

En'lightening' Energy Use: the co-evolution of household lighting practices

Dr Tracey Crosbie and Professor Simon Guy

Author Address and contact details

School of Environment and Development
University Of Manchester
Oxford Road
Manchester
M13 9PL
United Kingdom.

E-mail Tracey.Crosbie@Manchester.ac.uk

Tel + 44 (0)161 275 6896

Fax + 44 (0)161 275 6885

E-mail Simon.Guy@Manchester.ac.uk

Tel + 44 (0)161 275 6920

Fax + 44 (0)161 275 6885

Abstract

Compact florescent light bulbs are a well developed readily available technology that could deliver substantial energy savings in the residential sector. Due to this, lighting is usually a preferred target for household energy saving campaigns and policies.

However the energy used to light homes continues to rise. In order to explore the reasons behind this increase this paper examines changing household lighting practices in the UK using recent in-depth interview data and drawing upon current sociological theories about the construction of consumption practices. The paper illustrates how lighting choices made by householders tend to co-evolve with the household lighting practices portrayed by the media. It concludes that policies which seek to promote more energy efficient lighting technologies would be well advised to enlist the support of lighting designers, manufacturers, advertisers and sales people involved in the presentation of household lighting practices in the media.

Affiliations

This work forms part of the Carbon Reduction in Buildings (CaRB) Consortium, which has 5 UK partners: De Montfort University, University College London, Reading University, Newcastle University and Sheffield University. They are supported by the Carbon Vision initiative, which is jointly funded by the Carbon Trust and the Engineering and Physical Sciences Research Council, with additional support from the Economic and Social Research Council and the Natural Environment Research Council. The partners are assisted by a steering panel of representatives from UK industry and government.

Introduction

The UK Government is committed to making an ambitious 60% reduction in UK carbon dioxide (CO₂) emissions from 1990 levels by 2050. This demands a reduction in emissions of carbon dioxide per head from around three tonnes of carbon per year (tC/a) in 1990 to around one tonne of carbon per head in 2050. Therefore the need to identify effective measures to promote carbon reduction is urgent. The built environment – both domestic and commercial – is a significant arena for energy consumption and contributes substantially to UK emissions of greenhouse gases. Tackling energy use in this sector through the design and development of low carbon buildings is a policy priority for UK government (DTI 2002), and forms part of wider policies and initiatives promoted by the European commitment to reduce household energy consumption (European-Council 2003; European-Commission 2005a).

The search is on for technologies that might contribute to the mitigation of carbon use and compact florescent light bulbs represent a proven, readily available technology that could deliver substantial energy savings in the residential sector¹. As a result, lighting is often a preferred target for household energy saving campaigns and policies (Mills 2002). However, in the face of an early policy focus on compact fluorescent light bulbs (CFLs) as a means to reduce household energy consumption (see Mills 1993) the amount of energy used to light homes continues to rise (Palmer and Boardman 1999; Mills 2002). It is estimated that the total amount of energy used for domestic lighting in the UK grew 63% between 1970 and 2000 and by 11 per cent between 1990 and 2000 (DTI 2002). The latter increase occurred despite the UK

¹ Compact fluorescent light bulbs (CFLs) are on average 80% more efficient than incandescent lamps and their lifetime can reach 8 to 12 times the lifetime of incandescent lamps. In addition, CFLs offer possibilities for recycling, while incandescent lamps do not (CEETB 2005)

government's subsidisation of CFLs which led to the distribution of almost 17 million of these energy efficient light bulbs between 1994 – 2000 (Ofgem/EST 2003).

In the UK the main policy approach to reducing the energy consumed by household lighting has been subsidies for energy-efficient CFLs though the electricity industry (Boardman et al 2005, p.53). There are also a range of policies and initiatives designed to stimulate the market for dedicated energy efficient lighting fixtures and fittings² (MTP 2006). These include building regulations which set limits on the energy efficiency of lighting in domestic buildings and the DEELs program, which seeks to rebate the cost of supplying energy efficient light bulbs with the sale of dedicated energy efficient lighting fixtures and fittings. However, despite these policy innovations it is predicted that the energy used to light homes in the UK will rise a further 20 percent by 2020 (MTP. 2006).

According the Department of Trade and Industry (DTI), the increase in the energy used to light homes is largely due to the shift away from lighting rooms by single ceiling bulbs towards multi-source lighting from wall and table lamps as well as multiceiling lights (DTI 2002). This suggests that people are changing their household lighting practices in ways which increase the energy used by those practices.

As part of its commitment to reduce household energy consumption, the UK government, through its Engineering and Physical Research Council, is currently funding research into energy consumption and buildings under the Carbon Vision programme³. One of these research projects is being conducted by the Carbon

² Dedicated energy efficient lighting fixtures and fittings are designed explicitly for use with compact fluorescent lamps and can not be used with any other type of lamp. In this way they prevent

³ See: <http://www.epsrc.ac.uk/ResearchFunding/Programmes/Energy/Funding/CarbonVision/default.htm>

Reduction in Buildings (CaRB) consortium⁴. The CaRB project acknowledges that reducing carbon emissions from buildings requires understanding both the technical and social dimensions of energy use. Toward this end, part of the CaRB team located at the University of Manchester, are examining the social and cultural influences on home energy use. The research presented in this paper, exploring household lighting practices, forms part of this study.

In order to explore the factors framing the increase in the energy used to light homes, this paper examines household lighting practices in the UK using in-depth interview data from eighteen respondents conducted in March 2006. Snowball sampling was used to recruit the eleven women and seven men that took part in this study. All but two of the interviewees are owner occupiers and most have a household income at or above the UK national average of twenty two thousand pounds per annum. Two of the respondents are single and live alone, the other sixteen respondents live with their spouse or partner and seven of these respondents have children living at home. All the interviewees live in single family houses in urban areas.

The interview guide approach was taken in this research⁵ (Patton 1990) and as is usual when using this approach the interviews were recorded and later transcribed for analysis. The interviews took place in respondents' homes allowing the interviewer to confirm some of the respondents' responses. The length of the interviews varied, between forty minutes and an hour and a half, depending upon the length of the

⁴ *Carbon Reduction in Buildings: A sociotechnical study of carbon use in buildings* EPSRC/Carbon Trust funded project (GR/S94377/01). For more details see: <http://www.carb.org.uk/>

⁵ In this approach the interview is guided by an outline or list of topics, therefore the interviewer is able to vary the wording and order of the questions. It is one of the most widely used approaches in qualitative interviewing. One of major benefits of using this approach is that the data collected are more systematic and comprehensive than in the informal conversational interview, while the tone of the interview still remains fairly conversational and informal.

responses given by respondents. The interviews were designed to uncover how research participants currently light their homes, how this may differ from the ways they lit their homes in the past, what type of household lighting they aspire to in the future and why they made particular lighting choices. It is hoped that a better understanding of these factors can provide a sound basis from which to evaluate policy options and assess potential energy savings for this important aspect of household energy consumption. Our aim in this paper is to start to outline an alternative approach to exploring and explaining home energy use using lighting as a case study as a contribution to the wider debate on sustainable energy systems.

The remainder of this paper is split into three sections. To contextualise the arguments presented, the first section introduces the reader to the contribution of the social sciences within household energy studies and discusses the concept of household lighting as a social practice. In doing so, this section of the paper highlights the importance of the cultural and social meaning of lighting in shaping household lighting practices. The second section of this paper presents an analysis of the interview data. This section illustrates how and explores why research participants' household lighting practices are changing and the effects of these developments on the amount of energy used to light homes. In the third and final section the policy implications of the research findings are outlined.

Social science and household energy studies

CFLs are one of the many innovative solutions to the question of “how people can be more efficient” developed by engineers and other natural scientists. However, engineers and other natural scientists rarely seek to ask “why people not more energy-efficient, when clearly it is technically possible for it to be so?” Raising this question

suggests other questions about whether the right technologies and policies are being developed to reduce energy consumption (Shove et al. 1998; Guy 2004; Chappells and Shove 2005). These types of questions have more commonly been raised within the social sciences. For example, research within economics has attempted to address the question of why people are not more energy efficient with reference to market barriers to energy efficiency. Or in other words, economists have attempted to come up with the reasons why energy markets do not operate in the most efficient manner. From a sociological perspective, the problem with the approach taken by many economists is that on the whole they assume that the choices individuals make with regard to energy consumption are more or less rational, in the sense that they assume people will choose the most efficient option available because it is in their economic interest to do so (Shove et al 1998). However, as neatly illustrated by the slow uptake of CFLs, "*[i]t is well known that a lot of energy efficiency improving measures could be realised from a technical point of view and that they would be economically profitable, yet they are neglected*" (Weber 1997, p.833).

Building on the work carried out by economists, researchers within psychology have attempted to account for the how and why people might deviate from expected economic rationality (Lutzenhiser 1992, p.52). The main focus of this work has been attitudes towards energy consumption and saving (Aune et al. 2002, p.9). However, it has proved very difficult to predict the linkage between attitudes towards energy saving and actual behaviour and recent psychological research examining home and energy use suggests "*that using only attitudinal variables, such as values, may be too limited to explain all types of environmental behaviour*" (Poortinga 2004, p.70).

In the late 1980s, both sociologists and psychologists began to argue that both rational and attitudinal approaches are severely flawed (Lutzenhiser 1992, p.53). The problem with these approaches, it was argued, is that they both consider energy purchase and use in self-contained individual or household 'units' detached from their socio-cultural context - and thus separated from much that is potentially explanatory (Fujii et al. 1992; Lutzenhiser 1992; Strang 1997; Wilhite 2001; Wilk 2002; Guy 2004). Or in other words, they neglect that household energy consumption is a situated social practice – in that uses of household appliances are mediated and filtered through existing cultures and conventions to produce particular forms of cooking practices, heating practices, lighting practices and so on (Shove et al 1998; Warde 2005). Reviewing this work Loren Lutzenhiser found "*a consensus in the literature*" that to understand the socio-technical complexity of energy-saving action, policy-makers must concern themselves more directly with "*the social contexts of individual action*" (Lutzenhiser, 1993, p.262). As Lutzenhiser points out;

“While the physical-technical-economic model assumes consumption to be relatively homogenous and efficiency to be driven by price, the empirical evidence points towards variation, non-economic motives, and the social contexts of consumption. Economics can supply normative guides regarding when investments would be economically desirable, but it tells us little about how persons actually make economic decisions” (Lutzenhiser, 1993, p.269).

Household lighting as a social practice

In contemporary studies the use of practices as an analytical framework is emerging as a theoretical and empirical approach that bridges between theories of consumption, technology and society (Shove 2004; Spaargaren 2004; Hand 2005; Shove et al. 2005;

Warde 2005) These approaches are informed by the understanding that “[w]hen people use goods and services, they do not consider their activities to be about ‘consumption’, but rather to be about doing things like cooking, travelling or cleaning” (Warde 2005, p. 150, note 6). Consumption is so to say ‘derived’ from practices, or as Warde puts it, “*from the point of view of a theory of practice, consumption occurs within and for the sake of practices*” (Warde, 2005, p. 145). From this perspective, energy consumption in the home is the outcome of numerous household energy consuming practices such as cooking, lighting and heating. Each of these domestic practices involves a suite of technologies and numerous culturally informed decisions made by individual householders, both of which are shaped by particular institutional arrangements. The key analytical move here is that research on energy consumption focuses not on decision-making but on the daily routines within which cooking, lighting, heating and bathing etc are enacted. Seen this way, it is “*practices, which are logically and ontologically prior to action [that] steer consumption*” (Warde 2004, p.5).

Following the above argument, the social practice of household lighting can be understood as involving the acquisition⁶, installation and use of lighting technologies in the home. The technologies used in household lighting practices include light bulbs and light fixtures which are part of the built fabric of the home, standalone lighting appliances (such as table lamps, reading lamps and standard lamps), automated lighting technologies (such as security lighting) and lighting controls (such as dimmer switches). The decisions involved in household lighting practices include choices over

⁶The term acquisition of household lighting is used here to include not only those lighting fixtures and fittings purchased by householders but also those given by family or friends, those purchased by landlords and those installed prior to current householder living in the property.

both occasional actions (such as installing new light fixtures or buying a new lamp) and routine actions (such as setting lighting timers and switching lights on and off). The institutional arrangements which shape household lighting practices include the energy supply regulations, the structures of energy supply and distribution businesses, building regulations, the markets for light bulbs and light fittings and the aims of government policies and initiatives. Practices result from the active and creative co-production of these objects and processes within localised and dynamic settings.

A seminal exemplar of research on practice carried out in Japan and Norway helps us to conceptualise how particular cultures mediate household lighting practices (Wilhite et al 1996). This work found that *“heating and lighting have important symbolic value [being used] in combination to create what the Norwegians call cosiness, a state of comfort that is practically mandatory for Norwegian living rooms..... [and that] the strong social significance of cosiness leads to overheating and over lighting as insurance against social failure”* (Wilhite et al 1996, p.10). In Japan, aesthetic considerations were found to be no less significant than in Norway but they took a very different form. As a result Japanese living rooms are exclusively lit by central ceiling lamps, brightness is preferred and fluorescent lighting is the norm. This research also found diametrically opposing preferences for lighting in Japanese and Norwegian bathrooms and kitchens. In Norway fluorescent lights are common in both, whereas in Japan these are the only places in the home where one usually finds incandescent lighting.

This research neatly illustrates that the use of lighting fixtures and fittings is mediated and filtered through existing cultures and conventions to produce particular forms of household lighting practices. However, it does not address the question of how

household lighting practices come to change and what the consequences are for levels of household energy consumption. It is these interests which underpin this paper and to which we turn now.

How do social practices change?

While it makes sense to see the choice and use of household lighting as a situated social practice, this does not immediately help us to understand how lighting design and use changes over time. Shove and Pantzar's (2005) study of Nordic walking (a form of speed walking using two specially designed sticks) is particularly helpful when trying to understand this process. This study illustrates how new social practices arise out of the integration of images, artefacts and forms of competence. In the case of the recent vogue for Nordic walking in Norway, this involves the integration of images of health and fitness with the production and advertising of specialised walking sticks (designed and marketed specifically for Nordic walking), and the availability of specialised training in Nordic walking. The success of the process depends crucially upon translating existing images of walking with sticks that are associated with infirmity, with a new image of walking with sticks as fun and healthy (ibid p. 48). From this point of view, when companies promote products, which suppose the parallel existence of meaningful social practice, in effect they promote the diffusion of the elements or ingredients out of which new practices emerge in a form of co-production.

Critically, the exporting of Nordic walking has largely failed in the UK, despite the availability of the sticks and training courses. Shove and Pantzar (attribute this not to technological failure, but rather to an inability to successfully translate British ideas of walking as a non-adrenalin recreation into a more Scandinavian, adrenalin focused

mode of walking more commonly described in the UK as trekking. Coupled with a British reserve and resistance to “looking silly”, Nordic walking faces an uphill battle for acceptability in the UK. This is not, they argue, a failure of technology transfer, but rather a failure to integrate new technologies and techniques of walking into existing practices. The challenge for those wishing to export Nordic walking is then not one of diffusion, but one of successful reinvention in diverse cultural settings.

Following this argument, we can conceptualise changes in household lighting practices as arising from the co-evolution of changing images of household lighting, the development of new household lighting appliances and the promotion of new lighting designs for homes. From this perspective, when those involved in the design and marketing of lighting promote particular lighting products and lighting schemes, they are in effect promoting particular styles of household lighting practices which are picked up and re-translated by consumers in their own homes, in turn reshaping the energy performance of domestic buildings.

To begin to explore this process the next section looks at the images and methods of household lighting promoted in the UK. This paper then presents the empirical research and explores whether these images and methods of household lighting are influencing the ways in which lighting appliances are used by the householders that took part in the study which underpins this paper.

The promotion of lighting practices

Picking up on the Scandinavia lighting aesthetic noted by Wilhite et al (1996), the lighting practices promoted in the UK and across Europe are a variant of the Norwegian approach to lighting living rooms using multiple appliances to create a

cosy homely atmosphere. For example, the “BBC Homes” website advises householders to light their living rooms with “*table lamps dotted around the outside edges of the room on shelves and tables, [claiming that] [t]hey'll radiate light inwards, making the room feel spacious yet cosy*”(BBC 2006).

The BBC echoes the international Swedish furniture IKEA’s marketing material which states that “*often a combination of different types of lamps is required to create a comfortable light*” and you should “*move the lamps about in the room; vary them, until you find a lighting scheme that is as functional as it is cosy and relaxing*”(IKEA 2006a) IKEA’s marketing material goes on to suggest “*mixing different kinds of light can create a cosy and welcoming atmosphere and encourage us to enjoy our homes more*” (IKEA 2006b). One of the two largest lighting manufactures in Europe OSRAM claims in its promotional material that “*[p]roper lighting is essential for creating a cosy atmosphere*” and that you can “*[m]ake your home that little bit cosier with OSRAM RELAX*” [a type of incandescent bulb] (OSRAM 2006).

The household lighting practices currently promoted widely in the British media extend the multi appliance approach to lighting beyond the living room to all areas of the home. In the UK’s best selling homes style magazine, ‘Ideal Home’ an article entitled ‘how to select lighting’ claims that “*to light every room successfully, you need to layer lighting by mixing pendants, wall lights and floor to table lights.....For atmosphere, go for table lamps with pale shades for a warm glow, or dark versions to direct pools of light down onto the table and a floor lamp for eye level lighting*” (Ideal Home 2006a, p.34). Other articles in this issue of ‘Ideal Homes’ advise readers, to “*light up your home*” with Tesco’s new range of designer lighting (Ideal Home 2006b,

p.19), and to “*use light to set the mood*” when creating a relaxing space (Ideal Home 2006b p.100).

Another UK homes style magazine ‘4 Homes’ advises on the importance of lighting in kitchens claiming “*pendant lights will look more relaxed and provide a cosy glow over the kitchen table; and for atmosphere and to give the units a feeling of depth at night- important in a narrow kitchen - lights can be fitted in glass-fronted units*”

(Brownlee 2006, p. 43). The “BBC Homes” website advises householders renovating their bathrooms to “[s]tud the ceiling with several low-voltage spotlights or downlighters, which wash the walls with light” (BBC 2006).

In a similar way that the success of Nordic walking depended crucially on translating the image of walking with sticks from that of infirmity to health and fun, the shift from light-bulbs as providing basic, task based visibility to ‘washing’ walls with light can be seen as an attempt to transform lighting practices with dramatic consequences for energy use.

Changing household lighting practices

In this section we explore whether the images and methods of household lighting discussed above are reflected in the lighting practices of the householders that took part in the research.

In line with the multi-appliance approach to lighting homes, all of the interviewees stated that they currently use more lighting fixtures and fittings in their home than in the past. Comments such as “*years ago we only had one light in the middle of the room [and] now we have at least three or four in each room*” and “*when I was a girl*

En 'lightening' Energy Use: the co-evolution of household lighting practices

we only had one light in the ceiling and maybe the odd lamp, I think we simply have more lights now” were common.

When respondents were asked why they choose to have more lighting in their current home than in the past, most said they had changed the way they light certain rooms in their home to create a “*better atmosphere*” and give them more “*flexibility*” to change lighting “*to create different moods*” and accentuate different parts of their home.

All but one of the interviewees said that the style, design and flexibility of their household lighting are now more important than they were in the past. The following comments are representative of interviewees’ statements about the changes in the importance of household lighting:

“years ago when we all had single lights we didn’t know any different, but I think now having adequate lighting of a suitable style to create the right ambiance is important, the look of lights is also important - you know if it fits into the décor of the room”[single male in his late fifties].

“I like to have flexibility in lighting to be able to dim the light by turning off the main lights and having lamps or I like minimal lighting in the ceiling using a dimmer switch, as you can see here in this room [the dining room] in the living room I have flexibility created by the different lamps I have in there” [female in her early thirties living in a five person household].

“I think the change from one light in rooms started years ago when we got a television and you needed a side light beside the television. Now I don’t like ceiling lighting, I like more side lighting, I find it calming. I don’t like light coming down on top of me.

I like the lighting arranged to show off different bits of the house and ornaments"

[female in her early sixties living in a two person household].

The interviewee claiming the lighting in his home had "*never been important to him*" lives with his wife and three young children. This interviewee went on to say that the lighting in his home is very important to his wife. He said his wife made all the decisions concerning lighting in their household and his only input was to comment if he disliked the lighting she purchased, in which case she would be sent to change the new light fitting for one he found more "*agreeable to use and look at*". This suggests that this interviewee did find some aspects of the design and style of his household lighting important.

Six of those interviewed said that they were unhappy with their current lighting in their living rooms and would like to install new light fixtures and fittings. Four of these respondents said that they planned to change their living room light fittings in the near future. When asked what kind of lighting they would like and where they got the idea for that particular style of lighting, it became evident that the lighting promoted by television programs and housing style magazines played a role in respondents' decision making. For example, when asked what style of lighting she was planning to have in her living room one interviewee replied "*I quite like the idea of track lighting but again it uses halogens and is not very energy efficient, but I have looked at those and thought I would love those. I would like to have little silver lines that you move your lights along, so that if you put a new picture up or something you can move the light to shine on it and it can create a lot of different moods without having to change your lighting*". When asked where she had seen this style of lighting the respondent replied "*it was in magazines and things like that mostly..... My*

mam buys home and garden magazines, I wouldn't know which one I saw the track lighting in, but we do look at them for ideas" [female in her early thirties living in a three person household].

Another interviewee when asked what kind of lighting she would like in her sitting room replied "*I think I would like some really nice, beautiful designer fancy lamps and touch wall lighting where you touch them and they come on*". When asked where she had seen the type of lighting she would like the respondent replied "*the wall touch lights I have only seen on the television, it was one of those renovation programmes where they get a designer in to do it all for them*" [female in her early forties living in a three person household]. Another of the respondents who was planning to change their living room lighting, when asked what kind of lighting she would have in an ideal world replied "*I need bright light as I get older, I would also like it to have some style [and] it is difficult to match bright light with style but you can get designers to help you with that kind of thing today, I have seen it on the TV, and in an ideal world I think that is what I would do*" [female in her late fifties living in a two person household].

The role played by the promotion of lighting design in shaping household lighting practices was also evident in interviews where respondents had stated that they had strong environmental concerns and tried to use environmental criteria in their lifestyles. It might be thought that in the case of household lighting, a person with the intention to follow strictly environmental criteria in their lifestyle would act in accordance with those principals by using CFLs - a readily available efficient lighting technology. However the two interviewees expressing the strongest environmental

concerns did not use energy efficient light bulbs throughout their homes but opted for multi-bulb halogen light fittings in many of their rooms.

One of the interviewees expressing strong environmental concerns (a female in her early thirties living in a two person household), in accordance with these concerns spent considerable amounts of time and money sourcing and buying energy efficient white appliances for her kitchen. She also recycled household waste and made sure her household appliances were switched off at the wall to avoid the energy used by standby. However, she had installed multi-bulb halogen light fittings, with standard halogen light bulbs, in her kitchen-diner and living room. When questioned on the issue she said *“I was fully aware when I bought them that halogen lights are not really environmentally friendly or ecologically sound, it was a specific style choice”*. Elsewhere in her home this interviewee had replaced standard incandescent bulbs with CFLs in accordance with her stated concerns for the environment. When asked why she had chosen to use multi bulb halogen lights in her kitchen-diner and living room she said *“my partner designs bathrooms and kitchens to be honest when I have gone to see finished jobs the right lighting is the finishing touch”*.

Another interviewee (in her late sixties living with her husband and adult daughter) also expressed strong environmental concerns. At the time of the interview she was in the process of sourcing alternative energy technologies for her second home. She also recycles household waste, uses environmentally friendly household cleaning products, and has a wood burning stove to supplement her heating and hot water needs. However, she had recently installed multiple recessed halogen light fittings in her two bathrooms, kitchen and main bedroom. When questioned about this choice of light fittings she said *“I know they use a lot of energy, but I need bright light now I am*

getting older and I like they way they look, they give a good effect”. In common with the interviewee discussed above this respondent had replaced standard incandescent bulbs with CFLs, in this case she had done so some eight to ten years ago. However, when renovating her home and replacing her kitchen and bathrooms some four or five years ago she had opted for multiple recessed halogen lights. When asked why she had chosen this particular style of lighting the interviewee replied “ *I think I was probably influenced by changing fashions, it’s old fashioned now to have single central lights and when I was choosing the new kitchen the lights were part of the package and I just took their advice. When we came to do the bathroom I decided to have them in there as well because I like them so much in the kitchen and so on”*.

The selection of multi-bulb halogen light fittings for their kitchens and bathrooms by the two interviewees discussed above were far from isolated. Most of those interviewed had either selected multi-bulb halogen lights for their kitchens and /or bathroom or said they would like to have multi-bulb halogen lights in at least one or the other. However, the replacement of standard incandescent bulbs for CFLs was more unusual. Only five of those interviewed, including the two environmentally aware respondents discussed above, used more than one or two CFLs in their home.

It is well known that “*[e]ven individuals who state the intention to follow strictly and frequently environmental criteria that form the foundational principles of their lifestyle will act against these intentions at certain times and under certain circumstances in some segments of their lifestyles”* (Spaargaren 2004, p.18).

However, it is surprising that respondents with strong environmental concerns and who act in accordance with these concerns in many aspects of their household energy consumption do not do so with lighting. Light bulbs are replaced frequently and

replacing standard household incandescent light bulbs with energy efficient light bulbs has a much shorter payback period than other environmentally friendly household purchases- such as replacing inefficient household white goods with more energy efficient ones. It is also relatively simple to do. However, the framing of apparently rational choices within wider lifestyle practices of home improvement and creation of mood and affect highlights the poverty of viewing lighting choices as simply a process of economic calculation.

Increasing energy consumption

The changing lighting practices of those who took part in the research clearly embrace a multi-appliance approach to household lighting. In this sense the research confirms the assessment of the DTI that increases in the energy to light homes is the result of the shift away from rooms lit by single ceiling bulbs towards multi-source lighting from wall and table lamps as well as multiceiling lights (DTI 2002). The findings presented here also correlate with earlier research (Boardman et al 2005, p. 56) which indicated that the uptake of energy efficient light-bulbs in the domestic sector is slow despite the considerable subsidisation of these light bulbs by the UK government.

More fundamentally, the evidence from the interviews also confirms that household lighting practices are inextricably interwoven with images of stylish, cosy and comfortable homes as portrayed by household lighting promoted in the home improvement and the lighting industries advertising media. Thus, the evidence from this research certainly illustrates how the promotion of household lighting design plays a considerable role in shaping the lighting practices of those that took part in the research.

Changing lighting practices and government policy

As discussed in the introduction, the main policy approach in the UK to reducing the energy consumed by household lighting has been subsidies for energy-efficient CFLs through the electricity industry (Boardman et al 2005, p.53). This approach is ineffectual as a standalone initiative, as it does not prevent consumers from returning to the use of energy intensive incandescent light bulbs at the end of the lifespan of subsidised CFLs (Palmer and Boardman 1999; Boardman et al 2005).

Therefore *“[t]he ultimate focus of any [government] strategy must be a move towards dedicated fixtures, so that the savings are certain and there can be no reversal to incandescent bulbs and higher consumption (Palmer and Boardman 1999, p.67).*

In the face of this critique the UK government has made some tentative steps to stimulate the market for energy efficient light fixtures and fittings. These include building regulations which set limits on the energy efficiency of lighting in domestic buildings. However, this is argued to be having a minimal impact as the lack of stylish dedicated energy efficient light fittings and fixtures is leading those who buy new houses to replace the energy efficient light fittings with standard light fittings using incandescent bulbs which they find more aesthetically pleasing (Building News 2005).

Government efforts to stimulate the market for dedicated energy efficient light fittings and fixtures also include a program called “DEEL” which seeks to rebate the cost of supplying energy efficient light bulbs with the sale of dedicated energy efficient lighting fixtures and fittings. There have also been efforts to stimulate the design of dedicated energy efficient light fittings and fixtures through design competitions. These include the UK Student Lighting Design Competitions involving the Energy

Saving Trust (EST) and the European Design Competition for dedicated luminaries.

However, these competitions have to become regular and known industry events to be effective and to date this is not the case (MTP 2006).

The UK Government's current approach of subsidising the market for dedicated energy efficient light fittings and fixtures is underpinned by the idea that if energy efficient lighting fixtures and fittings are readily available householders will use them. As illustrated by the slow uptake of numerous energy efficient household appliances including CFL's, this is rarely, if ever, the case. To significantly increase the use of energy efficient lighting in the domestic sector it will be necessary to introduce stringent regulations into lighting markets. Ideally these would ensure all light fittings and fixtures sold in the UK are dedicated energy efficient fixtures and fittings that use CFLs or other energy efficient light bulbs such as light emitting diodes (LEDs).

So far, so efficient. However, to reduce the amount of energy used in household lighting policy-makers have to address both the efficiency of household lighting and the increasing numbers of lighting appliances used in homes. For example, CFLs are four times more efficient than incandescent bulbs but the replacement of a single lighting appliance using an incandescent bulb with four or five lighting appliances using CFLs will counteract the amount of energy saved by switching to energy efficient lighting. This is a more complex policy problem as it involves persuading householders to change their lighting practices in ways which decrease the amount of energy they use to light their homes. Or in other words to simply use less electric lighting.

One seemingly obvious solution to the problem of how to reduce the amount of electric lighting used to light homes is to encourage the use of natural lighting. Here, as with electric lighting, the interior design industry plays a role in shaping way in which householders utilise natural light. Pale colours reflect light back into a room, while dark colours adsorb light. On a positive note, the UK home improvement and advertising media currently advocates pale colours for carpets and walls to make the best use of the natural light in a room⁷. However replacing the use of electric lighting with natural lighting is not as simple as painting walls cream and fitting new carpets and curtains. The problem is that the waste of energy by the use of electric lighting during the day is usually the result of poor building design and/or lack of windows (Jenkins and Muneer 2003, p.965)⁸. It must be noted that *“[t]he increased emphasis on energy efficiency as a result of global warming has unfortunately led to forms of building design and construction where there has been reduced daylighting in domestic buildings. With windows as the main source of heat loss from buildings there has been a tendency to reduce their size with some encouragement from national building regulations. In addition the replacement of single glazing by double or double low-e glazing has led to a reduction in transmitted daylight between 10-25% (Wilson and Brotas, 2001, p27).*

The discussion surrounding the use of natural day light in housing neatly illustrates how those involved in the design of domestic buildings, as well as those involved in the design and marketing of domestic lighting, shape household lighting practices.

This suggests a need for joined up thinking in the development of policies and

⁷ For example, dark coloured decoration is argued to devalue a home by almost ten thousand pounds (Property News 2006).

⁸ There are solutions which can be retrofitted to existing houses such as larger windows, or light pipes. However these solutions are prohibitively expensive and are not encouraged by the housing improvement media or the lighting industries advertising media.

initiatives designed to reduce household energy consumption. Recently there have been some moves in this direction at the European policy level. For example, the European Parliament adopted a directive on the eco-design of energy-using products, in April 2005, which aims at improving the environmental performance of products throughout their life-cycle by systematic integration of environmental aspects at the earliest stage of their design (European Commission 2005b). The problem with the eco-design directive is that most of its initiatives focus on improving the energy efficiency of the product and / or disposal of the product at the end of its life cycle with little attempt to understand the practices that shape energy use, which are an essential element of developing and marketing energy efficient products.

The work presented here has built on the findings of earlier research (Wilhite et al 1996) to further illustrate that lighting is intrinsically linked to cultural factors such as 'mood' and 'well-being' which need to be considered when designing and marketing energy efficient lighting. More significantly it has also demonstrated how lighting choices made by householders tend to co-evolve with the household lighting practices portrayed by the media. This indicates that the policies which seek to promote energy efficient household lighting must not simply seek to support the market for dedicated energy efficient household lighting fixtures and fittings; they must also enter into dialogue with those involved in the design, production and marketing of household lighting in order to identify the energy and carbon implications of new forms of lighting design. In this way, the support of lighting designers, manufacturers, advertisers, sales people should be enlisted to demonstrate that environmentally friendly lighting schemes using a reduced number of appliances can be stylish, or in other words sometimes less is more.

Final thoughts

It has been argued “*that when the social practice of inhabiting a house is taken as a starting point the possibilities for householders to green their consumption can be said to be determined to a large extent by the green alternatives made available*” (Spaargaren 2004, p.20). Our aim in this paper has not been to argue against further technological research on energy efficient lighting, or to abandon advice and subsidy based policy initiatives. We would argue though, that it is not only the green alternatives made available to consumers that determine the possibilities for householders to green their consumption, but also the way in which those alternatives are presented or marketed to consumers. Therefore, if the amount of energy used to light homes is to be reduced then new ‘sustainable’ forms of lighting practice need to be developed and promoted. This means looking beyond technologies and decision-making as two distinct realms of activity. Our research that focuses on lighting ‘*practices*’ offers what Warde suggests is a “*distinctive perspective, attending less to individual choices and more to collective development of modes of appropriate conduct in everyday life*” (Warde 2005, p 146).

References

- Aune, M. Thomas, B. and Sorensen, K. (2002) *Needs, Roles and Participation: A review of the social science studies of users in technological design*. A report within the research program Smart Energy-Efficient Buildings at NTNU and SINTEF 2002-2006 [online] [cited on May 20, 2006]. Available from the World Wide Web: http://www.ntnu.no/em/dokumenter/smartbygg_rapp/User-Needs_State-of-the-Art.pdf
- BBC (2006) *Lighting: Lighting living rooms*, [online] [cited on May 30, 2006]. Available from the World Wide Web: http://www.bbc.co.uk/homes/design/lighting_livingroom.shtml.
- Boardman, B. (1999) *Bringing lighting out of the policy darkness*, Proceedings of the European Council for an Energy-Efficient Economy, June 1999, [online] [cited on May 28, 2006]. Available from the World Wide Web: http://www.eci.ox.ac.uk/lowercf/pdfdownloads/ECEEE99_liBB.pdf
- Boardman, B. Darby, S. Killip, G., et al (2005) *40%House*, February, The Environmental Change Institute, University of Oxford, London, [online] [cited on June 1, 2006]. Available from the World Wide Web: <http://www.eci.ox.ac.uk/lowercf/40house.html#report>
- Brownlee, S. (1996) Gotta Have it: an envy-inducing kitchen, *4 Home*, June, pp. 42-47.
- Building News (2005) Building regulations present market opportunities, *Building News* August 24th, [online] [cited on May 20, 2006]. Available from the World Wide Web: <http://www.azobuild.com/news.asp?newsID=1436>
- CEETB (2005) *Comments of CEETB on the Green Paper on Energy Efficiency or Doing More With Less*. European Technical Contractors Committee for the Construction Industry, Brussels, [online] [cited on May 23, 2006]. Available from the World Wide Web: <http://www.ceetb.org/Position%20paper/Green%20paper%20on%20energy%20efficiency.pdf>
- Chappells, H. and Shove, E. (2005) Debating the future of comfort: environmental sustainability, energy consumption and the indoor environment, *Building Research and Information* Vol. 33, No. 1, pp. 32-40.
- DTI (2002) *Energy Consumption in the UK*, Department of Trade and Industry, London, [online] [cited on May 21, 2006]. Available from the World Wide Web: <http://www.dti.gov.uk/energy/statistics/publications/energy-consumption/page17658.html>
- European Commission (2005a) *Doing more with less: Green Paper on Energy Efficiency*, [online] [cited on May 28, 2006]. Available from the World Wide Web: http://ec.europa.eu/energy/efficiency/doc/2005_06_green_paper_book_en.pdf
- European Commission (2005b) *Press Release Commission welcomes the adoption of the directive for environmentally friendly design of energy-using products* [online] [cited November 2, 2006]. Available from the World Wide Web:

- <http://europa.eu/rapid/pressReleasesAction.do?reference=IP/05/427&format=HTML&aged=0&language=EN&guiLanguage=en>
- European Council (2003) Directive 2002/91/EC Of The European Parliament And Of The Council of 16 December 2002 On The Energy Performance Of Buildings, *Official Journal of the European Communities* Vol. 4 No. 2 [online] [cited on May 19, 2006]. Available from the World Wide Web:
http://europa.eu.int/eurllex/pri/en/oj/dat/2003/l_001/l_00120030104en00650071.pdf
- Fujii, H. and Lutzenhiser, L. (1992) Japanese residential air-conditioning: natural cooling and intelligent systems, *Energy and Buildings*, Vol. 18, Nos. 3-4, pp. 221-233.
- Guy, S. (2004) Consumption, Energy, and the Environment, *Encyclopaedia of Energy* Vol.1, pp. 687-695.
- Hand, M. Shove, E. and Southerton, D. (2005) Explaining showering: A discussion of the material, conventional, and temporal dimensions of practice, *Sociological Research Online*, Vol. 10, No. 2.
- Ideal Home (1996a) How to light up your home, *Ideal Home*, Vol. 171, No. 4, p.34.
- Ideal Home (1996b) Light up your home, *Ideal Home*, Vol. 171, No. 4, p.19.
- Ideal Home (1996c) Create a Room for Relaxing, *Ideal Home*, Vol. 171, No. 4, p.100.
- IKEA (2006a) *Lighting*, [online] [cited on June 1, 2006]. Available from the World Wide Web:
http://www.ikea.com/webapp/wcs/stores/servlet/CategoryDisplay?storeId=7&langId=-20&catalogId=10103&cattype=top&identifier=00015_irwtree003
- IKEA (2006b) *Furnish with light*, [online] [cited on June 1, 2006]. Available from the World Wide Web:
http://www.ikea.com/ms/en_GB/furnish_with_light/fwl_start/index.html
- Jenkins, D. and Muneer, T (2003) Modelling light-pipe performances--a natural daylighting solution, *Building and Environment* Vol. 38 No.7, pp. 965-972.
- Lutzenhiser, L. (1993) Social and behavioural aspects of energy use, *Annual Review of Energy and Environment*, Vol.18, pp. 247-289.
- Lutzenhiser, L. (1992) A cultural model of household energy consumption, *Energy* Vol. 17, No.1, pp. 47-60.
- Mills, E. (1993) Efficient lighting programs in Europe: Cost effectiveness, consumer response, and market dynamics, *Energy*, Vol. 18, No.2
- Mills, E. (2002). *The \$230-billion Global Lighting Energy Bill*. Proceedings of the Fifth European Conference on Energy-Efficient Lighting, International Association for Energy-Efficient Lighting,, Nice, France, [online] [cited on May 20, 2006]. Available from the World Wide Web:
http://eetd.lbl.gov/emills/PUBS/Global_Lighting_Energy.html
- MTP (2006) *Policy Brief: Domestic Lighting: UK Energy Consumption of Domestic Lighting*, Market Transformation Program, [online] [cited on May 20, 2006]. Available from the World Wide Web:
<http://www.mtprog.com/PolicyBriefs/Stage1.aspx?intPolicyBriefID=500012&strPolicyBriefTitle=UK%20Energy%20Consumption%20of%20Domestic%20Lighting>

- Ofgem/EST (2003) *A review of the Energy Efficiency Standards of Performance, 1994-2002*, A joint report by Ofgem and the Energy Saving Trust, July, London.
- OSRAM (2006) *See the world in a new light: OSRAM RELAX for an atmospheric lighting mood*, [online] [cited on May 20, 2006]. Available from the World Wide Web:
http://www.osram.com/products/general/incandescent/active_relax/relax.html
- Palmer, J. and Boardman, B. (1999) *DElight: domestic efficient lighting, Energy and Environment Programme*, Environmental Change Unit, University of Oxford, [online] [cited on May 20, 2006]. Available from the World Wide Web:
<http://www.eci.ox.ac.uk/lowercf/pdfdownloads/DElightreport.pdf>
- Patton, M. Q. (1990). *Qualitative evaluation and research methods* (2nd ed.). Newbury Park, CA: Sage.
- Poortinga, W. Steg, L. and Vlek, C. (2004) Values, Environmental Concern, and Environmental Behaviour: A Study into Household Energy Use, *Environment and Behaviour* Vol. 36 No. 1, pp. 70-93.
- Property News (2006) *Home improvements that will loose you money*, 19 June [online] [cited on November 3, 2006]. Available
[http://www.aboutproperty.co.uk/news/home-improvement/home-improvement-tips/home-improvements-that-will-lose-you-money-\\$442821.htm](http://www.aboutproperty.co.uk/news/home-improvement/home-improvement-tips/home-improvements-that-will-lose-you-money-$442821.htm)
- Shove, E. (2004) Efficiency and consumption: Technology and practice, *Energy and Environment*, Vol. 15, No.6, pp. 1053-1065.
- Shove, E. and Wichita, H. (1999), *Energy policy: what it forgot and what it might yet recognise*, Proceedings of the European Council for an Energy-Efficient Economy, [online] [cited on June 1, 2006]. Available from the World Wide Web http://www.ecee.org/library_links/proceedings/1999/pdf99/Panel1/1-16.pdf
- Shove, E. and Pantzar, M. (2005) Consumers, Producers and Practices: Understanding the invention and reinvention of Nordic walking, *Journal of Consumer Culture* Vol. 5, No.1, pp. 43-64.
- Shove, E., Lutzenhiser, L., Guy, S., Hackett, B., and Wichita, H. (1998) Energy and Social Systems, in Rayner, S. and Malone, E. (Eds): *Human Choice and Climate Change: Resources and Technology*, Vol. 2, Battelle Press, Columbus Ohio, pp. 291 - 325.
- Spaargaren, G. (2004) Sustainable consumption: a theoretical and environmental policy perspective, in Southerton, D. Chappells, H. and Van Vliet, B. (Eds): *Sustainable consumption: the implications of changing infrastructures of provision*, Edward Elgar, Cheltenham, UK, pp. 15-31.
- Strang, V. (1997) *Contextualising Values and Behaviour*, Proceedings of the European Council for an Energy-Efficient Economy, [online] [cited on May 20, 2006]. Available from the World Wide Web:
http://www.eci.ox.ac.uk/lowercf/pdfdownloads/ECEEE97_VS.pdf
- Warde, A (2004) *Theories of Practice as an Approach to Consumption*, Cultures of Consumption programme (Working Paper 6), [online] [cited on May 20, 2006]. Available from the World Wide Web:

http://www.consume.bbk.ac.uk/working_papers/Warde%20work%20paper%201.doc

- Warde, A. (2005) Consumption and Theories of Practice, *Journal of Consumer Culture*, Vol. 5, No.2, pp. 131-153.
- Weber, L. (1997) Some reflections on barriers to the efficient use of energy, *Energy Policy*, Vol. 25, No.10, pp. 833-835.
- Wilhite, H. (2001) *What can energy efficiency policy learn from thinking about sex*, Proceedings of the European Council for an Energy-Efficient Economy, ADEME, France, [online] [cited on May 30, 2006]. Available from the World Wide Web:
http://www.eceee.org/library_links/proceedings/2001/abstract/Panel2/01p2_2_052.lasso
- Wilhite, H. Nakagami, H. Masuda, T. et al (1996) A cross-cultural analysis of household energy use behaviour in Japan and Norway, *Energy Policy*, Vol. 24, No. 9, pp. 795-803.
- Wilk, R. (2002) Consumption, human needs, and global environmental change. *Global Environmental Change*, Vol. 12, No.1, pp. 5-13.
- Wilson M. P and Brotas, L (2001) *Daylight and Domestic Buildings*, XI th national conference on lighting Bulgaria 13 – 15 June 2001 Light, pp. 27-32[online] [cited on November 1, 2006]. Available from the World Wide Web:
http://www.learn.londonmet.ac.uk/about/doc/brotas_bulgaria2001.pdf