at least one smart meter was already in place when they moved into their premises; in most other cases the smart meter(s) had been installed after the supplier offered or insisted. A couple of organisations had asked for a smart meter to be installed; one of these had done so on the suggestion of their energy broker.

Occasionally, organisations had requested or been invited to have a smart meter to resolve issues around billing i.e. to avoid estimated bills or high bills that did not reflect usage. As noted above, unexpectedly high energy bills had been a trigger for some organisations to review their energy use.

[Energy supplier] gave us the run-around until they provided the new meter. [] I think it got changed because we were having random gas bills, the whole place was empty, no-one was using anything and I was getting £600 bills and I had no idea why. (C8; specialist design activities; DM)

Another business had agreed for the smart meter to be installed on the grounds that in the future they might be more concerned about their energy costs and wish to monitor them more closely.

One business occupying a multiple occupancy building was unaware that they had a smart meter for their electricity supply or where it was.

The main benefit of having a smart meter was seen as having accurate rather than estimated bills, which in at least one case, helped with cash flow management. Remote automatic reading of the meter was seen as an essential part of this.

Installation Experience

None of the case study organisations that were aware of their smart meter being installed recalled being provided with information around the time of installation. However, a couple of businesses were keen to make the point that if the installer had offered to show them the sort of information they could get from their smart meter, they would probably have declined.

There were a small number of reports of issues relating to smart meters and their operation from the case study participants. The first was from the organisation that had a contract with the data monitoring and reporting company that installed their smart meters about a contract for £250 p.a. They were unaware what this charge was in relation to and had queried it with the provider but the issue had not been resolved. During the course of the case study visit, the respondent wondered if it was supposed to relate to the provision of their smart meter data, something she was keen to be able to access.

The second issue was described by the landlord of one of the multi-occupancy sites; he had changed gas suppliers but the new provider was unable to read remotely the smart meter put in by a previous provider and so a caretaker had to take manual readings. The last issue also involved taking readings manually from the smart meter (this was subsequently resolved).

Non-users of Smart Meter Data

None of the organisations were accessing smart meter data remotely except possibly one. This was a business consultancy that reported in the fact finder interview that it used an 'online energy monitor' with which it could track its consumption. However, it also said that the data did not enable it to manage its energy use.

The main reason for not making use of smart meter data was a lack of awareness that it existed or how to access it. A few of the case study organisations reported that they had simply been told by the supplier that the new meter would provide 'real time energy use', would allow the meter to be read remotely, and accurate billing.

A couple of case study organisations were taking manual readings from their smart meter with the intention of tracking consumption, but neither was currently using the data to help manage their energy. As previously noted, one of these was preparing to benchmark its use with a view to setting targets for a 10% reduction. They had also taken readings about eight months previously before and after weekends and found that there was a spike in consumption. They traced this to an air handling unit to which, as a result, they fitted a timer to resolve the problem. The exercise had been carried out in all offices but it was not without problems

So we did go through an exercise where, for five weeks on a Monday morning, they would read the meter and send it back to us. But the problem with that is that it wasn't always the same person who was in the office and whether they would remember and you know, blah, blah. So the ability for it to be read remotely, to be able to tap into it and read it remotely, would be immense as a resource. (C8; business advice service; DM)

when people sometimes forgot to take the readings. The facility to access data remotely from head office therefore had great appeal for them.

In the other organisation, even though a report was being produced on consumption levels regularly by a consultant and recommendations may have been made, the director was not reading it and following through.

In some of the case studies, respondents had used smart meter data from their domestic providers and had been able to view their household consumption profile online which they had found interesting. However, none identified measures they had taken as a result to manage their energy use. In one of these organisations, the participant had higher expectations of what smart meter data should be able to deliver to his organisation and how it should do this (this was before being shown information about what was possible). This included profiling consumption over various time periods to allow comparisons, plotting consumption against outside temperature and looking at the energy consumption of different devices. Another respondent in the organisation wanted to use the data to identify energy use out of hours as well as the impact that switching off devices could have. However, this level of expectation about what smart meters could do was very much the exception.

So instead of us having to do it [take readings] every morning, or morning, lunchtime and dinner, that we could see whether it's spiked and whether the spiking is something which we can identify and go, 'oh yes, Wednesday afternoon, yes it went up because actually there were 14 people all doing major photocopying exercises'. (C8; business advice service; DM)

Reactions to Products and Services

Towards the end of the case study visits, respondents were shown a range of material to illustrate how smart meter data could be used to help make energy management decisions. Overall, there was a lukewarm reaction from the case study respondents to this. Interest levels for the majority were fairly low and often accompanied by comments about the size of bills not meriting the time and effort required to examine the data or make changes or whether it would reveal anything they did not know or indeed, whether there was anything that could be done to become more energy efficient. Moreover, there was a reluctance to make changes to practices to save energy that might have an impact on staff efficiency.

It is interesting to know that information is there to do something with. Whether I'll have the time or the inclination to do something with it is another question. (C8; specialist design activities; DM)

However, very few rejected the idea of accessing the data completely and respondents in a couple of case study organisations expressed great interest. One of the most enthusiastic was the sole trader who had had experience of looking at consumption data from her domestic smart meter and who was keen to reduce her electricity bill given that it equated to a quarter of her rent.

I'm fascinated now! I've got this smart meter and I'm not using it for what it's useful for. But certainly, having those breakdowns hour or half hourly intervals, that's really interesting information. Anything to get down my electric bill. (C8; occupational therapy; DM)

Methods of accessing data

Participants in the case study interviews were shown information on how smart meter data could be accessed (see Figure 4, p44). PC or laptop were selected most frequently as the preferred way of doing this, based on the fact that many respondents were accustomed to using these tools in the work environment. A couple of respondents appreciated being able to check on consumption remotely at weekends, possibly on a smartphone or tablet.

A few others liked the idea of a visual display which could be placed in a position that they or staff could see. In one case, the business owner thought that having a display visible to staff would enable them to see the impact of such measures as switching off lights. In another case study however, a respondent was dismissive of the idea. He had tried using a visual display connected to a traditional meter in another office and found that staff took little notice.

Just coming back to the fact that I think we don't have the time to monitor it on a regular enough basis. I mean it's all very well saying we can look daily or whatever, but if I look daily I might just look and go, 'okay, that's wasted five minutes of time, I'll go back'. I wouldn't necessarily do anything with the information. (C8; accountants; DM)

It was clear that given the focus of their role was not on energy management, most case study respondents would not be able to give much time to the exercise and would not want to do so regularly.

Moreover, they needed the data to be very easily accessible and understandable. Some did not want to have to log in to any website to access the data and indeed, some questioned why their supplier could not provide the information, possibly accompanied with some pointers as to what to think about.

Parallels were drawn by a couple of decision makers with the level of Interest in accessing other types of utility data, such as information about telephone calls; while one had found this very useful, another did not have the time to access and scrutinise it.

Added value services

A number of participants voiced some interest in looking at **consumption over time** and in particular, their use of energy out of hours to see whether they could make worthwhile savings. Of particular interest for a few was the impact of leaving certain devices (particularly computers) on overnight or the cost of using portable heaters to supplement the background heating provided by a gas fired boiler or electric storage heaters.

I would see for the first part of the morning who switches on the electricity heaters that we have around the building, and there would be a spike at certain times of the day. (C8; accountants; DM)

Something like that might be useful if you could actually see where your peaks and troughs were, to see if you could actually take some of them out and then also to see if by doing the process, you could then monitor how much it had changed by, to see if it was worth the effort I suppose. (C8; accountants; DM)

However mild enthusiasm was often followed by doubts about whether the causes of peaks in consumption could be identified and addressed and whether any savings would merit the effort and time. For example, a respondent in the accountancy firm that left computers and printers on overnight to enable remote working thought that they would be able to measure the impact of switching them

off on their consumption/bills but they would also be testing whether it was viable for them as a business to remove the facility to have remote access.

Device disaggregation (see Figure 8, p47) was sometimes seen as a facility that could be 'nice to have', again to identify when portable heaters were being used or to see the effect of leaving devices on stand-by. Again however, interest was often accompanied by scepticism about how useful it would be in practice for a small business with small energy bills.

In contrast, the three respondents from the multi-site organisation identified that the information available from their smart meters should address their needs and help support their efforts to reduce energy consumption. The facilities manager had assumed that they would need a Building Management Systems (BMS) to achieve the same level of information and was pleased to see that this was not necessary. All the facilities on offer were of interest.

While a few of the case study participants thought they might place a visual display where it was visible to staff, there was very little interest in **setting targets** (see Figure 9, p47) that involved staff making a contribution to energy savings unless it was to ask them, for example, to switch off their computers at night, possibly by sending an email.

The only exception was again the multi-site organisation where they needed to involve their offices in achieving the 10% reduction in usage identified for ESOS. The facilities manager could see that setting targets and monitoring usage against these would be valuable; however a director from the same organisation expressed caution about comparing offices as they varied so much in their size and form. He saw the data as a tool for facilities management more than something to be used to engage staff.

Willingness to pay for added value services

Some decision makers thought they might be prepared to pay for these types of service if they felt that it could help identify where energy and cost savings could be made.

The need to engage with another provider and pay for their services did however represent a barrier for others on the grounds that savings were likely to be small or that they were already aware of where savings could be made and did not need data to tell them this. Again, there was a feeling that energy providers, like telephony, should be supplying information and guidance free of charge. The point was also made by the facilities manager that it would be so much simpler if the energy supplier provided this information without having to deal with other organisations.

Several participants expressed a reluctance to engage in on-going monitoring as opposed to identifying issues and resolving them as a single or occasional exercise and this also put them off the idea of subscription services.

The participants from the multi-site organisation that were most positive about having access to smart meter data were prepared to pay for this and possibly associated analysis and guidance based on the findings. There was an expectation that this could cost hundreds of pounds but for an organisation of their size, it should be worthwhile.

It depends what that charge is and if I were tied in for any long period of time. We're a small business - after a month of usage maybe I'd have probably figured out all I really need to figure out. Maybe I need a month in the winter, one in the summer, I don't know. But it'd be one of those things that I wouldn't want to pay continuously because I just wouldn't use it that much. (C8; specialised design activities; DM)

What would stop me? If I had to do something on a very regular basis like check all the monitors, or check the computer every five minutes and needed to log into something. Or if it was going to cost us to subscribe to the service in the first place, is the cost of the subscription going to outweigh the cost of any savings that you might make you know, when you're not saving large amounts of money? (C8; accountants; DM)

Methods of engagement

Respondents' views on different ways of engaging them with energy efficiency information and advice (access to a mentor, networking opportunities, case studies illustrating how other organisations had managed to reduce their consumption) were briefly explored (see Figure 11, p49). Given the lukewarm response to investing in energy efficiency and engaging with smart meter data, the idea of mentoring and networking was not well received by most case study organisations. They were sometimes seen as taking up time that would return very small savings and involving other people made it seem like too much trouble. One respondent suggested that small local business centres, one of which was located across from their offices, might have a role to play, perhaps by making a presentation about smart meters and what they could offer. Moreover, it tended to be the owner occupiers who were more disposed to engaging with a mentor.

Case studies are just generally quite interesting, if you had a case study, 'x small design company, very similar to yours, did this, this and this and then they used the savings to buy the third,' you'd pay attention and think, 'that's like us, we could do that.' (C8.19; DM)

Networking was more favourably looked upon where the respondent was already part of an active network; most notably, the facilities manager who attended meetings on a regular basis with facilities managers from other, similar organisations. Even here however, some doubt was expressed about the usefulness of the experience that was shared here as organisations, their premises and their financial situation varied so much. However, she thought she would put smart meters on the agenda for a future meeting.

Since the internet was an important source of information, case studies were seen as potentially useful by a few but would need to approximate their own situation to be useful. It was also questioned how one might be driven to find those case studies.

A couple of participants thought that an online forum would be most useful to learn from others' experience.

The suggestion was put forward by one of participants that it would be helpful to have some benchmarking information for different sizes and types of premises against which an organisation could compare its energy performance. It might then aspire to improve this.

If there was an online forum that we found through Googling where people were actually exchanging ideas and give slightly more detailed solutions, you'd probably want to engage in it that way. I think these one to one mentoring relationships are very difficult to maintain and to establish and sustain and the conversations you're having aren't really private conversations. The best thing is an online open forum where people can learn from each other very, very quickly. It's how the IT world solves most of its problems is to use online Q&A's. (C8; business advice service; DM)

One of the key things as well as really trying to understand your own data is to put it into context. So if DECC can provide benchmarking information so that you can describe your organisation maybe in size or square footage of premises [], then get some benchmarking data of what a typical organisation your size ought to be using, then you've got a benchmark. You've got something to try and beat or something to try and make sure you're always in the top quartile if there's a range or something like that. (C8; business advice service; DM)

Conclusions

This chapter summarises the key findings relating to cluster 8 and the implications of these for consumer engagement with energy efficiency and the role smart meter data has to play within this context. The emerging themes across all of the clusters and overall conclusions and implications can be found in the main report.

Summary of Key Findings

Summary pathway maps¹⁷

Two pathway maps were developed for cluster 8, one based on the majority of case study organisations that were micro or small in size (see Figure 2, p.37), and the other for a large, multi-site organisation (see Figure 3, p.38). None of the organisations were making use of smart meter data but the larger organisation had identified a need for such information and once made aware of it, was keen to have access. It was the most likely candidate to become a user.

The maps display a number of boxes that group together various factors that are involved in energy management. The four boxes shown within the central red box relate to those things that are internal to the organisation itself and include important organisational factors, the key motivations for trying to manage energy efficiently, the internal actors that have a role in energy management. The fourth box labelled Energy Management summarises how, if at all, the organisations were analysing their energy use, the energy saving actions that had been implemented and the extent to which the organisations had achieved energy savings and reductions in energy costs.

The boxes labelled Other Drivers and Barriers are shown at the top of the map inside a pink box. They include a mix of internal and external factors that influence energy management.

The yellow box at the bottom of the pathway map summarise things that are external to the organisation and is divided into External Actors that played some role in energy management, together with any particular Engagement Strategies that were being adopted. The External Context box outlines external factors that were relevant to how the organisations managed energy.

¹⁷ A pathway map is intended to help summarise the various factors, triggers and barriers that result in an organisation or a group of organisations managing energy in a particular way.

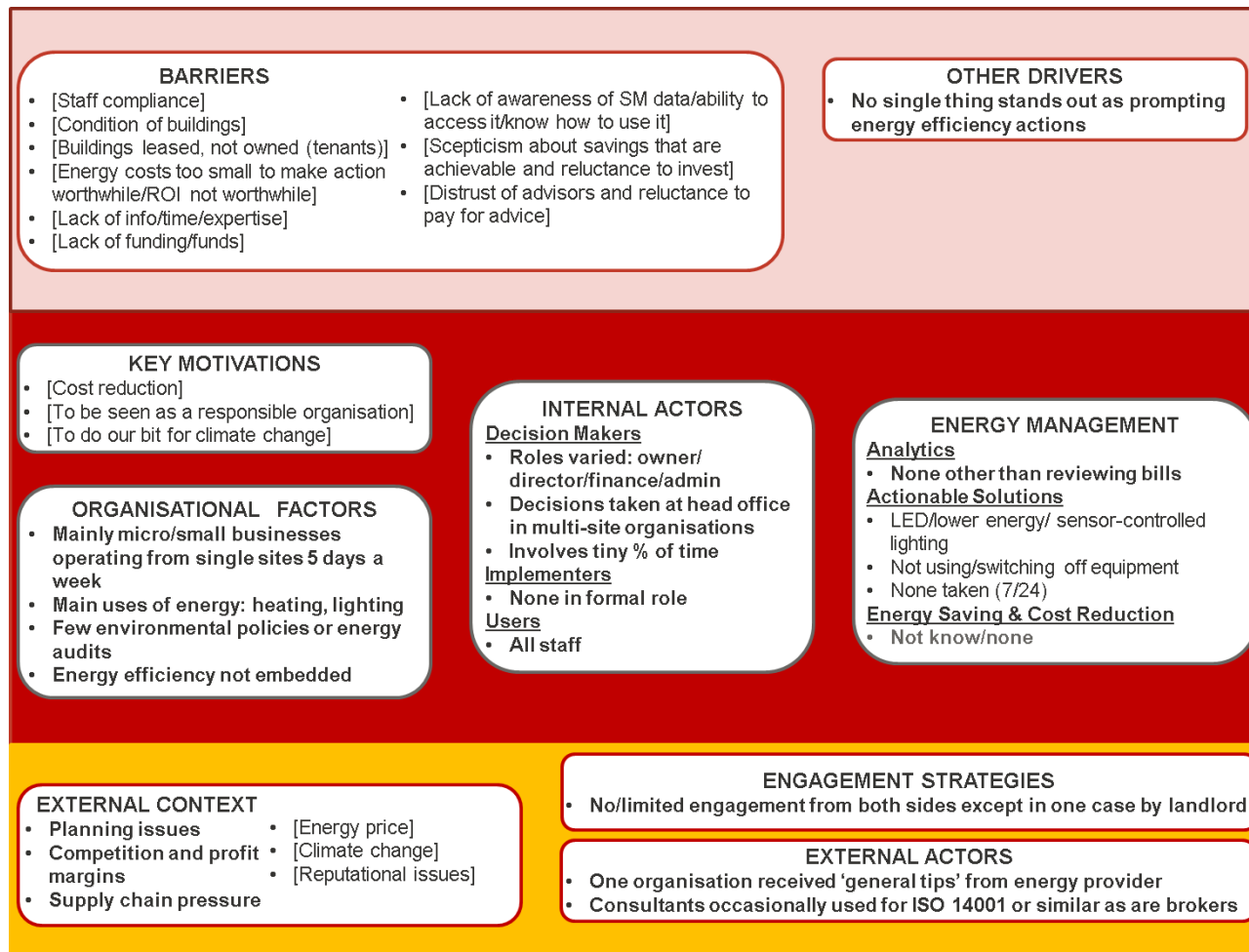


Figure 2: Summary pathway map for non-users of smart meter data in cluster 8

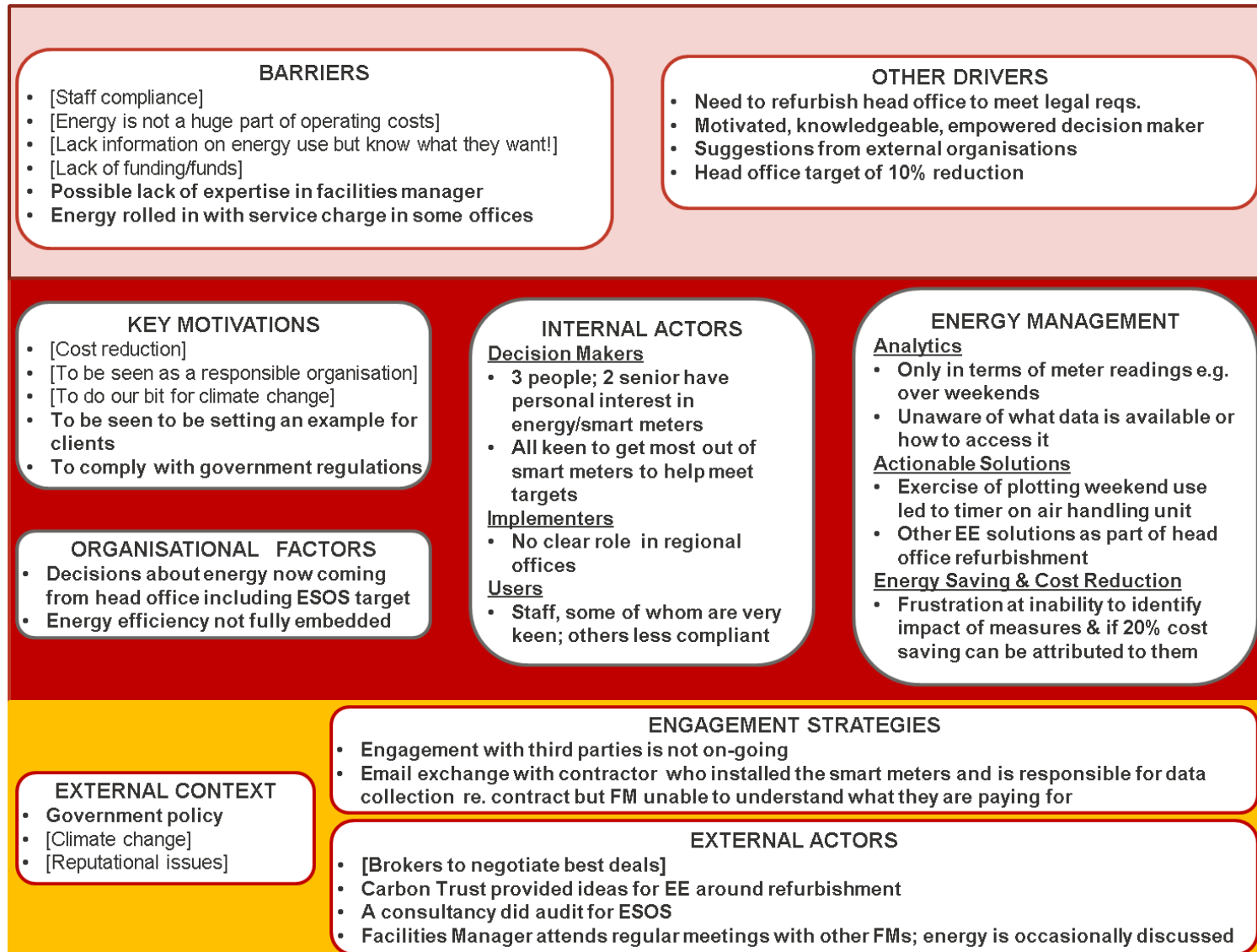


Figure 3: Summary pathway map for potential user of smart meter data in cluster 8

Factors that were common to all or most of the six clusters are shown in [square brackets] as they do not appear to differentiate between clusters. However, these maps should be interpreted with care as they are based on the experiences of a relatively small number of organisations.

Cluster specific findings on energy use, management and associated influences

This section summarises the factors that applied to the Cluster 8 organisations in the sample. There were very few factors that only applied to cluster 8. Most factors were also characteristic of other, smaller organisations that were not using their smart meter data. The single large organisation differed from the other organisations in the Cluster 8 sample on a number of counts.

The factors or characteristics that applied, in particular, to Cluster 8 were as follows:

- Heating and lighting were the main use of energy. Most were operating from a single site five days a week.
- The decision makers were often the business owners although some were employees in an IT, finance or administrative role; this may reflect the fact that the owners placed less importance on energy management.
- Compared to other clusters, there were no stand-out triggers for energy efficiency actions identified by organisations in cluster 8.

In addition, there were a number of factors or characteristics that applied, in particular, to the single large organisation in the Cluster 8 sample:

- They gave much greater weight to energy efficiency largely because their business involved advising clients on issues relating to corporate responsibility which included environmental sustainability. They also came under the ESOS requirements and had set themselves an energy reduction target of 10 per cent.
- While they had invested in energy efficiency at their head office, energy efficiency was not fully embedded across the organisation.
- They were unaware of the potential of their smart meter data to help manage energy more effectively but they were interested to find out more.

The other factors and characteristics found among Cluster 8 organisations were also common to many small organisations across all clusters.

- Energy efficiency was not embedded within the organisational culture and those responsible for energy management were typically spending a tiny percentage of their time on it.
- Most did not have environmental policies and had not had an energy audit.
- They were typically operating on low margins and cost reduction was the over-riding driver of any energy management that went on. However, there were many more barriers than triggers to energy management.
- Although reducing energy consumption was reported to be a priority, in reality this did not translate into action, in part because energy was perceived to be a relatively small

proportion of their overheads and organisations were reluctant/unable to invest in energy efficiency measures; lack of funds/funding was a particular barrier.

- Although some claimed that they knew how to be energy efficient, this was often based on a simplistic model of turning equipment down/off. Indeed, many felt they had limited scope to control their energy use because they felt unable to turn items down/off as they were essential to the running of the business.
- Smart meter data was not being accessed or used due to a lack of awareness that the data was available, how it was accessed, and how it could be used to manage consumption.
- There was no evidence that energy suppliers or meter installers had attempted to engage customers with the benefits of smart meter technology other than the fact they provide accurate meter readings remotely.
- When shown what information was available and how it could be accessed, reactions were typically lukewarm; there was little appetite for 'value added services' especially if these attracted a cost.

Smart meters

There was no evidence that the installation of a smart meter had resulted in an organisation embarking on an energy efficiency journey. The most that organisations were currently doing was to track their consumption by taking meter readings manually (something they could have done with their traditional meters) and there was only one example among the case studies of where this had resulted in action to resolve a problem with unnecessary energy use – once again, this was the large organisation.

Even though a few participants had used smart meter data from their domestic energy supply, there was no awareness that this was available to them in the business context. Their assumption was that accuracy of billing enabled by remote reading of their meters was the central benefit of smart meters. There was no evidence of energy suppliers, installers or energy consultants providing audits, making organisations aware that data could be accessed and used to help manage energy use.

Research Implications

The importance of size

Most of the organisations in the cluster 8 sample were classed as 'micro' or 'small' and this had an impact on their approach to energy management. What follows also applied to many of the smaller organisations found in all the clusters covered by the research sample. As such, size of organisation appears to cut across the cluster based approach to segmenting the market place.

The relationship between the size of an organisation and the approach to energy management is outlined below.

- Many of the organisations were tenants and were sometimes on short, rolling contracts – there was therefore little incentive to invest in energy efficiency measures.

- They were sometimes in older buildings or buildings that had been converted rather than purpose-built offices. These presented some challenges in terms of energy efficiency that would require investment to improve their performance.
- They either lacked facilities management or this was a very small part of the role of a staff member.
- They perceived that while it was important to reduce their energy costs, these were not unacceptably high and therefore energy management was not given high priority.
- The organisations typically had flat structures and being small, it was felt that they had a good idea of how energy was being used so that there was not a need for formal policies or staff engagement on the issue of energy efficiency.
- The only large organisation in the sample presented a notable exception to this pattern; although a tenant, it had invested heavily in the refurbishment of its headquarters site and in the process had installed many energy efficiency measures. It wished to demonstrate to its clients that it was playing its role to minimise its impact on the environment, it had a full-time facilities manager and its target of a 10% reduction in energy consumption as part of ESOS was evidence of the high priority it gave to energy management.

Engaging organisations in using smart meter data: key learnings

As noted, the organisations in the sample had smart meters in place but were not using the data to help manage their energy, or were not doing so on a regular basis. The key learnings from the research about how to engage these organisations, as well as those organisations that have not yet had smart meters installed, are summarised below. Although what follows is based on the findings from Cluster 8, they apply to other organisations across the sample that were not using their smart meter data.

- Decision makers need to be aware that they can access smart meter data in order to make use of it.
- There was no single preferred method of accessing the data; access via a PC or laptop was often expected but offering a choice will be important to cater for different preferences.
- There was no interest in data for its own sake and most of the non-users in the sample need help and guidance about how to apply their smart meter data within their own context.
- In addition to profiling consumption to identify peaks and out of hours use, device disaggregation seemed to offer the means to identify the causes although smaller organisations often felt they could do this themselves.
- The lukewarm response among small organisations to having access to smart meter data, and scepticism about whether its usefulness will outweigh the time and effort needed to engage with it, suggest that access needs to be straightforward and the interface easily understandable; guidance on interpreting the data is required.
- The reluctance to monitor data on a continuous or regular basis also suggests that some form of exception reporting (for example, alerting decision makers about

unusual/unexpected consumption via email or SMS) may be a more effective method of engagement.

- Small organisations were unwilling to pay for 'added value' services unless the savings were not only greater than the cost of the service but also did not involve a lot of time and effort on the part of hard-pressed staff.
- The larger organisation felt that engagement with smart meter data and energy management warranted time and effort; moreover, they would be more likely to be prepared to pay a reasonable amount to be provided with added value services including diagnostics.

Appendices

Research Questions

Box 2: Research Questions

- How does the population of smaller non-domestic sites covered by the smart metering mandate use energy and make energy efficiency related decisions? How do these uses and decision-making processes vary according to key characteristics?
- In what ways do different types (i.e. clusters) of smaller non-domestic sites covered by the smart metering mandate interact with;
 - other key influencing actors (e.g. energy suppliers, facilities managers, landlords)?
 - other influences on energy management (e.g. energy prices, reputational and/or corporate social responsibility)?
- How does data from smart meters contribute or have the potential to contribute to improved energy management, energy efficiency and reduced energy consumption in smaller non-domestic sites? What are the barriers to improvements? How does this differ for different types of smaller non-domestic sites?
- Based on an understanding of the support, products and services being (or planned to be) provided to help increase awareness, what is the level of understanding and use of smart meter data within small-non domestic sites? What has been or is likely to be the take-up or response from non-domestic sites?
- What are the implications for maximising the benefits of smart meters (in smaller non-domestic sites)?

Stimulus Materials

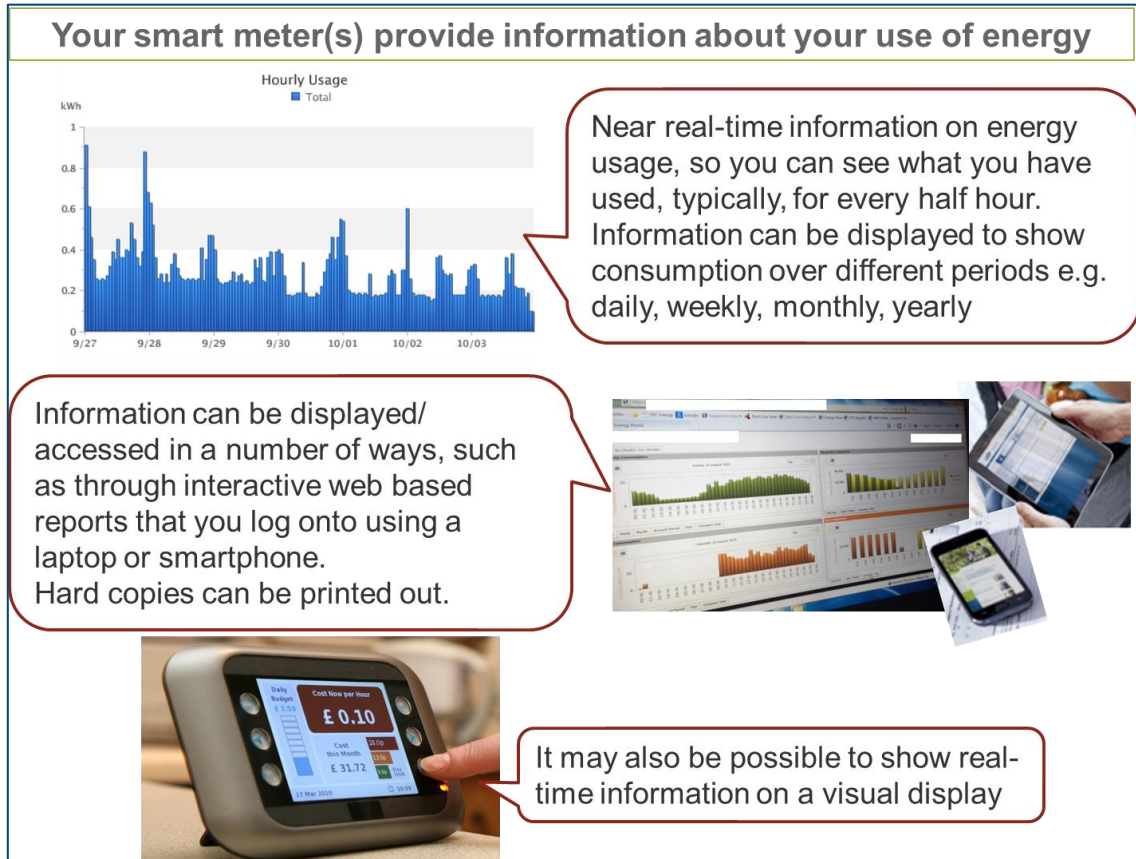


Figure 4: Methods of accessing data

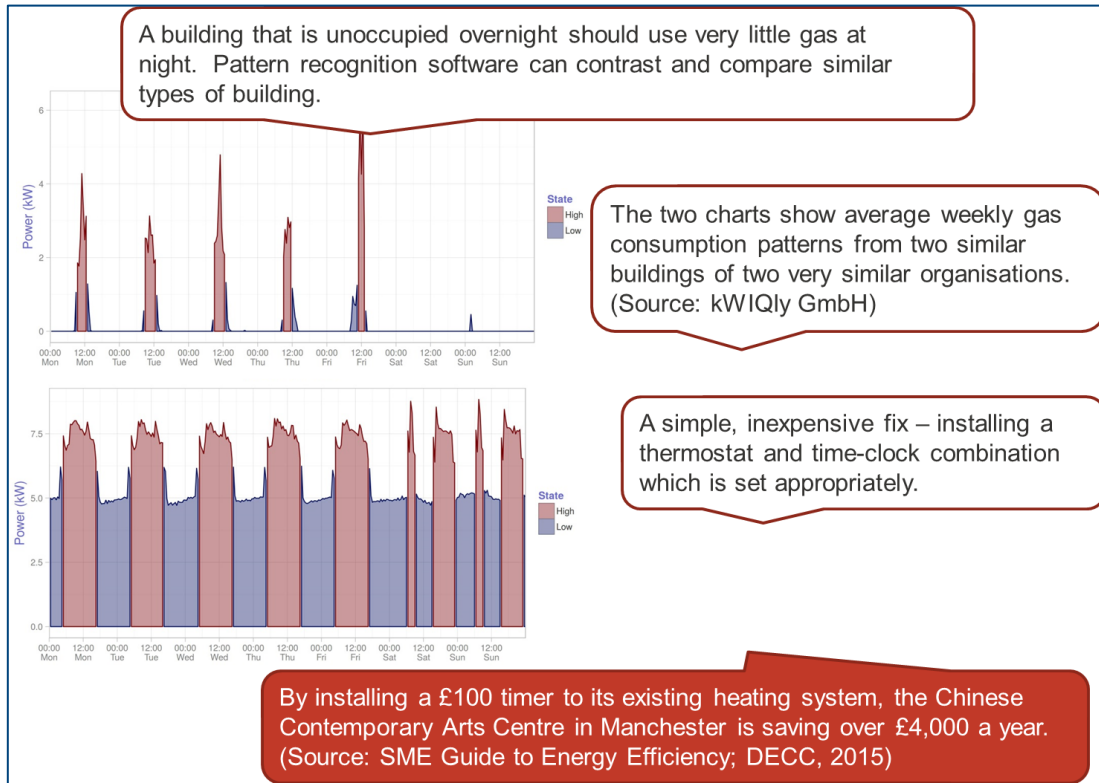


Figure 5: Example of pattern recognition (heating vs. external temperature)

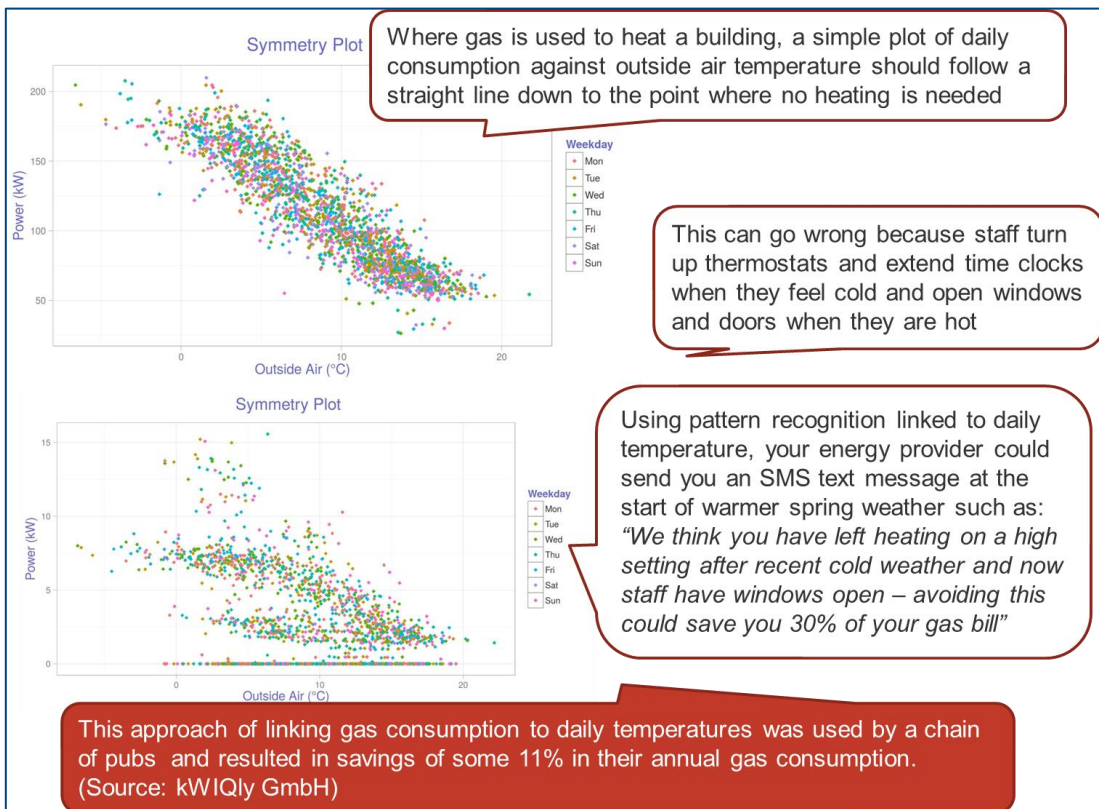


Figure 6: Example of pattern recognition (heating)

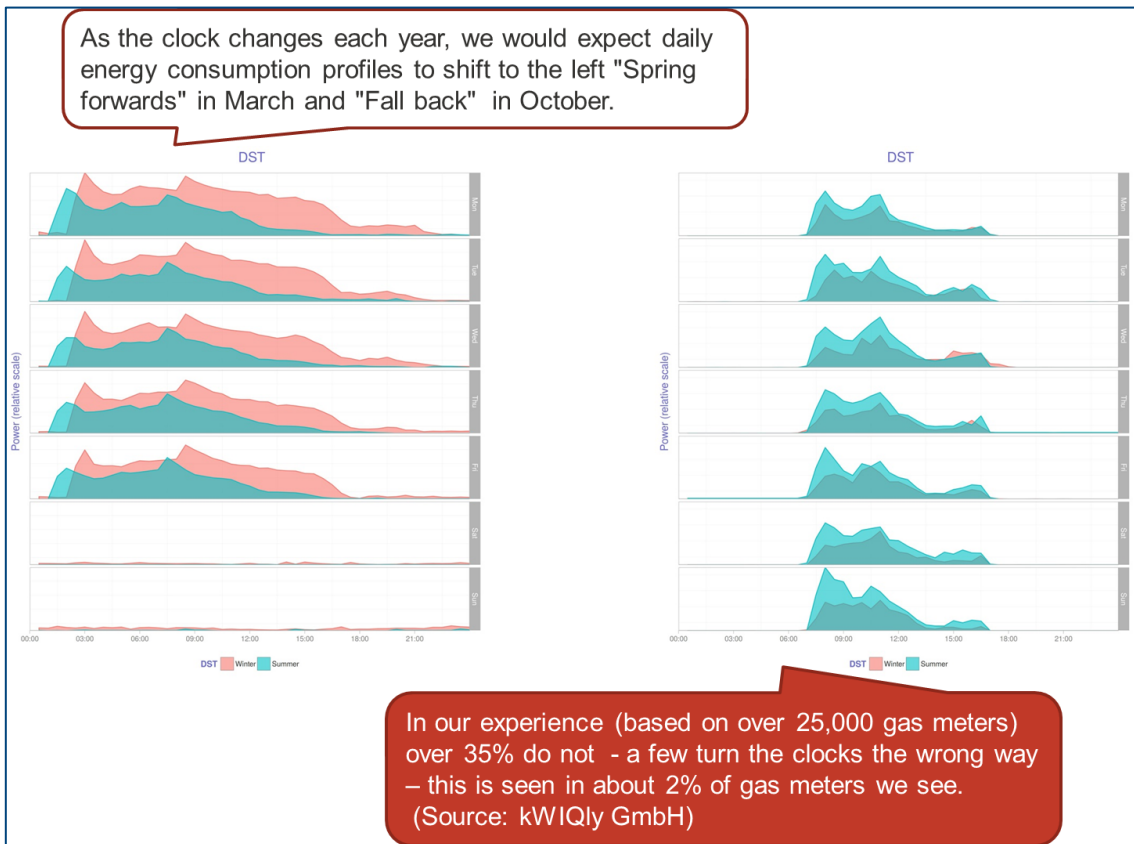


Figure 7: Example of pattern recognition (British Summer Time)

Do you know how much energy individual appliances use and what they cost to run?

- You can find out by subscribing to a service that uses software to identify which items of equipment are in use at different times and how much energy they are consuming e.g.
 - identifying equipment that is switched on when it is not needed – e.g. perhaps the automated controls have been manually over ridden and not reset
 - identifying equipment that is using more energy than it should – e.g. perhaps an air conditioning unit needs servicing

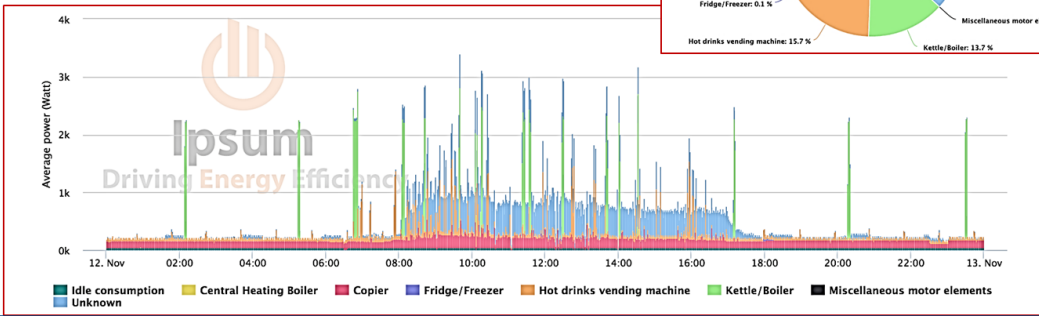
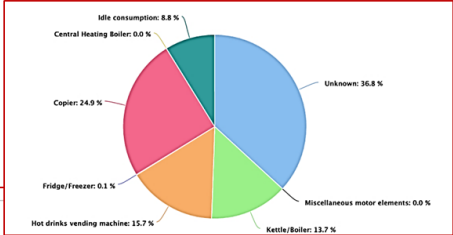


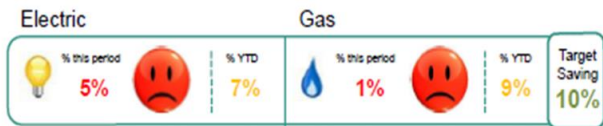
Figure 8: Example of device disaggregation

Encourage and engage your staff

Energy Savings Report



You can use your smart meter data to set meaningful targets and then measure how well these are being met and feedback the results to your staff



Target being met/exceeded
 50%+ towards meeting target
 Less than 50% towards meeting target



A visual display could be used to provide staff with real-time feedback.

Figure 9: Staff engagement (individual site)

Encourage and engage your staff

Target being met/exceeded
 50%+ towards meeting target
 Less than 50% towards meeting target

You can use your smart meter data to set meaningful targets and then measure how well these are being met, compare the performance of different sites and feedback the results to your staff.

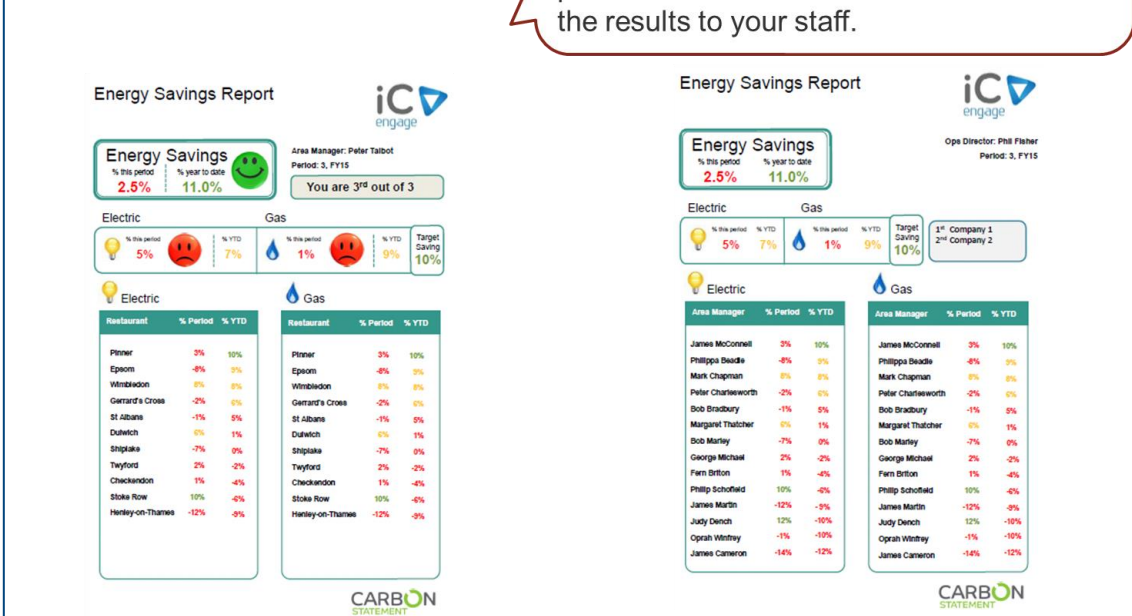


Figure 10: Staff engagement (multi-sites)

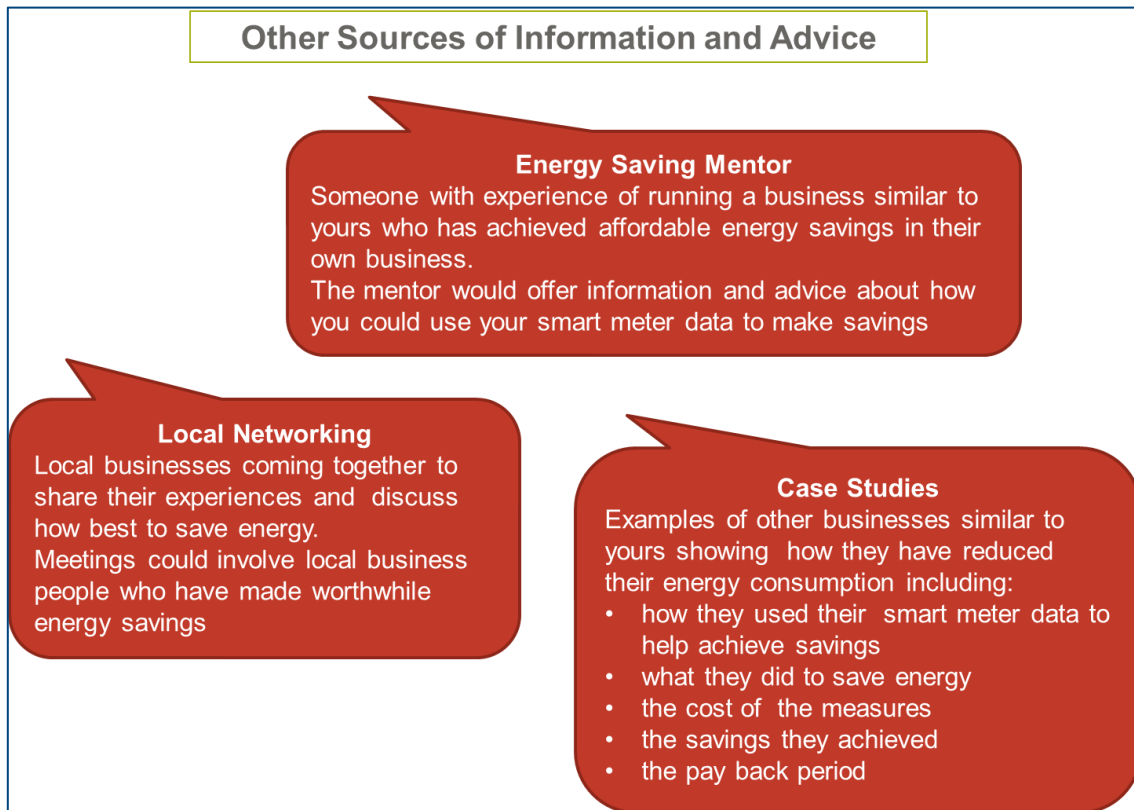


Figure 11: Other sources of information and advice

List of Reports

Non-Domestic Smart Metering Early Learning Research reports:

- Main Report
- Annex 1: Cluster 1 - Higher energy, customer facing chains
- Annex 2: Cluster 2 - Small Public Sector Sites (Schools)
- Annex 3: Cluster 3 & 4 - Small, customer facing independents
- Annex 4: Cluster 5 - Lower energy, customer facing chains
- Annex 5: Cluster 7 - Higher energy, employee only sites
- Annex 6: Cluster 8 – Offices
- Annex 7: Landlords & Tenants

Technical Report

