



Caught in the middle: The role of the Facilities Manager in organisational energy use



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HIGHLIGHTS

- Facilities Managers are increasingly critical node in organisational use of energy.
- Potential for FMs to make significant reductions to organisational energy use.
- Their ability to do so is constrained by the organisational environment.
- Three 'energy rationales' which the shape organisational context are identified.
- Opportunities exist for policy makers to improve organisational energy management.

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ABSTRACT

This study analyses the role of the Facilities Manager [FM] as a key actor in organisational energy management. This builds on the idea that 'middle' agents in networks can be an important lever for socio-technical change. The study demonstrates the considerable impact the FM can have on workplace energy consumption, whilst identifying a number of factors that constrain their agency and capacity to act. These include demands to meet workforce expectations of comfort; a lack of support from senior management; and a shortage of resources. Underlying these challenges, the study identifies three different energy rationales – that is to say conceptual frameworks – which are deployed by different groups of organisational actors. The challenges of reconciling these at-times-contradictory rationales results in a picture of energy management which to the outsider can appear highly irrational. The paper concludes with a consideration of how policy makers can apply these insights to support energy reduction in workplaces.

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1. Introduction

The need to pursue energy efficiency in response to climate change and energy insecurity is now well established. The UK, where this research took place, has targeted reductions in carbon emissions of 80% by 2050. From the commercial and public administration sectors, the Department for Energy and Climate Change (DECC) targets electricity reductions of 52 TW h by 2030 (13% of UK total) (DECC, 2012). We analyse the management of energy within organisations from the perspectives of those who directly control it, demonstrating the necessity of understanding energy use as a social process, and its management as an outcome of often complex organisational dynamics. We conclude with a discussion of the policy implications of these findings.

1.1. Energy consumption in the workplace

Previous research into energy consumption within workplaces has largely taken two forms (CSE and ECI, 2012): macro-level studies of strategic decision making (e.g. Anderson and Newell, 2004; Cooremans, 2011), and primarily psychology-based micro-level studies of individual office worker's attitudes and motivations (e.g. Lo et al., 2012; Tudor et al., 2007). Largely neglected has been the middle tiers of organisations who have direct control over much of the energy the workplace consumes. As energy consumption is rationalised in the contemporary office environment, this role is increasingly important. Individual building users' agency is increasingly being curtailed, as room thermostats, radiator valves, light switches and window latches are stripped out, superseded by Building Management Systems (BMS) remotely adjusting vents, heat sources, lighting and air conditioning. This process centralises energy management in the hands of the Facilities Manager (FM).

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With the click of a mouse, the FM can achieve significant reductions in gas or electricity. For example, a recent study found that lowering the heating set point from 21.1 °C to 20 °C reduced heating energy use by 34% (Hoyt et al., 2015). The FM interfaces between senior management [SM]; the organisation's energy strategy; employees; and the building's equipment and infrastructure. We argue that despite, or perhaps because of, this central position, the Facilities Manager should not be assumed to be the *energy manager* – that is, an individual whose job is to optimise energy use. FMs face a set of often-contradictory demands in their daily activities and reconciling these demands can result in energy management that, to the outsider, may appear highly irrational.

This perspective challenges existing policy making which often assumes organisations to be homogenous entities free of conflict or contradiction. Indeed research into organisational energy efficiency often ignores the organisational role of participants and potential interactions between key roles (e.g. Carbon Trust and SPA Future Thinking, 2012). Organisations are not single individuals, but rather political systems, composed of multiple actors with inconsistent preferences (March, 1962) and imperfect knowledge (Simon et al., 1991). A cursory understanding of organisations risks misdirecting efforts to better govern energy use (Lutzenhiser, 2014).

1.2. Studying the middle

The FM's role can only be understood with reference to their middle management position, which outside the energy literature has a long history as a subject of research. Two seminal US studies, on the 'man in the middle' (Whyte and Gardner, 1945) and 'marginal men of industry' (Wray, 1949), sought to better understand the troubled labour relations of the time by way of an analysis of the foreman occupying the space between the workforce and senior management. Both studies found that, contrary to assumptions, the foreman was isolated from decision making, being little more than a conduit between superiors and workers. This figure was more a victim of industrial tensions than a source of them. Ultimately "*the foreman's position is peripheral rather than in the middle*" (ibid. p301). Executing the foreman role more successfully required better leadership from senior managers, and greater inclusion in decision-making.

These themes, of exclusion from the exercising of power, and suffocation by the implementation of it, recur throughout subsequent organisational literature on middle management (e.g. Fenton-O'Cree, 1998; Sales, 2002; Sims, 2003). Following this pattern, Peschanski (1985) argues that the increasing complexity, fragmentation and regulation of organisations denies the middle manager any room for initiative or creativity. Like Wray (1949), Peschanski's account presents the middle manager as ultimately a pawn in the games played between those above and below. By contrast, other authors stress the effects middle management can have on organisational performance (Floyd and Wooldridge, 1997; Mair, 2005). Some have advanced that the middle manager can exercise agency through acts of resistance to strategies imposed from above (Ashton, 1992; Guth and Macmillan, 1986). Fenton-O'Cree (1998) supports these findings, but locates the cause of much resistance in organisational dysfunction, that is an environment in which the middle manager is unable to implement changes due to lack of resources, communications or training. These questions are given added importance by Balogun and Johnson (2004), who argue that the middle manager is becoming increasingly critical as organisations become more complex and distributed. This claim chimes with what appears to be an increasingly powerful role adopted by the FM as energy control is centralised within the BMS.

Within the energy field the role of the middle has only recently been addressed, through the work of Janda and Parag (2013) and Parag and Janda (2014) and their 'middle out' approach to energy transitions. In keeping with much middle management literature, they argue that the "*middle is more than filler*" (ibid. p103), having many qualities and functions not found elsewhere in the system. The middle shapes both supply and consumption of energy within buildings, making it an essential component in any process of transition. Accordingly, Parag and Janda differentiate middle-out from previous energy work on 'intermediaries' (e.g. Van Lente et al., 2003), as the latter describes a conduit between various levels of a system, but not an actor in its own right. Intermediaries are closer to Wray's (1949) description of the foreman.

The work presented here shares a belief in the importance of the middle. From this position the FM can potentially apply influence downwards to building occupants, upwards to senior managers, and sideways through external organisations, such as professional trade bodies, and specialist BMS contractors. We also follow Parag and Janda (2014) in using the concepts of *agency* and *capacity*, being the ability and willingness to make free choices, and the ability to enact those choices respectively. These allow for recognition of individual and structural factors in shaping actions, and are deployed here similarly, though with the caveat that agency and capacity should not read as polar opposites, but rather intertwined dependents. An actor's free choices, and awareness of them, do not emerge *sui generis*, but rather are influenced by the structures in which they act. Similarly, an actor's capacity to act cannot be separated from their agency, they may for example carve out that capacity through the gaining of other actors' trust.

1.3. Current research

Janda and Parag (2013) caution that, for all its centrality, the middle operates with "its own agendas, its own interests" (p. 47), as well as under limitations imposed from elsewhere in the system. In providing a situated understanding of the FM role, this paper is concerned with identifying these elements, and in detailing their consequences for organisational energy management. The paper highlights the contradictory demands placed on FMs from above and below; the necessity of negotiation with other stakeholders; and the constraints of time and skills. Three contrasting, and at times conflicting, rationales which shape the actions of the FM are identified. The first, energy as a *cost*, is likely to be expressed in financial terms, but might alternatively be reputational or environmental. The second, energy as a *utility*, conceives of energy as a background service, necessary for the organisation to carry out its functions. In the third, energy as an *implicit right*, energy actually goes unacknowledged, but the demands made by this rationale have direct consequences on energy consumption. These rationales are applied differently by the various tiers and specialisms of the organisation. Understanding and accounting for these tensions is a challenge to policy makers targeting reductions in organisational energy use, and we conclude with recommendations for doing so.

2. Methods

2.1. Design and participants

The study was conducted using ethnographic methods within four organisations over a period of nine months: one small-medium enterprise (SME), referred to here as 'Create'; two large enterprises, 'Allco' and 'Digitel'; and one county council, 'Dorton CC' (see Table 1).

The core of the data took the form of observation of one FM from each organisation within (~3 day) periods incorporating

Table 1
Research sites.

Organisation name	Organisation sector	Organisation size	Research site building type	Research site population
Create	Creative industries	Medium (50–250)	Early 20th century, converted from light industry. Cellular plan.	~80
Allco	Engineering	Large (> 250)	Early 21st century purpose built office. Open plan.	~200
Digitel	Data management	Large (> 250)	Late 20th century purpose built campus. Open plan.	~2500
Dorton CC	County council	Large (> 250)	Early 21st century purpose built office. Open plan.	~300

Table 2
Distribution of interviewees.

Organisation name	Facilities Manager (FM)	Senior manager (SM)	Middle manager (MM)	Technician (T)	Office worker (OW)	Energy management (EM)
Create (Cr)	1	1	3		5	
Allco (Al)	1	2			4	
Digitel (Di)	1		1	1		
Dorton CC (DCC)	1	1	2	1		11

semi-structured interviews with the FM. This was supported by interviews with a semi-structured sample comprising actors within the organisations with responsibility for energy: relevant managerial roles above the FM; technical roles; and office staff who occupied the environment controlled by the FM. This sample consisted of four senior managers; six middle managers; two technicians; nine office workers; and additionally eleven staff in energy management roles (all employed by Dorton CC). Four of the latter dealt with energy use within the council, the remainder provided advisory roles for other organisations in the county (see Table 2). The abbreviations in Table 2 are used in the subsequent quotes to identify the site and the role of the source.

With the exception of the nine office workers, all those interviewed were involved in the management of energy either directly or through someone working under them. The complexity of roles is partly a reflection of the multiple overlapping ways in which different organisations attempt to manage energy, and partly a reflection of the opportunistic nature of such fieldwork. Here one of the greatest challenges is simply gaining access to participants, all of whom have jobs to do, and this may help explain the dearth of research in this space. We are confident that enough important actors from each organisation were accessed to generate robust data for our analysis. This is supported by the commonalities in the patterns of energy management found in each the four organisations.

2.2. Procedure

The ethnographic work focused on the decision-making processes around energy use that occur on a continual basis within the workplace and took an “egological” approach focused on the subjective point-of-view of the actors being studied (Anderson et al., 1989, p. 60). The intention is to understand what practices the daily management of energy within a workplace consists of, and the formal processes and informal dynamics which shape them.

Observations entailed ‘shadowing’ the FMs as they carried out their tasks, noting their actions and asking questions where appropriate to understand intentions. This was supplemented by interview sessions which sought to understand the wider context of actions observed: such as the goals being pursued; other actors involved in any process; the implicit norms and explicit rules at play. The interviews with other actors, both above and below the FM in the hierarchy, were similarly to understand their own point-of-views on energy management, and the FM role particularly. These different perspectives allowed a measure of ‘triangulation’, providing validation and a depth of understanding of processes observed, and allowing for the tracking of influence emanating from the middle, and directed upon it.

Interview data and observation notes were coded with the Nvivo software package using thematic analysis. Drawing on existing literature in the fields of energy and organisations, initial coding focused on the agencies and capacities of the FM role, and its relations with other agents within the organisation. Subsequent analysis drew out the following findings.

3. Results and discussion

3.1. The Facilities Manager role

The FM role was historically preceded by that of the Building Engineer, a figure who inhabited the boiler room, and whose job was, fundamentally, to keep *things* working (Hug and Forbes, 2001). The increasing socio-technical complexity of organisations during the second half of the 20th Century drove an expansion of the role into that of the Facilities Manager. In the words of the Dorton CC FM:

DCC FM¹: *Basically, my role is to take away all aspects of running a building from the people who use it so that they can concentrate on doing what they need to do. You don't want social workers changing printer cartridges.*

Here we see the rationale of energy as a utility, operating in the background, enabling occupants to perform their jobs.

The FM's role is a diverse one, changing along two axes. The first of these, using FMs' own terminology, runs from ‘soft’ to ‘hard’ FM. Hard FM refers to work dealing with equipment and infrastructure – including managing the BMS; plant maintenance; and advising on procurement. Soft FM is work dealing with people, including cleaning, catering and security, any of which may be contracted out. Some of this work, such as mail delivery within the organisation, is commonly kept in-house. This soft/hard split was treated differently by different sites. At Dorton CC, the FM for the site we accessed covered both soft and hard FM. At Allco the FM covered hard FM, whilst soft FM was covered by the Operations Manager who sat above the FM in the hierarchy. A similar split was in place at Digitel. At Create, the FM covered soft FM, and it was the onsite electrician who dealt with hard FM.² This variety of solutions reflects the complexity of the challenge the role addresses and highlights how human-focused the previously pure-technical role has become.

¹ The tags attached to interview quotes designate the site (e.g. “DCC”) and role (e.g. “FM”) of the source.

² In the paper the Create Electrician is discussed as the FM, as it was their role which most closely matched the other site's FMs in terms of engagement with energy. As the Create FM had little direct involvement with energy, they are classified here as middle management.

The second axis concerns the degree to which the FM interacts with equipment and infrastructure directly. This axis appears more predictable as, at the sites studied, it changed with the scale of the organisation. At Create the direct involvement of the hard FM was reflected in the fact that by job title he was simply an ‘Electrician’. At both Allco and Dorton CC by contrast, whilst the FM maintained direct control of the BMS, monitoring aspects of energy management were given to dedicated teams based elsewhere in the organisation. Digital took this even further, for whilst the FM did hold ultimate control of the BMS, and spent time on it when able, most monitoring and alterations were left to a specialised BMS technician. The question of the resources FMs have available to expend on energy management is an issue we shall return to later.

Perhaps the greatest single change to the FM's role in recent decades, and the one that has positioned them as energy manager, has been the centralisation of energy control within a BMS. The effect of these systems profoundly alters the FM's relationship not just to energy consumption, but to the workforce occupying the building. With characteristic dry wit³ and again highlighting the rationale of energy as a utility, one FM observed

DCC FM: *The only disadvantage to a centralised type strategy is that everything's down to the FM and everyone has no interest in the running of the building.*

The tensions propagating from this ‘disadvantage’ have considerable implications for the nature of the role, and will be returned to in Section 3.2.

3.1.1. Independence of the FM role

Surprisingly for a role with direct control of a large proportion of workplace energy consumption, none of the FMs were served with specific energy reduction targets. This is not to say that the organisations as a whole necessarily had no explicit target, the council for example had committed to an overall 20% reduction between 2011 and 2015. However, in none of the organisations had a such a goal been translated into an explicit target for the FM. Rather, minimising energy use was understood to be a facet of the job, and avoiding wasteful practices appeared to be a personal motivation of all four FMs. Here we see an FM operating with a rationale of energy as a cost.

AI FM: *I don't have a specific target to reduce energy consumption or the amount we're spending on energy in this building, but given my job description and the kind of person I am, it's definitely at the forefront of my mind.*

The marginalism of the FM's middle manager position is realised as a considerable degree of latitude, that is to say agency, in performing this part of the role. This is, at least in part, due to the technical nature of the work, and the lack of relevant expertise amongst SM, for whom energy and the technologies which convert it into useful functions are far removed from the human actors they are used to dealing with. Any energy reduction targets set by SM would be accordingly arbitrary. The FM is left with significant leeway in how far to push energy reduction.

The disengagement of SM from energy management may also stem from the invisibility of energy. This can be partly explained as simply a matter of economic rationality. Whilst energy use in offices is substantial enough that as a sector it has important implications for climate change and energy security, within any one white-collar organisation energy expenditure is likely to be only a fraction of total operating costs.

Some cases observed during the research refuse such easy explanation however. At the SME studied, one issue of energy (mis)

management threatened to have considerable financial repercussions. The business had grown quickly and invested considerably in equipment to make the office environment both more productive and more comfortable, most notably air conditioning units. The building was operating at the limits of its energy supply, causing the FM concern that fuses would begin tripping. The financial consequences of such an outcome would be considerable. Despite relaying this problem to management they continued to introduce new demands on the electricity system, without consulting the FM, who was left out of the decision making process. Management saw this problem as of a class of technical issues they did not want to engage with. They were busy firefighting many other problems associated with expanding so quickly. SM here were operating under a rationale of energy as a utility, which is to say taken for granted as being available.

Cr FM: *This building, in particular, is right on the limit, power-wise... And you can't seem to get it through to them that the chain is going to eventually snap if they keep adding weights on.*

Cr SM: *[R]ealistically it's one of those problems we try not to think about.*

Organisational decision-making is highly dependent on the availability of attention (Cyert and March, 1992), and at this site the FM was unable to gain the attention of superiors, and so unable to influence them. This is the downside of the FM's freedom. Whilst the technical nature of the niche they inhabit gives them considerable agency with respect to how they carry out their role, it simultaneously curtails both their agency and capacity to act upon it. In this example the cost was to the FM's capacity, excluding them from decisions that had ramifications for their work. In examples given below, this isolation was also felt in SM's lack of support for FMs' attempts to apply influence downwards in the face of building occupant complaints. This undermined the FM's agency. Such marginalisation has profound implications for the FMs' ability to manage energy. The exclusion from many decision-making processes limits the influence the FM has over the tools they must work with and the problems they must work on. The lack of support from SM when dealing with building occupants, as is demonstrated below, undermines efforts to deal with those problems.

3.2. Factors influencing the FM's management of energy

3.2.1. The FM as service provider

The centralisation of energy control within modern offices gives the FM almost complete control over many aspects of the physical environment in which employees must work. The temperature, humidity, airflow and light levels experienced by the many workers in a building are all at the mercy of the FM. In a quote above the FM laments the fact the centralisation has the effect of undermining any engagement office workers might have with managing the workplace environment. Why take an interest in something one has so little capacity to effect? Beyond switching off computers and monitors when not in use there is little direct influence the contemporary office worker has over energy consumption (and even these examples might be void if automated IT systems are in place.)

This is though a very specific sense of ‘no interest’. One sense in which occupants do maintain interest in the running of the building is in regard to personal comfort. There is considerable evidence that occupants who have a sense of control over their local environment are more accepting of wider temperature bands, and more satisfied with thermal conditions generally (Brager et al., 2004; De Dear and Brager, 1998). In a traditional office space with decentralised controls, comfort settings are decided by informal negotiation, with the individual sitting closest to a window latch or thermostat control liable to adopt the role of

³ It is perhaps reflective of the contradictions that the role places them under that all four of the FMs studied in this work exhibited a humorous, slightly bitter sense of ironic understatement.

gatekeeper. This was the case at Create, the only site which did not have centralised control.

In lieu of personal control, the responsiveness of the FM to occupants' requests becomes highly salient (Leaman and Bordass, 1999). In the three centralised sites, the FM became the gatekeeper, and the process of negotiation absorbed into the organisation's bureaucracy. Occupants could contact the FMs through some form of computerised reporting system, though at all three sites the FM was widely known. They would be regularly approached by occupants whilst taking the researcher around the site, and as one building user put it: "I'm more likely to pick up the phone to [the FM] anyway than whack an email, because at the end of the day they're people and it's easier to ask" (AI OW).

It is important to note that occupant's thermal comfort expectations are considerably mediated by culture and convention. Currently, "people have become accustomed to a uniquely standardised understanding of what conditions 'should' be like indoors" (Chappells and Shove, 2005). Workplaces with centralised control help foster such expectations by separating occupants from both energy management, and from the costs associated with energy use. The result is that the office workers in our study gave little thought to workplace energy consumption. However their expectations of indoor comfort entailed considerable consequence for energy use, and so we label this rationale of energy as an implicit right.

It is necessary to understand what an important element of the FM's role these comfort requests are. At Digitel, the FM was responsible for several local sites, which between them held over 2000 employees. He reported receiving around 110 calls relating to comfort every month. The effect on building energy consumption from responding to any one request may well be negligible, indeed two FMs, demonstrating agency, reported times when they assured occupants complaining of cold that they would turn the heating up, only to make no adjustments at all. These are extreme examples of a common event: the FM applying influence downwards to nullify a particular request, avoiding the need to make adjustments to the BMS. However, aggregated over time, the effect of these requests profoundly influences the FM, and through them, the BMS. The Allco site had been opened in 1999, designed as a low carbon building with natural ventilation. The following exchange with its FM shows the slow death of efficiency by a thousand comfort requests:

AI FM: [Headquarters] are now talking about putting the [building] settings back to the original, which means we're going to be exactly back where [we were] 14 years ago. With everybody screaming, basically.

R[researcher]: So, over time, you've moved away from how it was set up, by closing vents and...?

AI FM: Over time, you've adjusted the building to suit the customer. Yes, I mean, the end of the day, that's what they are.

This example shows the consequences of occupants acting with the rationale of energy as an implicit right.

It was clear at all sites that occupant feedback was an important element in determining BMS settings. There was considerable variation in the respective 'dead band' (the target range for the heating and cooling systems) of the sites. These bands are based on an evaluation by the FM, factoring in the thermal limitations of the building; occupants' expectations (evaluated through feedback – usually in the form of complaints); and the FM's own beliefs. At Digitel, the band was 22–24 °C, at Dorton CC it was 19–21 °C. The difference here appeared to be the 'hard line' adopted by the FM at Dorton CC, ironically justifying it on the grounds that, relative to the private sector, the public sector was too soft on its employees:

DCC FM: I don't have an awful lot of sympathy for staff who tell me that they're cold because I know that we're actually exceeding

what we're meant to be delivering⁴ [...] I sometimes think it's a bit of a local government mentality that means that I should be providing a perfect office environment all the time.

This difference in dead bands highlights the considerable influence over energy consumption the FM can hold in situations where they have both agency and the capacity to use it.

A strong constraint on capacity comes in the form of senior management. At both centralised private sector sites the FMs rued the tendency for senior management to support the comfort demands of employees, in doing so negating the downwards influence of the FM. At Allco the FM recounted an effort to reduce lighting costs by dimming the main overhead lights at 17:00 each evening. When the FM held firm against complaints some occupants took their discontent to senior managers, and the FM was pressurised into backing down: again an example of the rationale of energy as an implicit right.

Di FM: [I]f the individuals don't get their way, they will tend to take it higher and they get the support of the director in most cases, so we end up with what we end up with; you know, keeping customers happy.

It is perhaps not coincidental that at the one site – Dorton – where the FM had both the agency and capacity to hold to a comfort level that was unpopular at least amongst some, there were reports that staff at the site felt neglected by senior management. The highest tiers of the organisation were based at another site 30 miles away, and were rarely seen. In their absence it appeared as though the constraints on the FM were loosened and thus the FM's agency increased.

The language with which FMs refer to building users is telling of the relationship between them. Despite being notionally subordinate, their status as 'customers' reflects the influence they hold over the FM. A primary reason why the FM is not the energy manager is the considerable time they spend acting as a service provider, the service in question being comfort. The imbalance between large numbers of staff able to recruit senior managers to their cause, and a lone, isolated FM, is likely why the FMs held an ambiguous relationship with office users. When not speaking of them as customers, FMs would often discuss them in terms that might otherwise be applied to spoilt children, even at times as some kind of infection of the building: "Wherever humans are involved, you've got the potential for poor behaviour to creep in" (DCC FM). In these accounts one gets a sense of the dynamics found by Wray (1949) and Whyte and Gardner (1945), of a fraught figure trapped between two hostile camps. Indeed the situation could be considered more perilous still, given the willingness of these camps to unite in opposition against the FM.

It was perhaps in response to such well-equipped opposition that the FMs at the centralised sites were all highly personable and apparently well-liked by the staff, at least on a personal level, a reflection of how important 'soft' skills are in what is ostensibly a 'hard', mechanical-technical job. The following light-hearted exchange between an FM demonstrating the remote control of lighting to the researcher, and a passing office worker [OW], gives some sense of these dynamics:

[AI FM changes light levels in space using computer]

R: That is quite nice to be able to do that from your desk.

AI FM: Yes, it makes-

OW: That, actually, Steve, I prefer that. Could you keep it like that?

AI FM: No.

OW: Yes. Do as you're told!

There is a complex process of influencing taking place here. In individual interactions it is easy to find examples of the FM

⁴ In the UK there is a legal requirement for workplace temperature to not fall below 16 °C. There is no effective upper limit.

imposing influence on occupants. However over time, as requests aggregate, occupants join forces, and SM is recruited, the influence reverses. In Kaufman (2006) study of US Forest Rangers, he identifies the threat to organisational unity that comes from Rangers – socially and geographically distant from the organisation's senior management – being “captured” (p. 76) by the local populations amongst which they live. Either voluntarily through shared identity or involuntarily in the face of local pressure, Rangers may become “community delegates to headquarters rather than the reverse” (*ibid.*). There is certainly an element of local capture in the deferment of FMs to the inhabitants of the spaces the FM oversees. The heterogeneous nature of the FM role, with its often overlapping ‘hard’ and ‘soft’ elements, could be said to foster such a process. Many of the tasks conducted by the FM, such as overseeing building security, mail delivery, and general site maintenance, entails face-to-face contact with building occupants, during which time ‘local capture’ might develop. Where this differs from Kaufmann's account is in the fact that in our examples SM are liable to accept, and even support this process of capture, not least because a content workforce makes their own jobs easier.

3.2.2. Conflicting demands

The tension between reducing energy spend and meeting occupant comfort demands is not the only contradiction the FM faces. Tensions were also evident in interactions with other aspects of organisational operations. Dorton had a distinct energy management structure, which reflected the complexity of the organisation's estate. Its corporate staff were housed in three large, modern offices, each of which was overseen by a separate FM. However, its portfolio also included hundreds of other sites across the county, including libraries and leisure facilities. In an effort to rationalise the energy management of these sites, all were fitted with smart metres which provide Automated Meter Readings (AMRs) of their gas and electricity consumption in real time. In total some 1600 m feed back information to the Energy Team, a group of four tasked with reducing the council's energy use through the overseeing of energy efficiency programmes. As such, this team were energy managers, a specialism made possible, and necessary, by the scale of the organisation.

The clarity of the role (in contrast to the FM's) supported the agency of this team. They did lack for capacity however, as they had no direct control over the equipment and infrastructure consuming the energy. This was the purview of the Buildings & Maintenance [B&M] team, of which the FMs were a part. The Energy Team expressed frustration that they would identify energy efficiencies using data from the AMRs and report them to B&M but nothing would be done about it. The B&M team gave a different account. They reported working unproblematically with the Energy Team on identifying problems and addressing them.

How these two teams could have such different accounts of their interactions was unclear, but the underlying cause of the discrepancy appeared to stem from the situated rationales of the different actors. By this we mean their actions must be understood through reference to the differing local circumstances they faced. The software used to view the AMR data was a powerful tool through which the Energy Team could identify anomalous energy use at council sites, but this was all it provided: a two dimensional graph trace of a single resource's consumption where the rationale of energy as a cost dominated. This, combined with the energy reduction remit of the Team, encouraged a very singular understanding of these buildings and the activities within them.

By contrast, B&M's roles involved personal experience of the sites, the staff working there, and in many cases the sub-contractors maintaining various elements. It was the human activities, the material quirks and the equipment's requirements that constituted particular sites in their discourse. Here not only did the

B&M team adopt the building occupants' rationale of energy as an implicit right, but they had different considerations when weighing energy in terms of cost and in terms of utility. Any intervention in the sites would require mediation with these components.

DCC MM: *I think, personally, in order to read those [AMRs] properly you need to understand the operations of that site [...] there are reasons why this is happening [...] they [onsite] have things which we don't know about [...] we want to make sure it's fitting with them.*

We can see here firstly, how different roles' application of energy rationales profoundly alter their efforts to manage energy, and secondly how central negotiation is to the FM's actions – with respect to individual wants, subcontractor bottom-lines, and corporate policies; humans and machines, and in terms of balancing differing rationales of energy.

Just as much of an FM's time is spent seeking acceptable compromises with comfort-seeking occupants, they must also account for the extra costs of situated demands on operations, e.g. replacing leisure centre lighting out of hours; the ‘defensiveness’ of a subcontractor keen to protect their margins; or the need in the depths of winter to heat a building over the weekend to ward against frost damage:

DCC FM: *We're constrained by the business, how they operate, and we can't upset that.*

3.2.3. Resource constraints

A significant curb on the capacity of FMs to enact energy management, even where the agency exists, comes in the form of resource limitation, primarily of time. Whilst there may be some truth in Hug and Forbes (2001) identification of a shift in the role of FM from agent of stasis to agent of change, there nevertheless is an ongoing demand for maintenance that claims much of the FM's time. The FM's description of workplace is often no more or less than a list of machines and surfaces to be checked, protected, replaced, reset:

Di FM: *First thing in the morning we check the pumps are working, check the others are working. Make sure everything's working: boilers, pumps, water, you know. Long as everything's up and running, we're happy people.*

In times of transformation, much of the FM's time is spent ensuring continuity, more likely to be required as a bulwark against the impacts of change, than as a leader of it. Just the moving of one desk – due to change in team personnel perhaps – might necessitate moving floor equipment like power and network points, in turn requiring the placement of additional carpet panels to make good the alterations and reassert the presentation of stability.

There are two aspects of an FM's work in which they *do* particularly bring about change in energy use. The first of these, procurement of new equipment and infrastructure, requiring the securing of funds from superiors, is one of the primary routes through which FMs exercise influence upwards. It is also one of the few aspects of energy use in organisations to be given previous attention. For that reason, and the fact procurement stands outside the daily management processes we focus on, it will not be dwelt upon. The second is through the optimisation of energy use – what we have discussed here as energy management. The process of centralisation, combined with increasingly sophisticated BMSs, gives the FM huge capacity for optimisation, in theory.

Here the sophistication of the management systems undermines their effectiveness. Contained within the BMS are the controls for various heating and cooling loops hidden in the skin of the building; the vents, valves, and baffles that direct the flows through them; and the sensors which monitor both their status and their impact on the office environment. In addition there might be months or even years of data logging air and water temperature, humidity, CO₂ and lux. With these resources comes a

level of complexity sufficient to defeat, to various degrees, all three FMs at the centralised sites examined. For one FM, the data logging and processing capabilities of the BMS was far beyond what was practical for him, given the day-to-day pressures he faced: “*the reality is, we just don't need it. It's a bit like giving you a Ferrari to do the posting*” (DCC FM). This FM used the BMS primarily to monitor and adjust different parts of the building's temperature manually, relying largely on intuition born of experience, to predict how conditions will change in different parts of the building over the course of the day. One of the other FMs had similarly discounted some of functions of their system on grounds of impracticality. The third, at Digitel, was the only FM with the luxury of delegating much of this work to a BMS technician, who was contracted in from a specialist company for one day each month. This not only gave the FM additional time resources, but also the technicians' specialist role ensured the required skills were available.

Keeping the work environment functioning is not only time consuming, it is often unpredictable. Organisational changes may bring a raft of jobs for the FM to tackle, as may individual complaints, changing weather conditions, or misbehaving equipment. In the main, these events occur unheralded, either by their nature, or because of failure by other tiers in the organisation to forewarn the FM. Regardless, much of the FM's workload is ‘firefighting’ immediate problems, what March refers to as the ‘squeaky wheel’ concept of attention (Cyert and March, 1992), where only the most glaring problems are dealt with. Long-term optimisation is a secondary concern; it's also an intractable one, given that changes to any of the elements listed previously entails in turn changes to what is optimal. It was the difficulty of managing this which led to the Allco case where continuous tweaks over time left the building considerably outside its intended performance envelope.

4. Conclusions and policy implications

Intervening in the energy consumption of organisations requires an understanding of human actions in the boiler room just as much as in the boardroom. The FM is, as middle-out perspectives argue (Janda and Parag, 2013; Parag and Janda, 2014), more than just ‘filler’, as the foreman was once described (Whyte and Gardner, 1945; Wray, 1949). This perspective emphasises the influence that may be directed outwards from the middle. Certainly this was the case with the FMs studied, and yet much of this influence was curtailed in practice by organisational factors. Through the BMS the FM has considerable influence over the entire organisation's energy consumption. Where FMs do find both the agency and capacity to act, the effect can be profound – for example the 3 °C difference in set point temperature between Dorton CC's site and Allco's would have resulted in significant energy savings for the former. However, we have detailed a number of constraints on the FM, including role isolation; conflicting organisational demands, particularly stemming from ‘local capture’; and resource constraints, specifically limits on time and skills. Of these, resource constraints limit the capacity of the FM to fully exploit the BMS, whilst role isolation limits capacity by excluding FMs from decision-making processes. All these factors constrain the agency of the FM: role isolation limits their authority over the environmental conditions of workplace; conflicting demands push them to enact changes which often increase energy demand rather than the opposite; and constraints on training diminish the FM's choices by leaving them with complex control systems they are often not able to fully exploit.

Ultimately, the FM struggles between three different, overlapping energy rationales which guide the actions of those within the workplace. The first conceives of energy as a *cost* – primarily financial, but also potentially in corporate social responsibility or

public relations terms. Here energy use is framed as something to be minimised. FM's spoken to within this study all expressed recognition of an expectation that they would work to minimise energy use despite a lack of any relevant explicit targets imposed upon them. The second rationale is that of energy as an *implicit right*. Energy is actually largely or wholly invisible within this rationale, but it is required in order to meet occupants' expectations of comfort. Employees bear no direct cost for energy use, are unlikely to be informed of the environmental impacts, and – in the contemporary office – are separated even from the interfaces and heating/cooling equipment that give some presence to energy. The third rationale holds energy to be a *utility*, which is to say unseen but always available for meeting the goals of the organisation. This rationale was evident in the disinterest amongst Create SM in the looming energy crisis the building faced as it approached the limits of its electricity provision. It was also apparent in the Dorton B&M team's unwillingness, or inability, to act upon apparently wasteful uses of energy identified by the Energy Team. Their overriding concern was to ensure continuity of service.

From a middle-out perspective, we can say that these rationales are not exclusive to particular roles, but their accumulation does correspond to the actor's position in the organisation. Those at the bottom of the hierarchy with minimal control have little reason to think of energy, but their comfort demands necessitate energy expenditure. For those closer to the top, energy is likely to be conceived primarily as a utility (with one of its facets being the meeting of staff expectations of energy as an implicit right), or – in specific contexts such as during procurement – as a cost. The three rationalities meet in the middle of the hierarchy, where the FM is tasked with enacting a strategy that is sensitive to all three. Understanding the rationales' patterns of accumulation is an important step towards mapping energy management within organisations as a social process.

For policy makers, if the ambitious energy savings targeted for the workplace are to be achieved, the first step must be recognising that organisations are not simply rational, homogeneous entities, but rather complex networks of technologies and humans, the latter comprising of a diverse set of roles, each with particular orientations towards energy, and particular agency and capacity to act. The central actor is that of the FM, but interventions to reduce energy need also to give attention to their interactions with tiers above and below them for it is here, where multiple energy rationales come into contact, sometimes in outright conflict, that the FM's actions are largely decided. Maximising energy efficiency within workplaces requires that the task of energy reduction not be the provision of the FM alone, but of building users and senior managers as well. An organisation in which a disengaged and disempowered workforce cares only for energy as a source of comfort, whilst senior management acquiesce rather than demonstrate leadership, will not succeed in minimising energy use.

Accordingly, policy makers must encourage solutions that encourage organisational unity in response to the challenge of energy reduction. Organisational-level policy makers have an important role to play here (2 and 3 below), but the current low cost of energy relative to other organisational costs means that action is also needed from state level policy makers (1,2 and 4) in order to incentivise organisations.

We conclude with the following recommendations:

1. *Make energy use more salient for SM:* Some progress is evident here, for example in the UK the Carbon Reduction Commitment Scheme (CRC) requires heavy users of electricity (> 6000 MW h/y) to report their consumption and purchase allowances. Such schemes, in principle at least, generate a financial motivation for SM to engage with the organisation's energy consumption, particularly when, as is likely the case in commercial entities, energy is otherwise only a fraction of

overheads. Such motivations are necessary to encourage SM to work with FMs to implement coherent energy reduction strategies. For FM's to better apply influence upwards to access the necessary resources to optimise or replace systems requires recognition from decision makers that this is an issue that requires attention. Options for making energy more salient for SM might include lowering the threshold at which reporting is mandatory, adding greater data collection requirements (which would support recommendation #3 below), and the addition of greater financial penalties or incentives.

2. *Adopt tools to strengthen the ability of FMs to direct influence downwards*: One of the easiest means of achieving reductions in building energy use is through reducing thermostat set points, something that requires no additional equipment and (in theory) little investment of time. However such changes are liable to run into opposition from the 'local population'. Reducing building temperatures whilst maintaining a sense of comfort amongst staff may necessitate both a change to workplace cultures (e.g. dress code) and a narrative of why such adjustments should be supported. The FM is well positioned to be part of this process, using the tools and local knowledge available to them to influence building occupants. As the processes by which expectations of comfort come to be established in workplaces are tied up with site-specific institutional and material factors (Walker et al., 2014), the FMs embedded understanding is key. However the sites studied here all had systems in place which presumed a one way flow of communication (in the form of complaints) from occupants to FM. As a result the FMs influence downwards was largely reactive, responding to occupant demands rather than working to proactively shape them. With the backing of SM, the FM's role could change from providing for customers, to leading staff.
3. *Support training for Facilities Managers and investment in optimisation*: The role of FM has changed considerably in recent years with the introduction of powerful, complex digital systems of control. Fulfilling the potential of these systems requires their operators to have the appropriate skills, which requires support for career-long learning. One option would be to incentivise organisations to bring in BMS specialists to optimise their systems, as Digitel did in this study. This could be done by creating the requirement for in-depth Key Performance Indicators relating to energy consumption from organisations: this would require organisations to either train FMs to understand the complex energy data in greater detail or encourage them to employ additional expertise for this purpose. Highlighting energy consumption in organisations in greater detail may help to bring this to the attention of SM and bring this to the forefront of the role of the FM, or create an additional role for this purpose. Ultimately rather than ignoring the complex detail of the data provided by BMSs that currently is not used, this would foreground this data, potentially provoking greater understandings and efficiencies.
4. *Ultimately, recognise commercial organisations as heterogeneous networks*: It is necessary for policy makers to recognise the conflicts present in the different energy rationales held by different organisation members. This draws attention to the need for compromise and culture change. Interventions need to understand the characteristics of different organisational sub-groups in regards to energy management, and tailor incentive schemes accordingly.

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