Disrupting social order by exposing personal accountability for energy consumption

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# Abstract

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A key component of the future Internet of Things - energy monitoring infrastructures - have the potential to disrupt established social order in the home, workplace and public space by reintroducing energy as a contentious *resource* where it has become considered a *right*. We suggest that this disruption has both positive and negative implications and that it is vital that we understand these before designing energy monitoring technologies.

# Keywords

Sustainability, HCI, Energy monitoring, metering

# ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

# General Terms

Design, Human Factors.

# Introduction

A historical abundance of the fossil resources used to generate large proportions of the energy consumed in the home, workplace and for travel, combined with the abstraction of the Western consumer from the process by which the energy is generated, means that the privilege of guaranteed electricity at the flick of a switch is taken for granted. Energy – in particular electricity – is thought of less as a consumable resource and more as a right.

There is compelling and widely accepted evidence that global peak oil, coal and gas production may be reached within 50 years [1,5,7], and the financial and political effects of this increasing (and uneven) scarcity of resources are already emerging across the globe.

In response, as well as a fervent interest in renewable and more efficient energy sources, there is significant interest in using energy monitoring (e.g. through future smart meters, and existing products such as CurrentCost[[1]](#footnote-1) Envi, OWL[[2]](#footnote-2), etc.) and energy displays to change personal energy consumption behaviour by making consumers more immediately and visibly accountable. Interest in this strategy for tackling our energy-related issues is evident in both government and academia. The UK government has confirmed plans to roll out of electricity and gas smart meters to all homes in Great Britain by the end of 2020 [3], connecting every house to the Internet to allow remote monitoring of energy use. In a thorough review of sustainable HCI literature, DiSalvo et al. illustrated the scale of the academic research interest in the scope such an infrastructure might provide, finding that almost half the reviewed literature pertained to the ways in which feedback might be presented to consumers to encourage reflection on consumption and persuade behaviour change [4]. The energy-monitoring devices and the “persuasive” consumer-facing technologies they drive will form an increasingly significant part of the Internet of Things.

# Energy as a resource vs. a right

Despite the increasing prevalence of domestic and workplace energy monitoring and displays, ethnographic studies have warned of the danger of assuming that individuals can play the role of “micro resource managers” [8], highlighting the role of social relationships in managing energy use. There is a tension between the new responsibilities placed on individuals in the role of a personal energy resource manager and the more subtle ways in which individuals currently maintain a social order around energy use. We suggest that this tension will become visible as existing social processes of attributing and assuming responsibility for energy use as disrupted and new social orders are formed.

## EXAMPLE – confrontation in the home

In the majority of homes in the UK the 'buck stops' with the bill payer, who is responsible for the debt owed to the energy retailer following a period of use. It is increasingly common that this debt is paid directly, regularly throughout the year, and so the financial implications of individual acts of consumption in the home by individual members of the family are aggregated and temporally distant from the acts themselves. The automatic act of payment holds the bill payer accountable to the energy retailer. This bears little relation to the true model of energy consumption created by the individuals that inhabit a domestic environment; those that lie at the bottom of the social order (e.g. children) may well be the highest consumers of energy, yet not be held accountable. In this case, the bill payer ensures access for the household to a service to which they are entitled.

The introduction of domestic energy monitoring drastically alters the social order, providing hard evidence for the accountability of previously “anonymous” individual family members to the bill payer. Where leeway may have been given previously in favour of maintaining social harmony, disparities within the social order are now quantified and placed within a stark frame of reference, encouraging direct confrontation. Contention over responsibility for the financial implications of personal use frames energy in this scenario as a resource.

# Implications

The example given above is a dark scenario that illustrates one possible side of the story of the introduction of a network of energy monitoring technologies. We can imagine other dark twists to this story: too much faith in the veracity of energy monitoring technologies risks decontextualising energy consumption which may lead to false accusations of wastefulness, for example, if the one family member uses a disproportionate amount of energy performing favours to aid other members of the family.

Apprehension of the disruption these technologies might introduce could well form a barrier to their acceptance, yet there are many positive implications to their introduction. Existing research in persuasive HCI has sought to minimise the discomfort of disruptions of social order by reframing such interventions as positive experiences that enable proactive responses [2], e.g. encouraging family members to trade energy “resource” [6], rather than as an opportunity for the apportionment of blame.

In workplace scenarios where organisational structures or cultures have become deeply embedded, exposing accountability of individuals or groups for their energy practices may provide a useful platform for invigoration of the workplace with new social dynamics.

The wider connectedness provided by future energy monitoring infrastructures (and the Internet of Things in general) also allows behaviour typically contained within the home, workplace or public place to be reframed in a wider context, allowing social entities to compare and share their energy practices beyond the physical and normative boundaries of the organisation or the immediate social surrounding in which the individuals are embedded in. This widening of frame is vital to reduce the psychological distance between energy consumers and the global dilemmas – climate change, energy scarcity, and so on - resulting directly from our collective overuse of fossil fuels.

# Conclusion

In this position paper we have stated that imminent ubiquitous energy monitoring infrastructures will form a significant part of the Internet of Things. While our ongoing research considers the practicalities of deploying and maintaining such infrastructures, as well as the nature and representations of data that these infrastructures might produce, we find the issue of how energy monitoring (in the form it is most commonly proposed) will disrupt social order highly compelling.

We believe that it is important to begin discussions in the HCI community that raise the significance of the tension between the existing practices of managing and understanding energy use in the home, workplace and public space, and the information that will be revealed (and responsibility that will be apportioned) through the intervention of future energy monitoring infrastructures into our daily lives. In particular we find the potential change in consumer perception from energy as a personal right to a contentious resource to be significant.

Correctly harnessed, intervention to cause disruption to established social order is an effective mechanism for encouraging behaviour change and beneficial reorganization of social structure. We have begun to draw on existing literature within the HCI community and elsewhere to consider both the benefits of disrupting social order, particularly where energy consumption behaviour change is a goal, and the negative implications that we might hope to neutralize or avoid through considered design.

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# References

1. Bentley, R. W. (2002). Global oil & gas depletion: an overview. *Energy Policy* (30).
2. Bird, J., & Rogers, Y. (2010). The Pulse of Tidy Street: Measuring and Publicly Displaying Domestic Electricity Consumption. *Workshop on Energy Awareness and Conservation through Pervasive Applications at Pervasive.*
3. Department of Energy and Climate Change. (2009). *Towards a smarter future: government response to the consultation on electricity and gas smart metering.* Department of Energy and Climate Change, Smart Metering Team.
4. DiSalvo, C., Sengers, P., & Brynjarsdóttir, H. (2010). Mapping the Landscape of Sustainable HCI. *Human factors in computing systems.* ACM.
5. Energy Watch Group. (2007). *Coal: Resources and Future Production.*
6. Shrubsole, P., Lavrysen, T., Janse, M., & Weda, H. (2011). Flo: raising family awareness about electricity use. *Human factors in computing systems.* ACM.
7. Sorrell, S., Speirs, J., Bentley, R., & Bran, A. (2009). *Global Oil Depletion.* UK Energy Research Centre, Technology and Policy Assessment.
8. Strengers, Y. (2011). Designing eco-feedback systems for everyday life. *Human factors in computing systems.* ACM.

1. http://www.currentcost.com/ [↑](#footnote-ref-1)
2. http://www.theowl.com/ [↑](#footnote-ref-2)