The practice of working from home and the place of energy

Mr Sam Hampton
DPhil Candidate, Environmental Change Institute, University of Oxford

samuel.hampton@ouce.ox.ac.uk

Paper prepared for DEMAND Centre Conference, Lancaster, 13-15 April 2016

Workshop 2: Professions and Energy Demand

Keywords: working from home, energy practices, comfort, demand-side response

Abstract

The practice of working from home has become widespread in the UK and is on the rise. There are potentially positive implications for energy consumption and carbon emissions associated with home working, but these depend on myriad variables. Attending to the doings and sayings of home work provides a more in-depth perspective on the role of energy compared with quantitative models of household consumption. Whilst 'energy sociology' has investigated a range of energy consuming practices in the domestic setting, no study in this tradition has focussed on home working. This paper draws on interviews with fifteen home workers on the use of energy when working from home, finding three emerging themes: comfort, control and flexibility. Findings from interviews are presented according to these themes and the meanings, materials and competences of each are drawn out. The discussion combines ideas from practice theory, actor network theory and discourses of affect to argue that comfort, control and flexibility are bound up in the constellation of elements making up the practice of working from home, and that they emerge from performances which have both intentional and affective dimensions. Parallels are drawn between contemporary discourses of energy demand and the three themes, including adaptive comfort and its links with control; and flexibility and demand-side response. The conclusion summarises key ideas, suggests areas for further research and discusses implications for policy.

Introduction

The practice of working from home has become widespread in the UK. In 2014, more than 25% (7.7 million) of those in employment reported that they sometimes work from home as part of their main job, whilst 4.2 million (13.9%) reported their home as their main place of work, an increase of 2.8 percentage points since 1998 (ONS, 2014a, 2014b).

As a growing trend with implications for energy consumption, home working has been addressed in a literature which has been dominated by efforts to quantify its potential environmental benefits (Fu et al., 2012; Kitou and Horvath, 2003; Koenig et al., 1996; Nelson et al., 2007; Walls and Safirova, 2004). On the one hand, when substituting for a commute, working from home can represent significant energy and emissions savings (Walls and Safirova, 2004). Whilst on the other, the heating and lighting

of a domestic space in addition to an unused desk at work, or the use of technologies such as cloud computing services can lead to increased energy consumption and environmental impact (Carbon Trust, 2014). In attempting to calculate a net balance of energy demand, key factors include the mode, length and energy intensity of the commute; the ability of employers to manage desk-space flexibly; and the technologies and practices involved in heating and lighting the home space (Nelson et al., 2007). Whilst many empirical studies find net energy and emissions reductions associated with home working (Fu et al., 2012; Koenig et al., 1996; Nelson et al., 2007; Walls and Safirova, 2004), considerable methodological difficulties (Mokhtarian et al., 1995) and the highly contingent nature of the practice prevent generalisations about its benefits.

The diversity of energy consuming practices is a subject of interest for the development of a literature termed 'energy sociology' (Horta et al., 2014). Significant variations in consumption have been observed in studies of household energy demand, even where building design and efficiency characteristics are shared and where inhabitants are amongst similar socio-economic groups (Gram-Hanssen, 2013). Energy sociology has sought to demonstrate that the key to understanding the diversity of energy demand patterns is to focus on the doings and sayings of everyday life, analysing the role of energy therein (Schatzki, 1996; Shove et al., 2012). Drawing on practice theory which posits that practices are made up of 'constellations' of elements (Reckwitz, 2002), emphasis is shifted away from the view which sees the human the principle consumer of energy. Instead, energy sociology develops a model of 'distributed agency' (Wilhite, 2008; Gabriel and Watson, 2013), in which meanings, materials, skills, technologies, embodied knowledge, and rules configure the ways in which energy is used as part of everyday activity (Gram-Hanssen, 2010).

Energy sociology literature since the 'practice turn' has analysed elements of practice within the household, including lighting (Crosbie and Guy, 2008); the use of appliances, technologies and interfaces (Darby, 2006; Gram-Hanssen, 2010, 2013; Strengers, 2013) and thermal comfort (Shove, 2003; Strengers and Maller, 2011; Gabriel and Watson, 2013; Royston, 2015). Despite the growing trend for home working and the significant implications for energy demand, no studies in energy sociology have specifically explored the practice of working from home. Building on literature which analyses the role of energy in household practices, this paper follows Shove and Walker's (2014) call to place the practice at the 'heart of enquiry'. It explores the meanings, materials and competences associated with working from home (Shove et al., 2012) and seeks to address two research questions: 1) What are the defining characteristics of working from home? 2) What is the role of energy in the practice?

The next section outlines the methodology used for the study and discusses the analytical approach and the challenges of investigating practices. Findings are structured according to themes which emerged from empirical data. The discussion uses insights from three different theoretical perspectives to help interpret empirical data. Practice theory provides the framework for research design whilst ideas from actor network theory (ANT) and the notion of affect help to illustrate the emerging themes of home working. Whereas ANT has been relatively influential across the social sciences, discourses of affect have largely been developed by geographers, and energy sociology has adopted practice theory as its principal framework. As well as seeking to analyse the practice of working from home and the role of energy, another aim of this paper is therefore to demonstrate the possibilities of combining these complementary theories to enrich analyses of energy consuming practices. Having analysed the characteristic themes of home working, parallels are then drawn with contemporary discourses of energy demand. The conclusion summarises key ideas, suggests areas for further research and explores implications for policy.

Methodology

Interviews with fifteen home workers were conducted in January 2016. Participants were recruited from personal and professional networks and all worked in the services sector. Three participants identified home as their main place of work, with the remainder working from home for at least one day per week. All participants were usually alone when working from home, although this was not specified in the sampling process. Where possible, interviews were conducted in participants' homes or photographs of the home working space were shared.

Interviews were semi-structured and followed a guide which was prepared in consultation with experienced researchers and trialled beforehand. In placing the practice at the heart of enquiry, interviews focussed on the meanings, materials and competences involved in working from home, with questions about energy consumption woven into conversations about home, work, boundaries and work-life balance. Interviews were recorded and notes taken to draw out the main points from the discussion. Following the interviews, notes were written up and added to by revisiting recordings and transcribing key passages. Data were compiled and analysed in a spreadsheet, where key themes relating to the two research questions began to emerge.

The aim of this methodology was not to establish a representative sample of home workers, nor to draw firm conclusions about energy consumption patterns in the home: the sample is both too small and non-random. Instead, the discussion is informed by home workers' reflections on their practice, my interpretation of their narratives and personal experience as an occasional home worker. Practice theory tells us that the tacit and embodied dimensions can be key to capturing the essence of practice. The reliability of asking interviewees to linguistically reflect on aspects of their practice is therefore a source of debate. Whilst some emphasise the importance of reflexivity for energy behaviours (Bonnington, 2015), proponents of non-representational theory have highlighted the difficulty of capturing embodied experience and 'affective atmospheres' produced in the conduct of practice (Anderson, 2009; Vannini and Taggart, 2014). Regardless, both perspectives tell us that the role of the researcher is crucial: in framing the discussion, guiding narratives and representing results. Sitting down for an hour and attempting to explain the variety of meanings, materials and skills required to conduct one's work from home is surely an unusual experience. In seeking to find language, insights and narratives to reflect on their practice and the role of energy, interviewees are required to step outside the normal doings and sayings of the practice: a process which can both be illuminative and transformative for the 'carrier' of practice (Reckwitz, 2002). The discussion that follows should therefore be considered as the product of participatory research, in which reflections on home working emerged through a process of collaborative discovery.

Findings

Three themes emerge from interviews with home workers: comfort, control and flexibility. In this section, each theme is discussed in turn, including a summary of related literature and insights from empirical data. The meanings, materials and competences involved in each are discussed and summarised in Table 1.

Comfort

Thermal comfort is a subject of interest across disciplines. In literatures concerned with building design and energy engineering, comfort has become technically specified, as 'optimal' conditions are defined in relation to human physiology and embedded in building energy management (Fanger, 1970; Shove, 2003). In contrast to relatively fixed ideas of comfort, the notion of 'adaptive comfort' has been developed to highlight individuals' ability to achieve comfort in flexible ways by making psychological,

physiological and behavioural adjustments (de Dear and Brager, 1997; Nicol and Humphreys, 2002). Developing this idea, energy sociologists employing practice theory have expanded on technical and behavioural discourses on comfort, illustrating the variety of materials, technologies, cultural norms and forms of knowledge involved in the everyday practices that formulate comfort (Shove, 2003; Hinton, 2010; Strengers and Maller, 2011).

In describing thermal conditions, 11 of the 12 occasional home workers reported tolerating lower temperatures when working from home when compared with their normal place of work, whilst a majority also maintained a cooler environment compared with other times spent in their homes. Where reasons were provided, explanations included conserving resources, the needs of others, staying alert for work and reducing environmental impact. As we will see, the desire to express feelings of control and be flexible also emerged as key themes, and were closely linked to comfort and the management of temperature.

A majority of respondents reported using clothing and blankets to establish comfort when working from home, including 'big fluffy socks and a hoody' (WM, 18/1/16) and a 'onesie' (RE, 22/1/16). 'Low-tech' solutions such as hot-water bottles, hot drinks and microwaveable wheat sacks were utilised for comfort by several participants, whilst a minority of interviewees reported making use of bodily movement:

> 'My main cure is to move... I have a small little trampoline in the garden so if the going gets really rough I'll go out and bounce on that!... then it feels warmer when you come in… you know I've never told anyone all these secrets!' (DA, 18/1/16)

Home workers seemed to relish the opportunity to make use of materials, technologies and bodily movements in ways that were reported as inappropriate for workplace environments. Avoiding using the central heating appeared to be important for interviewees, whilst adaptive comfort represented an apparently satisfying challenge, requiring competence and the use of materials.

The reference to 'secrets' above also illustrates how the interview can provide a unique platform for reflections on practice, as well as highlighting the personal and private nature of comfort. One respondent was particularly expansive in describing comfort in her workplace:

> 'It's very very light … in some way it sort of compensates [for heat]…. Looking out over beautiful views. Part of being warm is about a feeling of well-being.' (SI, 15/1/16)

Finally, comfort emerged as a theme for participants when differentiating meanings of home from work. 10 of the 15 interviewees used the words 'comfortable', 'comfy' or 'cosy' in response to the open-ended question 'tell me what the word home means to you'. The multiple meanings, materials and competences associated with the notion comfort was central to the practice of working from home.

Control

In adaptive comfort literature, personal control has been shown to increase tolerance of a wider range of thermal conditions (Luo et al., 2014, 2016), with potential energy savings to be made through greater personal environmental controls (Zhang et al., 2015). Interviewees felt almost unanimously that they had greater control over thermal conditions when working from home as opposed to other workplace environments. This was both due to having greater access to technologies such as thermostats and radiators in the home, as well as being restricted by perceptions of others' needs for comfort when cohabiting space (Cole et al., 2008). In some cases respondents reported colleagues

actively expressing discomfort, while others cited co-workers needs based on gender, body-mass-index or ethnicity:

> 'Sharing with three women, they like it on full tilt.' (RJ, 15/1/16)

> 'Some of those guys, they're really big… they're actively really hot… you can tell they are.' (HD, 21/1/16)

> 'We have an Italian contingent that have been known to wear their coats full time.' (TM, 15/1/16)

Commonly, temperature was reported as a source of tension in shared environments, where 'no one seems to agree on anything about heat' (HJ, 15/1/16). This culminated in one workplace in 'thermostat wars' (TM, 15/1/16) and another in organisational intervention: 'the policy is we don't touch them [the thermostats]' (HJ, 15/1/16).

In households, whereas a majority interviewees usually worked from home alone and tolerated lower temperatures when doing so, several cited the occasions when family members or housemates were home as times when they might put the central heating on, corroborating the notion of 'social loading' (Wilhite and Lutzenhiser, 1999):

> 'If I'm alone in the house, I try to avoid turning on the main heat, just because... I'm alone…. but if my housemate is going to stay at home then I'll probably turn on the heat.' (BR 20/1/16)

The question 'to what extent do you have control over the temperature when working from home', prompted a range of responses. Whilst a majority of respondents cited technologies such as thermostats, programmable timers and radiator valves as key elements of control, somewhat surprisingly around half of the sample responded to this question by choosing to talk about waste and inefficiency:

> 'It's a very old Victorian terrace, so it's probably leakier than it should be.' (DA, 18/1/16)

> 'Bizarrely, even though it's quite a new flat, it's not particularly good at saving heat… the windows… even though its double glazing, it's not great double glazing, and you get a bit of a draft under the door.' (RJ, 15/1/16)

> 'There must have been about 15 metres of copper piping… it was immense, just piping everywhere.' (HD, 21/1/16)

These examples of responses to a question about control of temperature are somewhat surprising findings. In my sample, the inefficiency of building materials and meanings of waste were intertwined with home worker's narratives of temperature control.

Competence was also reported as a key element of temperature control. Corroborating Royston's description of managing temperature by *getting to know* material assemblages through processes such as 'tinkering' and 'bricolage' (2015), several interviewees described a learning process though which their sense of control developed:

> 'Now I feel like I have a lot [of control] because I spent a lot of time training up on heating systems.' (HD, 21/1/16)

As we saw with unconventional means of establishing comfort, having the freedom to tinker with the materials of the home environment, the more creative the means the better:

> 'You can tweak a Labrador [to warm your feet].' (SI, 15/1/16)

It is clear from the examples above that home workers closely associated feelings of control with the materials, technologies, meanings and competences involved in heating practices. Assuming that the efficiency of their working environments and central heating systems was not so poor as to prevent temperatures reaching somewhere in the region of 18-20°C by means of simply turning on the heating, it becomes clear that creative means of controlling temperature and establishing comfort are important sub-practices for home workers.

Flexibility

Many respondents described their motivations for working from home in the context of having a break from routine. For example, several managers cited the demands of always being available and interruptible, or tied up in meetings with little time for themselves. Home working provided the opportunity to be flexible with their time and focus. A common expression of flexibility was in changes to normal working hours. My sample of home workers would often start later, take a longer lunch break and work into the evening. These changes reflected a general blurring of boundaries between domestic and working practices reported by a majority of home workers:

> 'I might… have a break and assemble the dinner at half past 4 or 5, then put it in the oven and go back and do some work.' (SI, 15/1/16)

Blurring of boundaries was reported both positively and negatively. On the one hand, conducting household chores during the working day afforded home workers more time in evenings and on weekends for other activities, whilst many struggled to manage the transition from *doing* work to *being* at home. These meanings often appeared to be two sides of the same coin of flexibility, suggestive of the tensions associated with bringing work into the home environment.

Many respondents interwove household chores with desk-based work, citing laundry in particular. Loading the washing machine, dryer, or hanging out washing were reported as tasks well-suited to break-times, sometimes act as prompts for taking a pause.

> [Regarding doing the laundry]: 'There's usually a day [in the 3 days per week working from home] … where the weather is going to be pretty reasonable… so [I] would actually go with the weather…it's a bit of a break from sitting in front of the computer.' (BR, 22/1/16)

> 'I'll use chores as a break.'' (SI, 15/1/16)

As these examples illustrate, flexibility for home workers is not simply an expression of choice over when and where to work, but can be enabled and instigated by appliances, the 'needs' of the house and even the weather. Just as we have seen for comfort and control, interviewees expressed flexibility in their practice through relations with material objects. Materials also appeared to be closely linked with the competences involved in self-management: taking breaks, getting fresh-air and headspace. The materials and competences associated with flexibility gave meaning to the practice of working from home.

For interviewees that had another regular place of work, the majority reported that their desk would be unoccupied (and heated and lit) when they were working from home. In these circumstances, the energy used for heating and lighting when home working constitute *additional* consumption. Only one

respondent described a flexible 'hot-desking' arrangement implemented at their workplace whereby this effect was mitigated. Whilst flexibility is a central feature of practice for home workers, the sample indicated that the theme was not mirrored by employers' energy management practices.

	Comfort	Control	Flexibility
Meanings	• Linked with concept of home • Opposition to work environment • Control and adaptation	• Alone vs shared environments • 'Thermostat wars' • Social loading • Company policy • Waste, inefficiency	• Break from routine • Freedom to choose work tasks • Frees up time elsewhere • Blurred boundaries • Headspace
Materials	• Clothing and blankets • Bodies • Low tech - hot drinks, wood fires, wheat sacks • Unconventional materials e.g. pets • Daylight	• Others' bodies • Thermostats, TRVs, heating timers • Unconventional materials e.g. pets	• Household appliances • Weather • Bodily conduct e.g. chores
Competences	• Managing boiler, interfaces • Bodily movement • Heating single room vs whole house • Targeting warmth – fingers and toes	• Know-how of managing heating, • Understandings of building fabric e.g. insulation, piping	• Self-management e.g. breaks • Delineating home and work • Employer energy management

Table 1 - Summary of the meanings, materials and competences associated with the three themes of home working (after Shove et al., 2012)

Discussion

The findings from interviews have been presented so far in the context of the so called 'three-element' model of practice theory (Table 1). The three emergent themes of home working are now further discussed according to Schatzki's (1996) distinction between the organisational and activity dimensions of practice. Ideas from ANT and the notion of affect are interwoven into this framework.

Entities, assemblages and affect

The findings from interviews demonstrate that comfort, control and flexibility are constituted by an assemblage of elements. Schatzki (2001) introduces the concept of an 'organisational dimension' of practice to describe these constellations of elements. In this dimension, the materials, meanings and competences involved in working from home constitute the 'practice-as-entity': a relational network of elements existing in the realm of potential. Understanding comfort in the organisational dimension, it becomes more than physical conditions or a psychological state; it is imbued in the objects, materials, memories, smells, doings and sayings associated with the home. Comfort exists both within and between the constellation of elements; an attribute of an assemblage poised and ready to be 'integrated' through performance (Schatzki, 2001). Existing in this realm of potential and held as a quality of the *atmosphere* of the home assemblage, working-from-home-as-entity has an *affective* dimension. This is both to say that the assemblage has the capacity to affect ordinary sensations such as the feeling of temperature (Vannini and Taggart, 2014), and more profoundly, that comfort is an 'atmospheric attunement' - an affective sensibility produced by the coming together of human and

non-human elements in the always-emerging, enveloping 'affective atmosphere' of the home (Stewart, 2011; Anderson, 2009).

Control and flexibility may also be understood as qualities of the home working assemblage. Although practices are made up of distributed forms of agency (Wilhite, 2008; Gabriel and Watson, 2013), variety exists in the degree to which influence can be exerted by individual *actants* in *curating* the constellation of elements. Certain configurations of practice in the organisational dimension determine the degree to which the 'carrier' of practice is able to control the space-times of performance. Working from home, as a particular configuration of work-as-entity, allowed my sample of practitioners to exert a greater degree of influence over certain aspects of their practice. Without the distractions of meetings or interruptions from colleagues for example, working from home allowed employees the flexibility to focus on intellectually demanding tasks, or to catch up on a week's worth of emails. However for home workers, control and flexibility are more than simply the ability to carry out work tasks in optimal conditions. As the findings illustrated, controlling energy consumption and creatively achieving comfort are important ways in which the meanings and motivations of working from home are underpinned.

Performance and performativity

Understanding working from home in Schatzki's 'activity dimension', comfort, control and flexibility may also be seen to emerge from performances of practice. Performances are the moments in which materials, technologies, meanings and competences come together in the space-times of practice, and through which practice-as-entities are recursively reconfigured (Schatzki, 2001). All performances of practice are unique, enrolling different meanings, materials and competences, and contributing to sediment, maintain, innovate or destabilise the practice in the organisational dimension.

If comfort is a quality of an atmospheric assemblage existing in the realm of potential, performances are the moments in which elements of comfort are 'integrated' and experienced by the practitioner. Vannini and Taggart argue that there is an important affective dimension to comfort, and they use the term 'thermoception' to highlight that temperature is felt by the body in ways that precede cognitive awareness and linguistic reflection. This is not to say that comfort does not have a cognitive dimension however. Affective experience is translated into individual consciousness and attributed with social and cultural meaning in a process of 'socio-linguistic fixing' (Massumi, 2002). In other words, affective sensations of comfort are given meaning as sensory data are computed, translated and reflected upon in particular personal and social contexts.

This process can be either immediate, or invoked in contexts divorced from affective experience, such as in staged interviews. Findings from this paper seemed to demonstrate this uneven and sometimes counter-intuitive computational process, as interviewees were asked to step outside of normal doings and sayings and try to *make sense* of their practice. The surprising association of light with comfort, control with meanings of waste and energy inefficiency, or the sharing of the 'secrets' of adaptive comfort for the first time are illustrations of the unsteady process by which experiences with affective and embodied dimensions are translated into narrative.

But this translation is not unidirectional. As well as passing from sensation to understanding, intention and reflexivity are also important for the production of comfort (Bonnington, 2015). Linguistically for example, speaking of the home as a space of comfort - as many interviewees did - has performative effects. In describing home as 'comfy' or 'cosy', qualities of comfort become embedded in the materials and spaces of the home through 'performative utterances' (Austin, 1962). In this productive process, the word 'home' itself becomes a 'somatic marker' for feelings of comfort, able to trigger an

affective response through its repetition (O'Tuathail, 2003). Deliberate use of language can thus be seen to contribute recursively to the construction of home as an affective atmosphere.

Performances of control and flexibility are key features of home working, expressed for example through the creative control of comfort, or the flexible interweaving of work and household chores. There is a strong element of intention associated with these performances, as they seem to fulfil the meanings and motivations of home working, and set the practice aside from the routines of 'normal' work. In addition, working in a dressing gown, bouncing on a trampoline or hanging out the washing are all corporeal performances which are felt affectively. Control and flexibility can therefore be seen as features of performance with both intentional and affective dimensions.

As the findings of this study have shown, energy is an integral element of the practice of working from home, bound up in the performances of comfort, control and flexibility. The next section discusses parallels with contemporary discourses of energy demand.

Parallels with Energy Discourses

The three themes of comfort, control and flexibility that characterise the practice of home working have two important parallels with the objectives of energy policy. Firstly, corroborating findings which link personal control with lower reported comfortable temperatures, evidence from interviews with home workers suggests both strong perceptions of control, and an active willingness for adaptive means of comfort. Indeed, the management of comfort in creative ways helps to give meaning to the practice of home working, as an expression of control and flexibility. A tendency to tolerate lower temperatures when working from home has positive implications for energy demand reduction. Consolidating this with flexible management of office space - preventing the unnecessary heating and lighting of an unused desk – represents a significant opportunity for associated emissions savings. This is an area that warrants greater attention from policy-makers, both those in business and in government.

The second synergy relates to flexibility of energy demand. With the growth of intermittent renewable sources of electricity, demand side response has gained increasing attention from academic and policy literature (Grünewald et al., 2015; Infield et al., 2007; DECC, 2012, 2015). The ability and willingness of householders to adapt to signals to shift their consumption over time has economic and environmental implications for the electricity system (Darby and Pisica, 2013; Strengers, 2010). Working from home represents an opportunity to use energy more flexibly, as demand shifting in the domestic setting has been shown to be correlated with occupancy (Strengers, 2010). Going further, this paper has demonstrated that flexibility is a central theme of the practice of home working, which is often performed in relation to the use of energy consuming appliances. Energy management is *already* implicated in the performances of flexibility, serving to help home workers delineate their practice from 'normal' work and home life. Targeting home workers with demand response policies may therefore be a fruitful enterprise.

Conclusions

The practice of working from home has not been the sole subject of studies within energy sociology since the 'practice turn', despite its growing instance. Most research concerned with energy and home working has focussed on a difficult calculation of net consumption and associated emissions, finding myriad contingent variables. In contrast, this paper has put the practice of home working at the heart of analysis, exploring the meanings, materials and competences involved. Three themes of comfort, control and flexibility emerged from interviews about working from home, as well as some surprising findings. Of a sample of 12 occasional home workers, 11 reported maintaining lower temperatures

while working from home, whilst material elements, low-technologies and meanings of waste were strongly associated with all three themes. Despite arguing that reflexive accounts of practices are limited, this study has relied on interviews. Developing this research, I intend to re-interview respondents as well observe home workers in order to explore the constructive nature of interviews and attempt to capture the non-representational dimensions of practice.

This paper has depicted home working as a constellation of human and non-human elements, as well as to highlight the relationship between affect and intention in the performance of practice. For instance, it argued that comfort is more than an individual's perception of thermal conditions. Comfort and home are willed together by inhabitants through their performative, linguistic association, and consolidated through the enrolment of clothing, spaces and low-tech appliances in performances of comfort. Comfort is thus imbued in the affective atmosphere of the home in performances involving meanings, materials and embodied experience. In combining ideas from practice theory, ANT and discourses of affect to explore the emergent themes of home working, this paper has sought to demonstrate the synergies of these conceptual frameworks. The affective dimension of practice represents a relatively under-studied area for energy sociology, warranting further research which draws links with this discourse of geography.

This paper has highlighted the central place of energy in the practice of working from home, as its consumption and conservation are bound up in performances of control and flexibility. Creatively establishing comfort is an expression of control for home workers that fulfils and consolidates the meaning of the practice. Equally satisfying is the notion of flexibility, expressed through performances of the body in relation to material assemblages and characterised by the reconfiguration of spaces and times of practice. Such performances include shifting conventional times of eating, working and using energy consuming appliances. Policies associated with electricity demand shifting are therefore well aligned with the sub-practices of control and flexibility which are central to home working. These links constitute an area for potential further research on home work and demand side response.

Whilst adaptive means of establishing comfort represent a major source of energy reduction potential, these creative practices are often invisible to academics and policy makers; not captured in energy models, for example. Not only does this lack of information make policy design problematic, there are undoubtedly further difficulties to be encountered when thinking through the kinds of measures involved. Despite the prevalence of low-technologies such as hot water bottles, blankets and pets, public authorities are likely to be wary of encouraging their use when working from home. That said, the potential for harnessing the synergies associated with energy and the three home working themes of comfort, control and flexibility warrants further discussion.

References

Anderson, B., 2009. Affective atmospheres. Emot. Space Soc. 2, 77–81. doi:10.1016/j.emospa.2009.08.005

Austin, J.L., 1962. How to Do Things with Words. Clarendon Press.

Bonnington, O., 2015. The Indispensability of Reflexivity to Practice: The Case of Home Energy Efficiency. J. Crit. Realism 14, 461–484. doi:10.1179/1572513815Y.0000000009

Carbon Trust, 2014. Homeworking: helping businesses cut costs and reduce their carbon footprint.

Cole, R.J., Robinson, J., Brown, Z., O'shea, M., 2008. Re-contextualizing the notion of comfort. Build. Res. Inf. 36, 323–336. doi:10.1080/09613210802076328

Crosbie, T. (Tracey), Guy, S. (Simon), 2008. En'lightening' energy use: the co-evolution of household lighting practices. Int. J. Technol. Manag. 9, 220–235. doi:10.1504/IJETM.2008.019035

Darby, S., 2006. The Effectiveness of Feedback on Energy Consumption, A review for DEFRA of the literature on metering, bulling and direct displays. ECI, Oxford.

Darby, S., Pisica, I., 2013. Focus on electricity tariffs: experience and exploration of different charging schemes.

DECC, 2015. 2010 to 2015 government policy: energy demand reduction in industry, business and the public sector.

DECC, 2012. Demand Side Response in the domestic sector - a literature review of major trials.

de Dear, R.J., Brager, G.S., 1997. Developing an Adaptive Model of Thermal Comfort and Preference - Final Report on RP-884. ASHRAE Trans. 104.

Fanger, O., 1970. Thermal Comfort, Analysis and Applications in Environmental Engineering. McGraw Hill, New York.

Fu, M., Andrew Kelly, J., Peter Clinch, J., King, F., 2012. Environmental policy implications of working from home: Modelling the impacts of land-use, infrastructure and socio-demographics. Energy Policy 47, 416–423. doi:10.1016/j.enpol.2012.05.014

Gabriel, M., Watson, P., 2013. From Modern Housing to Sustainable Suburbia: How Occupants and their Dwellings are Adapting to Reduce Home Energy Consumption. Hous. Theory Soc. 30, 219–236. doi:10.1080/14036096.2013.775183

Gram-Hanssen, K., 2013. Efficient technologies or user behaviour, which is the more important when reducing households' energy consumption? Energy Effic. 6, 447–457. doi:10.1007/s12053-012-9184-4

Gram-Hanssen, K., 2010. Standby Consumption in Households Analyzed With a Practice Theory Approach. J. Ind. Ecol. 14, 150–165. doi:10.1111/j.1530-9290.2009.00194.x

Grünewald, P., McKenna, E., Thomson, M., 2015. Keep it simple: time-of-use tariffs in high-wind scenarios. IET Renew. Power Gener. 9, 176–183(7).

Hinton, E., 2010. Review of the literature relating to comfort practices and socio-technical systems.

Horta, A., Wilhite, H., Schmidt, L., Bartiaux, F., 2014. Socio-Technical and Cultural Approaches to Energy Consumption An Introduction. Nat. Cult. 9, 115–121.

Infield, D.G., Short, J., Home, C., Freris, L.L., 2007. Potential for Domestic Dynamic Demand-Side Management in the UK, in: Power Engineering Society General Meeting, 2007. IEEE. Presented at the Power Engineering Society General Meeting, 2007. IEEE, pp. 1–6. doi:10.1109/PES.2007.385696

Kitou, E., Horvath, A., 2003. Energy-Related Emissions from Telework. Environ. Sci. Technol. 37, 3467–3475. doi:10.1021/es025849p

Koenig, B.E., Henderson, D.K., Mokhtarian, P.L., 1996. The travel and emissions impacts of telecommuting for the state of California Telecommuting Pilot Project. Transp. Res. Part C Emerg. Technol. 4, 13–32. doi:10.1016/0968-090X(95)00020-J

Luo, M., Cao, B., Ji, W., Ouyang, Q., Lin, B., Zhu, Y., 2016. The underlying linkage between personal control and thermal comfort: Psychological or physical effects? Energy Build. 111, 56–63. doi:10.1016/j.enbuild.2015.11.004

Luo, M., Cao, B., Zhou, X., Li, M., Zhang, J., Ouyang, Q., Zhu, Y., 2014. Can personal control influence human thermal comfort? A field study in residential buildings in China in winter. Energy Build. 72, 411–418. doi:10.1016/j.enbuild.2013.12.057

Massumi, B., 2002. Parables for the Virtual: Movement, Affect, Sensation. Duke University Press, London.

Mokhtarian, P.L., Handy, S.L., Salomon, I., 1995. Methodological issues in the estimation of the travel, energy, and air quality impacts of telecommuting. Transp. Res. Part Policy Pract. 29, 283–302. doi:10.1016/0965-8564(94)00029-A

Nelson, P., Safirova, E., Walls, M., 2007. Telecommuting and environmental policy: Lessons from the ecommute program. Transp. Res. Part Transp. Environ. 12, 195–207. doi:10.1016/j.trd.2007.01.011

Nicol, J.F., Humphreys, M.A., 2002. Adaptive thermal comfort and sustainable thermal standards for buildings. Spec. Issue Therm. Comf. Stand. 34, 563–572. doi:10.1016/S0378-7788(02)00006-3

ONS, 2014a. Quarterly Labour Force Survey - April - June 2014. Office for National Statistics.

ONS, 2014b. Characteristics of Home Workers, 2014. Office for National Statistics.
O'Tuathail, G., 2003. "Just Out Looking for a Fight": American Affect and the Invasion of Iraq. Antipode 35, 856–870. doi:10.1111/j.1467-8330.2003.00361.x
Reckwitz, A., 2002. Toward a Theory of Social Practices: A Development in Culturalist Theorizing. Eur. J. Soc. Theory 5, 243–263.
Royston, S., 2015. Active consumers? Everyday innovation and adaptation for efficiency in thermal comfort services, in: Dynamics of Consumption, 078-15. Presented at the ECEEE Summer Study.
Schatzki, T., 2001. Introduction: practice and theory, in: Schatzki, T., Knorr-Cetina, K., Von Savigny, E. (Eds.), The Practice Turn in Contemporary Theory Eds Schatzki, Knorr Cetina, Von Savigny. Routledge, London, pp. 1–14.
Schatzki, T., 1996. Social Practices: A Wittgensteinian Approach to Human Activity and the Social. Cambridge University Press.
Shove, E., 2003. Converging conventions of comfort, cleanliness and convenience. J. Consum. Policy 26, 395–418.
Shove, E., Pantzar, M., Watson, M., 2012. The Dynamics of Social Practice. SAGE Publications.
Shove, E., Walker, G., 2014. What Is Energy For? Social Practice and Energy Demand. Theory Cult. Soc. doi:10.1177/0263276414536746
Stewart, K., 2011. Atmospheric Attunements. Environ. Plan. Soc. Space 29, 445–453. doi:10.1068/d9109
Strengers, Y., 2013. Smart energy technologies in everyday life : smart utopia?, Consumption and public life. Basingstoke : Palgrave Macmillan.
Strengers, Y., 2010. Air-conditioning Australian households: The impact of dynamic peak pricing. Energy Effic. Policies Strateg. Regul. Pap. 38, 7312–7322. doi:10.1016/j.enpol.2010.08.006
Strengers, Y., Maller, C., 2011. Integrating health, housing and energy policies: social practices of cooling. Build. Res. Inf. 39, 154–168. doi:10.1080/09613218.2011.562720
Vannini, P., Taggart, J., 2014. Making Sense of Domestic Warmth: Affect, Involvement, and Thermoception in Off-grid Homes. Body Soc. 20, 61–84. doi:10.1177/1357034X13499381
Walls, M.A., Safirova, E., 2004. A review of the literature on telecommuting and its implications for vehicle travel and emissions. Resources for the Future.
Wilhite, H., 2008. New thinking on the agentive relationship between end-use technologies and energy-using practices. Energy Effic. 1, 121–130. doi:10.1007/s12053-008-9006-x
Wilhite, H., Lutzenhiser, L., 1999. Social loading and sustainable consumption. Adv. Consum. Res. Vol 26 26, 281–287.
Zhang, H., Arens, E., Zhai, Y., 2015. A review of the corrective power of personal comfort systems in non-neutral ambient environments. Fifty Year Anniv. Build. Environ. 91, 15–41. doi:10.1016/j.buildenv.2015.03.013