



From responsibility to accountability: Working creatively with distributed agency in office energy metering and management



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ABSTRACT

In homes and offices across the UK, increasingly sophisticated smart metering systems are being hailed as a crucial weapon in the fight against climate change through a focus on energy demand reduction. Using the example of Current, a multi-disciplinary project focused on energy use in large office environments, this paper reflects upon the metering process on a university campus and the challenges and opportunities that it poses for energy management. Through an exploration of the relationships between the human and non-human actors that are involved in energy consumption and metering (staff, students, radiators, data loggers, thermostats, computers and building insulation, to name but a few examples), we show that, rather than being used to critique and apportion blame for energy consumption, measurement systems which attempt to quantify that consumption can provide the opportunity to ask fresh questions about agency, responsibility and the relationships between people and things in ways that can help us work towards creative solutions for more sustainable futures.

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1. Introduction

This is a paper about attempts to monitor and reduce energy consumption in the workplace. It is also an exploration into the nature of responsibility and agency, and the role that measurement and uncertainty plays in all this. But, most fundamentally of all, it outlines how things come to be as they are, and how they could be different.

We start from the question of who – or what – is responsible for energy consumption in the workplace and explore the role that the energy meter and other kinds of monitoring systems have to play in answering this question. Our exploration shows that measurement systems which attempt to quantify energy consumption do, indeed, have a crucial part to play in discussions of responsibility. However, this is not because they provide us with concrete answers that lead to management interventions by fixing responsibilities on isolated actors. Rather, their true value lies in the ways in which we can use them to highlight fresh *questions* and *controversies* about the nature of the relationships between people and things which are implicated in particular kinds of energy consumption. In doing so we argue that it is possible to open up new and

more innovative avenues for intervention which have the potential to lead to significant reductions in energy consumption.

The focus for the paper is Lancaster University campus, which became the setting for Current, a two-year, multi-disciplinary research project, funded by the EPSRC. The research focused on understanding energy use – particularly IT energy use – in large office environments, and attempted to develop interventions to help reduce that energy use. Through a range of quantitative (software monitoring, data loggers) and qualitative (interviews, group discussions, observation) methods, our research set about exploring the question of who – or what – was responsible for energy consumption on campus and identifying which types of interventions could be best tailored to the different kinds of energy use and the varied needs and practices of staff and students on campus.

While this research is based on a single site case study in the UK, the insights that it develops have wider relevance for an international readership since it deals with many of the key themes identified by the literature as being of crucial importance for the future of energy research [40], including energy justice and governance, our relationship to energy consuming infrastructures and feedback devices [13] and the importance of understanding the social dynamics of energy demand [46]. Crucially, it also offers a much-needed focus upon energy consumption in the workplace and is an explicit attempt to connect the questions of interest to energy researchers with the practical concerns pertinent to energy

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managers and policy makers – a task identified as being of central importance when this journal was founded [40].

In order to illustrate the questions about responsibility which form the subject of this paper, the following fictionalised sketch is an attempt to characterise the kinds of debates emerging during some of the meetings that we participated in during the project. At these sessions, the university's newly appointed energy consultant worked with staff to try and develop a better understanding of some of the graphs of energy consumption resulting from the metering data taken from their office building. While this sketch is based on participant observation of these meetings, the dialogue itself is fictional, in order to characterize the key points of what were, in reality, long and detailed discussions in a short exchange suitable for this paper.

Box 1: In search of responsibility—a characterization of a typical group discussion.

- Hmm, well if you look at this building it's funny that there's so much energy used at night: I wonder why that is? Lots of staff do leave their computers on—could that be the reason?
- The lights in our corridors are automated so it certainly couldn't be them. Could it be someone coming in and turning things on?
- Yes but at 5.30am? That seems unlikely...
- Ok, so the cleaner maybe? She does come in at around that time, I think.
- Yes but if we look at the figures for the week, we can see how regular this event is. Whatever is happening, it happens at exactly the same time every day. And look at how much power is involved; that's a big jump in consumption so I don't think it's likely to be just one person turning things on. The fact that it's so regular and that a lot of energy is involved makes me think that it's something automated—the heating system coming on maybe?
- Yes, that seems like a reasonable explanation. But why do we need our heating to come on at 5.30am, given that no one comes in until at least 7.30? And anyway, what about that funny spike that happens at 3.20am on the 22nd? And there's another at 11.30pm on the 23rd? This time it isn't regular, so it can't possibly be something automated. It can't be staff working at this time, surely?
- Ah yes, but this isn't just your standard office environment—we have staff and PhD students who regularly work through the night, so you can't assume working hours of 8am to 6pm here. Besides, this is a mixed use building—we have lecture theatres on the ground floor and staff offices on the middle floors, but there are some flats on the top floors and this might explain the consumption throughout the night!
- Yes, but does that really explain that level of consumption? You don't get those figures just from having a few lights and the TV on...
- True. And why does the whole building need to be heated just because a few people happen to be in and awake at 2am? Surely that isn't very effective design? Who built the heating system like that anyway? Besides, it's always cold in here or boiling hot—there's no happy medium.
- Well that would explain this graph which shows how the building responds to changes in outside temperature. Does this building have insulation, do you know? How about radiator thermostats—what sort do you have in this building?
- We have the sort you can change—but no one knows how to use them. People feel cold so they crank them up to the maximum and then they leave so that it's boiling for the next person. Then they open the window without thinking to turn the thermostat down. It's a nightmare. Why do they put those sorts of controls in seminar rooms? It would be better if they were locked at a sensible level...

Computers, automated lights, cleaners, heating systems, architects, insulation (or the lack thereof), thermostats, windows – so many actants – all of whom could be said to have a role to play in the matter of energy consumption on campus. From this typical exchange, it seems as if the metering system – originally intended to *simplify* and *clarify* the discussion of responsibility – has only served in muddying the waters further. And if so, what is to be done about that, and in which direction should we proceed? Is the answer more measurement, or can we learn to live with the controversies and work generatively with them? This paper is our attempt to answer these questions.

To lay the ground for this work, we review two distinct approaches to tackling the problem of demand-side management within energy systems: those which seek to contain the issue by locating responsibilities within individuals – such as smart metering systems which pinpoint the role of consumer choice in reducing energy consumption – and those approaches which, instead, stress the relationships between things and the ways in which responsibilities are distributed through a range of human and non-human actants. Crucially, we also show how different systems of measurement are implicated in the distribution and redistribution of these responsibilities. We conclude from this discussion that ideas of distributed responsibility can make an important contribution to our understanding of the energy issue, and yet highlight how this approach also poses problems for accountability and management. If responsibilities are a matter of relationships, rather than containable within particular actants, then how and where can we act within the system? To find our way out of this impasse, we add to this discussion by introducing ideas of asymmetry between humans and non-humans. This allows us to distinguish between responsibility, meant in the simple sense of *who* is acting, and responsibility as *accountability* and *intentionality*, meant in the moral sense in order to show the important ethical role that humans have in trying to reconfigure or *compose* [27], the relationships between people and things in ways that look to be more beneficial for society and the environment. We then illustrate and extend these points by exploring some of the data from Current, before concluding with some reflections on how different forms of measurement can come into conversation with each other in order to help energy managers move away from an approach based exclusively on simplification, critique and blame towards one in which it is possible to work with the controversies that ensue in order to begin discussions about how to do things differently and *better*.

2. Errant individuals and unscrupulous objects—introducing the smart meter

In order to understand discussions relating to demand-side management within energy systems, it is first necessary to situate them within the broader context of debates around responsibility and accountability in relation to climate change. The international debates that exist over emissions targets, adaptation and mitigation are, fundamentally, questions about who is responsible for causing climate change and who should be responsible for solving it [6]. Thus every possible proposed 'solution' and – as we shall see – every attempt to quantify 'progress' through some form of *measurement*, is also a source of controversy as it will inevitably, by its very nature, transfer the burden of responsibility from one set of actants to another. The present paper considers one particular controversy: that between those who favour individualistic approaches to intervention and responsibility and those who view responsibility as a matter of the relationships between people and things. Crucially, it also highlights the far from innocent role that attempts to quantify energy consumption through particular systems of measurement have to play within this debate.

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