Undisciplined! Proceedings of the Design Research Society Conference 2008.
Sheffield, UK. July 2008

Persuasive Engagement:

Exploiting lifestyle as a driving force to promote energy-aware use patterns and behaviours.

Loove Broms, Interactive Institute - Power, Eskilstuna, Sweden

Magnus Bång, Interactive Institute - Power, Eskilstuna, Sweden

Sara Ilstedt Hjelm, Royal Institute of Technology – Engineering Design, Stockholm, Sweden

Abstract

Electricity consumption has been rising significantly in the western world the last decades and this has affected the environment negatively. Efficient use and more energy conservative usage patterns could be ways to approach this problem. However, electricity has for a long time actively been hidden away and it is rarely thought of unless it ceases to exist. From the perspective of critical design, we have been working to find methods to visualise electricity and electricity consumption in everyday life to promote environmentally positive behavioural change. In this paper, we are looking at how aspects of lifestyles can be used in design as central driving forces that could lead to changed behaviour. Attempts to promote behavioural changes related to energy consumption might be successfully carried out when people are offered desirable alternatives that are engaging and that do not impose a perceived extra burden in their everyday life. This argument is exemplified through two design concepts, the AWARE Laundry Lamp and the Energy Plant, which are examples on how to increase people's energy awareness and offer them means for reducing their energy consumption in the home. Both prototypes are inspired by current trends in lifestyle as well as actual observed user behaviour.

Keywords:

Interaction Design; Sustainable Design; Energy; Lifestyle; Persuasive Design.

It is widely acknowledged today that technical solutions alone will not solve environmental problems like energy provision and global warming. Behavioural and societal changes are also required to approach these pressing problems. For example, studies have shown that electricity consumption can be reduced about 20-30% by changing daily routines in the home (Carlsson-Kanyama & Lindén, 2002). However, a problem still is that most people do not think about these issues; they do seldom switch of the light when leaving a room and do not choose the more environmental friendly alternative when shopping. One possible reason why people are not particularly engaged in environmental-friendly behaviours could be that they perceive extra burdens and choices negatively. Moreover, in the midst of activities – when they use a tool – people are not always aware of that their actions can have environmental side effects. It seems that green alternatives

and behaviours are pushed down the list of priorities and impose bad conscience and stress. It is therefore highly desirable to find new design approaches that promote positive behavioural changes and methods that change people's views. For example, by moving environmental decisions away from mundane tasks into actions associated with positive values central to the consumer.

This paper provides an alternative viewpoint on sustainable design that departs from the traditional life-cycle thinking. We explore alternative design strategies that combine persuasive design (Fogg, 2003) with a lifestyle approach and user-centred design. This gives rise to a tension since persuasive design aims to motivate users to change behaviours and user centred design aims to follow existent behaviours and norms. The aim of the paper is to contribute to knowledge in methods for sustainable design in a critical design tradition. The idea behind critical design (Dunne & Raby, 2001) is to provoke discussion and reflection on a topic rather than to achieve utility and mass production. For example, a picture of a design object that is published in media can foster debate about an issue in the same way as an article in a newspaper.

Frayling describes three fields of design (or artistic) research; *research about design* studies design products and processes from an outside perspective; *research for design* develops methods and tools to improve design work and *research through design* is about exploring problems and developing solutions about how the future could be improved by means of creating artefacts. Our work should primarily be regarded as research through design to envisage attractive and innovative concepts that could change mental images, serve as living examples in debate, future research and education. This type of research is clearly needed to provide alternative designs that, due to lack of time and resources, might not be considered in commercial design work.

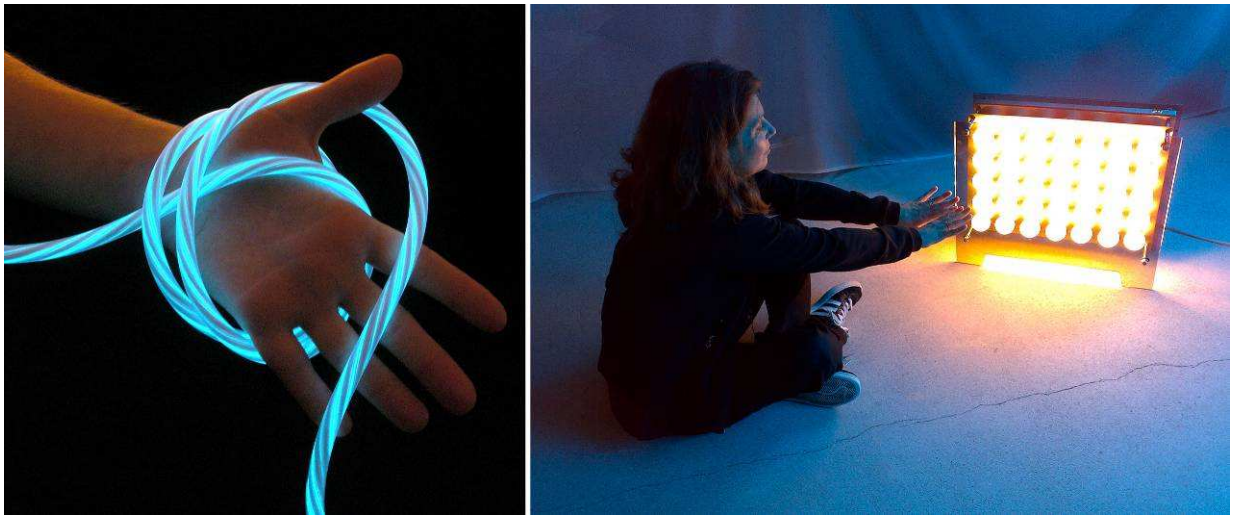

Fig. 1. The Power-Aware Cord and the Element visualizing energy in the Static! project.

In our previous work we have developed a series of objects working with energy as a design material with the goal of making electricity more visible (Backlund, Gyllenswärd, Gustafsson, Mazé, Redström, & Ilstedt Hjelm, 2006). Everyday behaviour is filled with habits, norms and unconscious choices and

to raise awareness of these habitual behaviours we need to make them less familiar and automatic. One way of achieving this is to add something new, strange and odd to everyday objects. In this project, everyday objects were reinterpreted in order to communicate energy consumption through artefact-use and aesthetics. For example, the Power-Aware Cord is a re-designed electrical power strip in which the cord is designed to visualize the energy rather than hiding it (Fig. 1). The use of electricity is represented through glowing pulses, flow, and intensity of light emitting from the cord. Expressing the presence of energy through light can inspire people to explore and reflect upon the energy consumption of electrical devices in their home. Another example is "The Element", an electric radiator consisting of 35 light bulbs of 60 watt, each designed to deliver heat equivalent of 2100 watts (Fig. 1). The fact that a bulb provides 95 percent heat and about five percent light is something most of us know on an abstract level but might not grasp fully. Thus, this radiator makes us realise these physical laws in a direct and practical way.

As we have said, redesigning objects into polemic prototypes can be an efficient tool for raising questions about everyday energy use. Hence, they can also be used to raise interesting questions that can propagate to the general public through media and exhibitions. The general awareness of energy consumption in relation to the environment is thus hopefully increased even though it is difficult to measure. On the other hand, several studies show that awareness and knowledge do not necessarily result in consistent behavioural changes (Abrahmse, Steg, Vlek, & Rothengatter, 2005)Therefore, it could be interesting to study aspects that motivate people to change their behaviours and habits and incorporate these into design of objects to foster positive change.

In this paper, we discuss how designers can move environmental decisions and actions partly away from the everyday mundane tasks of the users into actions associated with more positive values. Our goal was twofold, to raise awareness of energy consumption and to gently afford the user to change behaviour by adding on to already existing lifestyles and behaviour. We present two examples where we applied lifestyle thinking in the design phase. The Energy Plant is an example on how one can visualize the electricity use of a household in a way that is easy to understand and interact with. The AWARE Laundry Lamp is a design concept that associates with current trends in home decoration as well as offering an exciting alternative to tumble drying. The overall goal of these designs was that they should be desired and used voluntary and also promote energy conservative actions. Moreover, a considerable effort was put into offering attractive solutions instead of penalizing unwanted behaviour. First, we provide an introduction to lifestyle and persuasive research and discuss the methods used in the project. Second, we present our designs in greater detail and, at the reminder of the paper, we discuss how lifestyles that are associated with energy saving can be used as a tool for gentle persuasion.

Lifestyles and persuasive design

It is well known that sustainable products and services must be regarded as a part of our total consumption behaviour. Researchers have suggested that, in order to be successful in the design of sustainable products and services, we

must also look into social processes such as fashion, identity and identity construction (Dobers & Strannegård, 2005). Thus, a successful design approach could be to match products and services to peoples' *lifestyles* and activities. Lifestyle is a conception used within sociology and marketing, which includes constructs like identity, social relations and consuming behaviours (Chaney, 1996). Moreover, lifestyle also reflects an individual's values, attitudes and philosophy of life. Within business economics lifestyle implies the way people live and spend their time and money, controlled by demographic, economic and social factors. Lifestyle can also be interpreted as an ever-changing construction helping people to interact with the surrounding world. Different lifestyles are often defined by the scope in which they are to be used (Carlsson-Kanyama & Lindén, 2002). For example one can say that a certain person has a lifestyle associated with a certain sport, music or brand but there are also lifestyles related to the scope of the household, for example, a family oriented lifestyle.

In human-computer interaction there has been a discussion about how the design of products can lead to behavioural change. Norman, for example, argues that artefacts *suggest* actions through their form (Norman, 1990).He argues that design is a way to direct actions, for example, a handle can be designed to show users where to put their hands etc. The car-industry has for a long time used self-explanatory designs like natural mappings and different forms of constraints and reinforcements. Fogg argues that technology constantly influences our behaviours and that we need to be more aware of this in the design practise as well as when we use artefacts and services (Fogg, 2003). Moreover, objects and services could have a narrative so engaging that the user feel urged to change behaviour in order to actively participate in its use. The appearance of the artefact could focus on enhancing this story, providing clear visual information that is easy to grasp and interact with. Naturally, it can be seen as somewhat provoking that we are exposed to this kind of *persuasion* all the time – both deliberately and not. Nevertheless, according to the above-discussed viewpoints, behaviours and whole action systems can be pre-programmed and embedded in the designed objects.

It is more probable that an individual acquires and uses an object or service if it also communicates values associated with an aspired way of living. We believe that a fruitful strategy for behaviour change could be to draw on person's lifestyle behaviours and provide alternative "directions" within the already established system of activities. Thus, the interest required to use and acquire an object may come from a life style choice but the object also has an "embedded" energy saving agenda. In this paper we present two design examples where we have focused on utilizing energy use over time. Additionally, inviting the user to actively participate and shape the narrative of the artefact results in an ever-changing and interesting dynamic object.

Contextual studies and concept development

In the AWARE project, we investigated energy saving concepts associated with lifestyles and trends. Nine in-depth situated interviews (Lundell, Ilstedt Hjelm, & Moen, 2007) with different types of households were made. The goal of these sessions was to gain a wider understanding of economical behaviour and motivation in relation to lifestyle and identity and use this knowledge as

inspiration in the design of alternative artefacts. We decided to make deep interviews with a small set of informants.

The questions revolved around three main themes: the home as the material framing and context for everyday actions; the second theme was savings and energy efficiency - what were the driving forces for saving and how to enable a more sustainable behaviour. The last queries involved the electricity consumption. Additional data collection was made at the households in terms of note-taking and photographing key artefacts associated with energy provision and use.

The subsequent design process comprised a mixture of rational analyses and intuitive selection based on the facts, observations and trends that we collected. In a design research process knowledge and experience need to be seen in larger contexts; situations and physical events. Visits in the private home, dialogue notes, and photos we collected had similar importance in the analyses as the transcribed interviews – the results spans broadly from generalised conclusions to contextualised observations on individual behaviours and values. Another way of studying lifestyles was done by surveying magazines and newspapers. Instead of focusing on a specific lifestyle, trying to force energy conservative actions on that specific group, we attempted to look at several lifestyles simultaneously and map out the key driving forces behind them. Subsequently, these driving forces were used to create new concepts with energy conservative actions as the overall goal. For example, we know that people hang the laundry in their homes, on basins and over chairs, but the designer had to see this on site to sense the possibilities for a new design concept. Laundry-to-dry was associated with interior trends, "do it yourself", lifestyle, contemporary culture, environmental awareness and formed all together a pattern of metaphors and associative threads. This was the starting point for one of the concepts; The AWARE Laundry Lamp.

Lifestyle-inspired designs

The Energy Plant

The Energy Plant is an ambient transparent LCD-display that shows the electricity consumption of the household in the form of a growing plant (Fig. 2). The device is connected wirelessly to the domestic electricity meter. Each month, a new type of digital seed is "planted" and starts to grow on the screen. Modest electricity consumption result in a thriving fast growing plant and heavy consumption makes the plant wither and this is shown on the transparent screen. The idea is that the display can be placed in a window like an ordinary plant or elsewhere. The inspiration for the design was taken from two existing lifestyles; *gardening* - the fascination of making real plants grow, and the *gaming* lifestyle where one, for example, is trying to enhance online characters in a game. Taking care of the Energy Plant means thinking about your electricity consumption while enjoying the reward to see the plant grow.

The transparent display of the energy plant serves several purposes. During sunny days it can cast a shadow of the plant that wanders through the room

drawing attention back to the display and its message. It also serves the purpose of enhancing the information shown on the display instead of the display itself. The inverted shape of the pot together with the information shown on the display conveys the story of the growing plant.

Fig. 2. The Energy Plant. Top left to right: The plant is growing as the month progress. Bottom left and middle: High electricity use causes the plant to wither. Bottom right: Browsing through previous months' plants.

The Energy Plant has only two buttons located on its front; an info button and a history button. The info button toggles additional information on and off for those who want to take a closer look at the rate of their consumption. When enabled this feature shows your current electricity consumption in kilowatts (kW) and the overall consumption for this month in kilowatt hours (kWh). The history button allows you to go back one month, and a plant, at a time. In this way, previous months results are always kept and can be viewed whenever desired. If the info button is activated one can also compare the overall electricity usage of the different months and the outcome that results in a specific plant.

The Energy Plant is an attempt to break away from the traditional screen-based type of interaction in the context of energy metering – it is an ambient display that provides information with little effort from the user. A quick glance at it should be enough to tell if the home-consumption is low or high and it should also give a hint on consumption figures previous days. Moreover, it can be said to be an attempt to move away from the general PC to small specific computational devices (Weiser, 1991) in an effort to make it more understandable and usable for the consumer.

The idea behind using a seed metaphor and planting it every month serves several ends. First is the aforementioned idea of starting with a seed and seeing it grow. The users' electricity behaviours alter the way the plants grow much as a real plant is affected by the amount of water it gets. Moreover, starting with a new seed every month creates curiosity about what is about to come and a chance to start over in case last month's plant didn't turn out as

desired. The user can never be sure what kind of plant that will come out of a certain seed. The seed could, for example, be distributed from the energy company and communicated through the invoice and also shared between the consumers.

AWARE Laundry Lamp

The AWARE Laundry Lamp is a combined drying rack and a lamp (Fig 3). It affords people an easy and attractive way of hang-drying clothes in the flat instead of using a tumble dryer. The laundry lamp is inspired from two existing lifestyles; the trend for *individual decoration and design* of everyday objects and *hang drying of clothes* in the homes and the positive values associated with that activity.

Tumble dryers are one of the greatest consumers of electricity at home. Increasing standards in cleanliness of clothes has turned the washing machine and tumble dryer to constant partners in our daily lives. According to the Swedish Energy Agency a tumble dryer uses 1 kWh/kg laundry and an average household uses about 1000 kWh on a year on laundry. To tumble dry the clothes consumes about three times as much energy as it takes to wash them. Tumble dryers are fast and comfortable to use, but sometimes we do not use them, e.g., when the clothes are sensitive and shrink in the dryer, or the laundry room is too far away or is booked by other tenants.

In our field study we saw several examples of exactly this; for example, on individual had a laundry hanger full of white clothes in his living room and others had hangers full of baby clothes. Hence, hang-drying clothes in the apartment are an everyday behaviour, not always caused by energy saving intentions. But laundry hangers are considered awkward and bulky and fit better in a laundry room than in the living room. Many people choose therefore to hang clothes to dry on things that are at hand like chairs and doors etc. Aware laundry lamp is designed to inspire and facilitate for people to hang-dry laundry in their home. Laundry is part of our domestic routine and there is no reason why it should not be better integrated in interior design of the home. The aesthetics qualities of the laundry itself could be used and hang-drying become a creative activity.

Fig. 3. AWARE Laundry Lamp

We were also inspired by the recent trend of decorating our homes and the abundance of do-it-yourself programs on TV. The user can take an active and creative role in changing the appearance of the object by decorating and displaying different kind of laundry. The action of hang drying your clothes, continuously changing the style and mood of the Laundry Lamp, helps differentiate and modify the overall expression. The Laundry Lamp is engaging the user in an ever-continuing design process that makes it interesting also over time. The changing expressions of the lamp become the story that is told by the user.

Switching on the lamp helps drying the clothes faster as well as adding ambience to the room. Through this feature, this design can be said to discuss the fact that only five percent of the electricity used in a traditional light bulb transfers to light. Hence, making an environmentally friendly alternative that incorporates positive values from different lifestyles could make the AWARE Laundry Lamp something desired to be owned and thus used and promote changed behaviours in a direct way. Facilitating hang drying of clothes would also save energy, make dry house air damper, and be milder to the clothes.

AWARE Laundry Lamp is also an interesting design example from a technological standpoint despite the fact that the presence of modern technology is completely nonexistent in this object. Made out of metal tubes, cable, an electric cord, a lamp socket and a lamp, it is a physical

manifestation that modern energy conservation does not necessarily have to involve new technology. The focus is on offering new use patterns trough design instead of reinforcing the same patterns with more efficient technology. Energy efficient appliances do not necessarily result in lower energy use on a larger scale (society). People instead tend to use them more often resulting in a rebound effect with higher electricity use as a result (Abrahmse, Steg, Vlek, & Rothengatter, 2005).

Conclusion

Our work is devoted to make energy consumption more apparent in everyday life with the goal of promoting behaviour change towards more efficient consumption patterns. This paper suggested an approach to include lifestyle thinking into design practice. Positive behaviour change is difficult to achieve and even motivated people that have knowledge about these issues do seldom change their energy usage patterns. Providing attractive alternatives and designs that set out a path towards a sustainable way of living is one way to do this. In this paper, we have argued that designers can employ lifestyle analysis and make use of already established behavioural patterns in a lifestyle to gently persuade people to change behaviours. The idea was to offer desirable and usable objects within a lifestyle and also encourage efficient behaviours trough their form. We exemplified our approach in two designs; the Energy Plant and AWARE Laundry Lamp. These designs are still on an early stage and we need to evaluate and test them further to see if they have the intended impact.

The AWARE laundry lamp was launched in 2007 and has figured extensively in media and at exhibitions worldwide. Thus, it has fulfilled one of our aims; to act as a materialized discussion and placeholder. Nevertheless, a sustainable future needs to be seen as an attractive and desirable path and not another burden on everyday life. Designers have here an important role to play and design research would benefit to investigate these issues in greater detail.

References

Abrahmse, W., Steg, L., Vlek, C., & Rothengatter, T. (2005). A review of intervention studies aimed at household energy conservation. *Journal of Environmental Psychology 25* , 273-291.

Backlund, S., Gyllenswärd, M., Gustafsson, A., Mazé, R., Redström, J., & Ilstedt Hjelm, S. (2006). STATIC! The Aesthetics of Energy in Everyday Things. *Wonderground, Design Research Society International Conference.* Lisbon, Portugal.

Carlsson-Kanyama, A., & Lindén, A.-L. (2002). *Hushållens energianvändning, Väredringar, beteenden, livsstilar och teknik – en litteraturöversikt.* Stockholm: FMS.

Chaney, D. (1996). *Lifetyles.* London: Routledge.

Dobers, P., & Strannegård, L. (2005). Design, Lifestyles and Sustainability. Aesthetic Consumption in a World of Abundance. *Business Strategy and the Environment 14* , 324–336.

Dunne, A., & Raby, F. (2001). *Design Noir: The Secret Life of Electronic Objects.* Birkhäuser Basel.

Fogg, B. (2003). *Persuasive Technology, Using Computers to Change What People Think and Do.* San Francisc: Morgan Kaufman Publishers.

Frayling, C. (1993). *Research in art and design.* London: Royal College of Art.

Lundell, E., Ilstedt Hjelm, S. & Moen, J. (2007). *AWARE Design för energimedvetenhet, Fältstudierapport, Om energianvändning och uppfattningar kring elektricitet och konsumtion.* Eskilstuna: Interactive Institute.

Norman, D. (1990). *The Design of Everyday Things.* Doubleday Business.

Weiser, M. (1991, September). The Computer for the Twenty-First Century. *Scientific American* , pp. 94-10.

Loove Broms

Loove Broms is a PhD student at the Interactive Institute and at Linköping University, Sweden. He has been working as a product and interaction designer since 2005. He was one of the makers behind the interactive light installation *Colour by Numbers* that was shown publically in Stockholm in 2006-2007.

Magnus Bång

Magnus Bång is research manager at the Power Studio at the Interactive Institute in Eskilstuna, Sweden. He is working within the research areas of interaction design and persuasive computing. He received a PhD in computer science from Linköping University in 2004.

Sara IlstedtHjelm

Sara IlstedtHjelm is professor in product and service design at the Royal Institute of Technology in Stockholm. She has previously worked as a senior researcher at the Interactive Institute and SVID where she was director of research and education. She has a PhD in Human-Computer interaction and an MFA in Industrial Design.