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Beyond feedback: introducing the 'engagement gap' in organizational energy management

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ABSTRACT

This paper discusses socio-technical relationships between people, organizations and energy in workplaces. Inspired by Sherry Arnstein's ladder of citizen participation, it explores widening energy management beyond energy managers to other employees, introducing the idea of an 'engagement gap' to support a move beyond unidirectional forms of engagement (*e.g.* feedback and nudging) to more socially interactive processes. Results are drawn from two projects researching energy practices in public authorities and retail organizations. The first project, 'GoodDeeds', collaboratively created an information and communication technology tool and explored participatory processes within a municipality. The second project, Working with Infrastructure, Creation of Knowledge, and Energy strategy Development (WICKED), explored energy management in retail companies. The paper uses a '4Cs' framework to articulate the influences of *concerns*, *capacities* and technical *conditions* within organizational *communities*. The results concur with previous research that energy management sits against a backdrop of competing organizational, institutional and political concerns. New data reveal discrepancies across organizations with regard to energy management capacities and technical metering conditions. The authors suggest employee engagement can be broadened by treating energy as a communal subject for discussion, negotiation and partnership. This objective moves beyond the 'information-deficit' approach intrinsic in the existing focus on analytics, dashboards and feedback.

Introduction

This paper addresses the challenge of energy use in organizations and argues for a new approach to behaviour change by widening energy management participation within organizations. Latest estimates show that organizations (including commercial, public and industrial) account for between 50% and 60% of energy use worldwide, with their buildings constituting 18% of emissions from buildings in the UK and 20% globally (Andrews & Johnson, 2016; Stern et al., 2016). Novel public engagement approaches need to be explored, then, both within society and organizations to aid this transition towards energy efficiency (Chilvers & Longhurst, 2016). Too often behaviour-change theories view building users as a hurdle to be overcome rather than as active participants with a positive contribution to make in improving energy efficiency. In wider society,

the benefits of increased involvement of the public in decision-making are well documented and have been shown to have benefit in terms of improving the quality of the decisions made (Apostolakis & Pickett, 1998), procedural justice (Fiorino, 1990), democratic ideals (Sovacool, 2014) and social learning (Bull, Petts, & Evans, 2008).

If public engagement is important to democratic decision-making, what role does employee engagement play in organizational decision-making, particularly with respect to energy-efficiency actions? The potential of user engagement for social learning, or behaviour change, is important to managing the built environment. This notion of engagement is central to what Janda (2014) and Moezzi and Janda (2014) refer to as developing the *social potential* of building users rather than focusing on the technical potential of the building. In

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their review of the PLEA 2009 conference, Cole, Brown, and McKay (2010) note that one of the 5 key assumptions or 'conditions' was that the overall mechanization of architecture has led to a disconnection between the occupants and the building. Building on that assumption, this paper asks: what if employees were treated as active participants or citizens with environmental roles and responsibilities, rather than mere occupants or passive consumers (Cole, Robinson, Brown, & O'Shea, 2008)? As Bordass, Bromley, and Leaman (1993) suggest, providing local user flexibility can help find an appropriate balance between local and centralized solutions to comfort. This paper investigates this balance between technical and organizational challenges of building management.

To explore the challenge of widening the participation of non-domestic building users in energy management, this paper reflects on the results of two separate UK Engineering and Physical Sciences Research Council (EPSRC)-funded research projects. The first project, GoodDeeds (Digitally Engaging and empowering Employees for energy Demand reduction), aimed to collaboratively create an information and communication technology (ICT)-based tool and related social processes to improve energy management within a English municipality. The second project, Working with Infrastructure, Creation of Knowledge, and Energy strategy Development (WICKED), explored energy management practices in a range of different retail companies across the UK. It is important to note that in both projects, building users are employees, but each project focused on a different organizational type. GoodDeeds addressed a public-sector organization and WICKED explored a range of for-profit retail organizations.[1]

Previous quantitative energy-efficiency-adoption research has cross-cut industries and sectors. Schleich (2009), for example, found that there were differences in energy-efficiency barriers between organizations in different sectors and subsectors. However, understanding these differences is still difficult, and the evidence is not evenly distributed. The UK Department of Energy and Climate Change (DECC, now incorporated into the Department of Business, Enterprise and Industrial Strategy – BEIS), recently commissioned a rapid evidence assessment (REA) of organizational decision-making. This study found that most of the literature focuses on for-profit organizations rather than on public-sector organizations (Wilson, Sonderegger, & Buzzeo, 2016). Another DECC-funded REA into non-domestic energy behaviours and decision-making found more evidence in further- and higher-education buildings, schools and commercial offices, but 'there is very little covering other sectors such as retail' (CSE & ECI, 2012, p. 13). By bringing together previous research on two different understudied organizational types, this paper offers novel qualitative insights into challenges and opportunities for widening participation in energy management across both public-sector and retail organizations.

To discuss employees in these sectors, it is useful to set an overall context for employment. The UK public sector employed 5.4 million people in March 2017. This number is shrinking: the sector overall lost 20,000 jobs compared with the previous year. Local government employment was down 25,000 jobs at 2.1 million, the lowest since comparable records began in 1999 (ONS, 2017). Although jobs in this sector are generally considered to be safe and secure, they are often not well paid. Administrators in local government may receive meagre salary increases, and some public-sector workers are among the lowest earners in the country – in extreme cases earning barely above the minimum wage of £5.73 an hour (Bawden, 2008). In contrast, private-sector employment in the UK is growing. It increased by 115,000 people on the previous quarter to reach 26.5 million, the highest since comparable records began in 1999. The retail sector is the UK's largest private-sector employer with 2.9 million employees, and employs one in nine working people (ONS, 2015). These employees tend to be women than men (58:42), and almost one-third of retail employees are under 25 years old. Half of retail employees work part time, and only 18% of all retail staff are managers or senior officials (The Retail Appointment, 2017).

As a backdrop for considering the challenges with fostering employee participation, the paper begins by sketching the broader literature relating to public engagement, including Sherry Arnstein's ladder of citizen participation (Arnstein, 1969), then turns to employee engagement. Next, the goals, objectives and methods in each project are described. The findings are then analysed through a '4Cs' model of organizational change, which illuminates discrepancies across organizations and sectors with regards to energy-management capabilities and metering technologies. Finally, the paper reflects on the challenges and opportunities for policy and practice, suggesting a need to move beyond the unidirectional 'information-deficit' approach intrinsic in energy feedback toward a reconceptualization of energy use as an interactive topic for discussion, negotiation and participation.

Climbing the ladder of participation

The idea of citizen participation is a little like eating spinach: no one is against it in principle because it is good for you.

(Arnstein, 1969, p. 216)

Public participation: engagement and deliberation

In a review of public participation processes in environmental issues, Petts and Leach (2001) helpfully delineate between participation – a process that allows people to participate in a decision by putting forward their views verbally – and engagement, which suggests more innovative and interactive, two-way processes of discussion and dialogue (*i.e.* deliberation) to ensure that people's views inform a decision, alongside those of the expert and/or decision-maker. Engagement methods seek to optimize opportunities for dialogue between experts and the public. They include community panels and advisory committees, citizen's juries, focus groups and consensus panels, and applied to diverse scenarios such as transport planning (Bickerstaff & Walker, 2005), the siting of municipal waste facilities (Petts, 1995, 2001) and, more recently, energy-transition scenarios (Chilvers & Longhurst, 2016; Whitton, Parry, Akiyoshi, & Lawless, 2015).

Dryzek (1990, 2000) believed deliberation should be at the heart of democratic process, over and above voting, constitutional rights or self-government. From this perspective, deliberative processes have the potential to deepen democracy by strengthening the involvement of citizens. This emphasis on engagement, deliberation and participation is echoed by Sovacool (2014) who notes that, first, democracy is increased as all citizens have a right to participate and be represented in environmental decision-making; second, non-experts are often more attuned to the ethical issues of a situation; and third, greater acceptance can often be achieved by involving *all* those affected by the particular situation. A fourth benefit that is often overlooked is that processes of public engagement can create ideal conditions for social learning which can lead to varying degrees of behaviour change (Bull et al., 2008).

In addition to participation and engagement, there is the underlying question of power and control, as articulated by Arnstein's (1969) ladder of participation (Figure 1). Through this model Arnstein advanced the normative and ethical argument that citizen involvement is an improved and more just way of distributing power in society. At the bottom of the ladder are one-way forms of communication as a substitute for genuine forms of interaction and 'enable powerholders to educate or cure the participants' (p. 217). Readers doubtful of this process in today's world of social media might consider, for example, policy interest in the field of behavioural economics, where consumer decisions are framed carefully to generate the desired response *without* activating conscious choice (*e.g.* Thaler & Sunstein, 2008). Arnstein designated citizen control as the top of the ladder,
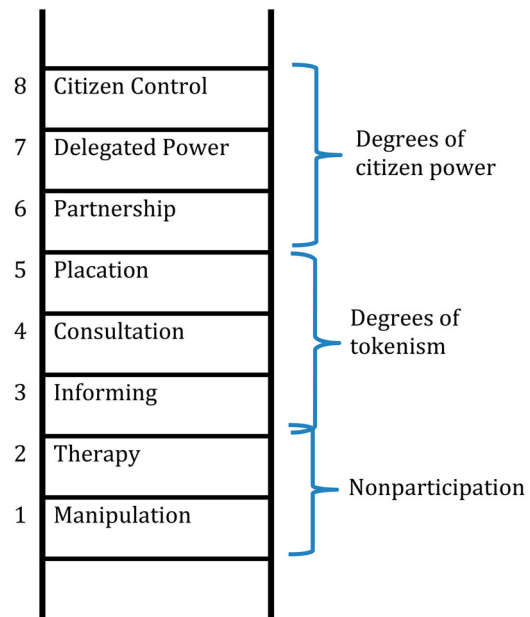

Figure 1. Eight rungs on the ladder of citizen participation. *Source:* Arnstein (1969).

denoting a redistribution of power to those traditionally excluded from the political and economic processes whilst creating a route for citizens to participate in social reform (Arnstein, 1969).

From an energy-management perspective, this paper argues that feedback (the subject of this special issue) would fall into Arnstein's informing category, which constitutes the third rung of her ladder. This level is characterized by a 'one-way flow of information with no power for negotiation' (p. 219). An energy dashboard, for example, generally delivers information from utilities to users or from building managers to employees, but it does not usually invite responses, dialogue or discussion *from* the user back to the provider. While dashboards provide more detailed information than utility bills, they do not necessarily increase levels of control (*e.g.* the ability to turn devices on and off). This paper considers implications for moving *beyond* feedback in the workplace by moving up Arnstein's ladder to partnerships. At this sixth rung:

> power is in fact redistributed through negotiation. … After the groundrules have been established through some form of give-and-take, they are not subject to unilateral change. (p. 221)

In other words, in partnerships the framework for decision-making is negotiated and power for making further changes is shared. This paper investigates who has the power to save energy and whether broader levels of participation and interaction can be negotiated between employees at different levels within organizations.

Applying Arnstein's principles to complex and varied organizational contexts poses a challenge as the role of each individual employee is subject to a wide range of factors and influences (Andrews & Johnson, 2016; Stern et al., 2016). If the deliberative turn encourages decision-makers to engage with people as active citizens, how does this idea of engagement translate to a work context and how might it be possible, for example, to create energy partnerships in the workplace?

From feedback to partnerships: employee engagement

Recent studies have applied the theory of planned behaviour (TPB) in an attempt to understand workplace energy behaviours. Norms within the workplace and the influence of social context on behaviour are important issues (Chen & Knight, 2014). This was also seen to be the case in research into energy behaviour in an American university (Dixon, Deline, McComas, Chambliss, & Hoffman, 2015) where a sense of community had a 'small but significant direct effect on behavioural intention' (p. 125). Scherbaum, Popovich, and Finlinson (2008) present a wider overview of the literature concerning workplace energy behaviours and remark on a spectrum of approaches from both the organizational level down to the individual level. These studies are instructive, although they do not fulfil some of the democratic ideals noted by Sovacool (2014), in which ordinary building users and non-experts, instead of being viewed as people who need to be corrected and act 'the right way', are actually a useful and valued source of knowledge on the ground.

As a response to this, there is an argument for widening participation; for a move away from mere feedback mechanisms to forming partnerships to understand and recognize the social potential of workplace communities. To do so requires organizations to adopt a more participatory approach to energy management (Janda, 2014; Moezzi & Janda, 2014). This also parallels the research of Brager, Zhang, and Arens (2015) and Cole et al. (2008) for increasing the inclusion of a wider range of individuals involved in buildings, expanding the occupant outwards into a participatory community of individuals who engage not only with energy use but also with others in the same building and organization. In a comprehensive review of over 20 energy and behaviour-change interventions in the workplace, Staddon, Cycil, Goulden, Leygue, and Spence (2016) note that the most successful initiatives had a combination of technological automation *and* 'enablement' – that is, opportunities for building users to move beyond education and training. The authors observe enablement appears to be linked to a change in the relationships between the relevant actors and a shift in levels of employee control and responsibility.

This is not to say that feedback alone cannot achieve energy savings in organizations. A recent evaluation by Mulville, Jones, and Huebner (2014) of electricity feedback at 39 office worker desks achieved savings of 18% over the 100-day intervention period through individual feedback. Comparative feedback pushed the savings to 28%. Although these results are promising, non-office settings may be more problematic for feedback delivery and impact. A study of energy behaviours in a retail organization, for example, found that employees had minimal control over energy consumption and that their work objectives and organizational roles often trumped energy-efficiency imperatives (Christina, Dainty, Daniels, & Waterson, 2014). This variation epitomizes the challenge of organizational energy research. Non-domestic buildings and the organizations inhabiting them are inherently heterogeneous and multiple cases across different sectors are required before a greater understanding is reached. This paper contributes to this need for a wider body of evidence through its consideration of organizations from both the private and public sectors.

Understanding organizations: the 4Cs model

Organizations vary in the extent to which they are willing and able to engage in energy-management practices at different levels within and across the organization. Previous research (Janda, Payne, Kunkle, & Lutzenhiser, 2002; Lutzenhiser, Janda, Kunkle, & Payne, 2002) has recognized that different organizations engage in the same types of energy-efficiency practices, whereas similar organizations may do different things. Based on these findings, the researchers developed a '3Cs' framework suggesting that energy-efficiency and conservation actions in organizations depend on the level of concern within the organization about efficiency relative to other business goals; the dedicated capacity of the organization to take action; and the real-world physical and technical conditions of the premises that are to be acted upon. The presence or absence of these three variables can be used to recognize variation within organizations and potentially map different policy approaches to encourage energy efficiency or conservation.

Janda (2014) further developed the 3Cs framework with a 'building communities' approach based on Axon, Bright, Dixon, Janda, and Kolokotroni (2012), augmenting it from 3Cs to 4Cs, as shown in Table 1.

The 'building communities' addition to the 3Cs framework accommodates the perspectives of building stakeholders at different levels. It builds on a communities

Table 1. 4Cs framework: concern, capacity, conditions within a community.

		3Cs		
	Analytical level	Concern (factors that shape attention to energy)	Conditions (factors that shape where energy actions occur)	Capacity (factors that moderate the abilities to take energy actions)
Building communities (grey area, neither organizational nor individual)	Organization	Legislative requirements, leases	Building retrofit opportunities, thermostat setpoints, standard operational hours, provision of space and equipment	Energy management structure; job titles and responsibilities; feedback and data availability; granularity of data
	Workgroup	Work styles	Clothing choices (*e.g.* 'casual Fridays'), activities outside 'normal' hours	Peer pressure and social practices; workgroup dynamics
	Individual	Attitudes, beliefs, habits, values	Use of task lights, computers, auxiliary heating/cooling devices; extra plug loads; operation of blinds/windows	Presence or absence of champions; expertise and understanding of systems; interest in and ability to act on feedback

of practice (CoP) approach, which is a system of relationships between people, activities and their outside world developing over time and interconnected with other CoPs (Lave and Wenger, 1991). CoPs can be found within businesses, across businesses and other organizational and professional structures (Cushman, Venters, Cornford, & Mitev, 2002; Ruikar, Koskela, & Sexton, 2009). Building communities can be either geographically coherent and organizationally diverse (*e.g.* a multi-tenanted office building or shopping mall) or organizationally coherent and geographically diverse (*e.g.* a fleet of retail stores like Wal-Mart, Carrefour, Lidl or Marks & Spencer).

One benefit of using a building communities frame for the energy research is that it moves beyond the usual levels of analysis that tend to take account of either organizations or users. It recognizes that employees are both a part of and apart from the organization in which they work. Employees have to do their jobs, but in many organizational contexts they have some agency over their actions that their employers do not completely control. The 4Cs framework emphasizes the presence of multiple scales in a dynamic context. The grey areas above, below and between organizations and individuals illustrate other levels of influence on organizations and individuals that are important but often not addressed in the energy-feedback literature. Deline (2015), for instance, calls attention to the relative absence of energy research on workgroups, which is a level in between organizations and individuals.

The 4Cs framework illuminates the presence and importance of multilevel influences, reflecting previous research that organizational change and innovation can occur from the top down (Gouldson & Sullivan, 2014), bottom up (Thomas, 1994), or middle out (Bedwell et al., 2014; Goulden & Spence, 2015; Parag & Janda, 2014). Moreover, such changes are likely to be more successful if the organization recognizes the need to integrate these levels through engagement (Christina, Waterson, Dainty, & Daniels, 2015).

In this paper, the 4Cs framework provides a heuristic device to articulate the complexity encountered

with regards to energy management, feedback and employee engagement manifested in our two research projects. A conceptual discussion of the 4Cs appears in Janda (2014); a more detailed empirical application appears in Janda, Bright, Patrick, Wilkinson, and Dixon (2016).

A tale of two projects

This paper uses two different research projects to shed light on opportunities for widening participation for energy management within organizations. The organizational research in GoodDeeds and WICKED was used to explore how organizations with different strategic concerns, energy staffing capacities and technical conditions do (or do not) create successful CoP around energy.

Both projects used multiple units of analysis. Table 2 outlines the different sectors, building types, organizations and methods used in each project. WICKED focused on energy-management strategies in retail-sector organizations; GoodDeeds investigated the use of social media, group meetings and energy feedback in a

Table 2. Overview of the research context in the two projects.

	GoodDeeds	WICKED
Sector	Public	Private (retail)
Building type	Office, library, leisure centre	Retail
Buildings with energy data	Five	1000+
Organizations studied	One (public authority)	23 (including property owners, retailers, letting and property management companies, energy management companies, law firms and legal experts, and industry intermediaries and associations); six with quantitative and qualitative data
Methods	Focus groups, interviews	Interviews, document analysis of company strategy reports, policy documents and industry reports.
Interviewees	11 (in one organization)	33 (across 23 organizations)

public-sector organization. WICKED gained access to energy data from thousands of buildings and provided supplementary energy analysis at a general level; Good-Deeds gathered data from a smaller number of buildings and developed a bespoke feedback portal. Although there are many differences been the projects, both projects interviewed energy managers and investigated efforts to widen participation of employees in energy management.

The qualitative data for this paper draw largely on interviews, supplemented by a quantitative backdrop of energy data for large portfolios of buildings (in the case of WICKED) or a smaller cluster (in the case of Good-Deeds). The research objects and methods used in each project are provided in Table 2, followed by a short description of each project.

GoodDeeds: purpose and methods

Researchers from De Montfort University (DMU), Leicester, UK, worked with the Energy Services team at an East Midlands local authority (LA) from 2013 to 2014 to explore a collaborative approach to energy management (for full details of the methodology, see Bull, Lemon, Everitt, & Stuart, 2015). The intention of Good-Deeds was to form a user group from a sample of the LA's buildings with the joint aim of exploring a more participatory approach to energy management alongside testing the potential of digital tools such as smartphones and social media. The user group was formed to facilitate interactions and knowledge sharing between lay building users and experts and to see whether the group interactions would lead to increased awareness of effective energy management. Additionally, the user group would work with the research team to provide user feedback on the development of an information technology (IT)-based application to foster interaction between building users across the city council and to test the opportunity for smartphones to help manage energy.

The user group met four times between May and July 2013. As far as possible, whilst recognizing the challenge of a workplace context, best-practice recommendations for effective public participation were followed (Bull, Petts, & Evans, 2010). For example, the group was able to choose the agenda for the sessions, food was provided to create an informal atmosphere and a representative group of participants was chosen. The user group was formed with help from the team leader of the energy services team who acted as 'gatekeeper' to the city council. An initial email was sent to 16 employees from various locations with a range of roles and responsibilities, and from this outreach a core of eight was formed (see

Table S1 in the supplemental data online for the members of the GoodDeeds user group, those who participated in the focus group and interviews plus three additional interviews of stakeholders within the wider organization). This group included a mixture of lay and expert people in terms of their awareness and responsibilities for energy management in the buildings, specifically, two members of the energy services team alongside staff members with no specific responsibilities for energy.

The team at DMU invited the relevant experts who would then present a perspective that could then be discussed, debated and challenged. These covered the relationship between people and buildings, energy and buildings, and social media. Smartphones were provided to all members of the group in the fourth meeting, and they were guided through the range of functions: texting, social media and the camera. After the initial four meetings the group focused on working with the DMU team to produce the specification for the application. Due to privacy concerns the group preferred a bespoke responsive web application rather than using existing social media tools. Midway through the 18-month project an interim evaluation of the user-group process was undertaken through an independently chaired focus group. All members of the user group were invited to attend (Table S1 in the supplemental data online lists those who attended). This was preferred to interviewing the participants individually because focus groups allow for greater exploration of why people feel the way they do about a particular issue (Bryman, 2001).

From September 2013 onwards the meetings met once a month until January 2014, during which time the group provided feedback to members of the research team on the design and functionality of the web-based application. This included key features such as being able to view the application on either webpages or smartphones, allow building users to raise an issue with a building and then comment on what needs to happen to resolve the issue (for screenshots of the app, see Figure S1 in the supplemental data online). Crucially, this bespoke application allowed for the app to be only visible by employees of the council through a secure log-in system.

At the end of the process interviews were conducted with members of the user-group as well as key stakeholders within the organization, notably the head of energy services and staff responsible for communications and social media. A semi-structured format was used and interviews were conducted in a location convenient to the individuals and were digitally recorded and professionally transcribed.

Wicked: purpose and methods

Currently, all firms and organizations pay energy bills (either directly or through service charges), but not all actively manage energy. The WICKED project identified the barriers to and opportunities for energy-strategy development by applying concepts of 'data rich' and 'data poor' (Janda, Bottrill, & Layberry, 2014) to the retail sector. Data-rich organizations have automatic meter reading (AMR) and are typically (but not exclusively) larger organizations with energy managers. Data-poor organizations generally have manually read meters and no staff members specifically dedicated to energy management. WICKED researched the retail sector between 2014 and 2016, looking at differences in data analytics, legal and organizational structures, and metering capabilities between owner occupiers, landlord and tenants.

The project was designed to gather both quantitative and qualitative data with regards to energy management. Qualitative data were gathered through interviews with 33 representatives of 23 different organizations, including property owners, retailers, letting and property management companies, energy management companies, law firms and legal experts, and industry intermediaries and associations. The interviews were supplemented by document analysis of company strategy reports and reviews of policy documents and industry reports. This paper focuses on a non-representative subset of six organizations where both quantitative and qualitative data were available and energy management practices were the focus of enquiry (summarized in Table S2 in the supplemental data online). In the findings below, these organizations are referred to as R1–R6. They include a European electronics retailer (R1), a British full-line department store (R2), a British high street and online retailer (R3), two shopping malls (R4 and R5) and a café chain (R6).

Although this is a qualitative analysis, the quantitative data provided a snapshot of the raw data, metadata, analytical processes and issues that different market participants are currently working with. It also presented an opportunity to examine whether the data that smart utility meters provide are at a sufficient level of detail for energy-management decisions to be made at all organizational levels across multiple sites.

Key findings

Findings across the two projects are presented below. As noted above, the 4Cs framework was used as a heuristic tool to classify variations across and within the cases represented by GoodDeeds and WICKED in terms of

organizational concern, capacity, conditions and community. Initial analysis of the research data for each projects was originally done independently by the original research teams (Bull et al., 2015; Janda et al., 2015; Janda, Bright et al., 2016; Janda, Wallom et al., 2016). This paper extends this exploration to discuss findings across the public and retail organizations investigated by GoodDeeds and WICKED.

Variation in concern

The most striking difference between GoodDeeds and WICKED is the difference between the purpose and priorities of the organizations and how that relates to the idea of energy management. Concern about energy management is not an independent value: it emerges and is formulated in relation to other organizational priorities.

Public sector concerns

Data from GoodDeeds show that employees and the energy-management team within the municipality face a challenging set of issues and competing priorities. Paramount among these is the function of the LA to provide services to citizens. As one interviewee put it:

> We do attempt to meet and get to high standards with energy and energy management. But … at the end of the day we're an authority and our main port is to look after the community and our constituents and the services that we have to provide. (I5)

This interviewee believed that an investment of public funds or staff time would be required to achieve higher energy savings and it would also be at odds with the need to provide services. In addition to this primary function, interviewees mentioned supporting vulnerable users and lack of funds resulting in job losses (Table 3).

These 'workplace priorities' are pressing in people's minds with employees feeling disconnected from energy consumption in their workplaces. But for many it seems the pressure of simply doing their job well means that energy is the last thing on their mind. As the Admin and Business Support leader (I5) observed:

> They're more thinking about their day job and what we're doing and it's just tunnel, the vision's tunnelled into and the energy impacts are outside of that tunnel for me.

This lack of engagement with energy may be due to apathy or general busyness, but for some, though, wasting energy may be a result of tensions and animosity toward management. For example, leaving your computer on overnight is a way of asserting control by 'screwing the system'. He went on to explain:

Table 3. Workplace issues facing local authority employees.

Issue	Employee quotations
Supporting vulnerable users	The problem I think we've got across the board is the operational staff, so staff that have got other priorities rather than the building … which is understandable because they've got an operational team which probably is usually quite a large operation team that could be supporting vulnerable service users, etc. or across the city. (I5)
	But they think, no, I'm employed as social worker or I'm employed as whatever it is, that's my responsibility. It's somebody else's responsibility to manage the heating and the cooling and the ventilation of this particular building. (I8)
'More with less'	The biggest challenge, apart from members of the public and our customers wanting more and wanting it 24/7, is the fact we are going to have to do an awful lot more with a lot less resource. So that's the number one priority really the city council has got, to still actually deliver our services robustly and resiliently with a far smaller resource given to us. (I9)
Job losses	The difficult thing is everyone has now got quite a lot of work to do. A lot of people are being made redundant. People are doing two or three jobs, and will people have time to look at this, or will they just carry on with their jobs. (I7)
	And so it is something that most people have an awareness of but they might feel less minded to, you know, if they feel under the threat of losing their job then it possibly isn't the highest priority on their mind. However it is a high priority on someone else's mind who might be their current manager or whatever. So it is still something that we try to drive through. It doesn't get discarded just because the public sector's going through a hard time and there are cuts. (I8)

It's a very stressful environment and it's very pressurised, I think some people just sort of see it as, well, screw the system, really. Again it's not really like, hey, you shoot them by leaving your computer on overnight, but I think it's that sort of childish mentality that affects some people.

Retail company concerns

Whereas the LA's central purpose is to provide services to citizens, a retail company's priority is maximizing sales to customers. Both organizational types are interested in minimizing costs, but the extent of this interest is tempered by the need to provide services or generate profit.

The idea of energy management was not new to any of the interviewees or case studies in WICKED. However, each of the six organizations in the WICKED cases engaged in this topic in a different way, as outlined below. Energy management can mean many things, and each of the cases participated in a unique subset of the possible topics that energy management denotes.

Retail organizations were (un)concerned about a variety of energy aspects. For example, only one retailer was working to partner with their landlord through the mechanism of green leases (Janda et al., 2016). None of the retailers was seriously considering rolling out demand–response strategies, although one interviewee mentioned an early-stage pilot project. Across the cases, a number of instances were found where organizational infrastructures did not necessarily match corporate communications about pursuing sustainability. For example, several energy managers expressed frustration with the ways in which internal accounting mechanisms and preset thresholds for capital projects did not allow for upgrades that would otherwise seem reasonable.

Within this diversity, interestingly all retailers WICKED investigated were interested in reducing out-of-hours energy consumption, looking to minimize energy use in the hours their stores were not in service.

This territory was clearly not in conflict with maximizing sales. Making any other changes that might affect store operations during service hours was more contentious, as it sets an energy manager's priorities (reducing energy) against a store manager's priorities (increasing sales), as will be discussed further below in the section on retail sector capacity.

Variation in capacity

Across both the public- and private-sector organizations studied, energy management appears to be understaffed relative to the scale of the problem.

Public-sector capacity

This variation in capacity was identified in the energy services team in the LA where the team acknowledged their own limited agency and control due to the team outsourcing all technical work to contractors who are managed by a small engineering team:

> Our problem is that we have limited control within the building in terms of what we can do. We might contact the property help desk for example, who will pass it on to engineering, but any response can take a while. (I3)

> Don't forget, they're getting outside contractors to come and look at stuff. Nothing is in house. If there was an engineer in house they would just pick up their hand and say, 'By the way, can you go down and look at this.' We can't do that anymore. (I7)

This all contributed to a level of bureaucracy and time delays that all members of the user group, including members of the energy services team, found frustrating. In turn it points to a shift in dynamics in how people see their responsibilities for energy use at work, the second barrier.

The inherent tension between local versus centralized control and perceptions of responsibility is illustrated by the following extended quote from the energy services

team leader who was part of the group. In it he faces the central question of responsibility of energy management in the workplace as well as acknowledging the role that all building users have:

> What people always assume is that because we're energy management we can sort of do things remotely. The only remote element to it is the monitoring aspect from ours to identify and report high usage. But in terms of actually physically turning thing off, finding the problems, that's in their [building users] hands. They have full control over those things. They're the ones who would most probably walk by and see light on but still continue to go down. That's not something I can do sitting from my desk in a building that's, you know, a mile away. (I1)

Retail sector capacity

All the retail organizations WICKED interviewed, as well as the six case studies used in this paper, showed varying levels of staffing devoted to the task of improving energy management. Most, but not all, of the WICKED cases had an energy manager. This energy manager is typically responsible for overseeing an entire portfolio of stores, which represents hundreds of buildings. In R6, for instance, the staff member responsible for energy is also responsible for water and waste in over 1000 premises. In all cases, the energy manager operated in a '1-to-many' context, rather than a '1-to-1' relationship, like a store manager. While this distant relationship provides the ability to learn from multiple sites, it does not enhance the ability to understand what is happening on the ground. The energy manager can usually only see what the data tell him or her. For most cases, however, the energy information stayed with the energy manager. The premises in R6, for instance, have smart meters, but the meters send their data to a central location and are not pushed back out to the stores.

Even where energy managers are present in a retail organization, WICKED found that (similar to Good-Deeds) there is a strong reliance on external expertise and hiring third parties to provide data management, analytics and display services. These capabilities are not provided in-house but instead are provided by consultants who may work entirely off-site or, in some cases, be embedded within the organization. However, store managers have considerable power to make independent decisions regarding sales displays and promotions, which includes adding feature lighting. Although these decisions impact energy use, the store managers are not required to notify the energy managers or their team of making such changes. As noted in the section on concerns above, the store manager's goal is to maximize sales, not minimize energy use. Unless energy management increases sales, it is at odds with the key performance indicators of many retailers.

Variation in conditions

This category within the 4Cs framework considers the physical and technical conditions present in each organizational portfolio. In both public- and private-sector organizations, it was found that heterogeneity of the stock is not yet well incorporated in energy-data analytics. Importantly for this special issue, this technical condition extends to the presence and absence of meters and data on which energy feedback can be based.

Public-sector conditions

In the LA there was consistency in the level of metering across the organization. It was one of the first LAs to install half-hourly metering across all its building stock for electricity, gas and water. A single energy services team oversees the whole building stock in terms of viewing the reports from the metering system. Despite this apparent uniformity, there is a significant amount of technical complexity within the LA's portfolio. The complexity arises from, firstly, the variety of building types, as noted by the team leader (I5):

> I think from the energy management point of view the main sort of issues are that we've got a large portfolio. … We've got leisure centres, admin buildings, libraries, museums and old people's homes. You've got quite a varied portfolio. And they're dotted around everywhere.

Second, there is the ongoing challenge of new developments, *e.g.* the integration of the new district heating scheme has provided challenges in terms of linking up the new boilers and controls, and integrating two different systems. The variance in these conditions is exacerbated by the range of actors involved. The energy services team needs to get in external contractors to do any engineering work and, as noted above, they were unwilling to be involved in any engagement activities in this project.

Retail sector conditions

A perfect portfolio for energy management would have a database envisioned by a consultant on R2's energy management team: an accurate and complete accounting of every energy-consuming item in every store, updated in real time and without flaws, matched perfectly with energy data at sufficient spatial and temporal resolution to be able to problem-solve deviations. Further, these deviations would be automatically detected and flagged by smart algorithms, which could learn over time what

is (and is not) a genuine problem, as opposed to a seasonal anomaly (*e.g.* a particularly cold or hot day).

The ideal database is far from the reality in either sector. Most existing databases are incomplete, some (such as R4) are largely non-existent. The shopping centre manager in R4, like most 'data poor', has a box of paid and neatly filed gas and electricity bills rather than an active database of information. Where databases do exist, the energy and building-level data are often in separate spreadsheets that are matched only on an *ad-hoc* basis. The norm is energy managers operating mainly with energy data, set at arm's length from hundreds of stores, often without a complete list of the building-level data, let alone equipment or appliance-level data. In these investigations common problems included: heterogeneous building stocks; evolving data practices; and some difficulties in relating the stocks and data to each other, let alone to problem-solving.

Internally, the organizations identify their building portfolios in different ways for business purposes. R1 had nine different internal definitions for 'store type', whereas R2's database used only three categories and R3 used two. From an energy perspective, these business classifications add some meaning but do not provide a sufficient technical basis for an internal benchmarking scheme.

At the building level, some organizations had hired a third party to check and aggregate the asset-level data through the lens of the European Union-wide energy performance certificate (EPC)-level data. Most cases, however, did not link their EPCs with their metered data. Interviewees mentioned concerns about the quality of EPC data as an accurate benchmark. However, aside from normalizing for building size and sometimes climate zone, little work has been done within companies to benchmark for building quality. The problems addressed by energy managers is often limited to pinpointing and troubleshooting out-of-hours energy use, rather than looking for retrofit opportunities within the building portfolio.

In all the studied cases, the metered data were imperfect. Meters and monitors fail. Across hundreds of stores, at any given time there are missing data, broken meters and anomalies either to correct or remove, lest they skew the analysis. In R1 and R3, for example, 3% and 2% of the meter readings were inaccurate respectively. In R2, however, close to 30% of the electricity readings were null values. This suggests that even the data rich can be information poor.

Building community

Building community is the fourth 'C' in the framework and aims to recognize the variations in the relationships between the different actors (dis)engaged in energy management in organizations. This includes both those with formal roles, *e.g.* energy managers and facilities managers, and the rest of the employees in the organization who all, to a greater or lesser extent, affect energy consumption.

Public-sector building community

The GoodDeeds project set out to foster a greater sense of community around energy management. Specifically, the researchers hoped that a community of practice might emerge between those formally responsible for energy management (the energy services team in this instance) and 'ordinary' building users. During the 18-month project there was regular contact through the monthly meetings of which members spoke positively of the benefits, for example:

> The project actually has been quite useful in terms of networking because I've managed to meet some of the people in the energy team who I didn't know before … so now I know them. And now they know me. And I'm able to report a few things to them. (I3)

Another member (I4) felt there were benefits in being able to put a face to the name in that it 'is easier now talking to them if we know who we're talking to'.

As noted above, many competing priorities affect how the individuals in the organization understand and engage with energy, yet it would be a mistake to take these two statements for granted. In large, complex and multi-site organization like LAs, healthy relationships, trust and a positive culture are vital if wider initiatives are to be positively received. For example, the efforts of the GoodDeeds project to schedule regular monthly times when a mix of people from across the organization meet to help improve energy management were positively received.

Retail sector community

Even though the retail organizations WICKED interviewed are coherent legal entities – a building community with a brand identity, unified by name and purpose – the project results show that companies operate across a diverse portfolio of properties, and there are significant variations both within companies (*e.g.* board room versus energy team versus store managers versus employees) and across them. In large retail organizations, there are 100–1000 times more store managers than energy managers (see above). Assuming each store has between 10 and 100 employees, the number of employees in each store further multiplies the potential difficulty faced by energy managers to affect change by another one to two orders of magnitude.

In the six cases studied here, two of the organizations (R1, R5) made no overt efforts to create an energy community across the organization and/or its employees during the time frame observed by WICKED researchers.

R2, however, provides an excellent example of a unified energy strategy across the organization. It has a highly publicized corporate sustainability plan, a data-rich building portfolio and a team of external consultants delivering analytics to in-house decision-makers. R2 has also hired a consultant to design internal communications to employees about energy priorities that are consistent with the organization's corporate social responsibility message and overall branding. They are also considering using the organization's in-house messaging platform to encourage exchanges about energy issues, much as GoodDeeds imagined social media might be used. This represents an emerging top-down 'energy community' fostered by the highest levels of the organization. R2's community is geographically diverse but organizationally coherent.

R3 and R4 represent a different form of building energy community led predominantly by the energy manager rather than by the organization's executives. In R3's case, the energy manager has designed an energy feedback portal for store managers to be used on iPads. This energy manager took the initiative to secure the organizational buy-in to distribute iPads to store managers and push the centralized energy data out to individual store managers through this device. The energy manager in R4 works for a landlord rather than a retailer, but is similarly interested in creating learning opportunities between shopping centres and retailers of similar types, and able to take the initiative within the organizational structure.

In R6, WICKED fostered a pilot project at the store level in a shopping mall. This investigation focused on local staff in a café chain, connecting them via real-time feedback with energy managers in the shopping mall rather than those in their own organization. This represents a nascent energy community which is geographically coherent but organizationally diverse.

Beyond the retail organizations themselves, WICKED found several notable efforts to create a community of practice for energy management across the retail sector. The Retail Energy Forum, for example, is a group of 17 leading retailers that aims to 'share best practice to reduce the carbon footprint of every member company'. Its participants consist largely of energy managers who meet several times a year to discuss both policies and practices. Similarly, the British Retail Consortium (BRC) is working closely with government and its members to achieve collective environmental ambitions.

Discussion and conclusions

Analysing these two projects through the 4Cs framework illuminates a significant set of challenges to widening employee participation and engagement in energy management initiatives. Across the seven organizations studied in two sectors, the findings show that organizational concerns, capacity and conditions affect the ability to create viable CoP around energy.

As others have recognized, the core strategy of an organization matters (Cooremans, 2011, 2012, 2015). If energy-efficiency actions compete (or are seen as competing) with core activities – either profitability in the retail sector or provision of services in public sector – then there will be only one winner. Thus, in the near term, engagement around energy efficiency needs work within existing organizational priorities and *concerns*, whether it be providing a social service to citizens or selling products to customers. Minimizing costs is appealing to both local governments and retailers, but only if it does not impinge upon primary goals. In future, core organizational strategies *might* change, but it is unlikely that energy efficiency will ever be the top priority for most organizations. For example, one of the organizations (R2) has significantly integrated sustainability into its core business. That being said, it is still a retail organization, and conflicts continue to exist between what energy managers and store managers see as desirable.

In addition, organizations are staffed in different ways. Thus, engagement around energy efficiency needs to happen within, and be aligned with, existing relationships, roles and teams, which represent organizational *capacities*. In all seven organizations, only the energy managers were directly responsible for energy. Other employees were responsible for other tasks, and there are many more other employees than energy managers. Further research is needed into how different organizational cultures frame employee duties, behaviours and expectations, particularly with regard to energy data, analytics and feedback. This also applies to how budgets are managed and financial targets are set for organizations.

Technical *conditions* across an organization's building portfolio can affect the ways in which buildings are seen, clustered and managed. The LA's building portfolio had many different building types – leisure centres, offices, libraries, museums and care homes – that may have been 'dotted about' but which were still in one climate zone. In contrast, many of the retailers studied in WICKED had (relatively) similar buildings, but a far greater spatial distribution across the whole of Britain and even beyond. These physical and technical differences have implications for how effective data analytics, benchmarking and centralized feedback are in providing

decision support. As Franconi, Bendewald, and Anderson (2014) have found, software solutions work best with building portfolios that are fairly uniform, match expected characteristics and have a lot of data. In this category, retailers are generally better off than LAs because their building types and uses are more homogenous.

All three variables affect the ability of organizations to create a *community* of practice around energy management within a building, across a portfolio and between organizations in a sector. For example, distances between buildings and diversity of building types can make it harder for people to gather to discuss and synthesize their experiences. In GoodDeeds, the user group was fostered by university researchers, not through the LA. However, the interaction was appreciated and participants felt positive about the experience. In WICKED, only one retailer fostered multilevel employee energy engagement (R2) from the boardroom to the shop floor; initiatives from two other organizations (R3 and R4) were driven primarily by energy managers interacting with store managers, rather than a full extension to store employees.

These results suggest, then, the presence of not just an *information gap* between utilities and users but also an *engagement gap* between energy managers and other employees (Figure 2). The paper now considers whether and how the engagement gap might be closed.

Implications, challenges and opportunities

Whether in organizations or wider society, climbing the ladder of participation is no easy task. These two projects provide examples of and insights into the challenges organizations face in simply surviving, never mind attempting innovative forms of engagement around energy-efficiency transitions. The implications of moving beyond both the information-deficit approach intrinsic in energy feedback toward a reconceptualization of energy use as an opportunity for creating partnerships are discussed below. In doing so, the engagement gap may begin to narrow. To help visualize what the engagement gap looks like, Figure 2 shows Arnstein's original ladder of citizen participation juxtaposed with a new 'ladder of energy engagement'. Following from these implications recommendations are presented for policy, practice and research, noting challenges and opportunities for each area.

From informing to partnerships: bridging the engagement gap

Observations from GoodDeeds and WICKED suggest that giving all employees collective control (the top of Arnstein's ladder) for managing energy in organizations may not be a realistic or a desirable goal. But neither is manipulation or information provision. Research has previously shown the benefits of increased agency of employees to have local control over their thermal comfort (Bordass et al., 1993) and this paper argues that, where practicable, this could be extended to wider employee participation in energy-efficiency decisions. Accordingly, a movement equivalent to the sixth rung on Arnstein's ladder – partnership – is suggested. The equivalent rung on the 'ladder of energy engagement' is developing and using interactive, multilevel employee engagement strategies. Such strategies are not yet widely practised in organizational energy management.

Partnerships *between* organizations are a well-established practice in health, welfare and other municipal services and believed to be capable of achievements that would not be feasible if individual organizations worked in isolation (Slater, Frederickson, Thomas, Wield, & Potter, 2007). A partnership approach for energy *within* organizations has implications for the socially ideal level of centralized automation and control, as well as who has access to data displays, both publicly and privately. Previous research, for example, has shown that facilities managers who operate different buildings within a single commercial property (real-estate) portfolio benefit from a combination of individual automated daily feedback and group social learning (Roussac, 2017). Definitive evidence is lacking in this paper to provide a full critique of the smart/intelligent building approach, suffice to say here that we would question the wisdom in removing all information and control from local employees. Moving up the ladder and embracing a level of delegated power through partnerships and
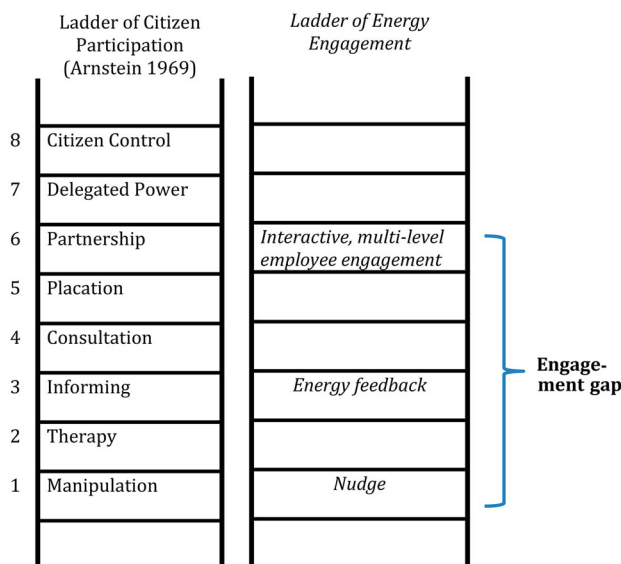

Figure 2. The ladder of citizen participation (Arnstein, 1969) and the ladder of energy engagement.

engagement (*e.g.* in the form of local heating or lighting controls or devolved energy or carbon budgets) has the potential to benefit the organization beyond merely saving electricity.

The language of partnerships within and across organizations, including business, government and academia, encourages a focus on the social and political goal of widening participation rather than the technological and analytical goal of gathering more data. The importance of creating social interaction around pro-environmental action is underscored, which has thus far been mainly explored at home rather than at work (Hargreaves, 2016; Moezzi & Janda, 2014).

Recommendations for policy

Creating a culture of energy engagement in organizations may be desirable, but it is not a directly tractable public policy objective. Government could, for example, mandate such efforts in its own premises, and write energy savings into more people's job descriptions. But when the jobs themselves are under threat, as in LAs in the UK, this becomes a very difficult ask. In the private sector, government powers are more limited. It would be difficult for government to go beyond current reporting efforts (such as those required by the UK's Energy Saving Opportunities Scheme) to prescribe energy reduction as an employee requirement or initiate dialogues around this topic.

In both sectors, however, governments might provide recognition or technical support for intermediary organizations to help foster partnership approaches in different sectors and to expand this approach from larger organizations to smaller ones. WICKED found organizations like the Retail Energy Forum already provide this role for large retailers. DECC, together with the British Retail Consortium and Resource Efficient Scotland, has formed a retail energy-efficiency taskforce. In the public sector, organizations like the Association for Public Service Excellence and the Green Building Council are tackling energy consumption in the public sector through the developing of networks and partnerships. It should be noted that this approach is different than the recent worldwide flurry of governmental activity to employ behavioural insights (*e.g.* OECD, 2017) to improve the choice architecture for consumers.

Recommendations for practice

Within an organizational culture of smart objectives, win–win solutions and key performance indicators it is easy to forget that organizations are social organisms, not circuit boards. To be effective, employee energy engagement should be framed in a way that acknowledges the positive contribution they can make to energy efficiency, rather than treating them as a problem to be solved or another management project.

Relationships take work and effort, particularly in places where there are job losses (as in LAs in the UK), high staff turnover rates (as in the UK retail sector) or a competitive workplace culture is encouraged. Additionally, not all employees will be intrinsically interested in energy, just as not all homeowners are. However, it is possible to affect organizational culture via the stories that are told and what is celebrated. Janda and Topouzi (2015) have emphasized the importance of learning stories (how things work in practice) and caring stories (attention to understanding, maintenance and fixing). Frantz (2014) asserts that people are motivated to be part of a social group and to belong, so communicating energy savings as a social action rather than just a cost saving could activate different and powerful motivators. Organizations could potentially benefit from encouraging a broader range of employees to identify and trouble-shoot problems with their physical premises, asking them to contribute to solutions. Previous research has shown that drawing from expertise on the shop floor has been shown to result in valuable process innovations that would not have been developed by managers (Thomas, 1994).

Variations also exist across organizational cultures, business models and even nations. For example, a *Harvard Business Review* article highlighted the importance of culture and, in particular, the variations of culture between American firms and Nordic firms such as Nokia (Gratton, 2009). Additionally, different forms of ownership have been shown to affect the uptake of energy efficiency in commercial real-estate firms (Janda, 2008). Therefore, modes of energy engagement will need to adapt to whether the organization is owned by stockholders or in partnership with employees, for example, the UK-based John Lewis Partnership (where employees are known as 'partners' and share the profits).

Recommendations for research

Tackling the engagement gap has implications for academic disciplines and research. Moezzi and Janda (2014) suggest there are four major disciplinary perspectives involved in shaping energy-efficiency research and policy: (1) physics and engineering; (2) economics; (3) psychology; and (4) sociology, anthropology and social studies of technology. 'Informing' fits well within engineering and physical science research, including big data and smart meter analytics. How people *react* to delivered energy information has been explored by economists and psychologists, who dominate the field of energy

behaviour. Moving to a partnership model, however, is more complicated and requires a fuller application of additional disciplines, including organizational research and management theory. Additionally, the multilevel perspective suggested by the 4Cs framework is inspired by and reflective of other forms of multilevel research, including transitions theory (Geels, 2002) and recent work on construction and innovation in the management literature. Hoffman and Henn (2008), for instance, identify social and psychological barriers to green buildings at three levels: individual, organizational and institutional.

This paper concurs with previous research in the energy field that suggests there is much more to employee engagement than is currently known or studied. Moezzi and Janda (2014, p. 35) call organizational energy research 'not just one can of worms but entire cases of cans of worms'. As the concerns about climate change continue to rise, however, policy-makers, organizations and researchers may find the potential benefits of narrowing the engagement gap will outweigh its challenges.

Note

1. This paper provides a broad overview of the two projects, both of which have been the focus of dedicated publications – details of which can be found in the references.

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References

Andrews, R., & Johnson, E. (2016). Energy use, behavioral change, and business organizations: Reviewing recent findings and proposing a future research agenda. *Energy Research & Social Science*, 11, 195–208. doi:10.1016/j.erss.2015.09.001

Apostolakis, G., & Pickett, S. (1998). Deliberation: Integrating analytical results into environmental decisions involving multiple stakeholders. *Risk Analysis*, 18(5), 621–634. doi:10.1111/j.1539-6924.1998.tb00375.x

Arnstein, S. (1969). A ladder of citizen participation. *Journal of the American Institute of Planners*, 35, 216–224. doi:10.1080/01944366908977225

Axon, C., Bright, S., Dixon, T., Janda, K., & Kolokotroni, M. (2012). Building communities: Reducing energy use in tenanted commercial property. *Building Research & Information*, 40(4), 461–472. doi:10.1080/09613218.2012.680701

Bawden, A. (2008, November 7). Wage wars. *The Guardian*. Retrieved from https://www.theguardian.com/society/2008/nov/07/recession-public-sector-pay

Bedwell, B., Leygue, L., Goulden, M., McAuley, D., J. Colley, E. Ferguson, … Spence, A. (2014). Apportioning energy consumption in the workplace: A review of issues in using metering data to motivate staff to save energy. *Technology Analysis & Strategic Management*, 26(10), 1196–1211. doi:10.1080/09537325.2014.978276

Bickerstaff, K., & Walker, G. (2005). Shared visions, unholy alliances: Power, governance and deliberative processes in local transport planning. *Urban Studies*, 42(12), 2123–2144. doi:10.1080/00420980500332098

Bordass, B., Bromley, K., & Leaman, A. (1993). User and occupant controls in office buildings. York: Building Use Studies. Retrieved from http://mail.seedengr.com/documents/UserandOccupantControls.pdf.

Brager, G., Zhang, H., & Arens, E. (2015). Evolving opportunities for providing thermal comfort. *Building Research and Information*, 43(3), 274–287. doi:10.1080/09613218.2015.993536

Bryman, A. (2001). *Social research methods*. Oxford: Oxford University Press.

Bull, R., Lemon, M., Everitt, D., & Stuart, G. (2015). Moving beyond feedback: Energy behaviour and local engagement in the United Kingdom. *Energy Research & Social Science*, 8, 32–40. doi:10.1016/j.erss.2015.04.006

Bull, R., Petts, J., & Evans, J. (2008). Social learning from public engagement: Dreaming the impossible? *Journal of Environmental Management and Planning*, 51(5), 701–716. doi:10.1080/09640560802208140

Bull, R., Petts, J., & Evans, J. (2010). The importance of context for effective public engagement: Learning from the governance of waste. *Journal of Environmental Planning and Management*, 53(8), 991–1009. doi:10.1080/09640568.2010.495503

Chen, C., & Knight, K. (2014). Energy at work: Social psychological factors affecting energy conservation interventions within the Chinese power companies. *Energy Research & Social Science*, 4, 23–31.

Chilvers, J., & Longhurst, N. (2016). Participation in transition(s): Reconceiving public engagements in energy transitions as co-produced, emergent and diverse. *Journal of Environmental*

Policy & Planning, 18, 585–607. doi:10.1080/1523908X.2015.1110483

Christina, S., Dainty, A., Daniels, K., & Waterson, W. (2014). How organisational behaviour and attitudes can impact building energy use in the UK retail environment: A theoretical framework. *Architectural Engineering and Design Management*, 10(1–2), 164–179. doi:10.1080/17452007.2013.837256

Christina, S., Waterson, P., Dainty, A., & Daniels, K. (2015). A socio-technical approach to improving retail energy efficiency behaviours. *Applied Ergonomics*, 47, 324–335. doi:10.1016/j.apergo.2014.08.003

Cole, R., Brown, Z., & McKay, S. (2010). Building human agency: A timely manifesto. *Building Research and Information*, 38(3), 339–350. doi:10.1080/09613211003747071

Cole, R., Robinson, J., Brown, Z., & O'Shea, M. (2008). Re-contextualizing the notion of comfort. *Building Research and Information*, 36(4), 323–336. doi:10.1080/09613210802076328

Cooremans, C. (2011). Make it strategic! financial investment logic is not enough. *Energy Efficiency*, 4(4), 473–492. doi:10.1007/s12053-011-9125-7

Cooremans, C. (2012). Investment in energy efficiency: Do the characteristics of investments matter? *Energy Efficiency*, 5, 497–518. doi:10.1007/s12053-012-9154-x

Cooremans, C. (2015). Competitiveness benefits of energy efficiency: A conceptual framework. In *Proceedings of ECEEE summer study*, 1–6 June 2015 (Toulon/Hyères, France). Vol. 1 – Foundations of future energy policy, pp. 123–131. Stockholm, Sweden: European Council for an Energy-Efficient Economy. Retrieved from http://www.eceee.org/library/conference_proceedings/eceee_Summer_Studies

CSE, & ECI. (2012). *What are the factors influencing energy behaviours and decision-making in the non-domestic sector? A rapid evidence assessment*. London: Department of Energy and Climate Change. https://www.gov.uk/government/publications/factors-influencing-energy-behaviours-and-decision-making-in-the-non-domestic-sector-a-rapid-evidence-assessment

Cushman, M., Venters, W., Cornford, T., & Mitev, N. (2002). Understanding sustainability as knowledge practice. *LSE Research Online*. London: London School of Economics.

Deline, M. B. (2015). Energizing organizational research: Advancing the energy field with group concepts and theories. *Energy Research & Social Science*, 8, 207–221. doi:http://doi.org/10.1016/j.erss.2015.06.003

Dixon, G., Deline, M., McComas, K., Chambliss, L., & Hoffman, M. (2015). Saving energy at the workplace: The salience of behavioural antecedents and sense of community. *Energy Research & Social Science*, 6, 121–127.

Dryzek, J. (1990). *Discursive democracy*. Cambridge: Cambridge University Press.

Dryzek, J. (2000). *Deliberative democracy and beyond*. Oxford: Oxford University Press.

Fiorino, D. J. (1990). Citizen participation and environmental risk: A survey of institutional mechanisms. *Science, Technology & Human Values*, 15(2), 226–243. doi:10.1177/016224399001500204

Franconi, E. M., Bendewald, M. J., & Anderson, C. E. (2014). Analyzing energy-efficiency opportunities across building portfolios. In *Proceedings of ACEEE Summer Study on Energy Efficiency in Buildings*, August 17–22, 2014, Asilomar, CA, 3, 133–146. Washington, DC: American Council for an Energy Efficient Economy.

Frantz, C. M. (2014). Tapping into core social motives. *Solutions*, 5(1), 31–34.

Geels, F. (2002). Technological transitions as evolutionary reconfiguration processes: A multi-level perspective and a case-study. *Research Policy*, 31(8–9), 1257–1274. doi:10.1016/S0048-7333(02)00062-8

Goulden, M., & Spence, A. (2015). Caught in the middle: The role of the facilities manager in organisational energy use. *Energy Policy*, 85, 280–287. doi:10.1016/j.enpol.2015.06.014

Gouldson, A., & Sullivan, R. (2014). Understanding the governance of corporations: An examination of the factors shaping UK supermarket strategies on climate change. *Environment and Planning A*, 46(12), 2972–2990. doi:10.1068/a130134p

Gratton, R. (2009). How to Foster a Cooperative Culture. *Harvard Business Review*. Retrieved from https://hbr.org/2009/01/four-ways-to-encourage-more-pr

Hargreaves, T. (2016). Interacting for the environment: Engaging Goffman in pro-environmental action. *Society & Natural Resources*, 29(1), 53–67. doi:10.1080/08941920.2015.1054978

Hoffman, A., & Henn, R. (2008). Overcoming the social and psychological barriers to green building. *Organization & Environment*, 21(4), 390–419. doi:10.1177/1086026608326129

Janda, K. (2008). Implications of ownership in the U.S. And U.K.: An exploration of ENERGY STAR buildings and the energy efficiency accreditation scheme. In *Proceedings of American Council for an Energy-Efficient Economy 2008 Summer Study*, Asilomar, CA. 7, 156–167.

Janda, K. B. (2014). Building communities and social potential: Between and beyond organizations and individuals in commercial properties. *Energy Policy*, 67(April), 48–55. doi:10.1016/j.enpol.2013.06.024

Janda, K. B., Bottrill, C., & Layberry, R. (2014). Learning from the 'data poor': Energy management in understudied organizations. *Journal of Property Investment & Finance*, 32(4), 424–442. doi:10.1108/JPIF-03-2014-0018

Janda, K. B., Bright, S., Patrick, J., Wilkinson, S., & Dixon, T. J. (2016). The evolution of green leases: Towards inter-organizational environmental governance. *Building Research & Information*, 44(5–6), 660–674. doi:10.1080/09613218.2016.1142811

Janda, K. B., Patrick, J., Granell, R., Bright, S., Wallom, D., & Layberry, R. (2015). A wicked approach to retail sector energy management. In *Proceedings of ECEEE Summer Study*, 1–6 June 2015, Toulon/Hyères, France. Vol. 1 – Foundations of Future Energy Policy, pp. 185–195. Stockholm, Sweden: European Council for an Energy-Efficient Economy.

Janda, K. B., Payne, C., Kunkle, R., & Lutzenhiser L. (2002). What organizations did (and didn't) do: Three factors that shaped conservation responses to California's 2001 'crisis'. In *Proceedings of American Council for an Energy-Efficient Economy 2002 Summer Study*, Asilomar, CA, 8, 117–128.

Janda, K. B., & Topouzi, M. (2015). Telling tales: Using stories to remake energy policy. *Building Research & Information*, 43(4), 516–533. doi:10.1080/09613218.2015.1020217

Janda, K. B., Wallom, D., Granell, R., & Layberry, R. (2016a). Shopping for success: Numbers, knowledge, time & energy. In *Proceedings of ACEEE Summer Study on Energy Efficiency in Buildings*, August 21–16, 2016, Asilomar, CA, Vol. 8, pp. 8.1–8.12. Washington, DC: American Council

for an Energy Efficient Economy. http://aceee.org/files/proceedings/2016/data/papers/8_627.pdf

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press.

Lutzenhiser, L., Janda, K., Kunkle, R., & Payne C. (2002). *Understanding the response of commercial and institutional organizations to the California energy crisis*. 400-02-018C Consultant Report. Sacramento, CA: California Energy Commission. Retrieved from http://www.osti.gov/servlets/purl/832751-6WN6Z0/native/

Moezzi, M., & Janda, K. (2014). From 'if only' to 'social potential' in schemes to reduce building energy use. *Energy Research and Social Science*, 1, 30–40. doi:10.1016/j.erss.2014.03.014

Mulville, M., Jones, K., & Huebner, G. (2014). The potential for energy reduction in UK commercial offices through effective management and behaviour change. *Architectural Engineering and Design Management*, 10(1–2), 79–90. doi:10.1080/17452007.2013.837250

OECD. (2017). *Behavioural insights and public policy: Lessons from around the world*. Paris: OECD Publ.

ONS. (2015). Office for national statistics. 'Retail Sales: September 2015, United Kingdom'. Retrieved from http://www.ons.gov.uk/businessindustryandtrade/retailindustry/bulletins/retailsales/2015-10-22

ONS. (2017). *Public sector employment, UK: Mar 2017*. Office for National Statistics. Retrieved from https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/publicsectorpersonnel/bulletins/publicsectoremployment/latest

Parag, Y., & Janda K. (2014). More than filler: Middle actors and socio-technical change in the energy system from the 'middle-out'. *Energy Research and Social Science*, 3(September), 102–112. doi:10.1016/j.erss.2014.03.014

Petts, J. (1995). Waste management strategy development: A case study of community involvement and consensus-building in Hampshire. *Journal of Environmental Planning and Management*, 38(4), 519–536. doi:10.1080/09640569512797

Petts, J. (2001). Evaluating the effectiveness of deliberative processes: Waste management case-studies. *Journal of Environmental Planning and Management*, 44(2), 207–226. doi:10.1080/09640560120033713

Petts, J., & Leach, B. (2001). *Evaluating methods for public participation: Literature review – R & D technical report E135*. Bristol: Environment Agency.

Roussac, A. C. (2017). *A framework for presenting energy efficiency feedback to operators of buildings* (PhD Thesis). Faculty of Architecture, Design, and Planning, University of Sydney, Sydney, Australia.

Ruikar, K., Koskela, L., & Sexton, M. (2009). Communities of practice in construction case study organisations. *Construction Innovation*, 9(4), 434–448. doi:10.1108/14714170910995967

Scherbaum, C., Popovich, P., & Finlinson, S. (2008). Exploring individual-level factors related to employee energy-conservation behaviors at work. *Journal of Applied Social Psychology*, 38(3), 818–835. doi:10.1111/j.1559-1816.2007.00328.x

Schleich, J. (2009). Barriers to energy efficiency: A comparison across the German commercial and services sector. *Ecological Economics*, 68(7), 2150–2159. doi:10.1016/j.ecolecon.2009.02.008

Slater, R., Frederickson, J., Thomas, C., Wield, D., & Potter, S. (2007). A critical evaluation of partnerships in municipal waste management in England. *Resources, Conservation and Recycling*, 51(3), 643–664. doi:10.1016/j.resconrec.2006.11.008

Sovacool, B. (2014). What are we doing here? Analyzing fifteen years of energy scholarship and proposing a social science research agenda. *Energy Research & Social Science*, 1, 1–29. doi:10.1016/j.erss.2014.02.003

Staddon, S., Cycil, C., Goulden, M., Leygue, C., & Spence, A. (2016). Intervening to change behaviour and save energy in the workplace: A systematic review of available evidence. *Energy Research & Social Science*, 17, 30–51. doi:10.1016/j.erss.2016.03.027

Stern, P., Janda, K., Brown, M., Steg, L., Vine, E., & Lutzenhiser, L. (2016). Opportunities and insights for reducing fossil fuel consumption by households and organizations. *Nature Energy*, 1, 16043. doi:10.1038/nenergy.2016.43

Thaler, R., & Sunstein, C. (2008). *Nudge: Improving decisions about health, wealth, and happiness*. New Haven, CT: Yale University Press.

The Retail Appointment. (2017). UK retail: Facts and figures. Retrieved from https://www.retailappointment.co.uk/career-advice/talking-shop/uk-retail-facts-and-figures

Thomas, R. J. (1994). *What machines can't do*. Berkeley, CA: University of California Press.

Whitton, J., Parry, I., Akiyoshi, M., & Lawless, W. (2015). Conceptualizing a social sustainability framework for energy infrastructure decisions. *Energy Research & Social Science*, 8(July), 127–138. ISSN 2214-6296. doi:10.1016/j.erss.2015.05.010

Wilson, S., Sonderegger, S., & Buzzeo, J. (2016). *Understanding the behavioural drivers of organisational decision-making: Rapid evidence assessment*. London: Cabinet Office. Retrieved from http://library.college.police.uk/docs/cabinetoffice/Behavioural_Drivers_of_Organisational_Decision_Making_REALinksFINAL_2016.pdf