Department for
Business, Energy
& Industrial Strategy

SMART METERING NON-DOMESTIC 'EARLY LEARNING' RESEARCH

Annex 7: Landlords and tenants

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The views expressed in this report are those of the authors, not necessarily those of the Department for Business, Energy & Industrial Strategy (nor do they reflect Government policy).

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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 annex focuses on a sample of landlords and tenants.

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 SMETS compliant 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

[1] A list of the full set of documents is provided in the appendices; see

List of **Reports**, p47

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.

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;

i. explore how 'smaller non-domestic sites' use energy and make energy related decisions

ii. 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

iii. 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.

The key research questions to be answered are summarised in Box 3, p37.

Method[2]

The research programme was conducted in two stages; the approach was modified after stage 1 to reflect lessons learned. The stimulus shown to participants also varied slightly over the two stages and the two versions are included in the appendices. The main sample was structured around a series of 'clusters' defined on the basis of the type of organisation. All the clusters included a number of organisations that were tenants who were interviewed by telephone or face to face during case study visits. Where possible, attempts were made to interview the landlords or property agents with whom they dealt.

Landlords and property managers were recruited to the study in two ways; most commonly, they were identified by decision makers in the case study sites and contact was then made. While all tenant decision makers taking part in the stage 2 fact finder interviews were asked about their landlord, many were reluctant to identify them or involve

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

them in the study. Where landlord details were provided, many of them were unwilling to take part.

Landlords and property managers were also approached directly either using leads provided by DECC or using a purchased sample[3]. The aim was to recruit a small number of landlord focussed case studies. However, only one landlord agreed to take part in a fact finder telephone depth interview. Although the participant was willing to try and identify a suitable case study site, including some tenants, this proved impossible to arrange within the timescales of the project.

The interviews with landlords and managing agents focused both on the site of the tenant organisation that participated in the research as well as covering the landlord and/or managing agents' wider approach to energy management across their portfolio.

Landlord and Tenant Sample

Landlords and managing agents

The sample comprised a total of seven landlords and property agents from across the different clusters conducted over the two stages of the research. Although the sample included a range of different types of landlords and managing agents, the small number taking part and the difficulties encountered in persuading others to do so means that it is not in any sense a representative sample.

The roles of those who were interviewed varied. They included two sustainability managers/advisors from large private landlords who were approached directly, and property managers from local authorities, a development agency and a private property management company as well as a single small private landlord who were identified by tenants. The size of their portfolios ranged from thousands of properties to just one.

Box 1 summarises the types of participant, their roles and the size of their portfolio.

The responsibilities of those in a sustainability role included compliance around energy and related issues, energy performance and efficiency across the portfolio, embedding sustainability into the company and the supply/procurement chain, internal training and reporting on sustainability. While the sustainability managers in the sample had an overview of energy management, they were less involved with individual buildings. The property managers on the other hand, whose responsibilities might include finding new tenants and troubleshooting problems, were more familiar with individual buildings but were more remote from central services in, for example, local authorities that dealt with energy management. It should be noted that landlords and property managers were asked not only about the case study sites but also about their wider portfolio and indeed, some were unfamiliar with particular sites. The findings in this report are therefore not necessarily directly relevant to the specific case studies or the clusters from which these were drawn.

[3] See Technical Report for further details on sources used for sampling

Care should be taken in making comparisons between different types of landlord and property manager and drawing conclusions about levels of engagement within their different organisations with energy management since we were unable to talk to all who might be involved within an organisation.

Box 1: Types of landlord and size of portfolio

2 x large private landlords

- 100+ commercial sites including shopping malls, ports, office developments etc., often high energy use; discussions focused on a multi unit office building although it was not possible to arrange a case study visit. The respondent was an Energy Manager
- several thousand commercial and residential property portfolio; the case study was an independent retailer with a single site. The respondent was a Sustainability Manager

2 x local authority landlords

- city council; the case study was a retail outlet with high intensity energy use. The respondent worked within Property Services managing parades of shops
- county council – a mixed portfolio of business centres, industrial space and large office buildings occupied mainly by SMEs: the case study was an importer and manufacturer of equipment. The respondent was a Property Manager for part of the portfolio

1 x small private landlord

- the owner of a single property, a multi-occupancy warehouse with 18 units; the case study was a creative agency occupying one of these

2 x property management agencies

- one in a large company managing mainly residential sites, the case study offices were on the ground floor of one of the sites. The respondent looked after several similar sites
- the other in a development agency managing over 100 office and light industrial units on behalf of the local authority; the case study was a manufacturing business in one of the light industrial units. The respondent was the Managing Agent for several business and enterprise centres.

Tenants

The views of tenants taking part in the research were also sought on the relationship with, and responsibilities of, their landlord as well as of other actors who had experience of exchanges with landlords. The latter included the energy manager of a school and an energy consultant who offered such services as negotiating energy contracts, monitoring, measuring and analysing energy use, carbon reporting for the Carbon Reduction Commitment CRC scheme and conducting audits for the Energy Savings Opportunity Scheme (ESOS)[4]. In addition, there were a small number of organisations in the case study sample that either owned the building that they occupied and rented out parts of it, or were tenants and sub-let parts to other organisations.

[4] The CRC Energy Efficiency Scheme is a mandatory reporting and pricing scheme to improve energy efficiency in large public and private organisations. The Energy Savings Opportunity Scheme (ESOS) is a mandatory requirement for all large businesses to undertake regular energy audits. Rather than having every outlet audited, organisations were often selecting a cross-section of outlets; these may not have included the case study sites but lessons from other sites were being transferred. Terms highlighted in blue text are defined in the glossary of the main report.

Fifty five organisations involved in the research were tenants and the details of the site that was the focus of the interviews and/or case studies are briefly summarised below.

- High energy consuming, customer facing chains (cluster 1): the selected sites of two organisations were tenancies; one of these took part in a case study visit. Both organisations were classed as large (>250 employees in total)
- Small customer facing independent organisations (cluster 3/4): the sample included 8 tenants, two of which took part in case study visits. All were classed as micro businesses (<10 employees in total)
- Lower energy consuming, customer facing chains (cluster 5): the selected sites of 13 organisations were rented/leased; five of these took part in a case study visit. Most of the organisations were classed as small although three were micro and one medium (51-259 employees in total)
- Higher energy consuming, employee only sites (cluster 7): 18 of the organisations in the sample were tenants and six of these took part in a case study visit; most were classed as micro or small; there was one medium and one large organisation (although this was due to the size of its US parent; the single UK company was classed as micro).
- Offices (cluster 8): 14 of the organisations in the sample were tenants and four of these took part in a case study visit; in terms of their size, they ranged from a sole trader to a large organisation although most were micro or small.

Interpreting the Findings

The findings in this report provide insights into the building and leasing arrangements that were in place, how the landlords and managing agents in the sample were currently managing and /or influencing the use of energy in their properties, and the things that get in the way of energy efficiency. As such, they are indicative of the broader picture. 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 landlords, managing agents or tenants 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 (Business and Leasing Arrangements) provides a summary of the various arrangements that were in place across the sample in terms of leases and tenancy agreements, responsibilities for repairs and refurbishments and for paying energy bills. This is followed by a consideration of the involvement of landlords and managing agents in energy management of the properties in their portfolios, the level of control they had over energy consumption, the priority they gave to energy efficiency and the types of energy efficiency measures they had put in place. It also considers they key motivating factors behind their energy efficiency actions, as well as other drivers that might prompt or enable them to be more energy efficient, along with any barriers that may hinder this. Finally, it outlines reactions to the concept of green leases and memorandum of understanding (Energy Management). The chapter headed Smart Meters summarises the extent to which smart meters were being used and reactions to some products and services intended to help organisations get the most from their smart meter data. 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 (actors from the

end customer sites: DM: decision maker; I: implementer; U: user; external actors LL: landlord; PM: property manager; EC: energy consultant).

Business and Leasing Arrangements

Various arrangements were described across the sample for leases and tenancy agreements, for responsibilities with respect to repairs and refurbishment, and for the payment of energy bills. The principal arrangement was one in which the landlords looked after the structure and exterior of the building, and any common parts, and the tenant was responsible for the interior of their premises. Payment of energy bills was largely made directly to suppliers by tenants. As noted in the last chapter, these arrangements may not necessarily reflect what happens in the wider population.

Nature of Tenant Agreements

Lease/rental agreements

A range of types of agreement were described. The term 'full insuring and repairing lease' was not always used but typically, the landlord's responsibility was the exterior and structure of the building while the tenant's was internal (whatever the lease arrangements).

> They could do anything they want on the inside. Normally the rules are, you might have to put it all back to exactly the way it was, at the end, by taking stuff out. But inside you are perfectly entitled to do anything you want. As long as it's safe and legal. (C5; sportswear and equipment retailer; EC)

Landlords also reported a mix of arrangements within their portfolio. Examples included:

> The council will be responsible for external repairs, the roof and the main walls, the structural elements and then everything else would be the tenant's responsibility. (C3/4; laundrette; LL)

- full insuring and repairing leases (at least with respect to the interior of premises) often seemed to be the norm as reported by tenants in the sample
- direct management of properties where landlords have full responsibility for all repairs, maintenance, energy management and supply, down to changing light bulbs
- the landlord or property managers on their behalf, looking after the common parts in a multi-occupancy building while the tenant is responsible for the interior of their own units

- multi-occupancy business centres and light industrial units, often for start-up businesses. These facilities may be rented out at a fixed price covering a range of services such as business rates and energy, water, broadband and telephone rental; the rent is based on a £ per sq. foot.

> So effectively we'll charge the tenants accordingly a fixed price which will, I say a fixed price, but a price obviously that will be index linked, will go up each year, to cover the cost of pretty well all the energy within the building used. It will cover business rates, it will cover light and heat obviously and just all those things and it's an easy in, easy out lease. (C7; manufacturer and repairer of agricultural buildings and equipment; PM)

- single properties owned by a private landlord with a more informal arrangement; in one case described as a 'tenancy at will'[5]; there was no fixed term to the lease and tenants could stay as long as they wished as long as they gave one month's notice.

Properties with more flexible arrangements were often aimed at start-up businesses and enabled expanding successful organisations to take on more space.

> I've got people in there and they've been with me a good ten years now and it's very flexible. The other advantage of it is I've got people who start in some small offices and when they want to grow, which they have done, I've got several who have done that now, the agreement is that they can just change the agreement and move into a larger space, rather than moving into other buildings. (C8; design consultancy; L)

The length of leases varied from rolling contracts of a month, through three year terms with a three month notice period, to 10 years and over, sometimes around 100 years. Interviews with both the large private landlords and some of the tenants suggested that it was often the well-established companies with a large estate that took on these long leases and would modify buildings to meet their needs, with the landlord playing a 'hands-off' role.

Repairs and refurbishment

Again, there was a mixed picture of how this was handled with both planned and *ad hoc* arrangements in place.

- The largest landlords might be refurbishing properties as part of a maintenance programme (where they are responsible for maintenance) which in the case of one landlord, typically involved making energy efficiency improvements (see Energy Efficiency Measures, p16); where tenants were refurbishing buildings, the landlord might provide guidance on the same
- Refurbishment or repairs could also be reactive and depended on the situation, with the recovery of cost also handled in various ways depending

> You never quite know what the next use of the property is going to be. So it really doesn't make sense [for the landlord] to do a lot to it [any refurbishment work], because you know when somebody goes in, I mean often shop tenants will get granted a rent free period at the start of the lease to reflect the fact that they had to carry out certain works to you know, to basically turn it into the sort of unit that they want. (C3/4; laundrette; LL)

[5] A **tenancy at will** or **estate at will** is a leasehold such that either the landlord or the tenant may terminate the tenancy at any time by giving reasonable notice.

on the particular lease and requirements of the property and tenant; any work done to common areas would be paid for via a service charge

- If a new tenant was taking on responsibility for remodelling/refurbishing a property (e.g. a retail shell), then they might be granted a rent-free period to reflect the expense
- Alternatively, a new tenant might negotiate for the landlord to carry out improvements to a property before moving in.

Where tenancy arrangements were more informal, the recovery of cost might be less defined. One organisation renting out parts of the property it owned to other businesses would have liked to be able to recover part of the cost of work it wanted to carry out to the building from tenants but was unsure that the lease had been set up to do this as there was no service charge. In the case of a development agency managing properties on behalf of a local authority, there was an option in the lease to impose a service charge but they had not exercised this, meaning that the cost of any repairs was met out of the rental income. Several tenants described having more relaxed relationships with their landlords, sometimes because they had known them personally for some time and/or because they appreciated that, as tenants, they were getting a 'good deal'. The impression given was that they would not want to make demands of their landlord.

> We know him, he's an old fella, we sort of work together. He's a reasonable chap and so are we and it sort of works that way. (C7; manufacturer of signs DM)

The viewpoint of property managers seemed to be that they would tend not to act proactively unless it was to make small modifications to the common parts such as putting in LEDs but this was because their running costs were lower rather than on grounds of energy efficiency. One such manager reported how they were more likely to get involved if repairs were needed for which they had responsibility or if a lease was coming to an end and they needed to ensure the property could be re-let.

The situation was reported by both a local authority landlord and their tenant that the council had been unable to carry out repairs for financial reasons and tenants may have to carry out their own repairs.

> We pay for the insurance and repairs. The landlord is the local council and they are supposed to deal with it, but they have no money and just don't do their part. We recently had a leaking roof. We ended up paying for the repair as the local council couldn't give us the money. (C7; importer and manufacturer of fresh food packaging; DM)

Arrangements for paying energy bills

A range of practices were reported although the most common scenario among the sample was that tenants paid for their own energy use (the small sample was purposively selected and is unlikely to have been fully representative, so this will not necessarily hold true for the wider non-domestic population).

- Landlords/property managers paid for all energy bills and passed this cost on to tenants through a service charge; sub-metering may allow the charge to reflect consumption or the charge may represent a share of the bill based on an equal split with other tenants or it may

> There are few where we will be procuring energy for an entire building but actually a lot of them are operated on what we call an FRI (fully repairs and insured) which means that basically it's up to the tenant to look after their area and that includes any repairs and maintenance. That includes procuring their energy all those types of things. (C3/4; textile/art retailer; LL)

reflect the size of the unit or be based on the amount of energy the tenant was 'expected to use'.

- Landlords paid for one of the energy supplies – typically, the gas because of a boiler supplying a multi-occupancy building. Tenants organised and paid for electricity direct to the supplier. In one case study, it was the gas that was paid for directly by the tenant and the electricity by the landlord
- Tenants organised and paid for their energy use direct to the supplier, possibly paying for energy use in common parts (e.g. for interior and exterior lighting) through a service charge.

Not only might there be different arrangements for different buildings within a portfolio but also within the same building. Small units might not for example, have their own meters and so all energy might be included in the service charge while other units may be metered.

Both a local authority and a large private landlord reported using a procurement manager to identify the best suppliers and tariff, sometimes with the help of an energy broker. One of the property managers described how they used an energy broker who not only negotiated the best price but dealt with the suppliers and invoicing; they then invoiced the company who passed on the cost in the form of the service charge for energy use in the common parts.

Another situation was described by the energy consultant in which a retail complex may have a lead tenant who recharges other tenants for the energy used in the common parts, taking responsibility for this away from the property managers.

Energy Management

While the larger landlords were in the process of developing a strategy for improving the energy efficiency of at least part of their estate often as part of a programme of refurbishment, it was either a lower priority for smaller and local authority landlords or action was impeded by lack of funds and other barriers. Among tenants, it was again, larger organisations with chains of outlets that were mainly engaging with landlords on the issue.

Involvement in Energy Management

Landlords and Property Managers

The sample of landlords and property managers exemplified very different roles in decision-making around energy management in their portfolios and associated with this was a wide range of levels of understanding of, and expertise in, energy issues.

The sample included specialist energy/sustainability managers/advisors in the largest landlords who had wide-ranging responsibilities for planning and embedding sustainability and greater energy efficiency across their estates but who might know very little about individual properties. They might work with procurement teams, estates teams and energy brokers but these functions could also work quite separately. Other members of the team were responsible at site level, such as asset managers, management surveyors, facilities management staff or it could be a contractor carrying out inspections or maintenance. In one of the larger landlords, these site level staff had targets around energy and energy performance (see also Other Drivers, p22) so they were also engaged with energy management as an issue.

Others in the sample were more familiar with the case study sites but had no involvement in decision-making about energy management for the commercial property portfolio. In a couple of case studies where local authorities were the landlords, reference was made to an ‘energy management team’ or ‘energy team’ in the council.

In one case it was reported that this group offered advice to businesses in the city on energy management and while there was a generic energy policy in place across the local authority that set targets for CO_2 emissions, the comment was made that this did not seem to be joined up with the activities of the energy team.

The property managers seemed to be remote from a strategic view of energy use and sometimes were even uncertain that there was a policy in place. They were charged with

looking after specific parts of the portfolio and in one case might involve property services who had responsibility for the BMS in some of their sites.

For small private landlords, the decisions may be taken by a single person.

Other influencers

There was little evidence of those who were interviewed engaging with sources of guidance except for one of the large private landlords who referred to input it had received from the Carbon Trust, the Building Research Establishment, the Better Buildings Partnership and the UK Green Building Council in the form of publications and attendance at events; these organisations were seen as useful sources of best practice.

Level of Control over Energy Use

The typical picture painted was that landlords had some control over energy use for the common parts and any shared services but not over tenants' use within their own premises.

Various examples were given of how control was exercised remotely or was otherwise outside the control of the tenants.

- in the development agency, property services looked after the BMS in the business centres and elsewhere, a similar centralised control using BMS was described in shopping centres
- the management of shopping centres could also place restrictions on how energy was used by individual units e.g. which appliances could or must be left on at night. This might be the front of house lights but could also be a television in the window
- the energy manager in one of the schools who helped other schools with their energy management described how, in some PFI schools, the heating may be controlled by a third party who does not know what is happening on the ground
- a small private landlord controlled the heating and hot water for a multi-

> The landlord controlled systems, such as the communal lighting and heating, we have full control over, but we have no control over what the tenants use. (C8; LL)

> The property services people have a buildings management system for monitoring all the use of, you know, boilers and various other things throughout quite a lot of properties that we run. So that's pretty efficient and that just sort of controls a little bit more centrally what you know energy is provided for each centre. [ ] I'm not sure how it works. There is somebody who has that responsibility as well to just sort of keep an eye on how it's all going. (C7; manufacturer and repairer of agricultural buildings and equipment; PM)

> So for example, if the centre wanted us to leave all the window lights on, we would have to go by those rules. But in some centres they do have to leave their window lights on for display so we just go by whatever happens in the centre really [ ] I think when I go home, there are some left on. [Name of retailer] have got a TV on for example so that tends to stay on whereas all the lights go out. So it depends on what the agreements are with the landlords. (C5; sportswear and equipment retailer; I)

> In fact in the case of that PFI school, the link was broken, so they couldn't log in if they wanted to anyway. But you know someone 10 miles down the road who knows nothing about your building is trying to control it, so you've got all that sort of issue. (C2; secondary school (LA); DM)

occupancy building from hundreds of miles away using a thermostat on the gas boiler that he could access remotely.

A couple of respondents where individual tenants' energy use was being charged on a fixed or shared basis, thought that while they might not be able to control consumption by each tenant, they would react if bills became unusually high. In the case of the former, the owner of the building (in which his business also occupied a unit) had not tried to exert any influence over energy consumption by his tenants even though he had noticed some behaviour that was unhelpful such as leaving windows open overnight in winter.

> We just split the bill three ways and invoice appropriately but if it had really gone through the roof I'd probably go and ask some questions, 'how come we're running a business and there's four of us and our bill's been this? You've moved in, there's four of you, [ ] okay, I would've expected them to go up but it shouldn't go up ten fold'. (C8; specialist design consultancy; DM)

> They are paying you a rent which is covering the costs of all the service charges incurred through running everything so you can't be too autocratic about it, but on the other hand yes, if there is a lot of energy being used, then you're going to say so and do something about it. (C7; manufacturer and repairer of agricultural buildings and equipment; PM)

The different roles, perspectives and possibly funds available within the sample were exemplified by the response to the idea of trying to engage tenants in discussions about greater energy efficiency. The view of a couple of local authority representatives was that energy management within premises was entirely the responsibility of the tenant; the council had neither the manpower nor financial resources to influence this.

> It is important because obviously we want to keep our carbon footprint down as much possible, but it's really the tenants who are paying the bills, so it's for them to actually keep their energy costs down to satisfy their business model. I don't think I can influence it. (C7; importer and manufacturer of fresh food packaging; LL)

> It would need somebody to sort of go round and visit all the offices to sort of double check that they are not spending too much on central heating and turning it up too hot and that sort of thing. So you would have to physically do an inspection to make sure that you are monitoring that. So that's not always that easy to do because it depends on manpower really. (C7; manufacturer and repairer of agricultural buildings and equipment; PM)

In contrast, the large private landlords, and to an extent, one of the local authorities, had recognised that they needed to engage tenants in energy management if they were to reduce consumption in their buildings and meet their targets. One of the energy managers described how they were starting to try to influence tenants as opposed to control their energy use through an approach based on partnership and facilitation, rather than enforcement. For example, they held quarterly meetings with their tenants in which they discuss energy saving.

> So it's trying to move away from thinking about our bit that we're responsible for and thinking about the whole building and that is a shift in the way that we engage in terms of we have to get the customers on board with that. So yeah it's challenging. (C3/4; textile/art retailer; LL)

Priority given to energy efficiency

Greatest priority within the sample (which was not representative) appeared to be given to energy efficiency by the large private landlords. One of these remarked (in a fact finder interview) that it was a high priority because it was 'good for business'. This organisation was accredited to ISO 50001[6] which meant it had a carbon policy, environmental policy, sustainable procurement policy and a sustainable construction policy.

The other large private landlord commented that while historically it had not been seen as important to help tenants manage their energy efficiently, they had recently changed their mind-set from one of focusing on the parts of the building for which they were responsible, to thinking about the whole building.

The local authorities described good intentions and in one case, the council being committed to 'the environment', but action with respect to its commercial property portfolio was constrained by lack of finance. A respondent speaking on behalf of one authority, spoke of the focus being on larger buildings that would be affected by the Minimum Energy Performance Standards (MEPS)[7]. The development agency (working on behalf of a local authority), considered energy efficient buildings as a medium priority but there was little evidence to suggest tenants were being encouraged to be energy efficient.

> It's certainly a medium priority I think because obviously it's very important to make sure that, you know, there's not excessive money being spent. So there is a priority to do that. (C7; manufacturer and repairer of agricultural buildings and equipment; PM)

His view was that installing measures to improve energy efficiency was entirely down to individual tenants where they had responsibility for paying for energy; the arrangements would need to be worked out between the individual tenant and the local authority. He thought that while it might be a good idea for the council to consider installing solar panels in all their units, the financial situation made this a low priority.

A small private landlord was unsure what his tenants could do to reduce their energy use except perhaps to change the lighting from halogen to something more energy efficient. This would need to be at their expense but he would get his electrician to do the work because he knew the building.

> If the tenant wanted, if the tenant looked at the lights or someone like yourself went in and said, 'look I reckon you could save another £x, or save the planet by doing this, that and the other', they could say to me, [ ] 'can we put in so and so lighting and we're happy to pay for that?' And I'd say, 'well that's fine, I'll get my man, my firm to do it for you because we don't want any Tom, Dick or Harry installing it' and I wouldn't object to that. (C8; design consultancy; LL)

[6] The international standard is concerned with energy management practices that aim to save energy, cut costs and meet environmental requirements.

[7] The Energy Act 2011 requires Government to introduce regulations to improve the energy efficiency of buildings in the private rented sector no later than April 2018. These are referred to as Minimum Energy Performance Standards (MEPS).

He had noted that some of the tenants (including the case study business) preferred to operate without the main lights on but it did not seem to have occurred to him that this was because of the quality of the light (the reason given by one of his tenants who took part in the same case study) rather than to save money. In another case study business, the tenant had changed the lighting from the low energy bulbs put in by the landlord to fluorescent tubes (not energy efficient versions) because the former were inadequate for its purposes.

The view of the energy consultant was that landlords and property managers were not interested in spending money to increase energy efficiency and indeed, one of the property managers remarked that they had no interest in how much energy their tenants consumed.

Energy Efficiency Measures

Landlord led initiatives

While some landlords were doing more than others to improve the energy efficiency of their portfolios, even here it seemed that they were at a fairly early stage of their journey particularly with respect to engaging tenants. The larger private landlords were seeking to improve performance through a mix of upgrading buildings and encouraging behaviour to reduce energy consumption. However, they explained that limited resources meant that they had to focus initially on the parts of their estates where they were likely to have greatest impact on consumption and where there was likely to be less resistance from tenants. Their views on this differed; one was starting with retailers because they were operating on very small margins and felt that it was hard to motivate office tenants, while the other was avoiding small retailers and concentrating on large commercial sites and multi-let properties because they consumed more energy and would therefore have most impact in terms of reducing their overall energy consumption. In addition, this landlord thought that offices would be easier to engage with than retailers with residential properties above them.

> We basically have a budget to reduce our carbon emissions and it's how we use that budget. So I think if we were approached and they said they were interested, then we would look to see what we could be doing. I would be pushing that, but to my knowledge, we haven't had that. (C3/4; textile/art retailer; LL)

Box 2 summarises the actions being taken by the largest landlord in the sample. This included retro-fitting to upgrade buildings where it was responsible for maintenance, the use of green leases or memoranda of understanding and other tools to work with tenants to make improvements and change behaviour. It had recognised that it would not achieve its CO_2 reduction target through refit alone and would also have to look at the operational side of tenants' businesses. It was using ESOS audits to gather information on energy consumption and hoped that by the end of 2016 it would have a much better picture of how it should be managing energy across all its properties, not just those for which it paid the energy bills. This landlord was working on an engagement strategy in order to talk to its clients about energy management and efficiency but saw this as a voluntary partnership in which it had a facilitating role so that its success depended on clients expressing an interest in working together to improve energy efficiency.

The areas in which the other large landlord had made most improvements were in lighting and controls. They had been able to identify high energy usage at weekends and were encouraging tenants to switch devices off (the respondent thought this change accounted for 70 per cent of its total energy reductions). The landlord had appointed 'energy champions' for each site or group of sites and was able to show tenants their profile data to help enter a dialogue with them. It also involved tenants by holding quarterly tenant meetings, at which they discussed mutual activities to reduce consumption as a building, and by running a 'switch it off' campaign and a carbon literacy programme. The landlord was using a green lease toolkit from the Better Buildings Partnership about collaboration between different companies working together for their building.

Box 2: Various initiatives being put in place by the landlord of one of the case studies

A retro fit programme to refurbish buildings as part of a planned maintenance programme (for the buildings where they were responsible for maintenance). They were trying out different technologies to ascertain what worked and what did not work in different types of property.

When we're looking to go and do a refurb or an upgrade to a property we will then put in what we call a retro fit - improved insulation, double glazing where we can, solar panels. When we're doing a retro fit work we've been doing energy audits before the work starts. (C3/4; textile/art retailer; LL)

An online sustainability tool that they used to track their retro fit projects using red, amber, and green flags. For example, it would flash up red if any part of the project was not meeting its sustainability targets. The intention is to share the tool with clients and encourage them to input their energy and waste water data to the tool so that it is all in one place by letting them use the database for free. They were also looking at a tool called Green Print that enabled companies to benchmark their energy performance.

If their tenants were refurbishing a property then the landlord provided them with **a Sustainable Fit Out Guide** which asked them to comply with certain requirements e.g. regarding the type of heating installed, or keeping in place any systems the landlord had already put in a new building to make it more energy efficient.

Where the lease of a building that had an EPC rating of C or better came up for renewal, they were replacing them with **a Green Lease** (see p26). For buildings with an EPC rating below C, they were intending to introduce **a Memorandum of Understanding** (MOU) – an agreement to work together to help improve the performance of the building.

Each location had an Asset Manager and Management Surveyor who had been set **targets relating to energy and energy performance**

Other landlords and property managers appeared to have done very little to date to improve or promote energy efficiency within their portfolio and the discussion was more about what they might do rather than what they had done or were actively doing. Again however, caution is needed because they may not have been aware of what was happening at a policy level or across the portfolio.

> It will be built into my planned maintenance programmes over the next period of time. Obviously we have got to consider the Energy Act 2011 so from 2018 we need to have an EPC rating of E on any building of over 1,000m^2 I understand. So we are working towards that to look at these properties as a priority, but I need to look at all the properties for the future. (C7; importer and manufacturer of fresh food packaging; LL)

One of the local authorities was in the process of carrying out a survey of all its buildings to try and identify where it could improve energy efficiency as part of compliance with MEPS.

This local authority had also been involved in discussions about trying to take advantage of funding through Scotland's Energy Efficiency Programme (SEEP) by developing information and planning seminars in energy efficiency for its tenants.

> Well I would think the obvious thing would be to promote the services of our energy team really, you know and obviously angle it in such a way that it hopefully would be of some benefit to them [tenants], in terms of the fact they'd be reducing their operating costs. (C3/4; laundrette; LL)

The other local authority suggested that it needed to promote the services of its energy team and how it could help tenants reduce their energy costs.

More generally, other improvements to buildings to make them more energy efficient seemed to be undertaken on a piecemeal basis, typically the common parts or when a unit was vacated. Energy efficient lighting, particularly LEDs, was often identified as a measure that delivered improvements with proven savings.

The private landlord with a single multi-occupancy building had replaced a timer on the gas boiler with a remotely controlled thermostat in part because he was getting calls from tenants saying their units were too hot or cold. He thought that it made more sense for the boiler to respond to temperature rather than time of day and accordingly, kept the same settings throughout the year.

> I've got this theory that if you keep it at a reasonable sort of temperature, it doesn't take as long to get to the optimum temperature. So in other words if you switched the boiler off completely, it was off and it went down to sort of zero degrees overnight and then it's got to get up to 20 degrees at 8 o'clock, you've got a hell of an output, whereas if it remained at sort of 18 degrees all the time, it's just going on and off, going on and off, on and off and then it's only got a small distance to go, so I think it's more economical that way. (C8; design consultancy; LL)

He experimented with getting the temperature right by telling the tenants what he was doing and asking them to email him to let him know if it was too hot or cold. It was set at night to 18 degrees and at 22 degrees first thing to get the building warmed up. This was then reduced during the day as it warms up to a setting of 20.5 degrees. This practice was based on his theory that it would use less energy to bring the temperature up to the preferred daytime level if

the boiler was not set too low at night or turned off.

At the other end of the scale, the energy consultant described a situation in which the largest retailers moving into a new site can specify all the plant and equipment such as LED lighting, highly efficient air conditioning and heating systems, specialist escalators and specialist motors in lifts. However his view was that in most commercial premises, engagement with employees to encourage energy saving behaviour should be given priority and technology should not be seen as the principal way of cutting consumption.

Tenants' perspective on landlords and energy efficiency measures

Tenants were asked about the role their landlords had played in supporting any energy efficiency measures they had introduced or wished to introduce. There were several reports of landlords who had been helpful in some way:

> When we first moved in, we had a discussion about what was here and how the building was put together. It's got a big folding door, but we have put up a partition with a door in front of that, which has 3 inches of fibreglass insulation. The landlord did that for us when we moved in as we were concerned about heat loss through the door. The building used to be heated by an old gas heater, so the landlord put in a new combi-boiler and new radiators when we moved in 2011. (C3/4; TV, audio and computer repairers; DM)

- an electronics repair business described how their landlord had agreed to undertake some energy efficiency improvements in their property before they moved in
- another landlord had agreed to fix the rent for five years in return for the tenant refurbishing the property to a high level of energy efficiency (insulation, double glazing, LEDs etc.).
- a retail chain operating out of hospitals where energy costs were included in the rent, had negotiated a reduced rent at two new sites on the grounds that it was going to install LEDs and would therefore cut its energy consumption; it was seeking to repeat this elsewhere as leases came up for renewal.

However, some landlords were perceived as obstructive or unwilling to cooperate:

> The service charge is about £10k a year for the electricity for the shopping centre. And the main reason for that is that they've got these massive great big halogen light bulbs that are about this big in the walkway underneath there. And I'm trying to pressurise them to get them changed into an LED thing, so if anything it's the opposite, I'm trying to chase them to be greener, they've never said anything to me [about how I could save energy]. (C5; jewellers; DM)

- a retail tenant had tried to persuade his landlord to switch to LEDs from halogen in the common parts but without success
- a local authority tenant wanted to improve the insulation of their premises and looked to the landlord to help with this, particularly as asbestos was present; the landlord viewed insulation as internal and therefore part of the tenant's responsibility
- a landlord wanted to levy a charge for allowing air

> I'd love to insulate the place but I'm not going to [name of county] Council. I mean the Council are good, they're better than most landlords, put it that way, but they don't have the money. None of the councils have the money to come round, they just perform their legal duties, that's it really. It would be nice to insulate. It would be nice to do that. (C7; importer and manufacturer of fresh food packaging; DM)

conditioning extraction units to be fixed to an external wall; these therefore had to be housed in the staff kitchen which meant air conditioning could only be used after lunch because otherwise the kitchen was too cold

- the terms of the lease typically included a requirement for equipment to be removed at the end of a lease so that it was not in the interests of the tenant to invest in, for example, solar panels
- a request to install solar panels had been turned down by a landlord on the grounds of appearance
- where the tenant would like to make improvements including installing solar panels, it could be difficult to come to an agreement with landlords about sharing the cost and benefits, or landlords may simply be unable to help financially.

> We are better in restaurants where we are totally in control, but where we have a landlord or shared services, for example in an airport or shopping centre, it's much more difficult. The landlord does not really have an active role in energy management, but they can be a hindrance in terms of us not having the ability to have the infrastructure exactly as we'd like it. (C1; restaurant; DM)

> We have solar PV panels at our manufacturing facilities but not at our stores because longevity of location means it's not possible to install renewables and we'd need to get the landlords involved. Also the difference in the types of premises we have would make it difficult to implement. (C1; bakery with shops/cafés; DM)

Chains of businesses sometimes compared sites they rented where they had more control over their energy management because they could decide about the infrastructure, to those that were within larger complexes such as shopping malls and airports where they were subject to the requirements of that landlord. It also made it more difficult to install energy saving measures. The energy consultant also described such scenarios among his clients.

The energy manager in one of the secondary schools who advised other schools on energy management identified particular problems with PFI schools whereby the building owners had no interest in energy saving measures or supporting schools in installing them themselves. They might also not inform the school about the BMS or provide them with any data that could help them manage their energy use.

> There was a PFI school - I said 'you can get these solar panels free on your roof and the school would benefit from it' and somebody said 'what's in it for them, what's in it for us?' It was like 'as the building owner, as the person who operates the building, we don't see what

The energy consultant also commented on a lack of communication between landlord and tenant in relation to new builds. He had seen cases where renewables had been incorporated into buildings to gain planning permission but tenants were not informed about their existence so the source was never registered or put to use.

In terms of landlord-initiated engagement about improving energy efficiency, smaller tenants in the sample did not describe any; the exception were some of the large chains that might work with landlords to upgrade buildings and schools that might have the support of an energy manager in the local authority.

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**[8] could also have an impact on approaches to energy management.

> Going back to the idea that we are [looking for] a long term financial return, that we want to make sure that our portfolio can withstand the changes of climate change, that we have high quality, high performance buildings. (C3/4; textile/art retailer; LL)

- While tenants across clusters might like to install energy efficiency technologies or have their landlords finance/help finance such improvements in order **to reduce costs**, this did not seem to be a major driver for landlords and property managers in the sample in the same way as for tenants. For the most part, they were not paying the energy bills, and where they were (most frequently in the common parts), that cost was passed on to their tenants. However, there was some comment by the larger landlords that upgrading properties was important to preserve its value in the longer term and to sustain it at a time of climate change.
- Far more significant drivers were **government policies** such as CRC, ESOS and MEPS, especially for the larger private landlords with extensive portfolios, who were gearing themselves up for upgrading the energy efficiency of at least parts of their estate. These efforts were being mirrored by the large chains that often had long leases who were sometimes working with the landlords to the same end. There were also signs that local authority landlords were working to meet their statutory obligations. All those organisations taking part in the research to which these policies applied wished to avoid penalties from not meeting their obligations.

  Government involvement in encouraging energy efficiency was not only a driver but was also seen as a potential lever with tenants who, it was suggested, were more motivated by the need to be compliant then the desire to adopt best practice.

> This is what was so good about energy performance standards and the energy regulators that have them put in place is that we want to go way above that but it gives us an impetus to begin with, to be able to say when people say, 'why are you doing this?' 'Well one, it's regulatory but then above that, it's because all these other things' and it's a really powerful message that if you can get people to understand that it's going to become compliance, sort of going to become best practice, they're more likely to do it than if it's just seen to be a good thing business wise. (C3/4; textile/art retailer; LL)

[8] 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 driver/trigger (e.g. increases in energy prices) but they could also be a barrier (e.g. planning restrictions).

This same energy manager was keen to know what DECC would like them to say to their tenants to promote the importance of energy efficiency.

> From a landlord perspective it would be useful to have the information that DECC would like us to be promoting I think, as a starting point. So almost having something that came from government saying, 'this is a booklet' or 'this is explaining why we're doing it' so then we can say, 'it's not just us. The government are looking at this, it's on their radar. We're interested, we want to help you, here's the guidance for it' and then we could give them our supplemented guidance as well if they wanted it. (C3/4; textile/art retailer; LL)

- Being **seen to be a responsible organisation** was clearly a motivation for the larger landlords; it was valuable for attracting investment and when they might be planning new developments. One respondent commented that its commitment to sustainability was viewed favourably by its stakeholders including local authorities and was generally felt to be 'good for business' because reducing costs also made it more competitive.
- A desire **to do our bit for climate change** was occasionally referred to but largely by those with a sustainability brief in their organisation although as with the case study business that owned its building but let out two units, a small landlord might have a personal commitment to this ethos.

Other Drivers

- One of the main triggers for installing energy efficiency measures in a building was as part of a **refurbishment**, be it on a large or small scale. The large landlords planned programmes of maintenance and refurbishment while others were more reactive. An opportunity to make small improvements might present itself when premises were vacated but several respondents commented that energy efficiency did not seem to be a priority for new tenants. Installing LEDs, for example, in common areas was done more for reasons of saving on the cost of energy and replacing bulbs than for attracting new occupants.
- **Access to expertise**, in the case of larger, private landlords, this came in the form of energy and sustainability specialists and, similarly, some local authorities had energy teams. This was lacking for smaller landlords.
- The use of **targets** in planning improvements in energy efficiency was described by the two largest landlords. One of these had two key targets; these were to reduce carbon emissions by 50 per cent on the properties that they directly managed by 2023 and in the rest of the portfolio by 2030. They saw these as ambitious and challenging targets. They also had specific emissions targets.

  The other large private landlord had an energy performance improvement target

> Our goal is to get all properties to an emissions rate of at least of no more than at 20 kilograms of CO_2 per square metre or, if we're focusing on passive house standard then it's 9 kilograms of CO_2 per square meter and we've done three passive houses. So we've almost got a no regrets investment policy into renewable technologies and retro fitting at the moment. 5 million pounds a year has been spent over a period of 10 years and we're in year 3 of that. So we're trying lots of different technologies and seeing what works, what doesn't work, particularly because heritage properties have been very difficult to retro fit into standards. (C3/4; textile/art retailer; LL)

of 3 per cent p.a. Those responsible for each site were asked to aim for a 3 per cent activity adjusted reduction based on the square footage occupied and allowing for some variance depending on the tenant's situation. All energy management projects were tracked and over 300 such projects had been found to generate £1.3m savings p.a. on an expenditure of £20m.

- More generally, there was little discussion of **pay-back periods** because respondents were either not implementing measures to improve energy efficiency or were removed from the decision-making. One of chains from cluster 5 preferred to take on properties with long leases (around 100 years) because return on investment (ROI) was then not an issue. Reference was made in one local authority to a required payback period of 10 years maximum, this being based on the condition of an energy management revolving fund. A small private landlord did not think in terms of ROIs but instead whether installing a measure (such as double glazing, LEDs or a thermostat) was affordable and going to be capable of making a difference within a reasonable but undefined length of time. His rationale was that since LEDs consume 50 per cent less energy, they must be a good idea. Comparing his gas bill before and after putting a thermostat on the gas boiler, he reported that this had fallen by 40-50 per cent. His view was similar to many small businesses across the clusters.
- **A request from a tenant** might be a trigger for a landlord to consider helping with the installation of an energy improvement measure and indeed, one of the larger private landlords was relying on tenants expressing interest to initiate discussions. This local authority landlord thought that financial help might be offered in the form of a grant.

> Possibly, if they come to us with a proposal to improve the fabric of the building we would consider a contribution or maybe the possibility of grant funding for property improvement through a Business Gateway referral. (C7; importer and manufacturer of fresh food packaging; LL)

- The possibility of **taking advantage of funding streams** was occasionally mentioned (see above quote); reference was also made to Scotland's Energy Efficiency Programme (SEEP) which aims to offer support to ensure that all buildings (domestic and non-domestic) in Scotland can achieve a good energy efficiency rating. This had given the impetus to one local authority landlord to consider how it could take advantage of potential funding to help increase the efficiency of its commercial portfolio.

Barriers

The barriers identified by landlords, by and large, were similar to those identified by tenants although their perspectives differed.

- The **terms of a lease:** had an impact on tenants' interest in installing energy efficiency measures and this was

> If it was our building, we could invest capital in it and have that capital asset value or whatever, then there may be some benefits to that. But as it is, if the lease is five years, we're not going to throw massive amounts of money at it, because we're going to be walking away from it. (C5; discount store; DM)

widely recognised by landlords as well as the tenants themselves. The length of the lease was a particularly important factor, with landlords in agreement that short or rolling leases meant there was no incentive for tenants to make changes. At least one landlord felt that a lot of tenants either did not wish to invest in rented properties or they tended to wait for a new lease to start before investing.

> Generally that isn't something that they [tenants] look at really or they certainly don't ask, 'what are the energy costs?' (C3/4; laundrette; LL)

This view was confirmed by many tenants who said they were unwilling to make significant or costly improvements at their own expense that would benefit the landlord, even where there may be some years left on the lease.

> There was one point where it looked like we weren't going to renew the lease and we, for two years, we didn't do any capital expenditure on the place at all because we thought, 'well we could spend the money and it would all go to waste'. [ ] Funnily enough, talking of the lights, as a project, that was probably delayed for about 12 months for that reason. Because we didn't want to put in expensive lights and then find out we wouldn't have got to use them. (C5; jewellers; DM)

Where a tenant wished to install energy efficient technologies, they might need to seek landlord consent for which there could be a charge or they might be required to remove the measures at the end of the lease. The challenges presented by the installation of renewables that were sometimes reported by tenants were confirmed by the energy consultant who commented that such a move would typically involve a legal agreement with the landlord and a splitting of any incentives; in his view, this acted as a major deterrent.

- **Arrangements for paying for energy:** were a barrier identified by some tenants rather than landlords. Where the cost of energy was included in the rent or part of the service charge, there was no incentive for tenants to reduce their energy consumption unless they could use this to negotiate a better rate. There was an occasional exception where the tenant was keen to reduce consumption and CO_2 emissions as part of its business ethos, regardless of not being able to benefit from the financial impact.
- **Perceived lack of control over energy use:** landlords and property managers often felt that it would be very difficult to influence how much energy their tenants used and while some were making efforts to do so, others considered it not to be their role.
- **Perceived low level of interest of tenants:** there was a common view that tenants were not overly concerned about the cost of energy or keen to make energy efficiency improvements. This had certain implications; for example councils might choose to prioritise extra parking to attract new tenants over building upgrades. The larger landlords needed to target their efforts to upgrade properties and engage tenants to make best use of the funds available and were influenced in this by whether they perceived certain types of tenant to be more interested than others.

> If they haven't shown an interest in engaging, at the moment we haven't gone out there to actively speak to the small retailers about their energy performance. (C3/4; textile/art retailer; LL)

Landlords and property managers were also aware that smaller and/or start-up businesses might struggle financially themselves if asked to pay for or contribute to energy saving measures and were reluctant to pressurise them to do so.

- **Condition of the building:** the age and features of a building could present a barrier to improvement for energy efficiency to landlords as well as tenants. The construction and use of a building could militate against energy efficiency; the example was given of rolling metal doors on industrial units that were constantly in use.

> And I find it difficult to see how we can improve some of our buildings because of the age of them and the structural fabric doesn't lend itself to high energy efficiency. So a lot of heat lost out of the walls and roofs. (C7; importer and manufacturer of fresh food packaging; LL)

- **Planning restrictions:** older properties might present issues not just because of their structure but because of planning restrictions, especially if they were listed. One of the large landlords was trying to ensure that all properties were ready to meet the energy performance standards coming in in 2018 under MEPS but this was proving very challenging with so many listed and very old properties. A small private landlord of a converted Victorian warehouse had been unable to make changes to the fabric that would increase its energy efficiency.

> It's a Grade 2 listed building. So I wanted to have double glazing in it and a refurbished ground floor, but I couldn't have double glazing because it was Grade 2, you have to have the sash windows. And so you get to the stage where there is only so much you can do. The radiators you see, you can't have the all singing, dancing modern radiators, you have to have you know, that sort of in-keeping with. (C8; design consultancy; LL)

- **Lack of resource:** this has been noted above in particular with respect to local authorities where funds for maintenance of commercial properties may be stretched, let alone those for trying to increase energy efficiency. A shortage of manpower was also sometimes perceived as a barrier especially if the assumption is that staff will need to engage with tenants directly.

> I would say it's a high priority but funding is very difficult, so it's a very … I want to make them more efficient because that makes them more sellable to businesses because their costs are down when they take on a tenancy with [name of county] Council, but the difficulty is getting the funding in order to improve the energy efficiency. (C7; importer and manufacturer of fresh food packaging; LL)

- **Lack of joined up thinking and action:** this was not an issue that was discussed as a barrier by respondents but something that emerged with respect to various parties having responsibility for different aspects of a site. Firstly, property managers appeared to work at a distance from landlords and were tasked with tactical fire-fighting more than longer term planning. While they might be concerned with re-letting a building or unit when vacated, they did not contribute to discussions about its development. Moreover, tenants sometimes commented that property managers were distant from them. In local authorities, the 'energy team' at head office appeared to have little to do with tenants or individual properties (although we cannot be certain as they were not interviewed) and property managers might have to deal with property services or facilities management on energy matters without having responsibility for the outcome.

> If you read through the policies [ ] there are various targets so I would say the council [ ], it does have a keen interest in reducing energy use for sure. But as I say, that hasn't really filtered through into a specific policy for our tenanted commercial properties yet. (C3/4; textile/art retailer; LL)

Even in the most proactive landlords, the sustainability advisers setting the strategy seemed to work separately from the estates team negotiating leases as well as staff on the ground. This was also seen in the large chains of cluster 5 (lower consuming, customer facing chains) where their estates teams took on lease negotiation. While closer working might not be important for encouraging tenants to engage with energy management, it might suggest that it is important that all parties have a clear picture of what the strategy is and their role in it.

- **Lack of consumption data:** this was a problem sometimes caused by the arrangement of the meters in a property. For example, different units may not be sub-metered (e.g. where an owner-occupier lets out units or a tenant sub-lets part of their premises) or the landlord may have divided a larger building into smaller units without it being clear which units are served by which meters. More generally, the larger landlords trying to improve the energy efficiency of their portfolios would have found it useful to have access to data about their tenants' energy consumption where the energy bills were paid directly to the energy provider, but needed to negotiate such access.
- **Lack of awareness of smart meter data/ability to access it/know how to use it:** this was a barrier for the small landlords and property managers in particular although, as noted under Non-users of smart meter data (p31), there was little interest in having access to the data.
- **Changeable renewables market:** One of the large private landlords that might consider investing in micro-generation was deterred from doing so by a renewables market that he felt was constantly changing in terms of tariffs.

Green Leases

A green lease is a standard lease with additional clauses which provide for the management and improvement of the Environmental Performance of a building by both owner and occupier(s).A Memoranda of Understanding (MOUs) is a similar arrangement that is not legally binding (see Figure 10, p45). The concept of green leases and MOUs was unfamiliar to most respondents and prompted different levels of interest.

Landlord and property manager response

As noted in Box 2, p17, one of the large landlords had set u p something they called green leases for buildings with an EPC rating of C or better that they were introducing for new leases or where leases were being renewed. This included a legally binding clause requiring the customer to share their energy data with the landlord. In return, the landlord gave them access to their data and analysis showing how much energy they were consuming and worked with them to help reduce their consumption. For buildings that were rated below C, the landlord was planning to put in place a Memorandum of

Understanding (MOU) with tenants as an 'in good faith' agreement to work together to help improve the performance of the building. They had a target to put a MOU in place with 50 per cent of their retailers.

> Most of them are in older heritage properties so the energy performance currently isn't as high as it could be. So we'll put a MOU in place and then we'll work with them to look at what that will involve, how we can start to do that. We haven't got that far yet with that but that's the next step. (C3/4; textile/art retailer; LL)

However, the company was still working out how to engage its clients with this; they envisaged that they might write to them and then, if interested, the client could approach the landlord to find out more. They were concerned not to appear to be heavy handed.

> Because they're small businesses so we don't want to be putting undue pressure and also requests on them that they won't be able to be able to comply with. (C3/4; textile/art retailer; LL)

Those case study landlords who had not heard of green leases varied in their response. One property manager felt the MOU offered greater flexibility which might be needed if the level of savings was not as high as expected. He also felt it would be more appropriate for their serviced offices than the independent units where the tenant was responsible for their own energy. This was because where the energy was included in the rent there was little incentive for tenants to use less energy and this might encourage them to do so. A local authority landlord was unsure whether it would appeal to prospective tenants based on his perception that it might involve them in additional costs.

> Really interesting, I didn't realise there was such a thing and I think it would be beneficial for both of us to look into it. Yeah, it's just a nice, an ethical way, of going about the landlord-tenant sort of relationship. I don't see why they wouldn't want to partake in such a thing and why we wouldn't. It makes sense. (C8; specialist design consultancy; DM)

In contrast, the owner of a property letting out two of its units was personally interested in the concept largely because it seemed to chime with his own values and belief that everyone should be aiming to behave in a sustainable manner.

Tenant response

Only those respondents with a strategic overview were asked about green leases.

The most positive response came from a large chain of high street outlets with an energy manager who oversaw energy management across the estate. She was aware that larger landlords (with whom they often dealt) had their own sustainability agenda which complemented their own. The company was already trying to arrive at mutually beneficial agreements around energy efficiency with such landlords, sometimes involving micro-generation, and was aware that other organisations were engaging in similar initiatives.

> We do have some landlords that are better than others. So some of the larger landlords have their own sustainability agenda and will want to work with us to reduce the amount of consumption that goes through and reduce the collective carbon footprint if you like. So whilst that doesn't necessarily fall under a green lease, we do tend to have in most big leases with the bigger landlords, you know, definite alignment in there around the environment and energy consumption etc., and trying to work with them on that. (C5; health and beauty retailer; DM)

Such agreements were not necessarily called green leases and a different team dealt with negotiations around them.

A fairly favourable reaction was seen from a chain of womenswear shops located largely in hospitals which was keen to reduce its energy consumption for cost and social responsibility reasons. The respondent at first assumed that a green lease would involve expense for the business but in the end thought that the directors would give it serious consideration.

> It will be the estates team that deal with it rather than us. [ ] The estates team will probably work with them when doing all the negotiation side and signing the lease to make sure that's there and it meets all the mandatory requirements (C5; health and beauty retailer; DM)

> I know that they would go for that quite happily. And again, that comes back to the ethical and moral thing that they've talked to with me in the past…
> **…So if a landlord came with that proposition it wouldn't be rejected?...**
> …No certainly not. It would be looked at, in fact I would probably be given the job of looking at it. (C5; ladies fashion retailer; DM)

Another small chain found it an interesting concept but was concerned about how the improvements would be paid for; in the experience of the energy decision maker there, the tenants would end up paying for changes whereas he felt the costs and savings should be shared. The respondent gave the example of investing in solar panels; he suspected the landlord would be a barrier but would prefer to see the landlord paying for the installation, with both parties benefiting from any payments and the lower cost of energy.

A decision maker from a large business with multiple offices, thought that the green lease sounded interesting and feasible for single occupancy sites but could foresee issues with those which were multi-occupancy where leases would come up for renewal at different times and would each need to be negotiated on the new terms. He also questioned what would happen where there were sub-leases and the lease was therefore not with the landlord. Overall, he was sceptical about the level of interest from landlords and how prepared they would be to engage in the process when he felt they were primarily motivated by financial returns.

> I don't have an issue with it except for how it's going to be funded. I think my experience is that the landlords would try and get the tenants to pay for it and then take the benefit in the sense that it's a capital improvement on their property and then you've [the tenant] ended up paying for the improvement. I know that, if there's a cost to the landlord and you're going to save money on your energy bill, I don't think there's anything wrong with making a contribution but it's important that the landlord pays for the capital side and you pay for the consumable side of it. So the costs have got to be amicable across the two parties. In my experience of retail, the landlord is very happy for things to be put on the service charge that are actually capital improvements so you've got to be very careful of that. (C5; jewellers; DM)

Smart Meters

Data from AMR and smart meters was being used by some larger landlords to monitor consumption, identify anomalous use and measure the impact of changes but generally, this was at an early stage. Consideration was being given to how to engage tenants in the use of the data as a tool to better manage their energy use. Other landlords and property managers lacked knowledge of smart meters, were unaware of the data that could be accessed and expressed low levels of interest.

Awareness and Understanding of Smart Meters

The use of smart meters was something that seemed to be in its early stages with the largest landlords in the sample seeing a move from automatic meter readers (AMR) to smart meters. The largest landlord had AMR in place for most of its estate where they paid for energy and lower numbers of smart meters. AMR and smart meters were less prevalent for gas as they had been focusing on electricity use. AMR (and smart meters) were valued because access to properties to read meters was a major issue. One landlord was putting sub-meters in all of its new builds, with a separate meter for the common parts where that was their responsibility. Another large landlord was retro-fitting smart meters in some of its buildings.

Other landlords and property managers had little knowledge of which properties had smart meters and did not see it as their responsibility to have them fitted.

> Where we're responsible for paying the bills, I'm actually not sure about that, I'm not too sure where we are with that. It's not an area I've been that closely focused on to be honest, I'm not really sure. (C7; manufacturer and repairer of agricultural buildings; PM)

There was however some recognition that smart meters offered benefits such as accurate bills, someone not physically needing to visit a property to take readings when tenants took it over or vacated it, and having greater control over empty properties where the landlord still needed to pay for consumption.

> On vacant properties, I guess it would mean that we wouldn't have to [ ] access the properties and take meter readings. Obviously, if there's a smart meter there, then that's not an issue, is it? The supplier is just going to be able to take the readings themselves and not really bother us. Really, we've got our own thing to do. (C3/4; textile/art retailer; LL)

A couple of respondents had little idea of what a smart meter was, one describing it instead in terms of BMS; another asked whether a smart

meter was something that tenants took with them, assuming that it was a costly piece of kit.

A private landlord with a single property did not identify benefits for smart meters apart from possibly accurate bills. He had experienced problems after switching suppliers because the new company was unable to use the smart meters installed by the previous supplier and he thought that as a result, he was receiving estimated bills far in excess of what they should be.

Use of Smart Meter Data

The large private landlords in the sample (where they could access the data) were using and planned to use data from AMR and some smart meters to monitor and profile consumption, to set targets for reductions and measure the impact of changes. One of these hoped the data would help them manage energy across all their properties, not just those where they paid for the energy.

Another landlord was using a proprietary web-based tool to manage its energy and carbon data reporting with analysis carried out in-house. On the basis of daily figures for the case study site which was a multi-occupancy office building, the sustainability manager had been able to identify that weekends showed a drop of 30 per cent in energy use and throughout the year there was a strong link with daylight hours with the energy bill going up significantly when it was dark, because he assumed, lighting was a large proportion of the energy usage. The respondent reported that the tool had enabled them to have a clearer picture of consumption and to compare the relationship between energy use and activity in order to help assess whether consumption was well controlled or not.

For one local authority, it was the energy management team that engaged with the data especially in larger multi-occupancy buildings and communicated this to the lead office for the property portfolio. The respondent (a property manager responsible for certain sites) was able to log into the system but also received pdfs of the charts. The data was available for larger buildings but not smaller.

> Now that's very good actually, I have that on my multi-occupancy buildings where we have got one or more suppliers, and we can get access to these sort of graphs, and in fact Energy Management highlight any areas where they feel there is an anomaly i.e. the high heating costs during the night, and we investigate that and possibly find a timing issue or something. (C7; importer and manufacturer of fresh food packaging; LL)

Non-users of Smart Meter Data

The smaller landlords and property managers not directly employed by landlords in the sample were not making use of data from smart meters largely because they were unaware that it was available. They showed little enthusiasm for its use for reasons of the perceived lack of time to engage with it, the cost of subscribing to services and a lack of desire to engage with tenants about energy use.

When the potential uses of the data were presented (see below), the discussion also demonstrated some of the difficulties with understanding and practicalities of how it might

be used. For example, in small serviced units where the cost of energy was included in the rent/service charge, attempts to monitor energy use in individual units would require the installation of further metering (at a cost) and could, it was suggested, be seen by tenants as intrusive.

Where landlords had responsibility for the common parts and/or shared services, there was little enthusiasm for data that might impact on their use of energy there. In terms of the energy that tenants had responsibility for, the view was often expressed that tenants were unlikely to be interested in engaging with the data either and even if the landlord had access to this data, he/she had no control over tenants' use of energy.

> I think I read somewhere here that somebody has left windows open or something like that, well in essence, these are tenants, I can't stop them opening a window, so as a landlord it wouldn't really make a great deal of difference to me. [ ] If people are wasting money by whatever, I can't alter it. Each tenant would have to do their own management really. (C8; design consultancy; LL)

This highlighted the challenge, recognised by the larger landlords, of taking care in how they tried to engage with tenants on the issue of energy management and working with them to make use of smart meter data.

Reactions to Products and Services

Towards the end of the interviews, and where time permitted, participants were provided with some information about products and services intended to help organisations get the most from their smart meter data. Depending on which stage of research in which they participated, landlords and property managers were shown different stimulus material describing added value services that might be offered in association with smart meter data (see Stimulus Materials, p38).

> Possibly [useful] but I think it's going down to detail that is not going to help us manage our building too greatly. [ ] It might give us some good information but it might not allow us to improve our energy efficiency too greatly…
> **…Do you think it would encourage your tenants at all?..**
> …Possibly, but a lot of businesses, they are not really going to look at that detail, but if they have high energy consumption then I think then it would be largely to see where they could maybe change a piece of equipment which is using high energy to have a more energy efficient one. (C7; importer and manufacturer of fresh food packaging; LL)

While some landlords were beginning to use data from their meters to profile energy consumption and identify anomalies in use, there was no great enthusiasm for other features and forms of analysis that might potentially be used, regardless of how these were presented. There was uncertainty over how pattern recognition using external temperature (see Figure 3, p41) and device disaggregation (see Figure 6, p42), for example, would help landlords better manage their buildings and a perception that tenants would not wish to engage with it.

The energy consultant working with retail chains felt that the level of analysis shown in the stimulus material was beyond what most of his clients would want. He would rather that effort went into engaging staff in stores with profile data that was easy to access and understand so that they could take the necessary steps to remedy issues arising.

Conclusions

Summary of Key Findings

Business and leasing arrangements

There was considerable variability in the leasing arrangements in place across the sample of tenants, landlords and managing agents taking part in the research.

Although the sample was small and not at all representative of the wider population of landlords and managing agents, it does highlight the diversity of the sector, ranging, as it did, from landlords with large portfolios, to individuals with a single property, and from commercial organisations to local authority landlords. Nevertheless, great care is needed in interpreting the findings especially in terms of the wider population.

While different forms of lease were in operation across the sample, the principal form encountered in the sample was a full insuring and repairing lease or variation of this in which the landlord looked after the structure and external fabric, and the tenant was responsible for the interior of their premises and for their energy.

Tenancies varied in length from monthly rolling contracts to around 100 years; most tenant organisations in the sample had leases of less than 10 years although the larger chains sometimes had longer leases.

The nature of relationships between tenant and landlord varied; these often seemed distant and were sometimes mediated by a property manager although closer working was described by respondents in a sustainability role in both large landlords and tenant chains who were working to increase the energy efficiency of buildings. Tenanted small businesses sometimes had closer and more informal relationships with their landlord who might own a single building.

Energy management

Just as there were differences in approaches to energy management between larger and smaller business organisations taking part in the research, so there were differences between larger and smaller landlords and managing agents.

While the small landlords in the sample generally made all decisions themselves about energy, the larger private and local authority landlords had specialist energy/sustainability staff working at a strategic level along with estates and procurement managers (sometimes external brokers were used), and on the ground, property managers, property services and facilities managers were assigned to different sites.

The larger private landlords in the sample were actively engaged in a programme of upgrading properties to make them more energy efficient, often as part of a wider programme of refurbishment, and were committed to high levels of investment in this; the local authority landlords appeared to be hindered in their good intentions by a lack of funding. This was not a priority for the small landlords. Tenants reported various

experiences in dealing with landlords when trying to make improvements to premises; in some cases, landlords had been very helpful in sharing the cost, while in others they were seen as obstructive.

All landlords in the sample recognised the difficulty of exerting control over their tenants' use of energy or even influencing it although the large private landlords, in particular, had identified the need to do so in order to achieve targets and meet the requirements of ESOS and MEPS. They were developing strategies to engage with tenants typically involving making use of energy profile data from AMR and smart meters. One of the local authority respondents also described a potential information dissemination programme for tenants on improving energy efficiency for which funding could be sought. None of the smaller tenants referred to any landlord-led initiatives to encourage them to be more energy efficient.

The key driver from the perspective of the larger landlords in the sample was the requirements of government policies such as CRC, ESOS and MEPS. This was followed by a desire to be seen as a responsible organisation and to do 'our bit' for climate change. The smaller landlords were currently not driven to make significant changes to their buildings.

Other drivers, triggers and enablers supporting greater energy efficiency for landlords in the sample were refurbishment opportunities, access to expertise in larger organisations, the use of targets, interest expressed by tenants, and the availability of funding (especially for local authorities).

A large number of barriers potentially impeded engagement with improving energy efficiency. Some of these were identified by both landlords and tenants; the terms of a lease being a disincentive to investment in a property, the condition of a building and planning restrictions that made changes to the fabric challenging and sometimes costly, a lack of resource in terms of funds and manpower, a lack of consumption data due to the arrangement of meters in a building and a lack of awareness that smart meter data was available. Other barriers for landlords were their perceived lack of control over tenants' use of energy and a perception that energy management was not a priority for their tenants.

There was some evidence of the planned introduction of Green Leases and Memorandum Of Understandings but only by one of the large private landlords. Response elsewhere varied with some supportive of the idea but others sceptical about its practicality for certain types of property and about how improvements for energy efficiency would be paid for.

Awareness and use of smart meters

Landlords and property managers in the sample varied in their awareness and knowledge of smart meters and where they had been fitted in their properties. Once again, there were differences between the larger and smaller landlords and managing agents.

Larger landlords were conducting energy audits for ESOS purposes, and using or planning to use data from AMR meters and, increasingly, smart meters, to monitor and profile consumption, to set targets for reductions and measure the impact of changes. Some were currently looking at using this data and particularly that from tenants' smart meters, to

engage tenants in conversations about their energy consumption and the impact on the building as a whole.

The smaller landlords and property managers not directly employed by landlords were not making use of data from smart meters largely because they were unaware that it was available. They also expressed little interest in engaging with the data and had difficulty understanding some of the added value features in particular. However, a critical issue was that they did not see it as their role to discuss energy use with tenants.

Differences between users and non-users of smart meter data

The large private landlords (where they could access the data) were using and planned to use data from AMR and some smart meters to monitor and profile consumption, to set targets for reductions and measure the impact of changes.

In contrast, the smaller landlords and property managers not directly employed by landlords taking part in the research were not making use of data from smart meters largely because they were unaware that it was available. They showed little enthusiasm for its use for reasons of the perceived lack of time to engage with it, the cost of subscribing to services and a lack of desire to engage with tenants about energy use.

Research Implications

The Importance of Size

Just as the size of an organisation or business had an impact on its approach to energy management, with larger organisations typically doing the most to improve energy efficiency, the size of a landlord's estate also made a difference.

Not only were the larger landlords (private and local authority) in the sample subject to the requirements of government policies, and experiencing greater demands for improvements, they were in a position to employ specialists who could respond to those demands. Similarities were found in this respect with the large retail chains from clusters 1 and 5 in terms of the staff infrastructure.

The larger landlords wanted to maintain and increase the value of their estates over the long term as well as protecting their reputations, not least to be able to expand their development activity.

Findings suggest that some level of motivation and understanding is necessary to engage with smart meter data and that this requires time and a level of knowledge to do so; this may require a certain size of organisation to employ such people.

Engaging Non-users

Although the sample is small, the research suggests that larger landlords will be easier to engage in terms of using smart meter data to improve the energy efficiency of their buildings.

They were concerned not only to be compliant with various government requirements but also to protect the long term value of their portfolios. However, along with smaller

landlords, they often did not feel they had a role in encouraging their tenants to use energy efficiently.

Smaller landlords represent more of a challenge as none of the key drivers that motivated the larger landlords in the sample applied to the smaller landlords; in some respects, they had more in common with the tenants than the large corporate landlords.

All landlords need to be aware of the role that smart meters can play in energy management; while the larger landlords may have the necessary in-house expertise, this is unlikely to be the case with smaller landlords and they need help to understand how to access and use smart meter data to improve energy efficiency.

The planned introduction of MEPS in 2018 may present an opportunity to engage with landlords of all sizes; although the larger landlords in the sample were already taking steps to ensure their properties would achieve the necessary energy performance rating, the small private landlord was unaware of MEPS.

Encouraging landlords to engage with their tenants to help and/or persuade them to be more energy efficient will be a challenge as this is not something they are likely to see as one of their functions and something which they are unlikely to feel offers them any tangible benefits.

Traditional leasing arrangements were often seen by both landlords and tenants as a disincentive for investments in energy efficiency measures. In terms of green leases and MOUs, the latter may have more appeal especially for smaller landlords and tenants and could open the door to discussions about improvements in energy efficiency and how these might be paid for. Some of the tenants in the sample were interested but foresaw difficulties especially in relation to the cost of installing energy efficient measures and the sharing of the benefits (reduced energy bills, FIT payments). More information, guidance and support are likely to be of benefit to both landlords and tenants.

There was some evidence of a lack of ‘joined up thinking’ in larger organisations, both landlords and tenants, which may prevent or inhibit energy efficiency initiatives. This suggests that it is important that all parties have a clear picture of what the approach to energy efficiency is within their organisation and their role in it. This is not dissimilar to the situation in some of the case study organisations; where energy efficiency was not fully embedded across an organisation, it was easy for members of staff not to give it attention. In the same way, those at the coalface with tenants need to understand what the aims of their organisation are with respect to improving energy efficiency so they can play a role in engaging tenants and feeding back any interest in measures that tenants would like to introduce or energy inefficiencies they would like to resolve.

Appendices

Research Questions

Box 3: 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

Materials used at stage 1

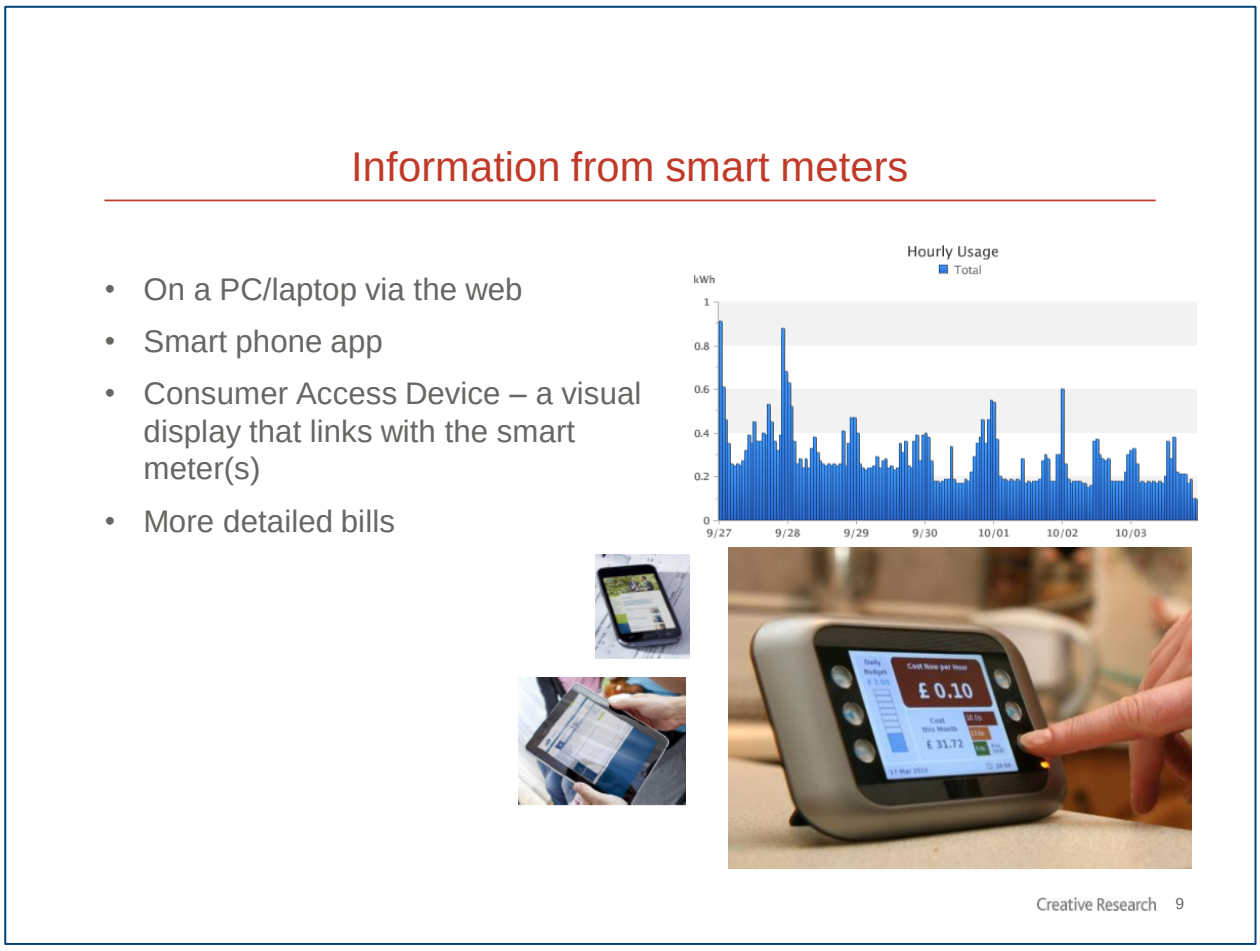

Figure 1: Information from smart meters

Power of Attorney Service
• Cheap Energy Club is an existing ‘power of attorney’ service for domestic energy customers • Subscribers enter data including their current supplier, previous consumption, etc. • They are sent an email automatically once a cheaper deal becomes available • Smart meters means that accurate consumption data could be used
Automated building performance evaluation
• Smart meter data can be used to compare the current energy use of your business premises with the energy use over time, taking into account weather related fluctuations. This can help identify the extent to which energy is being used efficiently • Where this reveals that energy is being used less efficiently, the service could provide ideas and advice on what is causing this as well as suggestions for improvements • By comparing a building’s energy performance against itself overcomes the problems of comparing two different buildings • For example, two hotels, one urban and one rural near to a lake, with a similar building fabric and number of rooms may have a large difference in heating requirements in winter and any benchmarking programme would struggle to account for this
Pattern recognition
• Pattern recognition technology can use smart meter information to identify, for example: • Heating or cooling comes on too soon or switches off too late • Boilers, or other heating components such as heat exchangers, are the wrong size for a building • Building energy management systems have been manually overridden and not re-set • Insights/recommendations can be sent to building managers and occupants; e.g. • “high gas and electricity consumption indicates that heating and cooling systems are working simultaneously” • “your building’s lights are on all night” • “changing your air conditioning filters will pay back in approximately eight months” • “you should change your air-conditioning settings to X today due to the weather forecast”
Device disaggregation
• A range of technologies that allow you to understand the electricity consumption per device. For example, a smart plug that sits between the plug on the appliance and the socket • This could inform you about items of equipment that are using the most energy, as well as those using more energy than they should be, such as an air con unit that needs servicing

Materials used at stage 2

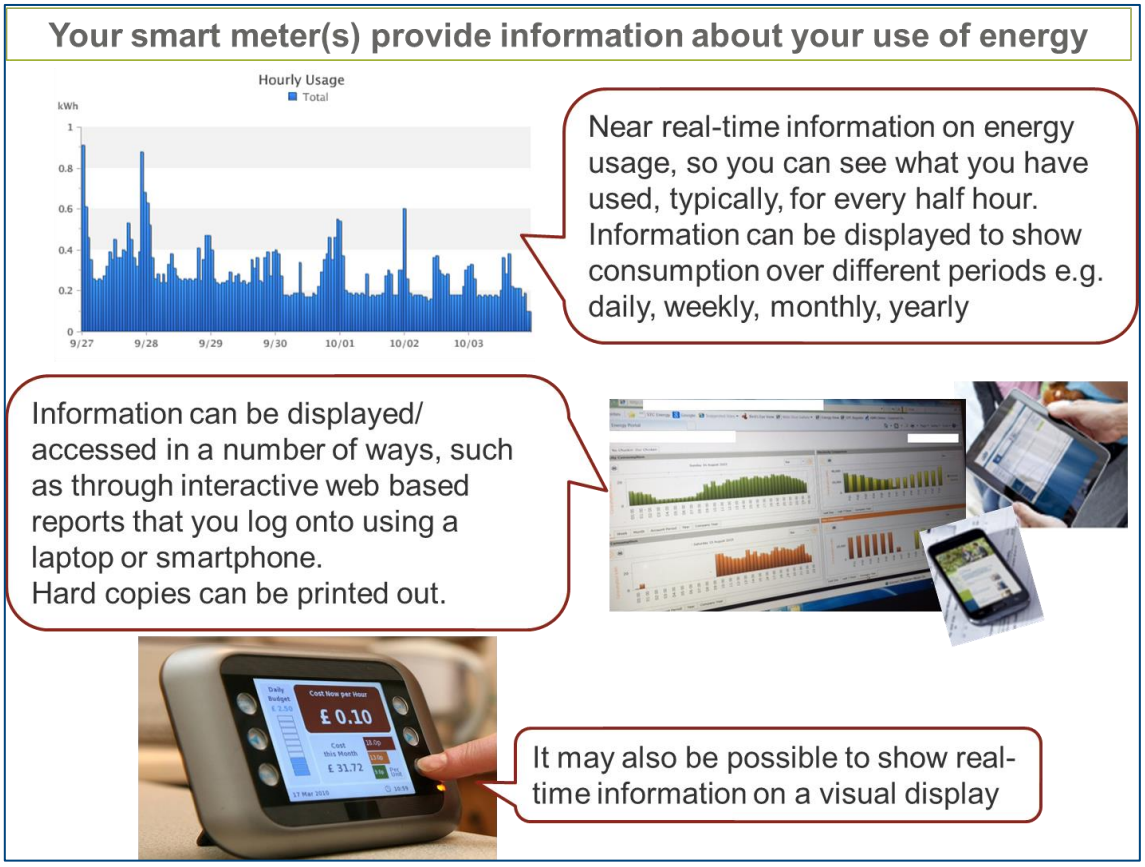

Figure 2: Methods of accessing data

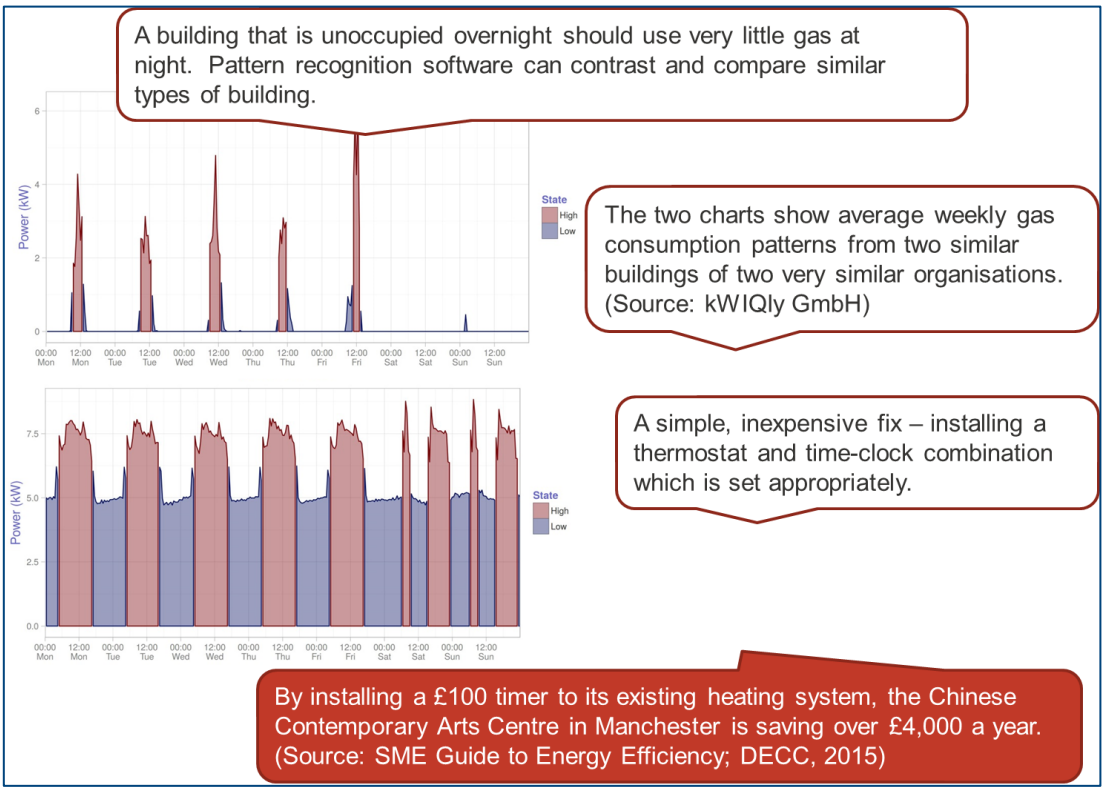

Figure 3: Example of pattern recognition (heating vs. external temperature)

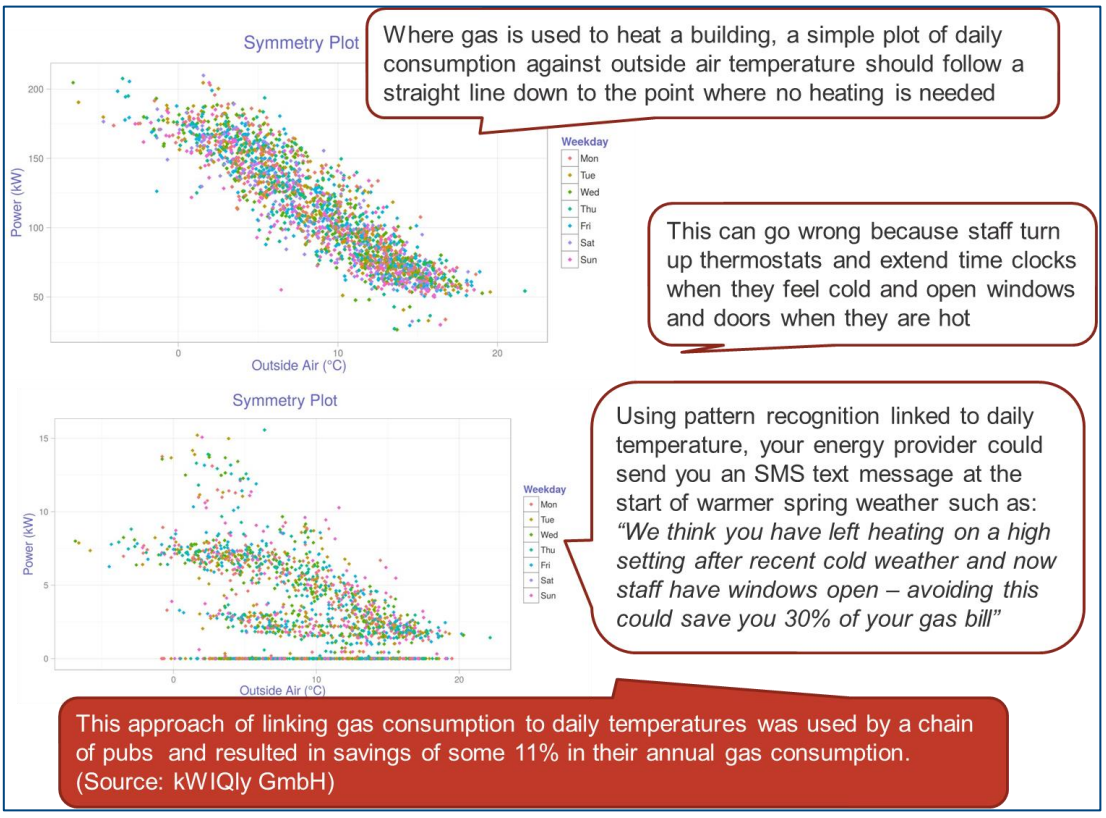

Figure 4: Example of pattern recognition (heating)

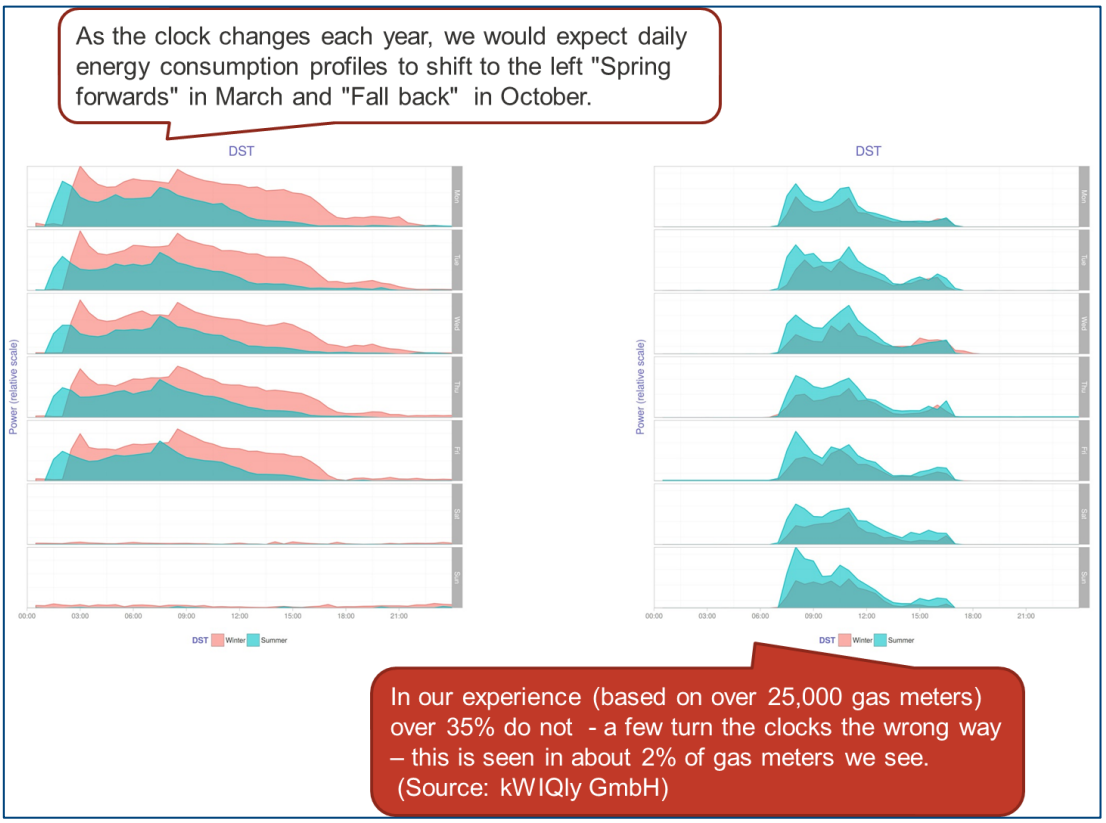

Figure 5: Example of pattern recognition (British Summer Time)

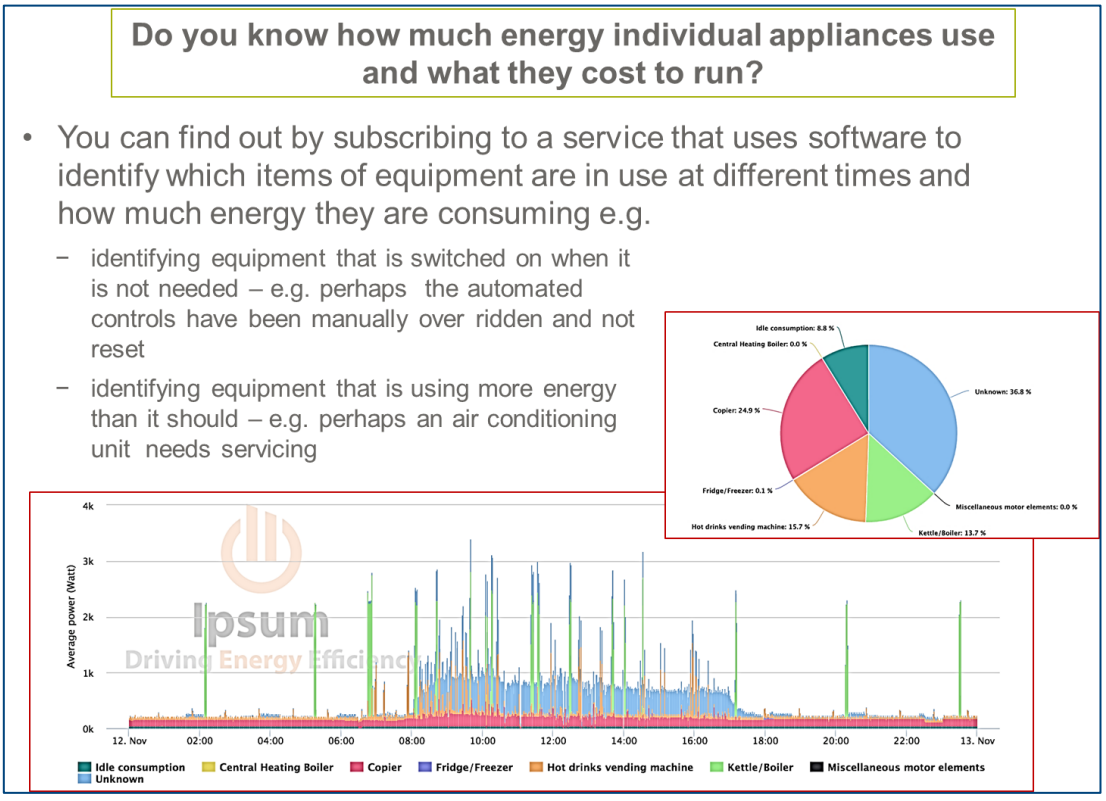

Figure 6: Example of device disaggregation

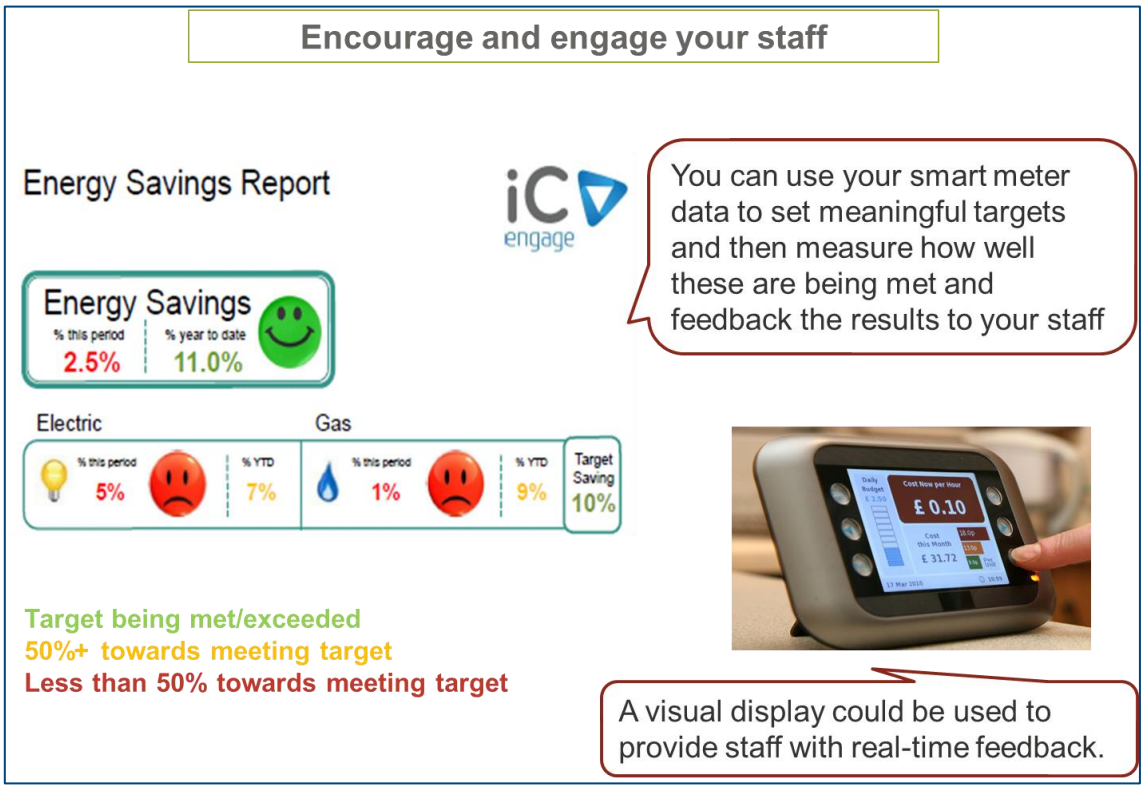

Figure 7: Staff engagement (individual site)

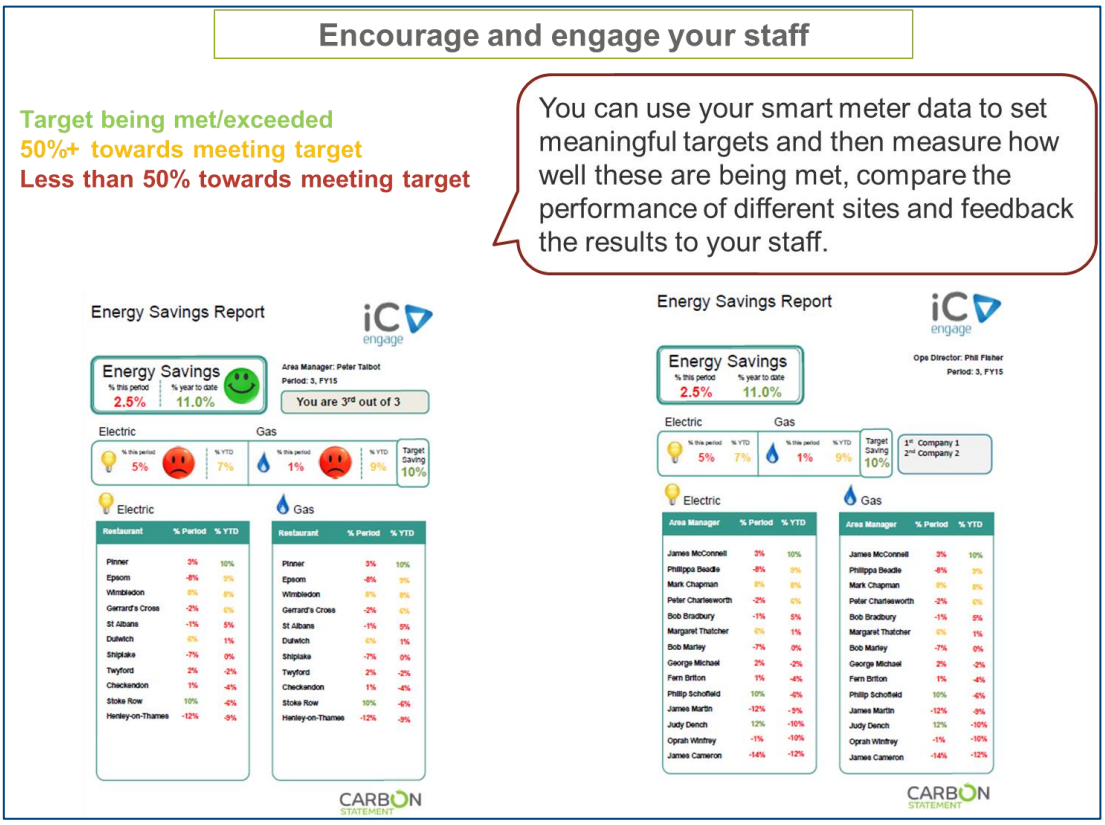

Figure 8: Staff engagement (multi-sites)

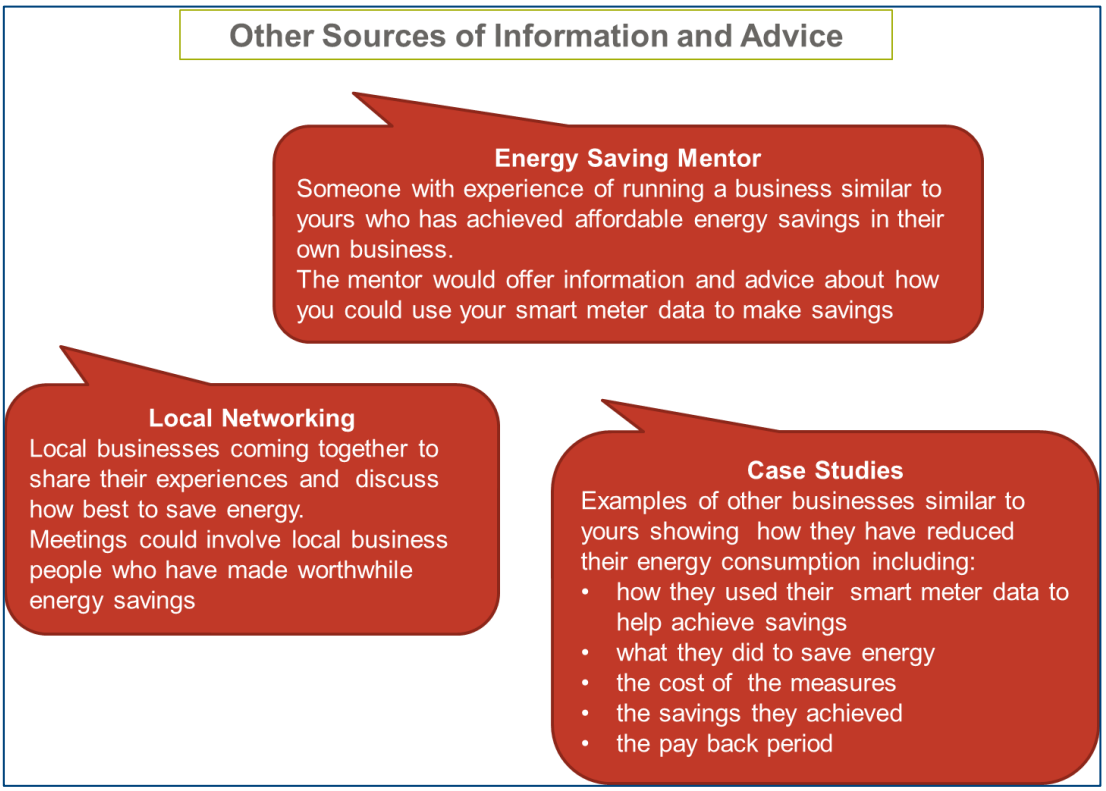

Figure 9: Other sources of information and advice

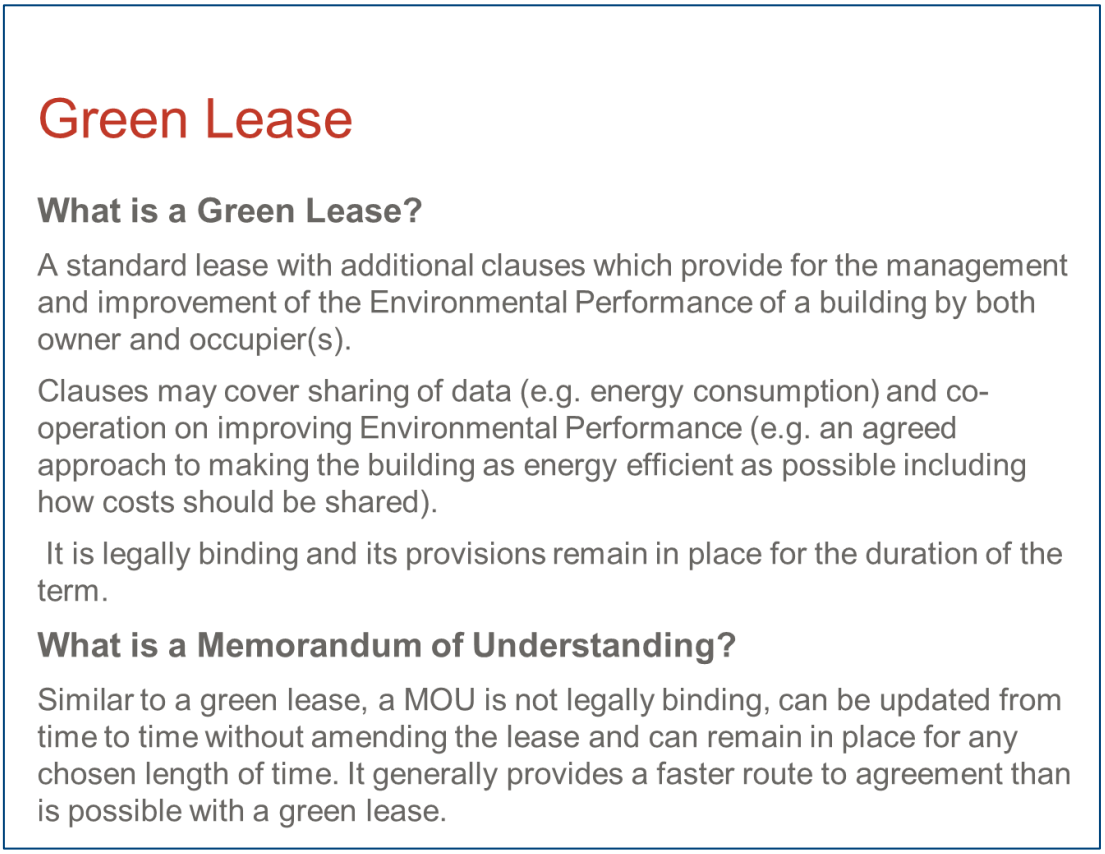

Figure 10: Green Lease

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

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